SLR-EP – 245

Seat No.	

Set **P**

S.E. (Part – I) (Electrical) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 13-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Use*** *of calculator is* ***allowed****.*
4) *Figures to the* ***right*** *indicate* ***full*** *marks.*
5) *Attempt* ***any three*** *questions from* ***each*** *Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) The general solution of $(D^2 - 7D + 12)y = e^{2x}$ is

a) $c_1e^{3x} + c_2e^{4x} + \frac{e^{2x}}{2}$ b) $c_1e^{-3x} + c_2e^{-4x} + \frac{e^{2x}}{2}$

c) $(c_1 + c_2x)e^{3x} + e^{4x}$ d) $c_1e^{3x} + c_2e^{4x} + e^{x}$

2) $\frac{1}{D^2+4}\sin 2x =$

a) $\frac{x}{4}\cos 2x$ b) $\frac{x}{4}\sin 2x$ c) $\frac{-x}{4}\cos 2x$ d) $\frac{\sin 2x}{8}$

3) The solution of $px + qy = z$ is

a) $\phi(xy, x + y) = 0$ b) $\phi(x + y, x - y) = 0$

c) $\phi\left(\frac{x}{y}, \frac{y}{z}\right) = 0$ d) $\phi(xy, yz) = 0$

4) The solution of $p^2 - q^2 = 1$ is

a) $z = ax + \sqrt{a^2+1}\ y + c$ b) $z = ax + (a^2 - 1)y + c$

c) $z = ax + \sqrt{a^2-1}\ y + c$ d) $z = ax + (a^2 + 1)y + c$

P.T.O.

5) If z {f(k)} = F(z) then z{f(k + n)} =
   a) z^{-n} F(z) b) z^{n}F(z)
   c) nF(z) d) kF(z)

6) For |z| > 1, z {1} =
   a) $\frac{1}{z-1}$ b) $\frac{1}{z}$ c) $\frac{z}{z+1}$ d) $\frac{z}{z-1}$

7) For |z| > a, $z^{-1}\left\{\frac{1}{z-a}\right\}$ =
   a) a^{k}, $k \geq 1$ b) a^{k-1}, $k \geq 1$ c) a^{k-2}, $k \geq 1$ d) a^{k+1}, $k \geq 1$

8) If $\bar{r} = xi + yj + zk$ and $\bar{a} = \frac{\bar{r}}{3}$ then div $(\bar{a})$ =
   a) 0 b) 1 c) – 1 d) 2

9) Which of the following is not true ?
   a) $\nabla\phi$ is a vector quantity b) $\nabla \cdot \bar{v}$ is a scalar quantity
   c) $\nabla \times \bar{v}$ is a scalar quantity d) $\nabla \cdot \nabla\phi = \nabla^{2}\phi$

10) If $\phi = x^2 + y + z$ then at (1, 1, 1), grad ϕ =
   a) i + j + k b) 2i + j + k c) i + 2j + k d) i + j + 2k

11) The conditions for expansion of a function in a Fourier series are known as _____ conditions.
   a) Harmonic b) Riemann c) Periodic d) Dirichlet's

12) The half range sine series of 1 in the interval (0, π) is
   a) $\frac{4}{\pi}\left\{\sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \ldots\right\}$ b) $\frac{4}{\pi}\left\{\sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \ldots\right\}$
   c) $\frac{4}{\pi}\left\{\frac{\sin 2x}{2} - \frac{\sin 4x}{4} + \frac{\sin 6x}{6} + \ldots\right\}$ d) $\frac{4}{\pi}\left\{\frac{\sin 2x}{2} - \frac{\sin 4x}{4} + \frac{\sin 6x}{6} - \ldots\right\}$

13) If $L\{f(t)\} = \frac{1}{s}e^{-1/s}$ then L{f(3t)} =
   a) $\frac{1}{3}e^{\frac{-3}{s}}$ b) $\frac{1}{3}e^{\frac{-s}{3}}$ c) $\frac{1}{3s}e^{\frac{-3}{s}}$ d) $\frac{1}{s}e^{\frac{-3}{s}}$

14) $L^{-1}\left\{\frac{1}{(s+2)^{2}}\right\}$ =
   a) $e^{-2t}.t$ b) $\frac{e^{-2t}}{t}$ c) $e^{2t}.t$ d) $\frac{t}{4}$

SLR-EP – 245

Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 13-12-2016 Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) **Use** of calculator is allowed.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Solve $(D^3 - 3D^2 + 3D - 1)y = xe^x + e^x$. **3**

   b) Solve $p^2 - pq = 1 - z^2$. **3**

   c) Find $z\{(k + 1)a^k\}$, $k \geq 0$. **3**

3. a) Solve $(D^2 + D)y = x^2 + 4$. **3**

   b) Solve $p^2x^2 + q^2y^2 = z^2$. **3**

   c) Find $z^{-1}\left\{\frac{z}{(z-1)(z-2)}\right\}, |z| > 2$. **3**

4. a) Solve : $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x^2$. **3**

   b) Solve $py = 2xy + \log q$. **3**

   c) Find $z\left\{\frac{\alpha^k}{k}\right\}, k \geq 1$. **3**

5. a) Solve $(x + 1)^2\frac{d^2y}{dx^2} + (x + 1)\frac{dy}{dx} + y = 2 \sin \log (1 + x)$. **3**

   b) Solve $(5z - 7y)p + (7x - 3z)q = 3y - 5x$. **3**

   c) Find $z\left\{\cos\left(\frac{k\pi}{3} + \alpha\right)\right\}, k \geq 0$. **4**

OR

   c) An electric circuit consists of an inductance L, a condenser of capacity C and e.m.f. $E = E_0 \cos \omega t$ so that the charge Q satisfies the differential equation.

   $$\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{E_0}{L}\cos \omega t$$

   If $\omega^2 = \frac{1}{LC}$, find the charge Q at time t. **4**

Set P

SECTION – II

6. Attempt **any three** : **9**

a) Find the angle between the curves x = t, y = t^2, z = t^3 and x = t^2, z = t^4 at t = 1.

b) Find the directional derivative of $\phi = x^2yz^2$ at (1, 1, – 1) along the curve x = e^{-t}, y = 2 sint + 1, z = t – cost at t = 0.

c) Prove that $\nabla(r^n \cdot \bar{r}) = (n+3)r^n$.

d) Show that the velocity given by $\bar{v} = (y+z)i + (z+x)j + (x+y)k$ is irrotational and find its scalar potential.

7. a) Find $L^{-1}\left\{\frac{s+29}{(s+4)(s^2+9)}\right\}$. **3**

b) Find the Laplace transform of $\int_0^t e^{-3u}$ sin 4u du. **3**

c) Using Laplace transform solve (D^2 – 2D + 2) x = 0, given that x(0) = 1, x′ (0) = 1. **3**

8. a) Find Fourier series of f(x) = x sin x in (– π, π). Hence deduce that

$$\frac{\pi-2}{4} = \frac{1}{1\times3} - \frac{1}{3\times5} + \frac{1}{5\times7} - \frac{1}{7\times9} + \ldots$$ **5**

b) Obtain Fourier expansion for f(x) = 2x – x^2 in (0, 3). **4**

OR

b) Expand $\pi x - x^2$ as a sine series in (0, π). **4**

9. a) Show that $\nabla\left(\bar{a} \cdot \nabla\frac{1}{r}\right) = \frac{-\bar{a}}{r^3} + \frac{3(\bar{a}\cdot\bar{r})\cdot\bar{r}}{r^5}$, where $\bar{a}$ is a constant vector and r, $\bar{r}$ have usual meaning. **3**

b) Find $L^{-1}\left\{\text{Log}\left(\frac{s^2+a^2}{s^2+b^2}\right)\right\}$. **3**

c) Prove that for 0 < x < π, x(π – x) = $\frac{\pi^2}{6} - \left[\frac{\cos 2x}{1^2} + \frac{\cos 4x}{2^2} + \frac{\cos 6x}{3^2} + \ldots\right]$. **4**

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SLR-EP – 245

Seat No.	

Set Q

S.E. (Part – I) (Electrical) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 13-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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4) *Figures to the* ***right*** *indicate* ***full*** *marks.*
5) *Attempt* ***any three*** *questions from* ***each*** *Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) If $\bar{r} = xi + yj + zk$ and $\bar{a} = \frac{\bar{r}}{3}$ then div $(\bar{a})$ =
   a) 0 b) 1 c) – 1 d) 2

2) Which of the following is not true ?
   a) $\nabla\phi$ is a vector quantity b) $\nabla \cdot \bar{v}$ is a scalar quantity
   c) $\nabla \times \bar{v}$ is a scalar quantity d) $\nabla \cdot \nabla\phi = \nabla^2\phi$

3) If $\phi = x^2 + y + z$ then at (1, 1, 1), grad ϕ =
   a) i + j + k b) 2i + j + k c) i + 2j + k d) i + j + 2k

4) The conditions for expansion of a function in a Fourier series are known as _____ conditions.
   a) Harmonic b) Riemann c) Periodic d) Dirichlet's

5) The half range sine series of 1 in the interval (0, π) is
   a) $\frac{4}{\pi}\left\{\sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \ldots\right\}$ b) $\frac{4}{\pi}\left\{\sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \ldots\right\}$
   c) $\frac{4}{\pi}\left\{\frac{\sin 2x}{2} - \frac{\sin 4x}{4} + \frac{\sin 6x}{6} + \ldots\right\}$ d) $\frac{4}{\pi}\left\{\frac{\sin 2x}{2} - \frac{\sin 4x}{4} + \frac{\sin 6x}{6} - \ldots\right\}$

P.T.O.

6) If $L\{f(t)\} = \frac{1}{s}e^{-1/s}$ then $L\{f(3t)\} =$

a) $\frac{1}{3}e^{\frac{-3}{s}}$ b) $\frac{1}{3}e^{\frac{-s}{3}}$ c) $\frac{1}{3s}e^{\frac{-3}{s}}$ d) $\frac{1}{s}e^{\frac{-3}{s}}$

7) $L^{-1}\left\{\frac{1}{(s+2)^2}\right\} =$

a) $e^{-2t}.t$ b) $\frac{e^{-2t}}{t}$ c) $e^{2t}.t$ d) $\frac{t}{4}$

8) The general solution of $(D^2 - 7D + 12)y = e^{2x}$ is

a) $c_1e^{3x} + c_2e^{4x} + \frac{e^{2x}}{2}$ b) $c_1e^{-3x} + c_2e^{-4x} + \frac{e^{2x}}{2}$

c) $(c_1 + c_2x)e^{3x} + e^{4x}$ d) $c_1e^{3x} + c_2e^{4x} + e^{x}$

9) $\frac{1}{D^2+4}\sin 2x =$

a) $\frac{x}{4}\cos 2x$ b) $\frac{x}{4}\sin 2x$ c) $\frac{-x}{4}\cos 2x$ d) $\frac{\sin 2x}{8}$

10) The solution of $px + qy = z$ is

a) $\phi(xy, x + y) = 0$ b) $\phi(x + y, x - y) = 0$

c) $\phi\left(\frac{x}{y}, \frac{y}{z}\right) = 0$ d) $\phi(xy, yz) = 0$

11) The solution of $p^2 - q^2 = 1$ is

a) $z = ax + \sqrt{a^2+1}\ y + c$ b) $z = ax + (a^2 - 1)y + c$

c) $z = ax + \sqrt{a^2-1}\ y + c$ d) $z = ax + (a^2 + 1)y + c$

12) If $z\{f(k)\} = F(z)$ then $z\{f(k + n)\} =$

a) $z^{-n}\ F(z)$ b) $z^nF(z)$

c) $nF(z)$ d) $kF(z)$

13) For $|z| > 1$, $z\{1\} =$

a) $\frac{1}{z-1}$ b) $\frac{1}{z}$ c) $\frac{z}{z+1}$ d) $\frac{z}{z-1}$

14) For $|z| > a$, $z^{-1}\left\{\frac{1}{z-a}\right\} =$

a) $a^k, k \geq 1$ b) $a^{k-1}, k \geq 1$ c) $a^{k-2}, k \geq 1$ d) $a^{k+1}, k \geq 1$

SLR-EP – 245

Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 13-12-2016 Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
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SECTION – I

2. a) Solve $(D^3 - 3D^2 + 3D - 1)y = xe^x + e^x$. **3**

   b) Solve $p^2 - pq = 1 - z^2$. **3**

   c) Find $z\{(k + 1)a^k\}$, $k \geq 0$. **3**

3. a) Solve $(D^2 + D)y = x^2 + 4$. **3**

   b) Solve $p^2x^2 + q^2y^2 = z^2$. **3**

   c) Find $z^{-1}\left\{\frac{z}{(z-1)(z-2)}\right\}, |z| > 2$. **3**

4. a) Solve : $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x^2$. **3**

   b) Solve $py = 2xy + \log q$. **3**

   c) Find $z\left\{\frac{\alpha^k}{k}\right\}, k \geq 1$. **3**

5. a) Solve $(x + 1)^2\frac{d^2y}{dx^2} + (x + 1)\frac{dy}{dx} + y = 2 \sin \log (1 + x)$. **3**

   b) Solve $(5z - 7y)p + (7x - 3z)q = 3y - 5x$. **3**

   c) Find $z\left\{\cos\left(\frac{k\pi}{3} + \alpha\right)\right\}, k \geq 0$. **4**

OR

   c) An electric circuit consists of an inductance L, a condenser of capacity C and e.m.f. $E = E_0 \cos \omega t$ so that the charge Q satisfies the differential equation.

   $$\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{E_0}{L}\cos \omega t$$

   If $\omega^2 = \frac{1}{LC}$, find the charge Q at time t. **4**

Set Q

SECTION – II

6. Attempt **any three** : **9**

a) Find the angle between the curves x = t, y = t^2, z = t^3 and x = t^2, z = t^4 at t = 1.

b) Find the directional derivative of $\phi = x^2yz^2$ at (1, 1, – 1) along the curve x = e^{-t}, y = 2 sint + 1, z = t – cost at t = 0.

c) Prove that $\nabla(r^n \cdot \bar{r}) = (n+3)r^n$.

d) Show that the velocity given by $\bar{v} = (y+z)i + (z+x)j + (x+y)k$ is irrotational and find its scalar potential.

7. a) Find $L^{-1}\left\{\frac{s+29}{(s+4)(s^2+9)}\right\}$. **3**

b) Find the Laplace transform of $\int_0^t e^{-3u}$ sin 4u du. **3**

c) Using Laplace transform solve (D^2 – 2D + 2) x = 0, given that x(0) = 1, x′ (0) = 1. **3**

8. a) Find Fourier series of f(x) = x sin x in (– π, π). Hence deduce that

$$\frac{\pi-2}{4} = \frac{1}{1\times3} - \frac{1}{3\times5} + \frac{1}{5\times7} - \frac{1}{7\times9} + \ldots$$ **5**

b) Obtain Fourier expansion for f(x) = 2x – x^2 in (0, 3). **4**

OR

b) Expand $\pi x - x^2$ as a sine series in (0, π). **4**

9. a) Show that $\nabla\left(\bar{a} \cdot \nabla\frac{1}{r}\right) = \frac{-\bar{a}}{r^3} + \frac{3(\bar{a}\cdot\bar{r})\cdot\bar{r}}{r^5}$, where $\bar{a}$ is a constant vector and r, $\bar{r}$ have usual meaning. **3**

b) Find $L^{-1}\left\{\text{Log}\left(\frac{s^2+a^2}{s^2+b^2}\right)\right\}$. **3**

c) Prove that for 0 < x < π, x(π – x) = $\frac{\pi^2}{6} - \left[\frac{\cos 2x}{1^2} + \frac{\cos 4x}{2^2} + \frac{\cos 6x}{3^2} + \ldots\right]$. **4**

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SLR-EP – 245

Seat No.	

Set R

S.E. (Part – I) (Electrical) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 13-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions :
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4) *Figures to the **right** indicate **full** marks.*
5) *Attempt **any three** questions from **each** Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) If z {f(k)} = F(z) then z{f(k + n)} =
   a) z^{-n} F(z) b) z^{n}F(z)
   c) nF(z) d) kF(z)

2) For |z| > 1, z {1} =
   a) $\frac{1}{z-1}$ b) $\frac{1}{z}$ c) $\frac{z}{z+1}$ d) $\frac{z}{z-1}$

3) For |z| > a, $z^{-1}\left\{\frac{1}{z-a}\right\}$ =
   a) a^{k}, $k \geq 1$ b) a^{k-1}, $k \geq 1$ c) a^{k-2}, $k \geq 1$ d) a^{k+1}, $k \geq 1$

4) If $\bar{r} = xi + yj + zk$ and $\bar{a} = \frac{\bar{r}}{3}$ then div $(\bar{a})$ =
   a) 0 b) 1 c) – 1 d) 2

5) Which of the following is not true ?
   a) $\nabla\phi$ is a vector quantity b) $\nabla \cdot \bar{v}$ is a scalar quantity
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P.T.O.

7) The conditions for expansion of a function in a Fourier series are known as _____ conditions.

a) Harmonic b) Riemann c) Periodic d) Dirichlet's

8) The half range sine series of 1 in the interval $(0, \pi)$ is

a) $\frac{4}{\pi}\left\{\sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \ldots\right\}$ b) $\frac{4}{\pi}\left\{\sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \ldots\right\}$

c) $\frac{4}{\pi}\left\{\frac{\sin 2x}{2} - \frac{\sin 4x}{4} + \frac{\sin 6x}{6} + \ldots\right\}$ d) $\frac{4}{\pi}\left\{\frac{\sin 2x}{2} - \frac{\sin 4x}{4} + \frac{\sin 6x}{6} - \ldots\right\}$

9) If $L\{f(t)\} = \frac{1}{s}e^{-1/s}$ then $L\{f(3t)\} =$

a) $\frac{1}{3}e^{\frac{-3}{s}}$ b) $\frac{1}{3}e^{\frac{-s}{3}}$ c) $\frac{1}{3s}e^{\frac{-3}{s}}$ d) $\frac{1}{s}e^{\frac{-3}{s}}$

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c) $(c_1 + c_2x)e^{3x} + e^{4x}$ d) $c_1e^{3x} + c_2e^{4x} + e^{x}$

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SLR-EP – 245

Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 13-12-2016 Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
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SECTION – I

2. a) Solve $(D^3 - 3D^2 + 3D - 1)y = xe^x + e^x$. **3**

   b) Solve $p^2 - pq = 1 - z^2$. **3**

   c) Find $z\{(k + 1)a^k\}$, $k \geq 0$. **3**

3. a) Solve $(D^2 + D)y = x^2 + 4$. **3**

   b) Solve $p^2x^2 + q^2y^2 = z^2$. **3**

   c) Find $z^{-1}\left\{\frac{z}{(z-1)(z-2)}\right\}, |z| > 2$. **3**

4. a) Solve : $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x^2$. **3**

   b) Solve $py = 2xy + \log q$. **3**

   c) Find $z\left\{\frac{\alpha^k}{k}\right\}, k \geq 1$. **3**

5. a) Solve $(x + 1)^2\frac{d^2y}{dx^2} + (x + 1)\frac{dy}{dx} + y = 2 \sin \log (1 + x)$. **3**

   b) Solve $(5z - 7y)p + (7x - 3z)q = 3y - 5x$. **3**

   c) Find $z\left\{\cos\left(\frac{k\pi}{3} + \alpha\right)\right\}, k \geq 0$. **4**

OR

   c) An electric circuit consists of an inductance L, a condenser of capacity C and e.m.f. $E = E_0 \cos \omega t$ so that the charge Q satisfies the differential equation.

   $$\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{E_0}{L}\cos \omega t$$

   If $\omega^2 = \frac{1}{LC}$, find the charge Q at time t. **4**

Set R

SECTION – II

6. Attempt **any three** : **9**

a) Find the angle between the curves x = t, y = t^2, z = t^3 and x = t^2, z = t^4 at t = 1.

b) Find the directional derivative of $\phi = x^2yz^2$ at (1, 1, – 1) along the curve x = e^{-t}, y = 2 sint + 1, z = t – cost at t = 0.

c) Prove that $\nabla(r^n \cdot \bar{r}) = (n+3)r^n$.

d) Show that the velocity given by $\bar{v} = (y+z)i + (z+x)j + (x+y)k$ is irrotational and find its scalar potential.

7. a) Find $L^{-1}\left\{\frac{s+29}{(s+4)(s^2+9)}\right\}$. **3**

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c) Using Laplace transform solve (D^2 – 2D + 2) x = 0, given that x(0) = 1, x′ (0) = 1. **3**

8. a) Find Fourier series of f(x) = x sin x in (– π, π). Hence deduce that

$$\frac{\pi-2}{4} = \frac{1}{1\times3} - \frac{1}{3\times5} + \frac{1}{5\times7} - \frac{1}{7\times9} + \ldots$$ **5**

b) Obtain Fourier expansion for f(x) = 2x – x^2 in (0, 3). **4**

OR

b) Expand $\pi x - x^2$ as a sine series in (0, π). **4**

9. a) Show that $\nabla\left(\bar{a} \cdot \nabla\frac{1}{r}\right) = \frac{-\bar{a}}{r^3} + \frac{3(\bar{a}\cdot\bar{r})\cdot\bar{r}}{r^5}$, where $\bar{a}$ is a constant vector and r, $\bar{r}$ have usual meaning. **3**

b) Find $L^{-1}\left\{\text{Log}\left(\frac{s^2+a^2}{s^2+b^2}\right)\right\}$. **3**

c) Prove that for 0 < x < π, x(π – x) = $\frac{\pi^2}{6} - \left[\frac{\cos 2x}{1^2} + \frac{\cos 4x}{2^2} + \frac{\cos 6x}{3^2} + \ldots\right]$. **4**

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SLR-EP – 245

Seat No.	

Set S

S.E. (Part – I) (Electrical) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 13-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Use*** *of calculator is* ***allowed****.*
4) *Figures to the* ***right*** *indicate* ***full*** *marks.*
5) *Attempt* ***any three*** *questions from* ***each*** *Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) If $\phi = x^2 + y + z$ then at (1, 1, 1), grad ϕ =

a) i + j + k b) 2i + j + k c) i + 2j + k d) i + j + 2k

2) The conditions for expansion of a function in a Fourier series are known as _____ conditions.

a) Harmonic b) Riemann c) Periodic d) Dirichlet's

3) The half range sine series of 1 in the interval (0, π) is

a) $\frac{4}{\pi}\left\{\sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \ldots\right\}$ b) $\frac{4}{\pi}\left\{\sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \ldots\right\}$

c) $\frac{4}{\pi}\left\{\frac{\sin 2x}{2} - \frac{\sin 4x}{4} + \frac{\sin 6x}{6} + \ldots\right\}$ d) $\frac{4}{\pi}\left\{\frac{\sin 2x}{2} - \frac{\sin 4x}{4} + \frac{\sin 6x}{6} - \ldots\right\}$

4) If $L\{f(t)\} = \frac{1}{s}e^{-1/s}$ then $L\{f(3t)\}$ =

a) $\frac{1}{3}e^{\frac{-3}{s}}$ b) $\frac{1}{3}e^{\frac{-s}{3}}$ c) $\frac{1}{3s}e^{\frac{-3}{s}}$ d) $\frac{1}{s}e^{\frac{-3}{s}}$

5) $L^{-1}\left\{\frac{1}{(s+2)^2}\right\}$ =

a) $e^{-2t}.t$ b) $\frac{e^{-2t}}{t}$ c) $e^{2t}.t$ d) $\frac{t}{4}$

P.T.O.

6) The general solution of $(D^2 - 7D + 12)y = e^{2x}$ is

a) $c_1e^{3x} + c_2e^{4x} + \frac{e^{2x}}{2}$ b) $c_1e^{-3x} + c_2e^{-4x} + \frac{e^{2x}}{2}$

c) $(c_1 + c_2x)e^{3x} + e^{4x}$ d) $c_1e^{3x} + c_2e^{4x} + e^{x}$

7) $\frac{1}{D^2 + 4} \sin 2x =$

a) $\frac{x}{4}\cos 2x$ b) $\frac{x}{4}\sin 2x$ c) $\frac{-x}{4}\cos 2x$ d) $\frac{\sin 2x}{8}$

8) The solution of px + qy = z is

a) $\phi(xy, x + y) = 0$ b) $\phi(x + y, x - y) = 0$

c) $\phi\left(\frac{x}{y}, \frac{y}{z}\right) = 0$ d) $\phi(xy, yz) = 0$

9) The solution of $p^2 - q^2 = 1$ is

a) $z = ax + \sqrt{a^2 + 1}\ y + c$ b) $z = ax + (a^2 - 1)y + c$

c) $z = ax + \sqrt{a^2 - 1}\ y + c$ d) $z = ax + (a^2 + 1)y + c$

10) If $z\{f(k)\} = F(z)$ then $z\{f(k + n)\} =$

a) $z^{-n} F(z)$ b) $z^nF(z)$

c) $nF(z)$ d) $kF(z)$

11) For $|z| > 1$, $z\{1\} =$

a) $\frac{1}{z-1}$ b) $\frac{1}{z}$ c) $\frac{z}{z+1}$ d) $\frac{z}{z-1}$

12) For $|z| > a$, $z^{-1}\left\{\frac{1}{z-a}\right\} =$

a) a^k, $k \geq 1$ b) a^{k-1}, $k \geq 1$ c) a^{k-2}, $k \geq 1$ d) a^{k+1}, $k \geq 1$

13) If $\bar{r} = xi + yj + zk$ and $\bar{a} = \frac{\bar{r}}{3}$ then div $(\bar{a})$ =

a) 0 b) 1 c) – 1 d) 2

14) Which of the following is not true ?

a) $\nabla\phi$ is a vector quantity b) $\nabla \cdot \bar{v}$ is a scalar quantity

c) $\nabla \times \bar{v}$ is a scalar quantity d) $\nabla \cdot \nabla\phi = \nabla^2\phi$

SLR-EP – 245

Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 13-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) **Use** of calculator is allowed.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Solve $(D^3 - 3D^2 + 3D - 1)y = xe^x + e^x$. **3**

   b) Solve $p^2 - pq = 1 - z^2$. **3**

   c) Find $z\{(k + 1)a^k\}$, $k \geq 0$. **3**

3. a) Solve $(D^2 + D)y = x^2 + 4$. **3**

   b) Solve $p^2x^2 + q^2y^2 = z^2$. **3**

   c) Find $z^{-1}\left\{\frac{z}{(z-1)(z-2)}\right\}, |z| > 2$. **3**

4. a) Solve : $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x^2$. **3**

   b) Solve $py = 2xy + \log q$. **3**

   c) Find $z\left\{\frac{\alpha^k}{k}\right\}, k \geq 1$. **3**

5. a) Solve $(x + 1)^2\frac{d^2y}{dx^2} + (x + 1)\frac{dy}{dx} + y = 2 \sin \log (1 + x)$. **3**

   b) Solve $(5z - 7y)p + (7x - 3z)q = 3y - 5x$. **3**

   c) Find $z\left\{\cos\left(\frac{k\pi}{3} + \alpha\right)\right\}, k \geq 0$. **4**

   OR

   c) An electric circuit consists of an inductance L, a condenser of capacity C and e.m.f. $E = E_0 \cos \omega t$ so that the charge Q satisfies the differential equation.

   $$\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{E_0}{L}\cos \omega t$$

   If $\omega^2 = \frac{1}{LC}$, find the charge Q at time t. **4**

Set S

SECTION – II

6. Attempt **any three** : **9**

a) Find the angle between the curves x = t, y = t^2, z = t^3 and x = t^2, z = t^4 at t = 1.

b) Find the directional derivative of $\phi = x^2yz^2$ at (1, 1, – 1) along the curve x = e^{-t}, y = 2 sint + 1, z = t – cost at t = 0.

c) Prove that $\nabla(r^n \cdot \bar{r}) = (n+3)r^n$.

d) Show that the velocity given by $\bar{v} = (y+z)i + (z+x)j + (x+y)k$ is irrotational and find its scalar potential.

7. a) Find $L^{-1}\left\{\frac{s+29}{(s+4)(s^2+9)}\right\}$. **3**

b) Find the Laplace transform of $\int_0^t e^{-3u}$ sin 4u du. **3**

c) Using Laplace transform solve (D^2 – 2D + 2) x = 0, given that x(0) = 1, x′ (0) = 1. **3**

8. a) Find Fourier series of f(x) = x sin x in (– π, π). Hence deduce that

$$\frac{\pi-2}{4} = \frac{1}{1\times3} - \frac{1}{3\times5} + \frac{1}{5\times7} - \frac{1}{7\times9} + \ldots$$ **5**

b) Obtain Fourier expansion for f(x) = 2x – x^2 in (0, 3). **4**

OR

b) Expand $\pi x - x^2$ as a sine series in (0, π). **4**

9. a) Show that $\nabla\left(\bar{a} \cdot \nabla\frac{1}{r}\right) = \frac{-\bar{a}}{r^3} + \frac{3(\bar{a}\cdot\bar{r})\cdot\bar{r}}{r^5}$, where $\bar{a}$ is a constant vector and r, $\bar{r}$ have usual meaning. **3**

b) Find $L^{-1}\left\{\text{Log}\left(\frac{s^2+a^2}{s^2+b^2}\right)\right\}$. **3**

c) Prove that for 0 < x < π, x(π – x) = $\frac{\pi^2}{6} - \left[\frac{\cos 2x}{1^2} + \frac{\cos 4x}{2^2} + \frac{\cos 6x}{3^2} + \ldots\right]$. **4**

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SLR-EP – 246

Seat No.	

Set **P**

S.E. (Part – I) (Electrical Engineering) (CGPA) Examination, 2016
ELECTRICAL MACHINE – I

Day and Date : Thursday, 15-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The armature of a DC machine is made up of
   a) Silicon steel b) Wrought iron
   c) Cast steel d) Soft iron

2) A 4 pole DC machine has _____ magnetic circuits.
   a) 2 b) 8
   c) 4 d) none of these

3) The greatest Eddy current loss occurs in the _____ of DC machine.
   a) field pole b) yoke
   c) commutating poles d) armature

4) The commutator pitch for a simplex lap winding is equal to the
   a) number of poles in the machine
   b) pole pairs
   c) 1
   d) none of these

5) A DC motor runs at 1725 r.p.m. at full load and 1775 r.p.m. at no load. The speed regulation is
   a) 4.7% b) 2.9%
   c) 7.6% d) 1.5%

6) A 240 V series motor takes 40 A when giving its rated output at 1500 r.p.m. Its resistance is 0.3Ω. What value of resistance must be added to obtain rated torque at starting ?
   a) 2.4Ω b) 1.5Ω c) 3.2Ω d) 5.7Ω

7) The value of diverter resistance is of the order of
   a) 25Ω b) 100Ω c) 0.1Ω d) none of these

8) Swinburne's test cannot be used for
   a) Shunt motor b) Compound motor
   c) Series motor d) None of these

9) A transformer does not possess _____ changing property.
   a) Impedance b) Voltage
   c) Current d) Power

10) A transformer is so designed that primary and secondary have
   a) high leakage reactance
   b) large resistance
   c) tight magnetic coupling
   d) none of these

11) The efficiency of power transformer is around
   a) 80% b) 95%
   c) 74% d) 50%

12) Transformer action requires
   a) constant magnetic flux
   b) increasing magnetic flux
   c) alternating magnetic flux
   d) none of these

13) An ideal transformer does not change
   a) voltage b) power
   c) current d) none of these

14) A 500 kVA transformer has constant loss of 500 W and copper losses at full load are 2000 W. Then at what load the efficiency will be maximum ?
   a) 250 kVA b) 500 kVA
   c) 1000 kVA d) 125 kVA

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SLR-EP – 246

Seat No.	

S.E. (Part – I) (Electrical Engineering) (CGPA) Examination, 2016
ELECTRICAL MACHINE – I

Day and Date : Thursday, 15-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **16**

a) A 30 kW, 300 V DC shunt generator has armature and field resistance of 0.05 Ω and 100 Ω respectively. Calculate the total power developed by the armature when it delivers full load output.

b) Derive the torque equation of a DC motor.

c) With neat sketch explain three point starter for DC motor.

d) A 250 V, 4 pole wave wound series motor has 782 conductors on its armature. It has armature and series field resistance of 0.75 Ω. The motor takes a current of 40 A. Find its speed and the gross torque developed if it has a flux per pole of 25 mWb.

e) Explain dynamic braking and plugging operation for DC motor.

f) A shunt generator supplies 96 A at a terminal voltage of 200 V. The armature and shunt field resistances are 0.1 Ω and 50 Ω respectively. The iron and frictional losses are 2500 W. Find (i) e.m.f. generated. (ii) copper losses.

3. Solve the following : **12**

a) The Hopkinson's test on two identical shunt machines gave following results :
Input voltage = 500 V
Input current = 15 A
Output current of generator = 120 A
Field current of generator = 4 A
Field current of motor = 4 A
Armature resistance of each machine = 0.06 Ω
Find the efficiency of motor and generator.

b) A DC shunt machine when run as a motor on no load takes 440 W and runs at 1000 r.p.m. The field current and armature resistance are 1 A and 0.5 Ω respectively. Calculate the efficiency of the machine when,

i) Running as a generator delivering 40 A at 220 V and

ii) As a motor taking 40 A from 220 V supply.

OR

c) With neat sketch explain the construction of a DC generator.

SECTION – II

4. Solve **any four** : **16**

a) Derive an emf equation of transformer.

b) A transformer takes a current of 0.6 A and absorbs 64 W when primary is connected to its normal supply of 200 V, 50 Hz; the secondary being open circuit. Find the magnetizing and iron loss currents.

c) A single phase transformer with a ratio of 440/110 V takes no load current of 5 A at 0.2 p.f. lagging. If the secondary supplies a current of 120 A at a p.f. 0.8 lagging, find the current taken by primary.

d) A 100 kVA transformer has 400 turns on the primary and 80 turns on the secondary. The primary and secondary resistances are 0.3 Ω and 0.01 Ω respectively and corresponding leakage reactances are 1.1 Ω and 0.035 Ω respectively. Calculate the equivalent impedance referred to primary circuit.

e) With neat sketch explain Sumpner test.

f) In autotransformer prove that saving in copper = K × weight of copper in ordinary transformer where, K is the transformation ratio.

5. Solve **any two** : **12**

a) A 150 kVA transformer has iron loss of 1.4 kW and full load copper loss of 2.8 kW. Calculate :

i) The efficiency of transformer at full load.

ii) The maximum efficiency of transformer.

iii) The output power at the maximum level of efficiency. Assume unity power factor.

b) Explain open delta and Scott connections for three phase transformer.

c) With neat sketch explain open circuit test and short circuit test for transformer.

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SLR-EP – 246

Seat No.	

Set **Q**

S.E. (Part – I) (Electrical Engineering) (CGPA) Examination, 2016
ELECTRICAL MACHINE – I

Day and Date : Thursday, 15-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Swinburne's test cannot be used for
   a) Shunt motor b) Compound motor
   c) Series motor d) None of these

2) A transformer does not possess _____ changing property.
   a) Impedance b) Voltage
   c) Current d) Power

3) A transformer is so designed that primary and secondary have
   a) high leakage reactance
   b) large resistance
   c) tight magnetic coupling
   d) none of these

4) The efficiency of power transformer is around
   a) 80% b) 95%
   c) 74% d) 50%

5) Transformer action requires
   a) constant magnetic flux
   b) increasing magnetic flux
   c) alternating magnetic flux
   d) none of these

P.T.O.

6) An ideal transformer does not change
   a) voltage b) power
   c) current d) none of these

7) A 500 kVA transformer has constant loss of 500 W and copper losses at full load are 2000 W. Then at what load the efficiency will be maximum ?
   a) 250 kVA b) 500 kVA
   c) 1000 kVA d) 125 kVA

8) The armature of a DC machine is made up of
   a) Silicon steel b) Wrought iron
   c) Cast steel d) Soft iron

9) A 4 pole DC machine has _____ magnetic circuits.
   a) 2 b) 8
   c) 4 d) none of these

10) The greatest Eddy current loss occurs in the _____ of DC machine.
   a) field pole b) yoke
   c) commutating poles d) armature

11) The commutator pitch for a simplex lap winding is equal to the
   a) number of poles in the machine
   b) pole pairs
   c) 1
   d) none of these

12) A DC motor runs at 1725 r.p.m. at full load and 1775 r.p.m. at no load. The speed regulation is
   a) 4.7% b) 2.9%
   c) 7.6% d) 1.5%

13) A 240 V series motor takes 40 A when giving its rated output at 1500 r.p.m. Its resistance is $0.3\,\Omega$. What value of resistance must be added to obtain rated torque at starting ?
   a) $2.4\,\Omega$ b) $1.5\,\Omega$ c) $3.2\,\Omega$ d) $5.7\,\Omega$

14) The value of diverter resistance is of the order of
   a) $25\,\Omega$ b) $100\,\Omega$ c) $0.1\,\Omega$ d) none of these

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SLR-EP – 246

Seat No.	

S.E. (Part – I) (Electrical Engineering) (CGPA) Examination, 2016
ELECTRICAL MACHINE – I

Day and Date : Thursday, 15-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **16**

a) A 30 kW, 300 V DC shunt generator has armature and field resistance of 0.05 Ω and 100 Ω respectively. Calculate the total power developed by the armature when it delivers full load output.

b) Derive the torque equation of a DC motor.

c) With neat sketch explain three point starter for DC motor.

d) A 250 V, 4 pole wave wound series motor has 782 conductors on its armature. It has armature and series field resistance of 0.75 Ω. The motor takes a current of 40 A. Find its speed and the gross torque developed if it has a flux per pole of 25 mWb.

e) Explain dynamic braking and plugging operation for DC motor.

f) A shunt generator supplies 96 A at a terminal voltage of 200 V. The armature and shunt field resistances are 0.1 Ω and 50 Ω respectively. The iron and frictional losses are 2500 W. Find (i) e.m.f. generated. (ii) copper losses.

3. Solve the following : **12**

a) The Hopkinson's test on two identical shunt machines gave following results :
Input voltage = 500 V
Input current = 15 A
Output current of generator = 120 A
Field current of generator = 4 A
Field current of motor = 4 A
Armature resistance of each machine = 0.06 Ω
Find the efficiency of motor and generator.

b) A DC shunt machine when run as a motor on no load takes 440 W and runs at 1000 r.p.m. The field current and armature resistance are 1 A and 0.5 Ω respectively. Calculate the efficiency of the machine when,

i) Running as a generator delivering 40 A at 220 V and

ii) As a motor taking 40 A from 220 V supply.

OR

c) With neat sketch explain the construction of a DC generator.

SECTION – II

4. Solve **any four** : **16**

a) Derive an emf equation of transformer.

b) A transformer takes a current of 0.6 A and absorbs 64 W when primary is connected to its normal supply of 200 V, 50 Hz; the secondary being open circuit. Find the magnetizing and iron loss currents.

c) A single phase transformer with a ratio of 440/110 V takes no load current of 5 A at 0.2 p.f. lagging. If the secondary supplies a current of 120 A at a p.f. 0.8 lagging, find the current taken by primary.

d) A 100 kVA transformer has 400 turns on the primary and 80 turns on the secondary. The primary and secondary resistances are 0.3 Ω and 0.01 Ω respectively and corresponding leakage reactances are 1.1 Ω and 0.035 Ω respectively. Calculate the equivalent impedance referred to primary circuit.

e) With neat sketch explain Sumpner test.

f) In autotransformer prove that saving in copper = K × weight of copper in ordinary transformer where, K is the transformation ratio.

5. Solve **any two** : **12**

a) A 150 kVA transformer has iron loss of 1.4 kW and full load copper loss of 2.8 kW. Calculate :

i) The efficiency of transformer at full load.

ii) The maximum efficiency of transformer.

iii) The output power at the maximum level of efficiency. Assume unity power factor.

b) Explain open delta and Scott connections for three phase transformer.

c) With neat sketch explain open circuit test and short circuit test for transformer.

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Seat No.	

Set **R**

S.E. (Part – I) (Electrical Engineering) (CGPA) Examination, 2016
ELECTRICAL MACHINE – I

Day and Date : Thursday, 15-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) A DC motor runs at 1725 r.p.m. at full load and 1775 r.p.m. at no load. The speed regulation is

a) 4.7% b) 2.9%

c) 7.6% d) 1.5%

2) A 240 V series motor takes 40 A when giving its rated output at 1500 r.p.m. Its resistance is $0.3\,\Omega$. What value of resistance must be added to obtain rated torque at starting ?

a) $2.4\,\Omega$ b) $1.5\,\Omega$ c) $3.2\,\Omega$ d) $5.7\,\Omega$

3) The value of diverter resistance is of the order of

a) $25\,\Omega$ b) $100\,\Omega$ c) $0.1\,\Omega$ d) none of these

4) Swinburne's test cannot be used for

a) Shunt motor b) Compound motor

c) Series motor d) None of these

5) A transformer does not possess _____ changing property.

a) Impedance b) Voltage

c) Current d) Power

P.T.O.

6) A transformer is so designed that primary and secondary have
   a) high leakage reactance
   b) large resistance
   c) tight magnetic coupling
   d) none of these

7) The efficiency of power transformer is around
   a) 80% b) 95%
   c) 74% d) 50%

8) Transformer action requires
   a) constant magnetic flux
   b) increasing magnetic flux
   c) alternating magnetic flux
   d) none of these

9) An ideal transformer does not change
   a) voltage b) power
   c) current d) none of these

10) A 500 kVA transformer has constant loss of 500 W and copper losses at full load are 2000 W. Then at what load the efficiency will be maximum ?
   a) 250 kVA b) 500 kVA
   c) 1000 kVA d) 125 kVA

11) The armature of a DC machine is made up of
   a) Silicon steel b) Wrought iron
   c) Cast steel d) Soft iron

12) A 4 pole DC machine has _____ magnetic circuits.
   a) 2 b) 8
   c) 4 d) none of these

13) The greatest Eddy current loss occurs in the _____ of DC machine.
   a) field pole b) yoke
   c) commutating poles d) armature

14) The commutator pitch for a simplex lap winding is equal to the
   a) number of poles in the machine
   b) pole pairs
   c) 1
   d) none of these

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SLR-EP – 246

Seat No.	

S.E. (Part – I) (Electrical Engineering) (CGPA) Examination, 2016
ELECTRICAL MACHINE – I

Day and Date : Thursday, 15-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **16**

a) A 30 kW, 300 V DC shunt generator has armature and field resistance of 0.05 Ω and 100 Ω respectively. Calculate the total power developed by the armature when it delivers full load output.

b) Derive the torque equation of a DC motor.

c) With neat sketch explain three point starter for DC motor.

d) A 250 V, 4 pole wave wound series motor has 782 conductors on its armature. It has armature and series field resistance of 0.75 Ω. The motor takes a current of 40 A. Find its speed and the gross torque developed if it has a flux per pole of 25 mWb.

e) Explain dynamic braking and plugging operation for DC motor.

f) A shunt generator supplies 96 A at a terminal voltage of 200 V. The armature and shunt field resistances are 0.1 Ω and 50 Ω respectively. The iron and frictional losses are 2500 W. Find (i) e.m.f. generated. (ii) copper losses.

3. Solve the following : **12**

a) The Hopkinson's test on two identical shunt machines gave following results :
Input voltage = 500 V
Input current = 15 A
Output current of generator = 120 A
Field current of generator = 4 A
Field current of motor = 4 A
Armature resistance of each machine = 0.06 Ω
Find the efficiency of motor and generator.

b) A DC shunt machine when run as a motor on no load takes 440 W and runs at 1000 r.p.m. The field current and armature resistance are 1 A and 0.5 Ω respectively. Calculate the efficiency of the machine when,

i) Running as a generator delivering 40 A at 220 V and

ii) As a motor taking 40 A from 220 V supply.

OR

c) With neat sketch explain the construction of a DC generator.

SECTION – II

4. Solve **any four** : **16**

a) Derive an emf equation of transformer.

b) A transformer takes a current of 0.6 A and absorbs 64 W when primary is connected to its normal supply of 200 V, 50 Hz; the secondary being open circuit. Find the magnetizing and iron loss currents.

c) A single phase transformer with a ratio of 440/110 V takes no load current of 5 A at 0.2 p.f. lagging. If the secondary supplies a current of 120 A at a p.f. 0.8 lagging, find the current taken by primary.

d) A 100 kVA transformer has 400 turns on the primary and 80 turns on the secondary. The primary and secondary resistances are 0.3 Ω and 0.01 Ω respectively and corresponding leakage reactances are 1.1 Ω and 0.035 Ω respectively. Calculate the equivalent impedance referred to primary circuit.

e) With neat sketch explain Sumpner test.

f) In autotransformer prove that saving in copper = K × weight of copper in ordinary transformer where, K is the transformation ratio.

5. Solve **any two** : **12**

a) A 150 kVA transformer has iron loss of 1.4 kW and full load copper loss of 2.8 kW. Calculate :

i) The efficiency of transformer at full load.

ii) The maximum efficiency of transformer.

iii) The output power at the maximum level of efficiency. Assume unity power factor.

b) Explain open delta and Scott connections for three phase transformer.

c) With neat sketch explain open circuit test and short circuit test for transformer.

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SLR-EP – 246

Seat No.	

Set **S**

S.E. (Part – I) (Electrical Engineering) (CGPA) Examination, 2016
ELECTRICAL MACHINE – I

Day and Date : Thursday, 15-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) A transformer is so designed that primary and secondary have
   a) high leakage reactance
   b) large resistance
   c) tight magnetic coupling
   d) none of these

2) The efficiency of power transformer is around
   a) 80% b) 95%
   c) 74% d) 50%

3) Transformer action requires
   a) constant magnetic flux
   b) increasing magnetic flux
   c) alternating magnetic flux
   d) none of these

4) An ideal transformer does not change
   a) voltage b) power
   c) current d) none of these

5) A 500 kVA transformer has constant loss of 500 W and copper losses at full load are 2000 W. Then at what load the efficiency will be maximum ?
   a) 250 kVA b) 500 kVA
   c) 1000 kVA d) 125 kVA

P.T.O.

6) The armature of a DC machine is made up of
   a) Silicon steel b) Wrought iron
   c) Cast steel d) Soft iron

7) A 4 pole DC machine has _____ magnetic circuits.
   a) 2 b) 8
   c) 4 d) none of these

8) The greatest Eddy current loss occurs in the _____ of DC machine.
   a) field pole b) yoke
   c) commutating poles d) armature

9) The commutator pitch for a simplex lap winding is equal to the
   a) number of poles in the machine
   b) pole pairs
   c) 1
   d) none of these

10) A DC motor runs at 1725 r.p.m. at full load and 1775 r.p.m. at no load. The speed regulation is
   a) 4.7% b) 2.9%
   c) 7.6% d) 1.5%

11) A 240 V series motor takes 40 A when giving its rated output at 1500 r.p.m. Its resistance is 0.3Ω. What value of resistance must be added to obtain rated torque at starting ?
   a) 2.4Ω b) 1.5Ω c) 3.2Ω d) 5.7Ω

12) The value of diverter resistance is of the order of
   a) 25Ω b) 100Ω c) 0.1Ω d) none of these

13) Swinburne's test cannot be used for
   a) Shunt motor b) Compound motor
   c) Series motor d) None of these

14) A transformer does not possess _____ changing property.
   a) Impedance b) Voltage
   c) Current d) Power

_____

SLR-EP – 246

Seat No.	

S.E. (Part – I) (Electrical Engineering) (CGPA) Examination, 2016
ELECTRICAL MACHINE – I

Day and Date : Thursday, 15-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **16**

a) A 30 kW, 300 V DC shunt generator has armature and field resistance of 0.05 Ω and 100 Ω respectively. Calculate the total power developed by the armature when it delivers full load output.

b) Derive the torque equation of a DC motor.

c) With neat sketch explain three point starter for DC motor.

d) A 250 V, 4 pole wave wound series motor has 782 conductors on its armature. It has armature and series field resistance of 0.75 Ω. The motor takes a current of 40 A. Find its speed and the gross torque developed if it has a flux per pole of 25 mWb.

e) Explain dynamic braking and plugging operation for DC motor.

f) A shunt generator supplies 96 A at a terminal voltage of 200 V. The armature and shunt field resistances are 0.1 Ω and 50 Ω respectively. The iron and frictional losses are 2500 W. Find (i) e.m.f. generated. (ii) copper losses.

3. Solve the following : **12**

a) The Hopkinson's test on two identical shunt machines gave following results :
Input voltage = 500 V
Input current = 15 A
Output current of generator = 120 A
Field current of generator = 4 A
Field current of motor = 4 A
Armature resistance of each machine = 0.06 Ω
Find the efficiency of motor and generator.

b) A DC shunt machine when run as a motor on no load takes 440 W and runs at 1000 r.p.m. The field current and armature resistance are 1 A and 0.5 Ω respectively. Calculate the efficiency of the machine when,

i) Running as a generator delivering 40 A at 220 V and

ii) As a motor taking 40 A from 220 V supply.

OR

c) With neat sketch explain the construction of a DC generator.

SECTION – II

4. Solve **any four** : **16**

a) Derive an emf equation of transformer.

b) A transformer takes a current of 0.6 A and absorbs 64 W when primary is connected to its normal supply of 200 V, 50 Hz; the secondary being open circuit. Find the magnetizing and iron loss currents.

c) A single phase transformer with a ratio of 440/110 V takes no load current of 5 A at 0.2 p.f. lagging. If the secondary supplies a current of 120 A at a p.f. 0.8 lagging, find the current taken by primary.

d) A 100 kVA transformer has 400 turns on the primary and 80 turns on the secondary. The primary and secondary resistances are 0.3 Ω and 0.01 Ω respectively and corresponding leakage reactances are 1.1 Ω and 0.035 Ω respectively. Calculate the equivalent impedance referred to primary circuit.

e) With neat sketch explain Sumpner test.

f) In autotransformer prove that saving in copper = K × weight of copper in ordinary transformer where, K is the transformation ratio.

5. Solve **any two** : **12**

a) A 150 kVA transformer has iron loss of 1.4 kW and full load copper loss of 2.8 kW. Calculate :

i) The efficiency of transformer at full load.

ii) The maximum efficiency of transformer.

iii) The output power at the maximum level of efficiency. Assume unity power factor.

b) Explain open delta and Scott connections for three phase transformer.

c) With neat sketch explain open circuit test and short circuit test for transformer.

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SLR-EP – 247

Seat No.	

Set P

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 17-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Question No. **1, 4** and **7** are **compulsory**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) For a Q point near the center of the dc load line, clipping is more likely to occur on the
   a) Positive peak of input voltage b) Negative peak of output voltage
   c) Positive peak of output voltage d) Negative peak of emitter voltage

2) For a transistor amplifier with self-biasing network, the following components are used $R_1 = 4K\Omega$, $R_2 = 4K\Omega$ and $R_E = 1K\Omega$, the approximate value of stability factor will be
   a) 4 b) 3 c) 2 d) 1.5

3) In the input RC circuit of a single stage BJT, by how much does the base voltage lead the input voltage for frequencies much larger than the cutoff frequency in the low frequency region ?
   a) About 0° b) 45°
   c) About 90° d) None of the above

4) In the input RC circuit of a single stage BJT or FET amplifier, as the frequency _____, the capacitive reactance _____ and _____ of the input voltage appears across the output terminals.
   a) increases, decreases, more b) increases, decreases, less
   c) increases, increases, more d) decreases, decreases, less

5) From output characteristics of common emitter BJT circuit which of following two hybrid parameters are calculated
   a) h_{ie}, h_{re} b) h_{ie}, h_{fe} c) h_{re}, h_{fe} d) h_{re}, h_{oe}

P.T.O.

6) The gate source diode of a JFET should be
   a) Forward biased b) Reverse biased
   c) Either forward or reverse biased d) None of the above

7) For a JFET, when V_{DS} is increased beyond the pinch-off voltage, the drain current
   a) increased b) decreases
   c) remains constant d) first increased and then decreases

8) Calculate the ripple of a filter output having a 20 V dc component and a 1.7 $V_{r(rms)}$ ac component.
   a) 6 % b) 8.5 % c) 85 % d) 58 %

9) What is the $V_{(rms)}$ p-p at the secondary of centre tapped transformer ?
   a) $\frac{Vm}{\sqrt{2}}$ b) $\frac{2Vm}{\sqrt{2}}$ c) $\frac{Vm}{2}$ d) $2V_m$

10) In class AB power amplifier collector current flows for angle
   a) 180° b) 360° c) < 180° d) 360° > □ > 180°

11) In certain oscillator Av = 50 the attenuation of feedback circuit must be
   a) 1 b) 10 c) 0.02 d) 0.2

12) In current series feedback amplifier the input resistance and output resistance respectively
   a) increases, decreases b) decreases, increases
   c) increases, increases d) decreases, decreases

13) Which of the amplifier commonly used as frequency multiplier ?
   a) class A b) class B c) class C d) all of the above

14) Feedback signal for current series feedback is
   a) current b) voltage c) power d) none

———————

SLR-EP – 247

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 17-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instruction**: Question No. **4** and **7** are **compulsory**.*

SECTION – I

2. Attempt **any three** : **(4×3=12)**

1) Explain the importance of stability factor in biasing of transistor. Derive the stability factor for voltage divider bias BJT circuit.

2) Define the Biasing of transistor. Determine the values of R_E, R_C and R_B for the Emitter Bias configuration as shown in figure 1. having following specifications :

$I_{CQ} = \frac{1}{2} I_{C(sat)}$, $I_{C(sat)} = 8$ mA, $V_C = 18$ V and $\beta = 110$.

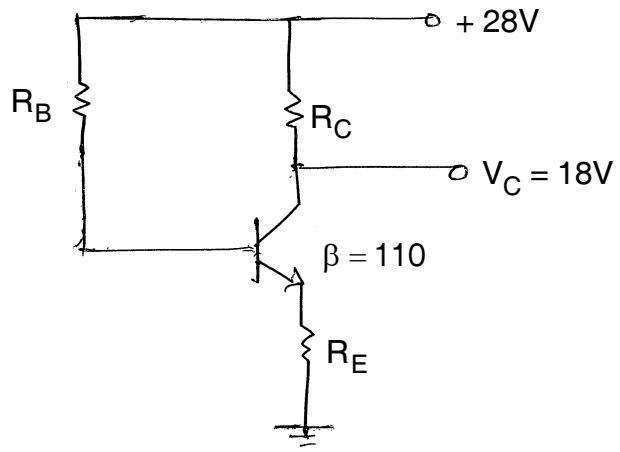

Figure 1

3) Define the following terms of JFET
   i) Forward transconductance
   ii) Input resistance and capacitance
   iii) Drain to source resistance

   Draw the self biasing JFET circuit and obtain the expression for Gate to source voltage and Drain to source voltage.

4) Draw the self bias amplifier circuit and explain the effect of coupling capacitor and bypass capacitor on low frequency response.
5) Draw the AC equivalent circuit using hybrid parameters and equivalent DC for CE amplifier.

3. Attempt **any one** : **(8×1=8)**
1) Draw the hybrid model for common emitter amplifier. Determine the current gain, voltage gain and output resistance of amplifier in term of hybrid parameters.
2) Design a single stage CE amplifier to give a voltage gain of 100 with stability factor 10 and output voltage of $2V_{rms}$ using transistor BC147A. If bandwidth is 25 Hz to 20 KHz. Transistor BC147A used has $P_{D(MAX)} = 250$ mW, $h_{fe} = 110$, $h_{ie} = 2.75$ K, $V_{CE(MAX)} = 45$ V, $I_{C(MAX)} = 200$ mA, $V_{CB(MAX)} = 6$V, $V_{BE} = 0.7$V and $V_{CC} = 10$V.

4. **Compulsory.**

Explain VI characteristics of D-MOSFET and E-MOSFET and explain common source amplifier. **8**

SECTION – II

5. Attempt **any three** : **(4×3=12)**
1) Derive the Ripple factor for capacitive filter. Hence, show that capacitive filters are preferred for light load condition.
2) Draw and explain power amplifier in which current conduction is for 90° to 180°.
3) Write the advantages of negative feedback.
4) Draw the circuit transistor coupled circuit of class A amplifier has $R_1 = 4.7\ K\Omega$, $R_2 = 3.7\ K\Omega$, load resistance $R_L = 56\,\Omega$, $R_E = 1$k, $V_{CEQ} = 8$V, $I_{CQ} = 5$ mA and $V_{CC} = 13$ V. Hence, obtain the efficiency for it. Assume the efficiency of transistor is 85 %.
5) Draw and explain Wein Bridge oscillator.

6. Attempt **any one** : **(8×1=8)**
1) Explain transresistance negative feedback and voltage negative feedback connection. Derive the input resistance and output resistance for the same.
2) Explain RC phase shift oscillator and derive the frequency of oscillation for the same.

7. **Compulsory.**

Design an unregulated power supply with inductor filter to provide the output voltage 25V at load resistance $2\,K\Omega$, ripple should not exceeds 3%. Use rectifier with great transformer utilization factor. Assume $R_{choke} = 20\,\Omega$. **8**

SLR-EP – 247

Seat No.	

Set Q

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 17-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Question No. **1, 4** and **7** are **compulsory**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) Calculate the ripple of a filter output having a 20 V dc component and a 1.7 $V_{r(rms)}$ ac component.
a) 6 % b) 8.5 % c) 85 % d) 58 %

2) What is the $V_{(rms)}$ p-p at the secondary of centre tapped transformer ?
a) $\frac{Vm}{\sqrt{2}}$ b) $\frac{2Vm}{\sqrt{2}}$ c) $\frac{Vm}{2}$ d) $2V_m$

3) In class AB power amplifier collector current flows for angle
a) 180° b) 360° c) < 180° d) 360° > □ > 180°

4) In certain oscillator Av = 50 the attenuation of feedback circuit must be
a) 1 b) 10 c) 0.02 d) 0.2

5) In current series feedback amplifier the input resistance and output resistance respectively
a) increases, decreases b) decreases, increases
c) increases, increases d) decreases, decreases

6) Which of the amplifier commonly used as frequency multiplier ?
a) class A b) class B c) class C d) all of the above

7) Feedback signal for current series feedback is
a) current b) voltage c) power d) none

P.T.O.

8) For a Q point near the center of the dc load line, clipping is more likely to occur on the
   a) Positive peak of input voltage
   b) Negative peak of output voltage
   c) Positive peak of output voltage
   d) Negative peak of emitter voltage

9) For a transistor amplifier with self-biasing network, the following components are used $R_1 = 4K\Omega$, $R_2 = 4K\Omega$ and $R_E = 1K\Omega$, the approximate value of stability factor will be
   a) 4 b) 3 c) 2 d) 1.5

10) In the input RC circuit of a single stage BJT, by how much does the base voltage lead the input voltage for frequencies much larger than the cutoff frequency in the low frequency region ?
   a) About 0°
   b) 45°
   c) About 90°
   d) None of the above

11) In the input RC circuit of a single stage BJT or FET amplifier, as the frequency _____, the capacitive reactance _____ and _____ of the input voltage appears across the output terminals.
   a) increases, decreases, more
   b) increases, decreases, less
   c) increases, increases, more
   d) decreases, decreases, less

12) From output characteristics of common emitter BJT circuit which of following two hybrid parameters are calculated
   a) h_{ie}, h_{re} b) h_{ie}, h_{fe} c) h_{re}, h_{fe} d) h_{re}, h_{oe}

13) The gate source diode of a JFET should be
   a) Forward biased
   b) Reverse biased
   c) Either forward or reverse biased
   d) None of the above

14) For a JFET, when V_{DS} is increased beyond the pinch-off voltage, the drain current
   a) increased
   b) decreases
   c) remains constant
   d) first increased and then decreases

_____

SLR-EP – 247

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 17-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instruction**: Question No. **4** and **7** are **compulsory**.*

SECTION – I

2. Attempt **any three** : **(4×3=12)**

1) Explain the importance of stability factor in biasing of transistor. Derive the stability factor for voltage divider bias BJT circuit.

2) Define the Biasing of transistor. Determine the values of R_E, R_C and R_B for the Emitter Bias configuration as shown in figure 1. having following specifications :

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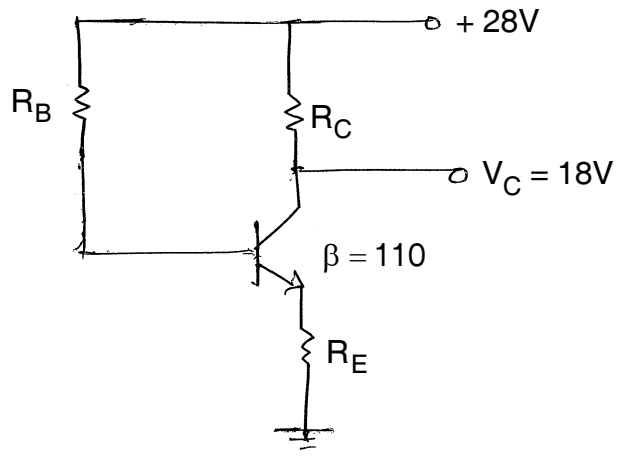

Figure 1

3) Define the following terms of JFET
   i) Forward transconductance
   ii) Input resistance and capacitance
   iii) Drain to source resistance

   Draw the self biasing JFET circuit and obtain the expression for Gate to source voltage and Drain to source voltage.

4) Draw the self bias amplifier circuit and explain the effect of coupling capacitor and bypass capacitor on low frequency response.
5) Draw the AC equivalent circuit using hybrid parameters and equivalent DC for CE amplifier.

3. Attempt **any one** : **(8×1=8)**
1) Draw the hybrid model for common emitter amplifier. Determine the current gain, voltage gain and output resistance of amplifier in term of hybrid parameters.
2) Design a single stage CE amplifier to give a voltage gain of 100 with stability factor 10 and output voltage of $2V_{rms}$ using transistor BC147A. If bandwidth is 25 Hz to 20 KHz. Transistor BC147A used has $P_{D(MAX)} = 250$ mW, $h_{fe} = 110$, $h_{ie} = 2.75$ K, $V_{CE(MAX)} = 45$ V, $I_{C(MAX)} = 200$ mA, $V_{CB(MAX)} = 6$V, $V_{BE} = 0.7$V and $V_{CC} = 10$V.

4. **Compulsory.**

Explain VI characteristics of D-MOSFET and E-MOSFET and explain common source amplifier. **8**

SECTION – II

5. Attempt **any three** : **(4×3=12)**
1) Derive the Ripple factor for capacitive filter. Hence, show that capacitive filters are preferred for light load condition.
2) Draw and explain power amplifier in which current conduction is for 90° to 180°.
3) Write the advantages of negative feedback.
4) Draw the circuit transistor coupled circuit of class A amplifier has $R_1 = 4.7\ K\Omega$, $R_2 = 3.7\ K\Omega$, load resistance $R_L = 56\,\Omega$, $R_E = 1$k, $V_{CEQ} = 8$V, $I_{CQ} = 5$ mA and $V_{CC} = 13$ V. Hence, obtain the efficiency for it. Assume the efficiency of transistor is 85 %.
5) Draw and explain Wein Bridge oscillator.

6. Attempt **any one** : **(8×1=8)**
1) Explain transresistance negative feedback and voltage negative feedback connection. Derive the input resistance and output resistance for the same.
2) Explain RC phase shift oscillator and derive the frequency of oscillation for the same.

7. **Compulsory.**

Design an unregulated power supply with inductor filter to provide the output voltage 25V at load resistance $2\,K\Omega$, ripple should not exceeds 3%. Use rectifier with great transformer utilization factor. Assume $R_{choke} = 20\,\Omega$. **8**

Set Q

SLR-EP – 247

Seat No.	

Set R

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 17-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Question No. **1, 4** and **7** are **compulsory**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) From output characteristics of common emitter BJT circuit which of following two hybrid parameters are calculated
a) h_{ie}, h_{re} b) h_{ie}, h_{fe} c) h_{re}, h_{fe} d) h_{re}, h_{oe}

2) The gate source diode of a JFET should be
a) Forward biased b) Reverse biased
c) Either forward or reverse biased d) None of the above

3) For a JFET, when V_{DS} is increased beyond the pinch-off voltage, the drain current
a) increased b) decreases
c) remains constant d) first increased and then decreases

4) Calculate the ripple of a filter output having a 20 V dc component and a 1.7 $V_{r(rms)}$ ac component.
a) 6 % b) 8.5 % c) 85 % d) 58 %

5) What is the $V_{(rms)}$ p-p at the secondary of centre tapped transformer ?
a) $\frac{Vm}{\sqrt{2}}$ b) $\frac{2Vm}{\sqrt{2}}$ c) $\frac{Vm}{2}$ d) $2V_m$

6) In class AB power amplifier collector current flows for angle
a) 180° b) 360° c) < 180° d) 360° > □ > 180°

7) In certain oscillator Av = 50 the attenuation of feedback circuit must be
a) 1 b) 10 c) 0.02 d) 0.2

P.T.O.

8) In current series feedback amplifier the input resistance and output resistance respectively
   a) increases, decreases
   b) decreases, increases
   c) increases, increases
   d) decreases, decreases

9) Which of the amplifier commonly used as frequency multiplier ?
   a) class A
   b) class B
   c) class C
   d) all of the above

10) Feedback signal for current series feedback is
   a) current
   b) voltage
   c) power
   d) none

11) For a Q point near the center of the dc load line, clipping is more likely to occur on the
   a) Positive peak of input voltage
   b) Negative peak of output voltage
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12) For a transistor amplifier with self-biasing network, the following components are used $R_1 = 4K\Omega$, $R_2 = 4K\Omega$ and $R_E = 1K\Omega$, the approximate value of stability factor will be
   a) 4
   b) 3
   c) 2
   d) 1.5

13) In the input RC circuit of a single stage BJT, by how much does the base voltage lead the input voltage for frequencies much larger than the cutoff frequency in the low frequency region ?
   a) About 0°
   b) 45°
   c) About 90°
   d) None of the above

14) In the input RC circuit of a single stage BJT or FET amplifier, as the frequency _____, the capacitive reactance _____ and _____ of the input voltage appears across the output terminals.
   a) increases, decreases, more
   b) increases, decreases, less
   c) increases, increases, more
   d) decreases, decreases, less

_____

SLR-EP – 247

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 17-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instruction**: Question No. **4** and **7** are **compulsory**.*

SECTION – I

2. Attempt **any three** : **(4×3=12)**

1) Explain the importance of stability factor in biasing of transistor. Derive the stability factor for voltage divider bias BJT circuit.

2) Define the Biasing of transistor. Determine the values of R_E, R_C and R_B for the Emitter Bias configuration as shown in figure 1. having following specifications :

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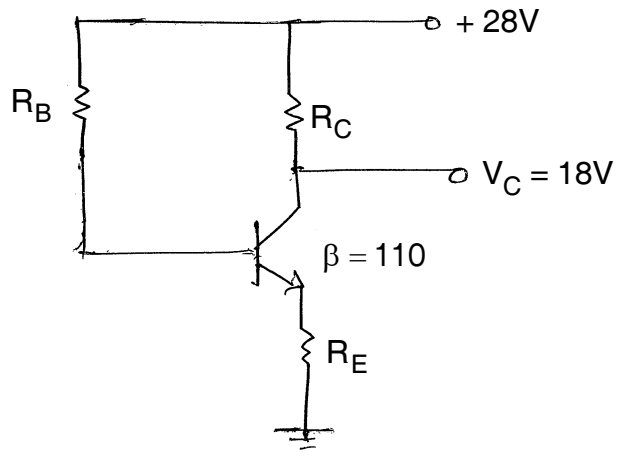

Figure 1

3) Define the following terms of JFET
   i) Forward transconductance
   ii) Input resistance and capacitance
   iii) Drain to source resistance

   Draw the self biasing JFET circuit and obtain the expression for Gate to source voltage and Drain to source voltage.

4) Draw the self bias amplifier circuit and explain the effect of coupling capacitor and bypass capacitor on low frequency response.
5) Draw the AC equivalent circuit using hybrid parameters and equivalent DC for CE amplifier.

3. Attempt **any one** : **(8×1=8)**
1) Draw the hybrid model for common emitter amplifier. Determine the current gain, voltage gain and output resistance of amplifier in term of hybrid parameters.
2) Design a single stage CE amplifier to give a voltage gain of 100 with stability factor 10 and output voltage of $2V_{rms}$ using transistor BC147A. If bandwidth is 25 Hz to 20 KHz. Transistor BC147A used has $P_{D(MAX)} = 250$ mW, $h_{fe} = 110$, $h_{ie} = 2.75$ K, $V_{CE(MAX)} = 45$ V, $I_{C(MAX)} = 200$ mA, $V_{CB(MAX)} = 6$V, $V_{BE} = 0.7$V and $V_{CC} = 10$V.

4. **Compulsory.**

Explain VI characteristics of D-MOSFET and E-MOSFET and explain common source amplifier. **8**

SECTION – II

5. Attempt **any three** : **(4×3=12)**
1) Derive the Ripple factor for capacitive filter. Hence, show that capacitive filters are preferred for light load condition.
2) Draw and explain power amplifier in which current conduction is for 90° to 180°.
3) Write the advantages of negative feedback.
4) Draw the circuit transistor coupled circuit of class A amplifier has $R_1 = 4.7\ K\Omega$, $R_2 = 3.7\ K\Omega$, load resistance $R_L = 56\,\Omega$, $R_E = 1$k, $V_{CEQ} = 8$V, $I_{CQ} = 5$ mA and $V_{CC} = 13$ V. Hence, obtain the efficiency for it. Assume the efficiency of transistor is 85 %.
5) Draw and explain Wein Bridge oscillator.

6. Attempt **any one** : **(8×1=8)**
1) Explain transresistance negative feedback and voltage negative feedback connection. Derive the input resistance and output resistance for the same.
2) Explain RC phase shift oscillator and derive the frequency of oscillation for the same.

7. **Compulsory.**

Design an unregulated power supply with inductor filter to provide the output voltage 25V at load resistance $2\,K\Omega$, ripple should not exceeds 3%. Use rectifier with great transformer utilization factor. Assume $R_{choke} = 20\,\Omega$. **8**

Set R

SLR-EP – 247

Seat No.	

Set S

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 17-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Question No. ***1, 4*** *and* ***7*** *are* ***compulsory****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) In class AB power amplifier collector current flows for angle
a) 180° b) 360° c) < 180° d) 360° > □ > 180°

2) In certain oscillator Av = 50 the attenuation of feedback circuit must be
a) 1 b) 10 c) 0.02 d) 0.2

3) In current series feedback amplifier the input resistance and output resistance respectively
a) increases, decreases b) decreases, increases
c) increases, increases d) decreases, decreases

4) Which of the amplifier commonly used as frequency multiplier ?
a) class A b) class B c) class C d) all of the above

5) Feedback signal for current series feedback is
a) current b) voltage c) power d) none

6) For a Q point near the center of the dc load line, clipping is more likely to occur on the
a) Positive peak of input voltage b) Negative peak of output voltage
c) Positive peak of output voltage d) Negative peak of emitter voltage

7) For a transistor amplifier with self-biasing network, the following components are used $R_1 = 4K\Omega$, $R_2 = 4K\Omega$ and $R_E = 1K\Omega$, the approximate value of stability factor will be
a) 4 b) 3 c) 2 d) 1.5

P.T.O.

8) In the input RC circuit of a single stage BJT, by how much does the base voltage lead the input voltage for frequencies much larger than the cutoff frequency in the low frequency region ?
   a) About 0° b) 45°
   c) About 90° d) None of the above

9) In the input RC circuit of a single stage BJT or FET amplifier, as the frequency _____, the capacitive reactance _____ and _____ of the input voltage appears across the output terminals.
   a) increases, decreases, more b) increases, decreases, less
   c) increases, increases, more d) decreases, decreases, less

10) From output characteristics of common emitter BJT circuit which of following two hybrid parameters are calculated
   a) h_{ie}, h_{re} b) h_{ie}, h_{fe} c) h_{re}, h_{fe} d) h_{re}, h_{oe}

11) The gate source diode of a JFET should be
   a) Forward biased b) Reverse biased
   c) Either forward or reverse biased d) None of the above

12) For a JFET, when V_{DS} is increased beyond the pinch-off voltage, the drain current
   a) increased b) decreases
   c) remains constant d) first increased and then decreases

13) Calculate the ripple of a filter output having a 20 V dc component and a 1.7 $V_{r(rms)}$ ac component.
   a) 6 % b) 8.5 % c) 85 % d) 58 %

14) What is the $V_{(rms)}$ p-p at the secondary of centre tapped transformer ?
   a) $\frac{Vm}{\sqrt{2}}$ b) $\frac{2Vm}{\sqrt{2}}$ c) $\frac{Vm}{2}$ d) $2V_m$

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Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 17-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instruction**: Question No. **4** and **7** are **compulsory**.*

SECTION – I

2. Attempt **any three** : **(4×3=12)**

1) Explain the importance of stability factor in biasing of transistor. Derive the stability factor for voltage divider bias BJT circuit.

2) Define the Biasing of transistor. Determine the values of R_E, R_C and R_B for the Emitter Bias configuration as shown in figure 1. having following specifications :

$I_{CQ} = \frac{1}{2} I_{C(sat)}$, $I_{C(sat)} = 8$ mA, $V_C = 18$ V and $\beta = 110$.

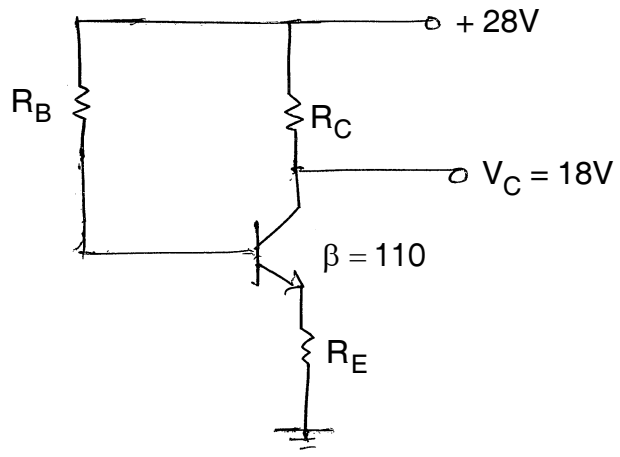

Figure 1

3) Define the following terms of JFET
   i) Forward transconductance
   ii) Input resistance and capacitance
   iii) Drain to source resistance

   Draw the self biasing JFET circuit and obtain the expression for Gate to source voltage and Drain to source voltage.

4) Draw the self bias amplifier circuit and explain the effect of coupling capacitor and bypass capacitor on low frequency response.
5) Draw the AC equivalent circuit using hybrid parameters and equivalent DC for CE amplifier.

3. Attempt **any one** : **(8×1=8)**
1) Draw the hybrid model for common emitter amplifier. Determine the current gain, voltage gain and output resistance of amplifier in term of hybrid parameters.
2) Design a single stage CE amplifier to give a voltage gain of 100 with stability factor 10 and output voltage of $2V_{rms}$ using transistor BC147A. If bandwidth is 25 Hz to 20 KHz. Transistor BC147A used has $P_{D(MAX)} = 250$ mW, $h_{fe} = 110$, $h_{ie} = 2.75$ K, $V_{CE(MAX)} = 45$ V, $I_{C(MAX)} = 200$ mA, $V_{CB(MAX)} = 6$V, $V_{BE} = 0.7$V and $V_{CC} = 10$V.

4. **Compulsory.**
Explain VI characteristics of D-MOSFET and E-MOSFET and explain common source amplifier. **8**

SECTION – II

5. Attempt **any three** : **(4×3=12)**
1) Derive the Ripple factor for capacitive filter. Hence, show that capacitive filters are preferred for light load condition.
2) Draw and explain power amplifier in which current conduction is for 90° to 180°.
3) Write the advantages of negative feedback.
4) Draw the circuit transistor coupled circuit of class A amplifier has $R_1 = 4.7\ K\Omega$, $R_2 = 3.7\ K\Omega$, load resistance $R_L = 56\,\Omega$, $R_E = 1$k, $V_{CEQ} = 8$V, $I_{CQ} = 5$ mA and $V_{CC} = 13$ V. Hence, obtain the efficiency for it. Assume the efficiency of transistor is 85 %.
5) Draw and explain Wein Bridge oscillator.

6. Attempt **any one** : **(8×1=8)**
1) Explain transresistance negative feedback and voltage negative feedback connection. Derive the input resistance and output resistance for the same.
2) Explain RC phase shift oscillator and derive the frequency of oscillation for the same.

7. **Compulsory.**
Design an unregulated power supply with inductor filter to provide the output voltage 25V at load resistance $2\,K\Omega$, ripple should not exceeds 3%. Use rectifier with great transformer utilization factor. Assume $R_{choke} = 20\,\Omega$. **8**

Set S

SLR-EP – 248

Seat No.	

Set P

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Tuesday, 20-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answers : **(1×14=14)**

1) A 1 mA ammeter has a resistance of 100 Ω . It is to be converted to a 1A ammeter. Rsh is
   a) 0.001Ω b) 0.1001Ω
   c) 10000Ω d) 100Ω

2) The power consumption of PMMC instruments is typically about
   a) 0.25W to 2W b) 0.25mW to 2mW
   c) 25μ W to 200μ W d) None of above

3) Which instrument has highest accuracy in the prescribed limit of frequency range ?
   a) PMMC b) Moving iron
   c) Electrodynamometer d) Rectifier

4) The standardization of AC potentiometers is done by
   a) Directly using AC standard voltage source
   b) Using DC standard sources and transfer instruments
   c) Using DC standard sources and d' Arsonval galvanometer
   d) Using AC standard sources and transfer instruments

5) Horizontally mounted moving iron instruments use
   a) Eddy current damping
   b) Electromagnetic damping
   c) Fluid friction damping
   d) Air friction damping

6) When potentiometer is used for measurement of voltage of an unknown source, the power consumed in circuit of the unknown source under null conditions.
   a) Is very high b) Is high c) Is small d) Is ideally zero

7) A Wheatstone's bridge can not be used for precision measurement because errors are introduced in to it on account of
   a) Resistance to connecting leads b) Thermo electric emfs
   c) Contact resistances d) All of above

8) In CRO saw tooth voltage is applied at the
   a) vertical deflecting plates b) horizontal deflecting plates
   c) accelerating anode d) cathode

9) Q meter works on principle of
   a) Mutual inductance
   b) Series resonance
   c) Self inductance
   d) Parallel resonance

10) The nominal ratio of current transformer is
   a) Primary winding current/secondary winding current
   b) Rated primary winding current / rated secondary winding current
   c) Number of secondary winding turns / number of primary winding turns
   d) All of these

11) The burden in Current Transformer is expressed in terms of
   a) Secondary winding current
   b) VA rating of transformer
   c) Voltage, current and power factor of secondary winding circuit
   d) None of these

12) Time division multiplexing is used
   a) When the data to be transferred is slow changing
   b) When the data to be transmitted has a small bandwidth
   c) When the data to be transmitted is slow changing and has a low bandwidth
   d) When the data to be transmitted is fast changing and has a high bandwidth

13) The time bases of an oscilloscope are generated by
   a) Horizontal amplifier
   b) Vertical amplifier
   c) Sweep generator
   d) Storage oscilloscope

14) In CRT focusing anode is located
   a) Between preaccelerating and accelerating anodes
   b) After accelerating anodes
   c) Before preaccelerating anode
   d) None of the above

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Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

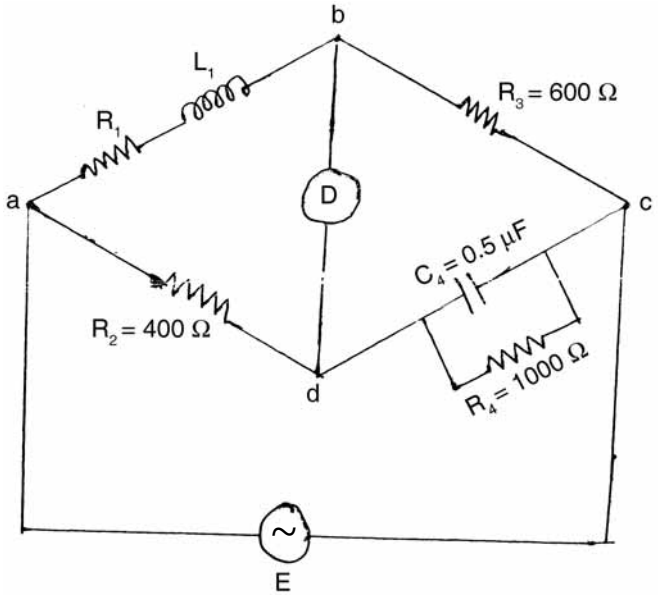
Day and Date : Tuesday, 20-12-2016 Max. Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **all** questions.*
*2) Figure to **right** indicates **full** marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) What do you mean by errors. Explain systematic errors with its types.
   2) Explain Schering bridge for capacitance measurement. Draw phasor diagram.
   3) Explain how the megger is used for insulation testing.
   4) With the help of diagram explain the working of spring and gravity control.
   5) Using a Weston cadium cell of 1.0183 V and a standard resistance of 0.1 Ω, a potentiometer was adjusted so that 1.0183 m was equivalent to the emf of cell ; when a certain direct current was flowing through the standard resistance. The voltage across I correspond to 150 cm. What was the value of current ?

3. Solve **any two** : **(2×6=12)**
   1) Derive the equations for calculations of shunts and multipliers.
   2) The inductance of a moving iron instrument is given by : L = $(10 + 5\theta - \theta^2)\,\mu H$ where θ is deflection in radian from zero position. The spring constant is 12×10^{-6} Nm/rad. Estimate deflection for a current of 5 A.
   3) An AC bridge is connected as shown. Determine the resistance and inductance of arm ab and storage Q-factor if frequency is 1000 Hz.



Set P

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) Draw block diagram of successive approximation type digital voltmeter and explain.

   b) Explain with neat block diagram working of general purpose CRO.

   c) Define following terms as applied to instrument transformer.

      i) Burden of an instrument transformer

      ii) Actual transformation ratio.

      iii) Nominal transformation ratio.

      iv) Turns ratio.

   d) Explain with the help of block diagram working of Digital Multimeter.

   e) Explain data acquisition system.

5. Solve **any two** : **(2×6=12)**

   a) What is multiplexing ? Explain different types of multiplexing.

   b) Draw phasor diagram of CT and discuss the effect of variation of power factor of secondary burden on performance of CT.

   c) Explain with neat diagram working of electronic frequency counter.

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SLR-EP – 248

Seat No.	

Set Q

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Tuesday, 20-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answers : **(1×14=14)**

1) In CRO saw tooth voltage is applied at the
   a) vertical deflecting plates
   b) horizontal deflecting plates
   c) accelerating anode
   d) cathode

2) Q meter works on principle of
   a) Mutual inductance
   b) Series resonance
   c) Self inductance
   d) Parallel resonance

3) The nominal ratio of current transformer is
   a) Primary winding current/secondary winding current
   b) Rated primary winding current / rated secondary winding current
   c) Number of secondary winding turns / number of primary winding turns
   d) All of these

4) The burden in Current Transformer is expressed in terms of
   a) Secondary winding current
   b) VA rating of transformer
   c) Voltage, current and power factor of secondary winding circuit
   d) None of these

5) Time division multiplexing is used
   a) When the data to be transferred is slow changing
   b) When the data to be transmitted has a small bandwidth
   c) When the data to be transmitted is slow changing and has a low bandwidth
   d) When the data to be transmitted is fast changing and has a high bandwidth

6) The time bases of an oscilloscope are generated by
   a) Horizontal amplifier
   b) Vertical amplifier
   c) Sweep generator
   d) Storage oscilloscope

7) In CRT focusing anode is located
   a) Between preaccelerating and accelerating anodes
   b) After accelerating anodes
   c) Before preaccelerating anode
   d) None of the above

8) A 1 mA ammeter has a resistance of 100 Ω. It is to be converted to a 1A ammeter. Rsh is
   a) 0.001Ω b) 0.1001Ω
   c) 10000Ω d) 100Ω

9) The power consumption of PMMC instruments is typically about
   a) 0.25W to 2W b) 0.25mW to 2mW
   c) 25μW to 200μW d) None of above

10) Which instrument has highest accuracy in the prescribed limit of frequency range ?
   a) PMMC b) Moving iron
   c) Electrodynamometer d) Rectifier

11) The standardization of AC potentiometers is done by
   a) Directly using AC standard voltage source
   b) Using DC standard sources and transfer instruments
   c) Using DC standard sources and d' Arsonval galvanometer
   d) Using AC standard sources and transfer instruments

12) Horizontally mounted moving iron instruments use
   a) Eddy current damping
   b) Electromagnetic damping
   c) Fluid friction damping
   d) Air friction damping

13) When potentiometer is used for measurement of voltage of an unknown source, the power consumed in circuit of the unknown source under null conditions.
   a) Is very high b) Is high c) Is small d) Is ideally zero

14) A Wheatstone's bridge can not be used for precision measurement because errors are introduced in to it on account of
   a) Resistance to connecting leads b) Thermo electric emfs
   c) Contact resistances d) All of above

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Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

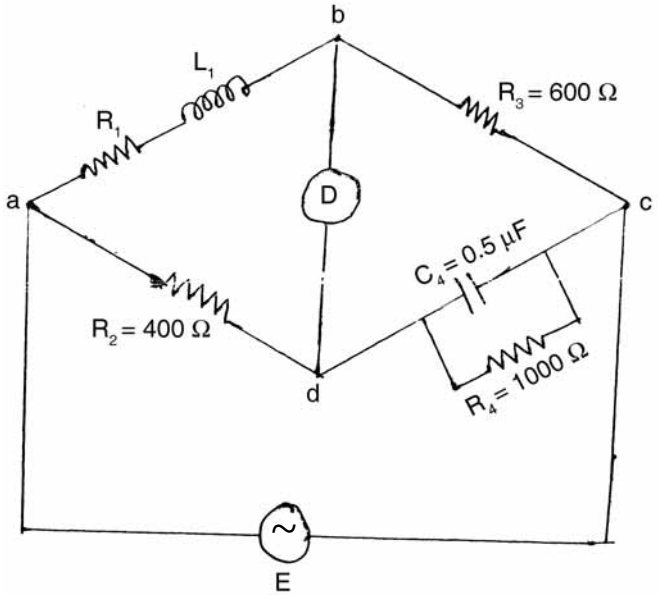
Day and Date : Tuesday, 20-12-2016 Max. Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **all** questions.*
*2) Figure to **right** indicates **full** marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) What do you mean by errors. Explain systematic errors with its types.
   2) Explain Schering bridge for capacitance measurement. Draw phasor diagram.
   3) Explain how the megger is used for insulation testing.
   4) With the help of diagram explain the working of spring and gravity control.
   5) Using a Weston cadium cell of 1.0183 V and a standard resistance of 0.1 Ω, a potentiometer was adjusted so that 1.0183 m was equivalent to the emf of cell ; when a certain direct current was flowing through the standard resistance. The voltage across I correspond to 150 cm. What was the value of current ?

3. Solve **any two** : **(2×6=12)**
   1) Derive the equations for calculations of shunts and multipliers.
   2) The inductance of a moving iron instrument is given by : L = $\left(10 + 5\theta - \theta^2\right)\mu H$ where θ is deflection in radian from zero position. The spring constant is 12×10^{-6} Nm/rad. Estimate deflection for a current of 5 A.
   3) An AC bridge is connected as shown. Determine the resistance and inductance of arm ab and storage Q-factor if frequency is 1000 Hz.



Set Q

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) Draw block diagram of successive approximation type digital voltmeter and explain.

   b) Explain with neat block diagram working of general purpose CRO.

   c) Define following terms as applied to instrument transformer.

      i) Burden of an instrument transformer

      ii) Actual transformation ratio.

      iii) Nominal transformation ratio.

      iv) Turns ratio.

   d) Explain with the help of block diagram working of Digital Multimeter.

   e) Explain data acquisition system.

5. Solve **any two** : **(2×6=12)**

   a) What is multiplexing ? Explain different types of multiplexing.

   b) Draw phasor diagram of CT and discuss the effect of variation of power factor of secondary burden on performance of CT.

   c) Explain with neat diagram working of electronic frequency counter.

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SLR-EP – 248

Seat No.	

Set R

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Tuesday, 20-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answers : **(1×14=14)**

1) Horizontally mounted moving iron instruments use
   a) Eddy current damping
   b) Electromagnetic damping
   c) Fluid friction damping
   d) Air friction damping

2) When potentiometer is used for measurement of voltage of an unknown source, the power consumed in circuit of the unknown source under null conditions.
   a) Is very high b) Is high c) Is small d) Is ideally zero

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   a) Mutual inductance
   b) Series resonance
   c) Self inductance
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6) The nominal ratio of current transformer is
   a) Primary winding current/secondary winding current
   b) Rated primary winding current / rated secondary winding current
   c) Number of secondary winding turns / number of primary winding turns
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7) The burden in Current Transformer is expressed in terms of
   a) Secondary winding current
   b) VA rating of transformer
   c) Voltage, current and power factor of secondary winding circuit
   d) None of these

8) Time division multiplexing is used
   a) When the data to be transferred is slow changing
   b) When the data to be transmitted has a small bandwidth
   c) When the data to be transmitted is slow changing and has a low bandwidth
   d) When the data to be transmitted is fast changing and has a high bandwidth

9) The time bases of an oscilloscope are generated by
   a) Horizontal amplifier
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   c) Sweep generator
   d) Storage oscilloscope

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   b) After accelerating anodes
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   a) 0.25W to 2W b) 0.25mW to 2mW
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13) Which instrument has highest accuracy in the prescribed limit of frequency range ?
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   c) Using DC standard sources and d' Arsonval galvanometer
   d) Using AC standard sources and transfer instruments

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SLR-EP – 248

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

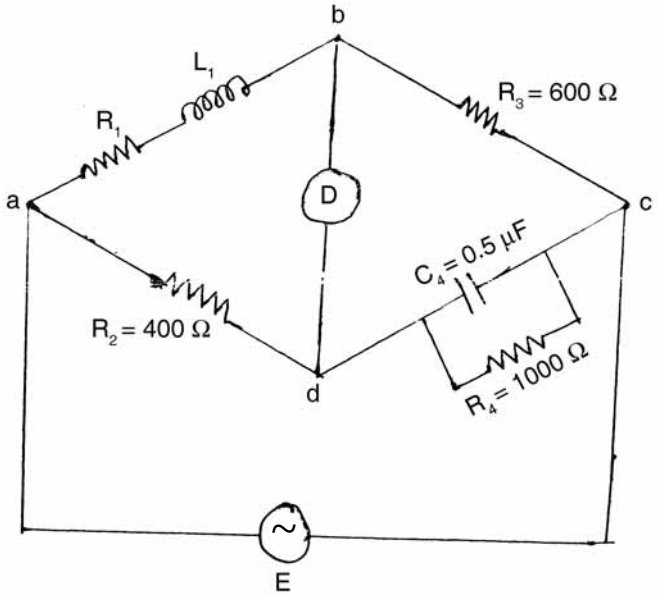
Day and Date : Tuesday, 20-12-2016 Max. Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **all** questions.*
*2) Figure to **right** indicates **full** marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) What do you mean by errors. Explain systematic errors with its types.
   2) Explain Schering bridge for capacitance measurement. Draw phasor diagram.
   3) Explain how the megger is used for insulation testing.
   4) With the help of diagram explain the working of spring and gravity control.
   5) Using a Weston cadium cell of 1.0183 V and a standard resistance of 0.1 Ω, a potentiometer was adjusted so that 1.0183 m was equivalent to the emf of cell ; when a certain direct current was flowing through the standard resistance. The voltage across I correspond to 150 cm. What was the value of current ?

3. Solve **any two** : **(2×6=12)**
   1) Derive the equations for calculations of shunts and multipliers.
   2) The inductance of a moving iron instrument is given by : L = $(10 + 5\theta - \theta^2)\,\mu H$ where θ is deflection in radian from zero position. The spring constant is 12×10^{-6} Nm/rad. Estimate deflection for a current of 5 A.
   3) An AC bridge is connected as shown. Determine the resistance and inductance of arm ab and storage Q-factor if frequency is 1000 Hz.



SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) Draw block diagram of successive approximation type digital voltmeter and explain.

   b) Explain with neat block diagram working of general purpose CRO.

   c) Define following terms as applied to instrument transformer.

      i) Burden of an instrument transformer

      ii) Actual transformation ratio.

      iii) Nominal transformation ratio.

      iv) Turns ratio.

   d) Explain with the help of block diagram working of Digital Multimeter.

   e) Explain data acquisition system.

5. Solve **any two** : **(2×6=12)**

   a) What is multiplexing ? Explain different types of multiplexing.

   b) Draw phasor diagram of CT and discuss the effect of variation of power factor of secondary burden on performance of CT.

   c) Explain with neat diagram working of electronic frequency counter.

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SLR-EP – 248

Seat No.	

Set S

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Tuesday, 20-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answers : **(1×14=14)**

1) The nominal ratio of current transformer is
   a) Primary winding current/secondary winding current
   b) Rated primary winding current / rated secondary winding current
   c) Number of secondary winding turns / number of primary winding turns
   d) All of these

2) The burden in Current Transformer is expressed in terms of
   a) Secondary winding current
   b) VA rating of transformer
   c) Voltage, current and power factor of secondary winding circuit
   d) None of these

3) Time division multiplexing is used
   a) When the data to be transferred is slow changing
   b) When the data to be transmitted has a small bandwidth
   c) When the data to be transmitted is slow changing and has a low bandwidth
   d) When the data to be transmitted is fast changing and has a high bandwidth

4) The time bases of an oscilloscope are generated by
   a) Horizontal amplifier
   b) Vertical amplifier
   c) Sweep generator
   d) Storage oscilloscope

5) In CRT focusing anode is located
   a) Between preaccelerating and accelerating anodes
   b) After accelerating anodes
   c) Before preaccelerating anode
   d) None of the above

P.T.O.

6) A 1 mA ammeter has a resistance of 100 Ω. It is to be converted to a 1A ammeter. Rsh is
   a) 0.001Ω b) 0.1001Ω
   c) 10000Ω d) 100Ω

7) The power consumption of PMMC instruments is typically about
   a) 0.25W to 2W b) 0.25mW to 2mW
   c) 25μW to 200μW d) None of above

8) Which instrument has highest accuracy in the prescribed limit of frequency range ?
   a) PMMC b) Moving iron
   c) Electrodynamometer d) Rectifier

9) The standardization of AC potentiometers is done by
   a) Directly using AC standard voltage source
   b) Using DC standard sources and transfer instruments
   c) Using DC standard sources and d' Arsonval galvanometer
   d) Using AC standard sources and transfer instruments

10) Horizontally mounted moving iron instruments use
   a) Eddy current damping
   b) Electromagnetic damping
   c) Fluid friction damping
   d) Air friction damping

11) When potentiometer is used for measurement of voltage of an unknown source, the power consumed in circuit of the unknown source under null conditions.
   a) Is very high b) Is high c) Is small d) Is ideally zero

12) A Wheatstone's bridge can not be used for precision measurement because errors are introduced in to it on account of
   a) Resistance to connecting leads b) Thermo electric emfs
   c) Contact resistances d) All of above

13) In CRO saw tooth voltage is applied at the
   a) vertical deflecting plates b) horizontal deflecting plates
   c) accelerating anode d) cathode

14) Q meter works on principle of
   a) Mutual inductance
   b) Series resonance
   c) Self inductance
   d) Parallel resonance

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SLR-EP – 248

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2016
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

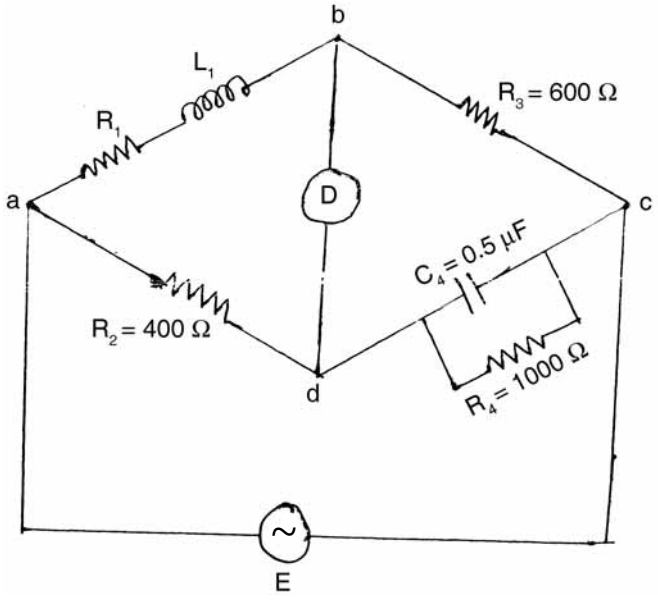
Day and Date : Tuesday, 20-12-2016 Max. Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
2) Figure to ***right*** *indicates* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) What do you mean by errors. Explain systematic errors with its types.
   2) Explain Schering bridge for capacitance measurement. Draw phasor diagram.
   3) Explain how the megger is used for insulation testing.
   4) With the help of diagram explain the working of spring and gravity control.
   5) Using a Weston cadium cell of 1.0183 V and a standard resistance of 0.1 Ω, a potentiometer was adjusted so that 1.0183 m was equivalent to the emf of cell ; when a certain direct current was flowing through the standard resistance. The voltage across I correspond to 150 cm. What was the value of current ?

3. Solve **any two** : **(2×6=12)**
   1) Derive the equations for calculations of shunts and multipliers.
   2) The inductance of a moving iron instrument is given by : $L = (10 + 5\theta - \theta^2)\,\mu H$ where θ is deflection in radian from zero position. The spring constant is 12×10^{-6} Nm/rad. Estimate deflection for a current of 5 A.
   3) An AC bridge is connected as shown. Determine the resistance and inductance of arm ab and storage Q-factor if frequency is 1000 Hz.



Set S

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) Draw block diagram of successive approximation type digital voltmeter and explain.

   b) Explain with neat block diagram working of general purpose CRO.

   c) Define following terms as applied to instrument transformer.

      i) Burden of an instrument transformer

      ii) Actual transformation ratio.

      iii) Nominal transformation ratio.

      iv) Turns ratio.

   d) Explain with the help of block diagram working of Digital Multimeter.

   e) Explain data acquisition system.

5. Solve **any two** : **(2×6=12)**

   a) What is multiplexing ? Explain different types of multiplexing.

   b) Draw phasor diagram of CT and discuss the effect of variation of power factor of secondary burden on performance of CT.

   c) Explain with neat diagram working of electronic frequency counter.

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SLR-EP – 249

Seat No.	

Set P

S.E. (Part – I) (Electrical Engineering) Examination, 2016
POWER PLANT ENGINEERING (CGPA)

Day and Date : Thursday, 22-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Hydro plant installed capacity depends on
a) Storage b) Discharge c) Head d) All

2) For high-power output, which of the following turbines is used ?
a) Francis b) Kaplan c) Pelton d) Propeller

3) For medium output about (330,000 H.P.), which of the following turbines is used ?
a) Francis b) Kaplan c) Pelton d) Propeller

4) For low output (about 150,000 H.P.), which of the following turbines is used ?
a) Francis b) Kaplan c) Pelton d) Propeller

5) For high-head plants, the permissible velocity of water through the penstock is
a) 8 m/sec b) 4 m/sec c) 2 m/sec d) 10 m/sec

6) Whenever the boiler pressure exceeds 70 kg/cm^2 invariably we use
a) Super heater b) Condenser
c) Turbine d) Economizer

7) The temperature inside the water tube boiler is
   a) 300°C b) 400°C c) 560°C d) 720°C

8) Which of the following is considered as superior quality of coal ?
   a) Peat b) Coke
   c) Bituminous coal d) Lignite

9) Ash content of Indian coal is approximately
   a) 5% b) 8% c) 10% d) 25%

10) Water is supplied to boiler
   a) At 120 kg/m^2
   b) At atmospheric pressure
   c) At slightly more than atmospheric pressure
   d) At more than the steam pressure in the boiler

11) The efficiency of ESP is as high as
   a) 99.6% b) 90% c) 85% d) 80%

12) The addition of ESP apparatus in a thermal plant
   a) Increases the efficiency of the plant
   b) Increases the reliability of the plant
   c) Decreases both the efficiency and the reliability
   d) Has no efficiency and reliability of plant

13) The useful life of thermal and hydroplants are
   a) 25 and 125 years
   b) 40 and 160 years
   c) 45 and 175 years
   d) 100 years

14) The machines used in hydro and thermal plants run at
   a) 300 and 3000 r.p.m.
   b) 500 and 6000 r.p.m.
   c) 3000 and 300 r.p.m.
   d) 6000 and 600 r.p.m.

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SLR-EP – 249

Seat No.	

S.E. (Part – I) (Electrical Engineering) Examination, 2016
POWER PLANT ENGINEERING (CGPA)

Day and Date : Thursday, 22-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**

1) The annual peak load on a 30 MW power station is 25 MW. The power station supplies load having maximum demands of 10 MW, 8.5 MW, 5 MW and 4.5 MW. The annual load factor is 0.45. Find : (i) Average load (ii) Energy supplied per year (iii) Diversity factor (iv) Demand factor.

2) Write short note on :
   i) Selection of generating units
   ii) Interconnected grid system.

3) Write advantages and disadvantages of Hydro-electric power plant.

4) Discuss factors governing the choice of site for hydro station.

5) Elaborate advantages and disadvantages of thermal power plant.

6) Give the general layout of ash handling system and dust collecting system.

3. Attempt **any two** : **(2×6=12)**

1) Write a short note on fluidized bed combustion.

2) Explain the layout of hydro power plant in detail.

OR

2) Explain function of condenser and cooling tower in thermal power plant.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Write advantages and disadvantages of diesel power plant and gas power plant.
   2) Discuss the factors governing the choice of site for gas turbine power plant.
   3) Classify reactors and explain any one in detail.
   4) Explain fission and fusion with neat sketch.
   5) Write a short note on tidal power generation.
   6) What is geothermal energy ? How it can be used for power generation ?

5. Attempt **any two** : **(2×6=12)**
   1) Explain with neat sketch, types of solar energy collectors with principle of solar collector.
   2) Describe with neat sketch the construction and operation of heavy water cooled and moderate reactor. What are its advantages and disadvantages ?

      OR

   2) With neat diagram, explain the working of nuclear power plant.

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SLR-EP – 249

Seat No.	

Set **Q**

S.E. (Part – I) (Electrical Engineering) Examination, 2016
POWER PLANT ENGINEERING (CGPA)

Day and Date : Thursday, 22-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Which of the following is considered as superior quality of coal ?
   a) Peat b) Coke
   c) Bituminous coal d) Lignite

2) Ash content of Indian coal is approximately
   a) 5% b) 8% c) 10% d) 25%

3) Water is supplied to boiler
   a) At 120 kg/m^2
   b) At atmospheric pressure
   c) At slightly more than atmospheric pressure
   d) At more than the steam pressure in the boiler

4) The efficiency of ESP is as high as
   a) 99.6% b) 90% c) 85% d) 80%

5) The addition of ESP apparatus in a thermal plant
   a) Increases the efficiency of the plant
   b) Increases the reliability of the plant
   c) Decreases both the efficiency and the reliability
   d) Has no efficiency and reliability of plant

6) The useful life of thermal and hydroplants are
   a) 25 and 125 years
   b) 40 and 160 years
   c) 45 and 175 years
   d) 100 years

7) The machines used in hydro and thermal plants run at
   a) 300 and 3000 r.p.m.
   b) 500 and 6000 r.p.m.
   c) 3000 and 300 r.p.m.
   d) 6000 and 600 r.p.m.

8) Hydro plant installed capacity depends on
   a) Storage b) Discharge c) Head d) All

9) For high-power output, which of the following turbines is used ?
   a) Francis b) Kaplan c) Pelton d) Propeller

10) For medium output about (330,000 H.P.), which of the following turbines is used ?
   a) Francis b) Kaplan c) Pelton d) Propeller

11) For low output (about 150,000 H.P.), which of the following turbines is used ?
   a) Francis b) Kaplan c) Pelton d) Propeller

12) For high-head plants, the permissible velocity of water through the penstock is
   a) 8 m/sec b) 4 m/sec c) 2 m/sec d) 10 m/sec

13) Whenever the boiler pressure exceeds 70 kg/cm^2 invariably we use
   a) Super heater b) Condenser
   c) Turbine d) Economizer

14) The temperature inside the water tube boiler is
   a) 300°C b) 400°C c) 560°C d) 720°C

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SLR-EP – 249

Seat No.	

S.E. (Part – I) (Electrical Engineering) Examination, 2016
POWER PLANT ENGINEERING (CGPA)

Day and Date : Thursday, 22-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**

1) The annual peak load on a 30 MW power station is 25 MW. The power station supplies load having maximum demands of 10 MW, 8.5 MW, 5 MW and 4.5 MW. The annual load factor is 0.45. Find : (i) Average load (ii) Energy supplied per year (iii) Diversity factor (iv) Demand factor.

2) Write short note on :
   i) Selection of generating units
   ii) Interconnected grid system.

3) Write advantages and disadvantages of Hydro-electric power plant.

4) Discuss factors governing the choice of site for hydro station.

5) Elaborate advantages and disadvantages of thermal power plant.

6) Give the general layout of ash handling system and dust collecting system.

3. Attempt **any two** : **(2×6=12)**

1) Write a short note on fluidized bed combustion.

2) Explain the layout of hydro power plant in detail.

OR

2) Explain function of condenser and cooling tower in thermal power plant.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Write advantages and disadvantages of diesel power plant and gas power plant.
   2) Discuss the factors governing the choice of site for gas turbine power plant.
   3) Classify reactors and explain any one in detail.
   4) Explain fission and fusion with neat sketch.
   5) Write a short note on tidal power generation.
   6) What is geothermal energy ? How it can be used for power generation ?

5. Attempt **any two** : **(2×6=12)**
   1) Explain with neat sketch, types of solar energy collectors with principle of solar collector.
   2) Describe with neat sketch the construction and operation of heavy water cooled and moderate reactor. What are its advantages and disadvantages ?

      OR

   2) With neat diagram, explain the working of nuclear power plant.

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SLR-EP – 249

Seat No.	

Set **R**

S.E. (Part – I) (Electrical Engineering) Examination, 2016
POWER PLANT ENGINEERING (CGPA)

Day and Date : Thursday, 22-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) For high-head plants, the permissible velocity of water through the penstock is
   a) 8 m/sec b) 4 m/sec c) 2 m/sec d) 10 m/sec

2) Whenever the boiler pressure exceeds 70 kg/cm^2 invariably we use
   a) Super heater b) Condenser c) Turbine d) Economizer

3) The temperature inside the water tube boiler is
   a) 300°C b) 400°C c) 560°C d) 720°C

4) Which of the following is considered as superior quality of coal ?
   a) Peat b) Coke
   c) Bituminous coal d) Lignite

5) Ash content of Indian coal is approximately
   a) 5% b) 8% c) 10% d) 25%

6) Water is supplied to boiler
   a) At 120 kg/m^2
   b) At atmospheric pressure
   c) At slightly more than atmospheric pressure
   d) At more than the steam pressure in the boiler

P.T.O.

7) The efficiency of ESP is as high as
   a) 99.6% b) 90% c) 85% d) 80%

8) The addition of ESP apparatus in a thermal plant
   a) Increases the efficiency of the plant
   b) Increases the reliability of the plant
   c) Decreases both the efficiency and the reliability
   d) Has no efficiency and reliability of plant

9) The useful life of thermal and hydroplants are
   a) 25 and 125 years
   b) 40 and 160 years
   c) 45 and 175 years
   d) 100 years

10) The machines used in hydro and thermal plants run at
   a) 300 and 3000 r.p.m.
   b) 500 and 6000 r.p.m.
   c) 3000 and 300 r.p.m.
   d) 6000 and 600 r.p.m.

11) Hydro plant installed capacity depends on
   a) Storage b) Discharge c) Head d) All

12) For high-power output, which of the following turbines is used ?
   a) Francis b) Kaplan c) Pelton d) Propeller

13) For medium output about (330,000 H.P.), which of the following turbines is used ?
   a) Francis b) Kaplan c) Pelton d) Propeller

14) For low output (about 150,000 H.P.), which of the following turbines is used ?
   a) Francis b) Kaplan c) Pelton d) Propeller

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SLR-EP – 249

Seat No.	

S.E. (Part – I) (Electrical Engineering) Examination, 2016
POWER PLANT ENGINEERING (CGPA)

Day and Date : Thursday, 22-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**

1) The annual peak load on a 30 MW power station is 25 MW. The power station supplies load having maximum demands of 10 MW, 8.5 MW, 5 MW and 4.5 MW. The annual load factor is 0.45. Find : (i) Average load (ii) Energy supplied per year (iii) Diversity factor (iv) Demand factor.

2) Write short note on :
   i) Selection of generating units
   ii) Interconnected grid system.

3) Write advantages and disadvantages of Hydro-electric power plant.

4) Discuss factors governing the choice of site for hydro station.

5) Elaborate advantages and disadvantages of thermal power plant.

6) Give the general layout of ash handling system and dust collecting system.

3. Attempt **any two** : **(2×6=12)**

1) Write a short note on fluidized bed combustion.

2) Explain the layout of hydro power plant in detail.

OR

2) Explain function of condenser and cooling tower in thermal power plant.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Write advantages and disadvantages of diesel power plant and gas power plant.
   2) Discuss the factors governing the choice of site for gas turbine power plant.
   3) Classify reactors and explain any one in detail.
   4) Explain fission and fusion with neat sketch.
   5) Write a short note on tidal power generation.
   6) What is geothermal energy ? How it can be used for power generation ?

5. Attempt **any two** : **(2×6=12)**
   1) Explain with neat sketch, types of solar energy collectors with principle of solar collector.
   2) Describe with neat sketch the construction and operation of heavy water cooled and moderate reactor. What are its advantages and disadvantages ?

      OR

   2) With neat diagram, explain the working of nuclear power plant.

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SLR-EP – 249

Seat No.	

Set **S**

S.E. (Part – I) (Electrical Engineering) Examination, 2016
POWER PLANT ENGINEERING (CGPA)

Day and Date : Thursday, 22-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Water is supplied to boiler
   a) At 120 kg/m^2
   b) At atmospheric pressure
   c) At slightly more than atmospheric pressure
   d) At more than the steam pressure in the boiler

2) The efficiency of ESP is as high as
   a) 99.6% b) 90% c) 85% d) 80%

3) The addition of ESP apparatus in a thermal plant
   a) Increases the efficiency of the plant
   b) Increases the reliability of the plant
   c) Decreases both the efficiency and the reliability
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4) The useful life of thermal and hydroplants are
   a) 25 and 125 years
   b) 40 and 160 years
   c) 45 and 175 years
   d) 100 years

P.T.O.

5) The machines used in hydro and thermal plants run at
   a) 300 and 3000 r.p.m.
   b) 500 and 6000 r.p.m.
   c) 3000 and 300 r.p.m.
   d) 6000 and 600 r.p.m.

6) Hydro plant installed capacity depends on
   a) Storage b) Discharge c) Head d) All

7) For high-power output, which of the following turbines is used ?
   a) Francis b) Kaplan c) Pelton d) Propeller

8) For medium output about (330,000 H.P.), which of the following turbines is used ?
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9) For low output (about 150,000 H.P.), which of the following turbines is used ?
   a) Francis b) Kaplan c) Pelton d) Propeller

10) For high-head plants, the permissible velocity of water through the penstock is
   a) 8 m/sec b) 4 m/sec c) 2 m/sec d) 10 m/sec

11) Whenever the boiler pressure exceeds 70 kg/cm^2 invariably we use
   a) Super heater b) Condenser
   c) Turbine d) Economizer

12) The temperature inside the water tube boiler is
   a) 300°C b) 400°C c) 560°C d) 720°C

13) Which of the following is considered as superior quality of coal ?
   a) Peat b) Coke
   c) Bituminous coal d) Lignite

14) Ash content of Indian coal is approximately
   a) 5% b) 8% c) 10% d) 25%

SLR-EP – 249

Seat No.	

S.E. (Part – I) (Electrical Engineering) Examination, 2016
POWER PLANT ENGINEERING (CGPA)

Day and Date : Thursday, 22-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**

1) The annual peak load on a 30 MW power station is 25 MW. The power station supplies load having maximum demands of 10 MW, 8.5 MW, 5 MW and 4.5 MW. The annual load factor is 0.45. Find : (i) Average load (ii) Energy supplied per year (iii) Diversity factor (iv) Demand factor.

2) Write short note on :
   i) Selection of generating units
   ii) Interconnected grid system.

3) Write advantages and disadvantages of Hydro-electric power plant.

4) Discuss factors governing the choice of site for hydro station.

5) Elaborate advantages and disadvantages of thermal power plant.

6) Give the general layout of ash handling system and dust collecting system.

3. Attempt **any two** : **(2×6=12)**

1) Write a short note on fluidized bed combustion.

2) Explain the layout of hydro power plant in detail.

OR

2) Explain function of condenser and cooling tower in thermal power plant.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Write advantages and disadvantages of diesel power plant and gas power plant.
   2) Discuss the factors governing the choice of site for gas turbine power plant.
   3) Classify reactors and explain any one in detail.
   4) Explain fission and fusion with neat sketch.
   5) Write a short note on tidal power generation.
   6) What is geothermal energy ? How it can be used for power generation ?

5. Attempt **any two** : **(2×6=12)**
   1) Explain with neat sketch, types of solar energy collectors with principle of solar collector.
   2) Describe with neat sketch the construction and operation of heavy water cooled and moderate reactor. What are its advantages and disadvantages ?

      OR

   2) With neat diagram, explain the working of nuclear power plant.

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SLR-EP – 250

Seat No.	

Set **P**

S.E. (Part – I) (Electrical) (Old) Examination, 2016
DATA STRUCTURE

Day and Date : Saturday, 10-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

(20×1=20)

1. 1) Multidimensional array is represented as
   a) Data Type Array [size]
   b) Data Type Array [size 1] [size 2]
   c) Data Type Array [size 1] [size 2] [size 3]
   d) None

   2) Which of the following operator is a logical operator ?
   a) & b) * c) && d) ?

   3) The fseek() function is used for
   a) Setting the position to the beginning of file
   b) Give the current position in the file
   c) Set position to a desired point in the file
   d) None

   4) A _____ is self contained block of statements that performs a specific task.
   a) Array b) Structure c) Function d) Pointer

   5) An infix expression can be converted to a postfix expression using a
   a) Stack b) Queue c) Dequeue d) None of these

   6) The postfix form of A*B+C/D is
   a) *AB/CD+ b) AB*CD/+ c) A*BC+/D d) ABCD+/*

   7) struct emp
   {
   char name [10];
   int age;
   }e;

   declaration requires _____ memory space.
   a) 22 bytes b) 12 bytes c) 1 word d) 14 bytes

P.T.O.

8) Recursive procedures are implemented by
   a) Queue b) Stack c) Linked list d) String

9) In _____ searching the records must be sorted.
   a) Linear b) Hashing c) Binary d) None

10) Divide and conquer technique is present in
   a) Bubble sort b) Merge sort c) Selection sort d) None

11) Priority queue means
   a) Assigning priority to each element of queue
   b) Giving the priority to queue
   c) Assigning priority to any some elements of queue
   d) None of the above

12) If the character 'D', 'C', 'B', 'A' are placed in a queue (in that order) and then remove one at a time, in what sequence they be removed ?
   a) ABCD b) ABDC c) DCAB d) DCBA

13) Deletion of a node in linked list involves keeping track of the address of the node
   a) Which immediately follows the node that is to be deleted
   b) Which immediately precedes the node that is to be deleted
   c) That is to be deleted
   d) None of these

14) Which of the following is not the application of stack ?
   a) Addition of 2 polynomials b) Evaluation of postfix expression
   c) Matching of parentheses in expression d) Conversion of infix to postfix expression

15) If fopen() fails it return
   a) – 1 b) NULL c) 1 d) File pointer

16) The running time of the following sorting algorithm depends on whether the partitioning is balanced or unbalanced
   a) Insertion sort b) Selection sort c) Quick sort d) Merge sort

17) Stack can not be used to
   a) Allocating resources and scheduling b) Implementation of recursion
   c) Reverse string d) Evaluation of postfix expression

18) Overflow condition in linked list may occur when attempting to
   a) Create a node when free space pool is empty
   b) Traverse the nodes when free space pool is empty
   c) Create a node when linked list is empty
   d) None of these

19) Direct or random access of elements is not possible in
   a) Linked list b) Array c) String d) None of these

20) A technique for direct search is
   a) Binary search b) Linear search c) Tree search d) Hashing

SLR-EP – 250

Seat No.	

S.E. (Part – I) (Electrical) (Old) Examination, 2016
DATA STRUCTURE

Day and Date : Saturday, 10-12-2016 Max. Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
   1) Explain storage classes in 'C'.
   2) Explain different file handling functions in 'C'.
   3) What is an Abstract Data Type ? Explain array as an ADT.
   4) Differentiate between Structure and Union.
   5) Write a short note on stack.

3. Attempt **any one** question : **10**
   1) How to evaluate a postfix expression ? Evaluate following postfix expression.
      123*+4–
   2) WAP to implement stack using array.

4. Attempt the question : **10**
   Explain the conversion of infix expression into postfix expression. Convert following infix expression into postfix (A + B) * (C + D).

SECTION – II

5. Attempt **any four** questions : **(4×5=20)**
   1) WAP to calculate factorial of number using recursion.
   2) Explain priority queue in detail.
   3) Differentiate between linear search and binary search.
   4) Define Hashing. What are the different criterias to choose a good hash function ?
   5) Sort the following sequence in ascending order using bubble sort :
      40, 20, 50, 60, 30, 10

6. Solve **any one** question : **10**
   1) Write a note on circular doubly linked list.
   2) Explain quick sort and sort following sequence using quick sort.
      5, 23, 21, 18, 16, 02, 20, 22, 25.

7. Explain doubly linked list with insertion and deletion operation. **10**

Set P

Set P

SLR-EP – 250

Seat No.	

Set **Q**

S.E. (Part – I) (Electrical) (Old) Examination, 2016
DATA STRUCTURE

Day and Date : Saturday, 10-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

(20×1=20)

1. 1) The running time of the following sorting algorithm depends on whether the partitioning is balanced or unbalanced
   a) Insertion sort b) Selection sort c) Quick sort d) Merge sort

   2) Stack can not be used to
   a) Allocating resources and scheduling b) Implementation of recursion
   c) Reverse string d) Evaluation of postfix expression

   3) Overflow condition in linked list may occur when attempting to
   a) Create a node when free space pool is empty
   b) Traverse the nodes when free space pool is empty
   c) Create a node when linked list is empty
   d) None of these

   4) Direct or random access of elements is not possible in
   a) Linked list b) Array c) String d) None of these

   5) A technique for direct search is
   a) Binary search b) Linear search c) Tree search d) Hashing

   6) Multidimensional array is represented as
   a) Data Type Array [size]
   b) Data Type Array [size 1] [size 2]
   c) Data Type Array [size 1] [size 2] [size 3]
   d) None

   7) Which of the following operator is a logical operator ?
   a) & b) * c) && d) ?

   8) The fseek() function is used for
   a) Setting the position to the beginning of file
   b) Give the current position in the file
   c) Set position to a desired point in the file
   d) None

P.T.O.

9) A _____ is self contained block of statements that performs a specific task.
a) Array b) Structure c) Function d) Pointer

10) An infix expression can be converted to a postfix expression using a
a) Stack b) Queue c) Dequeue d) None of these

11) The postfix form of A*B+C/D is
a) *AB/CD+ b) AB*CD/+ c) A*BC+/D d) ABCD+/*

12) struct emp
{
char name [10];
int age;
}e;

declaration requires _____ memory space.
a) 22 bytes b) 12 bytes c) 1 word d) 14 bytes

13) Recursive procedures are implemented by
a) Queue b) Stack c) Linked list d) String

14) In _____ searching the records must be sorted.
a) Linear b) Hashing c) Binary d) None

15) Divide and conquer technique is present in
a) Bubble sort b) Merge sort c) Selection sort d) None

16) Priority queue means
a) Assigning priority to each element of queue
b) Giving the priority to queue
c) Assigning priority to any some elements of queue
d) None of the above

17) If the character 'D', 'C', 'B', 'A' are placed in a queue (in that order) and then remove one at a time, in what sequence they be removed ?
a) ABCD b) ABDC c) DCAB d) DCBA

18) Deletion of a node in linked list involves keeping track of the address of the node
a) Which immediately follows the node that is to be deleted
b) Which immediately precedes the node that is to be deleted
c) That is to be deleted
d) None of these

19) Which of the following is not the application of stack ?
a) Addition of 2 polynomials b) Evaluation of postfix expression
c) Matching of parentheses in expression d) Conversion of infix to postfix expression

20) If fopen() fails it return
a) – 1 b) NULL c) 1 d) File pointer

_____

SLR-EP – 250

Seat No.	

S.E. (Part – I) (Electrical) (Old) Examination, 2016
DATA STRUCTURE

Day and Date : Saturday, 10-12-2016 Max. Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
   1) Explain storage classes in 'C'.
   2) Explain different file handling functions in 'C'.
   3) What is an Abstract Data Type ? Explain array as an ADT.
   4) Differentiate between Structure and Union.
   5) Write a short note on stack.

3. Attempt **any one** question : **10**
   1) How to evaluate a postfix expression ? Evaluate following postfix expression.
      123*+4–
   2) WAP to implement stack using array.

4. Attempt the question : **10**
   Explain the conversion of infix expression into postfix expression. Convert following infix expression into postfix (A + B) * (C + D).

SECTION – II

5. Attempt **any four** questions : **(4×5=20)**
   1) WAP to calculate factorial of number using recursion.
   2) Explain priority queue in detail.
   3) Differentiate between linear search and binary search.
   4) Define Hashing. What are the different criterias to choose a good hash function ?
   5) Sort the following sequence in ascending order using bubble sort :
      40, 20, 50, 60, 30, 10

6. Solve **any one** question : **10**
   1) Write a note on circular doubly linked list.
   2) Explain quick sort and sort following sequence using quick sort.
      5, 23, 21, 18, 16, 02, 20, 22, 25.

7. Explain doubly linked list with insertion and deletion operation. **10**

Set Q

Set Q

SLR-EP – 250

Seat No.	

Set **R**

S.E. (Part – I) (Electrical) (Old) Examination, 2016
DATA STRUCTURE

Day and Date : Saturday, 10-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

(20×1=20)

1. 1) Priority queue means
   a) Assigning priority to each element of queue
   b) Giving the priority to queue
   c) Assigning priority to any some elements of queue
   d) None of the above

   2) If the character 'D', 'C', 'B', 'A' are placed in a queue (in that order) and then remove one at a time, in what sequence they be removed ?
   a) ABCD b) ABDC c) DCAB d) DCBA

   3) Deletion of a node in linked list involves keeping track of the address of the node
   a) Which immediately follows the node that is to be deleted
   b) Which immediately precedes the node that is to be deleted
   c) That is to be deleted
   d) None of these

   4) Which of the following is not the application of stack ?
   a) Addition of 2 polynomials b) Evaluation of postfix expression
   c) Matching of parentheses in expression d) Conversion of infix to postfix expression

   5) If fopen() fails it return
   a) – 1 b) NULL c) 1 d) File pointer

   6) The running time of the following sorting algorithm depends on whether the partitioning is balanced or unbalanced
   a) Insertion sort b) Selection sort c) Quick sort d) Merge sort

   7) Stack can not be used to
   a) Allocating resources and scheduling b) Implementation of recursion
   c) Reverse string d) Evaluation of postfix expression

P.T.O.

8) Overflow condition in linked list may occur when attempting to
   a) Create a node when free space pool is empty
   b) Traverse the nodes when free space pool is empty
   c) Create a node when linked list is empty
   d) None of these

9) Direct or random access of elements is not possible in
   a) Linked list b) Array c) String d) None of these

10) A technique for direct search is
   a) Binary search b) Linear search c) Tree search d) Hashing

11) Multidimensional array is represented as
   a) Data Type Array [size]
   b) Data Type Array [size 1] [size 2]
   c) Data Type Array [size 1] [size 2] [size 3]
   d) None

12) Which of the following operator is a logical operator ?
   a) & b) * c) && d) ?

13) The fseek() function is used for
   a) Setting the position to the beginning of file
   b) Give the current position in the file
   c) Set position to a desired point in the file
   d) None

14) A _____ is self contained block of statements that performs a specific task.
   a) Array b) Structure c) Function d) Pointer

15) An infix expression can be converted to a postfix expression using a
   a) Stack b) Queue c) Dequeue d) None of these

16) The postfix form of A*B+C/D is
   a) *AB/CD+ b) AB*CD/+ c) A*BC+/D d) ABCD+/*

17) struct emp
```
{
 char name [10];
  int age;
}e;
```
   declaration requires _____ memory space.
   a) 22 bytes b) 12 bytes c) 1 word d) 14 bytes

18) Recursive procedures are implemented by
   a) Queue b) Stack c) Linked list d) String

19) In _____ searching the records must be sorted.
   a) Linear b) Hashing c) Binary d) None

20) Divide and conquer technique is present in
   a) Bubble sort b) Merge sort c) Selection sort d) None

_____

SLR-EP – 250

Seat No.	

S.E. (Part – I) (Electrical) (Old) Examination, 2016
DATA STRUCTURE

Day and Date : Saturday, 10-12-2016 Max. Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
   1) Explain storage classes in 'C'.
   2) Explain different file handling functions in 'C'.
   3) What is an Abstract Data Type ? Explain array as an ADT.
   4) Differentiate between Structure and Union.
   5) Write a short note on stack.

3. Attempt **any one** question : **10**
   1) How to evaluate a postfix expression ? Evaluate following postfix expression.
      123*+4–
   2) WAP to implement stack using array.

4. Attempt the question : **10**
   Explain the conversion of infix expression into postfix expression. Convert following infix expression into postfix (A + B) * (C + D).

SECTION – II

5. Attempt **any four** questions : **(4×5=20)**
   1) WAP to calculate factorial of number using recursion.
   2) Explain priority queue in detail.
   3) Differentiate between linear search and binary search.
   4) Define Hashing. What are the different criterias to choose a good hash function ?
   5) Sort the following sequence in ascending order using bubble sort :
      40, 20, 50, 60, 30, 10

6. Solve **any one** question : **10**
   1) Write a note on circular doubly linked list.
   2) Explain quick sort and sort following sequence using quick sort.
      5, 23, 21, 18, 16, 02, 20, 22, 25.

7. Explain doubly linked list with insertion and deletion operation. **10**

Set R

Set R

SLR-EP – 250

Seat No.	

Set **S**

S.E. (Part – I) (Electrical) (Old) Examination, 2016
DATA STRUCTURE

Day and Date : Saturday, 10-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

(20×1=20)

1. 1) The postfix form of A*B+C/D is
   a) *AB/CD+ b) AB*CD/+ c) A*BC+/D d) ABCD+/*

   2) struct emp
   {
   char name [10];
   int age;
   }e;

   declaration requires _____ memory space.
   a) 22 bytes b) 12 bytes c) 1 word d) 14 bytes

   3) Recursive procedures are implemented by
   a) Queue b) Stack c) Linked list d) String

   4) In _____ searching the records must be sorted.
   a) Linear b) Hashing c) Binary d) None

   5) Divide and conquer technique is present in
   a) Bubble sort b) Merge sort c) Selection sort d) None

   6) Priority queue means
   a) Assigning priority to each element of queue
   b) Giving the priority to queue
   c) Assigning priority to any some elements of queue
   d) None of the above

   7) If the character 'D', 'C', 'B', 'A' are placed in a queue (in that order) and then remove one at a time, in what sequence they be removed ?
   a) ABCD b) ABDC c) DCAB d) DCBA

   8) Deletion of a node in linked list involves keeping track of the address of the node
   a) Which immediately follows the node that is to be deleted
   b) Which immediately precedes the node that is to be deleted
   c) That is to be deleted
   d) None of these

P.T.O.

9) Which of the following is not the application of stack ?
   a) Addition of 2 polynomials
   b) Evaluation of postfix expression
   c) Matching of parentheses in expression
   d) Conversion of infix to postfix expression

10) If fopen() fails it return
   a) – 1 b) NULL c) 1 d) File pointer

11) The running time of the following sorting algorithm depends on whether the partitioning is balanced or unbalanced
   a) Insertion sort b) Selection sort c) Quick sort d) Merge sort

12) Stack can not be used to
   a) Allocating resources and scheduling
   b) Implementation of recursion
   c) Reverse string
   d) Evaluation of postfix expression

13) Overflow condition in linked list may occur when attempting to
   a) Create a node when free space pool is empty
   b) Traverse the nodes when free space pool is empty
   c) Create a node when linked list is empty
   d) None of these

14) Direct or random access of elements is not possible in
   a) Linked list b) Array c) String d) None of these

15) A technique for direct search is
   a) Binary search b) Linear search c) Tree search d) Hashing

16) Multidimensional array is represented as
   a) Data Type Array [size]
   b) Data Type Array [size 1] [size 2]
   c) Data Type Array [size 1] [size 2] [size 3]
   d) None

17) Which of the following operator is a logical operator ?
   a) & b) * c) && d) ?

18) The fseek() function is used for
   a) Setting the position to the beginning of file
   b) Give the current position in the file
   c) Set position to a desired point in the file
   d) None

19) A _____ is self contained block of statements that performs a specific task.
   a) Array b) Structure c) Function d) Pointer

20) An infix expression can be converted to a postfix expression using a
   a) Stack b) Queue c) Dequeue d) None of these

SLR-EP – 250

Seat No.	

S.E. (Part – I) (Electrical) (Old) Examination, 2016
DATA STRUCTURE

Day and Date : Saturday, 10-12-2016 Max. Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
   1) Explain storage classes in 'C'.
   2) Explain different file handling functions in 'C'.
   3) What is an Abstract Data Type ? Explain array as an ADT.
   4) Differentiate between Structure and Union.
   5) Write a short note on stack.

3. Attempt **any one** question : **10**
   1) How to evaluate a postfix expression ? Evaluate following postfix expression.
      123*+4–
   2) WAP to implement stack using array.

4. Attempt the question : **10**
   Explain the conversion of infix expression into postfix expression. Convert following infix expression into postfix (A + B) * (C + D).

SECTION – II

5. Attempt **any four** questions : **(4×5=20)**
   1) WAP to calculate factorial of number using recursion.
   2) Explain priority queue in detail.
   3) Differentiate between linear search and binary search.
   4) Define Hashing. What are the different criterias to choose a good hash function ?
   5) Sort the following sequence in ascending order using bubble sort :
      40, 20, 50, 60, 30, 10

6. Solve **any one** question : **10**
   1) Write a note on circular doubly linked list.
   2) Explain quick sort and sort following sequence using quick sort.
      5, 23, 21, 18, 16, 02, 20, 22, 25.

7. Explain doubly linked list with insertion and deletion operation. **10**

Set S

Set S

SLR-EP – 251

Seat No.	

Set P

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Monday, 21-11-2016 Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

3) Attempt ***any three*** *questions from* ***each*** *Section.*

4) ***Use*** *of scientific calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) If a function f(x) contains some other functions such as trigonometric, logarithmic, exponential then f(x) = 0 is called
   a) Linear equation b) Algebraic equation
   c) Transcendental equation d) Quadratic equation

2) If y = 3x + 4 is the best fit of 6 pairs of values of (x, y) by the method of least squares and $\sum y = 78$ then $\sum x =$ _____
   a) 18 b) 40
   c) 35 d) 50

3) LU decomposition of a matrix is possible for
   a) Only invertible matrix b) Only singular matrix
   c) Any square matrix d) Any ordered matrix

4) Every polynomial Pn(x) of degree n has
   a) n + 1 roots b) 2n roots
   c) Less than n roots d) Exactly n roots

5) If $f(x) = x^2+x+1$ then the first divided difference of arguments – 1 and 1 is
   a) 0 b) $\frac{1}{2}$
   c) 1 d) 2

6) Which of the following method is used to find the quadratic factor ?
   a) Newton – Raphson method b) Lin – Bairstow's method
   c) Bisection method d) Crout's method

7) Newton's divided difference formula is used to find polynomial, if given values of x are
   a) Equally spaced b) Unequally spaced
   c) Odd numbers d) Even numbers

P.T.O.

8) Following is not a Newton Cotes method

a) Simpson's $\frac{1}{3}$ rule b) Simpson's $\frac{3}{8}$ rule

c) Trapezoidal rule d) Crank – Nicolson method

9) For given data

x :	0	0.5	1
y :	1	0.8	0.5

The value of $I = \int_0^1 ydx$ by Trapezoidal rule is

a) 0.775 b) 0.275

c) 0.575 d) 0.755

10) Euler's approximation formula is given by

a) $y_{n+1} = y_n + hf(x_{n-1}, y_{n-1})$ b) $y_{n+1} = y_n + hf(x_n, y_n)$

c) $y_{n+1} = y_n + hf(x_{n+1}, y_{n-1})$ d) $y_{n+1} = y_0 + hf(x_n, y_n)$

11) Error in the Simpson's one-third rule is of order

a) h^3 b) h^4

c) h^5 d) None

12) Romberg's method is used to solve

a) Ordinary differential equation b) Partial differential equation

c) Integration d) Above all

13) The partial differential equation $U_{xx} - U_{yy} = 0$ is

a) Elliptic b) Parabolic

c) Hyperbolic d) None

14) Which of the following method is used to find largest eigen value of given square matrix ?

a) Cayley – Hamilton b) Newton's divided formula

c) Lagrange's method d) Power method

SLR-EP – 251

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Monday, 21-11-2016 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) **Use** of scientific calculator is **allowed**.*

SECTION – I

2. a) Two approximations to a real root of the equation $\cos x - x^2 - x = 0$ are –1.5 and –1.4. Use two iterations of the secant method to find the root. (Use four decimal arithmetic using radian mode). **3**

   b) Find by Newton – Raphson method a root of the equation $e^x = x^3 + \cos 25x$ which is near x = 4.5.
   (Perform two iterations only taking radian mode). **3**

   c) Find the real root of the equation $x\sin x + \cos x = 0$ between (2, 3) using Bisection method.
   (Perform three iterations only taking radian mode). **3**

3. a) Use Jacobi's method to solve
   $5x + 2y + z = 12$
   $x + 2y + 5z = 20$
   $x + 4y + 2z = 15$
   (Perform five iterations only). **3**

   b) Apply Crouts – Triangularization method (Factorization method) to solve the equations
   $x + y - z = 2$
   $2x + 3y + 5z = -3$
   $3x + 2y - 3z = 6$. **6**

4. a) Employ the method of least squares to fit a parabola $y = a + bx + cx^2$ in the following data (x, y) : (–1, 2), (0, 0), (0, 1), (1, 2). **3**

   b) Fit a curve of the form $y = ax^b$ to the following data : **3**

x :	61	26	7	2.6
y :	350	400	500	600

   OR

   b) Given u(–1) = 2, u(0) = 1, u(3) = –1, find u(1) using Newton's divided interpolation. **3**

   c) Using Lagrange's formula, express the function $\frac{x^2 + 6x - 1}{(x-1)(x+1)(x-4)(x-6)}$ as a sum of partial fractions. **4**

5. a) Find the quadratic factor of the equation $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$ using Lin-Bairstow's method upto first iteration only. **5**

   b) Find the cubic spline in the interval (2, 3) for the following table of values. **4**

x :	1	2	3
y :	– 6	– 1	16

SECTION – II

6. Attempt **any three** : **9**

a) Use Simpson's $\frac{1}{3}^{rd}$ rule to evaluate $\int_0^{\pi/2} \sqrt{\cos x}\, dx$ taking 8 subintervals.

b) Evaluate $\int_0^6 \frac{1}{1+x}\, dx$ using Simpson's $\frac{3}{8}^{th}$ rule with n = 6.

c) From the following table calculate the first and second derivative at x = 1.0

x	0.0	0.2	0.4	0.6	0.8	1.0	1.2
y	0.00	0.12	0.48	1.10	2.00	3.20	4.72

d) Determine $f'(0.16)$, $f''(0.16)$.

x	0.10	0.12	0.14	0.16	0.18	0.20	0.22
y	0.00	0.12	0.49	1.12	2.22	3.40	4.87

7. a) Find the numerically dominant eigen value and corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$ taking $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ as initial eigen vector. (Take 5 iterations). **5**

b) Using Jacobis method find all eigen values and eigen vectors of $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$. **4**

8. a) Using Runge Kutta method of order four, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1 at x = 0.2, 0.4, h = 0.2. **6**

b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5$, $t \geq 0$ given that u(x, 0) = 20, u(0, t) = 0, u(5, t) = 100. Compute u for the time step with h = 1 by Crank Nicholson method with $\alpha = 1$. **4**

9. a) Solve $\nabla^2 u = -10(x^2+y^2+10)$ over the square mesh with sides x = 0, y = 0, x = 3, y = 3 with u = 0 on the boundary and mesh length 1 unit. **4**

b) Use Romberg's method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to 4 decimal places with h = 0.5, 0.25, 0.125. **5**

SLR-EP – 251

Seat No.	

Set **Q**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Monday, 21-11-2016 Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

*3) Attempt **any three** questions from **each** Section.*

*4) **Use** of scientific calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Following is not a Newton Cotes method

a) Simpson's $\frac{1}{3}$ rule b) Simpson's $\frac{3}{8}$ rule

c) Trapezoidal rule d) Crank – Nicolson method

2) For given data

x :	0	0.5	1
y :	1	0.8	0.5

The value of $I = \int_0^1 ydx$ by Trapezoidal rule is

a) 0.775 b) 0.275

c) 0.575 d) 0.755

3) Euler's approximation formula is given by

a) $y_{n+1} = y_n + hf(x_{n-1}, y_{n-1})$ b) $y_{n+1} = y_n + hf(x_n, y_n)$

c) $y_{n+1} = y_n + \cdot f(x_{n+1}, y_{n-1})$ d) $y_{n+1} = y_0 + hf(x_n, y_n)$

4) Error in the Simpson's one-third rule is of order

a) h^3 b) h^4

c) h^5 d) None

5) Romberg's method is used to solve

a) Ordinary differential equation b) Partial differential equation

c) Integration d) Above all

P.T.O.

6) The partial differential equation $U_{xx} - U_{yy} = 0$ is
   a) Elliptic b) Parabolic
   c) Hyperbolic d) None

7) Which of the following method is used to find largest eigen value of given square matrix ?
   a) Cayley – Hamilton b) Newton's divided formula
   c) Lagrange's method d) Power method

8) If a function f(x) contains some other functions such as trigonometric, logarithmic, exponential then f(x) = 0 is called
   a) Linear equation b) Algebraic equation
   c) Transcendental equation d) Quadratic equation

9) If $y = 3x + 4$ is the best fit of 6 pairs of values of (x, y) by the method of least squares and $\sum y = 78$ then $\sum x =$ _____
   a) 18 b) 40
   c) 35 d) 50

10) LU decomposition of a matrix is possible for
   a) Only invertible matrix b) Only singular matrix
   c) Any square matrix d) Any ordered matrix

11) Every polynomial Pn(x) of degree n has
   a) n + 1 roots b) 2n roots
   c) Less than n roots d) Exactly n roots

12) If $f(x) = x^2+x+1$ then the first divided difference of arguments – 1 and 1 is
   a) 0 b) $\frac{1}{2}$
   c) 1 d) 2

13) Which of the following method is used to find the quadratic factor ?
   a) Newton – Raphson method b) Lin – Bairstow's method
   c) Bisection method d) Crout's method

14) Newton's divided difference formula is used to find polynomial, if given values of x are
   a) Equally spaced b) Unequally spaced
   c) Odd numbers d) Even numbers

_____

SLR-EP – 251

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Monday, 21-11-2016 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) **Use** of scientific calculator is **allowed**.*

SECTION – I

2. a) Two approximations to a real root of the equation $\cos x - x^2 - x = 0$ are –1.5 and –1.4. Use two iterations of the secant method to find the root. (Use four decimal arithmetic using radian mode). **3**

   b) Find by Newton – Raphson method a root of the equation $e^x = x^3 + \cos 25x$ which is near x = 4.5.
   (Perform two iterations only taking radian mode). **3**

   c) Find the real root of the equation $x\sin x + \cos x = 0$ between (2, 3) using Bisection method.
   (Perform three iterations only taking radian mode). **3**

3. a) Use Jacobi's method to solve
   $5x + 2y + z = 12$
   $x + 2y + 5z = 20$
   $x + 4y + 2z = 15$
   (Perform five iterations only). **3**

   b) Apply Crouts – Triangularization method (Factorization method) to solve the equations
   $x + y - z = 2$
   $2x + 3y + 5z = -3$
   $3x + 2y - 3z = 6$. **6**

4. a) Employ the method of least squares to fit a parabola $y = a + bx + cx^2$ in the following data (x, y) : (–1, 2), (0, 0), (0, 1), (1, 2). **3**

   b) Fit a curve of the form $y = ax^b$ to the following data : **3**

x :	61	26	7	2.6
y :	350	400	500	600

   OR

   b) Given u(–1) = 2, u(0) = 1, u(3) = –1, find u(1) using Newton's divided interpolation. **3**

   c) Using Lagrange's formula, express the function $\frac{x^2 + 6x - 1}{(x-1)(x+1)(x-4)(x-6)}$ as a sum of partial fractions. **4**

5. a) Find the quadratic factor of the equation $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$ using Lin-Bairstow's method upto first iteration only. **5**

   b) Find the cubic spline in the interval (2, 3) for the following table of values. **4**

x :	1	2	3
y :	– 6	– 1	16

SECTION – II

6. Attempt **any three** : **9**

a) Use Simpson's $\frac{1}{3}^{rd}$ rule to evaluate $\int_0^{\pi/2} \sqrt{\cos x}\, dx$ taking 8 subintervals.

b) Evaluate $\int_0^6 \frac{1}{1+x}\, dx$ using Simpson's $\frac{3}{8}^{th}$ rule with n = 6.

c) From the following table calculate the first and second derivative at x = 1.0

x	0.0	0.2	0.4	0.6	0.8	1.0	1.2
y	0.00	0.12	0.48	1.10	2.00	3.20	4.72

d) Determine $f'(0.16)$, $f''(0.16)$.

x	0.10	0.12	0.14	0.16	0.18	0.20	0.22
y	0.00	0.12	0.49	1.12	2.22	3.40	4.87

7. a) Find the numerically dominant eigen value and corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$ taking $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ as initial eigen vector. (Take 5 iterations). **5**

b) Using Jacobis method find all eigen values and eigen vectors of $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$. **4**

8. a) Using Runge Kutta method of order four, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1 at x = 0.2, 0.4, h = 0.2. **6**

b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5$, $t \geq 0$ given that u(x, 0) = 20, u(0, t) = 0, u(5, t) = 100. Compute u for the time step with h = 1 by Crank Nicholson method with $\alpha = 1$. **4**

9. a) Solve $\nabla^2 u = -10(x^2+y^2+10)$ over the square mesh with sides x = 0, y = 0, x = 3, y = 3 with u = 0 on the boundary and mesh length 1 unit. **4**

b) Use Romberg's method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to 4 decimal places with h = 0.5, 0.25, 0.125. **5**

Set Q

SLR-EP – 251

Seat No.	

Set **R**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Monday, 21-11-2016 Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

3) Attempt ***any three*** *questions from* ***each*** *Section.*

4) ***Use*** *of scientific calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) If $f(x) = x^2+x+1$ then the first divided difference of arguments – 1 and 1 is

a) 0 b) $\frac{1}{2}$

c) 1 d) 2

2) Which of the following method is used to find the quadratic factor ?

a) Newton – Raphson method b) Lin – Bairstow's method

c) Bisection method d) Crout's method

3) Newton's divided difference formula is used to find polynomial, if given values of x are

a) Equally spaced b) Unequally spaced

c) Odd numbers d) Even numbers

4) Following is not a Newton Cotes method

a) Simpson's $\frac{1}{3}$ rule b) Simpson's $\frac{3}{8}$ rule

c) Trapezoidal rule d) Crank – Nicolson method

5) For given data

x :	0	0.5	1
y :	1	0.8	0.5

The value of $I = \int_0^1 ydx$ by Trapezoidal rule is

a) 0.775 b) 0.275

c) 0.575 d) 0.755

6) Euler's approximation formula is given by
   a) $y_{n+1} = y_n + hf(x_{n-1}, y_{n-1})$ b) $y_{n+1} = y_n + hf(x_n, y_n)$
   c) $y_{n+1} = y_n + hf(x_{n+1}, y_{n-1})$ d) $y_{n+1} = y_0 + hf(x_n, y_n)$

7) Error in the Simpson's one-third rule is of order
   a) h^3 b) h^4
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8) Romberg's method is used to solve
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SLR-EP – 251

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Monday, 21-11-2016 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) **Use** of scientific calculator is **allowed**.*

SECTION – I

2. a) Two approximations to a real root of the equation $\cos x - x^2 - x = 0$ are –1.5 and –1.4. Use two iterations of the secant method to find the root. (Use four decimal arithmetic using radian mode). **3**

   b) Find by Newton – Raphson method a root of the equation $e^x = x^3 + \cos 25x$ which is near x = 4.5.
   (Perform two iterations only taking radian mode). **3**

   c) Find the real root of the equation $x\sin x + \cos x = 0$ between (2, 3) using Bisection method.
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   $5x + 2y + z = 12$
   $x + 2y + 5z = 20$
   $x + 4y + 2z = 15$
   (Perform five iterations only). **3**

   b) Apply Crouts – Triangularization method (Factorization method) to solve the equations
   $x + y - z = 2$
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   b) Fit a curve of the form $y = ax^b$ to the following data : **3**

x :	61	26	7	2.6
y :	350	400	500	600

   OR

   b) Given u(–1) = 2, u(0) = 1, u(3) = –1, find u(1) using Newton's divided interpolation. **3**

   c) Using Lagrange's formula, express the function $\frac{x^2 + 6x - 1}{(x-1)(x+1)(x-4)(x-6)}$ as a sum of partial fractions. **4**

5. a) Find the quadratic factor of the equation $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$ using Lin-Bairstow's method upto first iteration only. **5**

   b) Find the cubic spline in the interval (2, 3) for the following table of values. **4**

x :	1	2	3
y :	– 6	– 1	16

SECTION – II

6. Attempt **any three** : **9**

a) Use Simpson's $\frac{1}{3}^{rd}$ rule to evaluate $\int_0^{\pi/2} \sqrt{\cos x}\, dx$ taking 8 subintervals.

b) Evaluate $\int_0^6 \frac{1}{1+x}\, dx$ using Simpson's $\frac{3}{8}^{th}$ rule with n = 6.

c) From the following table calculate the first and second derivative at x = 1.0

x	0.0	0.2	0.4	0.6	0.8	1.0	1.2
y	0.00	0.12	0.48	1.10	2.00	3.20	4.72

d) Determine $f'(0.16)$, $f''(0.16)$.

x	0.10	0.12	0.14	0.16	0.18	0.20	0.22
y	0.00	0.12	0.49	1.12	2.22	3.40	4.87

7. a) Find the numerically dominant eigen value and corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$ taking $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ as initial eigen vector. (Take 5 iterations). **5**

b) Using Jacobis method find all eigen values and eigen vectors of $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$. **4**

8. a) Using Runge Kutta method of order four, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1 at x = 0.2, 0.4, h = 0.2. **6**

b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5$, $t \geq 0$ given that u(x, 0) = 20, u(0, t) = 0, u(5, t) = 100. Compute u for the time step with h = 1 by Crank Nicholson method with $\alpha = 1$. **4**

9. a) Solve $\nabla^2 u = -10(x^2+y^2+10)$ over the square mesh with sides x = 0, y = 0, x = 3, y = 3 with u = 0 on the boundary and mesh length 1 unit. **4**

b) Use Romberg's method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to 4 decimal places with h = 0.5, 0.25, 0.125. **5**

SLR-EP – 251

Seat No.	

Set S

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Monday, 21-11-2016 Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

3) Attempt ***any three*** *questions from* ***each*** *Section.*

4) ***Use*** *of scientific calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Euler's approximation formula is given by

a) $y_{n+1} = y_n + hf(x_{n-1}, y_{n-1})$ b) $y_{n+1} = y_n + hf(x_n, y_n)$

c) $y_{n+1} = y_n + hf(x_{n+1}, y_{n-1})$ d) $y_{n+1} = y_0 + hf(x_n, y_n)$

2) Error in the Simpson's one-third rule is of order

a) h^3 b) h^4

c) h^5 d) None

3) Romberg's method is used to solve

a) Ordinary differential equation b) Partial differential equation

c) Integration d) Above all

4) The partial differential equation $U_{xx} - U_{yy} = 0$ is

a) Elliptic b) Parabolic

c) Hyperbolic d) None

5) Which of the following method is used to find largest eigen value of given square matrix ?

a) Cayley – Hamilton b) Newton's divided formula

c) Lagrange's method d) Power method

6) If a function f(x) contains some other functions such as trigonometric, logarithmic, exponential then f(x) = 0 is called

a) Linear equation b) Algebraic equation

c) Transcendental equation d) Quadratic equation

P.T.O.

7) If $y = 3x + 4$ is the best fit of 6 pairs of values of (x, y) by the method of least squares and $\sum y = 78$ then $\sum x =$ _____
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   a) 0 b) $\frac{1}{2}$
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13) Following is not a Newton Cotes method
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14) For given data

x :	0	0.5	1
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   The value of $I = \int_0^1 y\,dx$ by Trapezoidal rule is
   a) 0.775 b) 0.275
   c) 0.575 d) 0.755

_____

SLR-EP – 251

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Monday, 21-11-2016 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) **Use** of scientific calculator is **allowed**.*

SECTION – I

2. a) Two approximations to a real root of the equation $\cos x - x^2 - x = 0$ are –1.5 and –1.4. Use two iterations of the secant method to find the root. (Use four decimal arithmetic using radian mode). **3**

   b) Find by Newton – Raphson method a root of the equation $e^x = x^3 + \cos 25x$ which is near x = 4.5.
   (Perform two iterations only taking radian mode). **3**

   c) Find the real root of the equation $x\sin x + \cos x = 0$ between (2, 3) using Bisection method.
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   $5x + 2y + z = 12$
   $x + 2y + 5z = 20$
   $x + 4y + 2z = 15$
   (Perform five iterations only). **3**

   b) Apply Crouts – Triangularization method (Factorization method) to solve the equations
   $x + y - z = 2$
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4. a) Employ the method of least squares to fit a parabola $y = a + bx + cx^2$ in the following data (x, y) : (–1, 2), (0, 0), (0, 1), (1, 2). **3**

   b) Fit a curve of the form $y = ax^b$ to the following data : **3**

x :	61	26	7	2.6
y :	350	400	500	600

   OR

   b) Given u(–1) = 2, u(0) = 1, u(3) = –1, find u(1) using Newton's divided interpolation. **3**

   c) Using Lagrange's formula, express the function $\frac{x^2 + 6x - 1}{(x-1)(x+1)(x-4)(x-6)}$ as a sum of partial fractions. **4**

5. a) Find the quadratic factor of the equation $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$ using Lin-Bairstow's method upto first iteration only. **5**

   b) Find the cubic spline in the interval (2, 3) for the following table of values. **4**

x :	1	2	3
y :	– 6	– 1	16

SECTION – II

6. Attempt **any three** : **9**

a) Use Simpson's $\frac{1}{3}^{rd}$ rule to evaluate $\int_0^{\pi/2} \sqrt{\cos x}\, dx$ taking 8 subintervals.

b) Evaluate $\int_0^6 \frac{1}{1+x}\, dx$ using Simpson's $\frac{3}{8}^{th}$ rule with n = 6.

c) From the following table calculate the first and second derivative at x = 1.0

x	0.0	0.2	0.4	0.6	0.8	1.0	1.2
y	0.00	0.12	0.48	1.10	2.00	3.20	4.72

d) Determine $f'(0.16)$, $f''(0.16)$.

x	0.10	0.12	0.14	0.16	0.18	0.20	0.22
y	0.00	0.12	0.49	1.12	2.22	3.40	4.87

7. a) Find the numerically dominant eigen value and corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$ taking $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ as initial eigen vector. (Take 5 iterations). **5**

b) Using Jacobis method find all eigen values and eigen vectors of $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$. **4**

8. a) Using Runge Kutta method of order four, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1 at x = 0.2, 0.4, h = 0.2. **6**

b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5$, $t \geq 0$ given that u(x, 0) = 20, u(0, t) = 0, u(5, t) = 100. Compute u for the time step with h = 1 by Crank Nicholson method with $\alpha = 1$. **4**

9. a) Solve $\nabla^2 u = -10(x^2+y^2+10)$ over the square mesh with sides x = 0, y = 0, x = 3, y = 3 with u = 0 on the boundary and mesh length 1 unit. **4**

b) Use Romberg's method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to 4 decimal places with h = 0.5, 0.25, 0.125. **5**

SLR-EP – 252

Seat No.	

Set **P**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL MACHINES – II

Day and Date : Tuesday, 22-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) The no-load current of a 3-phase induction motor in terms of its full-load current is of the order of
a) 5% b) 10% c) 25% d) 50%

2) The maximum torque in a 3-phase induction motor occurs at a slip
a) R2/X2 b) X2/R2 c) $R2^2/X2$ d) $R2^2/X2^2$

3) The effect of increasing the length of air-gap in an induction motor will be to increase the
a) power factor b) speed
c) magnetising current d) air-gap flux

4) Squirrel cage induction motors are not favored when _____ is considered.
a) initial cost b) low starting current
c) high starting torque d) both (a) and (b)

5) The starting torque of induction motor varies as
a) f b) $1/f^2$ c) 1/f d) f^2

6) Star-delta starting is equivalent to auto transformer starting with _____ tapping.
a) 33.3% b) 50% c) 57.7% d) 83%

7) The ratio of starting torque to normal torque in case of a star-delta starter will be
a) 0.35 b) 0.67 c) 1.07 d) 1.35

8) If any two phases for an induction motor are interchanged
a) The motor will run in reverse direction b) The motor will run at reduced speed
c) The motor will not run d) The motor will burn

9) For ceiling fans generally the single phase motor used is
a) Split phase type b) Capacitor start type
c) Capacitor start and run type d) Permanent capacitor type

P.T.O.

10) The extreme operating condition for I.M. are
   a) No load and standstill condition
   b) No load and full load condition
   c) Full load and standstill condition
   d) None of the above

11) The injected emf in the rotor of I.M. must have
   a) Zero frequency
   b) Same frequency as the slip frequency
   c) Same frequency as the rotor emf
   d) None of the above

12) Under blocked rotor condition the frequency of rotor current of a 3∅ 50Hz I.M. is
   a) 5 Hz b) 15 Hz c) 30 Hz d) 50 Hz

13) A single phase capacitor start motor will take starting current nearly
   a) Same as F.L. current
   b) Twice the F.L. current
   c) Three times the F.L. current
   d) Four to six times the F.L. current

14) The power factor of an I.M. under no load conditions will be closer to
   a) 0.2 lagging b) 0.2 leading c) 0.5 leading d) Unity

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SLR-EP – 252

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL MACHINES – II

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

A) A full load slip of 400 V, 3 phase squirrel cage IM is 3.5% and with locked rotor, full load current is circulated when 92 V is applied between lines. Find the necessary tapping on an autotransformer to limit starting current to twice the full load current.

B) Explain DOL starter with neat circuit diagram.

C) A three phase slip-ring induction motor gives a reading of 60 V across slip rings when at rest with normal stator voltage applied. The rotor is star connected and has an impedance of (0.8 + j6) ohm per phase. Find the rotor current when the machine is
   a) at standstill with the slip-rings joined to a star connected starter with a phase impedance of (4+j3) ohm.
   b) running normally with a 5% slip.

D) Draw and explain torque slip characteristics of three phase induction motor assuming torque equation at slip s.

E) In a double cage induction motor if the outer cage has an impedance at standstill of (2+j1) ohm, determine the slip at which the two cages develop equal torques if the inner cage has an impedance of (0.5+j3.5) ohm at standstill.

F) A 50 Hz, 6 pole induction motor runs at 94.5% of synchronous speed developing torque of 120 N-m the mechanical torque lost is 4 N-m and stator loss is 1430 watts. Calculate efficiency.

3. Solve the following : **(2×6=12)**

A) An 8-pole, 3-phase, 50 Hz induction motor running with a slip of 4% is taking 20 kW. Stator losses amount to 0.5 kW. If the mechanical torque lost in friction is 16.25 N-m, find
   i) BHP
   ii) Efficiency.

B) With neat sketch explain :
   1) DOL starter.
   2) Auto transformer starter.

OR

B) Derive an expression for starting torque and running torque for three phase induction motor.

Set P

SECTION – II

4. Attempt **any four** : **(4×4=16)**

   a) Explain construction and working of shaded pole induction motor.

   b) Explain rotor resistance control method of speed control of 3 phase I.M.

   c) A 240 V, 50 Hz, 2 pole single phase capacitor start motor has following constants referred to stator. Stator resistance = 2.2Ω, Rotor resistance = 3.8Ω, Stator resistance = 3Ω, Rotor reactance = 2.1Ω, Magnetizing reactance = 86Ω, Iron and friction loss = 50 W. Find output power and efficiency at the given loading.

   d) Explain induction motor as an induction generator and its limitations.

   e) Show that backward slip Sb = (2-S) where S is forward slip. Explain in detail.

5. Attempt **any two** : **(2×6=12)**

   a) Explain procedure to construct a circle diagram for induction motor.

   b) Explain the following speed control methods in detail.
      1) Slip power recovery scheme
      2) Cascade connection.

   c) Draw equivalent circuit of single phase induction motor on double revolving field theory.

SLR-EP – 252

Seat No.	

Set **Q**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL MACHINES – II

Day and Date : Tuesday, 22-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) If any two phases for an induction motor are interchanged
   a) The motor will run in reverse direction b) The motor will run at reduced speed
   c) The motor will not run d) The motor will burn

2) For ceiling fans generally the single phase motor used is
   a) Split phase type b) Capacitor start type
   c) Capacitor start and run type d) Permanent capacitor type

3) The extreme operating condition for I.M. are
   a) No load and standstill condition b) No load and full load condition
   c) Full load and standstill condition d) None of the above

4) The injected emf in the rotor of I.M. must have
   a) Zero frequency b) Same frequency as the slip frequency
   c) Same frequency as the rotor emf d) None of the above

5) Under blocked rotor condition the frequency of rotor current of a 3∅ 50Hz I.M. is
   a) 5 Hz b) 15 Hz c) 30 Hz d) 50 Hz

6) A single phase capacitor start motor will take starting current nearly
   a) Same as F.L. current b) Twice the F.L. current
   c) Three times the F.L. current d) Four to six times the F.L. current

7) The power factor of an I.M. under no load conditions will be closer to
   a) 0.2 lagging b) 0.2 leading c) 0.5 leading d) Unity

8) The no-load current of a 3-phase induction motor in terms of its full-load current is of the order of
   a) 5% b) 10% c) 25% d) 50%

P.T.O.

9) The maximum torque in a 3-phase induction motor occurs at a slip
   a) R2/X2 b) X2/R2 c) $R2^2/X2$ d) $R2^2/X2^2$

10) The effect of increasing the length of air-gap in an induction motor will be to increase the
   a) power factor b) speed
   c) magnetising current d) air-gap flux

11) Squirrel cage induction motors are not favored when _____ is considered.
   a) initial cost b) low starting current
   c) high starting torque d) both (a) and (b)

12) The starting torque of induction motor varies as
   a) f b) $1/f^2$ c) 1/f d) f^2

13) Star-delta starting is equivalent to auto transformer starting with _____ tapping.
   a) 33.3% b) 50% c) 57.7% d) 83%

14) The ratio of starting torque to normal torque in case of a star-delta starter will be
   a) 0.35 b) 0.67 c) 1.07 d) 1.35

_____

SLR-EP – 252

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL MACHINES – II

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

A) A full load slip of 400 V, 3 phase squirrel cage IM is 3.5% and with locked rotor, full load current is circulated when 92 V is applied between lines. Find the necessary tapping on an autotransformer to limit starting current to twice the full load current.

B) Explain DOL starter with neat circuit diagram.

C) A three phase slip-ring induction motor gives a reading of 60 V across slip rings when at rest with normal stator voltage applied. The rotor is star connected and has an impedance of (0.8 + j6) ohm per phase. Find the rotor current when the machine is
   a) at standstill with the slip-rings joined to a star connected starter with a phase impedance of (4+j3) ohm.
   b) running normally with a 5% slip.

D) Draw and explain torque slip characteristics of three phase induction motor assuming torque equation at slip s.

E) In a double cage induction motor if the outer cage has an impedance at standstill of (2+j1) ohm, determine the slip at which the two cages develop equal torques if the inner cage has an impedance of (0.5+j3.5) ohm at standstill.

F) A 50 Hz, 6 pole induction motor runs at 94.5% of synchronous speed developing torque of 120 N-m the mechanical torque lost is 4 N-m and stator loss is 1430 watts. Calculate efficiency.

3. Solve the following : **(2×6=12)**

A) An 8-pole, 3-phase, 50 Hz induction motor running with a slip of 4% is taking 20 kW. Stator losses amount to 0.5 kW. If the mechanical torque lost in friction is 16.25 N-m, find
   i) BHP
   ii) Efficiency.

B) With neat sketch explain :
   1) DOL starter.
   2) Auto transformer starter.

OR

B) Derive an expression for starting torque and running torque for three phase induction motor.

Set Q

SECTION – II

4. Attempt **any four** : **(4×4=16)**

   a) Explain construction and working of shaded pole induction motor.

   b) Explain rotor resistance control method of speed control of 3 phase I.M.

   c) A 240 V, 50 Hz, 2 pole single phase capacitor start motor has following constants referred to stator. Stator resistance = 2.2Ω, Rotor resistance = 3.8Ω, Stator resistance = 3Ω, Rotor reactance = 2.1Ω, Magnetizing reactance = 86Ω, Iron and friction loss = 50 W. Find output power and efficiency at the given loading.

   d) Explain induction motor as an induction generator and its limitations.

   e) Show that backward slip Sb = (2-S) where S is forward slip. Explain in detail.

5. Attempt **any two** : **(2×6=12)**

   a) Explain procedure to construct a circle diagram for induction motor.

   b) Explain the following speed control methods in detail.
      1) Slip power recovery scheme
      2) Cascade connection.

   c) Draw equivalent circuit of single phase induction motor on double revolving field theory.

SLR-EP – 252

Seat No.	

Set **R**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL MACHINES – II

Day and Date : Tuesday, 22-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) The starting torque of induction motor varies as
a) f b) $1/f^2$ c) 1/f d) f^2

2) Star-delta starting is equivalent to auto transformer starting with _____ tapping.
a) 33.3% b) 50% c) 57.7% d) 83%

3) The ratio of starting torque to normal torque in case of a star-delta starter will be
a) 0.35 b) 0.67 c) 1.07 d) 1.35

4) If any two phases for an induction motor are interchanged
a) The motor will run in reverse direction b) The motor will run at reduced speed
c) The motor will not run d) The motor will burn

5) For ceiling fans generally the single phase motor used is
a) Split phase type b) Capacitor start type
c) Capacitor start and run type d) Permanent capacitor type

6) The extreme operating condition for I.M. are
a) No load and standstill condition b) No load and full load condition
c) Full load and standstill condition d) None of the above

7) The injected emf in the rotor of I.M. must have
a) Zero frequency b) Same frequency as the slip frequency
c) Same frequency as the rotor emf d) None of the above

8) Under blocked rotor condition the frequency of rotor current of a 3∅ 50Hz I.M. is
a) 5 Hz b) 15 Hz c) 30 Hz d) 50 Hz

P.T.O.

9) A single phase capacitor start motor will take starting current nearly
   a) Same as F.L. current
   b) Twice the F.L. current
   c) Three times the F.L. current
   d) Four to six times the F.L. current

10) The power factor of an I.M. under no load conditions will be closer to
   a) 0.2 lagging
   b) 0.2 leading
   c) 0.5 leading
   d) Unity

11) The no-load current of a 3-phase induction motor in terms of its full-load current is of the order of
   a) 5%
   b) 10%
   c) 25%
   d) 50%

12) The maximum torque in a 3-phase induction motor occurs at a slip
   a) R2/X2
   b) X2/R2
   c) $R2^2/X2$
   d) $R2^2/X2^2$

13) The effect of increasing the length of air-gap in an induction motor will be to increase the
   a) power factor
   b) speed
   c) magnetising current
   d) air-gap flux

14) Squirrel cage induction motors are not favored when _____ is considered.
   a) initial cost
   b) low starting current
   c) high starting torque
   d) both (a) and (b)

_____

SLR-EP – 252

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL MACHINES – II

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

A) A full load slip of 400 V, 3 phase squirrel cage IM is 3.5% and with locked rotor, full load current is circulated when 92 V is applied between lines. Find the necessary tapping on an autotransformer to limit starting current to twice the full load current.

B) Explain DOL starter with neat circuit diagram.

C) A three phase slip-ring induction motor gives a reading of 60 V across slip rings when at rest with normal stator voltage applied. The rotor is star connected and has an impedance of (0.8 + j6) ohm per phase. Find the rotor current when the machine is
   a) at standstill with the slip-rings joined to a star connected starter with a phase impedance of (4+j3) ohm.
   b) running normally with a 5% slip.

D) Draw and explain torque slip characteristics of three phase induction motor assuming torque equation at slip s.

E) In a double cage induction motor if the outer cage has an impedance at standstill of (2+j1) ohm, determine the slip at which the two cages develop equal torques if the inner cage has an impedance of (0.5+j3.5) ohm at standstill.

F) A 50 Hz, 6 pole induction motor runs at 94.5% of synchronous speed developing torque of 120 N-m the mechanical torque lost is 4 N-m and stator loss is 1430 watts. Calculate efficiency.

3. Solve the following : **(2×6=12)**

A) An 8-pole, 3-phase, 50 Hz induction motor running with a slip of 4% is taking 20 kW. Stator losses amount to 0.5 kW. If the mechanical torque lost in friction is 16.25 N-m, find
   i) BHP
   ii) Efficiency.

B) With neat sketch explain :
   1) DOL starter.
   2) Auto transformer starter.

OR

B) Derive an expression for starting torque and running torque for three phase induction motor.

Set R

SECTION – II

4. Attempt **any four** : **(4×4=16)**

   a) Explain construction and working of shaded pole induction motor.

   b) Explain rotor resistance control method of speed control of 3 phase I.M.

   c) A 240 V, 50 Hz, 2 pole single phase capacitor start motor has following constants referred to stator. Stator resistance = 2.2Ω, Rotor resistance = 3.8Ω, Stator resistance = 3Ω, Rotor reactance = 2.1Ω, Magnetizing reactance = 86Ω, Iron and friction loss = 50 W. Find output power and efficiency at the given loading.

   d) Explain induction motor as an induction generator and its limitations.

   e) Show that backward slip Sb = (2-S) where S is forward slip. Explain in detail.

5. Attempt **any two** : **(2×6=12)**

   a) Explain procedure to construct a circle diagram for induction motor.

   b) Explain the following speed control methods in detail.
      1) Slip power recovery scheme
      2) Cascade connection.

   c) Draw equivalent circuit of single phase induction motor on double revolving field theory.

SLR-EP – 252

Seat No.	

Set **S**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL MACHINES – II

Day and Date : Tuesday, 22-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) The extreme operating condition for I.M. are
   a) No load and standstill condition
   b) No load and full load condition
   c) Full load and standstill condition
   d) None of the above

2) The injected emf in the rotor of I.M. must have
   a) Zero frequency
   b) Same frequency as the slip frequency
   c) Same frequency as the rotor emf
   d) None of the above

3) Under blocked rotor condition the frequency of rotor current of a 3∅ 50Hz I.M. is
   a) 5 Hz b) 15 Hz c) 30 Hz d) 50 Hz

4) A single phase capacitor start motor will take starting current nearly
   a) Same as F.L. current
   b) Twice the F.L. current
   c) Three times the F.L. current
   d) Four to six times the F.L. current

5) The power factor of an I.M. under no load conditions will be closer to
   a) 0.2 lagging b) 0.2 leading c) 0.5 leading d) Unity

6) The no-load current of a 3-phase induction motor in terms of its full-load current is of the order of
   a) 5% b) 10% c) 25% d) 50%

7) The maximum torque in a 3-phase induction motor occurs at a slip
   a) R2/X2 b) X2/R2 c) $R2^2/X2$ d) $R2^2/X2^2$

8) The effect of increasing the length of air-gap in an induction motor will be to increase the
   a) power factor
   b) speed
   c) magnetising current
   d) air-gap flux

P.T.O.

9) Squirrel cage induction motors are not favored when _____ is considered.
   a) initial cost
   b) low starting current
   c) high starting torque
   d) both (a) and (b)

10) The starting torque of induction motor varies as
   a) f
   b) $1/f^2$
   c) 1/f
   d) f^2

11) Star-delta starting is equivalent to auto transformer starting with _____ tapping.
   a) 33.3%
   b) 50%
   c) 57.7%
   d) 83%

12) The ratio of starting torque to normal torque in case of a star-delta starter will be
   a) 0.35
   b) 0.67
   c) 1.07
   d) 1.35

13) If any two phases for an induction motor are interchanged
   a) The motor will run in reverse direction
   b) The motor will run at reduced speed
   c) The motor will not run
   d) The motor will burn

14) For ceiling fans generally the single phase motor used is
   a) Split phase type
   b) Capacitor start type
   c) Capacitor start and run type
   d) Permanent capacitor type

_____

SLR-EP – 252

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL MACHINES – II

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

A) A full load slip of 400 V, 3 phase squirrel cage IM is 3.5% and with locked rotor, full load current is circulated when 92 V is applied between lines. Find the necessary tapping on an autotransformer to limit starting current to twice the full load current.

B) Explain DOL starter with neat circuit diagram.

C) A three phase slip-ring induction motor gives a reading of 60 V across slip rings when at rest with normal stator voltage applied. The rotor is star connected and has an impedance of (0.8 + j6) ohm per phase. Find the rotor current when the machine is
   a) at standstill with the slip-rings joined to a star connected starter with a phase impedance of (4+j3) ohm.
   b) running normally with a 5% slip.

D) Draw and explain torque slip characteristics of three phase induction motor assuming torque equation at slip s.

E) In a double cage induction motor if the outer cage has an impedance at standstill of (2+j1) ohm, determine the slip at which the two cages develop equal torques if the inner cage has an impedance of (0.5+j3.5) ohm at standstill.

F) A 50 Hz, 6 pole induction motor runs at 94.5% of synchronous speed developing torque of 120 N-m the mechanical torque lost is 4 N-m and stator loss is 1430 watts. Calculate efficiency.

3. Solve the following : **(2×6=12)**

A) An 8-pole, 3-phase, 50 Hz induction motor running with a slip of 4% is taking 20 kW. Stator losses amount to 0.5 kW. If the mechanical torque lost in friction is 16.25 N-m, find
   i) BHP
   ii) Efficiency.

B) With neat sketch explain :
   1) DOL starter.
   2) Auto transformer starter.

OR

B) Derive an expression for starting torque and running torque for three phase induction motor.

Set S

SECTION – II

4. Attempt **any four** : **(4×4=16)**

   a) Explain construction and working of shaded pole induction motor.

   b) Explain rotor resistance control method of speed control of 3 phase I.M.

   c) A 240 V, 50 Hz, 2 pole single phase capacitor start motor has following constants referred to stator. Stator resistance = 2.2Ω, Rotor resistance = 3.8Ω, Stator resistance = 3Ω, Rotor reactance = 2.1Ω, Magnetizing reactance = 86Ω, Iron and friction loss = 50 W. Find output power and efficiency at the given loading.

   d) Explain induction motor as an induction generator and its limitations.

   e) Show that backward slip Sb = (2-S) where S is forward slip. Explain in detail.

5. Attempt **any two** : **(2×6=12)**

   a) Explain procedure to construct a circle diagram for induction motor.

   b) Explain the following speed control methods in detail.
      1) Slip power recovery scheme
      2) Cascade connection.

   c) Draw equivalent circuit of single phase induction motor on double revolving field theory.

SLR-EP – 253

Seat No.	

Set **P**

S.E. (Electrical Engineering) Part – II (CGPA) Examination, 2016
ELEMENTS OF POWER SYSTEMS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives : **(14×1=14)**

1) The volume of copper required for an ac transmission line is inversely proportional to
   a) Current b) Voltage c) Power factor d) Both b) and c)

2) In a transmission system the feeder supplies power to
   a) Transformer substations (step down)
   b) Service mains
   c) Distributors
   d) All of the above

3) The diameter of each strand is 'd' then the diameter of n-layer stranded conductor will be
   a) (2n + 1)d b) 3(n + 1)d c) (2n – 1)d d) 3(n – 1)d

4) In a suspension type insulator, the potential drop is
   a) Maximum across the lowest disc b) Maximum across the top most disc
   c) Uniformly distributed over the discs d) None of the above

5) In a transmission line sag depends on
   a) Span length
   b) Tension in the conductor
   c) Weight of the conductor per unit length
   d) All of the above

6) To reduce corona effect usually
   a) Distance between the conductors is reduced
   b) Conductor diameter is reduced
   c) Bundled conductors are used
   d) Stranded conductors are used

7) Sheaths are used in cables to
   a) Provide proper insulation
   b) Provide mechanical strength
   c) Prevent ingress of moisture
   d) None of the above

8) The inductance of a transmission line is minimum when
   a) GMD is high
   b) GMR is low
   c) Both GMD and GMR are high
   d) GMD is low and GMR is high

9) Transposition of transmission line is done to
   a) Reduce line losses
   b) Balance line voltage drop
   c) Reduce skin effect
   d) Reduce corona

10) Which of the following is neglected while analyzing a short transmission line ?
   a) Series impedance
   b) Shunt capacitance
   c) Power losses
   d) None of these

11) % voltage regulation of a transmission line is given by the expression
   a) $\frac{V_R - V_S}{V_R} \times 100$
   b) $\frac{V_R - V_S}{V_S} \times 100$
   c) $\frac{V_S - V_R}{V_R} \times 100$
   d) $\frac{V_S - V_R}{V_S} \times 100$

12) Theoretically, maximum value of power factor can be
   a) 1 b) 0.5 c) 0 d) 0.9

13) Power factor can be improved by
   a) Capacitor banks
   b) Synchronous condenser
   c) Phase advancers
   d) All of the above

14) Which equipment has following symbol while drawing a single line diagram ?

   a) Current transformer
   b) Circuit breaker
   c) Potential transformer
   d) Lightning arrester

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Seat No.	

S.E. (Electrical Engineering) Part – II (CGPA) Examination, 2016
ELEMENTS OF POWER SYSTEMS

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×4=16)**
   1) Derive the expression for volume of conductor material required for single phase two wire system.
   2) What are the main components of transmission lines ? Explain criteria for choosing conductor material.
   3) What are different types of insulators that are used in overhead transmission line ? Write advantages of pin type and suspension type insulator.
   4) Define corona. Describe advantages and disadvantages of corona.
   5) Describe properties of insulating material used in underground cable. List the different insulating materials that are used in underground cables.

3. Solve **any two** questions: **(2×6=12)**
   1) Derive an expression for sag of transmission line having equal and unequal level of supports.
   2) In a 33 KV overhead line, there are three units in the string of insulators. If the capacitance between each pin and earth is 11% of self capacitance of each insulator, find :
      a) Distribution of voltage over three insulator discs
      b) String efficiency.
   3) The cost of a three phase overhead transmission line is (25000a + 2500) per km where 'a' is the area of cross section of each conductor in cm^2. The line is supplying a load of 5 MW at 33 KV and 0.8 lag power factor assumed to be constant throughout the year. Energy costs 4 paise per kWh and interest and depreciation total 10% per annum. Find the most economical size of conductor. Given : Specific resistance of conductor material is $10^{-6}\ \Omega\,m$.

SECTION – II

4. Solve **any four** questions : **(4×4=16)**

   1) Find the inductance per km of a three phase transmission line using 1.24 cm diameter conductor when these are placed at the corners of an equilateral triangle of each side 2 m.

   2) Define power factor. With neat circuit diagram and phasor diagram, explain the principle of power factor improvement.

   3) With neat diagram, derive the expression for A, B, C, D constants of medium transmission line using nominal T method.

   4) Draw and explain concentrated loaded DC distributor fed at one end.

   5) Explain different equipments used in substation.

5. Solve **any two** questions : **(2×6=12)**

   1) Derive the expression for inductance of three phase single circuit overhead triangular configuration of transmission line with symmetrical spacing.

   2) A three phase, 50 Hz overhead transmission line 100 km long has the following constants :

      Resistance/km/phase = 0.1 Ω

      Inductive reactance/km/phase = 0.5 Ω

      Capacitive susceptance/km/phase = 10×10^{-6} S

      Determine :

      a) Sending end current
      b) Sending end voltage
      c) Sending end power factor
      d) Transmission efficiency
      e) Voltage regulation.

      When supplying a balanced load of 20 MW at 66 KV, 0.9 P.F. lag. Use nominal T method.

   3) With neat circuit diagram and phasor diagram, derive an expression for voltage regulation and efficiency of medium transmission line using end condenser method.

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Seat No.	

Set Q

S.E. (Electrical Engineering) Part – II (CGPA) Examination, 2016
ELEMENTS OF POWER SYSTEMS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives : **(14×1=14)**

1) The inductance of a transmission line is minimum when
   a) GMD is high b) GMR is low
   c) Both GMD and GMR are high d) GMD is low and GMR is high

2) Transposition of transmission line is done to
   a) Reduce line losses b) Balance line voltage drop
   c) Reduce skin effect d) Reduce corona

3) Which of the following is neglected while analyzing a short transmission line ?
   a) Series impedance b) Shunt capacitance
   c) Power losses d) None of these

4) % voltage regulation of a transmission line is given by the expression
   a) $\frac{V_R - V_S}{V_R} \times 100$ b) $\frac{V_R - V_S}{V_S} \times 100$
   c) $\frac{V_S - V_R}{V_R} \times 100$ d) $\frac{V_S - V_R}{V_S} \times 100$

5) Theoretically, maximum value of power factor can be
   a) 1 b) 0.5 c) 0 d) 0.9

6) Power factor can be improved by
   a) Capacitor banks b) Synchronous condenser
   c) Phase advancers d) All of the above

P.T.O.

7) Which equipment has following symbol while drawing a single line diagram ?

a) Current transformer b) Circuit breaker
c) Potential transformer d) Lightning arrester

8) The volume of copper required for an ac transmission line is inversely proportional to
a) Current b) Voltage c) Power factor d) Both b) and c)

9) In a transmission system the feeder supplies power to
a) Transformer substations (step down)
b) Service mains
c) Distributors
d) All of the above

10) The diameter of each strand is 'd' then the diameter of n-layer stranded conductor will be
a) (2n + 1)d b) 3(n + 1)d c) (2n – 1)d d) 3(n – 1)d

11) In a suspension type insulator, the potential drop is
a) Maximum across the lowest disc b) Maximum across the top most disc
c) Uniformly distributed over the discs d) None of the above

12) In a transmission line sag depends on
a) Span length
b) Tension in the conductor
c) Weight of the conductor per unit length
d) All of the above

13) To reduce corona effect usually
a) Distance between the conductors is reduced
b) Conductor diameter is reduced
c) Bundled conductors are used
d) Stranded conductors are used

14) Sheaths are used in cables to
a) Provide proper insulation b) Provide mechanical strength
c) Prevent ingress of moisture d) None of the above

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SLR-EP – 253

Seat No.	

S.E. (Electrical Engineering) Part – II (CGPA) Examination, 2016
ELEMENTS OF POWER SYSTEMS

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×4=16)**
   1) Derive the expression for volume of conductor material required for single phase two wire system.
   2) What are the main components of transmission lines ? Explain criteria for choosing conductor material.
   3) What are different types of insulators that are used in overhead transmission line ? Write advantages of pin type and suspension type insulator.
   4) Define corona. Describe advantages and disadvantages of corona.
   5) Describe properties of insulating material used in underground cable. List the different insulating materials that are used in underground cables.

3. Solve **any two** questions: **(2×6=12)**
   1) Derive an expression for sag of transmission line having equal and unequal level of supports.
   2) In a 33 KV overhead line, there are three units in the string of insulators. If the capacitance between each pin and earth is 11% of self capacitance of each insulator, find :
      a) Distribution of voltage over three insulator discs
      b) String efficiency.
   3) The cost of a three phase overhead transmission line is (25000a + 2500) per km where 'a' is the area of cross section of each conductor in cm^2. The line is supplying a load of 5 MW at 33 KV and 0.8 lag power factor assumed to be constant throughout the year. Energy costs 4 paise per kWh and interest and depreciation total 10% per annum. Find the most economical size of conductor. Given : Specific resistance of conductor material is $10^{-6}\ \Omega\,m$.

SECTION – II

4. Solve **any four** questions : **(4×4=16)**

   1) Find the inductance per km of a three phase transmission line using 1.24 cm diameter conductor when these are placed at the corners of an equilateral triangle of each side 2 m.

   2) Define power factor. With neat circuit diagram and phasor diagram, explain the principle of power factor improvement.

   3) With neat diagram, derive the expression for A, B, C, D constants of medium transmission line using nominal T method.

   4) Draw and explain concentrated loaded DC distributor fed at one end.

   5) Explain different equipments used in substation.

5. Solve **any two** questions : **(2×6=12)**

   1) Derive the expression for inductance of three phase single circuit overhead triangular configuration of transmission line with symmetrical spacing.

   2) A three phase, 50 Hz overhead transmission line 100 km long has the following constants :

      Resistance/km/phase = 0.1 Ω

      Inductive reactance/km/phase = 0.5 Ω

      Capacitive susceptance/km/phase = 10×10^{-6} S

      Determine :

      a) Sending end current
      b) Sending end voltage
      c) Sending end power factor
      d) Transmission efficiency
      e) Voltage regulation.

      When supplying a balanced load of 20 MW at 66 KV, 0.9 P.F. lag. Use nominal T method.

   3) With neat circuit diagram and phasor diagram, derive an expression for voltage regulation and efficiency of medium transmission line using end condenser method.

SLR-EP – 253

Seat No.	

Set **R**

S.E. (Electrical Engineering) Part – II (CGPA) Examination, 2016
ELEMENTS OF POWER SYSTEMS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives : **(14×1=14)**

1) In a transmission line sag depends on
   a) Span length
   b) Tension in the conductor
   c) Weight of the conductor per unit length
   d) All of the above

2) To reduce corona effect usually
   a) Distance between the conductors is reduced
   b) Conductor diameter is reduced
   c) Bundled conductors are used
   d) Stranded conductors are used

3) Sheaths are used in cables to
   a) Provide proper insulation
   b) Provide mechanical strength
   c) Prevent ingress of moisture
   d) None of the above

4) The inductance of a transmission line is minimum when
   a) GMD is high
   b) GMR is low
   c) Both GMD and GMR are high
   d) GMD is low and GMR is high

5) Transposition of transmission line is done to
   a) Reduce line losses
   b) Balance line voltage drop
   c) Reduce skin effect
   d) Reduce corona

P.T.O.

6) Which of the following is neglected while analyzing a short transmission line ?
   a) Series impedance
   b) Shunt capacitance
   c) Power losses
   d) None of these

7) % voltage regulation of a transmission line is given by the expression
   a) $\frac{V_R - V_S}{V_R} \times 100$
   b) $\frac{V_R - V_S}{V_S} \times 100$
   c) $\frac{V_S - V_R}{V_R} \times 100$
   d) $\frac{V_S - V_R}{V_S} \times 100$

8) Theoretically, maximum value of power factor can be
   a) 1 b) 0.5 c) 0 d) 0.9

9) Power factor can be improved by
   a) Capacitor banks
   b) Synchronous condenser
   c) Phase advancers
   d) All of the above

10) Which equipment has following symbol while drawing a single line diagram ?

   a) Current transformer
   b) Circuit breaker
   c) Potential transformer
   d) Lightning arrester

11) The volume of copper required for an ac transmission line is inversely proportional to
   a) Current b) Voltage c) Power factor d) Both b) and c)

12) In a transmission system the feeder supplies power to
   a) Transformer substations (step down)
   b) Service mains
   c) Distributors
   d) All of the above

13) The diameter of each strand is 'd' then the diameter of n-layer stranded conductor will be
   a) (2n + 1)d b) 3(n + 1)d c) (2n – 1)d d) 3(n – 1)d

14) In a suspension type insulator, the potential drop is
   a) Maximum across the lowest disc
   b) Maximum across the top most disc
   c) Uniformly distributed over the discs
   d) None of the above

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SLR-EP – 253

Seat No.	

S.E. (Electrical Engineering) Part – II (CGPA) Examination, 2016
ELEMENTS OF POWER SYSTEMS

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×4=16)**
   1) Derive the expression for volume of conductor material required for single phase two wire system.
   2) What are the main components of transmission lines ? Explain criteria for choosing conductor material.
   3) What are different types of insulators that are used in overhead transmission line ? Write advantages of pin type and suspension type insulator.
   4) Define corona. Describe advantages and disadvantages of corona.
   5) Describe properties of insulating material used in underground cable. List the different insulating materials that are used in underground cables.

3. Solve **any two** questions: **(2×6=12)**
   1) Derive an expression for sag of transmission line having equal and unequal level of supports.
   2) In a 33 KV overhead line, there are three units in the string of insulators. If the capacitance between each pin and earth is 11% of self capacitance of each insulator, find :
      a) Distribution of voltage over three insulator discs
      b) String efficiency.
   3) The cost of a three phase overhead transmission line is (25000a + 2500) per km where 'a' is the area of cross section of each conductor in cm^2. The line is supplying a load of 5 MW at 33 KV and 0.8 lag power factor assumed to be constant throughout the year. Energy costs 4 paise per kWh and interest and depreciation total 10% per annum. Find the most economical size of conductor. Given : Specific resistance of conductor material is $10^{-6}\ \Omega\,m$.

Set R

SECTION – II

4. Solve **any four** questions : **(4×4=16)**

   1) Find the inductance per km of a three phase transmission line using 1.24 cm diameter conductor when these are placed at the corners of an equilateral triangle of each side 2 m.

   2) Define power factor. With neat circuit diagram and phasor diagram, explain the principle of power factor improvement.

   3) With neat diagram, derive the expression for A, B, C, D constants of medium transmission line using nominal T method.

   4) Draw and explain concentrated loaded DC distributor fed at one end.

   5) Explain different equipments used in substation.

5. Solve **any two** questions : **(2×6=12)**

   1) Derive the expression for inductance of three phase single circuit overhead triangular configuration of transmission line with symmetrical spacing.

   2) A three phase, 50 Hz overhead transmission line 100 km long has the following constants :

      Resistance/km/phase = 0.1 Ω

      Inductive reactance/km/phase = 0.5 Ω

      Capacitive susceptance/km/phase = 10×10^{-6} S

      Determine :

      a) Sending end current
      b) Sending end voltage
      c) Sending end power factor
      d) Transmission efficiency
      e) Voltage regulation.

      When supplying a balanced load of 20 MW at 66 KV, 0.9 P.F. lag. Use nominal T method.

   3) With neat circuit diagram and phasor diagram, derive an expression for voltage regulation and efficiency of medium transmission line using end condenser method.

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Seat No.	

Set **S**

S.E. (Electrical Engineering) Part – II (CGPA) Examination, 2016
ELEMENTS OF POWER SYSTEMS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives : **(14×1=14)**

1) Which of the following is neglected while analyzing a short transmission line ?
   a) Series impedance b) Shunt capacitance
   c) Power losses d) None of these

2) % voltage regulation of a transmission line is given by the expression
   a) $\frac{V_R - V_S}{V_R} \times 100$ b) $\frac{V_R - V_S}{V_S} \times 100$
   c) $\frac{V_S - V_R}{V_R} \times 100$ d) $\frac{V_S - V_R}{V_S} \times 100$

3) Theoretically, maximum value of power factor can be
   a) 1 b) 0.5 c) 0 d) 0.9

4) Power factor can be improved by
   a) Capacitor banks b) Synchronous condenser
   c) Phase advancers d) All of the above

5) Which equipment has following symbol while drawing a single line diagram ?

   a) Current transformer b) Circuit breaker
   c) Potential transformer d) Lightning arrester

P.T.O.

6) The volume of copper required for an ac transmission line is inversely proportional to
   a) Current b) Voltage c) Power factor d) Both b) and c)

7) In a transmission system the feeder supplies power to
   a) Transformer substations (step down)
   b) Service mains
   c) Distributors
   d) All of the above

8) The diameter of each strand is 'd' then the diameter of n-layer stranded conductor will be
   a) (2n + 1)d b) 3(n + 1)d c) (2n – 1)d d) 3(n – 1)d

9) In a suspension type insulator, the potential drop is
   a) Maximum across the lowest disc b) Maximum across the top most disc
   c) Uniformly distributed over the discs d) None of the above

10) In a transmission line sag depends on
   a) Span length
   b) Tension in the conductor
   c) Weight of the conductor per unit length
   d) All of the above

11) To reduce corona effect usually
   a) Distance between the conductors is reduced
   b) Conductor diameter is reduced
   c) Bundled conductors are used
   d) Stranded conductors are used

12) Sheaths are used in cables to
   a) Provide proper insulation b) Provide mechanical strength
   c) Prevent ingress of moisture d) None of the above

13) The inductance of a transmission line is minimum when
   a) GMD is high b) GMR is low
   c) Both GMD and GMR are high d) GMD is low and GMR is high

14) Transposition of transmission line is done to
   a) Reduce line losses b) Balance line voltage drop
   c) Reduce skin effect d) Reduce corona

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Seat No.	

S.E. (Electrical Engineering) Part – II (CGPA) Examination, 2016
ELEMENTS OF POWER SYSTEMS

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×4=16)**
   1) Derive the expression for volume of conductor material required for single phase two wire system.
   2) What are the main components of transmission lines ? Explain criteria for choosing conductor material.
   3) What are different types of insulators that are used in overhead transmission line ? Write advantages of pin type and suspension type insulator.
   4) Define corona. Describe advantages and disadvantages of corona.
   5) Describe properties of insulating material used in underground cable. List the different insulating materials that are used in underground cables.

3. Solve **any two** questions: **(2×6=12)**
   1) Derive an expression for sag of transmission line having equal and unequal level of supports.
   2) In a 33 KV overhead line, there are three units in the string of insulators. If the capacitance between each pin and earth is 11% of self capacitance of each insulator, find :
      a) Distribution of voltage over three insulator discs
      b) String efficiency.
   3) The cost of a three phase overhead transmission line is (25000a + 2500) per km where 'a' is the area of cross section of each conductor in cm^2. The line is supplying a load of 5 MW at 33 KV and 0.8 lag power factor assumed to be constant throughout the year. Energy costs 4 paise per kWh and interest and depreciation total 10% per annum. Find the most economical size of conductor. Given : Specific resistance of conductor material is $10^{-6}\ \Omega\,m$.

SECTION – II

4. Solve **any four** questions : **(4×4=16)**

   1) Find the inductance per km of a three phase transmission line using 1.24 cm diameter conductor when these are placed at the corners of an equilateral triangle of each side 2 m.

   2) Define power factor. With neat circuit diagram and phasor diagram, explain the principle of power factor improvement.

   3) With neat diagram, derive the expression for A, B, C, D constants of medium transmission line using nominal T method.

   4) Draw and explain concentrated loaded DC distributor fed at one end.

   5) Explain different equipments used in substation.

5. Solve **any two** questions : **(2×6=12)**

   1) Derive the expression for inductance of three phase single circuit overhead triangular configuration of transmission line with symmetrical spacing.

   2) A three phase, 50 Hz overhead transmission line 100 km long has the following constants :

      Resistance/km/phase = 0.1 Ω

      Inductive reactance/km/phase = 0.5 Ω

      Capacitive susceptance/km/phase = 10×10^{-6} S

      Determine :

      a) Sending end current
      b) Sending end voltage
      c) Sending end power factor
      d) Transmission efficiency
      e) Voltage regulation.

      When supplying a balanced load of 20 MW at 66 KV, 0.9 P.F. lag. Use nominal T method.

   3) With neat circuit diagram and phasor diagram, derive an expression for voltage regulation and efficiency of medium transmission line using end condenser method.

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Seat No.	

Set P

S.E. (Electrical Engg.) Part – II (CGPA) Examination, 2016
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figure to the **right** indicates **full** marks.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) Slew rate of an op amp indicates
   a) How fast its output current can change
   b) How fast its output impedance can change
   c) How fast its output power can change
   d) How fast its output voltage can change

2) The output stage of an op amp is usually a
   a) Complementary emitter follower
   b) Transformer coupled class B power amplifier
   c) Class A power amplifier
   d) Class B amplifier

3) When a sinusoidal voltage is fed to a Schmitt trigger, the output will be
   a) Triangular wave
   b) Rectangular wave
   c) Asymmetric square wave
   d) Trapezoidal wave

4) IC 741 C has a unity gain frequency of
   a) 10 Hz
   b) 100 Hz
   c) 1 MHz
   d) 75 Hz

P.T.O.

5) A Summing Amplifier can have
   a) Only one input
   b) More than two inputs
   c) No. of inputs
   d) None

6) For averaging amplifier with four inputs the ratio of Rf/Ri must be
   a) 5 b) 0.25 c) 1 d) 4

7) Voltage follower is an application of
   a) Inverting mode
   b) Non inverting mode
   c) Both
   d) None

8) Given Max term is A + B + C, its equivalent binary represented by
   a) 101 b) 111 c) 010 d) 000

9) The BCD code is
   a) Non weighted
   b) Same as binary numbers
   c) Weighted
   d) None

10) The one's complement of 1011100 is
   a) 0100011 b) 1100011
   c) 1100101 d) 1010101

11) The logic expression $Y = AB + A\overline{C} + BC$ is known as
   a) Standard SOP form
   b) Standard POS form
   c) SOP form
   d) POS form

12) The code used for labeling the cell of K-map is
   a) Natural BCD b) Gray
   c) Hexadecimal d) Octal

13) The multiplexer is also known as
   a) Counter b) Data selector
   c) Decoder d) None of these

14) The logic circuit which dissipates minimum power is
   a) RTL b) TTL
   c) ECL d) CMOS

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SLR-EP – 254

Seat No.	

S.E. (Electrical Engg.) Part – II (CGPA) Examination, 2016
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***comulsory****.*

2) Figure to the ***right*** *indicates* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Explain common mode rejection ratio and slew rate for ideal and practical op-amp.
   2) Draw and explain block diagram of operational amplifier.
   3) Explain virtual ground concept for operational amplifier.
   4) Determine the output voltage for inverting amplifier using 741, Rf = 10 KΩ , R = 1KΩ and input supplied 2V, also comment on the output.
   5) Explain with neat circuit diagram and equation working of inverting adder.

3. Solve **any two** : **(2×6=12)**
   1) Derive voltage gain, input resistance and output resistance for voltage series feedback op-amp.
   2) The IC 741 having following parameters is connected as non-inverting amplifier with R_1 = 1 KΩ and R_F = 10 KΩ A = 200000, Ri = 2 MΩ , Ro = 75Ω , fo = 5 Hz, Supply voltage = ± 15V, Output voltage swing = ± 13 V compute the values of A_F, Ri_F, Ro_F, f_F and V_{OOT}.
   3) Explain following parameters for op-amp
      a) Input offset voltage
      b) Input offset current
      c) Input bias current
      d) Differential input resistance

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Obtain canonical SOP of the equation Y(A, B, C, D) = AB + ACD.
   2) Simplify the function and implement using NAND gate

      $F = \sum m(0, 1, 2, 3, 7, 8, 9, 10, 11, 12, 13)$.
   3) Explain serial in parallel out shift register.
   4) Explain Max term, Min term, SOP and POS.
   5) Explain operation of D flip flop with truth table and characteristics table.

5. Solve **any two** : **(2×6=12)**
   1) Design MOD 6 counter using IC 7490.
   2) Convert SR flip flop into D flip flop and JK flip flop.
   3) Using 8 : 1 MUX implement the logic function given below. Also realize it by 16 : 1 MUX $F = \sum m(0, 2, 4, 6, 8, 10, 12, 14)$.

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Seat No.	

Set Q

S.E. (Electrical Engg.) Part – II (CGPA) Examination, 2016
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
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*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) Given Max term is A + B + C, its equivalent binary represented by
a) 101 b) 111 c) 010 d) 000

2) The BCD code is
a) Non weighted
b) Same as binary numbers
c) Weighted
d) None

3) The one's complement of 1011100 is
a) 0100011 b) 1100011
c) 1100101 d) 1010101

4) The logic expression $Y = AB + A\overline{C} + BC$ is known as
a) Standard SOP form
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5) The code used for labeling the cell of K-map is
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P.T.O.

6) The multiplexer is also known as
   a) Counter b) Data selector
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   d) How fast its output voltage can change

9) The output stage of an op amp is usually a
   a) Complementary emitter follower
   b) Transformer coupled class B power amplifier
   c) Class A power amplifier
   d) Class B amplifier

10) When a sinusoidal voltage is fed to a Schmitt trigger, the output will be
   a) Triangular wave
   b) Rectangular wave
   c) Asymmetric square wave
   d) Trapezoidal wave

11) IC 741 C has a unity gain frequency of
   a) 10 Hz
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   d) 75 Hz

12) A Summing Amplifier can have
   a) Only one input
   b) More than two inputs
   c) No. of inputs
   d) None

13) For averaging amplifier with four inputs the ratio of Rf/Ri must be
   a) 5 b) 0.25 c) 1 d) 4

14) Voltage follower is an application of
   a) Inverting mode b) Non inverting mode
   c) Both d) None

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Seat No.	

S.E. (Electrical Engg.) Part – II (CGPA) Examination, 2016
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***comulsory****.*

2) Figure to the ***right*** *indicates* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Explain common mode rejection ratio and slew rate for ideal and practical op-amp.
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   1) Derive voltage gain, input resistance and output resistance for voltage series feedback op-amp.
   2) The IC 741 having following parameters is connected as non-inverting amplifier with R_1 = 1 KΩ and R_F = 10 KΩ A = 200000, Ri = 2 MΩ , Ro = 75Ω , fo = 5 Hz, Supply voltage = ± 15V, Output voltage swing = ± 13 V compute the values of A_F, Ri_F, Ro_F, f_F and V_{OOT}.
   3) Explain following parameters for op-amp
      a) Input offset voltage
      b) Input offset current
      c) Input bias current
      d) Differential input resistance

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Obtain canonical SOP of the equation Y(A, B, C, D) = AB + ACD.
   2) Simplify the function and implement using NAND gate

      $F = \sum m(0, 1, 2, 3, 7, 8, 9, 10, 11, 12, 13)$.
   3) Explain serial in parallel out shift register.
   4) Explain Max term, Min term, SOP and POS.
   5) Explain operation of D flip flop with truth table and characteristics table.

5. Solve **any two** : **(2×6=12)**
   1) Design MOD 6 counter using IC 7490.
   2) Convert SR flip flop into D flip flop and JK flip flop.
   3) Using 8 : 1 MUX implement the logic function given below. Also realize it by 16 : 1 MUX $F = \sum m(0, 2, 4, 6, 8, 10, 12, 14)$.

SLR-EP – 254

Seat No.	

Set **R**

S.E. (Electrical Engg.) Part – II (CGPA) Examination, 2016
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figure to the **right** indicates **full** marks.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) A Summing Amplifier can have
   a) Only one input
   b) More than two inputs
   c) No. of inputs
   d) None

2) For averaging amplifier with four inputs the ratio of Rf/Ri must be
   a) 5 b) 0.25 c) 1 d) 4

3) Voltage follower is an application of
   a) Inverting mode
   b) Non inverting mode
   c) Both
   d) None

4) Given Max term is A + B + C, its equivalent binary represented by
   a) 101 b) 111 c) 010 d) 000

5) The BCD code is
   a) Non weighted
   b) Same as binary numbers
   c) Weighted
   d) None

6) The one's complement of 1011100 is
   a) 0100011 b) 1100011
   c) 1100101 d) 1010101

7) The logic expression $Y = AB + A\overline{C} + BC$ is known as
   a) Standard SOP form
   b) Standard POS form
   c) SOP form
   d) POS form

8) The code used for labeling the cell of K-map is
   a) Natural BCD b) Gray
   c) Hexadecimal d) Octal

9) The multiplexer is also known as
   a) Counter b) Data selector
   c) Decoder d) None of these

10) The logic circuit which dissipates minimum power is
   a) RTL b) TTL
   c) ECL d) CMOS

11) Slew rate of an op amp indicates
   a) How fast its output current can change
   b) How fast its output impedance can change
   c) How fast its output power can change
   d) How fast its output voltage can change

12) The output stage of an op amp is usually a
   a) Complementary emitter follower
   b) Transformer coupled class B power amplifier
   c) Class A power amplifier
   d) Class B amplifier

13) When a sinusoidal voltage is fed to a Schmitt trigger, the output will be
   a) Triangular wave
   b) Rectangular wave
   c) Asymmetric square wave
   d) Trapezoidal wave

14) IC 741 C has a unity gain frequency of
   a) 10 Hz b) 100 Hz
   c) 1 MHz d) 75 Hz

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SLR-EP – 254

Seat No.	

S.E. (Electrical Engg.) Part – II (CGPA) Examination, 2016
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***comulsory****.*

2) Figure to the ***right*** *indicates* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Explain common mode rejection ratio and slew rate for ideal and practical op-amp.
   2) Draw and explain block diagram of operational amplifier.
   3) Explain virtual ground concept for operational amplifier.
   4) Determine the output voltage for inverting amplifier using 741, Rf = 10 KΩ , R = 1KΩ and input supplied 2V, also comment on the output.
   5) Explain with neat circuit diagram and equation working of inverting adder.

3. Solve **any two** : **(2×6=12)**
   1) Derive voltage gain, input resistance and output resistance for voltage series feedback op-amp.
   2) The IC 741 having following parameters is connected as non-inverting amplifier with R_1 = 1 KΩ and R_F = 10 KΩ A = 200000, Ri = 2 MΩ , Ro = 75Ω , fo = 5 Hz, Supply voltage = ± 15V, Output voltage swing = ± 13 V compute the values of A_F, Ri_F, Ro_F, f_F and V_{OOT}.
   3) Explain following parameters for op-amp
      a) Input offset voltage
      b) Input offset current
      c) Input bias current
      d) Differential input resistance

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Obtain canonical SOP of the equation Y(A, B, C, D) = AB + ACD.
   2) Simplify the function and implement using NAND gate

      $F = \sum m(0, 1, 2, 3, 7, 8, 9, 10, 11, 12, 13)$.
   3) Explain serial in parallel out shift register.
   4) Explain Max term, Min term, SOP and POS.
   5) Explain operation of D flip flop with truth table and characteristics table.

5. Solve **any two** : **(2×6=12)**
   1) Design MOD 6 counter using IC 7490.
   2) Convert SR flip flop into D flip flop and JK flip flop.
   3) Using 8 : 1 MUX implement the logic function given below. Also realize it by 16 : 1 MUX $F = \sum m(0, 2, 4, 6, 8, 10, 12, 14)$.

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SLR-EP – 254

Seat No.	

Set **S**

S.E. (Electrical Engg.) Part – II (CGPA) Examination, 2016
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figure to the **right** indicates **full** marks.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) The one's complement of 1011100 is
   a) 0100011 b) 1100011
   c) 1100101 d) 1010101

2) The logic expression $Y = AB + A\overline{C} + BC$ is known as
   a) Standard SOP form
   b) Standard POS form
   c) SOP form
   d) POS form

3) The code used for labeling the cell of K-map is
   a) Natural BCD b) Gray
   c) Hexadecimal d) Octal

4) The multiplexer is also known as
   a) Counter b) Data selector
   c) Decoder d) None of these

5) The logic circuit which dissipates minimum power is
   a) RTL b) TTL
   c) ECL d) CMOS

6) Slew rate of an op amp indicates
   a) How fast its output current can change
   b) How fast its output impedance can change
   c) How fast its output power can change
   d) How fast its output voltage can change

7) The output stage of an op amp is usually a
   a) Complementary emitter follower
   b) Transformer coupled class B power amplifier
   c) Class A power amplifier
   d) Class B amplifier

8) When a sinusoidal voltage is fed to a Schmitt trigger, the output will be
   a) Triangular wave
   b) Rectangular wave
   c) Asymmetric square wave
   d) Trapezoidal wave

9) IC 741 C has a unity gain frequency of
   a) 10 Hz
   b) 100 Hz
   c) 1 MHz
   d) 75 Hz

10) A Summing Amplifier can have
   a) Only one input
   b) More than two inputs
   c) No. of inputs
   d) None

11) For averaging amplifier with four inputs the ratio of Rf/Ri must be
   a) 5 b) 0.25 c) 1 d) 4

12) Voltage follower is an application of
   a) Inverting mode
   b) Non inverting mode
   c) Both
   d) None

13) Given Max term is A + B + C, its equivalent binary represented by
   a) 101 b) 111 c) 010 d) 000

14) The BCD code is
   a) Non weighted
   b) Same as binary numbers
   c) Weighted
   d) None

SLR-EP – 254

Seat No.	

S.E. (Electrical Engg.) Part – II (CGPA) Examination, 2016
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **comulsory**.*
*2) Figure to the **right** indicates **full** marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Explain common mode rejection ratio and slew rate for ideal and practical op-amp.
   2) Draw and explain block diagram of operational amplifier.
   3) Explain virtual ground concept for operational amplifier.
   4) Determine the output voltage for inverting amplifier using 741, Rf = 10 KΩ , R = 1KΩ and input supplied 2V, also comment on the output.
   5) Explain with neat circuit diagram and equation working of inverting adder.

3. Solve **any two** : **(2×6=12)**
   1) Derive voltage gain, input resistance and output resistance for voltage series feedback op-amp.
   2) The IC 741 having following parameters is connected as non-inverting amplifier with R_1 = 1 KΩ and R_F = 10 KΩ A = 200000, Ri = 2 MΩ , Ro = 75Ω , fo = 5 Hz, Supply voltage = ± 15V, Output voltage swing = ± 13 V compute the values of A_F, Ri_F, Ro_F, f_F and V_{OOT}.
   3) Explain following parameters for op-amp
      a) Input offset voltage
      b) Input offset current
      c) Input bias current
      d) Differential input resistance

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Obtain canonical SOP of the equation Y(A, B, C, D) = AB + ACD.
   2) Simplify the function and implement using NAND gate

      $F = \sum m(0, 1, 2, 3, 7, 8, 9, 10, 11, 12, 13)$.
   3) Explain serial in parallel out shift register.
   4) Explain Max term, Min term, SOP and POS.
   5) Explain operation of D flip flop with truth table and characteristics table.

5. Solve **any two** : **(2×6=12)**
   1) Design MOD 6 counter using IC 7490.
   2) Convert SR flip flop into D flip flop and JK flip flop.
   3) Using 8 : 1 MUX implement the logic function given below. Also realize it by 16 : 1 MUX $F = \sum m(0, 2, 4, 6, 8, 10, 12, 14)$.

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SLR-EP – 255

Seat No.	

Set **P**

S.E. (Part – II) (CGPA) (Electrical Engg.) Examination, 2016
NETWORK ANALYSIS

Day and Date : Friday, 25-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume the suitable data* ***whenever*** *necessary.*
2) Q. No. ***I*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
3) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

I. Choose the correct answer : **(14×1=14)**

1) A sub graph i.e. tree of an given network having nodes and branch. Identify the correct statement.
   a) It has all the nodes of the network
   b) There are no closed path
   c) The number of branches exceeds the number of nodes of the network graph by one
   d) It is always planar

2) The time constant of series RC network is
   a) 1/RC b) R/C
   c) RC d) e^{-RC}

3) For DC, at switching condition which of the following acts as open circuit ?
   a) Inductor b) Capacitor
   c) Resistor d) All of the above

4) The concept on which super position theorem is based is
   a) Reciprocity b) Duality
   c) Non-linearity d) Linearity

5) Millman's theorem yields
   a) Equivalent resistance
   b) Equivalent impedance
   c) Equivalent voltage force
   d) Equivalent voltage or current source

6) Six light bulbs are connected in parallel across 110 V, each bulb is related at 75 W. How much current flows through each bulb ?
   a) 0.682 A b) 0.7A c) 75 A d) 110 A

7) The number of independent loops for a network with 'n' nodes and 'b' branches is
   a) a – 1 b) b – n
   c) b – n + 1 d) Independent of the number of nodes

8) The transient current in a loss free LC circuit when exited from an ac source is an _____ sine wave.
   a) Un damped b) Over damped
   c) Under damped d) Critically damped

9) The time constant of a series RL circuit is
   a) LR b) L|R c) R|L d) $e^{-R|L}$

10) The initial value of $20 – 10t – e^{25t}$ is
   a) 20 b) 19 c) 10 d) 25

11) The final value of $2s + 1|s^4 + 8s^3 + 16s^2 + s$ is
   a) 2 b) infinite c) zero d) 1

12) For a two port network to be reciprocal
   a) $Z_{11} = Z_{22}$ b) $Y_{21} = Y_{22}$ c) $h_{21} = – h_{12}$ d) AD – BC = 0

13) The number of possible combinations generated by four variables taken two at a time in a two port network is
   a) 4 b) 2 c) 6 d) 8

14) A two port network is simply a network inside a black box and the network has only
   a) Two terminals b) Two pairs of accessible terminals
   c) Two pairs of ports d) All of the above

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Seat No.	

S.E. (Part – II) (CGPA) (Electrical Engg.) Examination, 2016
NETWORK ANALYSIS

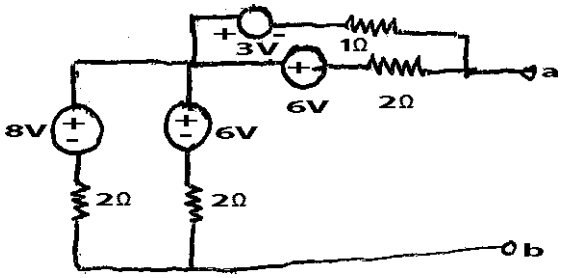
Day and Date : Friday, 25-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Assume the suitable data **whenever** necessary.*

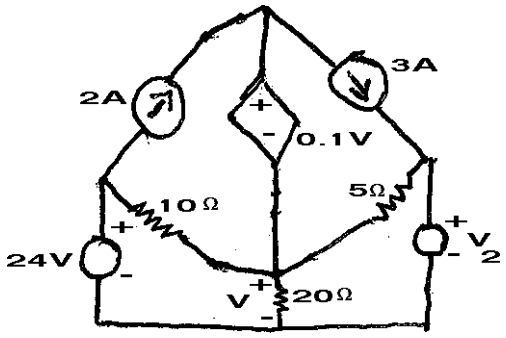
SECTION – I

II. Answer **any four** questions : **(4×3=12)**

1) Using source transformation techniques reduce the network between the terminals a and b into a single voltage source in series with a single resistance.

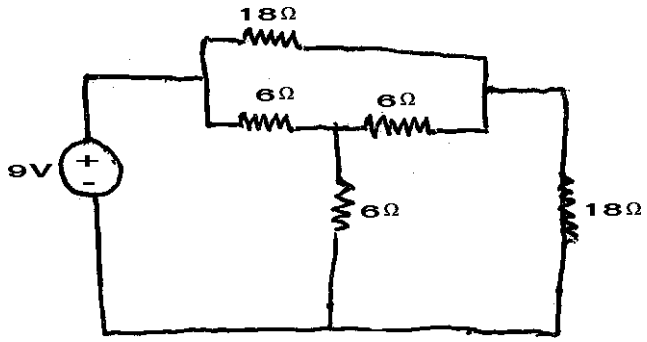


2) Use mesh analysis to determine what value of V_2 in the network in fig. shown causes V = 0, V is the voltage across 20 Ω .

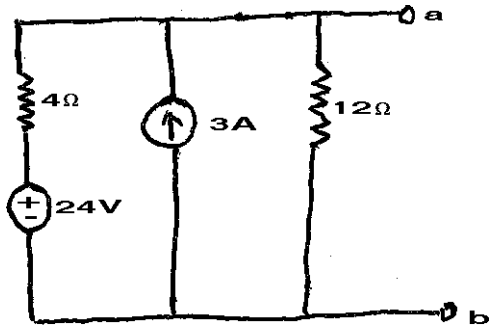


Set P

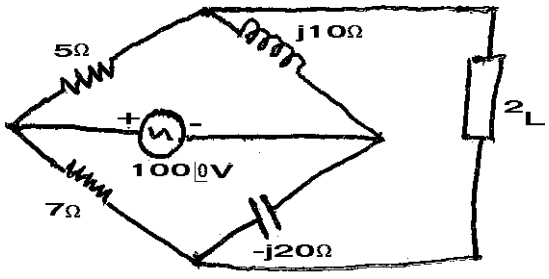
3) Using star-delta transformations reduce the given network shown in fig. and determine the total current supplied by the source.



4) Find the Norton's equivalent circuit across terminals a, b of the network shown in fig.



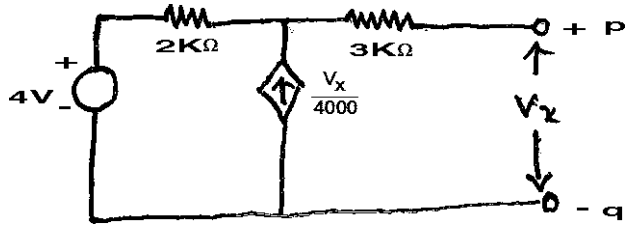
5) Find the value of Z_L for which power is transferred to the load Z_L from the network shown in fig.



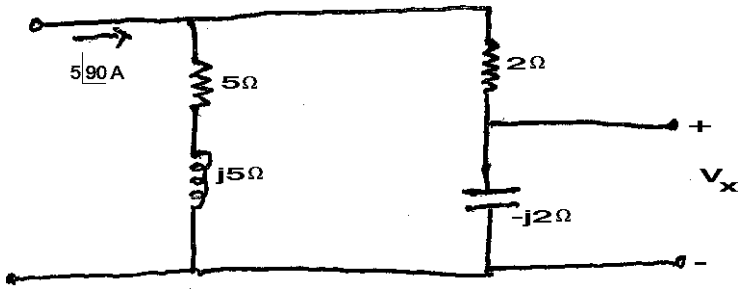
Set P

III. Answer **any two** questions : **(2×8=16)**

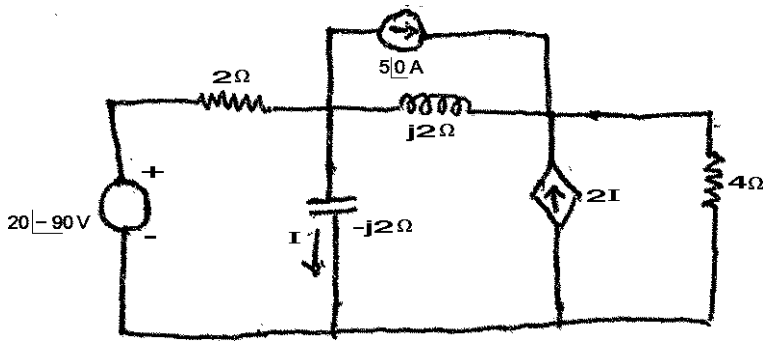
1) For the network shown obtain Thevenin's equivalent as seen from terminals p and q.



2) In the single current source circuit shown in fig. find the voltage V_X. Interchange the current source and the resulting voltage V_X is the reciprocity theorem verified ?



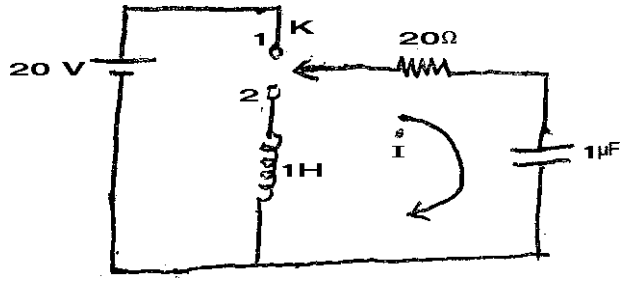
3) Find I using mesh analysis as shown in the circuit below.



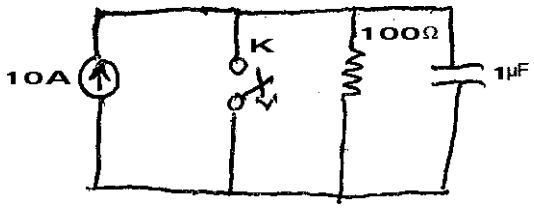
SECTION – II

IV. Answer **any four** questions : **(4×3=12)**

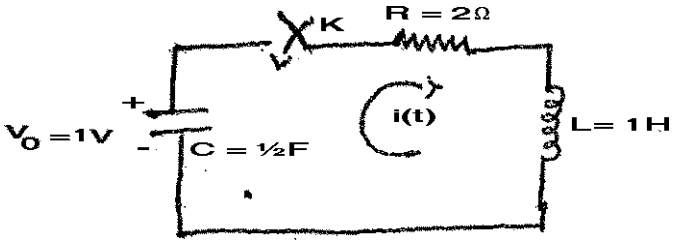
1) In the circuit shown in fig. K is moved from 1 to 2 at t = 0, find values of i and di/dt at t = 0^+ assume steady state is reached.



2) In the circuit shown in fig. switch K is opened at t = 0 find the value of V, dv/dt and d^2v/dt^2 at t =0^+.

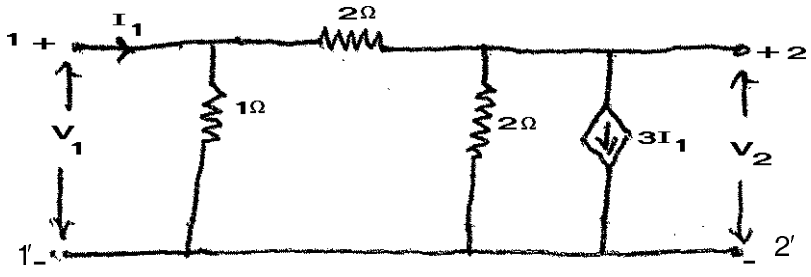


3) In the circuit shown in fig. if the capacitor is initially charged to 1V. Find an expression for i(t) when the switch K is closed at t = 0.



4) Find inverse Laplace transformation for F(s) = 5s + 3/(s – 1) (s^2 + 2s + 5).

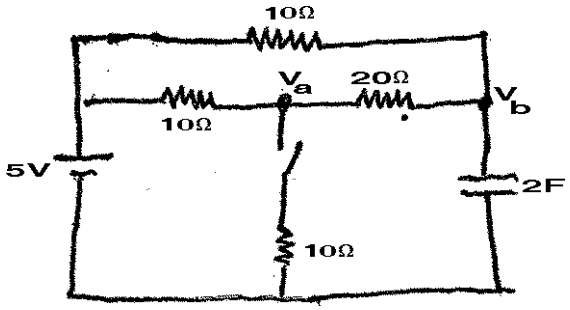
5) The network given in fig. contains a controlled current source find Y parameters.



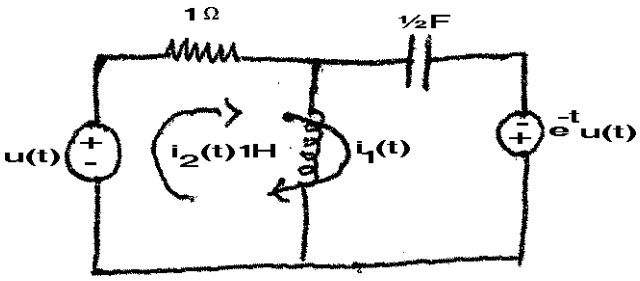
Set P

V. Answer **any two** questions : **(2×8=16)**

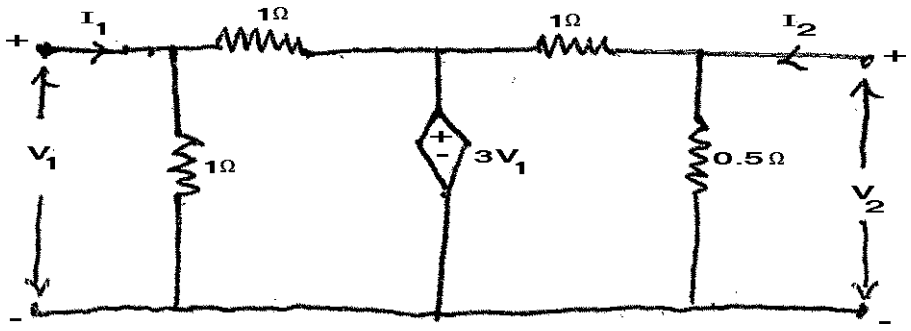
1) For the network shown in fig. with K open steady state is reached at t = 0, switch is closed find $V_a(0^-)$; $V_a(0^+)$; $V_b(0^-)$; $V_b(0^+)$.



2) In the network shown in fig. all the initial currents are zero obtain $i_1(t)$ and $i_2(t)$ by Laplace transformation method.



3) Find the Z parameters for the network shown in fig. which contains a controlled voltage source.



Set P

SLR-EP – 255

Seat No.	

Set Q

S.E. (Part – II) (CGPA) (Electrical Engg.) Examination, 2016
NETWORK ANALYSIS

Day and Date : Friday, 25-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Assume the suitable data **whenever** necessary.*
*2) Q. No. **I** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

I. Choose the correct answer : **(14×1=14)**

1) The transient current in a loss free LC circuit when exited from an ac source is an _____ sine wave.
   a) Un damped b) Over damped
   c) Under damped d) Critically damped

2) The time constant of a series RL circuit is
   a) LR b) L|R c) R|L d) $e^{-R|L}$

3) The initial value of $20 – 10t – e^{25t}$ is
   a) 20 b) 19 c) 10 d) 25

4) The final value of $2s + 1|s^4 + 8s^3 + 16s^2 + s$ is
   a) 2 b) infinite c) zero d) 1

5) For a two port network to be reciprocal
   a) $Z_{11} = Z_{22}$ b) $Y_{21} = Y_{22}$ c) $h_{21} = – h_{12}$ d) $AD – BC = 0$

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10) For DC, at switching condition which of the following acts as open circuit ?
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11) The concept on which super position theorem is based is
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12) Millman's theorem yields
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   b) Equivalent impedance
   c) Equivalent voltage force
   d) Equivalent voltage or current source

13) Six light bulbs are connected in parallel across 110 V, each bulb is related at 75 W. How much current flows through each bulb ?
   a) 0.682 A b) 0.7A c) 75 A d) 110 A

14) The number of independent loops for a network with 'n' nodes and 'b' branches is
   a) a – 1
   b) b – n
   c) b – n + 1
   d) Independent of the number of nodes

———————

SLR-EP – 255

Seat No.	

S.E. (Part – II) (CGPA) (Electrical Engg.) Examination, 2016
NETWORK ANALYSIS

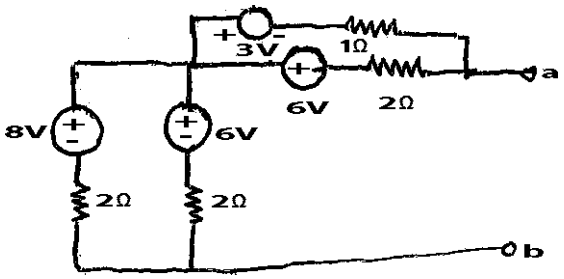
Day and Date : Friday, 25-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Assume the suitable data **whenever** necessary.*

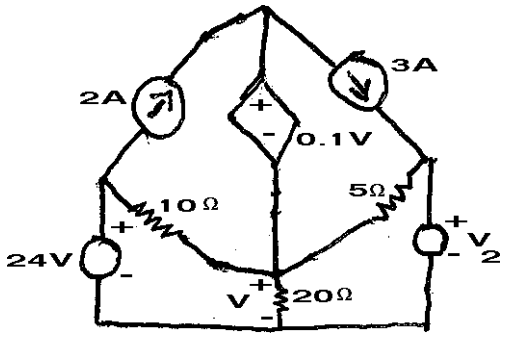
SECTION – I

II. Answer **any four** questions : **(4×3=12)**

1) Using source transformation techniques reduce the network between the terminals a and b into a single voltage source in series with a single resistance.

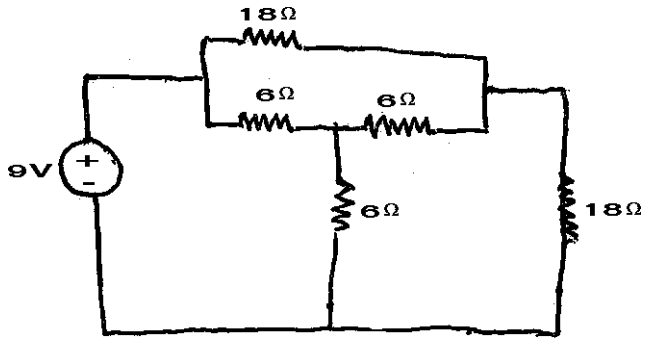


2) Use mesh analysis to determine what value of V_2 in the network in fig. shown causes V = 0, V is the voltage across $20\,\Omega$.

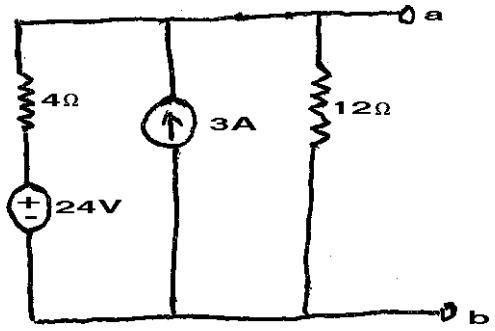


Set Q

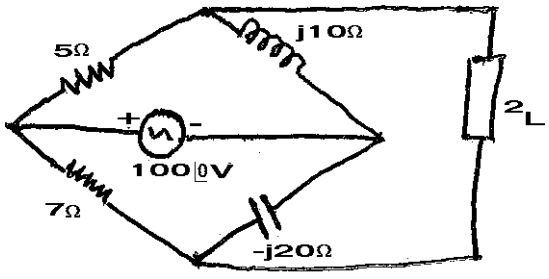
3) Using star-delta transformations reduce the given network shown in fig. and determine the total current supplied by the source.



4) Find the Norton's equivalent circuit across terminals a, b of the network shown in fig.



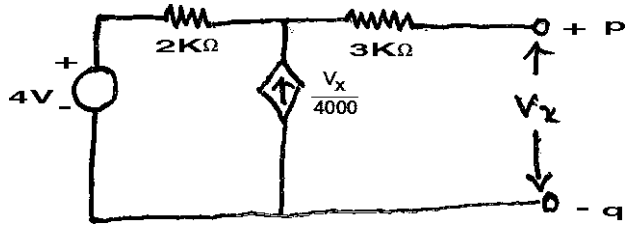
5) Find the value of Z_L for which power is transferred to the load Z_L from the network shown in fig.



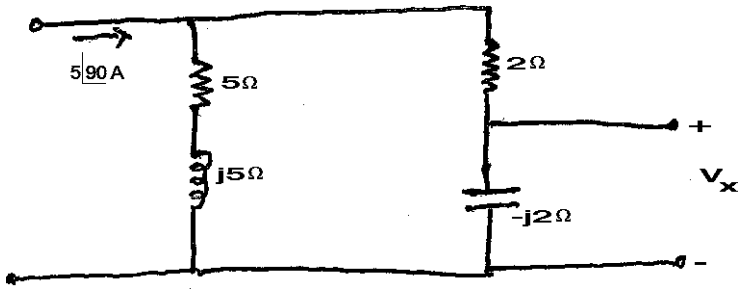
Set Q

III. Answer **any two** questions : **(2×8=16)**

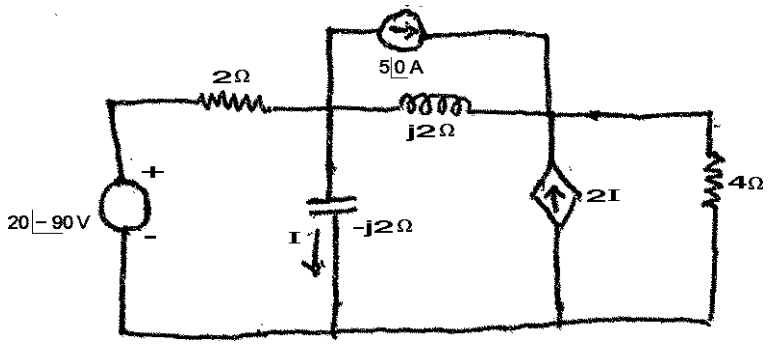
1) For the network shown obtain Thevenin's equivalent as seen from terminals p and q.



2) In the single current source circuit shown in fig. find the voltage V_X. Interchange the current source and the resulting voltage V_X is the reciprocity theorem verified ?



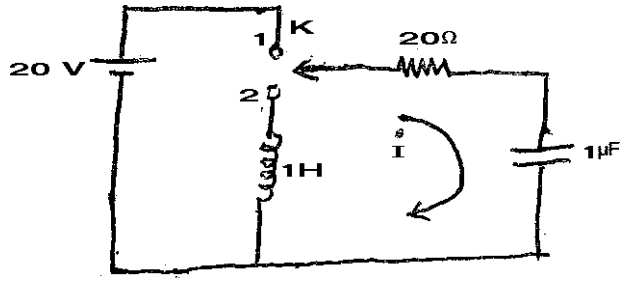
3) Find I using mesh analysis as shown in the circuit below.



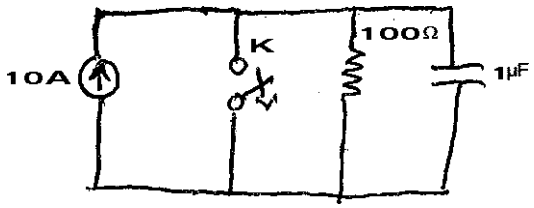
SECTION – II

IV. Answer **any four** questions : **(4×3=12)**

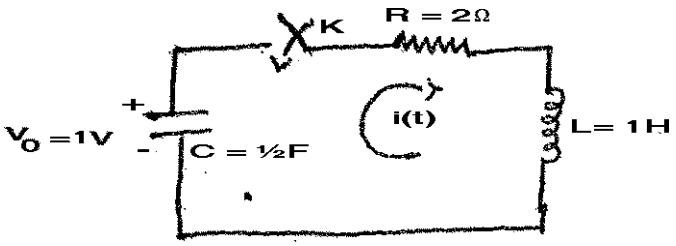
1) In the circuit shown in fig. K is moved from 1 to 2 at t = 0, find values of i and di/dt at t = 0^+ assume steady state is reached.



2) In the circuit shown in fig. switch K is opened at t = 0 find the value of V, dv/dt and d^2v/dt^2 at t =0^+.

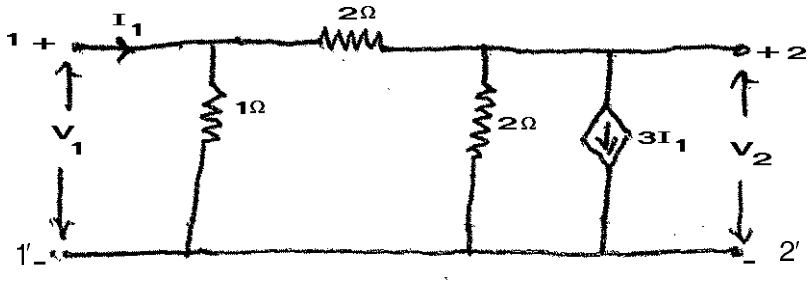


3) In the circuit shown in fig. if the capacitor is initially charged to 1V. Find an expression for i(t) when the switch K is closed at t = 0.



4) Find inverse Laplace transformation for F(s) = 5s + 3/(s – 1) (s^2 + 2s + 5).

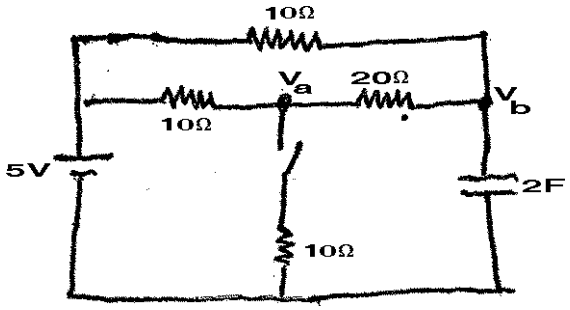
5) The network given in fig. contains a controlled current source find Y parameters.



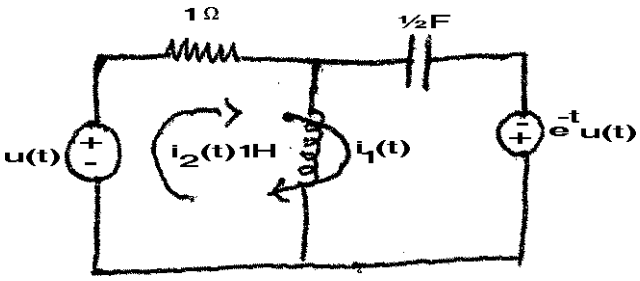
Set Q

V. Answer **any two** questions : **(2×8=16)**

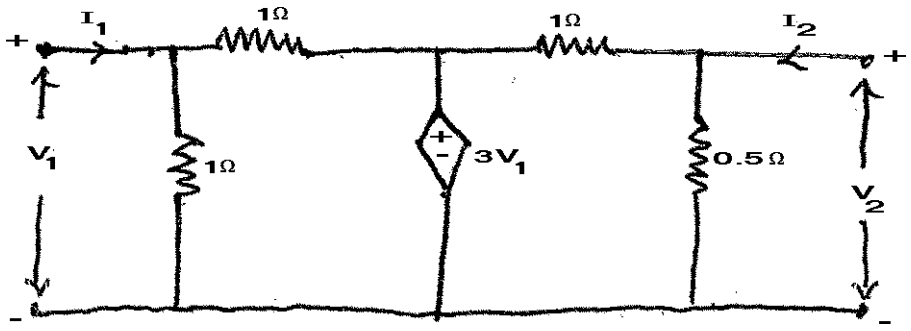
1) For the network shown in fig. with K open steady state is reached at t = 0, switch is closed find $V_a(0^-)$; $V_a(0^+)$; $V_b(0^-)$; $V_b(0^+)$.



2) In the network shown in fig. all the initial currents are zero obtain $i_1(t)$ and $i_2(t)$ by Laplace transformation method.



3) Find the Z parameters for the network shown in fig. which contains a controlled voltage source.



Set Q

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Seat No.	

Set R

S.E. (Part – II) (CGPA) (Electrical Engg.) Examination, 2016
NETWORK ANALYSIS

Day and Date : Friday, 25-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Assume the suitable data **whenever** necessary.*
*2) Q. No. **I** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

I. Choose the correct answer : **(14×1=14)**

1) Millman's theorem yields
   a) Equivalent resistance
   b) Equivalent impedance
   c) Equivalent voltage force
   d) Equivalent voltage or current source

2) Six light bulbs are connected in parallel across 110 V, each bulb is related at 75 W. How much current flows through each bulb ?
   a) 0.682 A b) 0.7A c) 75 A d) 110 A

3) The number of independent loops for a network with 'n' nodes and 'b' branches is
   a) a – 1 b) b – n
   c) b – n + 1 d) Independent of the number of nodes

4) The transient current in a loss free LC circuit when exited from an ac source is an _____ sine wave.
   a) Un damped b) Over damped
   c) Under damped d) Critically damped

P.T.O.

5) The time constant of a series RL circuit is
   a) LR b) L|R c) R|L d) $e^{-R|L}$

6) The initial value of $20 - 10t - e^{25t}$ is
   a) 20 b) 19 c) 10 d) 25

7) The final value of $2s + 1|s^4 + 8s^3 + 16s^2 + s$ is
   a) 2 b) infinite c) zero d) 1

8) For a two port network to be reciprocal
   a) $Z_{11} = Z_{22}$ b) $Y_{21} = Y_{22}$ c) $h_{21} = -h_{12}$ d) $AD - BC = 0$

9) The number of possible combinations generated by four variables taken two at a time in a two port network is
   a) 4 b) 2 c) 6 d) 8

10) A two port network is simply a network inside a black box and the network has only
   a) Two terminals b) Two pairs of accessible terminals
   c) Two pairs of ports d) All of the above

11) A sub graph i.e. tree of an given network having nodes and branch. Identify the correct statement.
   a) It has all the nodes of the network
   b) There are no closed path
   c) The number of branches exceeds the number of nodes of the network graph by one
   d) It is always planar

12) The time constant of series RC network is
   a) 1/RC b) R/C c) RC d) e^{-RC}

13) For DC, at switching condition which of the following acts as open circuit ?
   a) Inductor b) Capacitor
   c) Resistor d) All of the above

14) The concept on which super position theorem is based is
   a) Reciprocity b) Duality
   c) Non-linearity d) Linearity

———————

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Seat No.	

S.E. (Part – II) (CGPA) (Electrical Engg.) Examination, 2016
NETWORK ANALYSIS

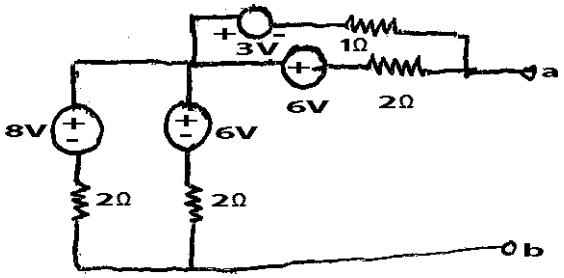
Day and Date : Friday, 25-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: Assume the suitable data* ***whenever*** *necessary.*

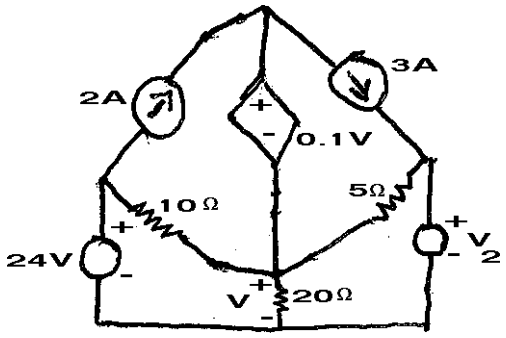
SECTION – I

II. Answer **any four** questions : **(4×3=12)**

1) Using source transformation techniques reduce the network between the terminals a and b into a single voltage source in series with a single resistance.

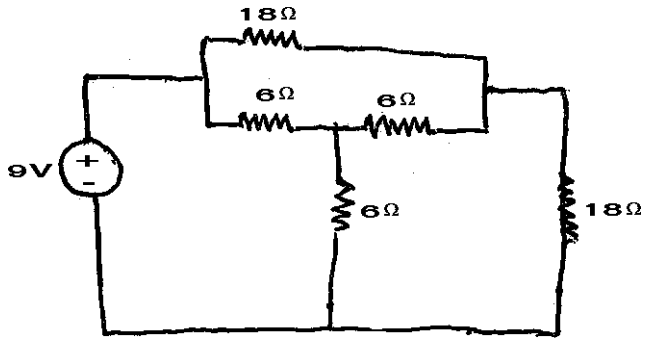


2) Use mesh analysis to determine what value of V_2 in the network in fig. shown causes V = 0, V is the voltage across 20 Ω .

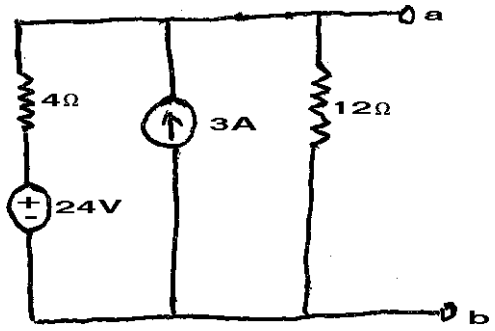


Set R

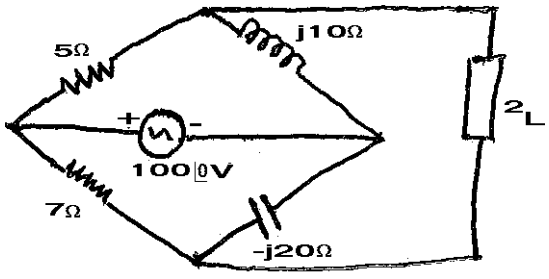
3) Using star-delta transformations reduce the given network shown in fig. and determine the total current supplied by the source.



4) Find the Norton's equivalent circuit across terminals a, b of the network shown in fig.

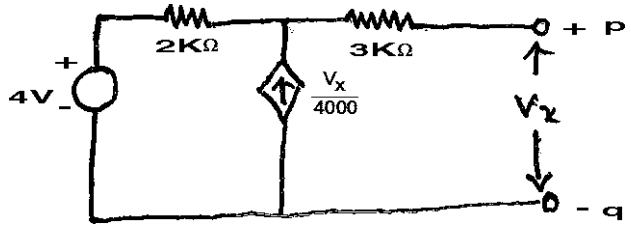


5) Find the value of Z_L for which power is transferred to the load Z_L from the network shown in fig.

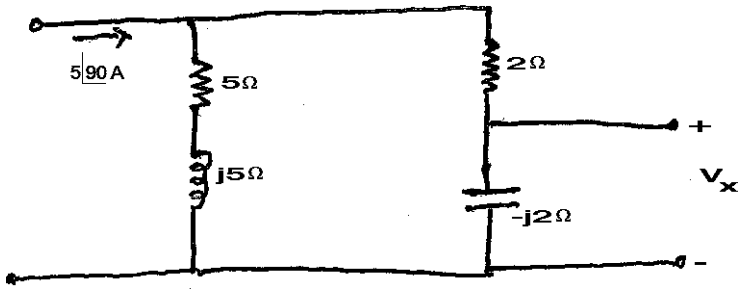


III. Answer **any two** questions : **(2×8=16)**

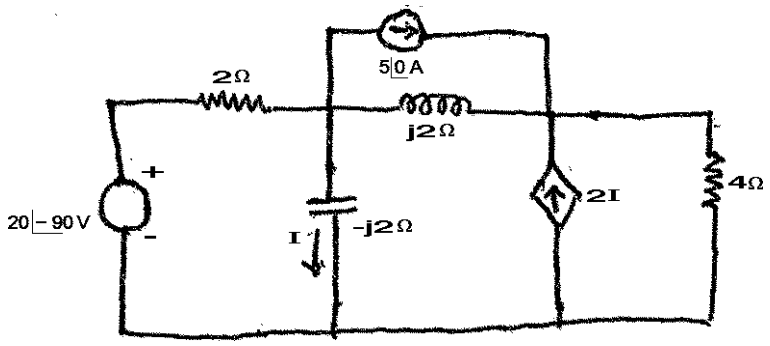
1) For the network shown obtain Thevenin's equivalent as seen from terminals p and q.



2) In the single current source circuit shown in fig. find the voltage V_X. Interchange the current source and the resulting voltage V_X is the reciprocity theorem verified ?



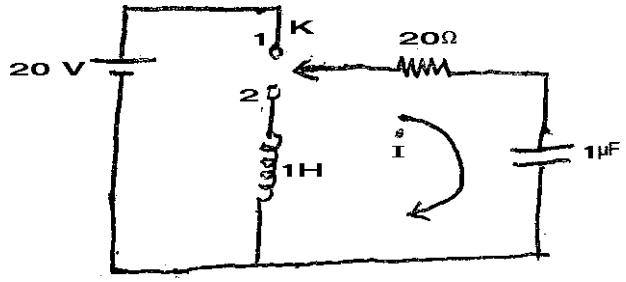
3) Find I using mesh analysis as shown in the circuit below.



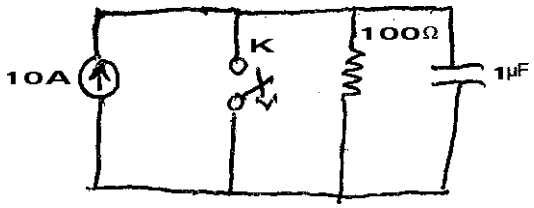
SECTION – II

IV. Answer **any four** questions : **(4×3=12)**

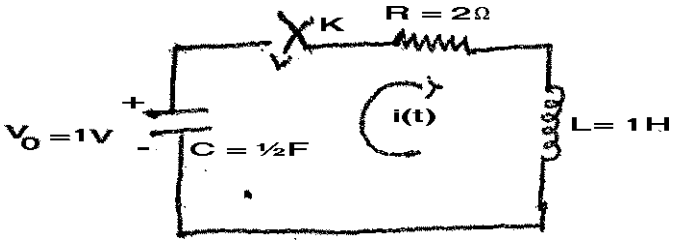
1) In the circuit shown in fig. K is moved from 1 to 2 at t = 0, find values of i and di/dt at t = 0^+ assume steady state is reached.



2) In the circuit shown in fig. switch K is opened at t = 0 find the value of V, dv/dt and d^2v/dt^2 at t =0^+.

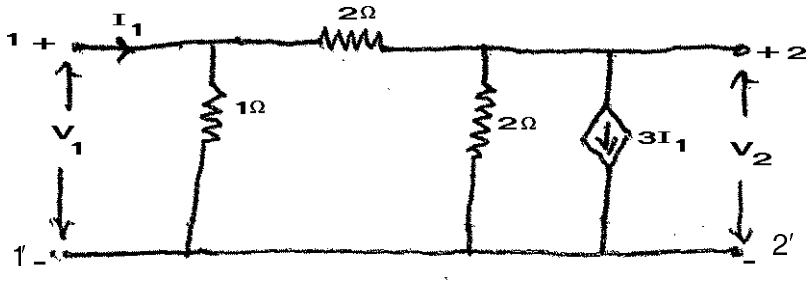


3) In the circuit shown in fig. if the capacitor is initially charged to 1V. Find an expression for i(t) when the switch K is closed at t = 0.



4) Find inverse Laplace transformation for F(s) = 5s + 3/(s – 1) (s^2 + 2s + 5).

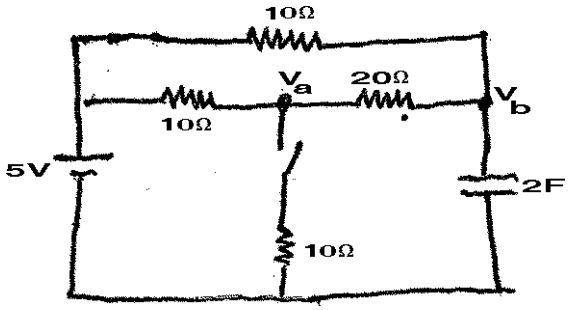
5) The network given in fig. contains a controlled current source find Y parameters.



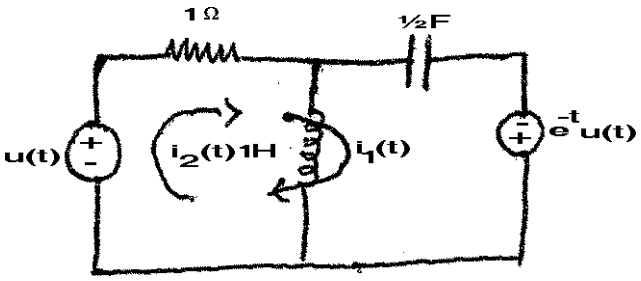
Set R

V. Answer **any two** questions : **(2×8=16)**

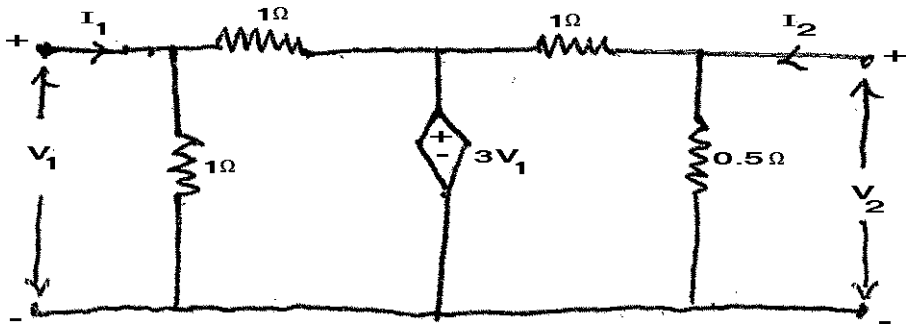
1) For the network shown in fig. with K open steady state is reached at t = 0, switch is closed find $V_a(0^-)$; $V_a(0^+)$; $V_b(0^-)$; $V_b(0^+)$.



2) In the network shown in fig. all the initial currents are zero obtain $i_1(t)$ and $i_2(t)$ by Laplace transformation method.



3) Find the Z parameters for the network shown in fig. which contains a controlled voltage source.



Set R

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Seat No.	

Set **S**

S.E. (Part – II) (CGPA) (Electrical Engg.) Examination, 2016
NETWORK ANALYSIS

Day and Date : Friday, 25-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume the suitable data* ***whenever*** *necessary.*
2) Q. No. ***I*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
3) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

I. Choose the correct answer : **(14×1=14)**

1) The initial value of $20 - 10t - e^{25t}$ is
   a) 20 b) 19 c) 10 d) 25

2) The final value of $2s + 1|s^4 + 8s^3 + 16s^2 + s$ is
   a) 2 b) infinite
   c) zero d) 1

3) For a two port network to be reciprocal
   a) $Z_{11} = Z_{22}$ b) $Y_{21} = Y_{22}$
   c) $h_{21} = -h_{12}$ d) $AD - BC = 0$

4) The number of possible combinations generated by four variables taken two at a time in a two port network is
   a) 4 b) 2 c) 6 d) 8

5) A two port network is simply a network inside a black box and the network has only
   a) Two terminals b) Two pairs of accessible terminals
   c) Two pairs of ports d) All of the above

P.T.O.

6) A sub graph i.e. tree of an given network having nodes and branch. Identify the correct statement.
   a) It has all the nodes of the network
   b) There are no closed path
   c) The number of branches exceeds the number of nodes of the network graph by one
   d) It is always planar

7) The time constant of series RC network is
   a) 1/RC b) R/C c) RC d) e^{-RC}

8) For DC, at switching condition which of the following acts as open circuit ?
   a) Inductor b) Capacitor
   c) Resistor d) All of the above

9) The concept on which super position theorem is based is
   a) Reciprocity b) Duality
   c) Non-linearity d) Linearity

10) Millman's theorem yields
   a) Equivalent resistance
   b) Equivalent impedance
   c) Equivalent voltage force
   d) Equivalent voltage or current source

11) Six light bulbs are connected in parallel across 110 V, each bulb is related at 75 W. How much current flows through each bulb ?
   a) 0.682 A b) 0.7A c) 75 A d) 110 A

12) The number of independent loops for a network with 'n' nodes and 'b' branches is
   a) a – 1 b) b – n
   c) b – n + 1 d) Independent of the number of nodes

13) The transient current in a loss free LC circuit when exited from an ac source is an _____ sine wave.
   a) Un damped b) Over damped
   c) Under damped d) Critically damped

14) The time constant of a series RL circuit is
   a) LR b) L|R c) R|L d) $e^{-R|L}$

_____

SLR-EP – 255

Seat No.	

S.E. (Part – II) (CGPA) (Electrical Engg.) Examination, 2016
NETWORK ANALYSIS

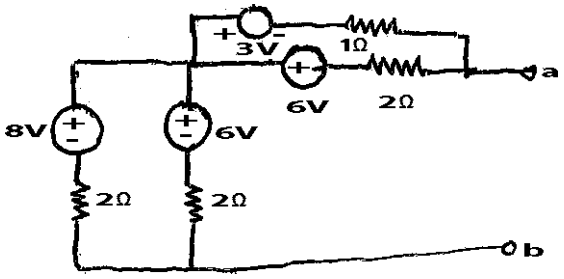
Day and Date : Friday, 25-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Assume the suitable data **whenever** necessary.*

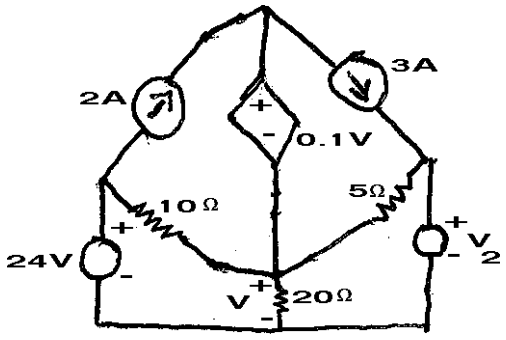
SECTION – I

II. Answer **any four** questions : **(4×3=12)**

1) Using source transformation techniques reduce the network between the terminals a and b into a single voltage source in series with a single resistance.

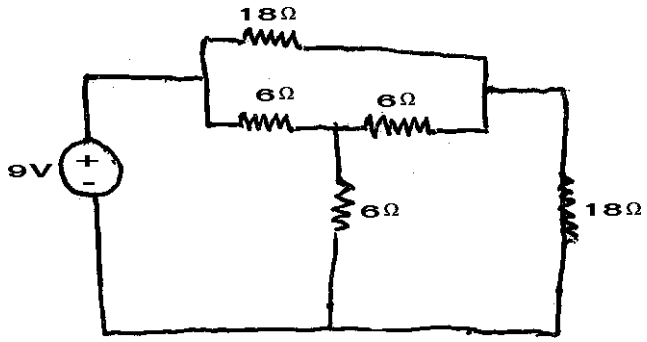


2) Use mesh analysis to determine what value of V_2 in the network in fig. shown causes V = 0, V is the voltage across 20 Ω .

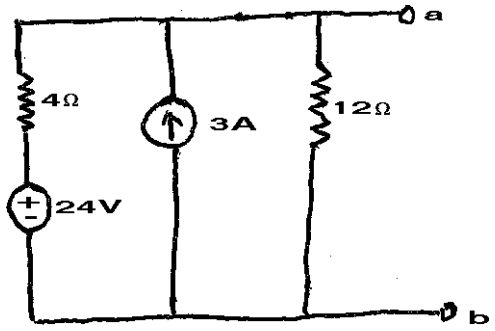


Set S

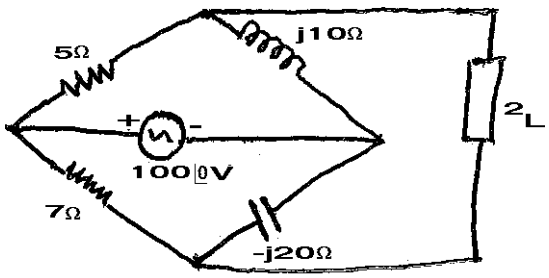
3) Using star-delta transformations reduce the given network shown in fig. and determine the total current supplied by the source.



4) Find the Norton's equivalent circuit across terminals a, b of the network shown in fig.

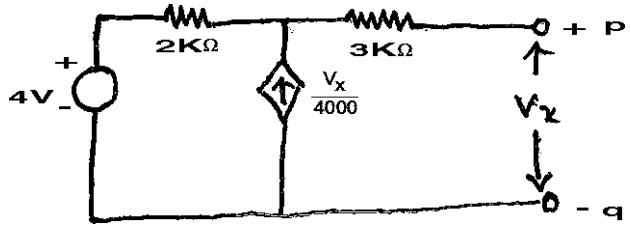


5) Find the value of Z_L for which power is transferred to the load Z_L from the network shown in fig.

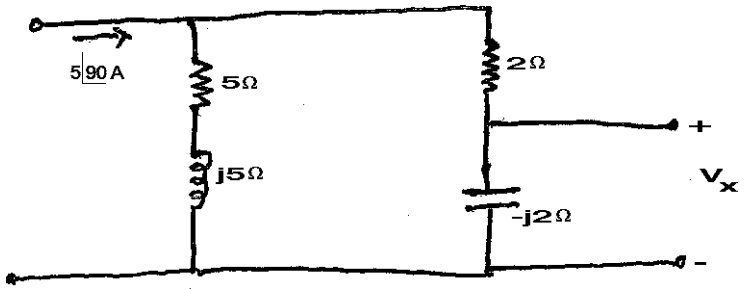


III. Answer **any two** questions : **(2×8=16)**

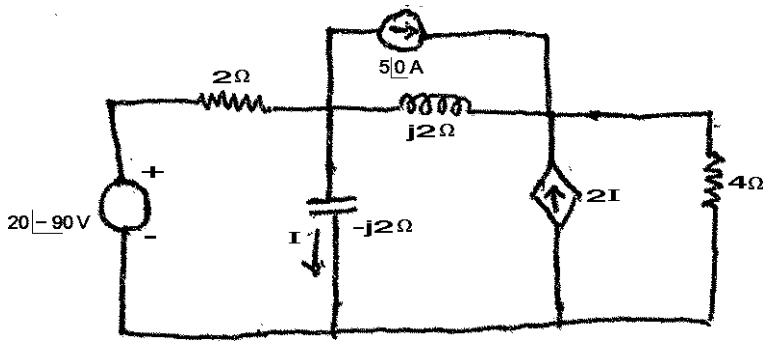
1) For the network shown obtain Thevenin's equivalent as seen from terminals p and q.



2) In the single current source circuit shown in fig. find the voltage V_X. Interchange the current source and the resulting voltage V_X is the reciprocity theorem verified ?



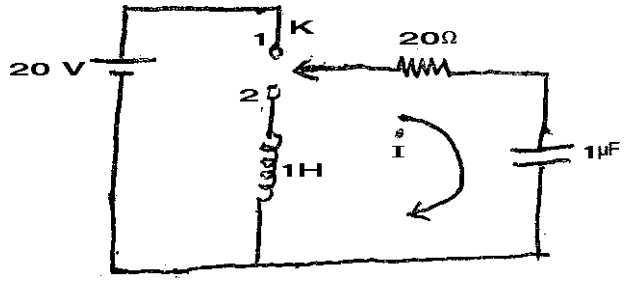
3) Find I using mesh analysis as shown in the circuit below.



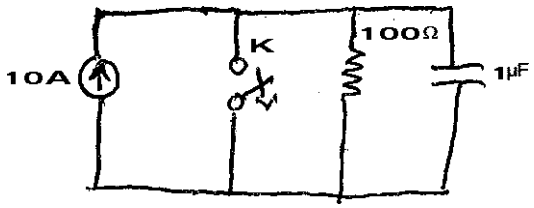
SECTION – II

IV. Answer **any four** questions : **(4×3=12)**

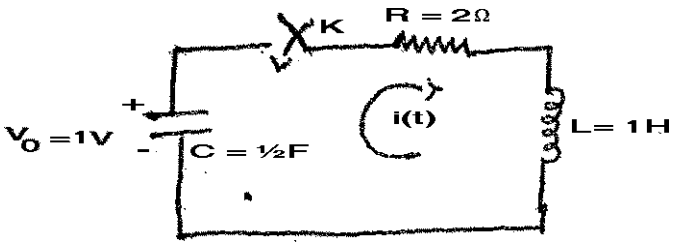
1) In the circuit shown in fig. K is moved from 1 to 2 at t = 0, find values of i and di/dt at t = 0^+ assume steady state is reached.



2) In the circuit shown in fig. switch K is opened at t = 0 find the value of V, dv/dt and d^2v/dt^2 at t =0^+.

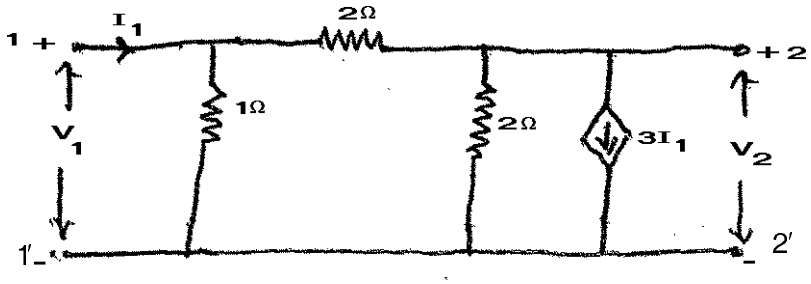


3) In the circuit shown in fig. if the capacitor is initially charged to 1V. Find an expression for i(t) when the switch K is closed at t = 0.



4) Find inverse Laplace transformation for F(s) = 5s + 3/(s – 1) (s^2 + 2s + 5).

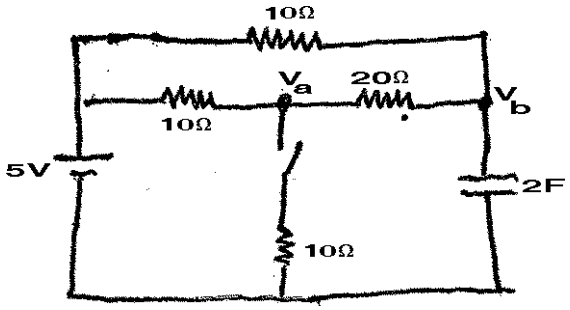
5) The network given in fig. contains a controlled current source find Y parameters.



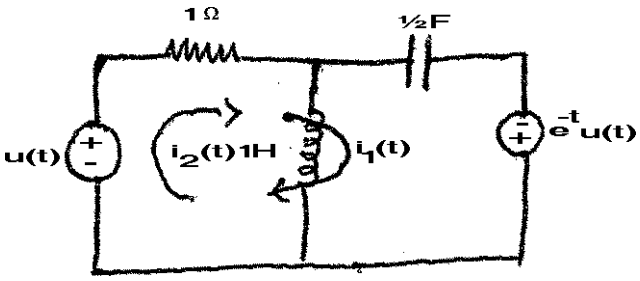
Set S

V. Answer **any two** questions : **(2×8=16)**

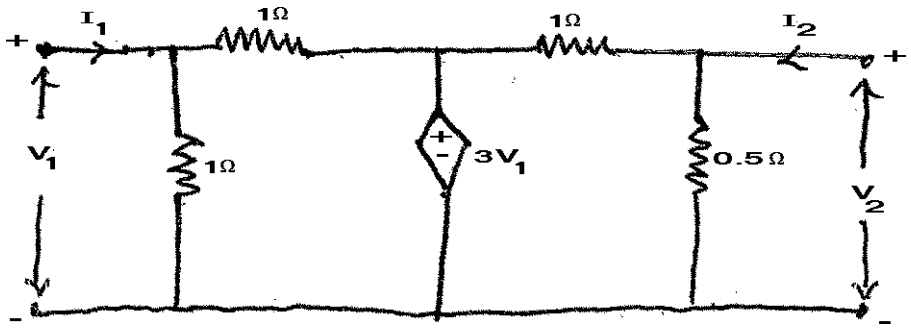
1) For the network shown in fig. with K open steady state is reached at t = 0, switch is closed find $V_a(0^-)$; $V_a(0^+)$; $V_b(0^-)$; $V_b(0^+)$.



2) In the network shown in fig. all the initial currents are zero obtain $i_1(t)$ and $i_2(t)$ by Laplace transformation method.



3) Find the Z parameters for the network shown in fig. which contains a controlled voltage source.



Set S

SLR-EP – 256

Seat No.	

Set P

S.E. (Electrical) (Part – II) (Old) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 16-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) If $x(n) = \cos \frac{\pi n}{2}$ how many samples per period in this signal ?
A) 4 B) 8 C) 2 D) 5

2) The given signal y(n) = a x(n) + b x(n – 1) is
A) Causal B) Non-causal

3) The given signal $y(n) = n\, x^4(n)$ is
A) Non-linear B) Linear

4) If the average energy of signal satisfies the condition $0 < E < \infty$ is called
A) Energy B) Power C) Primary D) Random

5) A discrete time signal x(n) is said to be periodic with period N if and only if
A) x(N + n) = x(n) for all n B) x(N + n) = x(n + 1) for all n
C) x(N – n) = x(n + 1) for all n D) x(N – n) = x(n) for all n

6) The signal which exists only at t=0 where area is unity is referred as continuous time unit
A) Time B) Impulse C) Series D) Level

7) For static system output at any instant depends on the
A) Present input B) Past input
C) Future input D) Present input but not on past or future input

8) For rational Laplace transforms, the ROC does not contains any
A) Zeros B) Poles C) Eigen functions D) None

P.T.O.

9) A signal for which the system output is constant times the input is referred to as an
A) Eigen function B) Eigen value C) Poles D) Eigen vector

10) The given signal is time variant $y(n) = n\, x^2(n)$.
A) True B) False

11) Zero padding are
A) Zero appearing in the X[k] sequence
B) Value of X[k] is zero
C) Dummy sample added with value 0 in X[k]
D) Both A) and B)

12) If x[n] is real and odd, then its discrete Fourier series coefficient c_k will be
A) Real B) Odd C) Imaginary D) Both A) and B)

13) Fourier transform of x[– n] is
A) $-X(\Omega)$ (B) $X(-\Omega)$ C) $X(\Omega)$ D) Zero

14) If the output of discrete time LTI system is always identical to the input signal then the impulse response h(n) is
A) Unit step B) Unit impulse C) All one D) Ramp

15) The number of complex multiplication required to calculate N-point DFT using radix-2 DIT-FFT algorithm is
A) $N \log_2 N$ B) $\frac{N}{2}\log_{10}^{N}$ C) $N \log_{10} N$ D) $\frac{N}{2}\log_2 N$

16) Fourier transform of unit impulse sequence is
A) 1 B) Zero C) $\pi\delta(\Omega)$ D) $\delta(\Omega)$

17) DFT X(k) of x(n) is
A) A function of continuous variable B) A function of discrete variable
C) Both A) and B) D) None of these

18) Discrete Fourier transform and Fourier transform of finite length sequence x[n] is
A) Same B) Different C) Maybe same D) Maybe different

19) The DFT of sequence $x(n) = \delta(n - n_0)$ is
A) 1 B) $e^{j2\pi k n_0}$ C) $e^{j2\pi k n_0}/N$ D) $e^{-j2\pi k n_0/N}$

20) The sampling theorem is applicable to continuous time
A) Band limited signal B) Band undefined
C) Any signal D) Stochastic signal

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SLR-EP – 256

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 16-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Find y(n) = x(2n) is static or dynamic signal.
   2) State and prove differentiation property of Laplace transform.
   3) x(t)= cos(wt), check x(t) is even or odd signal.
   4) Obtain direct form representation of following LTI system with system function

      $$H(s) = \frac{s^2 + 8s - 16}{s^2 + 3s + 2}.$$

   5) Determine power of given signal x(t) :

      $$x(t) = 10\cos\left(50t + \frac{\pi}{4}\right) + 16\cos\left(100t + \frac{\pi}{3}\right).$$

3. Solve **any two** : **(2×10=20)**
   1) Sketch the following signals :
      a) u(t – 1)
      b) 2u(t + 1)
      c) 3r(t – 2)
      d) – 2r(t)
      e) r(– t + 2).
   2) Determine convolution sum of following two sequences :
      x[n] = {2,2,1,2} h[n] = {2,2,2,2}.
   3) Find inverse Laplace transform of $x(s) = \frac{2s + 1}{(s + 1)(s^2 + 2s + 2)}$

      Also state initial value theorem in case of Laplace transform.

SECTION – II

4. Solve **any four** : **(4×5=20)**

   1) Find Fourier transform of $x(t) = e^{-3t}[u(t + 2) – u(t – 3)]$.

   2) Determine the Nyquist sampling rate and Nyquist sampling interval for the signal $x(t) = \sin c(200\pi t) + 3 \sin c^2 (120\pi t)$.

   3) Explain what is convolution in frequency domain.

   4) Using z-transform find the convolution of two sequences

      $x_1 = \{1, 2, – 1, 0, 3\}$; $x_2 = \{1, 2, –1\}$.

   5) Explain and prove frequency shifting property of discrete time Fourier transform.

5. Solve **any two** : **(2×10=20)**

   1) Find Fourier components of the periodic rectangular waveform shown in figure.

   2) Verify Parseval's theorem.

      $\sum_{n=-\infty}^{\infty} x(n)x^*(n) = \frac{1}{2\pi}\int_{-\pi}^{\pi} X(e^{i\omega})\, X^*(e^{i\omega})\, d\omega$ for the sequence given as follows $x(n) = \left(\frac{1}{2}\right)^n u(n)$.

   3) A causal and stable LTI system has the property that $\left(\frac{4}{5}\right)^n u(n) \rightarrow n\left(\frac{4}{5}\right)^n u(n)$.

      a) Determine the frequency response $H(e^{j\omega})$ for the system.

      b) Find Fourier series for the periodic signal $x(t) = t\ 0 \le t \le 1$ and repeats at every 1 sec.

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SLR-EP – 256

Seat No.	

Set Q

S.E. (Electrical) (Part – II) (Old) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 16-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Fourier transform of unit impulse sequence is
A) 1 B) Zero C) $\pi\delta(\Omega)$ D) $\delta(\Omega)$

2) DFT X(k) of x(n) is
A) A function of continuous variable B) A function of discrete variable
C) Both A) and B) D) None of these

3) Discrete Fourier transform and Fourier transform of finite length sequence x[n] is
A) Same B) Different C) Maybe same D) Maybe different

4) The DFT of sequence $x(n) = \delta(n - n_0)$ is
A) 1 B) $e^{j2\pi kn_0}$ C) $e^{j2\pi kn_0}/N$ D) $e^{-j2\pi kn_0/N}$

5) The sampling theorem is applicable to continuous time
A) Band limited signal B) Band undefined
C) Any signal D) Stochastic signal

6) If $x(n) = \cos\frac{\pi n}{2}$ how many samples per period in this signal ?
A) 4 B) 8 C) 2 D) 5

7) The given signal y(n) = a x(n) + b x(n – 1) is
A) Causal B) Non-causal

8) The given signal $y(n) = n\, x^4(n)$ is
A) Non-linear B) Linear

P.T.O.

9) If the average energy of signal satisfies the condition $0 < E < \infty$ is called
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10) A discrete time signal x(n) is said to be periodic with period N if and only if
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C) x(N – n) = x(n + 1) for all n D) x(N – n) = x(n) for all n

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A) Time B) Impulse C) Series D) Level

12) For static system output at any instant depends on the
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13) For rational Laplace transforms, the ROC does not contains any
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14) A signal for which the system output is constant times the input is referred to as an
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15) The given signal is time variant $y(n) = n\, x^2(n)$.
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A) $-X(\Omega)$ (B) $X(-\Omega)$ C) $X(\Omega)$ D) Zero

19) If the output of discrete time LTI system is always identical to the input signal then the impulse response h(n) is
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20) The number of complex multiplication required to calculate N-point DFT using radix-2 DIT-FFT algorithm is
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Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 16-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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   1) Find y(n) = x(2n) is static or dynamic signal.
   2) State and prove differentiation property of Laplace transform.
   3) x(t)= cos(wt), check x(t) is even or odd signal.
   4) Obtain direct form representation of following LTI system with system function

      $$H(s) = \frac{s^2 + 8s - 16}{s^2 + 3s + 2}.$$

   5) Determine power of given signal x(t) :

      $$x(t) = 10\cos\left(50t + \frac{\pi}{4}\right) + 16\cos\left(100t + \frac{\pi}{3}\right).$$

3. Solve **any two** : **(2×10=20)**
   1) Sketch the following signals :
      a) u(t – 1)
      b) 2u(t + 1)
      c) 3r(t – 2)
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   2) Determine convolution sum of following two sequences :
      x[n] = {2,2,1,2} h[n] = {2,2,2,2}.
   3) Find inverse Laplace transform of $x(s) = \frac{2s + 1}{(s + 1)(s^2 + 2s + 2)}$

      Also state initial value theorem in case of Laplace transform.

SECTION – II

4. Solve **any four** : **(4×5=20)**

   1) Find Fourier transform of $x(t) = e^{-3t}[u(t + 2) – u(t – 3)]$.

   2) Determine the Nyquist sampling rate and Nyquist sampling interval for the signal $x(t) = \sin c(200\pi t) + 3 \sin c^2 (120\pi t)$.

   3) Explain what is convolution in frequency domain.

   4) Using z-transform find the convolution of two sequences

      $x_1 = \{1, 2, – 1, 0, 3\}$; $x_2 = \{1, 2, –1\}$.

   5) Explain and prove frequency shifting property of discrete time Fourier transform.

5. Solve **any two** : **(2×10=20)**

   1) Find Fourier components of the periodic rectangular waveform shown in figure.

   2) Verify Parseval's theorem.

      $\sum_{n=-\infty}^{\infty} x(n)x^*(n) = \frac{1}{2\pi}\int_{-\pi}^{\pi} X(e^{i\omega})\, X^*(e^{i\omega})\, d\omega$ for the sequence given as follows $x(n) = \left(\frac{1}{2}\right)^n u(n)$.

   3) A causal and stable LTI system has the property that $\left(\frac{4}{5}\right)^n u(n) \rightarrow n\left(\frac{4}{5}\right)^n u(n)$.

      a) Determine the frequency response $H(e^{j\omega})$ for the system.

      b) Find Fourier series for the periodic signal $x(t) = t\ 0 \le t \le 1$ and repeats at every 1 sec.

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SLR-EP – 256

Seat No.	

Set R

S.E. (Electrical) (Part – II) (Old) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 16-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Zero padding are
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   B) Value of X[k] is zero
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6) Fourier transform of unit impulse sequence is
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7) DFT X(k) of x(n) is
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P.T.O.

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19) A signal for which the system output is constant times the input is referred to as an
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20) The given signal is time variant $y(n) = n\, x^2(n)$.
A) True B) False

SLR-EP – 256

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 16-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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   3) Find inverse Laplace transform of $x(s) = \frac{2s + 1}{(s + 1)(s^2 + 2s + 2)}$

      Also state initial value theorem in case of Laplace transform.

SECTION – II

4. Solve **any four** : **(4×5=20)**

   1) Find Fourier transform of $x(t) = e^{-3t}[u(t + 2) – u(t – 3)]$.

   2) Determine the Nyquist sampling rate and Nyquist sampling interval for the signal $x(t) = \sin c(200\pi t) + 3 \sin c^2 (120\pi t)$.

   3) Explain what is convolution in frequency domain.

   4) Using z-transform find the convolution of two sequences

      $x_1 = \{1, 2, – 1, 0, 3\}$; $x_2 = \{1, 2, –1\}$.

   5) Explain and prove frequency shifting property of discrete time Fourier transform.

5. Solve **any two** : **(2×10=20)**

   1) Find Fourier components of the periodic rectangular waveform shown in figure.

   2) Verify Parseval's theorem.

      $\sum_{n=-\infty}^{\infty} x(n)x^*(n) = \frac{1}{2\pi}\int_{-\pi}^{\pi} X(e^{i\omega})\, X^*(e^{i\omega})\, d\omega$ for the sequence given as follows $x(n) = \left(\frac{1}{2}\right)^n u(n)$.

   3) A causal and stable LTI system has the property that $\left(\frac{4}{5}\right)^n u(n) \rightarrow n\left(\frac{4}{5}\right)^n u(n)$.

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      b) Find Fourier series for the periodic signal $x(t) = t\ 0 \le t \le 1$ and repeats at every 1 sec.

———————

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Seat No.	

Set S

S.E. (Electrical) (Part – II) (Old) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 16-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The signal which exists only at t=0 where area is unity is referred as continuous time unit
A) Time B) Impulse C) Series D) Level

2) For static system output at any instant depends on the
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4) A signal for which the system output is constant times the input is referred to as an
A) Eigen function B) Eigen value C) Poles D) Eigen vector

5) The given signal is time variant $y(n) = n\, x^2(n)$.
A) True B) False

6) Zero padding are
A) Zero appearing in the X[k] sequence
B) Value of X[k] is zero
C) Dummy sample added with value 0 in X[k]
D) Both A) and B)

7) If x[n] is real and odd, then its discrete Fourier series coefficient c_k will be
A) Real B) Odd C) Imaginary D) Both A) and B)

P.T.O.

8) Fourier transform of x[– n] is
A) $-X(\Omega)$ (B) $X(-\Omega)$ C) $X(\Omega)$ D) Zero

9) If the output of discrete time LTI system is always identical to the input signal then the impulse response h(n) is
A) Unit step B) Unit impulse C) All one D) Ramp

10) The number of complex multiplication required to calculate N-point DFT using radix-2 DIT-FFT algorithm is
A) $N \log_2 N$ B) $\frac{N}{2}\log_{10}^{N}$ C) $N \log_{10} N$ D) $\frac{N}{2}\log_2 N$

11) Fourier transform of unit impulse sequence is
A) 1 B) Zero C) $\pi\delta(\Omega)$ D) $\delta(\Omega)$

12) DFT X(k) of x(n) is
A) A function of continuous variable B) A function of discrete variable
C) Both A) and B) D) None of these

13) Discrete Fourier transform and Fourier transform of finite length sequence x[n] is
A) Same B) Different C) Maybe same D) Maybe different

14) The DFT of sequence $x(n) = \delta(n - n_0)$ is
A) 1 B) $e^{j2\pi kn_0}$ C) $e^{j2\pi kn_0}/N$ D) $e^{-j2\pi kn_0/N}$

15) The sampling theorem is applicable to continuous time
A) Band limited signal B) Band undefined
C) Any signal D) Stochastic signal

16) If $x(n) = \cos\frac{\pi n}{2}$ how many samples per period in this signal ?
A) 4 B) 8 C) 2 D) 5

17) The given signal y(n) = a x(n) + b x(n – 1) is
A) Causal B) Non-causal

18) The given signal $y(n) = n\, x^4(n)$ is
A) Non-linear B) Linear

19) If the average energy of signal satisfies the condition $0 < E < \infty$ is called
A) Energy B) Power C) Primary D) Random

20) A discrete time signal x(n) is said to be periodic with period N if and only if
A) x(N + n) = x(n) for all n B) x(N + n) = x(n + 1) for all n
C) x(N – n) = x(n + 1) for all n D) x(N – n) = x(n) for all n

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SLR-EP – 256

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 16-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Find y(n) = x(2n) is static or dynamic signal.
   2) State and prove differentiation property of Laplace transform.
   3) x(t)= cos(wt), check x(t) is even or odd signal.
   4) Obtain direct form representation of following LTI system with system function

      $$H(s) = \frac{s^2 + 8s - 16}{s^2 + 3s + 2}.$$

   5) Determine power of given signal x(t) :

      $$x(t) = 10\cos\left(50t + \frac{\pi}{4}\right) + 16\cos\left(100t + \frac{\pi}{3}\right).$$

3. Solve **any two** : **(2×10=20)**
   1) Sketch the following signals :
      a) u(t – 1)
      b) 2u(t + 1)
      c) 3r(t – 2)
      d) – 2r(t)
      e) r(– t + 2).
   2) Determine convolution sum of following two sequences :
      x[n] = {2,2,1,2} h[n] = {2,2,2,2}.
   3) Find inverse Laplace transform of $x(s) = \frac{2s + 1}{(s + 1)(s^2 + 2s + 2)}$

      Also state initial value theorem in case of Laplace transform.

SECTION – II

4. Solve **any four** : **(4×5=20)**

   1) Find Fourier transform of $x(t) = e^{-3t}[u(t + 2) – u(t – 3)]$.

   2) Determine the Nyquist sampling rate and Nyquist sampling interval for the signal $x(t) = \sin c(200\pi t) + 3 \sin c^2 (120\pi t)$.

   3) Explain what is convolution in frequency domain.

   4) Using z-transform find the convolution of two sequences

      $x_1 = \{1, 2, – 1, 0, 3\}$; $x_2 = \{1, 2, –1\}$.

   5) Explain and prove frequency shifting property of discrete time Fourier transform.

5. Solve **any two** : **(2×10=20)**

   1) Find Fourier components of the periodic rectangular waveform shown in figure.

   2) Verify Parseval's theorem.

      $\sum_{n=-\infty}^{\infty} x(n)x^*(n) = \frac{1}{2\pi} \int_{-\pi}^{\pi} X(e^{i\omega})\, X^*(e^{i\omega})\, d\omega$ for the sequence given as follows $x(n) = \left(\frac{1}{2}\right)^n u(n)$.

   3) A causal and stable LTI system has the property that $\left(\frac{4}{5}\right)^n u(n) \rightarrow n\left(\frac{4}{5}\right)^n u(n)$.

      a) Determine the frequency response $H(e^{j\omega})$ for the system.

      b) Find Fourier series for the periodic signal $x(t) = t\ 0 \le t \le 1$ and repeats at every 1 sec.

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SLR-EP – 257

Seat No.	

Set P

S.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
COMPUTER PROGRAMMING C++

Day and Date : Monday, 19-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) C++ is a _____ language.
a) Low level b) High level c) Average level d) Best level

2) Size of character type data is _____
a) 8 bit b) 1 byte c) 2 nibble d) a) b) and c)

3) Which one is the logical operator ?
a) : b) | c) || d) ::

4) Member of structure are accessed by which operator ?
a) :: b) ++ c) −− d) .

5) Function can accept the values as well as addresses
a) True b) False

6) Overloaded function have same names
a) True b) False

7) After declaration of object which function is invoked ?
a) Inline b) Constructor c) Destructor d) Virtual

8) The operator ~ is used with which function ?
a) Inline b) Constructor c) Destructor d) Virtual

9) Which is not a type of constructor ?
a) Default b) Empty c) Full d) Dynamic

P.T.O.

10) :: is called as
a) Colon b) Scope resolution
c) Dot d) None of above

11) To indicate end of string which character constant is used ?
a) \0 b) \b c) \a d) \t

12) Ternary operator can be overloaded
a) True b) False

13) Which one is correct declaration of array of objects ?
a) Array (objects) b) A [o] c) Student s [5] d) All above

14) Reusability means
a) Constructor b) Dynamic memory allocation
c) Inheritance d) Overloading

15) Which operator is used in declaration of derived class ?
a) :: b) → c) && d) :

16) Which one is a mode of derivation ?
a) Private b) Public c) Protected d) All above

17) To release the claim over dynamically allocated memory which operator is used ?
a) Free b) Delete c) Release d) Remove

18) Pointer to pointer can be declared with
a) * b) & c) && d) **

19) Friend is a keyword
a) True b) False

20) The int *A[5]; is the declarative
a) Array of 5 integers b) Array of pointers
c) Pointer to an array d) None of these

_____

SLR-EP – 257

Seat No.	

S.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
COMPUTER PROGRAMMING C++

Day and Date : Monday, 19-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Write a note on function.
   2) Explain in short pre-processor directives.
   3) Explain structure in C++.
   4) Write a note on inline function.
   5) Explain concept of class and object.
   6) Explain parameterized constructor.

3. Attempt **any two** : **(2×10=20)**
   1) Write in details operator in c++.
   2) Write a program using overloaded function area() to find area of circle, triangle and square.
   3) Write a program using class and object for addition of two integers. Using getdata(), add(), and display() function.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Write a note on rules of operator overloading.
   2) Write a note on string.
   3) Write a note on this pointer.

4) Explain static function.

5) Explain derived class constructor.

6) Write a note on need of inheritance.

5. Attempt **any two** : **(10×2=20)**

1) Write a program to overload + operator.

2) Explain with example the concept of friend function.

3) Explain in detail type of inheritance.

SLR-EP – 257

Seat No.	

Set **Q**

S.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
COMPUTER PROGRAMMING C++

Day and Date : Monday, 19-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which one is a mode of derivation ?
a) Private b) Public c) Protected d) All above

2) To release the claim over dynamically allocated memory which operator is used ?
a) Free b) Delete c) Release d) Remove

3) Pointer to pointer can be declared with
a) * b) & c) && d) **

4) Friend is a keyword
a) True b) False

5) The int *A[5]; is the declarative
a) Array of 5 integers b) Array of pointers
c) Pointer to an array d) None of these

6) C++ is a _____ language.
a) Low level b) High level c) Average level d) Best level

7) Size of character type data is _____
a) 8 bit b) 1 byte c) 2 nibble d) a) b) and c)

8) Which one is the logical operator ?
a) : b) | c) || d) ::

9) Member of structure are accessed by which operator ?
a) :: b) ++ c) −− d) .

P.T.O.

10) Function can accept the values as well as addresses
a) True b) False

11) Overloaded function have same names
a) True b) False

12) After declaration of object which function is invoked ?
a) Inline b) Constructor c) Destructor d) Virtual

13) The operator ~ is used with which function ?
a) Inline b) Constructor c) Destructor d) Virtual

14) Which is not a type of constructor ?
a) Default b) Empty c) Full d) Dynamic

15) :: is called as
a) Colon b) Scope resolution
c) Dot d) None of above

16) To indicate end of string which character constant is used ?
a) \0 b) \b c) \a d) \t

17) Ternary operator can be overloaded
a) True b) False

18) Which one is correct declaration of array of objects ?
a) Array (objects) b) A [o] c) Student s [5] d) All above

19) Reusability means
a) Constructor b) Dynamic memory allocation
c) Inheritance d) Overloading

20) Which operator is used in declaration of derived class ?
a) :: b) → c) && d) :

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Seat No.	

S.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
COMPUTER PROGRAMMING C++

Day and Date : Monday, 19-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Write a note on function.
   2) Explain in short pre-processor directives.
   3) Explain structure in C++.
   4) Write a note on inline function.
   5) Explain concept of class and object.
   6) Explain parameterized constructor.

3. Attempt **any two** : **(2×10=20)**
   1) Write in details operator in c++.
   2) Write a program using overloaded function area() to find area of circle, triangle and square.
   3) Write a program using class and object for addition of two integers. Using getdata(), add(), and display() function.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Write a note on rules of operator overloading.
   2) Write a note on string.
   3) Write a note on this pointer.

Set Q

4) Explain static function.

5) Explain derived class constructor.

6) Write a note on need of inheritance.

5. Attempt **any two** : **(10×2=20)**

1) Write a program to overload + operator.

2) Explain with example the concept of friend function.

3) Explain in detail type of inheritance.

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Seat No.	

Set R

S.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
COMPUTER PROGRAMMING C++

Day and Date : Monday, 19-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) To indicate end of string which character constant is used ?
a) \0 b) \b c) \a d) \t

2) Ternary operator can be overloaded
a) True b) False

3) Which one is correct declaration of array of objects ?
a) Array (objects) b) A [o] c) Student s [5] d) All above

4) Reusability means
a) Constructor b) Dynamic memory allocation
c) Inheritance d) Overloading

5) Which operator is used in declaration of derived class ?
a) :: b) → c) && d) :

6) Which one is a mode of derivation ?
a) Private b) Public c) Protected d) All above

7) To release the claim over dynamically allocated memory which operator is used ?
a) Free b) Delete c) Release d) Remove

8) Pointer to pointer can be declared with
a) * b) & c) && d) **

9) Friend is a keyword
a) True b) False

P.T.O.

10) The int *A[5]; is the declarative
   a) Array of 5 integers
   b) Array of pointers
   c) Pointer to an array
   d) None of these

11) C++ is a _____ language.
   a) Low level b) High level c) Average level d) Best level

12) Size of character type data is _____
   a) 8 bit b) 1 byte c) 2 nibble d) a) b) and c)

13) Which one is the logical operator ?
   a) : b) | c) || d) ::

14) Member of structure are accessed by which operator ?
   a) :: b) ++ c) – – d) .

15) Function can accept the values as well as addresses
   a) True b) False

16) Overloaded function have same names
   a) True b) False

17) After declaration of object which function is invoked ?
   a) Inline b) Constructor c) Destructor d) Virtual

18) The operator ~ is used with which function ?
   a) Inline b) Constructor c) Destructor d) Virtual

19) Which is not a type of constructor ?
   a) Default b) Empty c) Full d) Dynamic

20) :: is called as
   a) Colon
   b) Scope resolution
   c) Dot
   d) None of above

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Seat No.	

S.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
COMPUTER PROGRAMMING C++

Day and Date : Monday, 19-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Write a note on function.
   2) Explain in short pre-processor directives.
   3) Explain structure in C++.
   4) Write a note on inline function.
   5) Explain concept of class and object.
   6) Explain parameterized constructor.

3. Attempt **any two** : **(2×10=20)**
   1) Write in details operator in c++.
   2) Write a program using overloaded function area() to find area of circle, triangle and square.
   3) Write a program using class and object for addition of two integers. Using getdata(), add(), and display() function.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Write a note on rules of operator overloading.
   2) Write a note on string.
   3) Write a note on this pointer.

4) Explain static function.

5) Explain derived class constructor.

6) Write a note on need of inheritance.

5. Attempt **any two** : **(10×2=20)**

1) Write a program to overload + operator.

2) Explain with example the concept of friend function.

3) Explain in detail type of inheritance.

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Seat No.	

Set **S**

S.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
COMPUTER PROGRAMMING C++

Day and Date : Monday, 19-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Overloaded function have same names
a) True b) False

2) After declaration of object which function is invoked ?
a) Inline b) Constructor c) Destructor d) Virtual

3) The operator ~ is used with which function ?
a) Inline b) Constructor c) Destructor d) Virtual

4) Which is not a type of constructor ?
a) Default b) Empty c) Full d) Dynamic

5) :: is called as
a) Colon b) Scope resolution
c) Dot d) None of above

6) To indicate end of string which character constant is used ?
a) \0 b) \b c) \a d) \t

7) Ternary operator can be overloaded
a) True b) False

8) Which one is correct declaration of array of objects ?
a) Array (objects) b) A [o] c) Student s [5] d) All above

9) Reusability means
a) Constructor b) Dynamic memory allocation
c) Inheritance d) Overloading

P.T.O.

10) Which operator is used in declaration of derived class ?
a) :: b) → c) && d) :

11) Which one is a mode of derivation ?
a) Private b) Public c) Protected d) All above

12) To release the claim over dynamically allocated memory which operator is used ?
a) Free b) Delete c) Release d) Remove

13) Pointer to pointer can be declared with
a) * b) & c) && d) **

14) Friend is a keyword
a) True b) False

15) The int *A[5]; is the declarative
a) Array of 5 integers b) Array of pointers
c) Pointer to an array d) None of these

16) C++ is a _____ language.
a) Low level b) High level c) Average level d) Best level

17) Size of character type data is _____
a) 8 bit b) 1 byte c) 2 nibble d) a) b) and c)

18) Which one is the logical operator ?
a) : b) | c) || d) ::

19) Member of structure are accessed by which operator ?
a) :: b) ++ c) −− d) .

20) Function can accept the values as well as addresses
a) True b) False

_____

SLR-EP – 257

Seat No.	

S.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
COMPUTER PROGRAMMING C++

Day and Date : Monday, 19-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Write a note on function.
   2) Explain in short pre-processor directives.
   3) Explain structure in C++.
   4) Write a note on inline function.
   5) Explain concept of class and object.
   6) Explain parameterized constructor.

3. Attempt **any two** : **(2×10=20)**
   1) Write in details operator in c++.
   2) Write a program using overloaded function area() to find area of circle, triangle and square.
   3) Write a program using class and object for addition of two integers. Using getdata(), add(), and display() function.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Write a note on rules of operator overloading.
   2) Write a note on string.
   3) Write a note on this pointer.

4) Explain static function.

5) Explain derived class constructor.

6) Write a note on need of inheritance.

5. Attempt **any two** : **(10×2=20)**

1) Write a program to overload + operator.

2) Explain with example the concept of friend function.

3) Explain in detail type of inheritance.

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Seat No.	

Set **P**

T.E. (Electrical Engineering) (Part – I) Examination, 2016
(New CGPA)
POWER SYSTEM ANALYSIS

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Assume*** *suitable data if necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The per unit impedance Z(pu) is given by

a) $\frac{z(Ohms) \times (KVA)_B}{(KV)_B^2}$ b) $\frac{z(Ohms) \times (MVA)_B}{(KV)_B^2}$

c) $\frac{z(Ohms) \times (MVA)_B}{(KV)_B^2 \times 100}$ d) $\frac{z(Ohms) \times (MVA)_B \times 100}{(KV)_B^2}$

2) Percentage value is _____ times per unit value.
a) 100 b) 1/100
c) 10 d) 1/10

3) The bus which is infinitely strong and has a constant voltage and frequency is known as
a) Infinite bus b) Slack bus
c) PQ bus d) PV bus

4) The power delivered by a synchronous generator to an infinite bus is given by

a) $P = \frac{|V_t||E_f|}{R_a} \sin\delta$ b) $P = \frac{|V_t||E_f|}{X_S} \sin\delta$

c) $P = \frac{|V_t||E_f|^2}{X_S} \sin\delta$ d) $P = \frac{|V_t||E_f|}{X_S} \cos\delta$

5) Normally Z_{bus} matrix is a
a) Null matrix b) Sparse matrix
c) Full matrix d) Unity matrix

6) Which among the following quantities are specified at the load bus ?
a) P and Q b) P and |V|
c) Q and |V| d) P and δ

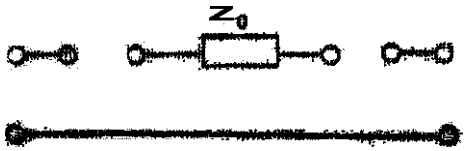
7) Fault level means
a) Voltage at the point of fault b) Fault current
c) Fault power factor d) Fault MVA

8) The phasor α is an operator which when operates upon other phasor rotates it by
a) + 90° b) – 90°
c) + 120° d) – 120°

P.T.O.

9) In case of balanced three phase system, negative and zero sequence currents are
   a) Absent
   b) Equal
   c) Infinite
   d) Present

10) Below figure shows the zero sequence network of transformer. Transformer connections are



   a) 
   b) 
   c) 
   d) 

11) In which type of faults given below, all the three components I_{a0}, I_{a1} and I_{a2} are equal ?
   a) LG
   b) LL
   c) LLG
   d) None of the above

12) For a fault at the terminals of a synchronous generator, the fault current is maximum for a _____ fault.
   a) Three phase
   b) Double line
   c) Double line to ground
   d) Line to ground

13) For a fault in a power system, the term critical clearing time is related to
   a) Reactive power limit
   b) Transient stability limit
   c) Short circuit current limit
   d) Steady state stability limit

14) Lightning arresters should be located
   a) Near the circuit breaker
   b) Away from circuit breaker
   c) Near the transformer
   d) Away from transformer

_____

SLR-EP – 258

Seat No.	

T.E. (Electrical Engineering) (Part – I) Examination, 2016
(New CGPA)
POWER SYSTEM ANALYSIS

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data if necessary.*

SECTION – I

2. Solve **any four** : **(4×3=12)**

a) Explain short circuit of a loaded synchronous machine.

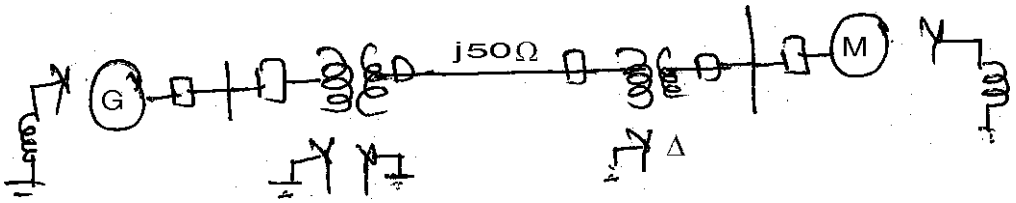
b) Define per unit system in power system. Explain the importance of pu in power system analysis.

c) Draw the pu impedance diagram for the power system shown in fig. Neglect resistance, and use a base of 100 MVA, 220 KV in 50 Ω line. The ratings of the generator, motor and transformers are as follows :

Generator – 40 MVA, 25 KV, X'' = 20%

Motor – 50 MVA, 11 KV, X'' = 30%

Y-Δ transformer – 30 MVA, 11Δ – 220Y KV, X = 15%.



YY – transformer 40 MVA, 33Y – 220 Y kV, X = 15%.

d) The parameters of 4 bus systems are as under

Bus Code	Line impedance (pu)	Charging Admittance (pu) $Y_{P1/2}$
1 – 2	0.2 + j0.8	j0.02
2 – 3	0.3 + j0.9	j0.03
2 – 4	0.25 + j1	j0.04
3 – 4	0.2 + j0.8	j0.02
1 – 3	0.1 + j0.4	j0.01

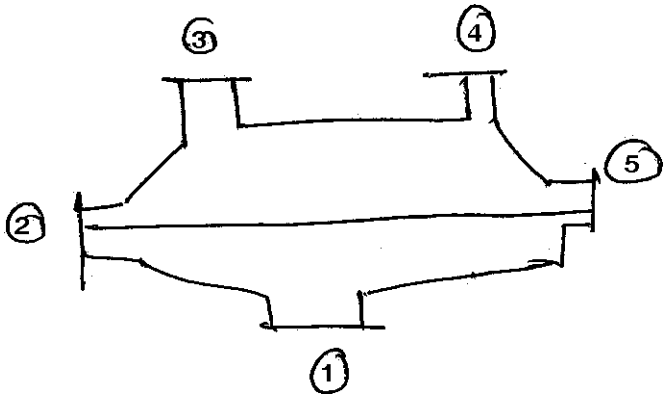
Draw the network and find bus admittance matrix.

e) Describe the various types of buses and their significances in detail.

3. a) Fig. shows a five bus power system. Each line has an impedance of 0.05 + j0.15 pu. The line shunt admittances may be neglected. The bus power and voltage specification are given below **16**

Bus	PL	QL	PG	QG	V	Bus Specification
1	1.0	0.5	?	?	1.02 $\angle 0°$	Slack Bus
2	0	0	2	?	1.02	PV Bus
3	0.5	0.2	0	0	?	PQ Bus
4	0.5	0.2	0	0	?	PQ Bus
5	0.5	0.2	0	0	?	PQ Bus

Set P



a) Find Form Y bus.

b) Find Q_2, δ_2, V_3, V_4 and V_5 after 1st iteration using Gauss-Seidal method. Assume Q_{2min} = 0.2 pu and Q_{2max} = 0.6 pu

OR

b) i) Write computational algorithm of Gauss-Seidal method for local flow analysis. **8**

ii) A two generator station supplies a feeder through a bus as shown in figure. Additional power is fed to the bus through transformer from a large system which be regarded as infinite. A reactor X is included between the transformer and bus to limit the SC rupturing capacity of the feeder circuit breaker B to 333 MVA (fault close to Breaker). Find the inductive reactance of the reactor required. System data is as follows : **8**

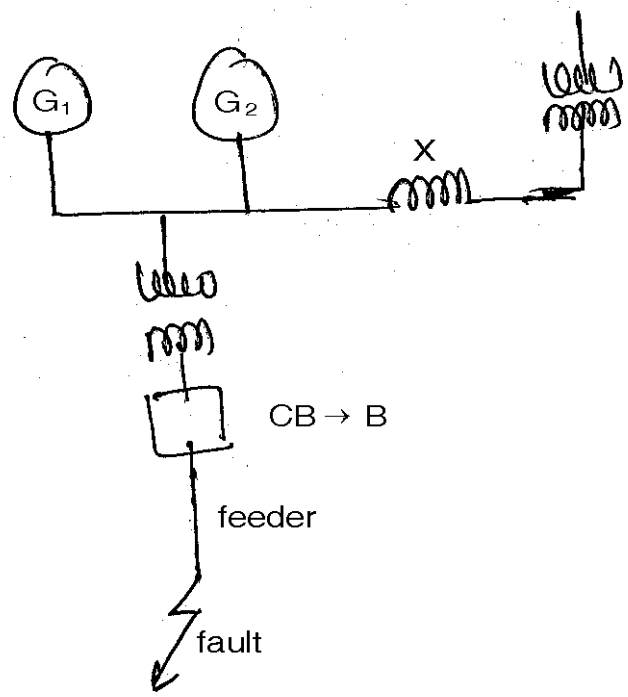
G_1 = 25 MVA, 15%

G_2 = 50 MVA, 20%

T_1 = 100 MVA, 8%

T_2 = 40 MVA, 10%

Assume that all reactances are given on appropriate voltage bases. Choose the base of 100 MVA.



SECTION – II

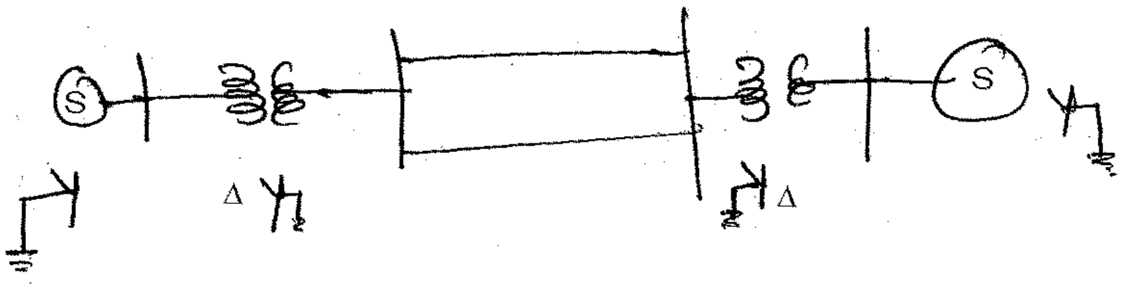
4. Solve **any 4** : **(4×3=12)**

a) Derive an expression of swing equation.

b) Write a detail note on zero sequence network of a synchronous machine.

c) Draw a sequence n/w of series types of faults occurring on power system n/w.

d) Draw the zero sequence n/w for the power system shown below :



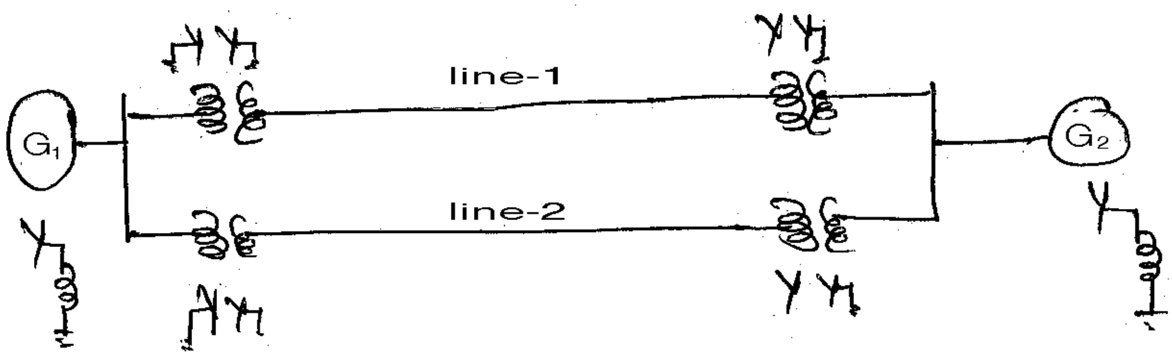
e) Explain how an unbalanced set of three phase voltage can be represented by three set of symmetrical components.

5. Solve **any two** : **(8×2=16)**

a) A line to ground fault occurs on the generator terminals. Find the fault current and line voltage during fault conditions. Assume that the generator neutral is solidly grounded and that the generator is operating at no load and rated voltage at the occurrence of fault.

b) A 25 MVA, 11 KV, generator has a $x_d'' = 0.2$ pu. Its negative and zero sequence reactances are respectively 0.3 and 0.1 pu. The neutral of the generator is solidly grounded. Determine the subtransient condition when an LL fault occurs at the generator terminals. Assume that before the occurrence of fault the generator is operating at no load at rated voltage. Ignore resistances.

c) Draw the +ve, –ve and zero sequence impedance n/w for the power system of figure shown below.



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Set P

SLR-EP – 258

Seat No.	

Set **Q**

T.E. (Electrical Engineering) (Part – I) Examination, 2016
(New CGPA)
POWER SYSTEM ANALYSIS

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Assume** suitable data if necessary.*

MCQ/Objective Type Questions

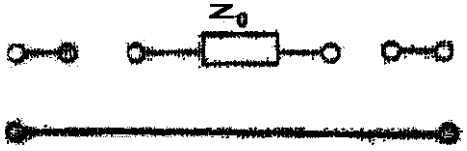
Duration : 30 Minutes Marks : 14

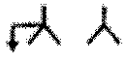
1. Choose the correct answer : **14**

1) The phasor α is an operator which when operates upon other phasor rotates it by
   a) + 90° b) – 90°
   c) + 120° d) – 120°

2) In case of balanced three phase system, negative and zero sequence currents are
   a) Absent b) Equal
   c) Infinite d) Present

3) Below figure shows the zero sequence network of transformer. Transformer connections are



   a)  b) 
   c)  d) 

4) In which type of faults given below, all the three components I_{a0}, I_{a1} and I_{a2} are equal ?
   a) LG b) LL
   c) LLG d) None of the above

5) For a fault at the terminals of a synchronous generator, the fault current is maximum for a _____ fault.
   a) Three phase b) Double line
   c) Double line to ground d) Line to ground

6) For a fault in a power system, the term critical clearing time is related to
   a) Reactive power limit
   b) Transient stability limit
   c) Short circuit current limit
   d) Steady state stability limit

7) Lightning arresters should be located
   a) Near the circuit breaker
   b) Away from circuit breaker
   c) Near the transformer
   d) Away from transformer

P.T.O.

8) The per unit impedance Z(pu) is given by

a) $\frac{z(Ohms) \times (KVA)_B}{(KV)_B^2}$ b) $\frac{z(Ohms) \times (MVA)_B}{(KV)_B^2}$

c) $\frac{z(Ohms) \times (MVA)_B}{(KV)_B^2 \times 100}$ d) $\frac{z(Ohms) \times (MVA)_B \times 100}{(KV)_B^2}$

9) Percentage value is _____ times per unit value.
a) 100 b) 1/100
c) 10 d) 1/10

10) The bus which is infinitely strong and has a constant voltage and frequency is known as
a) Infinite bus b) Slack bus
c) PQ bus d) PV bus

11) The power delivered by a synchronous generator to an infinite bus is given by

a) $P = \frac{|V_t||E_f|}{R_a} \sin\delta$ b) $P = \frac{|V_t||E_f|}{X_S} \sin\delta$

c) $P = \frac{|V_t||E_f|^2}{X_S} \sin\delta$ d) $P = \frac{|V_t||E_f|}{X_S} \cos\delta$

12) Normally Z_{bus} matrix is a
a) Null matrix b) Sparse matrix
c) Full matrix d) Unity matrix

13) Which among the following quantities are specified at the load bus ?
a) P and Q b) P and |V|
c) Q and |V| d) P and δ

14) Fault level means
a) Voltage at the point of fault b) Fault current
c) Fault power factor d) Fault MVA

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Seat No.	

T.E. (Electrical Engineering) (Part – I) Examination, 2016
(New CGPA)
POWER SYSTEM ANALYSIS

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data if necessary.*

SECTION – I

2. Solve **any four** : **(4×3=12)**

a) Explain short circuit of a loaded synchronous machine.

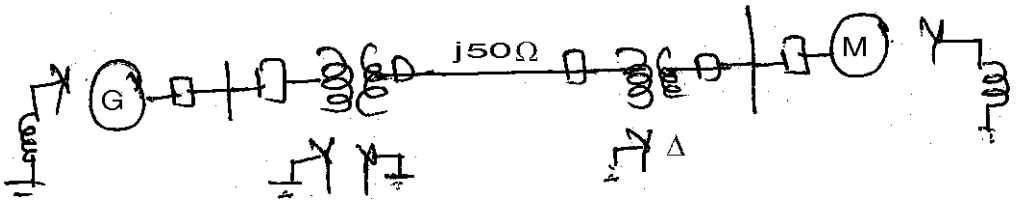
b) Define per unit system in power system. Explain the importance of pu in power system analysis.

c) Draw the pu impedance diagram for the power system shown in fig. Neglect resistance, and use a base of 100 MVA, 220 KV in 50 Ω line. The ratings of the generator, motor and transformers are as follows :

Generator – 40 MVA, 25 KV, X'' = 20%

Motor – 50 MVA, 11 KV, X'' = 30%

Y-Δ transformer – 30 MVA, 11Δ – 220Y KV, X = 15%.



YY – transformer 40 MVA, 33Y – 220 Y kV, X = 15%.

d) The parameters of 4 bus systems are as under

Bus Code	Line impedance (pu)	Charging Admittance (pu) $Y_{P1/2}$
1 – 2	0.2 + j0.8	j0.02
2 – 3	0.3 + j0.9	j0.03
2 – 4	0.25 + j1	j0.04
3 – 4	0.2 + j0.8	j0.02
1 – 3	0.1 + j0.4	j0.01

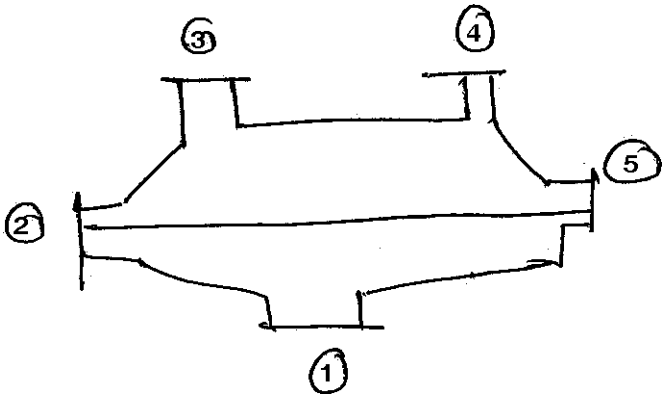
Draw the network and find bus admittance matrix.

e) Describe the various types of buses and their significances in detail.

3. a) Fig. shows a five bus power system. Each line has an impedance of 0.05 + j0.15 pu. The line shunt admittances may be neglected. The bus power and voltage specification are given below **16**

Bus	PL	QL	PG	QG	V	Bus Specification
1	1.0	0.5	?	?	1.02 $\angle 0°$	Slack Bus
2	0	0	2	?	1.02	PV Bus
3	0.5	0.2	0	0	?	PQ Bus
4	0.5	0.2	0	0	?	PQ Bus
5	0.5	0.2	0	0	?	PQ Bus

Set Q



a) Find Form Y bus.

b) Find Q_2, δ_2 , V_3, V_4 and V_5 after 1st iteration using Gauss-Seidal method. Assume Q_{2min} = 0.2 pu and Q_{2max} = 0.6 pu

OR

b) i) Write computational algorithm of Gauss-Seidal method for local flow analysis. **8**

ii) A two generator station supplies a feeder through a bus as shown in figure. Additional power is fed to the bus through transformer from a large system which be regarded as infinite. A reactor X is included between the transformer and bus to limit the SC rupturing capacity of the feeder circuit breaker B to 333 MVA (fault close to Breaker). Find the inductive reactance of the reactor required. System data is as follows : **8**

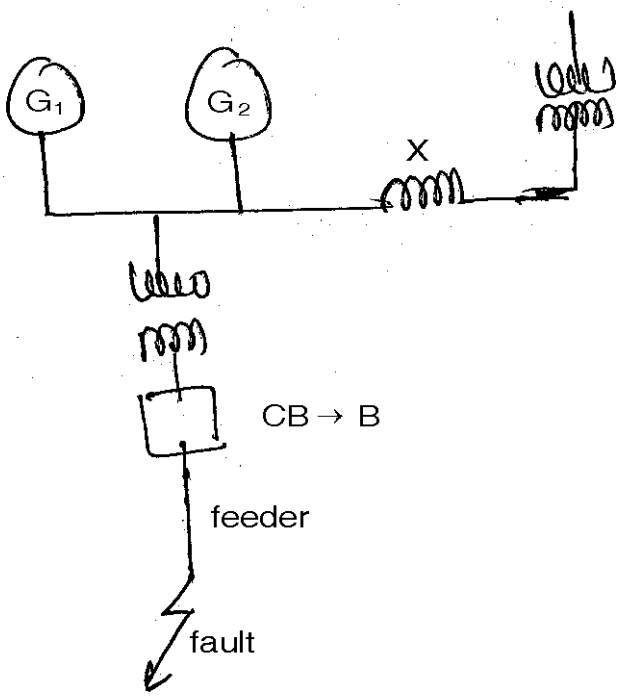
G_1 = 25 MVA, 15%

G_2 = 50 MVA, 20%

T_1 = 100 MVA, 8%

T_2 = 40 MVA, 10%

Assume that all reactances are given on appropriate voltage bases. Choose the base of 100 MVA.



SECTION – II

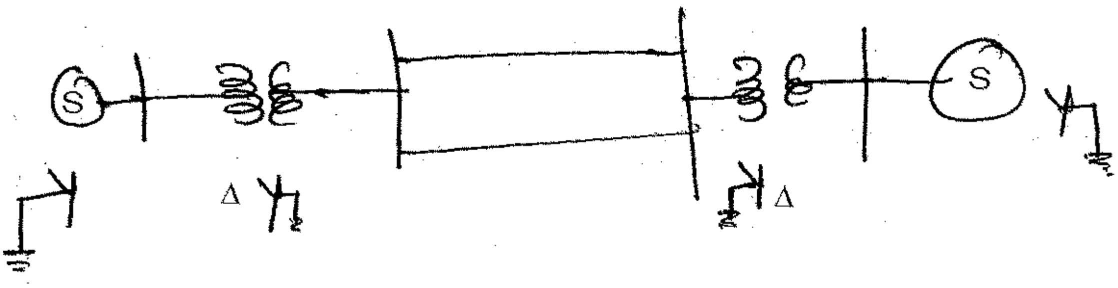
4. Solve **any 4** : **(4×3=12)**

a) Derive an expression of swing equation.

b) Write a detail note on zero sequence network of a synchronous machine.

c) Draw a sequence n/w of series types of faults occurring on power system n/w.

d) Draw the zero sequence n/w for the power system shown below :



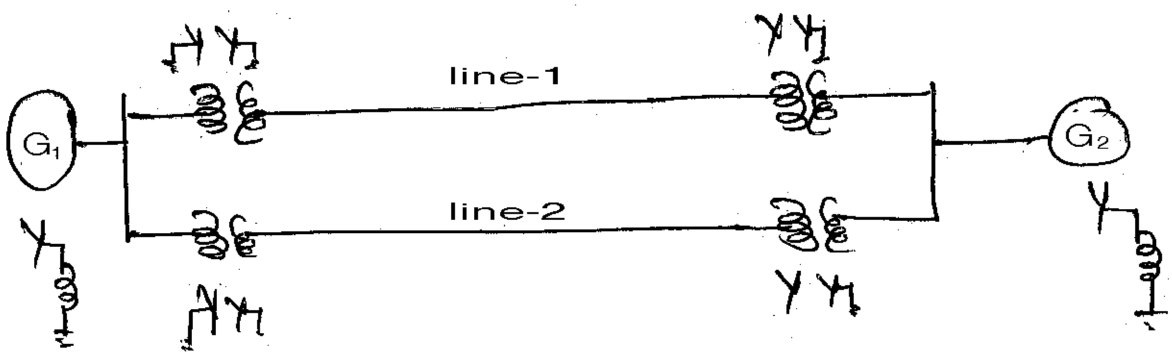
e) Explain how an unbalanced set of three phase voltage can be represented by three set of symmetrical components.

5. Solve **any two** : **(8×2=16)**

a) A line to ground fault occurs on the generator terminals. Find the fault current and line voltage during fault conditions. Assume that the generator neutral is solidly grounded and that the generator is operating at no load and rated voltage at the occurrence of fault.

b) A 25 MVA, 11 KV, generator has a $x_d'' = 0.2$ pu. Its negative and zero sequence reactances are respectively 0.3 and 0.1 pu. The neutral of the generator is solidly grounded. Determine the subtransient condition when an LL fault occurs at the generator terminals. Assume that before the occurrence of fault the generator is operating at no load at rated voltage. Ignore resistances.

c) Draw the +ve, –ve and zero sequence impedance n/w for the power system of figure shown below.



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Set Q

SLR-EP – 258

Seat No.	

Set **R**

T.E. (Electrical Engineering) (Part – I) Examination, 2016
(New CGPA)
POWER SYSTEM ANALYSIS

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Assume*** *suitable data if necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Normally Z_{bus} matrix is a
   a) Null matrix b) Sparse matrix
   c) Full matrix d) Unity matrix

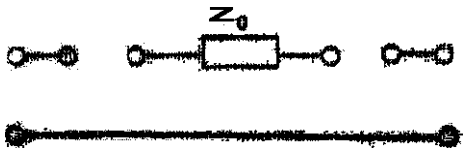
2) Which among the following quantities are specified at the load bus ?
   a) P and Q b) P and |V|
   c) Q and |V| d) P and δ

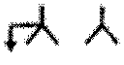
3) Fault level means
   a) Voltage at the point of fault b) Fault current
   c) Fault power factor d) Fault MVA

4) The phasor α is an operator which when operates upon other phasor rotates it by
   a) + 90° b) – 90°
   c) + 120° d) – 120°

5) In case of balanced three phase system, negative and zero sequence currents are
   a) Absent b) Equal
   c) Infinite d) Present

6) Below figure shows the zero sequence network of transformer. Transformer connections are



   a)  b) 
   c)  d) 

7) In which type of faults given below, all the three components I_{a0}, I_{a1} and I_{a2} are equal ?
   a) LG b) LL
   c) LLG d) None of the above

8) For a fault at the terminals of a synchronous generator, the fault current is maximum for a _____ fault.
   a) Three phase b) Double line
   c) Double line to ground d) Line to ground

P.T.O.

9) For a fault in a power system, the term critical clearing time is related to
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   b) Transient stability limit
   c) Short circuit current limit
   d) Steady state stability limit

10) Lightning arresters should be located
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   d) Away from transformer

11) The per unit impedance Z(pu) is given by

   a) $\frac{z(\text{Ohms}) \times (\text{KVA})_B}{(\text{KV})_B^2}$

   b) $\frac{z(\text{Ohms}) \times (\text{MVA})_B}{(\text{KV})_B^2}$

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12) Percentage value is _____ times per unit value.
   a) 100
   b) 1/100
   c) 10
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13) The bus which is infinitely strong and has a constant voltage and frequency is known as
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14) The power delivered by a synchronous generator to an infinite bus is given by

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   b) $P = \frac{|V_t||E_f|}{X_S} \sin\delta$

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SLR-EP – 258

Seat No.	

T.E. (Electrical Engineering) (Part – I) Examination, 2016
(New CGPA)
POWER SYSTEM ANALYSIS

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data if necessary.*

SECTION – I

2. Solve **any four** : **(4×3=12)**

a) Explain short circuit of a loaded synchronous machine.

b) Define per unit system in power system. Explain the importance of pu in power system analysis.

c) Draw the pu impedance diagram for the power system shown in fig. Neglect resistance, and use a base of 100 MVA, 220 KV in 50 Ω line. The ratings of the generator, motor and transformers are as follows :

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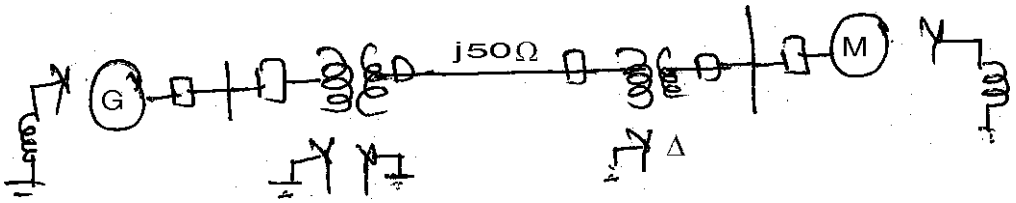

YY – transformer 40 MVA, 33Y – 220 Y kV, X = 15%.

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1 – 3	0.1 + j0.4	j0.01

Draw the network and find bus admittance matrix.

e) Describe the various types of buses and their significances in detail.

3. a) Fig. shows a five bus power system. Each line has an impedance of 0.05 + j0.15 pu. The line shunt admittances may be neglected. The bus power and voltage specification are given below **16**

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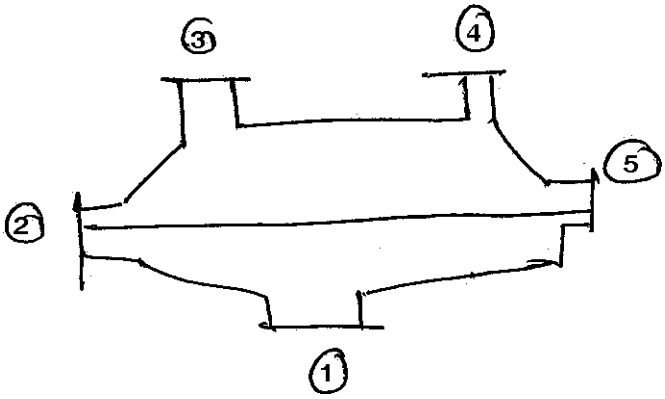
3	0.5	0.2	0	0	?	PQ Bus
4	0.5	0.2	0	0	?	PQ Bus
5	0.5	0.2	0	0	?	PQ Bus

Set R



a) Find Form Y bus.

b) Find Q_2, δ_2 , V_3, V_4 and V_5 after 1st iteration using Gauss-Seidal method. Assume Q_{2min} = 0.2 pu and Q_{2max} = 0.6 pu

OR

b) i) Write computational algorithm of Gauss-Seidal method for local flow analysis. **8**

ii) A two generator station supplies a feeder through a bus as shown in figure. Additional power is fed to the bus through transformer from a large system which be regarded as infinite. A reactor X is included between the transformer and bus to limit the SC rupturing capacity of the feeder circuit breaker B to 333 MVA (fault close to Breaker). Find the inductive reactance of the reactor required. System data is as follows : **8**

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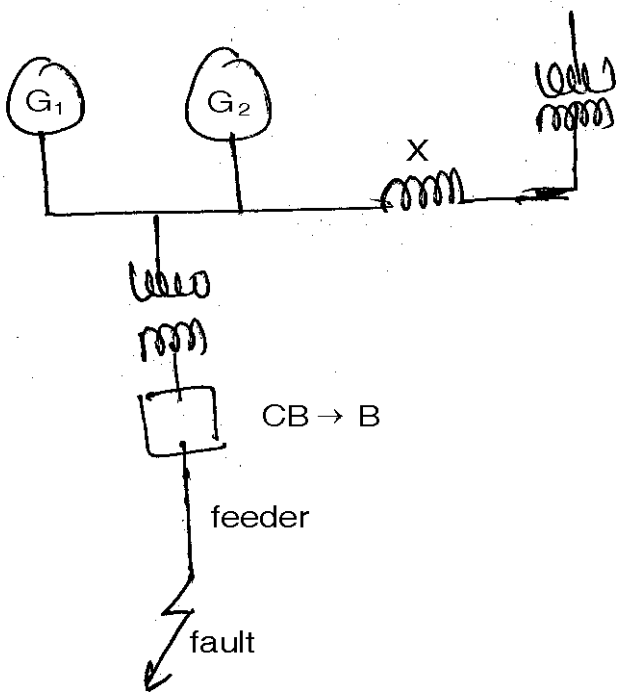
G_2 = 50 MVA, 20%

T_1 = 100 MVA, 8%

T_2 = 40 MVA, 10%

Assume that all reactances are given on appropriate voltage bases. Choose the base of 100 MVA.



SECTION – II

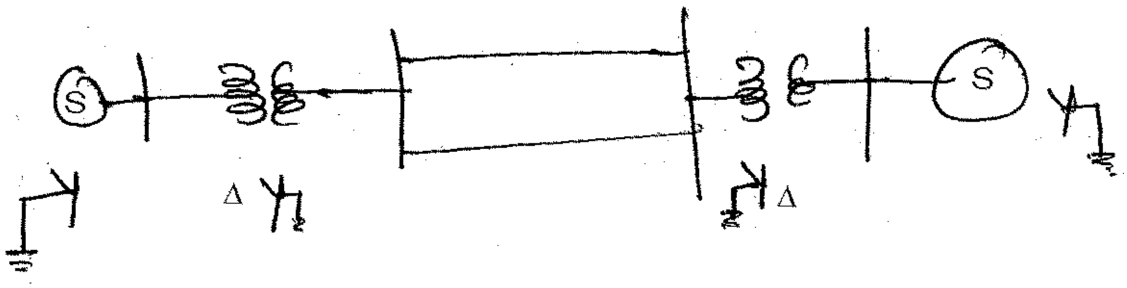
4. Solve **any 4** : **(4×3=12)**

a) Derive an expression of swing equation.

b) Write a detail note on zero sequence network of a synchronous machine.

c) Draw a sequence n/w of series types of faults occurring on power system n/w.

d) Draw the zero sequence n/w for the power system shown below :



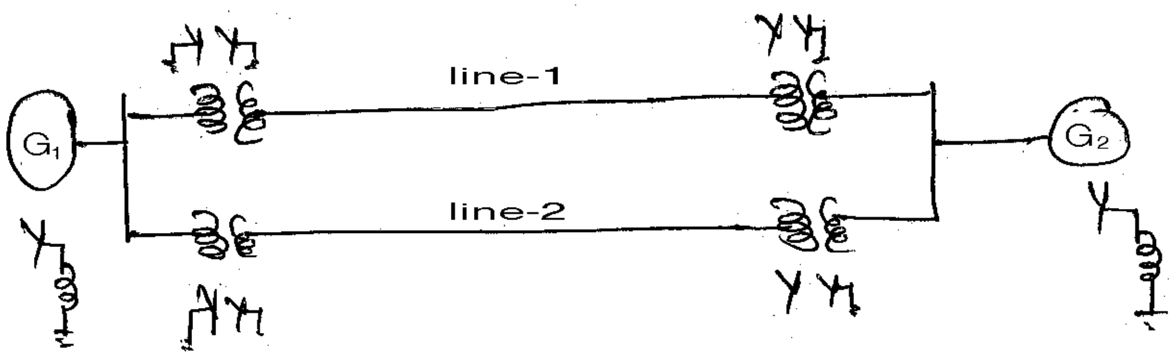
e) Explain how an unbalanced set of three phase voltage can be represented by three set of symmetrical components.

5. Solve **any two** : **(8×2=16)**

a) A line to ground fault occurs on the generator terminals. Find the fault current and line voltage during fault conditions. Assume that the generator neutral is solidly grounded and that the generator is operating at no load and rated voltage at the occurrence of fault.

b) A 25 MVA, 11 KV, generator has a $x_d'' = 0.2$ pu. Its negative and zero sequence reactances are respectively 0.3 and 0.1 pu. The neutral of the generator is solidly grounded. Determine the subtransient condition when an LL fault occurs at the generator terminals. Assume that before the occurrence of fault the generator is operating at no load at rated voltage. Ignore resistances.

c) Draw the +ve, –ve and zero sequence impedance n/w for the power system of figure shown below.



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Set R

SLR-EP – 258

Seat No.	

Set **S**

T.E. (Electrical Engineering) (Part – I) Examination, 2016
(New CGPA)
POWER SYSTEM ANALYSIS

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

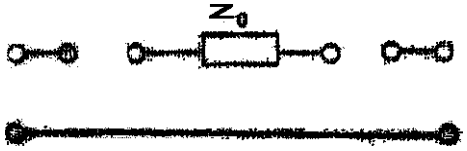
Instructions : 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Assume*** *suitable data if necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Below figure shows the zero sequence network of transformer. Transformer connections are



a) 
b) 
c) 
d) 

2) In which type of faults given below, all the three components I_{a0}, I_{a1} and I_{a2} are equal ?
a) LG b) LL
c) LLG d) None of the above

3) For a fault at the terminals of a synchronous generator, the fault current is maximum for a _____ fault.
a) Three phase b) Double line
c) Double line to ground d) Line to ground

4) For a fault in a power system, the term critical clearing time is related to
a) Reactive power limit
b) Transient stability limit
c) Short circuit current limit
d) Steady state stability limit

5) Lightning arresters should be located
a) Near the circuit breaker b) Away from circuit breaker
c) Near the transformer d) Away from transformer

6) The per unit impedance Z(pu) is given by

a) $\frac{z(Ohms) \times (KVA)_B}{(KV)_B{}^2}$ b) $\frac{z(Ohms) \times (MVA)_B}{(KV)_B{}^2}$

c) $\frac{z(Ohms) \times (MVA)_B}{(KV)_B{}^2 \times 100}$ d) $\frac{z(Ohms) \times (MVA)_B \times 100}{(KV)_B{}^2}$

P.T.O.

7) Percentage value is _____ times per unit value.
   a) 100 b) 1/100
   c) 10 d) 1/10

8) The bus which is infinitely strong and has a constant voltage and frequency is known as
   a) Infinite bus b) Slack bus
   c) PQ bus d) PV bus

9) The power delivered by a synchronous generator to an infinite bus is given by
   a) $P = \frac{|V_t||E_f|}{R_a}\sin\delta$ b) $P = \frac{|V_t||E_f|}{X_S}\sin\delta$
   c) $P = \frac{|V_t||E_f|^2}{X_S}\sin\delta$ d) $P = \frac{|V_t||E_f|}{X_S}\cos\delta$

10) Normally Z_{bus} matrix is a
   a) Null matrix b) Sparse matrix
   c) Full matrix d) Unity matrix

11) Which among the following quantities are specified at the load bus ?
   a) P and Q b) P and |V|
   c) Q and |V| d) P and δ

12) Fault level means
   a) Voltage at the point of fault b) Fault current
   c) Fault power factor d) Fault MVA

13) The phasor α is an operator which when operates upon other phasor rotates it by
   a) + 90° b) – 90°
   c) + 120° d) – 120°

14) In case of balanced three phase system, negative and zero sequence currents are
   a) Absent b) Equal
   c) Infinite d) Present

_____

SLR-EP – 258

Seat No.	

T.E. (Electrical Engineering) (Part – I) Examination, 2016
(New CGPA)
POWER SYSTEM ANALYSIS

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data if necessary.*

SECTION – I

2. Solve **any four** : **(4×3=12)**

a) Explain short circuit of a loaded synchronous machine.

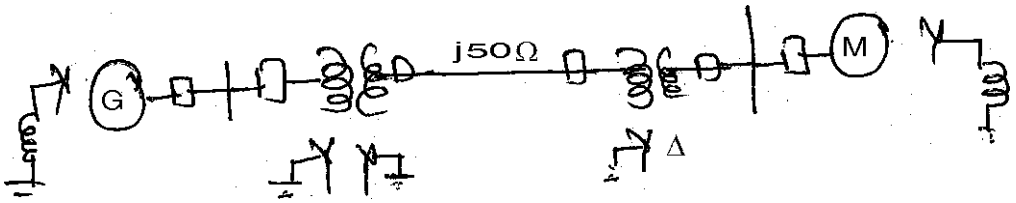
b) Define per unit system in power system. Explain the importance of pu in power system analysis.

c) Draw the pu impedance diagram for the power system shown in fig. Neglect resistance, and use a base of 100 MVA, 220 KV in 50 Ω line. The ratings of the generator, motor and transformers are as follows :

Generator – 40 MVA, 25 KV, X'' = 20%

Motor – 50 MVA, 11 KV, X'' = 30%

Y-Δ transformer – 30 MVA, 11Δ – 220Y KV, X = 15%.



YY – transformer 40 MVA, 33Y – 220 Y kV, X = 15%.

d) The parameters of 4 bus systems are as under

Bus Code	Line impedance (pu)	Charging Admittance (pu) $Y_{P1/2}$
1 – 2	0.2 + j0.8	j0.02
2 – 3	0.3 + j0.9	j0.03
2 – 4	0.25 + j1	j0.04
3 – 4	0.2 + j0.8	j0.02
1 – 3	0.1 + j0.4	j0.01

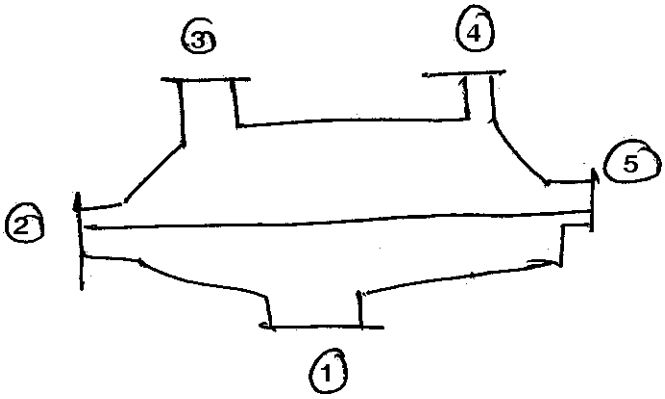
Draw the network and find bus admittance matrix.

e) Describe the various types of buses and their significances in detail.

3. a) Fig. shows a five bus power system. Each line has an impedance of 0.05 + j0.15 pu. The line shunt admittances may be neglected. The bus power and voltage specification are given below **16**

Bus	PL	QL	PG	QG	V	Bus Specification
1	1.0	0.5	?	?	1.02 $\angle 0°$	Slack Bus
2	0	0	2	?	1.02	PV Bus
3	0.5	0.2	0	0	?	PQ Bus
4	0.5	0.2	0	0	?	PQ Bus
5	0.5	0.2	0	0	?	PQ Bus

Set S



a) Find Form Y bus.

b) Find Q_2, δ_2 , V_3, V_4 and V_5 after 1st iteration using Gauss-Seidal method.
Assume Q_{2min} = 0.2 pu and Q_{2max} = 0.6 pu

OR

b) i) Write computational algorithm of Gauss-Seidal method for local flow analysis. **8**

ii) A two generator station supplies a feeder through a bus as shown in figure. Additional power is fed to the bus through transformer from a large system which be regarded as infinite. A reactor X is included between the transformer and bus to limit the SC rupturing capacity of the feeder circuit breaker B to 333 MVA (fault close to Breaker). Find the inductive reactance of the reactor required. System data is as follows : **8**

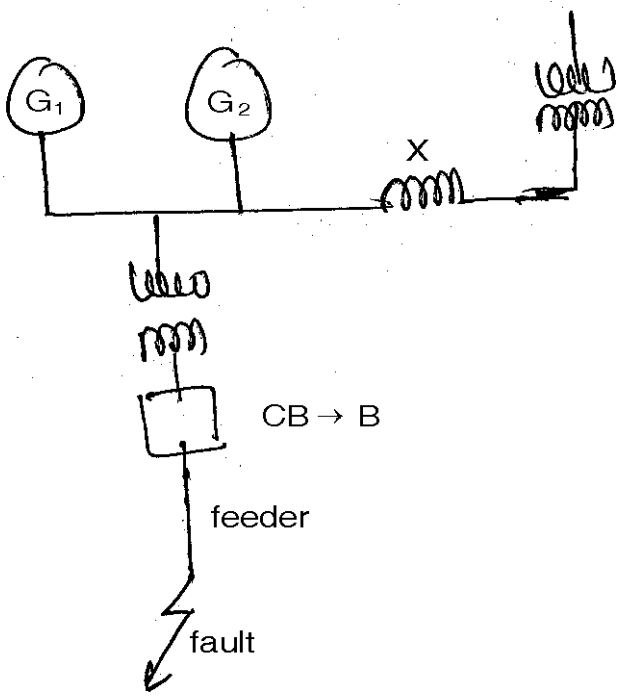
G_1 = 25 MVA, 15%

G_2 = 50 MVA, 20%

T_1 = 100 MVA, 8%

T_2 = 40 MVA, 10%

Assume that all reactances are given on appropriate voltage bases. Choose the base of 100 MVA.



SECTION – II

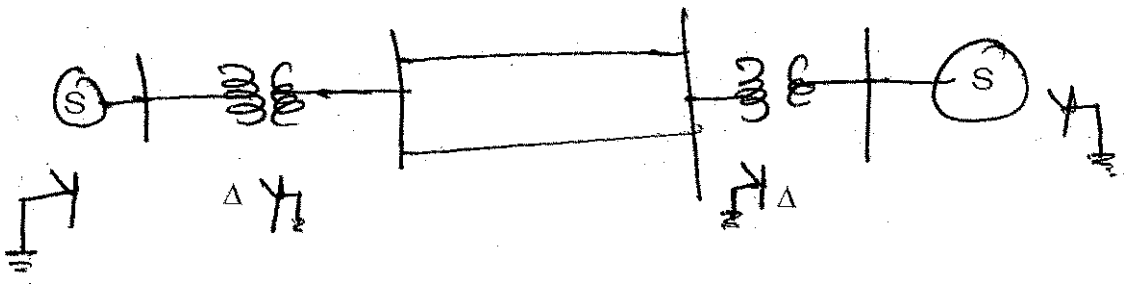
4. Solve **any 4** : **(4×3=12)**

a) Derive an expression of swing equation.

b) Write a detail note on zero sequence network of a synchronous machine.

c) Draw a sequence n/w of series types of faults occurring on power system n/w.

d) Draw the zero sequence n/w for the power system shown below :



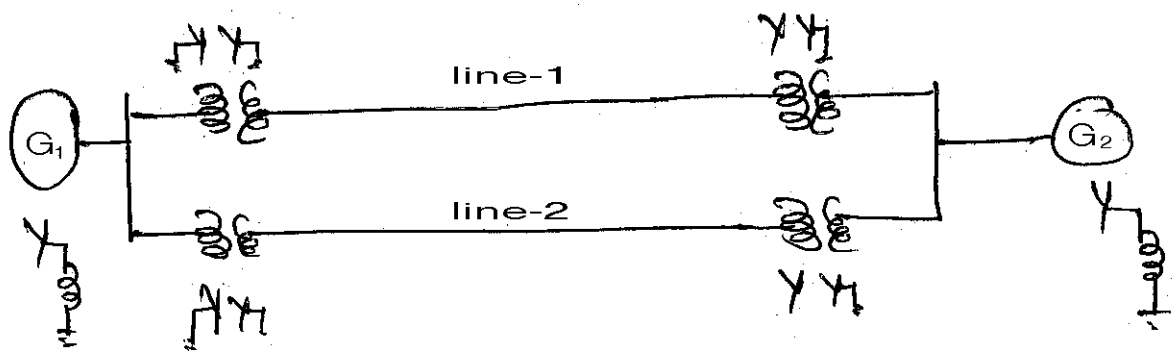
e) Explain how an unbalanced set of three phase voltage can be represented by three set of symmetrical components.

5. Solve **any two** : **(8×2=16)**

a) A line to ground fault occurs on the generator terminals. Find the fault current and line voltage during fault conditions. Assume that the generator neutral is solidly grounded and that the generator is operating at no load and rated voltage at the occurrence of fault.

b) A 25 MVA, 11 KV, generator has a x_d'' = 0.2 pu. Its negative and zero sequence reactances are respectively 0.3 and 0.1 pu. The neutral of the generator is solidly grounded. Determine the subtransient condition when an LL fault occurs at the generator terminals. Assume that before the occurrence of fault the generator is operating at no load at rated voltage. Ignore resistances.

c) Draw the +ve, –ve and zero sequence impedance n/w for the power system of figure shown below.



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Set S

SLR-EP – 259

Seat No.	

Set P

T.E. (Electrical) (Part – I) Examination, 2016
(New – CGPA)
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Wednesday, 30-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The micro economics mainly studies
   A) The whole economy of the country
   B) The economy of the individual or a unit
   C) Both above
   D) None of the above

2) In joint stock company, the property of the firm is the property of the company
   A) This statement is correct
   B) This statement is wrong
   C) The statement is neither correct nor wrong
   D) Can't say

3) The least power generation contribution in India from which of the following resource.
   A) Thermal power B) Hydro power
   C) Wind power D) Nuclear power

4) _____ is nothing but the time taken by the businessman to repay all the expenses incurred in the plant or the industry.
   A) Return on investment B) Profit ratio
   C) Payback period D) Return on equity

P.T.O.

5) _____ helps to control the inventory which is more valued.
   A) Make or buy decision B) EOQ
   C) Value engineering D) ABC analysis

6) DIC means
   A) District Industrial Centre B) Divisional Irrigation centre
   C) Department of Industrial centre D) None of the above

7) _____ is the father of principles of management.
   A) Peter Drucker B) Henry Fayol
   C) William Hawtray D) Joseph Schumpeter

8) What are steps needed to start and Enterprise _____
   A) Selection of location
   B) Obtaining permission from concern government agencies
   C) Both A) and B)
   D) None of the above

9) Renewable energy source
   A) Can be generated as and when wants
   B) Exhausts with its use
   C) Environment friendly energy generation
   D) None of the above

10) PERT includes following :
   A) Most likely time B) Pessimistic time
   C) Optimistic time D) All of above

11) Functions of Management are _____
   A) Planning B) Organizing C) Both A) and B) D) Multitasking

12) Electricity theft can be addressed by
   A) Creating awareness among people
   B) Making more strict rules
   C) By change in people's mindset
   D) All of above

13) In Industrial safety PPE stands for
   A) People protective equipment B) Personal protective equipment
   C) People protective engineering D) Personal People environment

14) Planning is
   A) Measurement and correction of the performance of subordinates
   B) Selection alternatives for further course of action
   C) Getting the things done through others
   D) What is to be done within a time frame ?

_____

SLR-EP – 259

Seat No.	

T.E. (Electrical) (Part – I) Examination, 2016
(New – CGPA)
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Short Notes **any four** : **16**
   A) Cost Control and cost reduction
   B) Scenario of future energy requirement in India
   C) Challenges before Indian Economy
   D) Value Analysis
   E) Difference between Public Limited Company and Private Limited Company.

3. Attempt following : **12**
   A) What are the Infrastructural changes will you suggest for the development of Power and Agricultural sector in India ?
   B) Explain in detail Proprietorship, Partnership, and Joint Stock Company.

   OR

   B) What are the barriers concerned to development of science and technology in India ?

SECTION – II

4. Write a short note on **any four** : **(4×4=16)**
   A) Entrepreneurship
   B) Small Scale Industry
   C) Electricity Act 2003
   D) Project planning methods
   E) Project cost reduction.

Set P

5. Explain MIS in an organization with suitable flow of information to smooth functioning of organization. **6**

6. Explain “PERT and CPM” in project planning with proper example and arrow diagram.

OR

6. Explain in detail functions of Management. Give a suitable example of application of functions of Management. **6**

SLR-EP – 259

Seat No.	

Set Q

T.E. (Electrical) (Part – I) Examination, 2016
(New – CGPA)
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Wednesday, 30-11-2016 Max. Marks : 70
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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P.T.O.

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12) _____ helps to control the inventory which is more valued.
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SLR-EP – 259

Seat No.	

T.E. (Electrical) (Part – I) Examination, 2016
(New – CGPA)
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Short Notes **any four** : **16**
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SECTION – II

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Set Q

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OR

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SLR-EP – 259

Seat No.	

Set R

T.E. (Electrical) (Part – I) Examination, 2016
(New – CGPA)
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Wednesday, 30-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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D) None of the above

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   A) Most likely time B) Pessimistic time
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_____

SLR-EP – 259

Seat No.	

T.E. (Electrical) (Part – I) Examination, 2016
(New – CGPA)
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Short Notes **any four** : **16**
   A) Cost Control and cost reduction
   B) Scenario of future energy requirement in India
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SECTION – II

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Set R

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6. Explain “PERT and CPM” in project planning with proper example and arrow diagram.

OR

6. Explain in detail functions of Management. Give a suitable example of application of functions of Management. **6**

SLR-EP – 259

Seat No.	

Set S

T.E. (Electrical) (Part – I) Examination, 2016
(New – CGPA)
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Wednesday, 30-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) PERT includes following :
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P.T.O.

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SLR-EP – 259

Seat No.	

T.E. (Electrical) (Part – I) Examination, 2016
(New – CGPA)
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Short Notes **any four** : **16**
   A) Cost Control and cost reduction
   B) Scenario of future energy requirement in India
   C) Challenges before Indian Economy
   D) Value Analysis
   E) Difference between Public Limited Company and Private Limited Company.

3. Attempt following : **12**
   A) What are the Infrastructural changes will you suggest for the development of Power and Agricultural sector in India ?
   B) Explain in detail Proprietorship, Partnership, and Joint Stock Company.

   OR

   B) What are the barriers concerned to development of science and technology in India ?

SECTION – II

4. Write a short note on **any four** : **(4×4=16)**
   A) Entrepreneurship
   B) Small Scale Industry
   C) Electricity Act 2003
   D) Project planning methods
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5. Explain MIS in an organization with suitable flow of information to smooth functioning of organization. **6**

6. Explain “PERT and CPM” in project planning with proper example and arrow diagram.

OR

6. Explain in detail functions of Management. Give a suitable example of application of functions of Management. **6**

SLR-EP – 260

Seat No.	

Set **P**

T.E. (Electrical) (Part – I) (New CGPA) Examination, 2016
ELECTROMAGNETIC ENGINEERING

Day and Date : Friday, 2-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The magnitude of electric field E due to charge uniformly distributed over an infinite plane with density C_s is
   a) Directly proportional to distance from plane
   b) Inversely proportional to distance from plane
   c) Inversely proportional to square distance from plane
   d) Independent of the distance from plane

2) In Dot product of unit vector in cylindrical and rectangular coordinate system for ay.aϕ is
   a) – cos ϕ b) – sin ϕ c) sin ϕ d) cos ϕ

3) The unit of electric field intensity E is
   a) N/C b) J/C c) N.M/C d) V/M

4) The electric field due to electric dipole is
   a) proportional to distance from dipole
   b) proportional to square of distance from dipole
   c) proportional to inverse square of distance from dipole
   d) proportional to inverse cube of distance from dipole

5) The force between two charges is 120 N. If the distance between the charge is doubled. Then force will be
   a) 60 N b) 30 N c) 40 N d) 240 N

6) A Gaussian surface within a metallic spherical shell of inner and outer radii R_1 and R_2 contains charge Q placed at the center, the normal component of D at the Gaussian surface will be

a) Zero b) $\frac{Q}{4\pi R_1^2}$ c) $\frac{Q}{4\pi R_2^2}$ d) $\frac{Q}{4\pi(R_1 - R_2)^2}$

7) In Dot product of unit vector in spherical and rectangular coordinate system for $a_z.a_\theta$ is

a) $-\cos\theta$ b) $-\sin\theta$ c) $\sin\theta$ d) $\cos\theta$

8) Magnetic vector potential for volume current is expressed as

a) $B = \nabla \times A$ b) $A = \nabla \times B$ c) $B = \nabla.A$ d) $A = \nabla.B$

9) Energy density W_H is given as

a) Energy per volume b) Energy per area
c) Linear energy d) All of these

10) Curl of electrostatic field is

a) ∞ b) 1 c) 0 d) None of these

11) Biot-Savart's Law is expressed mathematically as

a) H b) $B\alpha\int Idl\sin\theta/r^2$

c) $\int Hdl = I_{enc}$ d) $\int Hdl = \int(\nabla\times H)\,ds$

12) The torque T on a current loop with magnetic moment m in uniform magnetic field B is

a) $T = m\times B$ b) $T = m/B$ c) $T = B/m$ d) $T = m\cdot B$

13) $\oint E\cdot dl = -\int_s \frac{\partial B}{\partial t}\cdot ds$ is Maxwell's third equation in integral form for

a) magnetic field b) static field
c) non-time varying field d) time varying field

14) In a magnetic flux density, the total magnetic lines of force crossing a unit area in plane to the direction of flux are at

a) Acute angles b) Obtuse angles
c) Right angles d) None of the above

SLR-EP – 260

Seat No.	

T.E. (Electrical) (Part – I) (New CGPA) Examination, 2016
ELECTROMAGNETIC ENGINEERING

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory.***
2) Assume suitable data and mention it, ***if*** *necessary.*
3) ***Use*** *of non-programmable calculator is* ***allowed.***

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) For what value of α and β

$A = a_r + \pi\ a_\phi + 3a_z$

$B = \alpha a_r + \beta\ a_\phi - 6a_z$, are parallel ?

b) A charge configuration in cylindrical coordinate is given by $\rho = 5re^{-2r}\, c/m^3$, use Gauss law to determine D.

c) For a line charge $\rho_e = \frac{10^{-9}}{2}$ c/m, on the z-axis. Find V_{AB} where A is (2m, $\frac{\pi}{2}$, 0) and B is (4 m, π, 5m).

d) Explain the uniqueness theorem/statement.

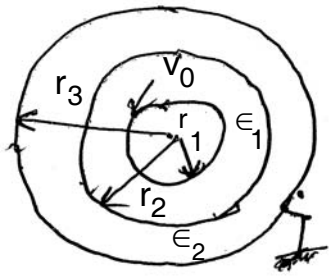
e) Determine the energy stored in the system of two point charges, Q_1 = 3nC, and Q_2 = – 3nC separated by a distance of d = .2 m.

f) If $D = (2y^2 + z)\ \hat{a}_x + 4ny\ \hat{a}_y + n\hat{a}_z$, then find volume charge density at (– 1, 0, 3).

3. Solve **any two** : **(2×6=12)**

a) Determine capacitance per unit length of cable for given geometry with following parameters.

V_0 = 1.2 KV
$\in r_1$ = 4.5
$\in r_2$ = 3
$r_3 = 2\ r_2 = 4r_1$ = 40 mm



Set P

b) Four point charges of equal values are placed at the corners of square of side 'a' meter. Determine the resultant electric field at the centre of square due to these charges.

c) Explain Gauss law and its application in detail.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) A current filament of $3\bar{a}_x$ ampere lies along the axis. Find H component at P(–1, 3, 2).

b) Derive an expression for inductance of solenoid and toroid.

c) Derive an expression for magnetic field intensity on the axis of circular current carrying loop.

d) State and derive the Maxwell's equation from Faraday's law for time varying field in integral and point form.

e) Derive an expression for energy density in magnetic field.

5. Solve **any two** : **(2×6=12)**

a) Verify Stoke's theorem for the field $H = 6xy\ \bar{a}_x - 3y^2\bar{a}_y$ and the rectangular path around the region, $2 \leq x \leq 5$, $-1 \leq y \leq 1$, $z = 0$. Let the positive direction of ds be $\bar{a}_z$.

b) Derive the Maxwell's equation from Ampere's law for static and harmonically varying fileds in integral and point form.

c) Region 1 is defined by $x < 0$ has $\mu_{r1} = 3$ and region 2 is $x > 0$ has $\mu_{r2} = 5$. Given $H1 = 4\ \bar{a}_x + 3\ \bar{a}_y - 6\ \bar{a}_z$ A/m. Show that $\theta_2 = 19.7°$ and $|H_2| = 17.2$ A/m.

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SLR-EP – 260

Seat No.	

Set Q

T.E. (Electrical) (Part – I) (New CGPA) Examination, 2016
ELECTROMAGNETIC ENGINEERING

Day and Date : Friday, 2-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Magnetic vector potential for volume current is expressed as
a) $B = \nabla \times A$ b) $A = \nabla \times B$ c) $B = \nabla . A$ d) $A = \nabla . B$

2) Energy density W_H is given as
a) Energy per volume b) Energy per area
c) Linear energy d) All of these

3) Curl of electrostatic field is
a) ∞ b) 1 c) 0 d) None of these

4) Biot-Savart's Law is expressed mathematically as
a) H b) $B\alpha\int Idl\sin\theta / r^2$
c) $\int Hdl = I_{enc}$ d) $\int Hdl = \int(\nabla \times H)\, ds$

5) The torque T on a current loop with magnetic moment m in uniform magnetic field B is
a) $T = m \times B$ b) $T = m/B$ c) $T = B/m$ d) $T = m \cdot B$

6) $\oint E \cdot dl = -\int_s \frac{\partial B}{\partial t} \cdot ds$ is Maxwell's third equation in integral form for
a) magnetic field b) static field
c) non-time varying field d) time varying field

P.T.O.

7) In a magnetic flux density, the total magnetic lines of force crossing a unit area in plane to the direction of flux are at
   a) Acute angles b) Obtuse angles
   c) Right angles d) None of the above

8) The magnitude of electric field E due to charge uniformly distributed over an infinite plane with density C_s is
   a) Directly proportional to distance from plane
   b) Inversely proportional to distance from plane
   c) Inversely proportional to square distance from plane
   d) Independent of the distance from plane

9) In Dot product of unit vector in cylindrical and rectangular coordinate system for $a_y.a_\phi$ is
   a) $-\cos\phi$ b) $-\sin\phi$ c) $\sin\phi$ d) $\cos\phi$

10) The unit of electric field intensity E is
   a) N/C b) J/C c) N.M/C d) V/M

11) The electric field due to electric dipole is
   a) proportional to distance from dipole
   b) proportional to square of distance from dipole
   c) proportional to inverse square of distance from dipole
   d) proportional to inverse cube of distance from dipole

12) The force between two charges is 120 N. If the distance between the charge is doubled. Then force will be
   a) 60 N b) 30 N c) 40 N d) 240 N

13) A Gaussian surface within a metallic spherical shell of inner and outer radii R_1 and R_2 contains charge Q placed at the center, the normal component of D at the Gaussian surface will be
   a) Zero b) $\frac{Q}{4\pi R_1^2}$ c) $\frac{Q}{4\pi R_2^2}$ d) $\frac{Q}{4\pi(R_1 - R_2)^2}$

14) In Dot product of unit vector in spherical and rectangular coordinate system for $a_z.a_\theta$ is
   a) $-\cos\theta$ b) $-\sin\theta$ c) $\sin\theta$ d) $\cos\theta$

SLR-EP – 260

Seat No.	

T.E. (Electrical) (Part – I) (New CGPA) Examination, 2016
ELECTROMAGNETIC ENGINEERING

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory.***
2) Assume suitable data and mention it, ***if*** *necessary.*
3) ***Use*** *of non-programmable calculator is* ***allowed.***

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) For what value of α and β

$A = a_r + \pi\ a_\phi + 3a_z$

$B = \alpha a_r + \beta\ a_\phi - 6a_z$, are parallel ?

b) A charge configuration in cylindrical coordinate is given by $\rho = 5re^{-2r}\, c/m^3$, use Gauss law to determine D.

c) For a line charge $\rho_e = \frac{10^{-9}}{2}$ c/m, on the z-axis. Find V_{AB} where A is (2m, $\frac{\pi}{2}$, 0) and B is (4 m, π, 5m).

d) Explain the uniqueness theorem/statement.

e) Determine the energy stored in the system of two point charges, Q_1 = 3nC, and Q_2 = – 3nC separated by a distance of d = .2 m.

f) If $D = (2y^2 + z)\ \hat{a}_x + 4ny\ \hat{a}_y + n\hat{a}_z$, then find volume charge density at (– 1, 0, 3).

3. Solve **any two** : **(2×6=12)**

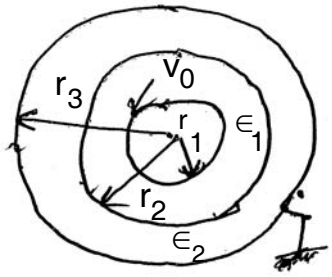
a) Determine capacitance per unit length of cable for given geometry with following parameters.

V_0 = 1.2 KV

$\in r_1$ = 4.5

$\in r_2$ = 3

$r_3 = 2\ r_2 = 4r_1$ = 40 mm



Set Q

b) Four point charges of equal values are placed at the corners of square of side 'a' meter. Determine the resultant electric field at the centre of square due to these charges.

c) Explain Gauss law and its application in detail.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) A current filament of $3\bar{a}_x$ ampere lies along the axis. Find H component at P(–1, 3, 2).

b) Derive an expression for inductance of solenoid and toroid.

c) Derive an expression for magnetic field intensity on the axis of circular current carrying loop.

d) State and derive the Maxwell's equation from Faraday's law for time varying field in integral and point form.

e) Derive an expression for energy density in magnetic field.

5. Solve **any two** : **(2×6=12)**

a) Verify Stoke's theorem for the field $H = 6xy\ \bar{a}_x - 3y^2\bar{a}_y$ and the rectangular path around the region, $2 \leq x \leq 5$, $-1 \leq y \leq 1$, $z = 0$. Let the positive direction of ds be $\bar{a}_z$.

b) Derive the Maxwell's equation from Ampere's law for static and harmonically varying fileds in integral and point form.

c) Region 1 is defined by $x < 0$ has $\mu_{r1} = 3$ and region 2 is $x > 0$ has $\mu_{r2} = 5$. Given $H1 = 4\ \bar{a}_x + 3\ \bar{a}_y - 6\ \bar{a}_z$ A/m. Show that $\theta_2 = 19.7°$ and $|H_2| = 17.2$ A/m.

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SLR-EP – 260

Seat No.	

Set R

T.E. (Electrical) (Part – I) (New CGPA) Examination, 2016
ELECTROMAGNETIC ENGINEERING

Day and Date : Friday, 2-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The force between two charges is 120 N. If the distance between the charge is doubled. Then force will be
a) 60 N b) 30 N c) 40 N d) 240 N

2) A Gaussian surface within a metallic spherical shell of inner and outer radii R_1 and R_2 contains charge Q placed at the center, the normal component of D at the Gaussian surface will be
a) Zero b) $\frac{Q}{4\pi R_1^2}$ c) $\frac{Q}{4\pi R_2^2}$ d) $\frac{Q}{4\pi(R_1 - R_2)^2}$

3) In Dot product of unit vector in spherical and rectangular coordinate system for $a_z.a_\theta$ is
a) $-\cos\theta$ b) $-\sin\theta$ c) $\sin\theta$ d) $\cos\theta$

4) Magnetic vector potential for volume current is expressed as
a) $B = \nabla \times A$ b) $A = \nabla \times B$ c) $B = \nabla.A$ d) $A = \nabla.B$

5) Energy density W_H is given as
a) Energy per volume b) Energy per area
c) Linear energy d) All of these

6) Curl of electrostatic field is
a) ∞ b) 1 c) 0 d) None of these

P.T.O.

7) Biot-Savart's Law is expressed mathematically as

a) H b) $B\alpha\int Idl\sin\theta/r^2$

c) $\int Hdl = I_{enc}$ d) $\int Hdl = \int(\nabla\times H)\,ds$

8) The torque T on a current loop with magnetic moment m in uniform magnetic field B is

a) T = m×B b) T = m/B c) T = B/m d) T = m▪B

9) $\oint E\cdot dl = -\int_s \frac{\partial B}{\partial t}\cdot ds$ is Maxwell's third equation in integral form for

a) magnetic field b) static field
c) non-time varying field d) time varying field

10) In a magnetic flux density, the total magnetic lines of force crossing a unit area in plane to the direction of flux are at

a) Acute angles b) Obtuse angles
c) Right angles d) None of the above

11) The magnitude of electric field E due to charge uniformly distributed over an infinite plane with density C_s is

a) Directly proportional to distance from plane
b) Inversely proportional to distance from plane
c) Inversely proportional to square distance from plane
d) Independent of the distance from plane

12) In Dot product of unit vector in cylindrical and rectangular coordinate system for $a_y.a_\phi$ is

a) – cos ϕ b) – sin ϕ c) sin ϕ d) cos ϕ

13) The unit of electric field intensity E is

a) N/C b) J/C c) N.M/C d) V/M

14) The electric field due to electric dipole is

a) proportional to distance from dipole
b) proportional to square of distance from dipole
c) proportional to inverse square of distance from dipole
d) proportional to inverse cube of distance from dipole

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SLR-EP – 260

Seat No.	

T.E. (Electrical) (Part – I) (New CGPA) Examination, 2016
ELECTROMAGNETIC ENGINEERING

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory.***
2) Assume suitable data and mention it, ***if*** *necessary.*
3) ***Use*** *of non-programmable calculator is* ***allowed.***

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) For what value of α and β

$A = a_r + \pi\ a_\phi + 3a_z$

$B = \alpha a_r + \beta\ a_\phi - 6a_z$, are parallel ?

b) A charge configuration in cylindrical coordinate is given by $\rho = 5re^{-2r}\, c/m^3$, use Gauss law to determine D.

c) For a line charge $\rho_e = \frac{10^{-9}}{2}$ c/m, on the z-axis. Find V_{AB} where A is $(2m, \frac{\pi}{2}, 0)$ and B is $(4\ m, \pi, 5m)$.

d) Explain the uniqueness theorem/statement.

e) Determine the energy stored in the system of two point charges, $Q_1 = 3nC$, and $Q_2 = -3nC$ separated by a distance of d = .2 m.

f) If $D = (2y^2 + z)\ \hat{a}_x + 4ny\ \hat{a}_y + n\hat{a}_z$, then find volume charge density at (– 1, 0, 3).

3. Solve **any two** : **(2×6=12)**

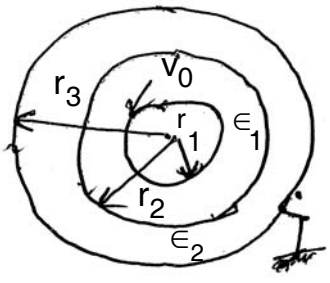
a) Determine capacitance per unit length of cable for given geometry with following parameters.

$V_0 = 1.2$ KV

$\in r_1 = 4.5$

$\in r_2 = 3$

$r_3 = 2\ r_2 = 4r_1 = 40$ mm



b) Four point charges of equal values are placed at the corners of square of side 'a' meter. Determine the resultant electric field at the centre of square due to these charges.

c) Explain Gauss law and its application in detail.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) A current filament of $3\bar{a}_x$ ampere lies along the axis. Find H component at P(–1, 3, 2).

b) Derive an expression for inductance of solenoid and toroid.

c) Derive an expression for magnetic field intensity on the axis of circular current carrying loop.

d) State and derive the Maxwell's equation from Faraday's law for time varying field in integral and point form.

e) Derive an expression for energy density in magnetic field.

5. Solve **any two** : **(2×6=12)**

a) Verify Stoke's theorem for the field $H = 6xy\ \bar{a}_x - 3y^2\bar{a}_y$ and the rectangular path around the region, $2 \leq x \leq 5$, $-1 \leq y \leq 1$, $z = 0$. Let the positive direction of ds be $\bar{a}_z$.

b) Derive the Maxwell's equation from Ampere's law for static and harmonically varying fileds in integral and point form.

c) Region 1 is defined by $x < 0$ has $\mu_{r1} = 3$ and region 2 is $x > 0$ has $\mu_{r2} = 5$. Given $H1 = 4\ \bar{a}_x + 3\ \bar{a}_y - 6\ \bar{a}_z$ A/m. Show that $\theta_2 = 19.7°$ and $|H_2| = 17.2$ A/m.

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SLR-EP – 260

Seat No.	

Set S

T.E. (Electrical) (Part – I) (New CGPA) Examination, 2016
ELECTROMAGNETIC ENGINEERING

Day and Date : Friday, 2-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Curl of electrostatic field is
a) ∞ b) 1 c) 0 d) None of these

2) Biot-Savart's Law is expressed mathematically as
a) H b) $B\alpha\int Idl\sin\theta/r^2$
c) $\int Hdl = I_{enc}$ d) $\int Hdl = \int(\nabla\times H)\,ds$

3) The torque T on a current loop with magnetic moment m in uniform magnetic field B is
a) T = m×B b) T = m/B c) T = B/m d) T = m·B

4) $\oint E\cdot dl = -\int_s \frac{\partial B}{\partial t}\cdot ds$ is Maxwell's third equation in integral form for
a) magnetic field b) static field
c) non-time varying field d) time varying field

5) In a magnetic flux density, the total magnetic lines of force crossing a unit area in plane to the direction of flux are at
a) Acute angles b) Obtuse angles
c) Right angles d) None of the above

P.T.O.

6) The magnitude of electric field E due to charge uniformly distributed over an infinite plane with density C_s is
   a) Directly proportional to distance from plane
   b) Inversely proportional to distance from plane
   c) Inversely proportional to square distance from plane
   d) Independent of the distance from plane

7) In Dot product of unit vector in cylindrical and rectangular coordinate system for $a_y.a_\phi$ is
   a) $-\cos\phi$ b) $-\sin\phi$ c) $\sin\phi$ d) $\cos\phi$

8) The unit of electric field intensity E is
   a) N/C b) J/C c) N.M/C d) V/M

9) The electric field due to electric dipole is
   a) proportional to distance from dipole
   b) proportional to square of distance from dipole
   c) proportional to inverse square of distance from dipole
   d) proportional to inverse cube of distance from dipole

10) The force between two charges is 120 N. If the distance between the charge is doubled. Then force will be
   a) 60 N b) 30 N c) 40 N d) 240 N

11) A Gaussian surface within a metallic spherical shell of inner and outer radii R_1 and R_2 contains charge Q placed at the center, the normal component of D at the Gaussian surface will be
   a) Zero b) $\frac{Q}{4\pi R_1^2}$ c) $\frac{Q}{4\pi R_2^2}$ d) $\frac{Q}{4\pi(R_1 - R_2)^2}$

12) In Dot product of unit vector in spherical and rectangular coordinate system for $a_z.a_\theta$ is
   a) $-\cos\theta$ b) $-\sin\theta$ c) $\sin\theta$ d) $\cos\theta$

13) Magnetic vector potential for volume current is expressed as
   a) $B = \nabla \times A$ b) $A = \nabla \times B$ c) $B = \nabla.A$ d) $A = \nabla.B$

14) Energy density W_H is given as
   a) Energy per volume b) Energy per area
   c) Linear energy d) All of these

SLR-EP – 260

Seat No.	

T.E. (Electrical) (Part – I) (New CGPA) Examination, 2016
ELECTROMAGNETIC ENGINEERING

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory.***
2) Assume suitable data and mention it, ***if*** *necessary.*
3) ***Use*** *of non-programmable calculator is* ***allowed.***

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) For what value of α and β

$A = a_r + \pi\ a_\phi + 3az$

$B = \alpha a_r + \beta\ a_\phi - 6a_z$, are parallel ?

b) A charge configuration in cylindrical coordinate is given by $\rho = 5re^{-2r}\, c/m^3$, use Gauss law to determine D.

c) For a line charge $\rho_e = \frac{10^{-9}}{2}$ c/m, on the z-axis. Find V_{AB} where A is $(2m, \frac{\pi}{2}, 0)$ and B is $(4\ m, \pi, 5m)$.

d) Explain the uniqueness theorem/statement.

e) Determine the energy stored in the system of two point charges, $Q_1 = 3nC$, and $Q_2 = -3nC$ separated by a distance of d = .2 m.

f) If $D = (2y^2 + z)\ \hat{a}_x + 4ny\ \hat{a}_y + n\hat{a}_z$, then find volume charge density at (– 1, 0, 3).

3. Solve **any two** : **(2×6=12)**

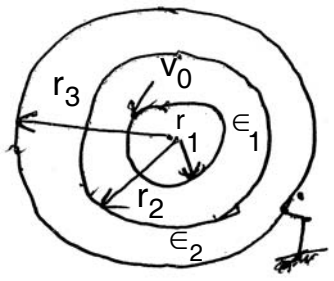
a) Determine capacitance per unit length of cable for given geometry with following parameters.

$V_0 = 1.2$ KV

$\in r_1 = 4.5$

$\in r_2 = 3$

$r_3 = 2\ r_2 = 4r_1 = 40$ mm



b) Four point charges of equal values are placed at the corners of square of side 'a' meter. Determine the resultant electric field at the centre of square due to these charges.

c) Explain Gauss law and its application in detail.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) A current filament of $3\bar{a}_x$ ampere lies along the axis. Find H component at P(–1, 3, 2).

b) Derive an expression for inductance of solenoid and toroid.

c) Derive an expression for magnetic field intensity on the axis of circular current carrying loop.

d) State and derive the Maxwell's equation from Faraday's law for time varying field in integral and point form.

e) Derive an expression for energy density in magnetic field.

5. Solve **any two** : **(2×6=12)**

a) Verify Stoke's theorem for the field $H = 6xy\ \bar{a}_x - 3y^2\bar{a}_y$ and the rectangular path around the region, $2 \leq x \leq 5$, $-1 \leq y \leq 1$, $z = 0$. Let the positive direction of ds be $\bar{a}_z$.

b) Derive the Maxwell's equation from Ampere's law for static and harmonically varying fileds in integral and point form.

c) Region 1 is defined by $x < 0$ has $\mu_{r1} = 3$ and region 2 is $x > 0$ has $\mu_{r2} = 5$. Given $H1 = 4\ \bar{a}_x + 3\ \bar{a}_y - 6\ \bar{a}_z$ A/m. Show that $\theta_2 = 19.7°$ and $|H_2| = 17.2$ A/m.

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SLR-EP – 261

Seat No.	

Set **P**

T.E. (Electrical Engineering) (Part – I) (New-CGPA) Examination, 2016
ELECTRICAL MACHINES – III

Day and Date : Monday, 5-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The winding of a 4-pole alternator having 36 slots and coil span of 1 to 8 is short pitched by _____ degrees.
a) 140 b) 80 c) 20 d) 40

2) If an alternator winding has a fractional pitch of 5/6, the coil span is _____ degrees.
a) 300 b) 150 c) 30 d) 60

3) The harmonic which would be totally eliminated from the alternator e.m.f. using a fractional pitch of 4/5 is
a) 3^{rd} b) 7^{th} c) 5^{th} d) 9^{th}

4) For eliminating 7^{th} harmonic, from the e.m.f. wave of an alternator, the fractional pitch must be
a) 2/3 b) 5/6 c) 7/8 d) 6/7

5) In an alternator if chording angle for fundamental flux wave is α, its value for 5^{th} harmonic is
a) 5α b) $\alpha/5$ c) 25α d) $\alpha/25$

6) The d.c. armature resistance of a star connected alternator measured across its two terminals is $0.5\,\Omega$. The per phase resistance is
a) $0.5\,\Omega$ b) $1\,\Omega$ c) $0.25\,\Omega$ d) $1.5\,\Omega$

7) The Potier's triangle separates the
   a) iron losses and copper losses
   b) field mmf and armature mmf
   c) stator voltage and rotor voltage
   d) armature leakage reactance and armature reaction mmf

8) The voltage regulation of an alternator having 0.75 leading p.f.load, no load induced e.m.f. of 2400 V and rated terminal voltage of 3000 V is _____ percent.
   a) 20 b) – 20 c) 150 d) – 26.7

9) Zero power factor method of an alternator is used to find its
   a) efficiency b) voltage regulation
   c) armature resistance d) synchronous impedance

10) The regulation of an alternator is
   a) the reduction in terminal voltage when alternator is loaded
   b) the variation of terminal voltage under the conditions of maximum and minimum excitation
   c) the increase in terminal voltage when load is thrown off
   d) the change in terminal voltage from lagging power factor to leading power factor.

11) The rotational speed of a given stepper motor is determined solely by the
   a) shaft load b) step pulse frequency
   c) polarity of stator current d) magnitude of stator current

12) A stepper motor may be considered as a _____ converter.
   a) dc to dc b) ac to ac
   c) dc to ac d) digital-to-analogue

13) The rotor of a stepper motor has no
   a) windings b) commutator c) brushes d) all of the above

14) Wave excitation of a stepper motor results in
   a) microstepping b) half-stepping
   c) increased step angle d) reduced resolution

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SLR-EP-261

Seat No.	

T.E. (Electrical Engineering) (Part – I) (New-CGPA) Examination, 2016
ELECTRICAL MACHINES – III

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(16 Marks)**
   1) A 12 pole three phase 50 Hz star connected alternator has 72 slots. The flux per pole is 0.0988 Wb. Calculate a) Line e.m.f. for full pitch coils and 8 conductors per slot b) Terminal e.m.f. if the coil span is reduced to 2/3 of the pole pitch.
   2) Explain three lamp method for synchronization.
   3) Calculate the distribution factor for a single phase alternator having 6 slots/ pole a) when all the slots are wound and b) when only four adjacent slots per pole are wound, the remaining slots being unwound.
   4) A 2 MVA three phase 8-pole star connected alternator is connected to 6000 V 50 Hz busbars and has synchronous reactance of 4Ω per phase. Calculate the synchronizing power and synchronizing torque per mechanical degree of rotor displacement at no load. Assume normal excitation.
   5) Explain ZPE method for voltage regulation in detail.
   6) Derive an e.m.f. equation of an alternator.

3. Solve **any two** : **(12 Marks)**
   1) Two three phase star connected alternators 1 and 2 supply a total load of 18 MVA at 0.7 lagging p.f. at a line voltage of 6.6 kV. The two alternators are rated at 10 MVA, 6.6 kV. The machine 1 is operating on full load at 08 lagging p.f. Find a) current supplied by machine 2 b) operating p.f. of machine 2 c) power delivered by each machine.
   2) Derive an expression for power developed in : a) salient pole type alternator b) non salient pole type alternator.

3) The open circuit characteristics of a 6 pole, 440 V, 50 Hz 3-phase star connected alternator is as under :

O.C. line voltage	156	288	396	440	474	530	568	592
Field current	2	4	6	7	8	10	12	14

A field current of 7 A is needed to circulate the full load armature current of 40A under S.C. conditions. The field current for rated terminal voltage under full load zero p.f. conditions 15 A. The armature resistance is 0.2 Ω per phase. Find voltage regulation at full load current of 40 A at 0.8 p.f. lagging by Potier method.

SECTION – II

4. Solve **any four** : **(16 Marks)**

1) A 2000 V, three phase star connected motor has resistance and synchronous reactance per phase of 0.2 Ω and 1.9 Ω resp. Calculate the generated (back) e.m.f. per phase with an input of 800 kW at 0.8 p.f. lagging.

2) Explain why synchronous motor is not self starting ?

3) With neat sketch explain PMDC motor.

4) Explain V and inverted V curves of a synchronous motor.

5) Explain synchronous condenser.

6) With neat sketch explain the working of universal motor.

5. Solve **any two** : **(12 Marks)**

1) Draw and explain the phasor diagrams of synchronous motor with different excitations.

2) Explain types of stepper motor.

3) Explain AC and DC servomotor.

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SLR-EP – 261

Seat No.	

Set **Q**

T.E. (Electrical Engineering) (Part – I) (New-CGPA) Examination, 2016
ELECTRICAL MACHINES – III

Day and Date : Monday, 5-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The voltage regulation of an alternator having 0.75 leading p.f.load, no load induced e.m.f. of 2400 V and rated terminal voltage of 3000 V is _____ percent.
a) 20 b) – 20 c) 150 d) – 26.7

2) Zero power factor method of an alternator is used to find its
a) efficiency b) voltage regulation
c) armature resistance d) synchronous impedance

3) The regulation of an alternator is
a) the reduction in terminal voltage when alternator is loaded
b) the variation of terminal voltage under the conditions of maximum and minimum excitation
c) the increase in terminal voltage when load is thrown off
d) the change in terminal voltage from lagging power factor to leading power factor.

4) The rotational speed of a given stepper motor is determined solely by the
a) shaft load b) step pulse frequency
c) polarity of stator current d) magnitude of stator current

5) A stepper motor may be considered as a _____ converter.
a) dc to dc b) ac to ac
c) dc to ac d) digital-to-analogue

6) The rotor of a stepper motor has no
   a) windings b) commutator c) brushes d) all of the above
7) Wave excitation of a stepper motor results in
   a) microstepping b) half-stepping
   c) increased step angle d) reduced resolution
8) The winding of a 4-pole alternator having 36 slots and coil span of 1 to 8 is short pitched by _____ degrees.
   a) 140 b) 80 c) 20 d) 40
9) If an alternator winding has a fractional pitch of 5/6, the coil span is _____ degrees.
   a) 300 b) 150 c) 30 d) 60
10) The harmonic which would be totally eliminated from the alternator e.m.f. using a fractional pitch of 4/5 is
   a) 3^{rd} b) 7^{th} c) 5^{th} d) 9^{th}
11) For eliminating 7^{th} harmonic, from the e.m.f. wave of an alternator, the fractional pitch must be
   a) 2/3 b) 5/6 c) 7/8 d) 6/7
12) In an alternator if chording angle for fundamental flux wave is α, its value for 5^{th} harmonic is
   a) 5α b) $\alpha/5$ c) 25α d) $\alpha/25$
13) The d.c. armature resistance of a star connected alternator measured across its two terminals is 0.5Ω. The per phase resistance is
   a) 0.5Ω b) 1Ω c) 0.25Ω d) 1.5Ω
14) The Potier's triangle separates the
   a) iron losses and copper losses
   b) field mmf and armature mmf
   c) stator voltage and rotor voltage
   d) armature leakage reactance and armature reaction mmf

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SLR-EP-261

Seat No.	

T.E. (Electrical Engineering) (Part – I) (New-CGPA) Examination, 2016
ELECTRICAL MACHINES – III

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(16 Marks)**
   1) A 12 pole three phase 50 Hz star connected alternator has 72 slots. The flux per pole is 0.0988 Wb. Calculate a) Line e.m.f. for full pitch coils and 8 conductors per slot b) Terminal e.m.f. if the coil span is reduced to 2/3 of the pole pitch.
   2) Explain three lamp method for synchronization.
   3) Calculate the distribution factor for a single phase alternator having 6 slots/ pole a) when all the slots are wound and b) when only four adjacent slots per pole are wound, the remaining slots being unwound.
   4) A 2 MVA three phase 8-pole star connected alternator is connected to 6000 V 50 Hz busbars and has synchronous reactance of 4Ω per phase. Calculate the synchronizing power and synchronizing torque per mechanical degree of rotor displacement at no load. Assume normal excitation.
   5) Explain ZPE method for voltage regulation in detail.
   6) Derive an e.m.f. equation of an alternator.

3. Solve **any two** : **(12 Marks)**
   1) Two three phase star connected alternators 1 and 2 supply a total load of 18 MVA at 0.7 lagging p.f. at a line voltage of 6.6 kV. The two alternators are rated at 10 MVA, 6.6 kV. The machine 1 is operating on full load at 08 lagging p.f. Find a) current supplied by machine 2 b) operating p.f. of machine 2 c) power delivered by each machine.
   2) Derive an expression for power developed in : a) salient pole type alternator b) non salient pole type alternator.

3) The open circuit characteristics of a 6 pole, 440 V, 50 Hz 3-phase star connected alternator is as under :

O.C. line voltage	156	288	396	440	474	530	568	592
Field current	2	4	6	7	8	10	12	14

A field current of 7 A is needed to circulate the full load armature current of 40A under S.C. conditions. The field current for rated terminal voltage under full load zero p.f. conditions 15 A. The armature resistance is 0.2 Ω per phase. Find voltage regulation at full load current of 40 A at 0.8 p.f. lagging by Potier method.

SECTION – II

4. Solve **any four** : **(16 Marks)**

1) A 2000 V, three phase star connected motor has resistance and synchronous reactance per phase of 0.2 Ω and 1.9 Ω resp. Calculate the generated (back) e.m.f. per phase with an input of 800 kW at 0.8 p.f. lagging.

2) Explain why synchronous motor is not self starting ?

3) With neat sketch explain PMDC motor.

4) Explain V and inverted V curves of a synchronous motor.

5) Explain synchronous condenser.

6) With neat sketch explain the working of universal motor.

5. Solve **any two** : **(12 Marks)**

1) Draw and explain the phasor diagrams of synchronous motor with different excitations.

2) Explain types of stepper motor.

3) Explain AC and DC servomotor.

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SLR-EP – 261

Seat No.	

Set **R**

T.E. (Electrical Engineering) (Part – I) (New-CGPA) Examination, 2016
ELECTRICAL MACHINES – III

Day and Date : Monday, 5-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) In an alternator if chording angle for fundamental flux wave is α, its value for 5^{th} harmonic is
   a) 5α b) $\alpha/5$ c) 25α d) $\alpha/25$

2) The d.c. armature resistance of a star connected alternator measured across its two terminals is $0.5\,\Omega$. The per phase resistance is
   a) $0.5\,\Omega$ b) $1\,\Omega$ c) $0.25\,\Omega$ d) $1.5\,\Omega$

3) The Potier's triangle separates the
   a) iron losses and copper losses
   b) field mmf and armature mmf
   c) stator voltage and rotor voltage
   d) armature leakage reactance and armature reaction mmf

4) The voltage regulation of an alternator having 0.75 leading p.f.load, no load induced e.m.f. of 2400 V and rated terminal voltage of 3000 V is _____ percent.
   a) 20 b) -20 c) 150 d) -26.7

5) Zero power factor method of an alternator is used to find its
   a) efficiency b) voltage regulation
   c) armature resistance d) synchronous impedance

6) The regulation of an alternator is
   a) the reduction in terminal voltage when alternator is loaded
   b) the variation of terminal voltage under the conditions of maximum and minimum excitation
   c) the increase in terminal voltage when load is thrown off
   d) the change in terminal voltage from lagging power factor to leading power factor.

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9) The rotor of a stepper motor has no
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   a) microstepping b) half-stepping
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11) The winding of a 4-pole alternator having 36 slots and coil span of 1 to 8 is short pitched by _____ degrees.
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12) If an alternator winding has a fractional pitch of 5/6, the coil span is _____ degrees.
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SLR-EP-261

Seat No.	

T.E. (Electrical Engineering) (Part – I) (New-CGPA) Examination, 2016
ELECTRICAL MACHINES – III

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(16 Marks)**
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   3) Calculate the distribution factor for a single phase alternator having 6 slots/ pole a) when all the slots are wound and b) when only four adjacent slots per pole are wound, the remaining slots being unwound.
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   1) Two three phase star connected alternators 1 and 2 supply a total load of 18 MVA at 0.7 lagging p.f. at a line voltage of 6.6 kV. The two alternators are rated at 10 MVA, 6.6 kV. The machine 1 is operating on full load at 08 lagging p.f. Find a) current supplied by machine 2 b) operating p.f. of machine 2 c) power delivered by each machine.
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A field current of 7 A is needed to circulate the full load armature current of 40A under S.C. conditions. The field current for rated terminal voltage under full load zero p.f. conditions 15 A. The armature resistance is 0.2 Ω per phase. Find voltage regulation at full load current of 40 A at 0.8 p.f. lagging by Potier method.

SECTION – II

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1) A 2000 V, three phase star connected motor has resistance and synchronous reactance per phase of 0.2 Ω and 1.9 Ω resp. Calculate the generated (back) e.m.f. per phase with an input of 800 kW at 0.8 p.f. lagging.

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6) With neat sketch explain the working of universal motor.

5. Solve **any two** : **(12 Marks)**

1) Draw and explain the phasor diagrams of synchronous motor with different excitations.

2) Explain types of stepper motor.

3) Explain AC and DC servomotor.

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SLR-EP – 261

Seat No.	

Set **S**

T.E. (Electrical Engineering) (Part – I) (New-CGPA) Examination, 2016
ELECTRICAL MACHINES – III

Day and Date : Monday, 5-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The regulation of an alternator is
   a) the reduction in terminal voltage when alternator is loaded
   b) the variation of terminal voltage under the conditions of maximum and minimum excitation
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   a) shaft load b) step pulse frequency
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13) The voltage regulation of an alternator having 0.75 leading p.f.load, no load induced e.m.f. of 2400 V and rated terminal voltage of 3000 V is _____ percent.
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14) Zero power factor method of an alternator is used to find its
   a) efficiency b) voltage regulation
   c) armature resistance d) synchronous impedance

_____

SLR-EP-261

Seat No.	

T.E. (Electrical Engineering) (Part – I) (New-CGPA) Examination, 2016
ELECTRICAL MACHINES – III

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(16 Marks)**
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SECTION – II

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5. Solve **any two** : **(12 Marks)**

1) Draw and explain the phasor diagrams of synchronous motor with different excitations.

2) Explain types of stepper motor.

3) Explain AC and DC servomotor.

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SLR-EP – 262

Seat No.	

Set P

T.E. (Electrical) (Part – I) (New) (CGPA) Examination, 2016
CONTROL SYSTEM – I

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Transfer function can be obtained from
   a) Output-input ratio b) Analogous table
   c) Signal flow graph d) Standard block diagram

2) Two blocks G1 and G2 are connected in cascade fashion its resultant will be
   a) G1 + G2 b) G1.G2
   c) 1 + G1.G2 d) G1.G2 – G1

3) Transfer function is defined for
   a) Linear time invariant system b) Non-linear time invariant system
   c) Non-linear time variant system d) Linear time variant system

4) A servo system output drive should be
   a) Easily reversible, required power rating and good speed control
   b) Highly sensitive and constant speed
   c) Easily reversible and variable speed
   d) Highly sensitive easily controllable speed

5) In a control system the controller output is given to
   a) Sensor b) Comparator
   c) Amplifier d) Final control element

P.T.O.

6) Introduction of feedback reduces the effect of
   a) Noise signals
   b) Noise signals and disturbances
   c) Error and noise signals
   d) Error signals

7) In F-I analogy Mass is analogous to
   a) C b) 1/R c) 1/L d) 1/C

8) The Root Loci of a system has three asymptotes. The system can have
   a) Three poles
   b) Five poles and two zeros
   c) Four poles and one zero
   d) All above

9) A system having the characteristic equation $(s + 1)(s + 4)(s - 3) = 0$ is
   a) Stable
   b) Unstable
   c) Marginally stable
   d) None of above

10) The steady state acceleration error for TYPE-1 system is
   a) Zero
   b) Unity
   c) Between 0 and 1
   d) Infinity

11) The breakaway points of the root locus occurs at
   a) Imaginary axis
   b) In the RHS
   c) In the LHS
   d) On the real axis

12) When the gain margin is positive and phase margin is negative, the system is
   a) Stable
   b) Unstable
   c) Probablistic
   d) Undeterministic

13) Gain crossover frequency is defined as frequency at which
   a) $|G(S)H(S)| = 1$
   b) $|G(S)H(S)| = 0$
   c) $|G(S)H(S)| = \infty$
   d) $|G(S)H(S)| = -1$

14) Slope of asymptote in BODE plot for second order system is _____ per decade.
   a) 20 db
   b) 40 db
   c) – 20 db
   d) – 40 db

_____

SLR-EP – 262

Seat No.	

T.E. (Electrical) (Part – I) (New) (CGPA) Examination, 2016
CONTROL SYSTEM – I

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**

a) Derive the transfer function of closed loop system.

b) Define following terms :

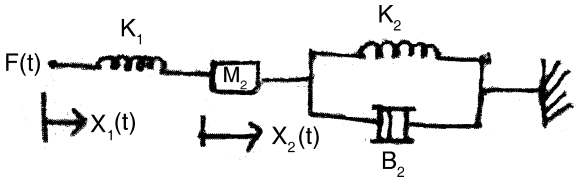
i) Sensitivity

ii) Forward path

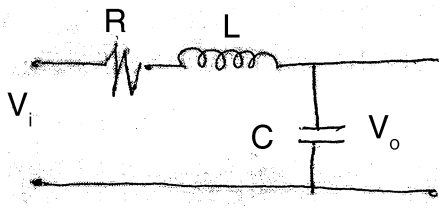
iii) Self loop

iv) Path gain.

c) Find F-V Analogy of a given mechanical system.



d) Construct the signal flow graph of given electrical network and find out transfer function.



e) Explain F-I analogy.

f) Compare open loop and closed loop system.

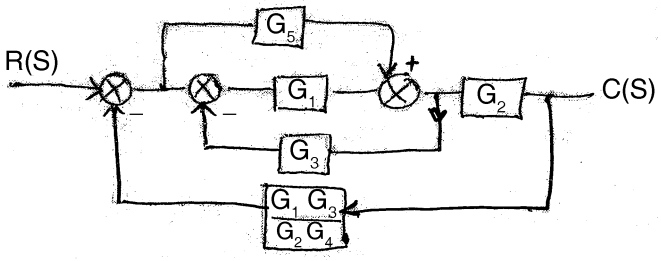
3. Attempt **any two** : **(6×2=12)**

a) Derive the transfer function of AC servomotor.

b) Explain the Mason's Gain formula.

Set P

c) Find the transfer function of block diagram.



SECTION – II

4. Solve **any four** : **(4×4=16)**

a) What is gain margin and phase margin for frequency response ?

b) Explain how the breakaway point and angle of departure are calculated.

c) With neat diagram explain time domain specifications.

d) Using Routh Hurwitz criteria determine the relation between K and T so that unity feedback control system whose open loop transfer function given below is stable. G(S = K/S [S(S + 10) + T].

e) The open loop transfer function of a unity feedback system is given by G(S) = 25 / S (S + 5). Calculate :

i) Damping factor ii) Natural frequency iii) Damped frequency.

f) Explain minimum phase, non minimum phase and all pass systems.

5. Solve **any two** : **(2×6=12)**

a) Construct the BODE plot for system below whose open loop transfer function is G (S) H (S) = 4/S (1 + 0.5 S) (1 + 0.08 S).

Determine the

i) Gain margin

ii) Phase margin.

b) Draw the Root Locus for a system having open loop transfer function as G(S)H(S) = K/S (S + 1) (S + 3).

c) The open loop transfer function of a control system is given below :

$G(S) = \frac{2(S2 + 3S + 20)}{S(S + 2)(S2 + 4S + 10)}$. Determine the static error coefficients and steady state error for the input given as :

i) 5 ii) 4t iii) $4\ t^2/2$

———————

Set P

SLR-EP – 262

Seat No.	

Set **Q**

T.E. (Electrical) (Part – I) (New) (CGPA) Examination, 2016
CONTROL SYSTEM – I

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The Root Loci of a system has three asymptotes. The system can have
   a) Three poles b) Five poles and two zeros
   c) Four poles and one zero d) All above

2) A system having the characteristic equation $(s + 1)(s + 4)(s – 3) = 0$ is
   a) Stable b) Unstable
   c) Marginally stable d) None of above

3) The steady state acceleration error for TYPE-1 system is
   a) Zero b) Unity
   c) Between 0 and 1 d) Infinity

4) The breakaway points of the root locus occurs at
   a) Imaginary axis b) In the RHS
   c) In the LHS d) On the real axis

5) When the gain margin is positive and phase margin is negative, the system is
   a) Stable b) Unstable
   c) Probablistic d) Undeterministic

P.T.O.

6) Gain crossover frequency is defined as frequency at which

a) $|G(S)H(S)| = 1$ b) $|G(S)H(S)| = 0$

c) $|G(S)H(S)| = \infty$ d) $|G(S)H(S)| = -1$

7) Slope of asymptote in BODE plot for second order system is _____ per decade.

a) 20 db b) 40 db

c) – 20 db d) – 40 db

8) Transfer function can be obtained from

a) Output-input ratio b) Analogous table

c) Signal flow graph d) Standard block diagram

9) Two blocks G1 and G2 are connected in cascade fashion its resultant will be

a) G1 + G2 b) G1.G2

c) 1 + G1.G2 d) G1.G2 – G1

10) Transfer function is defined for

a) Linear time invariant system b) Non-linear time invariant system

c) Non-linear time variant system d) Linear time variant system

11) A servo system output drive should be

a) Easily reversible, required power rating and good speed control

b) Highly sensitive and constant speed

c) Easily reversible and variable speed

d) Highly sensitive easily controllable speed

12) In a control system the controller output is given to

a) Sensor b) Comparator

c) Amplifier d) Final control element

13) Introduction of feedback reduces the effect of

a) Noise signals b) Noise signals and disturbances

c) Error and noise signals d) Error signals

14) In F-I analogy Mass is analogous to

a) C b) 1/R c) 1/L d) 1/C

_____

SLR-EP – 262

Seat No.	

T.E. (Electrical) (Part – I) (New) (CGPA) Examination, 2016
CONTROL SYSTEM – I

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**

a) Derive the transfer function of closed loop system.

b) Define following terms :

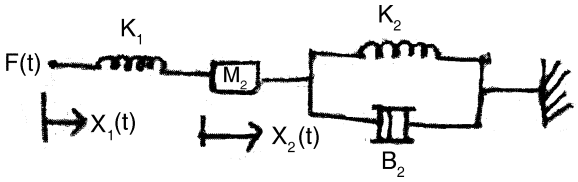
i) Sensitivity

ii) Forward path

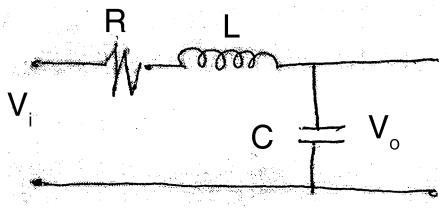
iii) Self loop

iv) Path gain.

c) Find F-V Analogy of a given mechanical system.



d) Construct the signal flow graph of given electrical network and find out transfer function.



e) Explain F-I analogy.

f) Compare open loop and closed loop system.

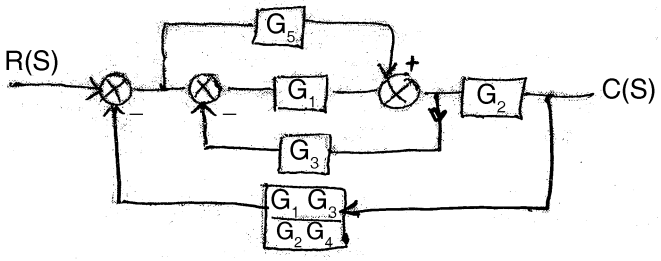
3. Attempt **any two** : **(6×2=12)**

a) Derive the transfer function of AC servomotor.

b) Explain the Mason's Gain formula.

Set Q

c) Find the transfer function of block diagram.



SECTION – II

4. Solve **any four** : **(4×4=16)**

a) What is gain margin and phase margin for frequency response ?

b) Explain how the breakaway point and angle of departure are calculated.

c) With neat diagram explain time domain specifications.

d) Using Routh Hurwitz criteria determine the relation between K and T so that unity feedback control system whose open loop transfer function given below is stable. G(S = K/S [S(S + 10) + T].

e) The open loop transfer function of a unity feedback system is given by G(S) = 25 / S (S + 5). Calculate :

i) Damping factor ii) Natural frequency iii) Damped frequency.

f) Explain minimum phase, non minimum phase and all pass systems.

5. Solve **any two** : **(2×6=12)**

a) Construct the BODE plot for system below whose open loop transfer function is G (S) H (S) = 4/S (1 + 0.5 S) (1 + 0.08 S).

Determine the

i) Gain margin

ii) Phase margin.

b) Draw the Root Locus for a system having open loop transfer function as G(S)H(S) = K/S (S + 1) (S + 3).

c) The open loop transfer function of a control system is given below :

$G(S) = \frac{2(S2 + 3S + 20)}{S(S + 2)(S2 + 4S + 10)}$. Determine the static error coefficients and steady state error for the input given as :

i) 5 ii) 4t iii) $4\ t^2/2$

———————

Set Q

SLR-EP – 262

Seat No.	

Set R

T.E. (Electrical) (Part – I) (New) (CGPA) Examination, 2016
CONTROL SYSTEM – I

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) In a control system the controller output is given to

a) Sensor b) Comparator

c) Amplifier d) Final control element

2) Introduction of feedback reduces the effect of

a) Noise signals b) Noise signals and disturbances

c) Error and noise signals d) Error signals

3) In F-I analogy Mass is analogous to

a) C b) 1/R c) 1/L d) 1/C

4) The Root Loci of a system has three asymptotes. The system can have

a) Three poles b) Five poles and two zeros

c) Four poles and one zero d) All above

P.T.O.

5) A system having the characteristic equation (s + 1) (s + 4) (s – 3) = 0 is
   a) Stable b) Unstable
   c) Marginally stable d) None of above

6) The steady state acceleration error for TYPE-1 system is
   a) Zero b) Unity
   c) Between 0 and 1 d) Infinity

7) The breakaway points of the root locus occurs at
   a) Imaginary axis b) In the RHS
   c) In the LHS d) On the real axis

8) When the gain margin is positive and phase margin is negative, the system is
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9) Gain crossover frequency is defined as frequency at which
   a) $|G(S)H(S)| = 1$ b) $|G(S)H(S)| = 0$
   c) $|G(S)H(S)| = \infty$ d) $|G(S)H(S)| = -1$

10) Slope of asymptote in BODE plot for second order system is _____ per decade.
   a) 20 db b) 40 db
   c) – 20 db d) – 40 db

11) Transfer function can be obtained from
   a) Output-input ratio b) Analogous table
   c) Signal flow graph d) Standard block diagram

12) Two blocks G1 and G2 are connected in cascade fashion its resultant will be
   a) G1 + G2 b) G1.G2
   c) 1 + G1.G2 d) G1.G2 – G1

13) Transfer function is defined for
   a) Linear time invariant system b) Non-linear time invariant system
   c) Non-linear time variant system d) Linear time variant system

14) A servo system output drive should be
   a) Easily reversible, required power rating and good speed control
   b) Highly sensitive and constant speed
   c) Easily reversible and variable speed
   d) Highly sensitive easily controllable speed

_____

SLR-EP – 262

Seat No.	

T.E. (Electrical) (Part – I) (New) (CGPA) Examination, 2016
CONTROL SYSTEM – I

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**

a) Derive the transfer function of closed loop system.

b) Define following terms :

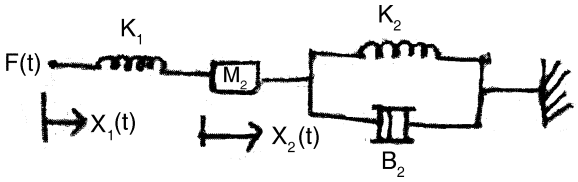
i) Sensitivity

ii) Forward path

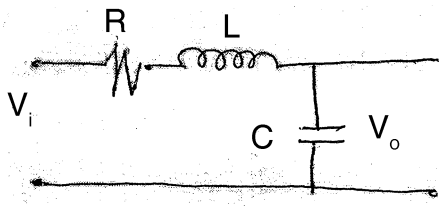
iii) Self loop

iv) Path gain.

c) Find F-V Analogy of a given mechanical system.



d) Construct the signal flow graph of given electrical network and find out transfer function.



e) Explain F-I analogy.

f) Compare open loop and closed loop system.

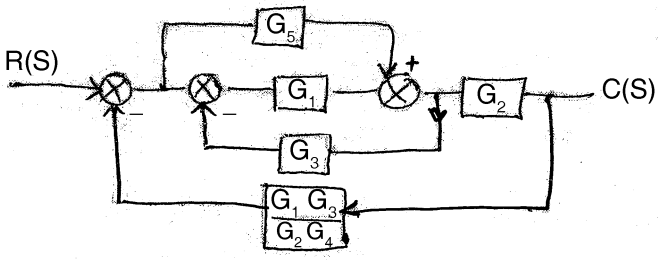
3. Attempt **any two** : **(6×2=12)**

a) Derive the transfer function of AC servomotor.

b) Explain the Mason's Gain formula.

Set R

c) Find the transfer function of block diagram.



SECTION – II

4. Solve **any four** : **(4×4=16)**

a) What is gain margin and phase margin for frequency response ?

b) Explain how the breakaway point and angle of departure are calculated.

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f) Explain minimum phase, non minimum phase and all pass systems.

5. Solve **any two** : **(2×6=12)**

a) Construct the BODE plot for system below whose open loop transfer function is G (S) H (S) = 4/S (1 + 0.5 S) (1 + 0.08 S).

Determine the

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b) Draw the Root Locus for a system having open loop transfer function as G(S)H(S) = K/S (S + 1) (S + 3).

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———————

Set R

SLR-EP – 262

Seat No.	

Set S

T.E. (Electrical) (Part – I) (New) (CGPA) Examination, 2016
CONTROL SYSTEM – I

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The steady state acceleration error for TYPE-1 system is
   a) Zero b) Unity
   c) Between 0 and 1 d) Infinity

2) The breakaway points of the root locus occurs at
   a) Imaginary axis b) In the RHS
   c) In the LHS d) On the real axis

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P.T.O.

6) Transfer function can be obtained from
   a) Output-input ratio
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   c) Signal flow graph
   d) Standard block diagram

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   a) Sensor
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   c) Amplifier
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11) Introduction of feedback reduces the effect of
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   a) C b) 1/R c) 1/L d) 1/C

13) The Root Loci of a system has three asymptotes. The system can have
   a) Three poles
   b) Five poles and two zeros
   c) Four poles and one zero
   d) All above

14) A system having the characteristic equation (s + 1) (s + 4) (s – 3) = 0 is
   a) Stable
   b) Unstable
   c) Marginally stable
   d) None of above

———————

SLR-EP – 262

Seat No.	

T.E. (Electrical) (Part – I) (New) (CGPA) Examination, 2016
CONTROL SYSTEM – I

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**

a) Derive the transfer function of closed loop system.

b) Define following terms :

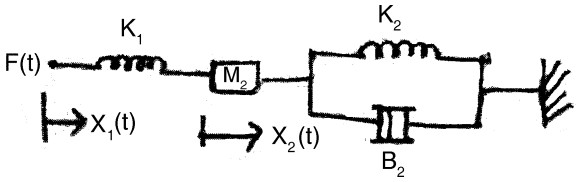
i) Sensitivity

ii) Forward path

iii) Self loop

iv) Path gain.

c) Find F-V Analogy of a given mechanical system.



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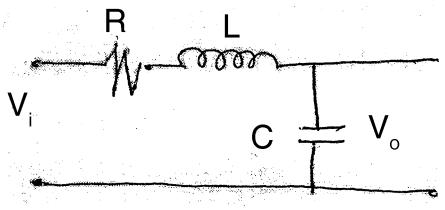

e) Explain F-I analogy.

f) Compare open loop and closed loop system.

3. Attempt **any two** : **(6×2=12)**

a) Derive the transfer function of AC servomotor.

b) Explain the Mason's Gain formula.

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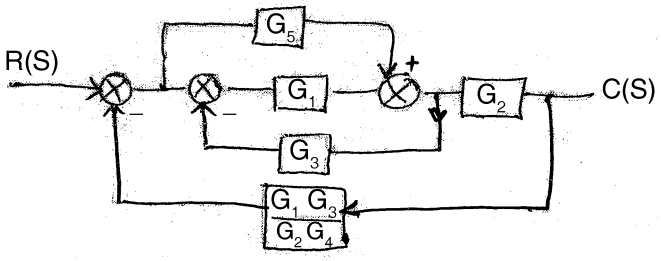
c) Find the transfer function of block diagram.



SECTION – II

4. Solve **any four** : **(4×4=16)**

a) What is gain margin and phase margin for frequency response ?

b) Explain how the breakaway point and angle of departure are calculated.

c) With neat diagram explain time domain specifications.

d) Using Routh Hurwitz criteria determine the relation between K and T so that unity feedback control system whose open loop transfer function given below is stable. G(S = K/S [S(S + 10) + T].

e) The open loop transfer function of a unity feedback system is given by G(S) = 25 / S (S + 5). Calculate :

i) Damping factor ii) Natural frequency iii) Damped frequency.

f) Explain minimum phase, non minimum phase and all pass systems.

5. Solve **any two** : **(2×6=12)**

a) Construct the BODE plot for system below whose open loop transfer function is G (S) H (S) = 4/S (1 + 0.5 S) (1 + 0.08 S).

Determine the

i) Gain margin

ii) Phase margin.

b) Draw the Root Locus for a system having open loop transfer function as G(S)H(S) = K/S (S + 1) (S + 3).

c) The open loop transfer function of a control system is given below :

$G(S) = \frac{2(S2 + 3S + 20)}{S(S + 2)(S2 + 4S + 10)}$. Determine the static error coefficients and steady state error for the input given as :

i) 5 ii) 4t iii) $4\ t^2/2$

———————

Set S

SLR-EP – 264

Seat No.	

Set **P**

T.E. (Electrical) (Part – I) (Old) Examination, 2016
LINEAR INTEGRATED CIRCUITS

Day and Date : Saturday, 10-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Negative Feedback
   a) increases the input and output impedances
   b) increases input impedance and bandwidth
   c) decreases input impedance and bandwidth
   d) does not effect impedance and bandwidth

2) PLL consists of
   a) Phase detector b) VCO
   c) Phase defector d) all of the above

3) VCO is designed so that at zero voltage it is oscillating at some initial frequency W_0 called
   a) cut-off frequency b) free-cycle frequency
   c) free-running frequency d) none of the above

4) The time taken for a PLL to capture the incoming signal is called
   a) pull out time b) capture time
   c) lock out time d) none of the above

5) The basic components of 565 IC is
   a) phase vector b) amplifier
   c) VCO d) all of the above

6) The main advantage of PLL as a detector with other Am detector is
   a) high degree of selectivity and noise immunity
   b) low noise immunity with high degree of selectivity
   c) high degree of selectivity only
   d) noise immunity only

7) The important characteristics of PLL are
   a) lock in range b) capture range
   c) pull in time d) all of the above
8) _____ filter controls the capture range and lock range of PLL.
   a) LPF b) HPF c) BPF d) None of the above
9) The other name for phase detector is
   a) comparator b) multiplier c) adder d) none of the above
10) The application of PLL are
   a) Frequency multiplier b) AM, FM demodulator
   c) Frequency demodulator d) All of the above
11) An external capacitor connected across 565 will act as
   a) passive device b) low pass filter
   c) charging device d) discharging device
12) The capture range is _____ located with respect to VCO free running frequency f_0 in PLL
   a) asymmetrical b) symmetrical
   c) opposite d) none of the above
13) The output waveform of PLL 566 is
   a) square and triangular b) square and sine wave
   c) triangular and sine wave d) none of the above
14) The number of pins in IC -566
   a) 10 b) 16 c) 12 d) 8
15) The output frequency of VCO can be changed by
   a) R_T b) C_T c) V_C d) all of the above
16) With zero volts on both inputs, an opamp ideally should have an output equal to
   a) the positive supply voltage b) the negative supply voltage
   c) zero d) the CMRR
17) In the common mode
   a) both inputs are grounded b) the outputs are connected together
   c) an ideal signal appears on both inputs d) the output signal are in phase
18) Op amp has,
   a) high output resistance b) low output resistance
   c) fixed value output resistance d) none of above
19) 1/f is a
   a) noise b) slew rate
   c) sensitivity parameter d) none of above
20) 78xx is,
   a) positive voltage regulator b) negative sensitivity
   c) fixed voltage regulator d) none of above

_____

SLR-EP – 264

Seat No.	

T.E. (Electrical) (Part – I) (Old) Examination, 2016
LINEAR INTEGRATED CIRCUITS

Day and Date : Saturday, 10-12-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four**. **(4×5=20)**

   a) Explain the ideal characteristics of op amp.

   b) With the help of neat diagram explain concept of Virtual ground.

   c) Explain compensation techniques of Opamp.

   d) Explain window detector.

   e) Explain Inverting and non inverting amplifier.

3. a) Design a summing amplifier for $V_0 = V_1 + 2V_2 + 4V_3$ **(1×10=10)**

   b) Explain in detail special cases of comparator. **(1×10 =10)**

      1) ZCD 2) Window detector

      OR

   b) Explain op amp as non inverting amplifier and derive expression for gain in closed loop. **(1×10=10)**

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Explain the band reject filters with block diagram.

   b) Design the RC phase shift oscillator which oscillates at 5 KHz. Assume C = 0.1 uf.

Set P

c) Explain the circuit diagram of IC 555 as astable multivibrator.

d) Explain the positive voltage regulator with diagrams.

e) Explain the circuit diagram of PD controller.

5. Solve **any two** :

a) Explain wein bridge oscillator with circuit diagram and design the same so that F_0 = 965 Hz ? **10**

b) Explain in detail applications of IC 565

1) FM Detector

2) FIV and VIF converter. **10**

c) Explain the major components of switching regulators in detail. **10**

SLR-EP – 264

Seat No.	

Set **Q**

T.E. (Electrical) (Part – I) (Old) Examination, 2016
LINEAR INTEGRATED CIRCUITS

Day and Date : Saturday, 10-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) With zero volts on both inputs, an opamp ideally should have an output equal to
   a) the positive supply voltage b) the negative supply voltage
   c) zero d) the CMRR
2) In the common mode
   a) both inputs are grounded b) the outputs are connected together
   c) an ideal signal appears on both inputs d) the output signal are in phase
3) Op amp has,
   a) high output resistance b) low output resistance
   c) fixed value output resistance d) none of above
4) 1/f is a
   a) noise b) slew rate
   c) sensitivity parameter d) none of above
5) 78xx is,
   a) positive voltage regulator b) negative sensitivity
   c) fixed voltage regulator d) none of above
6) Negative Feedback
   a) increases the input and output impedances
   b) increases input impedance and bandwidth
   c) decreases input impedance and bandwidth
   d) does not effect impedance and bandwidth
7) PLL consists of
   a) Phase detector b) VCO
   c) Phase defector d) all of the above

P.T.O.

8) VCO is designed so that at zero voltage it is oscillating at some initial frequency W_0 called
   a) cut-off frequency b) free-cycle frequency
   c) free-running frequency d) none of the above
9) The time taken for a PLL to capture the incoming signal is called
   a) pull out time b) capture time
   c) lock out time d) none of the above
10) The basic components of 565 IC is
   a) phase vector b) amplifier
   c) VCO d) all of the above
11) The main advantage of PLL as a detector with other Am detector is
   a) high degree of selectivity and noise immunity
   b) low noise immunity with high degree of selectivity
   c) high degree of selectivity only
   d) noise immunity only
12) The important characteristics of PLL are
   a) lock in range b) capture range
   c) pull in time d) all of the above
13) _____ filter controls the capture range and lock range of PLL.
   a) LPF b) HPF c) BPF d) None of the above
14) The other name for phase detector is
   a) comparator b) multiplier c) adder d) none of the above
15) The application of PLL are
   a) Frequency multiplier b) AM, FM demodulator
   c) Frequency demodulator d) All of the above
16) An external capacitor connected across 565 will act as
   a) passive device b) low pass filter
   c) charging device d) discharging device
17) The capture range is _____ located with respect to VCO free running frequency f_0 in PLL
   a) asymmetrical b) symmetrical
   c) opposite d) none of the above
18) The output waveform of PLL 566 is
   a) square and triangular b) square and sine wave
   c) triangular and sine wave d) none of the above
19) The number of pins in IC -566
   a) 10 b) 16 c) 12 d) 8
20) The output frequency of VCO can be changed by
   a) R_T b) C_T c) V_C d) all of the above

SLR-EP – 264

Seat No.	

T.E. (Electrical) (Part – I) (Old) Examination, 2016
LINEAR INTEGRATED CIRCUITS

Day and Date : Saturday, 10-12-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four**. **(4×5=20)**

   a) Explain the ideal characteristics of op amp.

   b) With the help of neat diagram explain concept of Virtual ground.

   c) Explain compensation techniques of Opamp.

   d) Explain window detector.

   e) Explain Inverting and non inverting amplifier.

3. a) Design a summing amplifier for $V_0 = V_1 + 2V_2 + 4V_3$ **(1×10=10)**

   b) Explain in detail special cases of comparator. **(1×10 =10)**

      1) ZCD 2) Window detector

      OR

   b) Explain op amp as non inverting amplifier and derive expression for gain in closed loop. **(1×10=10)**

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Explain the band reject filters with block diagram.

   b) Design the RC phase shift oscillator which oscillates at 5 KHz. Assume C = 0.1 uf.

Set Q

c) Explain the circuit diagram of IC 555 as astable multivibrator.

d) Explain the positive voltage regulator with diagrams.

e) Explain the circuit diagram of PD controller.

5. Solve **any two** :

a) Explain wein bridge oscillator with circuit diagram and design the same so that F_0 = 965 Hz ? **10**

b) Explain in detail applications of IC 565

1) FM Detector

2) FIV and VIF converter. **10**

c) Explain the major components of switching regulators in detail. **10**

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Seat No.	

Set **R**

T.E. (Electrical) (Part – I) (Old) Examination, 2016
LINEAR INTEGRATED CIRCUITS

Day and Date : Saturday, 10-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) An external capacitor connected across 565 will act as
   a) passive device b) low pass filter
   c) charging device d) discharging device

2) The capture range is _____ located with respect to VCO free running frequency f_0 in PLL
   a) asymmetrical b) symmetrical
   c) opposite d) none of the above

3) The output waveform of PLL 566 is
   a) square and triangular b) square and sine wave
   c) triangular and sine wave d) none of the above

4) The number of pins in IC -566
   a) 10 b) 16 c) 12 d) 8

5) The output frequency of VCO can be changed by
   a) R_T b) C_T c) V_C d) all of the above

6) With zero volts on both inputs, an opamp ideally should have an output equal to
   a) the positive supply voltage b) the negative supply voltage
   c) zero d) the CMRR

7) In the common mode
   a) both inputs are grounded b) the outputs are connected together
   c) an ideal signal appears on both inputs d) the output signal are in phase

8) Op amp has,
   a) high output resistance b) low output resistance
   c) fixed value output resistance d) none of above

9) 1/f is a
   a) noise
   b) slew rate
   c) sensitivity parameter
   d) none of above

10) 78xx is,
   a) positive voltage regulator
   b) negative sensitivity
   c) fixed voltage regulator
   d) none of above

11) Negative Feedback
   a) increases the input and output impedances
   b) increases input impedance and bandwidth
   c) decreases input impedance and bandwidth
   d) does not effect impedance and bandwidth

12) PLL consists of
   a) Phase detector
   b) VCO
   c) Phase defector
   d) all of the above

13) VCO is designed so that at zero voltage it is oscillating at some initial frequency W_0 called
   a) cut-off frequency
   b) free-cycle frequency
   c) free-running frequency
   d) none of the above

14) The time taken for a PLL to capture the incoming signal is called
   a) pull out time
   b) capture time
   c) lock out time
   d) none of the above

15) The basic components of 565 IC is
   a) phase vector
   b) amplifier
   c) VCO
   d) all of the above

16) The main advantage of PLL as a detector with other Am detector is
   a) high degree of selectivity and noise immunity
   b) low noise immunity with high degree of selectivity
   c) high degree of selectivity only
   d) noise immunity only

17) The important characteristics of PLL are
   a) lock in range
   b) capture range
   c) pull in time
   d) all of the above

18) _____ filter controls the capture range and lock range of PLL.
   a) LPF b) HPF c) BPF d) None of the above

19) The other name for phase detector is
   a) comparator b) multiplier c) adder d) none of the above

20) The application of PLL are
   a) Frequency multiplier
   b) AM, FM demodulator
   c) Frequency demodulator
   d) All of the above

_____

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Seat No.	

T.E. (Electrical) (Part – I) (Old) Examination, 2016
LINEAR INTEGRATED CIRCUITS

Day and Date : Saturday, 10-12-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four**. **(4×5=20)**

   a) Explain the ideal characteristics of op amp.

   b) With the help of neat diagram explain concept of Virtual ground.

   c) Explain compensation techniques of Opamp.

   d) Explain window detector.

   e) Explain Inverting and non inverting amplifier.

3. a) Design a summing amplifier for $V_0 = V_1 + 2V_2 + 4V_3$ **(1×10=10)**

   b) Explain in detail special cases of comparator. **(1×10 =10)**

      1) ZCD 2) Window detector

      OR

   b) Explain op amp as non inverting amplifier and derive expression for gain in closed loop. **(1×10=10)**

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Explain the band reject filters with block diagram.

   b) Design the RC phase shift oscillator which oscillates at 5 KHz. Assume C = 0.1 uf.

Set R

c) Explain the circuit diagram of IC 555 as astable multivibrator.

d) Explain the positive voltage regulator with diagrams.

e) Explain the circuit diagram of PD controller.

5. Solve **any two** :

a) Explain wein bridge oscillator with circuit diagram and design the same so that F_0 = 965 Hz ? **10**

b) Explain in detail applications of IC 565

1) FM Detector

2) FIV and VIF converter. **10**

c) Explain the major components of switching regulators in detail. **10**

SLR-EP – 264

Seat No.	

Set **S**

T.E. (Electrical) (Part – I) (Old) Examination, 2016
LINEAR INTEGRATED CIRCUITS

Day and Date : Saturday, 10-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The main advantage of PLL as a detector with other Am detector is
   a) high degree of selectivity and noise immunity
   b) low noise immunity with high degree of selectivity
   c) high degree of selectivity only
   d) noise immunity only

2) The important characteristics of PLL are
   a) lock in range b) capture range
   c) pull in time d) all of the above

3) _____ filter controls the capture range and lock range of PLL.
   a) LPF b) HPF c) BPF d) None of the above

4) The other name for phase detector is
   a) comparator b) multiplier c) adder d) none of the above

5) The application of PLL are
   a) Frequency multiplier b) AM, FM demodulator
   c) Frequency demodulator d) All of the above

6) An external capacitor connected across 565 will act as
   a) passive device b) low pass filter
   c) charging device d) discharging device

7) The capture range is _____ located with respect to VCO free running frequency f_0 in PLL
   a) asymmetrical b) symmetrical
   c) opposite d) none of the above

8) The output waveform of PLL 566 is
   a) square and triangular b) square and sine wave
   c) triangular and sine wave d) none of the above
9) The number of pins in IC -566
   a) 10 b) 16 c) 12 d) 8
10) The output frequency of VCO can be changed by
   a) R_T b) C_T c) V_C d) all of the above
11) With zero volts on both inputs, an opamp ideally should have an output equal to
   a) the positive supply voltage b) the negative supply voltage
   c) zero d) the CMRR
12) In the common mode
   a) both inputs are grounded b) the outputs are connected together
   c) an ideal signal appears on both inputs d) the output signal are in phase
13) Op amp has,
   a) high output resistance b) low output resistance
   c) fixed value output resistance d) none of above
14) 1/f is a
   a) noise b) slew rate
   c) sensitivity parameter d) none of above
15) 78xx is,
   a) positive voltage regulator b) negative sensitivity
   c) fixed voltage regulator d) none of above
16) Negative Feedback
   a) increases the input and output impedances
   b) increases input impedance and bandwidth
   c) decreases input impedance and bandwidth
   d) does not effect impedance and bandwidth
17) PLL consists of
   a) Phase detector b) VCO
   c) Phase defector d) all of the above
18) VCO is designed so that at zero voltage it is oscillating at some initial frequency W_0 called
   a) cut-off frequency b) free-cycle frequency
   c) free-running frequency d) none of the above
19) The time taken for a PLL to capture the incoming signal is called
   a) pull out time b) capture time
   c) lock out time d) none of the above
20) The basic components of 565 IC is
   a) phase vector b) amplifier
   c) VCO d) all of the above

SLR-EP – 264

Seat No.	

T.E. (Electrical) (Part – I) (Old) Examination, 2016
LINEAR INTEGRATED CIRCUITS

Day and Date : Saturday, 10-12-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four**. **(4×5=20)**

   a) Explain the ideal characteristics of op amp.

   b) With the help of neat diagram explain concept of Virtual ground.

   c) Explain compensation techniques of Opamp.

   d) Explain window detector.

   e) Explain Inverting and non inverting amplifier.

3. a) Design a summing amplifier for $V_0 = V_1 + 2V_2 + 4V_3$ **(1×10=10)**

   b) Explain in detail special cases of comparator. **(1×10 =10)**

      1) ZCD 2) Window detector

      OR

   b) Explain op amp as non inverting amplifier and derive expression for gain in closed loop. **(1×10=10)**

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Explain the band reject filters with block diagram.

   b) Design the RC phase shift oscillator which oscillates at 5 KHz. Assume C = 0.1 uf.

Set S

c) Explain the circuit diagram of IC 555 as astable multivibrator.

d) Explain the positive voltage regulator with diagrams.

e) Explain the circuit diagram of PD controller.

5. Solve **any two** :

a) Explain wein bridge oscillator with circuit diagram and design the same so that F_0 = 965 Hz ? **10**

b) Explain in detail applications of IC 565

1) FM Detector

2) FIV and VIF converter. **10**

c) Explain the major components of switching regulators in detail. **10**

SLR-EP – 265

Seat No.	

Set **P**

T.E. (Electrical) (Part – II) Examination, 2016
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Missing **data** suitably **assumed**.*
*2) Non programmable calculator is **allowed**.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(1×20=20)**

1) Iron losses of a machine are
   A) Inversely proportional to the square of flux density
   B) Inversely proportional to the flux density
   C) Directly proportional to the square of flux density
   D) Directly proportional to the flux density

2) How the leakage reactance of a transformer vary with number of turns ?
   A) Directly proportional to number of turns
   B) Proportional to square of number of turns
   C) Inversely proportional to number of turns
   D) Proportional to inverse square number to turns

3) How much heat can be dissipated by natural means from the plain walled tank of a transformer ?
   A) 12.5 w/m^2/°C B) 6 w/m^2/°C C) 3.72 w/m^2/°C D) 8.78 w/m^2/°C

4) For square stepped core net core area is given by
   A) 0.45 d2 B) 0.56 d2 C) 0.6 d2 D) 0.62 d2

5) A 1-ϕ shell type distribution transformer has sandwich type winding.
   A) To save copper B) To reduce the leakage reactance
   C) To improve the voltage regulation D) Both B) and C)

6) Which loss in a dc machine does not vary with load as well as flux density ?
   A) Copper loss B) Eddy current loss
   C) Hysteresis loss D) Windage loss

7) Number of parallel paths in a dc machine with duplex wave winding is
   A) 2 B) 4 C) 6 D) 8

8) The harmonics in rotating machines are generated due to
   A) Non-sinusoidal field form B) Slotting of the stator core
   C) Both A) and B) above D) None of the above

P.T.O.

9) If a DC machine gives shock the probable cause could be
   A) Armature field coils or brush holders earthed
   B) Weak or leaky insulation
   C) Loose earth wire
   D) All of the above

10) If a DC motor stops after running for some time, the probable cause could be any of the following EXCEPT
   A) Weak or no field
   B) Brushes ahead of neutral
   C) Insufficient power supply
   D) Insufficient torque developed

11) If coefficient of dispersion is increased, then max. Power factor of machine will be _____
   A) Decrease B) Increase C) Remains same D) None of these

12) If an induction motor is designed with lesser air gap, then the motor will have
   A) Better cooling
   B) Better overload capacity
   C) Better power factor
   D) Lower power factor

13) In 3-ϕ induction motor, $L/\tau = 1.5$ for
   A) Minimum cost
   B) Good efficiency
   C) Overall good design
   D) Good power factor

14) An increase in number of poles of an induction motor results in
   A) Decrease in maximum pf
   B) Increase in maximum pf
   C) No change in maximum pf
   D) Cannot be predicted

15) In an induction motor the slots per pole per phase are most normally taken as
   A) Three or less B) More than five C) Less than three D) Three to five

16) In induction motor if the number of rotor slots is equal to the stator slots then
   A) The motor may refuse to start
   B) The noise level will be low
   C) The motor will run smoothly
   D) None of these

17) In case a synchronous motor starts but fails to develop torque, the probable cause could be
   A) Open or short circuit
   B) Reverse field winding
   C) Low excitation
   D) All of the above

18) Larger air gap length in synchronous machine will characterize as having
   A) Higher stability limit
   B) Higher synchronizing power
   C) Inherently good voltage regulation
   D) All of the above

19) A turbo-machine is usually running at a speed of
   A) 15000 rpm B) 3000 rpm C) 5000 rpm D) 1500 rpm

20) An alternator coupled to which prime mover will usually have the highest rotating speed .
   A) Steam engine
   B) Reciprocating engine
   C) Francis engine
   D) None of these

SLR-EP – 265

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Missing **data** suitably **assumed**.*

*2) Non-programmable **calculator** is allowed.*

SECTION – I

2. Solve **any four** : **(4×5=20)**

a) Derive an expression for armature diameter for dc machine.

b) Derive an expression for volt per turn for transformer.

c) What is design and explain the design factors of electrical machine ?

d) The ratio of flux to full load mmf in a 400 KVA, 50 Hz, single phase core type power transformer is 2.4×10^{-6}. Calculate the net iron area and the window area of the transformer. Maximum flux density in the core is 1.3 web/m^2, current density 2.7 A/mm^2 and window space factor 0.26. Also calculate the full load mmf.

e) The diameter and length of the armature of a 1000 KW, 500 V, 300 rpm dc generator is 1.40 m and 0.35 m respectively. Calculate the mean emf per conductor, total flux and the number of conductors connected in series. Armature drop is 6.6 V at full load and flux density in the air gap is 1 web/m^2. Assume form factor Kf = 0.7.

3. Solve **any two** : **(2×10=20)**

a) With neat sketch derive an expression for design of square and two stepped core in transformer.

b) A 250 KW, 460 V, 600 rpm, 6-pole dc generator is built with an armature diameter of 72 cm and core length 27 cm. The lap armature winding has 660 conductors. Using data obtained from this machine, determine preliminary dimensions for the armature core, number of armature conductors and commutator segments for a 350 Kw, 500 V, 725 rpm, 60 pole dc generator. Assume a square pole face with the pole arc = 0.7 pole pitch.

c) Determine the main dimensions of the core, the number of turns and the cross-section of the conductors for a 5 KVA, 11000/400 v, 50 Hz, single phase core type distribution transformer. The net conductor area in the window is 0.6 times the net cross-section of iron in the core. Assume a square cross-section for a core, a flux density of 1 wb/m^2, a current density of 1.4 A/mm^2 and a window space factor 0.2. The height of window is 3 times width of window.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   a) With neat diagram explain the equivalent circuit of a single phase induction motor.
   b) Explain the effect of dispersion co-efficient on overload capacity.
   c) Explain the different factors while calculating air gap length for synchronous machine.
   d) Find the main dimensions of a 100 MVA, 11 KV, 50 Hz, 40 pole salient pole generator assuming air gap flux density as 0.65 wb/m^2 and ampere conductors as 40000 per metre. The peripheral speed should not exceed 60 m/sec.
   e) A 15 HP 400 V, 50 Hz, 1430 rpm, 3 phase induction motor with an efficiency of 80% and pf 81% has inner diameter of stator 30 cm and length 12 cm. Estimate the diameter and length for a 50 HP, 406 V, 4 pole, 50 Hz induction motor to be designed for 84% efficiency and 85% pf assuming same specific loading as the previous motor.

5. Solve **any two** : **(2×10=20)**
   a) With neat sketch explain in detail the procedure for drawing circle diagram of induction motor.
   b) Derive expression for design of rotor bars and slots with end rings.
   c) Determine the dimensions of a 75000 KVA, 13.8 KV, 50 Hz, 62.5 rpm, 3 phase, star-connected alternator. Also, find the number of stator slots, conductors per slot, conductor area. The peripheral velocity should be about 40 m/sec. Assume, average gap density = 0.65 wb/m^2, ampere conductors per metre = 40000 and current density = 4 Amp/mm^2.

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SLR-EP – 265

Seat No.	

Set **Q**

T.E. (Electrical) (Part – II) Examination, 2016
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Missing **data** suitably **assumed**.*
*2) Non programmable calculator is **allowed**.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(1×20=20)**

1) In induction motor if the number of rotor slots is equal to the stator slots then
   A) The motor may refuse to start B) The noise level will be low
   C) The motor will run smoothly D) None of these

2) In case a synchronous motor starts but fails to develop torque, the probable cause could be
   A) Open or short circuit B) Reverse field winding
   C) Low excitation D) All of the above

3) Larger air gap length in synchronous machine will characterize as having
   A) Higher stability limit B) Higher synchronizing power
   C) Inherently good voltage regulation D) All of the above

4) A turbo-machine is usually running at a speed of
   A) 15000 rpm B) 3000 rpm C) 5000 rpm D) 1500 rpm

5) An alternator coupled to which prime mover will usually have the highest rotating speed .
   A) Steam engine B) Reciprocating engine
   C) Francis engine D) None of these

6) Iron losses of a machine are
   A) Inversely proportional to the square of flux density
   B) Inversely proportional to the flux density
   C) Directly proportional to the square of flux density
   D) Directly proportional to the flux density

7) How the leakage reactance of a transformer vary with number of turns ?
   A) Directly proportional to number of turns
   B) Proportional to square of number of turns
   C) Inversely proportional to number of turns
   D) Proportional to inverse square number to turns

P.T.O.

8) How much heat can be dissipated by natural means from the plain walled tank of a transformer ?
A) 12.5 w/m^2/°C B) 6 w/m^2/°C C) 3.72 w/m^2/°C D) 8.78 w/m^2/°C

9) For square stepped core net core area is given by
A) 0.45 d2 B) 0.56 d2 C) 0.6 d2 D) 0.62 d2

10) A 1-ϕ shell type distribution transformer has sandwich type winding.
A) To save copper B) To reduce the leakage reactance
C) To improve the voltage regulation D) Both B) and C)

11) Which loss in a dc machine does not vary with load as well as flux density ?
A) Copper loss B) Eddy current loss
C) Hysteresis loss D) Windage loss

12) Number of parallel paths in a dc machine with duplex wave winding is
A) 2 B) 4 C) 6 D) 8

13) The harmonics in rotating machines are generated due to
A) Non-sinusoidal field form B) Slotting of the stator core
C) Both A) and B) above D) None of the above

14) If a DC machine gives shock the probable cause could be
A) Armature field coils or brush holders earthed
B) Weak or leaky insulation
C) Loose earth wire
D) All of the above

15) If a DC motor stops after running for some time, the probable cause could be any of the following EXCEPT
A) Weak or no field B) Brushes ahead of neutral
C) Insufficient power supply D) Insufficient torque developed

16) If coefficient of dispersion is increased, then max. Power factor of machine will be _____
A) Decrease B) Increase C) Remains same D) None of these

17) If an induction motor is designed with lesser air gap, then the motor will have
A) Better cooling B) Better overload capacity
C) Better power factor D) Lower power factor

18) In 3-ϕ induction motor, $L/\tau = 1.5$ for
A) Minimum cost B) Good efficiency
C) Overall good design D) Good power factor

19) An increase in number of poles of an induction motor results in
A) Decrease in maximum pf B) Increase in maximum pf
C) No change in maximum pf D) Cannot be predicted

20) In an induction motor the slots per pole per phase are most normally taken as
A) Three or less B) More than five C) Less than three D) Three to five

SLR-EP – 265

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Missing **data** suitably **assumed**.*

*2) Non-programmable **calculator** is allowed.*

SECTION – I

2. Solve **any four** : **(4×5=20)**

a) Derive an expression for armature diameter for dc machine.

b) Derive an expression for volt per turn for transformer.

c) What is design and explain the design factors of electrical machine ?

d) The ratio of flux to full load mmf in a 400 KVA, 50 Hz, single phase core type power transformer is 2.4×10^{-6}. Calculate the net iron area and the window area of the transformer. Maximum flux density in the core is 1.3 web/m^2, current density 2.7 A/mm^2 and window space factor 0.26. Also calculate the full load mmf.

e) The diameter and length of the armature of a 1000 KW, 500 V, 300 rpm dc generator is 1.40 m and 0.35 m respectively. Calculate the mean emf per conductor, total flux and the number of conductors connected in series. Armature drop is 6.6 V at full load and flux density in the air gap is 1 web/m^2. Assume form factor Kf = 0.7.

3. Solve **any two** : **(2×10=20)**

a) With neat sketch derive an expression for design of square and two stepped core in transformer.

b) A 250 KW, 460 V, 600 rpm, 6-pole dc generator is built with an armature diameter of 72 cm and core length 27 cm. The lap armature winding has 660 conductors. Using data obtained from this machine, determine preliminary dimensions for the armature core, number of armature conductors and commutator segments for a 350 Kw, 500 V, 725 rpm, 60 pole dc generator. Assume a square pole face with the pole arc = 0.7 pole pitch.

c) Determine the main dimensions of the core, the number of turns and the cross-section of the conductors for a 5 KVA, 11000/400 v, 50 Hz, single phase core type distribution transformer. The net conductor area in the window is 0.6 times the net cross-section of iron in the core. Assume a square cross-section for a core, a flux density of 1 wb/m^2, a current density of 1.4 A/mm^2 and a window space factor 0.2. The height of window is 3 times width of window.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   a) With neat diagram explain the equivalent circuit of a single phase induction motor.
   b) Explain the effect of dispersion co-efficient on overload capacity.
   c) Explain the different factors while calculating air gap length for synchronous machine.
   d) Find the main dimensions of a 100 MVA, 11 KV, 50 Hz, 40 pole salient pole generator assuming air gap flux density as 0.65 wb/m^2 and ampere conductors as 40000 per metre. The peripheral speed should not exceed 60 m/sec.
   e) A 15 HP 400 V, 50 Hz, 1430 rpm, 3 phase induction motor with an efficiency of 80% and pf 81% has inner diameter of stator 30 cm and length 12 cm. Estimate the diameter and length for a 50 HP, 406 V, 4 pole, 50 Hz induction motor to be designed for 84% efficiency and 85% pf assuming same specific loading as the previous motor.

5. Solve **any two** : **(2×10=20)**
   a) With neat sketch explain in detail the procedure for drawing circle diagram of induction motor.
   b) Derive expression for design of rotor bars and slots with end rings.
   c) Determine the dimensions of a 75000 KVA, 13.8 KV, 50 Hz, 62.5 rpm, 3 phase, star-connected alternator. Also, find the number of stator slots, conductors per slot, conductor area. The peripheral velocity should be about 40 m/sec. Assume, average gap density = 0.65 wb/m^2, ampere conductors per metre = 40000 and current density = 4 Amp/mm^2.

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SLR-EP – 265

Seat No.	

Set **R**

T.E. (Electrical) (Part – II) Examination, 2016
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Missing **data** suitably **assumed**.*
*2) Non programmable calculator is **allowed**.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(1×20=20)**

1) If coefficient of dispersion is increased, then max. Power factor of machine will be _____
A) Decrease B) Increase C) Remains same D) None of these

2) If an induction motor is designed with lesser air gap, then the motor will have
A) Better cooling B) Better overload capacity
C) Better power factor D) Lower power factor

3) In 3-ϕ induction motor, $L/\tau = 1.5$ for
A) Minimum cost B) Good efficiency
C) Overall good design D) Good power factor

4) An increase in number of poles of an induction motor results in
A) Decrease in maximum pf B) Increase in maximum pf
C) No change in maximum pf D) Cannot be predicted

5) In an induction motor the slots per pole per phase are most normally taken as
A) Three or less B) More than five C) Less than three D) Three to five

6) In induction motor if the number of rotor slots is equal to the stator slots then
A) The motor may refuse to start B) The noise level will be low
C) The motor will run smoothly D) None of these

7) In case a synchronous motor starts but fails to develop torque, the probable cause could be
A) Open or short circuit B) Reverse field winding
C) Low excitation D) All of the above

P.T.O.

8) Larger air gap length in synchronous machine will characterize as having
   A) Higher stability limit B) Higher synchronizing power
   C) Inherently good voltage regulation D) All of the above
9) A turbo-machine is usually running at a speed of
   A) 15000 rpm B) 3000 rpm C) 5000 rpm D) 1500 rpm
10) An alternator coupled to which prime mover will usually have the highest rotating speed .
   A) Steam engine B) Reciprocating engine
   C) Francis engine D) None of these
11) Iron losses of a machine are
   A) Inversely proportional to the square of flux density
   B) Inversely proportional to the flux density
   C) Directly proportional to the square of flux density
   D) Directly proportional to the flux density
12) How the leakage reactance of a transformer vary with number of turns ?
   A) Directly proportional to number of turns
   B) Proportional to square of number of turns
   C) Inversely proportional to number of turns
   D) Proportional to inverse square number to turns
13) How much heat can be dissipated by natural means from the plain walled tank of a transformer ?
   A) 12.5 w/m^2/°C B) 6 w/m^2/°C C) 3.72 w/m^2/°C D) 8.78 w/m^2/°C
14) For square stepped core net core area is given by
   A) 0.45 d2 B) 0.56 d2 C) 0.6 d2 D) 0.62 d2
15) A 1-ϕ shell type distribution transformer has sandwich type winding.
   A) To save copper B) To reduce the leakage reactance
   C) To improve the voltage regulation D) Both B) and C)
16) Which loss in a dc machine does not vary with load as well as flux density ?
   A) Copper loss B) Eddy current loss
   C) Hysteresis loss D) Windage loss
17) Number of parallel paths in a dc machine with duplex wave winding is
   A) 2 B) 4 C) 6 D) 8
18) The harmonics in rotating machines are generated due to
   A) Non-sinusoidal field form B) Slotting of the stator core
   C) Both A) and B) above D) None of the above
19) If a DC machine gives shock the probable cause could be
   A) Armature field coils or brush holders earthed
   B) Weak or leaky insulation
   C) Loose earth wire
   D) All of the above
20) If a DC motor stops after running for some time, the probable cause could be any of the following EXCEPT
   A) Weak or no field B) Brushes ahead of neutral
   C) Insufficient power supply D) Insufficient torque developed

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Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Missing **data** suitably **assumed**.*

*2) Non-programmable **calculator** is allowed.*

SECTION – I

2. Solve **any four** : **(4×5=20)**

a) Derive an expression for armature diameter for dc machine.

b) Derive an expression for volt per turn for transformer.

c) What is design and explain the design factors of electrical machine ?

d) The ratio of flux to full load mmf in a 400 KVA, 50 Hz, single phase core type power transformer is 2.4×10^{-6}. Calculate the net iron area and the window area of the transformer. Maximum flux density in the core is 1.3 web/m^2, current density 2.7 A/mm^2 and window space factor 0.26. Also calculate the full load mmf.

e) The diameter and length of the armature of a 1000 KW, 500 V, 300 rpm dc generator is 1.40 m and 0.35 m respectively. Calculate the mean emf per conductor, total flux and the number of conductors connected in series. Armature drop is 6.6 V at full load and flux density in the air gap is 1 web/m^2. Assume form factor Kf = 0.7.

3. Solve **any two** : **(2×10=20)**

a) With neat sketch derive an expression for design of square and two stepped core in transformer.

b) A 250 KW, 460 V, 600 rpm, 6-pole dc generator is built with an armature diameter of 72 cm and core length 27 cm. The lap armature winding has 660 conductors. Using data obtained from this machine, determine preliminary dimensions for the armature core, number of armature conductors and commutator segments for a 350 Kw, 500 V, 725 rpm, 60 pole dc generator. Assume a square pole face with the pole arc = 0.7 pole pitch.

c) Determine the main dimensions of the core, the number of turns and the cross-section of the conductors for a 5 KVA, 11000/400 v, 50 Hz, single phase core type distribution transformer. The net conductor area in the window is 0.6 times the net cross-section of iron in the core. Assume a square cross-section for a core, a flux density of 1 wb/m^2, a current density of 1.4 A/mm^2 and a window space factor 0.2. The height of window is 3 times width of window.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   a) With neat diagram explain the equivalent circuit of a single phase induction motor.
   b) Explain the effect of dispersion co-efficient on overload capacity.
   c) Explain the different factors while calculating air gap length for synchronous machine.
   d) Find the main dimensions of a 100 MVA, 11 KV, 50 Hz, 40 pole salient pole generator assuming air gap flux density as 0.65 wb/m^2 and ampere conductors as 40000 per metre. The peripheral speed should not exceed 60 m/sec.
   e) A 15 HP 400 V, 50 Hz, 1430 rpm, 3 phase induction motor with an efficiency of 80% and pf 81% has inner diameter of stator 30 cm and length 12 cm. Estimate the diameter and length for a 50 HP, 406 V, 4 pole, 50 Hz induction motor to be designed for 84% efficiency and 85% pf assuming same specific loading as the previous motor.

5. Solve **any two** : **(2×10=20)**
   a) With neat sketch explain in detail the procedure for drawing circle diagram of induction motor.
   b) Derive expression for design of rotor bars and slots with end rings.
   c) Determine the dimensions of a 75000 KVA, 13.8 KV, 50 Hz, 62.5 rpm, 3 phase, star-connected alternator. Also, find the number of stator slots, conductors per slot, conductor area. The peripheral velocity should be about 40 m/sec. Assume, average gap density = 0.65 wb/m^2, ampere conductors per metre = 40000 and current density = 4 Amp/mm^2.

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SLR-EP – 265

Seat No.	

Set **S**

T.E. (Electrical) (Part – II) Examination, 2016
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Missing **data** suitably **assumed**.*
*2) Non programmable calculator is **allowed**.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(1×20=20)**

1) Which loss in a dc machine does not vary with load as well as flux density ?
A) Copper loss B) Eddy current loss
C) Hysteresis loss D) Windage loss

2) Number of parallel paths in a dc machine with duplex wave winding is
A) 2 B) 4 C) 6 D) 8

3) The harmonics in rotating machines are generated due to
A) Non-sinusoidal field form B) Slotting of the stator core
C) Both A) and B) above D) None of the above

4) If a DC machine gives shock the probable cause could be
A) Armature field coils or brush holders earthed
B) Weak or leaky insulation
C) Loose earth wire
D) All of the above

5) If a DC motor stops after running for some time, the probable cause could be any of the following EXCEPT
A) Weak or no field B) Brushes ahead of neutral
C) Insufficient power supply D) Insufficient torque developed

6) If coefficient of dispersion is increased, then max. Power factor of machine will be _____
A) Decrease B) Increase C) Remains same D) None of these

7) If an induction motor is designed with lesser air gap, then the motor will have
A) Better cooling B) Better overload capacity
C) Better power factor D) Lower power factor

P.T.O.

8) In 3-ϕ induction motor, $L/\tau = 1.5$ for
   A) Minimum cost B) Good efficiency
   C) Overall good design D) Good power factor

9) An increase in number of poles of an induction motor results in
   A) Decrease in maximum pf B) Increase in maximum pf
   C) No change in maximum pf D) Cannot be predicted

10) In an induction motor the slots per pole per phase are most normally taken as
   A) Three or less B) More than five C) Less than three D) Three to five

11) In induction motor if the number of rotor slots is equal to the stator slots then
   A) The motor may refuse to start B) The noise level will be low
   C) The motor will run smoothly D) None of these

12) In case a synchronous motor starts but fails to develop torque, the probable cause could be
   A) Open or short circuit B) Reverse field winding
   C) Low excitation D) All of the above

13) Larger air gap length in synchronous machine will characterize as having
   A) Higher stability limit B) Higher synchronizing power
   C) Inherently good voltage regulation D) All of the above

14) A turbo-machine is usually running at a speed of
   A) 15000 rpm B) 3000 rpm C) 5000 rpm D) 1500 rpm

15) An alternator coupled to which prime mover will usually have the highest rotating speed .
   A) Steam engine B) Reciprocating engine
   C) Francis engine D) None of these

16) Iron losses of a machine are
   A) Inversely proportional to the square of flux density
   B) Inversely proportional to the flux density
   C) Directly proportional to the square of flux density
   D) Directly proportional to the flux density

17) How the leakage reactance of a transformer vary with number of turns ?
   A) Directly proportional to number of turns
   B) Proportional to square of number of turns
   C) Inversely proportional to number of turns
   D) Proportional to inverse square number to turns

18) How much heat can be dissipated by natural means from the plain walled tank of a transformer ?
   A) 12.5 w/m^2/°C B) 6 w/m^2/°C C) 3.72 w/m^2/°C D) 8.78 w/m^2/°C

19) For square stepped core net core area is given by
   A) 0.45 d2 B) 0.56 d2 C) 0.6 d2 D) 0.62 d2

20) A 1-ϕ shell type distribution transformer has sandwich type winding.
   A) To save copper B) To reduce the leakage reactance
   C) To improve the voltage regulation D) Both B) and C)

SLR-EP – 265

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Missing **data** suitably **assumed**.*

*2) Non-programmable **calculator** is allowed.*

SECTION – I

2. Solve **any four** : **(4×5=20)**

a) Derive an expression for armature diameter for dc machine.

b) Derive an expression for volt per turn for transformer.

c) What is design and explain the design factors of electrical machine ?

d) The ratio of flux to full load mmf in a 400 KVA, 50 Hz, single phase core type power transformer is 2.4×10^{-6}. Calculate the net iron area and the window area of the transformer. Maximum flux density in the core is 1.3 web/m^2, current density 2.7 A/mm^2 and window space factor 0.26. Also calculate the full load mmf.

e) The diameter and length of the armature of a 1000 KW, 500 V, 300 rpm dc generator is 1.40 m and 0.35 m respectively. Calculate the mean emf per conductor, total flux and the number of conductors connected in series. Armature drop is 6.6 V at full load and flux density in the air gap is 1 web/m^2. Assume form factor Kf = 0.7.

3. Solve **any two** : **(2×10=20)**

a) With neat sketch derive an expression for design of square and two stepped core in transformer.

b) A 250 KW, 460 V, 600 rpm, 6-pole dc generator is built with an armature diameter of 72 cm and core length 27 cm. The lap armature winding has 660 conductors. Using data obtained from this machine, determine preliminary dimensions for the armature core, number of armature conductors and commutator segments for a 350 Kw, 500 V, 725 rpm, 60 pole dc generator. Assume a square pole face with the pole arc = 0.7 pole pitch.

c) Determine the main dimensions of the core, the number of turns and the cross-section of the conductors for a 5 KVA, 11000/400 v, 50 Hz, single phase core type distribution transformer. The net conductor area in the window is 0.6 times the net cross-section of iron in the core. Assume a square cross-section for a core, a flux density of 1 wb/m^2, a current density of 1.4 A/mm^2 and a window space factor 0.2. The height of window is 3 times width of window.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   a) With neat diagram explain the equivalent circuit of a single phase induction motor.
   b) Explain the effect of dispersion co-efficient on overload capacity.
   c) Explain the different factors while calculating air gap length for synchronous machine.
   d) Find the main dimensions of a 100 MVA, 11 KV, 50 Hz, 40 pole salient pole generator assuming air gap flux density as 0.65 wb/m^2 and ampere conductors as 40000 per metre. The peripheral speed should not exceed 60 m/sec.
   e) A 15 HP 400 V, 50 Hz, 1430 rpm, 3 phase induction motor with an efficiency of 80% and pf 81% has inner diameter of stator 30 cm and length 12 cm. Estimate the diameter and length for a 50 HP, 406 V, 4 pole, 50 Hz induction motor to be designed for 84% efficiency and 85% pf assuming same specific loading as the previous motor.

5. Solve **any two** : **(2×10=20)**
   a) With neat sketch explain in detail the procedure for drawing circle diagram of induction motor.
   b) Derive expression for design of rotor bars and slots with end rings.
   c) Determine the dimensions of a 75000 KVA, 13.8 KV, 50 Hz, 62.5 rpm, 3 phase, star-connected alternator. Also, find the number of stator slots, conductors per slot, conductor area. The peripheral velocity should be about 40 m/sec. Assume, average gap density = 0.65 wb/m^2, ampere conductors per metre = 40000 and current density = 4 Amp/mm^2.

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SLR-EP – 266

Seat No.	

Set **P**

T.E. (Electrical) (Part – II) Examination, 2016
CONTROL SYSTEM – II

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data, if* ***necessary****.*
iii) ***Use*** *of non-programmable* ***calculator*** *is allowed.*
iv) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
v) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answers : **20**

1) A cascade lead-compensator should have a
   a) Pole nearer to the origin b) Zero nearer to the origin
   c) Pole at origin d) Zero at origin
2) A cascade-lead compensator would
   a) Reduce the settling time to the extent desired
   b) Reduce the steady state error to the extent desired
   c) Gives a suitable value of static error constant
   d) None of these
3) What happens to the value of static error constant of a system provided with a cascade lead-compensator ?
   a) No change b) Decreases
   c) Increases a little d) Increases as desired
4) A cascade lag-compensator used in the LTI control system is known so, because
   a) The response of the system lags the input
   b) The input to the system should lag the response of the system
   c) The angle contribution at the dominant closed-loop poles due to pole-zero pair of the compensator is negative
   d) Due to the cascade lag-compensator, the root-loci of the original system shifts towards left
5) A cascaded lag-lead compensator used in linear control systems work as a
   a) Low pass filter b) High pass filter c) Band stop filter d) Band pass filter
6) The effect of inserting a cascade lead compensator in the forward path of linear unity feedback control system on the speed of its transient response is that it
   a) Increases b) Decreases
   c) May increase or decreases d) Remains same

P.T.O.

7) The TF of a phase-lead compensator is given by $G_c(S) = \frac{1+3Ts}{1+Ts}$ where T > 0. The maximum phase shift provided by such a compensator is

a) $\pi/2$ b) $\pi/3$ c) $\pi/4$ d) $\pi/6$

8) For an n^{th} order system the state equations will be of the order of

a) n b) 1 c) n/2 d) (n + 1)/2

9) The state transition matrix for the system $\dot{X} = AX$ with initial state X(0) is

a) $(sI - A)^{-1}$ b) $e^{At} X(0)$

c) Laplace inverse of $[(sI - A)^{-1}]$ d) Laplace inverse of $[(sI - A)^{-1}] X(0)$

10) The state space approach is applicable to the control systems which are

a) Time variant b) Time invariant c) Both a) and b) d) None of these

11) The necessary and sufficient condition for full order state observer is that the system must be

a) Completely observable b) Completely controllable

c) Not observable d) Not controllable

12) The process of designing a closed loop control system is by

a) Regulator b) Lag compensation

c) Pole placement d) None of these

13) The eigenvalues of the matrix (A-BK) are called

a) Open loop poles b) Open loop zeros c) Regulator poles d) None of these

14) In a system nonlinearity may be introduced by which of the following ?

a) Saturation effect in amplifiers b) End positions in detectors

c) Backlash in gears d) Any of the above

15) A control system with excessive noise, is likely to suffer from

a) Saturation in amplifying stages b) Loss of gain

c) Vibrations d) Oscillations

16) A non-linear control system must have

a) At least one nonlinear element b) Some of the elements as nonlinear

c) Most of elements as nonlinear d) All the elements as nonlinear

17) Phase plane technique has the potential of analysing the nonlinear systems upto an order of

a) One b) Two c) Three d) Higher order

18) For a unity feedback system, the origin of the s-plane is mapped in the z-plane by transformation $z = e^{sT}$ to which one of the following ?

a) Origin b) 1+ j0 c) –1 + j0 d) 0 + j1

19) The information contained in a signal is preserved in the sampled version if

a) $\omega_s = \omega_m$ b) $\omega_s = 0.5\omega_m$ c) $\omega_s = 0.1\omega_m$ d) $\omega_s = 2\omega_m$

20) Compared to continuous time system, the discrete system is

a) More accurate but less stable b) Less accurate but more stable

c) More accurate and more stable d) Less accurate and less stable

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Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
CONTROL SYSTEM – II

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data, if* ***necessary****.*
iii) ***Use*** *of non-programmable* ***calculator*** *is allowed.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) Derive the realization of lag or lead compensator for active circuit.

b) Explain the procedure for lag compensator using Bode Plot.

c) Design a lead compensator for a unity feedback system with OLTF $G(s) = \frac{10}{s(s+1)}$ to meet the following specifications.

i) ω_n = 3 rad/sec,

ii) $\xi = 0.5$.

d) Obtain state transition matrix for the following system matrix $A = \begin{bmatrix} 0 & -3 \\ 1 & -4 \end{bmatrix}$.

e) Determine the controllability and observability of the system with state model

$$\begin{bmatrix} \dot{1} \\ \dot{2} \\ \dot{3} \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 10 & 5 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}.$$

3. Solve **any two** :

a) The forward path TF of a unity feedback control system is given by

$G(s) = \frac{K}{s(s^2+8s+17)}$. The system has to have percentage overshoot for unit step input $\leq 16\%$ and steady state error for unit input $\leq {}^{17}/_{70}$ rad/sec. design a lag compensator using root locus. **10**

b) Design a lead compensator for a unity feedback system with OLTF

$G(s) = \frac{K}{s(s+1)(s+5)}$ to satisfy the following specifications

a) Kv ≥ 50

b) Phase Margin $\geq 20°$. **10**

c) Find eigenvalues, eigenvectors and modal matrix for

$$A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}.$$ **10**

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) Derive the expression for full order state observer gain matrix using Transformation matrix method.

b) The closed-loop poles (eigenvalues) are to be located at s = –3, s = –7. Design a state variable feedback. Given that $A = \begin{bmatrix} 0 & 1 \\ -20 & -9 \end{bmatrix}$ and $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, C = [1 0].

c) Explain in short, friction and dead-zone nonlinearity.

d) Explain isocline method for construction of phase trajectories.

e) Derive the pulse transfer function of cascaded elements.

5. Solve **any two** : **(10×2=20)**

a) A system is described by $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & -6 \\ 1 & 0 & -11 \\ 0 & 1 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} r$

i) Compute k so that control law u = –kx + r(t), r(t) = reference input, places the control loop poles at $-2 \pm j\sqrt{12}, -6$.

ii) Design an observer such that the eigenvalues of the observer are located at $-2 \pm j\sqrt{12}, -6$.

b) Derive the describing function of saturation nonlinearity.

c) Check the stability of the sampled data control system represented by the equation using bilinear transformation $z^3 - 0.2z^2 - 0.25z + 0.05 = 0$.

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SLR-EP – 266

Seat No.	

Set **Q**

T.E. (Electrical) (Part – II) Examination, 2016
CONTROL SYSTEM – II

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data, if* ***necessary****.*
iii) ***Use*** *of non-programmable* ***calculator*** *is allowed.*
iv) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
v) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answers : **20**

1) A non-linear control system must have
   a) At least one nonlinear element b) Some of the elements as nonlinear
   c) Most of elements as nonlinear d) All the elements as nonlinear
2) Phase plane technique has the potential of analysing the nonlinear systems upto an order of
   a) One b) Two c) Three d) Higher order
3) For a unity feedback system, the origin of the s-plane is mapped in the z-plane by transformation $z = e^{sT}$ to which one of the following ?
   a) Origin b) 1+ j0 c) –1 + j0 d) 0 + j1
4) The information contained in a signal is preserved in the sampled version if
   a) $\omega_s = \omega_m$ b) $\omega_s = 0.5\omega_m$ c) $\omega_s = 0.1\omega_m$ d) $\omega_s = 2\omega_m$
5) Compared to continuous time system, the discrete system is
   a) More accurate but less stable b) Less accurate but more stable
   c) More accurate and more stable d) Less accurate and less stable
6) A cascade lead-compensator should have a
   a) Pole nearer to the origin b) Zero nearer to the origin
   c) Pole at origin d) Zero at origin
7) A cascade-lead compensator would
   a) Reduce the settling time to the extent desired
   b) Reduce the steady state error to the extent desired
   c) Gives a suitable value of static error constant
   d) None of these
8) What happens to the value of static error constant of a system provided with a cascade lead-compensator ?
   a) No change b) Decreases
   c) Increases a little d) Increases as desired

P.T.O.

9) A cascade lag-compensator used in the LTI control system is known so, because
   a) The response of the system lags the input
   b) The input to the system should lag the response of the system
   c) The angle contribution at the dominant closed-loop poles due to pole-zero pair of the compensator is negative
   d) Due to the cascade lag-compensator, the root-loci of the original system shifts towards left

10) A cascaded lag-lead compensator used in linear control systems work as a
   a) Low pass filter b) High pass filter c) Band stop filter d) Band pass filter

11) The effect of inserting a cascade lead compensator in the forward path of linear unity feedback control system on the speed of its transient response is that it
   a) Increases b) Decreases
   c) May increase or decreases d) Remains same

12) The TF of a phase-lead compensator is given by $G_c(S) = \frac{1+3Ts}{1+Ts}$ where T > 0. The maximum phase shift provided by such a compensator is
   a) $\pi/2$ b) $\pi/3$ c) $\pi/4$ d) $\pi/6$

13) For an n^{th} order system the state equations will be of the order of
   a) n b) 1 c) n/2 d) (n + 1)/2

14) The state transition matrix for the system $\dot{X} = AX$ with initial state X(0) is
   a) $(sI - A)^{-1}$ b) $e^{At}X(0)$
   c) Laplace inverse of $[(sI - A)^{-1}]$ d) Laplace inverse of $[(sI - A)^{-1}]X(0)$

15) The state space approach is applicable to the control systems which are
   a) Time variant b) Time invariant c) Both a) and b) d) None of these

16) The necessary and sufficient condition for full order state observer is that the system must be
   a) Completely observable b) Completely controllable
   c) Not observable d) Not controllable

17) The process of designing a closed loop control system is by
   a) Regulator b) Lag compensation
   c) Pole placement d) None of these

18) The eigenvalues of the matrix (A-BK) are called
   a) Open loop poles b) Open loop zeros c) Regulator poles d) None of these

19) In a system nonlinearity may be introduced by which of the following ?
   a) Saturation effect in amplifiers b) End positions in detectors
   c) Backlash in gears d) Any of the above

20) A control system with excessive noise, is likely to suffer from
   a) Saturation in amplifying stages b) Loss of gain
   c) Vibrations d) Oscillations

SLR-EP – 266

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
CONTROL SYSTEM – II

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data, if* ***necessary****.*
iii) ***Use*** *of non-programmable* ***calculator*** *is allowed.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) Derive the realization of lag or lead compensator for active circuit.

b) Explain the procedure for lag compensator using Bode Plot.

c) Design a lead compensator for a unity feedback system with OLTF $G(s) = \frac{10}{s(s+1)}$ to meet the following specifications.

i) ω_n = 3 rad/sec,

ii) $\xi = 0.5$.

d) Obtain state transition matrix for the following system matrix $A = \begin{bmatrix} 0 & -3 \\ 1 & -4 \end{bmatrix}$.

e) Determine the controllability and observability of the system with state model

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 10 & 5 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}.$$

3. Solve **any two** :

a) The forward path TF of a unity feedback control system is given by

$G(s) = \frac{K}{s(s^2+8s+17)}$. The system has to have percentage overshoot for unit step input $\leq$ 16% and steady state error for unit input $\leq {}^{17}/_{70}$ rad/sec. design a lag compensator using root locus. **10**

Set Q

b) Design a lead compensator for a unity feedback system with OLTF

$G(s) = \frac{K}{s(s+1)(s+5)}$ to satisfy the following specifications

a) Kv ≥ 50

b) Phase Margin $\geq 20°$. **10**

c) Find eigenvalues, eigenvectors and modal matrix for

$$A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}.$$ **10**

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) Derive the expression for full order state observer gain matrix using Transformation matrix method.

b) The closed-loop poles (eigenvalues) are to be located at s = –3, s = –7. Design a state variable feedback. Given that $A = \begin{bmatrix} 0 & 1 \\ -20 & -9 \end{bmatrix}$ and $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, C = [1 0].

c) Explain in short, friction and dead-zone nonlinearity.

d) Explain isocline method for construction of phase trajectories.

e) Derive the pulse transfer function of cascaded elements.

5. Solve **any two** : **(10×2=20)**

a) A system is described by $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & -6 \\ 1 & 0 & -11 \\ 0 & 1 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} r$

i) Compute k so that control law u = –kx + r(t), r(t) = reference input, places the control loop poles at $-2 \pm j\sqrt{12}, -6$.

ii) Design an observer such that the eigenvalues of the observer are located at $-2 \pm j\sqrt{12}, -6$.

b) Derive the describing function of saturation nonlinearity.

c) Check the stability of the sampled data control system represented by the equation using bilinear transformation $z^3 - 0.2z^2 - 0.25z + 0.05 = 0$.

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SLR-EP – 266

Seat No.	

Set **R**

T.E. (Electrical) (Part – II) Examination, 2016
CONTROL SYSTEM – II

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data, if* ***necessary****.*
iii) ***Use*** *of non-programmable* ***calculator*** *is allowed.*
iv) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
v) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answers : **20**

1) The necessary and sufficient condition for full order state observer is that the system must be
   a) Completely observable b) Completely controllable
   c) Not observable d) Not controllable
2) The process of designing a closed loop control system is by
   a) Regulator b) Lag compensation
   c) Pole placement d) None of these
3) The eigenvalues of the matrix (A-BK) are called
   a) Open loop poles b) Open loop zeros c) Regulator poles d) None of these
4) In a system nonlinearity may be introduced by which of the following ?
   a) Saturation effect in amplifiers b) End positions in detectors
   c) Backlash in gears d) Any of the above
5) A control system with excessive noise, is likely to suffer from
   a) Saturation in amplifying stages b) Loss of gain
   c) Vibrations d) Oscillations
6) A non-linear control system must have
   a) At least one nonlinear element b) Some of the elements as nonlinear
   c) Most of elements as nonlinear d) All the elements as nonlinear
7) Phase plane technique has the potential of analysing the nonlinear systems upto an order of
   a) One b) Two c) Three d) Higher order
8) For a unity feedback system, the origin of the s-plane is mapped in the z-plane by transformation $z = e^{sT}$ to which one of the following ?
   a) Origin b) 1+ j0 c) –1 + j0 d) 0 + j1

P.T.O.

9) The information contained in a signal is preserved in the sampled version if

a) $\omega_s = \omega_m$ b) $\omega_s = 0.5\omega_m$ c) $\omega_s = 0.1\omega_m$ d) $\omega_s = 2\omega_m$

10) Compared to continuous time system, the discrete system is
a) More accurate but less stable b) Less accurate but more stable
c) More accurate and more stable d) Less accurate and less stable

11) A cascade lead-compensator should have a
a) Pole nearer to the origin b) Zero nearer to the origin
c) Pole at origin d) Zero at origin

12) A cascade-lead compensator would
a) Reduce the settling time to the extent desired
b) Reduce the steady state error to the extent desired
c) Gives a suitable value of static error constant
d) None of these

13) What happens to the value of static error constant of a system provided with a cascade lead-compensator ?
a) No change b) Decreases
c) Increases a little d) Increases as desired

14) A cascade lag-compensator used in the LTI control system is known so, because
a) The response of the system lags the input
b) The input to the system should lag the response of the system
c) The angle contribution at the dominant closed-loop poles due to pole-zero pair of the compensator is negative
d) Due to the cascade lag-compensator, the root-loci of the original system shifts towards left

15) A cascaded lag-lead compensator used in linear control systems work as a
a) Low pass filter b) High pass filter c) Band stop filter d) Band pass filter

16) The effect of inserting a cascade lead compensator in the forward path of linear unity feedback control system on the speed of its transient response is that it
a) Increases b) Decreases
c) May increase or decreases d) Remains same

17) The TF of a phase-lead compensator is given by $G_c(S) = \frac{1+3Ts}{1+Ts}$ where T > 0.

The maximum phase shift provided by such a compensator is

a) $\pi/2$ b) $\pi/3$ c) $\pi/4$ d) $\pi/6$

18) For an n^{th} order system the state equations will be of the order of
a) n b) 1 c) n/2 d) (n + 1)/2

19) The state transition matrix for the system $\dot{X} = AX$ with initial state X(0) is
a) $(sI - A)^{-1}$ b) $e^{At}X(0)$
c) Laplace inverse of $[(sI - A)^{-1}]$ d) Laplace inverse of $[(sI - A)^{-1}]X(0)$

20) The state space approach is applicable to the control systems which are
a) Time variant b) Time invariant c) Both a) and b) d) None of these

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SLR-EP – 266

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
CONTROL SYSTEM – II

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data, if* ***necessary****.*
iii) ***Use*** *of non-programmable* ***calculator*** *is allowed.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) Derive the realization of lag or lead compensator for active circuit.

b) Explain the procedure for lag compensator using Bode Plot.

c) Design a lead compensator for a unity feedback system with OLTF $G(s) = \frac{10}{s(s+1)}$ to meet the following specifications.

i) ω_n = 3 rad/sec,

ii) $\xi = 0.5$.

d) Obtain state transition matrix for the following system matrix $A = \begin{bmatrix} 0 & -3 \\ 1 & -4 \end{bmatrix}$.

e) Determine the controllability and observability of the system with state model

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 10 & 5 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}.$$

3. Solve **any two** :

a) The forward path TF of a unity feedback control system is given by

$G(s) = \frac{K}{s(s^2+8s+17)}$. The system has to have percentage overshoot for unit step input $\leq 16\%$ and steady state error for unit input $\leq {}^{17}/_{70}$ rad/sec. design a lag compensator using root locus. **10**

b) Design a lead compensator for a unity feedback system with OLTF

$G(s) = \frac{K}{s(s+1)(s+5)}$ to satisfy the following specifications

a) Kv ≥ 50

b) Phase Margin $\geq 20°$. **10**

c) Find eigenvalues, eigenvectors and modal matrix for

$$A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}.$$ **10**

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) Derive the expression for full order state observer gain matrix using Transformation matrix method.

b) The closed-loop poles (eigenvalues) are to be located at s = –3, s = –7. Design a state variable feedback. Given that $A = \begin{bmatrix} 0 & 1 \\ -20 & -9 \end{bmatrix}$ and $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, C = [1 0].

c) Explain in short, friction and dead-zone nonlinearity.

d) Explain isocline method for construction of phase trajectories.

e) Derive the pulse transfer function of cascaded elements.

5. Solve **any two** : **(10×2=20)**

a) A system is described by $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & -6 \\ 1 & 0 & -11 \\ 0 & 1 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} r$

i) Compute k so that control law u = –kx + r(t), r(t) = reference input, places the control loop poles at $-2 \pm j\sqrt{12}, -6$.

ii) Design an observer such that the eigenvalues of the observer are located at $-2 \pm j\sqrt{12}, -6$.

b) Derive the describing function of saturation nonlinearity.

c) Check the stability of the sampled data control system represented by the equation using bilinear transformation $z^3 - 0.2z^2 - 0.25z + 0.05 = 0$.

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Seat No.	

Set **S**

T.E. (Electrical) (Part – II) Examination, 2016
CONTROL SYSTEM – II

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data, if* ***necessary****.*
iii) ***Use*** *of non-programmable* ***calculator*** *is allowed.*
iv) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
v) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answers : **20**

1) The effect of inserting a cascade lead compensator in the forward path of linear unity feedback control system on the speed of its transient response is that it
   a) Increases b) Decreases
   c) May increase or decreases d) Remains same

2) The TF of a phase-lead compensator is given by $G_c(S) = \frac{1+3Ts}{1+Ts}$ where T > 0.
   The maximum phase shift provided by such a compensator is
   a) $\pi/2$ b) $\pi/3$ c) $\pi/4$ d) $\pi/6$

3) For an n^{th} order system the state equations will be of the order of
   a) n b) 1 c) n/2 d) (n + 1)/2

4) The state transition matrix for the system $\dot{X}$ = AX with initial state X(0) is
   a) $(sI - A)^{-1}$ b) $e^{At}X(0)$
   c) Laplace inverse of $[(sI - A)^{-1}]$ d) Laplace inverse of $[(sI - A)^{-1}]$ X(0)

5) The state space approach is applicable to the control systems which are
   a) Time variant b) Time invariant c) Both a) and b) d) None of these

6) The necessary and sufficient condition for full order state observer is that the system must be
   a) Completely observable b) Completely controllable
   c) Not observable d) Not controllable

7) The process of designing a closed loop control system is by
   a) Regulator b) Lag compensation
   c) Pole placement d) None of these

P.T.O.

8) The eigenvalues of the matrix (A-BK) are called
   a) Open loop poles b) Open loop zeros c) Regulator poles d) None of these
9) In a system nonlinearity may be introduced by which of the following ?
   a) Saturation effect in amplifiers b) End positions in detectors
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10) A control system with excessive noise, is likely to suffer from
   a) Saturation in amplifying stages b) Loss of gain
   c) Vibrations d) Oscillations
11) A non-linear control system must have
   a) At least one nonlinear element b) Some of the elements as nonlinear
   c) Most of elements as nonlinear d) All the elements as nonlinear
12) Phase plane technique has the potential of analysing the nonlinear systems upto an order of
   a) One b) Two c) Three d) Higher order
13) For a unity feedback system, the origin of the s-plane is mapped in the z-plane by transformation $z = e^{sT}$ to which one of the following ?
   a) Origin b) 1+ j0 c) –1 + j0 d) 0 + j1
14) The information contained in a signal is preserved in the sampled version if
   a) $\omega_s = \omega_m$ b) $\omega_s = 0.5\omega_m$ c) $\omega_s = 0.1\omega_m$ d) $\omega_s = 2\omega_m$
15) Compared to continuous time system, the discrete system is
   a) More accurate but less stable b) Less accurate but more stable
   c) More accurate and more stable d) Less accurate and less stable
16) A cascade lead-compensator should have a
   a) Pole nearer to the origin b) Zero nearer to the origin
   c) Pole at origin d) Zero at origin
17) A cascade-lead compensator would
   a) Reduce the settling time to the extent desired
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18) What happens to the value of static error constant of a system provided with a cascade lead-compensator ?
   a) No change b) Decreases
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19) A cascade lag-compensator used in the LTI control system is known so, because
   a) The response of the system lags the input
   b) The input to the system should lag the response of the system
   c) The angle contribution at the dominant closed-loop poles due to pole-zero pair of the compensator is negative
   d) Due to the cascade lag-compensator, the root-loci of the original system shifts towards left
20) A cascaded lag-lead compensator used in linear control systems work as a
   a) Low pass filter b) High pass filter c) Band stop filter d) Band pass filter

SLR-EP – 266

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
CONTROL SYSTEM – II

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data, if* ***necessary****.*
iii) ***Use*** *of non-programmable* ***calculator*** *is allowed.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) Derive the realization of lag or lead compensator for active circuit.

b) Explain the procedure for lag compensator using Bode Plot.

c) Design a lead compensator for a unity feedback system with OLTF $G(s) = \frac{10}{s(s+1)}$ to meet the following specifications.

i) ω_n = 3 rad/sec,

ii) $\xi = 0.5$.

d) Obtain state transition matrix for the following system matrix $A = \begin{bmatrix} 0 & -3 \\ 1 & -4 \end{bmatrix}$.

e) Determine the controllability and observability of the system with state model

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 10 & 5 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}.$$

3. Solve **any two** :

a) The forward path TF of a unity feedback control system is given by

$G(s) = \frac{K}{s(s^2 + 8s + 17)}$. The system has to have percentage overshoot for unit step input $\leq$ 16% and steady state error for unit input $\leq {}^{17}/_{70}$ rad/sec. design a lag compensator using root locus. **10**

b) Design a lead compensator for a unity feedback system with OLTF

$G(s) = \frac{K}{s(s+1)(s+5)}$ to satisfy the following specifications

a) Kv ≥ 50

b) Phase Margin $\geq 20°$. **10**

c) Find eigenvalues, eigenvectors and modal matrix for

$$A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}.$$ **10**

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) Derive the expression for full order state observer gain matrix using Transformation matrix method.

b) The closed-loop poles (eigenvalues) are to be located at s = –3, s = –7. Design a state variable feedback. Given that $A = \begin{bmatrix} 0 & 1 \\ -20 & -9 \end{bmatrix}$ and $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, C = [1 0].

c) Explain in short, friction and dead-zone nonlinearity.

d) Explain isocline method for construction of phase trajectories.

e) Derive the pulse transfer function of cascaded elements.

5. Solve **any two** : **(10×2=20)**

a) A system is described by $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & -6 \\ 1 & 0 & -11 \\ 0 & 1 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} r$

i) Compute k so that control law u = –kx + r(t), r(t) = reference input, places the control loop poles at $-2 \pm j\sqrt{12}, -6$.

ii) Design an observer such that the eigenvalues of the observer are located at $-2 \pm j\sqrt{12}, -6$.

b) Derive the describing function of saturation nonlinearity.

c) Check the stability of the sampled data control system represented by the equation using bilinear transformation $z^3 - 0.2z^2 - 0.25z + 0.05 = 0$.

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SLR-EP – 267

Seat No.	

Set P

T.E. (Electrical Engineering) Part – II Examination, 2016
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data ***if necessary****.*
3) Figures to the ***right*** *indicates full marks.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct option. **20**

1) When microcontroller executes some arithmetic operation then the flag bits of which register are affected ?
a) PSW b) SP c) DPTR d) PC

2) If we push data onto the stack then stack pointer
a) Increases with every push b) Decreases with every push
c) Both a) and b) d) None of the above

3) How many bytes of bit addressable memory is present in 8051 based microcontroller ?
a) 8 bytes b) 32 bytes c) 16 bytes d) 128 bytes

4) Which interrupt has highest priority ?
a) INTR b) TRAP c) RST 6.5 d) None of the above

5) In 8085 name the 16 bit register
a) SP b) PC c) Both a) and b) d) None of the above

6) What is SIM ?
a) Select Interrupt Mask b) Sorting Interrupt Mask
c) Set Interrupt Mask d) None of the above

7) What does microprocessor speed depends on ?
a) Clock b) Data bus width
c) Address bus width d) None of the above

P.T.O.

8) CPU removes the _____ signal to complete memory write operation.
a) Read b) Write c) Both a) and b) d) None of these

9) Which of the following is not a data copy/transfer instruction ?
a) MOV b) PUSH c) DAS d) POP

10) The instruction that are used for reading an input port and writing an output port respectively are
a) MOV, XCHG b) MOV, IN c) IN, MOV d) IN, OUT

11) Highest priority interrupt in 8051 is
a) INT1 b) TF0 c) INT0 d) TF1

12) Write control signal function is for
a) P3.8 b) P3.3 c) P3.6 d) P3.1

13) Which bits are set to generate serial port interrupt ?
a) IE b) RI, IE c) IP, TI d) RI, TI

14) When 8051 is resetted, all the ports are configured as ?
a) inputs b) outputs
c) inputs or outputs d) inputs and outputs

15) How many timers are available in 8051 ?
a) two 8 bit b) two 16 bit
c) one 8 bit and one 16 bit d) one 16 bit

16) To change the triggering level of the interrupt, SFR used
a) IE and TCON b) TCON only
c) TMOD d) All of the above

17) If an 8051 based system is controlled 18 MHz crystal frequency, then timer clock frequency and period respectively are
a) 1 MHz, 1μs b) 921.6 KHz, 1.08 μs
c) 1.5 MHz, 0.667 μs d) 2 MHz, 0.5 μs

18) While interfacing 8051 with LCD, _____ line will instruct the LCD that 8051 is sending the data.
a) DB0 b) RW c) EN d) RS

19) _____ address lines are required for accessing the data if memory capacity is 1KB bytes.
a) 9 b) 10 c) 8 d) 11

20) Number of steps to rotate the stepper motor for 360° at a step angle of 1.8 degree is
a) 200 b) 1.8 c) 3 d) 1.1

_____

SLR-EP – 267

Seat No.	

T.E. (Electrical Engineering) Part – II Examination, 2016
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data ***if necessary****.*
3) Figures to the ***right*** *indicates full marks.*

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Explain pins of 8085.
   2) Write a ALP using 8051 to make addition of two decimal numbers.
   3) Explain different addressing modes of 8085.
   4) Explain data memory and program memory organization of 8051.
   5) Explain various SFRs related with timer.

3. Solve **any two** : **(2×10=20)**
   1) Write ALP using 8085 to arrange an array of 10 bytes in descending order.
   2) Explain in detail addressing modes in 8051 with instructions.
   3) A) Explain control and status signal of 8085.
      B) With suitable example explain following instruction :
      a) SHLD b) DAD c) PCHL d) DAA e) MVI

SECTION – II

4. Solve **any four** : **20**
   a) Draw and explain the port 1 structure of 8051.
   b) Draw the interfacing diagram of relay with 8051. Write an ALP to toggle the relay continuously every 500 ms.
   c) Draw and explain interfacing of RTC DS12887 to 8051.
   d) Draw the interfacing diagram of 8051 with 4KB ROM.
   e) Write an ALP to generate square wave using DAC 0808.

5. Solve **any two** : **(2×10=20)**
   a) Draw the interfacing diagram for 16 × 2 LCD display with 8051 and write an ALP to display “Welcome” on LCD display.
   b) Explain interrupt structure of 8051. Explain various SFRs related with interrupt to fix the priority and to modify triggering.
   c) Draw the interfacing diagram of stepper motor with 8051. Write an ALP to rotate the stepper motor in clockwise direction.

Set P

Set P

SLR-EP – 267

Seat No.	

Set Q

T.E. (Electrical Engineering) Part – II Examination, 2016
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
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5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct option. **20**

1) To change the triggering level of the interrupt, SFR used
   a) IE and TCON b) TCON only
   c) TMOD d) All of the above

2) If an 8051 based system is controlled 18 MHz crystal frequency, then timer clock frequency and period respectively are
   a) 1 MHz, 1μs b) 921.6 KHz, 1.08 μs
   c) 1.5 MHz, 0.667 μs d) 2 MHz, 0.5 μs

3) While interfacing 8051 with LCD, _____ line will instruct the LCD that 8051 is sending the data.
   a) DB0 b) RW c) EN d) RS

4) _____ address lines are required for accessing the data if memory capacity is 1KB bytes.
   a) 9 b) 10 c) 8 d) 11

5) Number of steps to rotate the stepper motor for 360° at a step angle of 1.8 degree is
   a) 200 b) 1.8 c) 3 d) 1.1

6) When microcontroller executes some arithmetic operation then the flag bits of which register are affected ?
   a) PSW b) SP c) DPTR d) PC

P.T.O.

7) If we push data onto the stack then stack pointer
   a) Increases with every push b) Decreases with every push
   c) Both a) and b) d) None of the above

8) How many bytes of bit addressable memory is present in 8051 based microcontroller ?
   a) 8 bytes b) 32 bytes c) 16 bytes d) 128 bytes

9) Which interrupt has highest priority ?
   a) INTR b) TRAP c) RST 6.5 d) None of the above

10) In 8085 name the 16 bit register
   a) SP b) PC c) Both a) and b) d) None of the above

11) What is SIM ?
   a) Select Interrupt Mask b) Sorting Interrupt Mask
   c) Set Interrupt Mask d) None of the above

12) What does microprocessor speed depends on ?
   a) Clock b) Data bus width
   c) Address bus width d) None of the above

13) CPU removes the _____ signal to complete memory write operation.
   a) Read b) Write c) Both a) and b) d) None of these

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   a) MOV b) PUSH c) DAS d) POP

15) The instruction that are used for reading an input port and writing an output port respectively are
   a) MOV, XCHG b) MOV, IN c) IN, MOV d) IN, OUT

16) Highest priority interrupt in 8051 is
   a) INT1 b) TF0 c) INT0 d) TF1

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   a) P3.8 b) P3.3 c) P3.6 d) P3.1

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   a) inputs b) outputs
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SLR-EP – 267

Seat No.	

T.E. (Electrical Engineering) Part – II Examination, 2016
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
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SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Explain pins of 8085.
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   3) A) Explain control and status signal of 8085.
      B) With suitable example explain following instruction :
      a) SHLD b) DAD c) PCHL d) DAA e) MVI

SECTION – II

4. Solve **any four** : **20**
   a) Draw and explain the port 1 structure of 8051.
   b) Draw the interfacing diagram of relay with 8051. Write an ALP to toggle the relay continuously every 500 ms.
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   d) Draw the interfacing diagram of 8051 with 4KB ROM.
   e) Write an ALP to generate square wave using DAC 0808.

5. Solve **any two** : **(2×10=20)**
   a) Draw the interfacing diagram for 16 × 2 LCD display with 8051 and write an ALP to display “Welcome” on LCD display.
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   c) Draw the interfacing diagram of stepper motor with 8051. Write an ALP to rotate the stepper motor in clockwise direction.

Set Q

Set Q

SLR-EP – 267

Seat No.	

Set R

T.E. (Electrical Engineering) Part – II Examination, 2016
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
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5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct option. **20**

1) Highest priority interrupt in 8051 is
a) INT1 b) TF0 c) INT0 d) TF1

2) Write control signal function is for
a) P3.8 b) P3.3 c) P3.6 d) P3.1

3) Which bits are set to generate serial port interrupt ?
a) IE b) RI, IE c) IP, TI d) RI, TI

4) When 8051 is resetted, all the ports are configured as ?
a) inputs b) outputs
c) inputs or outputs d) inputs and outputs

5) How many timers are available in 8051 ?
a) two 8 bit b) two 16 bit
c) one 8 bit and one 16 bit d) one 16 bit

6) To change the triggering level of the interrupt, SFR used
a) IE and TCON b) TCON only
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7) If an 8051 based system is controlled 18 MHz crystal frequency, then timer clock frequency and period respectively are
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P.T.O.

8) While interfacing 8051 with LCD, _____ line will instruct the LCD that 8051 is sending the data.
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9) _____ address lines are required for accessing the data if memory capacity is 1KB bytes.
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10) Number of steps to rotate the stepper motor for 360° at a step angle of 1.8 degree is
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11) When microcontroller executes some arithmetic operation then the flag bits of which register are affected ?
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12) If we push data onto the stack then stack pointer
a) Increases with every push b) Decreases with every push
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13) How many bytes of bit addressable memory is present in 8051 based microcontroller ?
a) 8 bytes b) 32 bytes c) 16 bytes d) 128 bytes

14) Which interrupt has highest priority ?
a) INTR b) TRAP c) RST 6.5 d) None of the above

15) In 8085 name the 16 bit register
a) SP b) PC c) Both a) and b) d) None of the above

16) What is SIM ?
a) Select Interrupt Mask b) Sorting Interrupt Mask
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17) What does microprocessor speed depends on ?
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a) MOV, XCHG b) MOV, IN c) IN, MOV d) IN, OUT

_____

SLR-EP – 267

Seat No.	

T.E. (Electrical Engineering) Part – II Examination, 2016
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
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SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Explain pins of 8085.
   2) Write a ALP using 8051 to make addition of two decimal numbers.
   3) Explain different addressing modes of 8085.
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   5) Explain various SFRs related with timer.

3. Solve **any two** : **(2×10=20)**
   1) Write ALP using 8085 to arrange an array of 10 bytes in descending order.
   2) Explain in detail addressing modes in 8051 with instructions.
   3) A) Explain control and status signal of 8085.
      B) With suitable example explain following instruction :
      a) SHLD b) DAD c) PCHL d) DAA e) MVI

SECTION – II

4. Solve **any four** : **20**
   a) Draw and explain the port 1 structure of 8051.
   b) Draw the interfacing diagram of relay with 8051. Write an ALP to toggle the relay continuously every 500 ms.
   c) Draw and explain interfacing of RTC DS12887 to 8051.
   d) Draw the interfacing diagram of 8051 with 4KB ROM.
   e) Write an ALP to generate square wave using DAC 0808.

5. Solve **any two** : **(2×10=20)**
   a) Draw the interfacing diagram for 16 × 2 LCD display with 8051 and write an ALP to display “Welcome” on LCD display.
   b) Explain interrupt structure of 8051. Explain various SFRs related with interrupt to fix the priority and to modify triggering.
   c) Draw the interfacing diagram of stepper motor with 8051. Write an ALP to rotate the stepper motor in clockwise direction.

Set R

Set R

SLR-EP – 267

Seat No.	

Set S

T.E. (Electrical Engineering) Part – II Examination, 2016
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
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5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct option. **20**

1) What is SIM ?
a) Select Interrupt Mask b) Sorting Interrupt Mask
c) Set Interrupt Mask d) None of the above

2) What does microprocessor speed depends on ?
a) Clock b) Data bus width
c) Address bus width d) None of the above

3) CPU removes the _____ signal to complete memory write operation.
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4) Which of the following is not a data copy/transfer instruction ?
a) MOV b) PUSH c) DAS d) POP

5) The instruction that are used for reading an input port and writing an output port respectively are
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6) Highest priority interrupt in 8051 is
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7) Write control signal function is for
a) P3.8 b) P3.3 c) P3.6 d) P3.1

8) Which bits are set to generate serial port interrupt ?
a) IE b) RI, IE c) IP, TI d) RI, TI

P.T.O.

9) When 8051 is resetted, all the ports are configured as ?
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11) To change the triggering level of the interrupt, SFR used
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12) If an 8051 based system is controlled 18 MHz crystal frequency, then timer clock frequency and period respectively are
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18) How many bytes of bit addressable memory is present in 8051 based microcontroller ?
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19) Which interrupt has highest priority ?
   a) INTR b) TRAP c) RST 6.5 d) None of the above

20) In 8085 name the 16 bit register
   a) SP b) PC c) Both a) and b) d) None of the above

_____

SLR-EP – 267

Seat No.	

T.E. (Electrical Engineering) Part – II Examination, 2016
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
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3) Figures to the ***right*** *indicates full marks.*

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Explain pins of 8085.
   2) Write a ALP using 8051 to make addition of two decimal numbers.
   3) Explain different addressing modes of 8085.
   4) Explain data memory and program memory organization of 8051.
   5) Explain various SFRs related with timer.

3. Solve **any two** : **(2×10=20)**
   1) Write ALP using 8085 to arrange an array of 10 bytes in descending order.
   2) Explain in detail addressing modes in 8051 with instructions.
   3) A) Explain control and status signal of 8085.
      B) With suitable example explain following instruction :
      a) SHLD b) DAD c) PCHL d) DAA e) MVI

SECTION – II

4. Solve **any four** : **20**
   a) Draw and explain the port 1 structure of 8051.
   b) Draw the interfacing diagram of relay with 8051. Write an ALP to toggle the relay continuously every 500 ms.
   c) Draw and explain interfacing of RTC DS12887 to 8051.
   d) Draw the interfacing diagram of 8051 with 4KB ROM.
   e) Write an ALP to generate square wave using DAC 0808.

5. Solve **any two** : **(2×10=20)**
   a) Draw the interfacing diagram for 16 × 2 LCD display with 8051 and write an ALP to display “Welcome” on LCD display.
   b) Explain interrupt structure of 8051. Explain various SFRs related with interrupt to fix the priority and to modify triggering.
   c) Draw the interfacing diagram of stepper motor with 8051. Write an ALP to rotate the stepper motor in clockwise direction.

Set S

Set S

SLR-EP – 268

Seat No.	

Set **P**

T.E. (Part – II) (Electrical) Examination, 2016
POWER ELECTRONICS

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) As base width of npn and pnp transistors reduce, the current gain increases and anode current of SCR
   a) Increases b) Decreases
   c) Remains same d) None of the above

2) The angle at which SCR turns off is called
   a) On angle b) Conduction angle
   c) Firing angle d) Extinction angle

3) Which one is greater of the following ?
   a) Leaking current b) Holding current
   c) Latching current d) None

4) TRIAC and DIAC are
   a) Bi-directional devices b) Unidirectional devices
   c) Can't decide d) None of these

5) IGBT is _____ device.
   a) Current controlled b) Voltage controlled
   c) Not controlled d) None

6) Which circuit gives inherent freewheeling action ?
   a) Half wave converter b) Semi converter
   c) Full converter d) None

7) Converters use _____ to control output voltage.
   a) Phase angle control b) Natural control
   c) Diode d) None

8) For a 3-phase half wave converter, firing angle is measured from

a) ωt b) $\omega t = \frac{\pi}{6}$ c) $\omega t = \frac{\pi}{3}$ d) None

9) A class D chopper
   a) Can operate in first quadrant only
   b) Can operate in second quadrant only
   c) Can operate in first or fourth quadrant
   d) Can operate in all quadrant

10) In pulse width modulation of chopper
   a) T is kept constant and T_{ON} is varied
   b) T_{ON} is kept constant and T is varied
   c) Both T and T_{ON} are varied
   d) Either T or T_{ON} is varied

11) The commutation method, in an inverter is
   a) Line commutation b) Forced commutation
   c) Either a) or b) d) None of the above

12) For a duty cycle of 40%, the output DC for step down chopper is if input dc is 200 V
   a) 80 V b) 800 V c) 8 V d) .8 V

13) The two transistor model of a thyristor consists of two transistor
   a) NPN and PNP b) Both NPN c) Both PNP d) None of the above

14) The rms value of output voltage in a 1-phase half bridge inverter is
   a) V/2 b) V c) 2 V d) V/3

15) The output voltage of AC regulators can be
   a) Variable b) Constant
   c) Either of a) or b) d) None of these

16) Power electronics converters used to
   a) Control the speed b) Control the power
   c) Control the current d) None

17) The line to line voltage output of a 180 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

18) The phase voltage output of a 120 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

19) The phase voltage output of a 180 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

20) The minimum gate current which can turn on SCR is called
   a) Trigger current b) Holding current
   c) Junction current d) Break over current

SLR-EP – 268

Seat No.	

T.E. (Part – II) (Electrical) Examination, 2016
POWER ELECTRONICS

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
   a) Explain the two transistor analogy of SCR. Explain regenerative current process to conduct the SCR.
   b) Explain the working principle of Depletion p-channel MOSFET with V-I and transfer characteristics.
   c) How GTO will works and explain ?
   d) Explain 1-single phase half controlled bridge rectifier with RL load. Draw the output voltage wave for α = 120 degrees and derive the output voltage and current equations.
   e) What is meant by commutation ? Explain class D commutation with proper wave form.

3. Attempt **any two** questions : **(2×10=20)**
   a) Draw the static V-I characteristics of SCR. Explain effect of gate current on anode current.
   b) Explain the two quadrant operation of 1-phase fully controlled bridge rectifier with RL load. Draw the output voltage and current wave form for α = 0 degrees, α = 90 degrees and α = 120 degrees. Derive the V_L and I_L.
   c) A single –phase full-converter, connected to 230 V, 50 Hz, is feeding a load R = 10 Ω in series with a large inductance that makes the load current ripple free. For a firing angle of 45°, calculate :
      i) Average load voltage (V_L)
      ii) Average load current
      iii) RMS output voltage, RMS output current
      iv) FF, RF
      v) Output DC power (P_{DC}), Output AC Power (P_{AC}).

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

   a) Explain the four quadrant operation of chopper.

   b) Explain the voltage control and harmonics analysis of inverter.

   c) What are the types of AC controllers ? Explain the phase angle control regulator.

   d) Explain the application power electronics in HVDC transmission (block diagram and basic principle).

   e) An on-off type ac regulator is operating with a resistive load of R = 10 ohms and the RMS voltage is 203 V. The controller remains on for 40 cycles and is off for 60 cycles. Determine :
      i) RMS load voltage
      ii) Input power factor.

5. Attempt **any two** questions : **(2×10=20)**

   a) Draw a neat sketch and explain the 180 degrees conduction mode of 3-phase inverter and derive the line-line voltage and phase voltage expressions.

   b) Draw the neat wave form and explain the operation of Buck converter and derive the expression for peak to peak load voltage and load current.

   c) A single-phase full bridge inverter has a resistive load of R = 2.4 ohms and the DC input voltage V = 48 V. Determine :
      i) RMS output voltage at the fundamental frequency
      ii) The output power
      iii) The average and peak currents of each transistor
      iv) The peak reverse blocking voltage of each transistor
      v) The total harmonic distortion
      vi) Distortion factor
      vii) The harmonic factor and distortion factor at the lowest order harmonic.

SLR-EP – 268

Seat No.	

Set **Q**

T.E. (Part – II) (Electrical) Examination, 2016
POWER ELECTRONICS

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Power electronics converters used to
   a) Control the speed b) Control the power
   c) Control the current d) None

2) The line to line voltage output of a 180 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

3) The phase voltage output of a 120 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

4) The phase voltage output of a 180 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

5) The minimum gate current which can turn on SCR is called
   a) Trigger current b) Holding current
   c) Junction current d) Break over current

6) As base width of npn and pnp transistors reduce, the current gain increases and anode current of SCR
   a) Increases b) Decreases
   c) Remains same d) None of the above

7) The angle at which SCR turns off is called
   a) On angle b) Conduction angle
   c) Firing angle d) Extinction angle

8) Which one is greater of the following ?
   a) Leaking current b) Holding current
   c) Latching current d) None

P.T.O.

9) TRIAC and DIAC are
   a) Bi-directional devices b) Unidirectional devices
   c) Can't decide d) None of these

10) IGBT is _____ device.
   a) Current controlled b) Voltage controlled
   c) Not controlled d) None

11) Which circuit gives inherent freewheeling action ?
   a) Half wave converter b) Semi converter
   c) Full converter d) None

12) Converters use _____ to control output voltage.
   a) Phase angle control b) Natural control
   c) Diode d) None

13) For a 3-phase half wave converter, firing angle is measured from
   a) ωt b) $\omega t = \frac{\pi}{6}$ c) $\omega t = \frac{\pi}{3}$ d) None

14) A class D chopper
   a) Can operate in first quadrant only
   b) Can operate in second quadrant only
   c) Can operate in first or fourth quadrant
   d) Can operate in all quadrant

15) In pulse width modulation of chopper
   a) T is kept constant and T_{ON} is varied
   b) T_{ON} is kept constant and T is varied
   c) Both T and T_{ON} are varied
   d) Either T or T_{ON} is varied

16) The commutation method, in an inverter is
   a) Line commutation b) Forced commutation
   c) Either a) or b) d) None of the above

17) For a duty cycle of 40%, the output DC for step down chopper is if input dc is 200 V
   a) 80 V b) 800 V c) 8 V d) .8 V

18) The two transistor model of a thyristor consists of two transistor
   a) NPN and PNP b) Both NPN c) Both PNP d) None of the above

19) The rms value of output voltage in a 1-phase half bridge inverter is
   a) V/2 b) V c) 2 V d) V/3

20) The output voltage of AC regulators can be
   a) Variable b) Constant
   c) Either of a) or b) d) None of these

_____

SLR-EP – 268

Seat No.	

T.E. (Part – II) (Electrical) Examination, 2016
POWER ELECTRONICS

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
   a) Explain the two transistor analogy of SCR. Explain regenerative current process to conduct the SCR.
   b) Explain the working principle of Depletion p-channel MOSFET with V-I and transfer characteristics.
   c) How GTO will works and explain ?
   d) Explain 1-single phase half controlled bridge rectifier with RL load. Draw the output voltage wave for α = 120 degrees and derive the output voltage and current equations.
   e) What is meant by commutation ? Explain class D commutation with proper wave form.

3. Attempt **any two** questions : **(2×10=20)**
   a) Draw the static V-I characteristics of SCR. Explain effect of gate current on anode current.
   b) Explain the two quadrant operation of 1-phase fully controlled bridge rectifier with RL load. Draw the output voltage and current wave form for α = 0 degrees, α = 90 degrees and α = 120 degrees. Derive the V_L and I_L.
   c) A single –phase full-converter, connected to 230 V, 50 Hz, is feeding a load R = 10 Ω in series with a large inductance that makes the load current ripple free. For a firing angle of 45°, calculate :
      i) Average load voltage (V_L)
      ii) Average load current
      iii) RMS output voltage, RMS output current
      iv) FF, RF
      v) Output DC power (P_{DC}), Output AC Power (P_{AC}).

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

   a) Explain the four quadrant operation of chopper.

   b) Explain the voltage control and harmonics analysis of inverter.

   c) What are the types of AC controllers ? Explain the phase angle control regulator.

   d) Explain the application power electronics in HVDC transmission (block diagram and basic principle).

   e) An on-off type ac regulator is operating with a resistive load of R = 10 ohms and the RMS voltage is 203 V. The controller remains on for 40 cycles and is off for 60 cycles. Determine :
      i) RMS load voltage
      ii) Input power factor.

5. Attempt **any two** questions : **(2×10=20)**

   a) Draw a neat sketch and explain the 180 degrees conduction mode of 3-phase inverter and derive the line-line voltage and phase voltage expressions.

   b) Draw the neat wave form and explain the operation of Buck converter and derive the expression for peak to peak load voltage and load current.

   c) A single-phase full bridge inverter has a resistive load of R = 2.4 ohms and the DC input voltage V = 48 V. Determine :
      i) RMS output voltage at the fundamental frequency
      ii) The output power
      iii) The average and peak currents of each transistor
      iv) The peak reverse blocking voltage of each transistor
      v) The total harmonic distortion
      vi) Distortion factor
      vii) The harmonic factor and distortion factor at the lowest order harmonic.

SLR-EP – 268

Seat No.	

Set **R**

T.E. (Part – II) (Electrical) Examination, 2016
POWER ELECTRONICS

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The commutation method, in an inverter is
   a) Line commutation b) Forced commutation
   c) Either a) or b) d) None of the above

2) For a duty cycle of 40%, the output DC for step down chopper is if input dc is 200 V
   a) 80 V b) 800 V c) 8 V d) .8 V

3) The two transistor model of a thyristor consists of two transistor
   a) NPN and PNP b) Both NPN c) Both PNP d) None of the above

4) The rms value of output voltage in a 1-phase half bridge inverter is
   a) V/2 b) V c) 2 V d) V/3

5) The output voltage of AC regulators can be
   a) Variable b) Constant
   c) Either of a) or b) d) None of these

6) Power electronics converters used to
   a) Control the speed b) Control the power
   c) Control the current d) None

7) The line to line voltage output of a 180 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

8) The phase voltage output of a 120 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

9) The phase voltage output of a 180 degrees conduction of inverter having
   a) Step wave b) Squire wave
   c) Quasi square d) Wave in 6 steps

P.T.O.

10) The minimum gate current which can turn on SCR is called
a) Trigger current b) Holding current
c) Junction current d) Break over current

11) As base width of npn and pnp transistors reduce, the current gain increases and anode current of SCR
a) Increases b) Decreases
c) Remains same d) None of the above

12) The angle at which SCR turns off is called
a) On angle b) Conduction angle
c) Firing angle d) Extinction angle

13) Which one is greater of the following ?
a) Leaking current b) Holding current
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14) TRIAC and DIAC are
a) Bi-directional devices b) Unidirectional devices
c) Can't decide d) None of these

15) IGBT is _____ device.
a) Current controlled b) Voltage controlled
c) Not controlled d) None

16) Which circuit gives inherent freewheeling action ?
a) Half wave converter b) Semi converter
c) Full converter d) None

17) Converters use _____ to control output voltage.
a) Phase angle control b) Natural control
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18) For a 3-phase half wave converter, firing angle is measured from
a) ωt b) $\omega t = \frac{\pi}{6}$ c) $\omega t = \frac{\pi}{3}$ d) None

19) A class D chopper
a) Can operate in first quadrant only
b) Can operate in second quadrant only
c) Can operate in first or fourth quadrant
d) Can operate in all quadrant

20) In pulse width modulation of chopper
a) T is kept constant and T_{ON} is varied
b) T_{ON} is kept constant and T is varied
c) Both T and T_{ON} are varied
d) Either T or T_{ON} is varied

_____

SLR-EP – 268

Seat No.	

T.E. (Part – II) (Electrical) Examination, 2016
POWER ELECTRONICS

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
   a) Explain the two transistor analogy of SCR. Explain regenerative current process to conduct the SCR.
   b) Explain the working principle of Depletion p-channel MOSFET with V-I and transfer characteristics.
   c) How GTO will works and explain ?
   d) Explain 1-single phase half controlled bridge rectifier with RL load. Draw the output voltage wave for α = 120 degrees and derive the output voltage and current equations.
   e) What is meant by commutation ? Explain class D commutation with proper wave form.

3. Attempt **any two** questions : **(2×10=20)**
   a) Draw the static V-I characteristics of SCR. Explain effect of gate current on anode current.
   b) Explain the two quadrant operation of 1-phase fully controlled bridge rectifier with RL load. Draw the output voltage and current wave form for α = 0 degrees, α = 90 degrees and α = 120 degrees. Derive the V_L and I_L.
   c) A single –phase full-converter, connected to 230 V, 50 Hz, is feeding a load R = 10 Ω in series with a large inductance that makes the load current ripple free. For a firing angle of 45°, calculate :
      i) Average load voltage (V_L)
      ii) Average load current
      iii) RMS output voltage, RMS output current
      iv) FF, RF
      v) Output DC power (P_{DC}), Output AC Power (P_{AC}).

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

   a) Explain the four quadrant operation of chopper.

   b) Explain the voltage control and harmonics analysis of inverter.

   c) What are the types of AC controllers ? Explain the phase angle control regulator.

   d) Explain the application power electronics in HVDC transmission (block diagram and basic principle).

   e) An on-off type ac regulator is operating with a resistive load of R = 10 ohms and the RMS voltage is 203 V. The controller remains on for 40 cycles and is off for 60 cycles. Determine :
      i) RMS load voltage
      ii) Input power factor.

5. Attempt **any two** questions : **(2×10=20)**

   a) Draw a neat sketch and explain the 180 degrees conduction mode of 3-phase inverter and derive the line-line voltage and phase voltage expressions.

   b) Draw the neat wave form and explain the operation of Buck converter and derive the expression for peak to peak load voltage and load current.

   c) A single-phase full bridge inverter has a resistive load of R = 2.4 ohms and the DC input voltage V = 48 V. Determine :
      i) RMS output voltage at the fundamental frequency
      ii) The output power
      iii) The average and peak currents of each transistor
      iv) The peak reverse blocking voltage of each transistor
      v) The total harmonic distortion
      vi) Distortion factor
      vii) The harmonic factor and distortion factor at the lowest order harmonic.

SLR-EP – 268

Seat No.	

Set S

T.E. (Part – II) (Electrical) Examination, 2016
POWER ELECTRONICS

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which circuit gives inherent freewheeling action ?
   a) Half wave converter b) Semi converter
   c) Full converter d) None

2) Converters use _____ to control output voltage.
   a) Phase angle control b) Natural control
   c) Diode d) None

3) For a 3-phase half wave converter, firing angle is measured from
   a) ωt b) $\omega t = \frac{\pi}{6}$ c) $\omega t = \frac{\pi}{3}$ d) None

4) A class D chopper
   a) Can operate in first quadrant only
   b) Can operate in second quadrant only
   c) Can operate in first or fourth quadrant
   d) Can operate in all quadrant

5) In pulse width modulation of chopper
   a) T is kept constant and T_{ON} is varied
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   c) Both T and T_{ON} are varied
   d) Either T or T_{ON} is varied

6) The commutation method, in an inverter is
   a) Line commutation b) Forced commutation
   c) Either a) or b) d) None of the above

P.T.O.

7) For a duty cycle of 40%, the output DC for step down chopper is if input dc is 200 V
a) 80 V b) 800 V c) 8 V d) .8 V

8) The two transistor model of a thyristor consists of two transistor
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9) The rms value of output voltage in a 1-phase half bridge inverter is
a) V/2 b) V c) 2 V d) V/3

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c) Quasi square d) Wave in 6 steps

14) The phase voltage output of a 180 degrees conduction of inverter having
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c) Quasi square d) Wave in 6 steps

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16) As base width of npn and pnp transistors reduce, the current gain increases and anode current of SCR
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c) Remains same d) None of the above

17) The angle at which SCR turns off is called
a) On angle b) Conduction angle
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18) Which one is greater of the following ?
a) Leaking current b) Holding current
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19) TRIAC and DIAC are
a) Bi-directional devices b) Unidirectional devices
c) Can't decide d) None of these

20) IGBT is _____ device.
a) Current controlled b) Voltage controlled
c) Not controlled d) None

SLR-EP – 268

Seat No.	

T.E. (Part – II) (Electrical) Examination, 2016
POWER ELECTRONICS

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
   a) Explain the two transistor analogy of SCR. Explain regenerative current process to conduct the SCR.
   b) Explain the working principle of Depletion p-channel MOSFET with V-I and transfer characteristics.
   c) How GTO will works and explain ?
   d) Explain 1-single phase half controlled bridge rectifier with RL load. Draw the output voltage wave for α = 120 degrees and derive the output voltage and current equations.
   e) What is meant by commutation ? Explain class D commutation with proper wave form.

3. Attempt **any two** questions : **(2×10=20)**
   a) Draw the static V-I characteristics of SCR. Explain effect of gate current on anode current.
   b) Explain the two quadrant operation of 1-phase fully controlled bridge rectifier with RL load. Draw the output voltage and current wave form for α = 0 degrees, α = 90 degrees and α = 120 degrees. Derive the V_L and I_L.
   c) A single –phase full-converter, connected to 230 V, 50 Hz, is feeding a load R = 10 Ω in series with a large inductance that makes the load current ripple free. For a firing angle of 45°, calculate :
      i) Average load voltage (V_L)
      ii) Average load current
      iii) RMS output voltage, RMS output current
      iv) FF, RF
      v) Output DC power (P_{DC}), Output AC Power (P_{AC}).

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

   a) Explain the four quadrant operation of chopper.

   b) Explain the voltage control and harmonics analysis of inverter.

   c) What are the types of AC controllers ? Explain the phase angle control regulator.

   d) Explain the application power electronics in HVDC transmission (block diagram and basic principle).

   e) An on-off type ac regulator is operating with a resistive load of R = 10 ohms and the RMS voltage is 203 V. The controller remains on for 40 cycles and is off for 60 cycles. Determine :
      i) RMS load voltage
      ii) Input power factor.

5. Attempt **any two** questions : **(2×10=20)**

   a) Draw a neat sketch and explain the 180 degrees conduction mode of 3-phase inverter and derive the line-line voltage and phase voltage expressions.

   b) Draw the neat wave form and explain the operation of Buck converter and derive the expression for peak to peak load voltage and load current.

   c) A single-phase full bridge inverter has a resistive load of R = 2.4 ohms and the DC input voltage V = 48 V. Determine :
      i) RMS output voltage at the fundamental frequency
      ii) The output power
      iii) The average and peak currents of each transistor
      iv) The peak reverse blocking voltage of each transistor
      v) The total harmonic distortion
      vi) Distortion factor
      vii) The harmonic factor and distortion factor at the lowest order harmonic.

SLR-EP – 269

Seat No.	

Set **P**

T.E. (Electrical Engineering) (Part – II) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 25-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The even component of the signal $x(t) = 1 + t + 4t^2 + 7t^3 + 10t^4$ is
   a) $1 + t + 4t^2 + 7t^3 + 10t^4$ b) $1 + 4t^2 + 10t^4$
   c) $1 + 7t^3$ d) None of the above

2) A signal which is unchanged by a time shift of T i.e. $x(t + T) = x(t)$ is referred as
   a) Causal b) Linear c) Periodic d) Even

3) A signal is said to be energy signal if it has _____ energy and _____ power.
   a) infinite, finite b) finite, infinite c) zero, finite d) finite, zero

4) If two LTI systems with same input are connected in parallel then equivalent system is
   a) Multiplication of individual impulse response
   b) Convolution of individual impulse response
   c) Sum of individual impulse response
   d) None of these

5) The series RC circuit is a _____ system.
   a) Dynamic b) Static c) Memoryless d) None of these

6) A DT LTI system is said to be stable if
   a) $\int_{-\infty}^{\infty} |h[n]| < \infty$ b) $\sum_{n=-\infty}^{\infty} |h[n]| < \infty$
   c) Cannot be predicted d) None of these

7) The impulse response of $y(t) = x(t - t_0)$ is
   a) $h(t) = \delta(t + t_0)$ b) $h(t) = \delta(t \pm t_0)$ c) $h(t) = \delta(t - t_0)$ d) None of these

8) If $x(t) \leftrightarrow X(\omega)$ is the Fourier transform pair then Fourier transform of $x(\alpha t)$ is
   a) $\frac{1}{|\alpha|} \times \left(\frac{f}{2\alpha}\right)$ b) $|\alpha| \times \left(\frac{2f}{\alpha}\right)$ c) $|\alpha| \times \left(\frac{f}{\alpha}\right)$ d) $\frac{1}{|\alpha|} \times \left(\frac{f}{\alpha}\right)$

P.T.O.

9) Harmonics of the periodic signals are equal to
   a) Integral multiple of fundamental frequency
   b) Fundamental frequency
   c) Zero frequency
   d) Both a) and b)

10) The signal x (t) = sin $(\omega_0 t)$ has complex exponential Fourier series components

   a) $C_1 = \frac{1}{2j}$ b) $C_{-1} = \frac{-1}{2j}$ c) $C_1 = \frac{j}{2}$ d) Both a) and b)

11) For a stable LTI discrete time system poles should lie _____ and unit circle should be _____
   a) outside unit circle, included in ROC b) inside unit circle, outside of ROC
   c) inside unit circle, included in ROC d) outside unit circle, outside of ROC

12) The z-transform of x(n) is x (z) then z-transform of x (– n) is,
   a) – X (z) b) X (– z) c) – X (z^{-1}) d) X (z^{-1})

13) ROC of x(n) contains
   a) poles b) zeros c) no poles d) no zeros

14) The z-transform of a ramp function x (n) = n u(n) is

   a) $X(z) = \frac{z}{(z-1)^2}$ ROC is $|z| > 1$ b) $X(z) = \frac{-z}{(z-1)^2}$ ROC is $|z| > 1$

   c) $X(z) = \frac{z}{(z-1)^2}$ ROC is $|z| < 1$ d) $X(z) = \frac{-z}{(z-1)^2}$ ROC is $|z| < 1$

15) The inverse z-transform of $H(z) = \frac{0.5z^2 - 0.25z + 1}{z^2}$ is

   a) {0.5, – 0.25, 1} b) {1, – 0.25, 0.5} c) {– 0.25, 1, 0.5} d) None of these

16) For computing 8-point DFT using radix – 2 FFT, the number of stages required are
   a) 8 b) 4 c) 3 d) 2

17) Number of complex multiplication in DIT FFT algorithm are _____ as compared to DIF FFT algorithm.
   a) less b) more c) same d) none of these

18) The phase factors are multiplied after the add and subtract operation in
   a) DIT radix 2 FFT b) DIF radix – 2 FFT
   c) Inverse DFT d) Both a) and c)

19) If DFT {x (n)} = X (k), then DFT $\{x (n - m)_N\}$ is

   a) $X(k).e^{\frac{-j2\pi km}{N}}$ b) $X(k).e^{\frac{-j2\pi k}{mN}}$ c) $X(k).e^{\frac{j2\pi km}{N}}$ d) $X(k).e^{\frac{j2\pi k}{mN}}$

20) In which of the following FFT, output will be in bit reversed order ?
   a) DIF FFT b) DIT FFT c) Both a) and b) d) None of these

_____

SLR-EP – 269

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2016
SIGNALS AND SYSTEMS

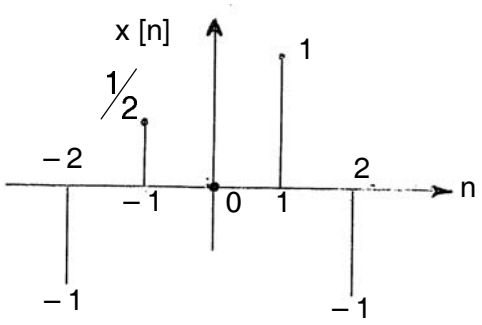
Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***All*** *questions are* ***compulsory****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

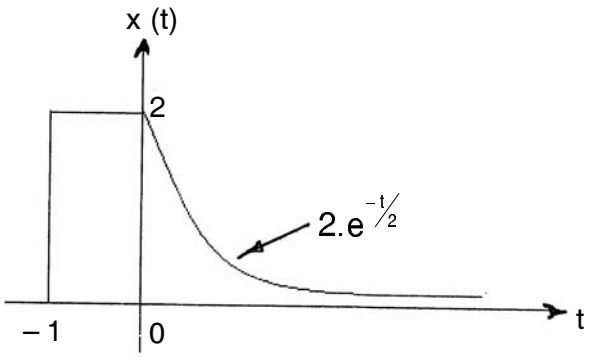
a) Sketch and label the following signals.



i) X [n + 3]

ii) $x\left[4-\frac{n}{2}\right]$

b) For a signal shown in the fig. Determine whether the signal is an energy signal or a power signal or neither. Also determine its energy or power.



c) Define singularity function and explain its properties.

d) Explain the convergence of Fourier series.

e) Verify the general properties for the system y [n] = x [2n].

Set P

3. Attempt **any two** : **(2×10=20)**

a) Convolve the signals and find y (t) = x(t) * h(t).

$x(t) = e^{2t} u(-t)$ and $h(t) = u(t-3)$

b) Find the trigonometric Fourier series of a periodic signal x(t) defined by

$x(t) = t^2$, $-\pi \le t \le \pi$ and

$x(t + 2\pi) = x(t)$.

c) Consider a stable LTI system that is characterized by the differential equation

$$\frac{d^2 y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$$

and the input is $x(t) = e^{-t} u(t)$. Find the output y(t).

SECTION – II

4. Attempt **any four** : **(5×4=20)**

1) Find DTFT if $x(n) = \frac{1}{2}\left[\left(\frac{1}{2}\right)^n + \left(\frac{1}{4}\right)^n\right] u(n)$.

2) Prove the time shifting property of discrete time Fourier transform.

3) Find inverse z-transform of $X(z) = \frac{3z^2 + 2z + 1}{z^2 + 3z + 2}$ using power series expansion.

4) Find initial value X(0) and final value $X(\infty)$ for $X(z) = \frac{1}{1 - z^{-2}}$.

5) Find z-transform of $x(n) = 0.8^n u(-n-1)$.

5. Attempt **any two** : **(10×2=20)**

1) Compute 8 point DFT of the sequence x (n) = {1, 1, 1, 1, 1, 0, 0, 0} using DIF FFT algorithm.

2) Find : i) DFT of sequence x(n) = {1, 1, 0, 0}

ii) IDFT of sequence X (K) = {1, 0, 1, 0}.

3) Find transfer function and impulse response of the system described by difference equation

$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$.

Set P

SLR-EP – 269

Seat No.	

Set Q

T.E. (Electrical Engineering) (Part – II) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 25-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) For computing 8-point DFT using radix – 2 FFT, the number of stages required are
a) 8 b) 4 c) 3 d) 2

2) Number of complex multiplication in DIT FFT algorithm are _____ as compared to DIF FFT algorithm.
a) less b) more c) same d) none of these

3) The phase factors are multiplied after the add and subtract operation in
a) DIT radix 2 FFT b) DIF radix – 2 FFT
c) Inverse DFT d) Both a) and c)

4) If DFT {x (n)} = X (k), then DFT $\{x (n - m)_N\}$ is
a) $X(k).e^{\frac{-j2\pi km}{N}}$ b) $X(k).e^{\frac{-j2\pi k}{mN}}$ c) $X(k).e^{\frac{j2\pi km}{N}}$ d) $X(k).e^{\frac{j2\pi k}{mN}}$

5) In which of the following FFT, output will be in bit reversed order ?
a) DIF FFT b) DIT FFT c) Both a) and b) d) None of these

6) The even component of the signal $x (t) = 1 + t + 4t^2 + 7t^3 + 10t^4$ is
a) $1 + t + 4t^2 + 7t^3 + 10t^4$ b) $1 + 4t^2 + 10t^4$
c) $1 + 7t^3$ d) None of the above

7) A signal which is unchanged by a time shift of T i.e. x (t + T) = x (t) is referred as
a) Causal b) Linear c) Periodic d) Even

8) A signal is said to be energy signal if it has _____ energy and _____ power.
a) infinite, finite b) finite, infinite c) zero, finite d) finite, zero

9) If two LTI systems with same input are connected in parallel then equivalent system is
a) Multiplication of individual impulse response
b) Convolution of individual impulse response
c) Sum of individual impulse response
d) None of these

P.T.O.

10) The series RC circuit is a _____ system.
a) Dynamic b) Static c) Memoryless d) None of these

11) A DT LTI system is said to be stable if

a) $\int_{-\infty}^{\infty} |h[n]| < \infty$ b) $\sum_{n=-\infty}^{\infty} |h[n]| < \infty$

c) Cannot be predicted d) None of these

12) The impulse response of $y(t) = x(t - t_0)$ is
a) $h(t) = \delta(t + t_0)$ b) $h(t) = \delta(t \pm t_0)$ c) $h(t) = \delta(t - t_0)$ d) None of these

13) If $x(t) \leftrightarrow X(\omega)$ is the Fourier transform pair then Fourier transform of $x(\alpha t)$ is

a) $\frac{1}{|\alpha|} \times \left(\frac{f}{2\alpha}\right)$ b) $|\alpha| \times \left(\frac{2f}{\alpha}\right)$ c) $|\alpha| \times \left(\frac{f}{\alpha}\right)$ d) $\frac{1}{|\alpha|} \times \left(\frac{f}{\alpha}\right)$

14) Harmonics of the periodic signals are equal to
a) Integral multiple of fundamental frequency
b) Fundamental frequency
c) Zero frequency
d) Both a) and b)

15) The signal $x(t) = \sin(\omega_0 t)$ has complex exponential Fourier series components

a) $C_1 = \frac{1}{2j}$ b) $C_{-1} = \frac{-1}{2j}$ c) $C_1 = \frac{j}{2}$ d) Both a) and b)

16) For a stable LTI discrete time system poles should lie _____ and unit circle should be _____
a) outside unit circle, included in ROC b) inside unit circle, outside of ROC
c) inside unit circle, included in ROC d) outside unit circle, outside of ROC

17) The z-transform of x(n) is x (z) then z-transform of x (– n) is,
a) – X (z) b) X (– z) c) $-X(z^{-1})$ d) $X(z^{-1})$

18) ROC of x(n) contains
a) poles b) zeros c) no poles d) no zeros

19) The z-transform of a ramp function x (n) = n u(n) is

a) $X(z) = \frac{z}{(z-1)^2}$ ROC is $|z| > 1$ b) $X(z) = \frac{-z}{(z-1)^2}$ ROC is $|z| > 1$

c) $X(z) = \frac{z}{(z-1)^2}$ ROC is $|z| < 1$ d) $X(z) = \frac{-z}{(z-1)^2}$ ROC is $|z| < 1$

20) The inverse z-transform of $H(z) = \frac{0.5z^2 - 0.25z + 1}{z^2}$ is
a) {0.5, – 0.25, 1} b) {1, – 0.25, 0.5} c) {– 0.25, 1, 0.5} d) None of these

_____

Set Q

SLR-EP – 269

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2016
SIGNALS AND SYSTEMS

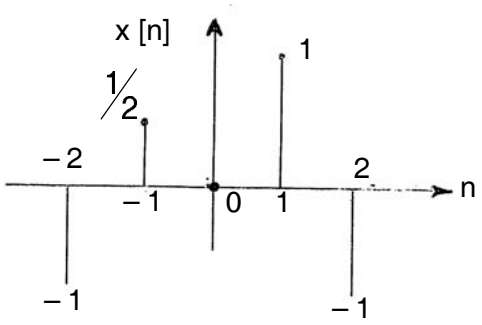
Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***All*** *questions are* ***compulsory****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

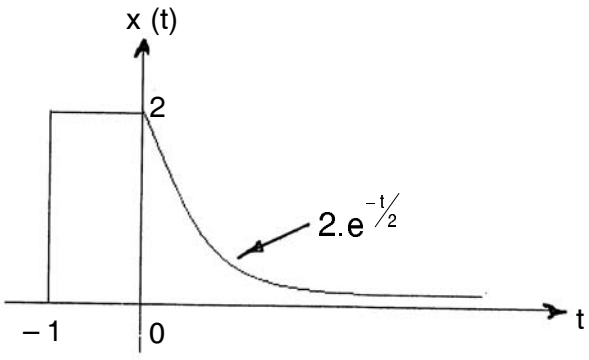
a) Sketch and label the following signals.



i) X [n + 3]

ii) $x\left[4-\frac{n}{2}\right]$

b) For a signal shown in the fig. Determine whether the signal is an energy signal or a power signal or neither. Also determine its energy or power.



c) Define singularity function and explain its properties.

d) Explain the convergence of Fourier series.

e) Verify the general properties for the system y [n] = x [2n].

Set Q

3. Attempt **any two** : **(2×10=20)**

a) Convolve the signals and find y (t) = x(t) * h(t).

$x(t) = e^{2t} u(-t)$ and $h(t) = u(t-3)$

b) Find the trigonometric Fourier series of a periodic signal x(t) defined by

$x(t) = t^2$, $-\pi \le t \le \pi$ and

$x(t + 2\pi) = x(t)$.

c) Consider a stable LTI system that is characterized by the differential equation

$$\frac{d^2 y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t)$$

and the input is $x(t) = e^{-t} u(t)$. Find the output y(t).

SECTION – II

4. Attempt **any four** : **(5×4=20)**

1) Find DTFT if $x(n) = \frac{1}{2}\left[\left(\frac{1}{2}\right)^n + \left(\frac{1}{4}\right)^n\right] u(n)$.

2) Prove the time shifting property of discrete time Fourier transform.

3) Find inverse z-transform of $X(z) = \frac{3z^2 + 2z + 1}{z^2 + 3z + 2}$ using power series expansion.

4) Find initial value X(0) and final value $X(\infty)$ for $X(z) = \frac{1}{1 - z^{-2}}$.

5) Find z-transform of $x(n) = 0.8^n u(-n-1)$.

5. Attempt **any two** : **(10×2=20)**

1) Compute 8 point DFT of the sequence x (n) = {1, 1, 1, 1, 1, 0, 0, 0} using DIF FFT algorithm.

2) Find : i) DFT of sequence x(n) = {1, 1, 0, 0}

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3) Find transfer function and impulse response of the system described by difference equation

$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$.

SLR-EP – 269

Seat No.	

Set R

T.E. (Electrical Engineering) (Part – II) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 25-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) For a stable LTI discrete time system poles should lie _____ and unit circle should be _____
   a) outside unit circle, included in ROC b) inside unit circle, outside of ROC
   c) inside unit circle, included in ROC d) outside unit circle, outside of ROC

2) The z-transform of x(n) is x (z) then z-transform of x (– n) is,
   a) – X (z) b) X (– z) c) $-X(z^{-1})$ d) $X(z^{-1})$

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   a) $X(z)=\frac{z}{(z-1)^2}$ ROC is $|z|>1$ b) $X(z)=\frac{-z}{(z-1)^2}$ ROC is $|z|>1$

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5) The inverse z-transform of $H(z)=\frac{0.5z^2-0.25z+1}{z^2}$ is
   a) {0.5, – 0.25, 1} b) {1, – 0.25, 0.5} c) {– 0.25, 1, 0.5} d) None of these

6) For computing 8-point DFT using radix – 2 FFT, the number of stages required are
   a) 8 b) 4 c) 3 d) 2

7) Number of complex multiplication in DIT FFT algorithm are _____ as compared to DIF FFT algorithm.
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P.T.O.

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10) In which of the following FFT, output will be in bit reversed order ?
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11) The even component of the signal $x (t) = 1 + t + 4t^2 + 7t^3 + 10t^4$ is
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a) $\frac{1}{|\alpha|} \times \left(\frac{f}{2\alpha}\right)$ b) $|\alpha| \times \left(\frac{2f}{\alpha}\right)$ c) $|\alpha| \times \left(\frac{f}{\alpha}\right)$ d) $\frac{1}{|\alpha|} \times \left(\frac{f}{\alpha}\right)$

19) Harmonics of the periodic signals are equal to
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20) The signal $x (t) = \sin (\omega_0 t)$ has complex exponential Fourier series components

a) $C_1 = \frac{1}{2j}$ b) $C_{-1} = \frac{-1}{2j}$ c) $C_1 = \frac{j}{2}$ d) Both a) and b)

_____

SLR-EP – 269

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2016
SIGNALS AND SYSTEMS

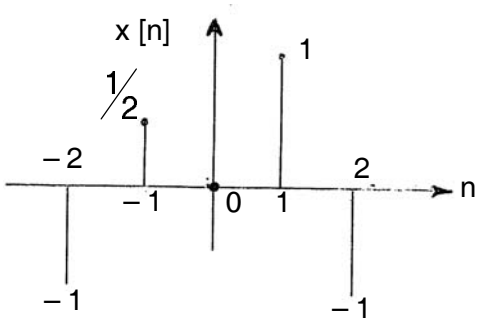
Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***All*** *questions are* ***compulsory****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

a) Sketch and label the following signals.



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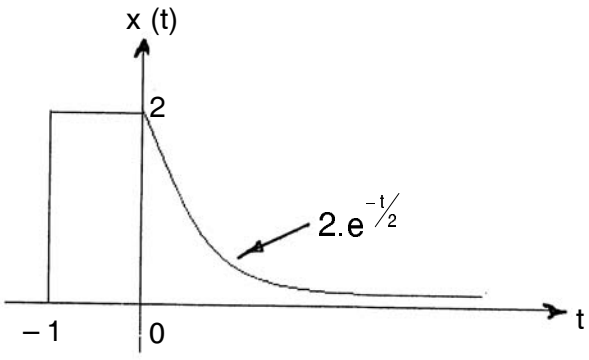

c) Define singularity function and explain its properties.

d) Explain the convergence of Fourier series.

e) Verify the general properties for the system y [n] = x [2n].

Set R

3. Attempt **any two** : **(2×10=20)**

   a) Convolve the signals and find y (t) = x(t) * h(t).

   $x(t) = e^{2t} u(-t)$ and $h(t) = u(t-3)$

   b) Find the trigonometric Fourier series of a periodic signal x(t) defined by

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SECTION – II

4. Attempt **any four** : **(5×4=20)**

   1) Find DTFT if $x(n) = \frac{1}{2}\left[\left(\frac{1}{2}\right)^n + \left(\frac{1}{4}\right)^n\right] u(n)$.

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   5) Find z-transform of $x(n) = 0.8^n u(-n-1)$.

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   1) Compute 8 point DFT of the sequence x (n) = {1, 1, 1, 1, 1, 0, 0, 0} using DIF FFT algorithm.

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   $y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$.

SLR-EP – 269

Seat No.	

Set S

T.E. (Electrical Engineering) (Part – II) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 25-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) A DT LTI system is said to be stable if

a) $\int_{-\infty}^{\infty} |h[n]| < \infty$ b) $\sum_{n=-\infty}^{\infty} |h[n]| < \infty$

c) Cannot be predicted d) None of these

2) The impulse response of $y(t) = x(t - t_0)$ is

a) $h(t) = \delta(t + t_0)$ b) $h(t) = \delta(t \pm t_0)$ c) $h(t) = \delta(t - t_0)$ d) None of these

3) If $x(t) \leftrightarrow X(\omega)$ is the Fourier transform pair then Fourier transform of $x(\alpha t)$ is

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4) Harmonics of the periodic signals are equal to
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P.T.O.

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20) The series RC circuit is a _____ system.
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_____

SLR-EP – 269

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***All*** *questions are* ***compulsory****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

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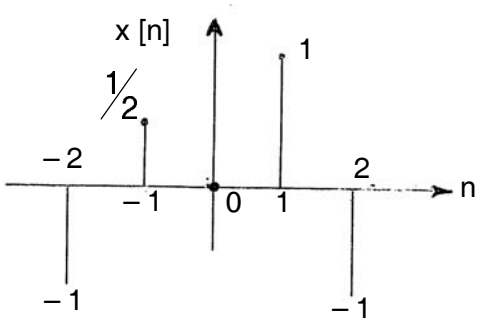

i) X [n + 3]

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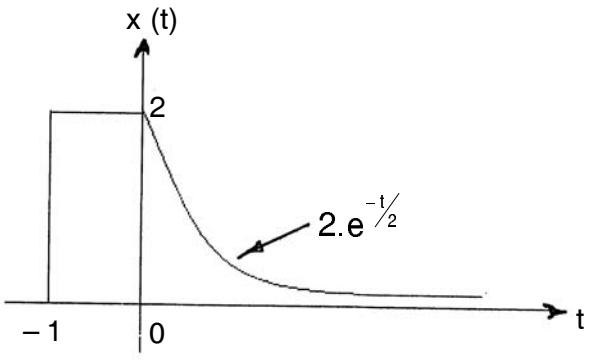
b) For a signal shown in the fig. Determine whether the signal is an energy signal or a power signal or neither. Also determine its energy or power.



c) Define singularity function and explain its properties.

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e) Verify the general properties for the system y [n] = x [2n].

Set S

3. Attempt **any two** : **(2×10=20)**

   a) Convolve the signals and find y (t) = x(t) * h(t).

   $x(t) = e^{2t} u(-t)$ and $h(t) = u(t-3)$

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SECTION – II

4. Attempt **any four** : **(5×4=20)**

   1) Find DTFT if $x(n) = \frac{1}{2}\left[\left(\frac{1}{2}\right)^n + \left(\frac{1}{4}\right)^n\right] u(n)$.

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SLR-EP – 270(b)

Seat No.	

Set **P**

T.E. (Electrical Engineering) (Part – II) Examination, 2016
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Saturday, 26-11-2016 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Marks : 10

1. **True** or **False** : **(10×1=10)**

1) The semiconductor Integrated circuit layout Design Act was enacted in year 2000.

2) Trade related aspects of Intellectual Property Act are nothing but the TRIPS.

3) A trademark is a special symbol for distinguishing the goods offered for sale.

4) Trademark includes only mark, symbol, name.

5) Solapuri chadar is an example of geographical indication.

6) Berne convention is related to protection of copyrights.

7) The agreement concerning International Registration of Trademarks was adopted in the year 1891 at Madrid.

8) Design means the shape, pattern, configuration or ornamentation of an industrial article.

9) ISI mark on the product does not guarantee the standard of the product.

10) Intellectual Property Rights (IPR) protect the use of information and ideas that are of commercial value.

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SLR-EP – 270(b)

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2016
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Saturday, 26-11-2016 Marks : 40
Time : 10.00 a.m. to 12.00 noon

2. Attempt following questions (**any two**) : **20**

   1) Explain in detail Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement.

   2) Explain the Intellectual Property Act and its scope.

   3) Discuss the patents on computer programmes.

3. Short notes (**any four**) : **20**

   1) Rights of a patentee.

   2) Trademark.

   3) Importance of IP rights.

   4) Geographical indication of goods.

   5) Law on Industrial design.

   6) Patent on Biotechnology.

Set P

SLR-EP – 270(b)

Seat No.	

Set **Q**

T.E. (Electrical Engineering) (Part – II) Examination, 2016
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Saturday, 26-11-2016 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Marks : 10

1. **True** or **False** : **(10×1=10)**

1) ISI mark on the product does not guarantee the standard of the product.

2) Intellectual Property Rights (IPR) protect the use of information and ideas that are of commercial value.

3) The agreement concerning International Registration of Trademarks was adopted in the year 1891 at Madrid.

4) Design means the shape, pattern, configuration or ornamentation of an industrial article.

5) The semiconductor Integrated circuit layout Design Act was enacted in year 2000.

6) Trade related aspects of Intellectual Property Act are nothing but the TRIPS.

7) A trademark is a special symbol for distinguishing the goods offered for sale.

P.T.O.

8) Trademark includes only mark, symbol, name.

9) Solapuri chadar is an example of geographical indication.

10) Berne convention is related to protection of copyrights.

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SLR-EP – 270(b)

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2016
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Saturday, 26-11-2016 Marks : 40
Time : 10.00 a.m. to 12.00 noon

2. Attempt following questions (**any two**) : **20**

   1) Explain in detail Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement.

   2) Explain the Intellectual Property Act and its scope.

   3) Discuss the patents on computer programmes.

3. Short notes (**any four**) : **20**

   1) Rights of a patentee.

   2) Trademark.

   3) Importance of IP rights.

   4) Geographical indication of goods.

   5) Law on Industrial design.

   6) Patent on Biotechnology.

Set Q

Set Q

SLR-EP – 270(b)

Seat No.	

Set **R**

T.E. (Electrical Engineering) (Part – II) Examination, 2016
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Saturday, 26-11-2016 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Marks : 10

1. **True** or **False** : **(10×1=10)**

1) Solapuri chadar is an example of geographical indication.

2) Berne convention is related to protection of copyrights.

3) ISI mark on the product does not guarantee the standard of the product.

4) Intellectual Property Rights (IPR) protect the use of information and ideas that are of commercial value.

5) A trademark is a special symbol for distinguishing the goods offered for sale.

6) Trademark includes only mark, symbol, name.

7) The semiconductor Integrated circuit layout Design Act was enacted in year 2000.

8) Trade related aspects of Intellectual Property Act are nothing but the TRIPS.

9) The agreement concerning International Registration of Trademarks was adopted in the year 1891 at Madrid.

10) Design means the shape, pattern, configuration or ornamentation of an industrial article.

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SLR-EP – 270(b)

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2016
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Saturday, 26-11-2016 Marks : 40
Time : 10.00 a.m. to 12.00 noon

2. Attempt following questions (**any two**) : **20**

   1) Explain in detail Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement.

   2) Explain the Intellectual Property Act and its scope.

   3) Discuss the patents on computer programmes.

3. Short notes (**any four**) : **20**

   1) Rights of a patentee.

   2) Trademark.

   3) Importance of IP rights.

   4) Geographical indication of goods.

   5) Law on Industrial design.

   6) Patent on Biotechnology.

Set R

SLR-EP – 270(b)

Seat No.	

Set **S**

T.E. (Electrical Engineering) (Part – II) Examination, 2016
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Saturday, 26-11-2016 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Marks : 10

1. **True** or **False** : **(10×1=10)**

1) A trademark is a special symbol for distinguishing the goods offered for sale.

2) Trademark includes only mark, symbol, name.

3) Solapuri chadar is an example of geographical indication.

4) Berne convention is related to protection of copyrights.

5) The agreement concerning International Registration of Trademarks was adopted in the year 1891 at Madrid.

6) Design means the shape, pattern, configuration or ornamentation of an industrial article.

7) ISI mark on the product does not guarantee the standard of the product.

P.T.O.

8) Intellectual Property Rights (IPR) protect the use of information and ideas that are of commercial value.

9) The semiconductor Integrated circuit layout Design Act was enacted in year 2000.

10) Trade related aspects of Intellectual Property Act are nothing but the TRIPS.

———————

SLR-EP – 270(b)

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2016
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Saturday, 26-11-2016 Marks : 40
Time : 10.00 a.m. to 12.00 noon

2. Attempt following questions (**any two**) : **20**

   1) Explain in detail Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement.

   2) Explain the Intellectual Property Act and its scope.

   3) Discuss the patents on computer programmes.

3. Short notes (**any four**) : **20**

   1) Rights of a patentee.

   2) Trademark.

   3) Importance of IP rights.

   4) Geographical indication of goods.

   5) Law on Industrial design.

   6) Patent on Biotechnology.

Set S

SLR-EP – 270 (a)

Seat No.	

Set **P**

T.E. (Electrical) (Part – II) Examination, 2016
SELF LEARNING (Safety Engineering and Disaster Management)

Day and Date : Saturday, 26-11-2016 Max. Marks : 50
Time : 10.00 a.m. to 12.00 Noon

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(1×10=10)**

1) The workplace hazard excessive noise may be controlled by :

A) Air conditioning B) Ventilation

C) Shift work D) PPE

2) An emergency that could arise and cause a risk to H&S could include

A) Fire B) Explosion

C) Chemical spill D) All of the above

3) A workplace emergency evacuation plan is the responsibility of

A) Company management B) The government

C) The Health and Safety Committee D) Individual employees

4) Which is the most effective method of reducing contamination to workers ?

A) PPE B) Administration controls

C) Fans D) Engineering controls

5) Which of the following is a major contribution to workplace stress ?

A) Low pay B) Poor working conditions

C) Reasonable work pressures D) Social isolation

6) Which one of the following theories of disaster management informs organizational readiness and response in a disaster ?
   A) Hobfoll's theory of conservation of resources
   B) The problem-solving "task model"
   C) Structure-functional theory
   D) Theory of traumatogenic forces
7) Ensuring the safety, health and welfare of the employees is the primary purpose of the
   A) Factories Act, 1948 B) Payment of Wages Act, 1936
   C) Equal Remuneration Act, 1976 D) Industrial Disputes Act, 1947
8) All of the following are TRUE about disasters EXCEPT
   A) A disaster may be domestic or International
   B) A disaster may be caused by nature or have human origins
   C) A disaster always receives widespread media coverage
   D) A disaster may have a known and gradual onset
9) Disasters frequently result in all of the following EXCEPT
   A) Damage to the ecological environment
   B) Displacement of populations
   C) Destruction of a population's homeland
   D) Sustained public attention during the recovery phase
10) There are nine tasks in the of *disaster management.* All of the following are tasks of this model EXCEPT
   A) Assess secondary social problems such as health epidemics, displaced persons
   B) Counsel those who have suffered trauma and bereavement
   C) Control rumors, provide accurate information
   D) Provide security, prevent looting, protect person and property

SLR-EP – 270 (a)

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
SELF LEARNING (Safety Engineering and Disaster Management)

Day and Date : Saturday, 26-11-2016 Marks : 40

Time : 10.00 a.m. to 12.00 Noon

2. Solve **any four** : **(4×5=20)**

   a) What are the various safety considerations to be kept in mind in regard to electrical engineering ?

   b) Discuss contributions of safety engineering on plant productivity.

   c) What are various types of fires ? What are the strategies to be adopted for fire prevention ?

   d) As an engineer how would you describe safety as an essential parameter in designing industrial production system ?

   e) Discuss safety engineering analysis.

3. Solve **any two** : **(2×10=20)**

   a) List all of governmental organisations related to disaster management

   b) What is concept of system safety ? Also discuss safety engineering analysis.

   c) Discuss organization structure of safety department along with role and responsibilities of each position.

Set P

Set P

SLR-EP – 270 (a)

Seat No.	

Set **Q**

T.E. (Electrical) (Part – II) Examination, 2016
SELF LEARNING (Safety Engineering and Disaster Management)

Day and Date : Saturday, 26-11-2016 Max. Marks : 50
Time : 10.00 a.m. to 12.00 Noon

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(1×10=10)**

1) Disasters frequently result in all of the following EXCEPT

A) Damage to the ecological environment

B) Displacement of populations

C) Destruction of a population's homeland

D) Sustained public attention during the recovery phase

2) There are nine tasks in the of *disaster management.* All of the following are tasks of this model EXCEPT

A) Assess secondary social problems such as health epidemics, displaced persons

B) Counsel those who have suffered trauma and bereavement

C) Control rumors, provide accurate information

D) Provide security, prevent looting, protect person and property

3) Ensuring the safety, health and welfare of the employees is the primary purpose of the

A) Factories Act, 1948 B) Payment of Wages Act, 1936

C) Equal Remuneration Act, 1976 D) Industrial Disputes Act, 1947

4) All of the following are TRUE about disasters EXCEPT

A) A disaster may be domestic or International

B) A disaster may be caused by nature or have human origins

C) A disaster always receives widespread media coverage

D) A disaster may have a known and gradual onset

P.T.O.

5) The workplace hazard excessive noise may be controlled by :

A) Air conditioning B) Ventilation

C) Shift work D) PPE

6) An emergency that could arise and cause a risk to H&S could include

A) Fire B) Explosion

C) Chemical spill D) All of the above

7) A workplace emergency evacuation plan is the responsibility of

A) Company management B) The government

C) The Health and Safety Committee D) Individual employees

8) Which is the most effective method of reducing contamination to workers ?

A) PPE B) Administration controls

C) Fans D) Engineering controls

9) Which of the following is a major contribution to workplace stress ?

A) Low pay B) Poor working conditions

C) Reasonable work pressures D) Social isolation

10) Which one of the following theories of disaster management informs organizational readiness and response in a disaster ?

A) Hobfoll's theory of conservation of resources

B) The problem-solving "task model"

C) Structure-functional theory

D) Theory of traumatogenic forces

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SLR-EP – 270 (a)

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
SELF LEARNING (Safety Engineering and Disaster Management)

Day and Date : Saturday, 26-11-2016 Marks : 40

Time : 10.00 a.m. to 12.00 Noon

2. Solve **any four** : **(4×5=20)**

   a) What are the various safety considerations to be kept in mind in regard to electrical engineering ?

   b) Discuss contributions of safety engineering on plant productivity.

   c) What are various types of fires ? What are the strategies to be adopted for fire prevention ?

   d) As an engineer how would you describe safety as an essential parameter in designing industrial production system ?

   e) Discuss safety engineering analysis.

3. Solve **any two** : **(2×10=20)**

   a) List all of governmental organisations related to disaster management

   b) What is concept of system safety ? Also discuss safety engineering analysis.

   c) Discuss organization structure of safety department along with role and responsibilities of each position.

Set Q

Set Q

SLR-EP – 270 (a)

Seat No.	

Set **R**

T.E. (Electrical) (Part – II) Examination, 2016
SELF LEARNING (Safety Engineering and Disaster Management)

Day and Date : Saturday, 26-11-2016 Max. Marks : 50
Time : 10.00 a.m. to 12.00 Noon

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(1×10=10)**

1) Which of the following is a major contribution to workplace stress ?

A) Low pay B) Poor working conditions

C) Reasonable work pressures D) Social isolation

2) Which one of the following theories of disaster management informs organizational readiness and response in a disaster ?

A) Hobfoll's theory of conservation of resources

B) The problem-solving "task model"

C) Structure-functional theory

D) Theory of traumatogenic forces

3) Disasters frequently result in all of the following EXCEPT

A) Damage to the ecological environment

B) Displacement of populations

C) Destruction of a population's homeland

D) Sustained public attention during the recovery phase

4) There are nine tasks in the of *disaster management.* All of the following are tasks of this model EXCEPT

A) Assess secondary social problems such as health epidemics, displaced persons

B) Counsel those who have suffered trauma and bereavement

C) Control rumors, provide accurate information

D) Provide security, prevent looting, protect person and property

5) A workplace emergency evacuation plan is the responsibility of

A) Company management B) The government

C) The Health and Safety Committee D) Individual employees

6) Which is the most effective method of reducing contamination to workers ?

A) PPE B) Administration controls

C) Fans D) Engineering controls

7) The workplace hazard excessive noise may be controlled by :

A) Air conditioning B) Ventilation

C) Shift work D) PPE

8) An emergency that could arise and cause a risk to H&S could include

A) Fire B) Explosion

C) Chemical spill D) All of the above

9) Ensuring the safety, health and welfare of the employees is the primary purpose of the

A) Factories Act, 1948 B) Payment of Wages Act, 1936

C) Equal Remuneration Act, 1976 D) Industrial Disputes Act, 1947

10) All of the following are TRUE about disasters EXCEPT

A) A disaster may be domestic or International

B) A disaster may be caused by nature or have human origins

C) A disaster always receives widespread media coverage

D) A disaster may have a known and gradual onset

———————

SLR-EP – 270 (a)

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
SELF LEARNING (Safety Engineering and Disaster Management)

Day and Date : Saturday, 26-11-2016 Marks : 40

Time : 10.00 a.m. to 12.00 Noon

2. Solve **any four** : **(4×5=20)**

   a) What are the various safety considerations to be kept in mind in regard to electrical engineering ?

   b) Discuss contributions of safety engineering on plant productivity.

   c) What are various types of fires ? What are the strategies to be adopted for fire prevention ?

   d) As an engineer how would you describe safety as an essential parameter in designing industrial production system ?

   e) Discuss safety engineering analysis.

3. Solve **any two** : **(2×10=20)**

   a) List all of governmental organisations related to disaster management

   b) What is concept of system safety ? Also discuss safety engineering analysis.

   c) Discuss organization structure of safety department along with role and responsibilities of each position.

Set R

Set R

SLR-EP – 270 (a)

Seat No.	

Set **S**

T.E. (Electrical) (Part – II) Examination, 2016
SELF LEARNING (Safety Engineering and Disaster Management)

Day and Date : Saturday, 26-11-2016 Max. Marks : 50
Time : 10.00 a.m. to 12.00 Noon

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(1×10=10)**

1) A workplace emergency evacuation plan is the responsibility of

A) Company management B) The government

C) The Health and Safety Committee D) Individual employees

2) Which is the most effective method of reducing contamination to workers ?

A) PPE B) Administration controls

C) Fans D) Engineering controls

3) Which of the following is a major contribution to workplace stress ?

A) Low pay B) Poor working conditions

C) Reasonable work pressures D) Social isolation

4) Which one of the following theories of disaster management informs organizational readiness and response in a disaster ?

A) Hobfoll's theory of conservation of resources

B) The problem-solving "task model"

C) Structure-functional theory

D) Theory of traumatogenic forces

5) Ensuring the safety, health and welfare of the employees is the primary purpose of the

A) Factories Act, 1948 B) Payment of Wages Act, 1936

C) Equal Remuneration Act, 1976 D) Industrial Disputes Act, 1947

P.T.O.

6) All of the following are TRUE about disasters EXCEPT
   A) A disaster may be domestic or International
   B) A disaster may be caused by nature or have human origins
   C) A disaster always receives widespread media coverage
   D) A disaster may have a known and gradual onset
7) Disasters frequently result in all of the following EXCEPT
   A) Damage to the ecological environment
   B) Displacement of populations
   C) Destruction of a population's homeland
   D) Sustained public attention during the recovery phase
8) There are nine tasks in the of *disaster management.* All of the following are tasks of this model EXCEPT
   A) Assess secondary social problems such as health epidemics, displaced persons
   B) Counsel those who have suffered trauma and bereavement
   C) Control rumors, provide accurate information
   D) Provide security, prevent looting, protect person and property
9) The workplace hazard excessive noise may be controlled by :
   A) Air conditioning
   B) Ventilation
   C) Shift work
   D) PPE
10) An emergency that could arise and cause a risk to H&S could include
   A) Fire
   B) Explosion
   C) Chemical spill
   D) All of the above

_____

SLR-EP – 270 (a)

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
SELF LEARNING (Safety Engineering and Disaster Management)

Day and Date : Saturday, 26-11-2016 Marks : 40

Time : 10.00 a.m. to 12.00 Noon

2. Solve **any four** : **(4×5=20)**

   a) What are the various safety considerations to be kept in mind in regard to electrical engineering ?

   b) Discuss contributions of safety engineering on plant productivity.

   c) What are various types of fires ? What are the strategies to be adopted for fire prevention ?

   d) As an engineer how would you describe safety as an essential parameter in designing industrial production system ?

   e) Discuss safety engineering analysis.

3. Solve **any two** : **(2×10=20)**

   a) List all of governmental organisations related to disaster management

   b) What is concept of system safety ? Also discuss safety engineering analysis.

   c) Discuss organization structure of safety department along with role and responsibilities of each position.

Set S

Set S

SLR-EP – 270(C)

Seat No.	

Set **P**

T.E. (Electrical) (Part – II) Examination, 2016
Self Learning
VALUE ENGINEERING

Day and Date : Saturday, 26-11-2016 Total Marks : 50
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) SAVE means
   a) Society of American Value Engineering
   b) Secretary of American Value Engineering
   c) Symbol of American Value Engineering
   d) None of the above

2) Short term planning means
   a) Period up to one year
   b) More than two years
   c) More than one year but less than two years
   d) Period up to three years

3) Planning is the _____ function.
   a) Primary b) Secondary
   c) Both a and b d) None of the above

4) Objective of value analysis
   a) To increase profit b) To decrease efficiency
   c) To reduce cost of production d) Both a and c

5) Which of the following indicators are consider for measuring organizational effectiveness ?
   a) Ability to produce useful results b) Productivity increase
   c) Quality control d) All of the above

P.T.O.

6) Actual cost of the product will not depend on following
   a) Direct material cost
   b) Administrative overheads
   c) Direct labour cost
   d) None of the above

7) Aim of value analysis is
   a) Simplify the product
   b) Modify and improve product design
   c) Save money or increase profit
   d) All of the above

8) Fixed cost of the company includes
   a) Direct productive labour cost
   b) Direct material cost
   c) Staff salaries
   d) Direct expenses

9) Elements of good forecasting method is/are
   a) Accuracy
   b) Simplicity
   c) Availability
   d) All of the above

10) Govt. have offer facilities, incentives, cad concessions to small industries to encourage industrial development is/are
   a) Technical assistance
   b) Tax concession
   c) Power supply
   d) All of the above

_____

SLR-EP – 270(C)

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
Self Learning
VALUE ENGINEERING

Day and Date : Saturday, 26-11-2016 Marks : 40
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

2. Write short notes on **any four** : **(5×4=20)**
   1) Relevance of value in Indian Scenario.
   2) Compare value and cost.
   3) Stages in value analysis.
   4) Waste control.
   5) Reasons for scrap or rejections.
   6) Disposal of unwanted material.

3. Solve **any two** : **(2×10=20)**
   1) Define Value Engineering and brief the advantages of Value Engineering.
   2) Explain different phase of job plan.
   3) Brief the selection procedure for value engineering projects.

Set P

Set P

SLR-EP – 270(C)

Seat No.	

Set **Q**

T.E. (Electrical) (Part – II) Examination, 2016
Self Learning
VALUE ENGINEERING

Day and Date : Saturday, 26-11-2016 Total Marks : 50
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) Elements of good forecasting method is/are
   a) Accuracy b) Simplicity
   c) Availability d) All of the above

2) Govt. have offer facilities, incentives, cad concessions to small industries to encourage industrial development is/are
   a) Technical assistance b) Tax concession
   c) Power supply d) All of the above

3) Aim of value analysis is
   a) Simplify the product b) Modify and improve product design
   c) Save money or increase profit d) All of the above

4) Fixed cost of the company includes
   a) Direct productive labour cost b) Direct material cost
   c) Staff salaries d) Direct expenses

5) SAVE means
   a) Society of American Value Engineering
   b) Secretary of American Value Engineering
   c) Symbol of American Value Engineering
   d) None of the above

6) Short term planning means
   a) Period up to one year
   b) More than two years
   c) More than one year but less than two years
   d) Period up to three years

7) Planning is the _____ function.
   a) Primary
   b) Secondary
   c) Both a and b
   d) None of the above

8) Objective of value analysis
   a) To increase profit
   b) To decrease efficiency
   c) To reduce cost of production
   d) Both a and c

9) Which of the following indicators are consider for measuring organizational effectiveness ?
   a) Ability to produce useful results
   b) Productivity increase
   c) Quality control
   d) All of the above

10) Actual cost of the product will not depend on following
   a) Direct material cost
   b) Administrative overheads
   c) Direct labour cost
   d) None of the above

_____

SLR-EP – 270(C)

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
Self Learning
VALUE ENGINEERING

Day and Date : Saturday, 26-11-2016 Marks : 40
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

2. Write short notes on **any four** : **(5×4=20)**
   1) Relevance of value in Indian Scenario.
   2) Compare value and cost.
   3) Stages in value analysis.
   4) Waste control.
   5) Reasons for scrap or rejections.
   6) Disposal of unwanted material.

3. Solve **any two** : **(2×10=20)**
   1) Define Value Engineering and brief the advantages of Value Engineering.
   2) Explain different phase of job plan.
   3) Brief the selection procedure for value engineering projects.

Set Q

Set Q

SLR-EP – 270(C)

Seat No.	

Set **R**

T.E. (Electrical) (Part – II) Examination, 2016
Self Learning
VALUE ENGINEERING

Day and Date : Saturday, 26-11-2016 Total Marks : 50
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) Which of the following indicators are consider for measuring organizational effectiveness ?
   a) Ability to produce useful results b) Productivity increase
   c) Quality control d) All of the above

2) Actual cost of the product will not depend on following
   a) Direct material cost b) Administrative overheads
   c) Direct labour cost d) None of the above

3) Elements of good forecasting method is/are
   a) Accuracy b) Simplicity
   c) Availability d) All of the above

4) Govt. have offer facilities, incentives, cad concessions to small industries to encourage industrial development is/are
   a) Technical assistance b) Tax concession
   c) Power supply d) All of the above

5) Planning is the _____ function.
   a) Primary b) Secondary
   c) Both a and b d) None of the above

6) Objective of value analysis
   a) To increase profit b) To decrease efficiency
   c) To reduce cost of production d) Both a and c

P.T.O.

7) SAVE means
   a) Society of American Value Engineering
   b) Secretary of American Value Engineering
   c) Symbol of American Value Engineering
   d) None of the above

8) Short term planning means
   a) Period up to one year
   b) More than two years
   c) More than one year but less than two years
   d) Period up to three years

9) Aim of value analysis is
   a) Simplify the product
   b) Modify and improve product design
   c) Save money or increase profit
   d) All of the above

10) Fixed cost of the company includes
   a) Direct productive labour cost
   b) Direct material cost
   c) Staff salaries
   d) Direct expenses

———————

SLR-EP – 270(C)

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
Self Learning
VALUE ENGINEERING

Day and Date : Saturday, 26-11-2016 Marks : 40
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

2. Write short notes on **any four** : **(5×4=20)**
   1) Relevance of value in Indian Scenario.
   2) Compare value and cost.
   3) Stages in value analysis.
   4) Waste control.
   5) Reasons for scrap or rejections.
   6) Disposal of unwanted material.

3. Solve **any two** : **(2×10=20)**
   1) Define Value Engineering and brief the advantages of Value Engineering.
   2) Explain different phase of job plan.
   3) Brief the selection procedure for value engineering projects.

Set R

Set R

SLR-EP – 270(C)

Seat No.	

Set **S**

T.E. (Electrical) (Part – II) Examination, 2016
Self Learning
VALUE ENGINEERING

Day and Date : Saturday, 26-11-2016 Total Marks : 50
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) Planning is the _____ function.
   a) Primary b) Secondary
   c) Both a and b d) None of the above

2) Objective of value analysis
   a) To increase profit b) To decrease efficiency
   c) To reduce cost of production d) Both a and c

3) Which of the following indicators are consider for measuring organizational effectiveness ?
   a) Ability to produce useful results b) Productivity increase
   c) Quality control d) All of the above

4) Actual cost of the product will not depend on following
   a) Direct material cost b) Administrative overheads
   c) Direct labour cost d) None of the above

5) Aim of value analysis is
   a) Simplify the product b) Modify and improve product design
   c) Save money or increase profit d) All of the above

6) Fixed cost of the company includes
   a) Direct productive labour cost b) Direct material cost
   c) Staff salaries d) Direct expenses

P.T.O.

7) Elements of good forecasting method is/are
   a) Accuracy
   b) Simplicity
   c) Availability
   d) All of the above

8) Govt. have offer facilities, incentives, cad concessions to small industries to encourage industrial development is/are
   a) Technical assistance
   b) Tax concession
   c) Power supply
   d) All of the above

9) SAVE means
   a) Society of American Value Engineering
   b) Secretary of American Value Engineering
   c) Symbol of American Value Engineering
   d) None of the above

10) Short term planning means
   a) Period up to one year
   b) More than two years
   c) More than one year but less than two years
   d) Period up to three years

———————

SLR-EP – 270(C)

Seat No.	

T.E. (Electrical) (Part – II) Examination, 2016
Self Learning
VALUE ENGINEERING

Day and Date : Saturday, 26-11-2016 Marks : 40
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

2. Write short notes on **any four** : **(5×4=20)**
   1) Relevance of value in Indian Scenario.
   2) Compare value and cost.
   3) Stages in value analysis.
   4) Waste control.
   5) Reasons for scrap or rejections.
   6) Disposal of unwanted material.

3. Solve **any two** : **(2×10=20)**
   1) Define Value Engineering and brief the advantages of Value Engineering.
   2) Explain different phase of job plan.
   3) Brief the selection procedure for value engineering projects.

Set S

Set S

SLR-EP – 271

Seat No.	

Set **P**

T.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
POWER SYSTEM – II

Day and Date : Saturday, 10-12-2016 Max. Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions:
1) *Assume the suitable data **whenever** necessary.*
2) *Attempt **any two** questions from **each** Section.*
3) *Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) In a power system, each bus is associated with four quantities, namely (1) Real power (2) Reactive power (3) Bus voltage (4) Phase angle. For load flow solutions, among these four the number of quantities to be specified is
a) Any one b) Any two c) Any three d) All four

2) The voltage of a particular bus can be controlled by controlling the
a) Active power of the bus b) Reactive power of the bus
c) Phase angle d) Both a) and b)

3) The bus admittance matrix of the N/W shown in the given figure, for which the marked parameters are per unit impedance is

a) $\begin{pmatrix} 0.3 & 0.2 \\ -0.2 & 0.2 \end{pmatrix}$ b) $\begin{pmatrix} 0.3 & 0.2 \\ 0.2 & 0.2 \end{pmatrix}$ c) $\begin{pmatrix} 0.3 & -0.2 \\ -0.2 & 0.2 \end{pmatrix}$ d) $\begin{pmatrix} 15 & -5 \\ -5 & 5 \end{pmatrix}$

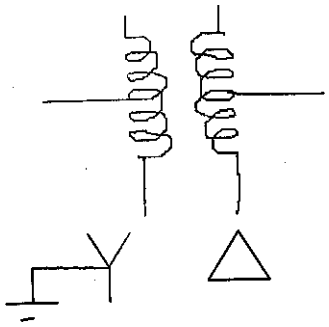
4) Zero sequence currents flow in the transmission line when there is
a) Double line to ground fault
b) An over voltage in the caused by charged loads
c) A line to line fault
d) A fault across all the three lines

5) The value of the expression $1 + \alpha + \alpha^2$ is
a) 0 b) 1 c) – 1 d) 2

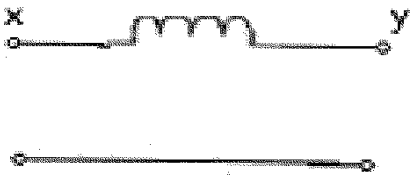
6) In case of balance three phase current, the zero sequence component of current is
a) Minimum b) Maximum
c) Sometimes minimum d) Sometimes maximum

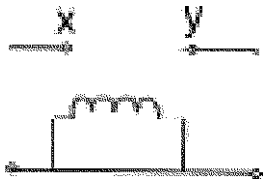
P.T.O.

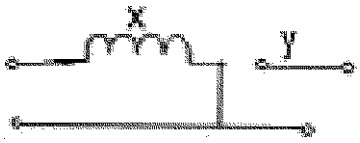
7) For the transformer connections shown below the zero sequence equivalent is



a) 

b) 

c) 

d) 

8) The positive sequence current of the transmission line is
   a) Always zero
   b) 1/3 of negative sequence current
   c) Equal to the negative sequence current
   d) Three time negative sequence current

9) For limiting short circuits we use
   a) Reactors b) Resistors c) Capacitors d) Any of these

10) The impedance per phase of 3 phase transmission line on a base of 100 MVA, 100 kV is 2 PU, the value of this impedance on a base of 400 MVA and 400 kV would be
   a) 1.5 PU b) 1.0 PU c) 0.5 PU d) 0.25 PU

11) Which of the following results in a symmetrical fault ?
   a) Single line to earth
   b) Phase to phase
   c) All the three phases to earth
   d) Two phases to earth

12) The magnitude of the fault current depends upon
   a) Total impedance up to fault
   b) Voltage at the fault point
   c) Load current being supplied before occurrence of the fault
   d) All of the above

13) The stability of the power system is not affected by
   a) Generator reactance b) Line reactance c) Line losses d) Excitation of generator

14) Transient disturbances are caused by
   a) Sudden load changes
   b) Switching operation
   c) Fault in the power system
   d) All of the above

15) Base impedance of power system is given as
   a) X' b) X'' c) X d) 0

16) EMF source is present _____ sequence N/W.
   a) Positive b) Zero c) Negative d) All of the above

17) A zero phase sequence is one in which all phasors are of
   a) Equal in magnitude b) Equal angle c) a) and b) d) All of above

18) Primitive Y matrix is
   a) Singular b) Diagonal c) Sparse d) Null

19) An acceleration factor is used in load flow studies using G-S method to
   a) To increase the number of iterations
   b) To increase the speed of calculations
   c) Both a) and b)
   d) None of above

20) In G-S method the number iterations of the load flow study depend upon
   a) Number of buses b) Tolerance factor c) Slack bus d) None of above

SLR-EP – 271

Seat No.	

T.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
POWER SYSTEM – II

Day and Date : Saturday, 10-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) How buses are classified ?
   2) Starting from the first principle develop the equations for real and reactive bus powers.
   3) What is per unit system ? How the base quantities are selected ?
   4) A generator is rated at 200 MVA, 11 kV. Its reactance is 0.3 PU. Find the PU reactance on 100 MVA, 33 kV base.
   5) Discuss step by step method of formation of γ Bus.
   6) From the Y bus for the G bus system if the line series impedances are as under

Bus	**Impedance (PV)**
1-2	0.15 + j 0.6
1-3	0.1 + j 0.4
1-4	0.15 + j 0.6
2-3	0.05 + j 0.2
3-4	0.05 + j 0.2

3. a) Two generators rated at 10 MVA, 13.2 kV and 15 MVA, 13.2 kV resp. are connected in parallel to a bus. The bus feeds two motors rated at 8 MVA and 12 MVA resp. The rated voltage of motor is 12.5 kV. The reactance of each generator is 15% and that of motor is 20% each. Assume 50 MVA, 13.8 kV base and draw reactance diagram. **10**

   b) Explain the G-S method for solution of non linear algebraic equations. **10**

   OR

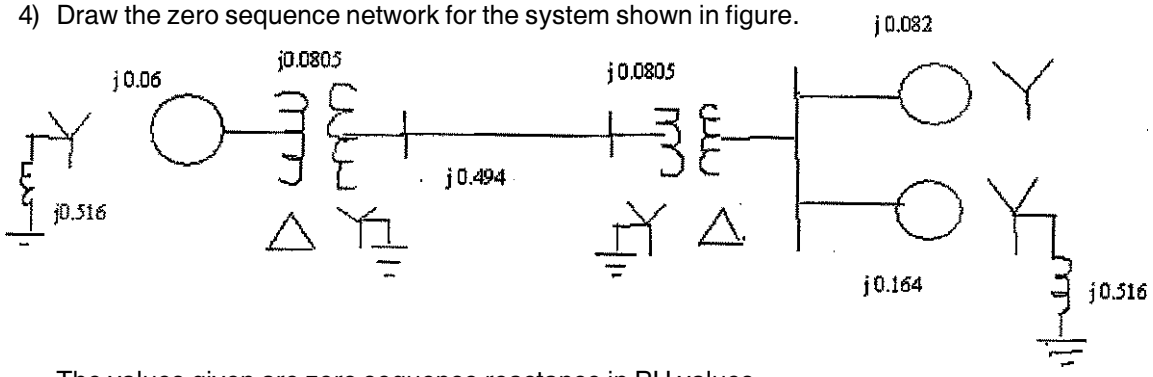
   Differentiate between steady state stability and transient stability. **10**

SECTION – II

4. Solve **any four** : **(4×5=20)**
   1) The line currents in a three phase system are Ia = 2500 < – 90° A, Ib = 2500 < 90° A and Ic = 0. Find the symmetrical components.
   2) A double line to ground fault occurs on the terminals of generator. Determine the symmetrical sub transient line current for X' = X2 = j 0.2 PU and X0 = 0.05 PU. Assume generative neutral is solidly grounded.
   3) What are symmetrical components ?

Set P

4) Draw the zero sequence network for the system shown in figure.



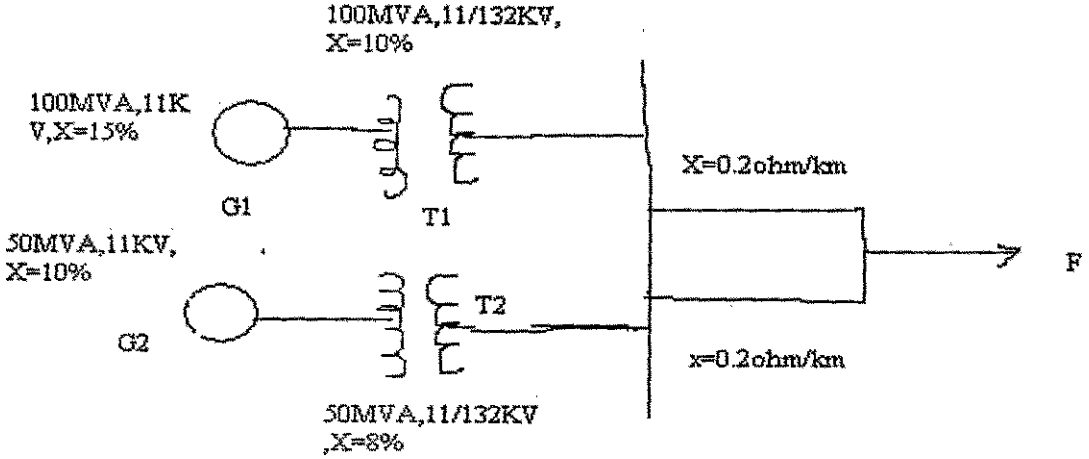
The values given are zero sequence reactance in PU values.

5) Derive the necessary equation to determine the fault current for single line to ground fault. Draw a diagram showing the interconnections of sequence networks.

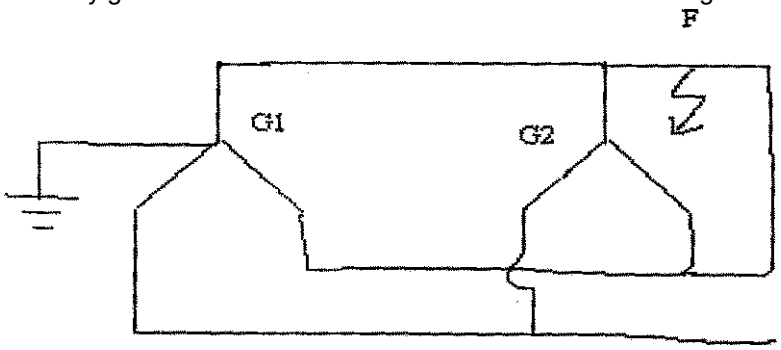
6) Which sequence current flows through ground and ground wires and why ?

5. Solve **any two** : **(10×2=20)**

a) Figure shows generating station feeding a 132 kV system. Determine the total fault current. The line is 200 Km long.



b) Two 11 kV 20 MVA, 3 phase, start connected generators operate in parallel as shown. The positive, negative and zero sequence reactance of each being respectively j0.18, j0.15, j0.1 PV. Assuming the neutral is solidly grounded. Find the fault current for a double line to ground fault.



c) Draw the zero sequence N/W of star/star transformer with star point grounded and delta/delta transformer.

SLR-EP – 271

Seat No.	

Set **Q**

T.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
POWER SYSTEM – II

Day and Date : Saturday, 10-12-2016 Max. Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions:
1) *Assume the suitable data **whenever** necessary.*
2) *Attempt **any two** questions from **each** Section.*
3) *Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) EMF source is present _____ sequence N/W.
a) Positive b) Zero c) Negative d) All of the above

2) A zero phase sequence is one in which all phasors are of
a) Equal in magnitude b) Equal angle c) a) and b) d) All of above

3) Primitive Y matrix is
a) Singular b) Diagonal c) Sparse d) Null

4) An acceleration factor is used in load flow studies using G-S method to
a) To increase the number of iterations b) To increase the speed of calculations
c) Both a) and b) d) None of above

5) In G-S method the number iterations of the load flow study depend upon
a) Number of buses b) Tolerance factor c) Slack bus d) None of above

6) In a power system, each bus is associated with four quantities, namely (1) Real power (2) Reactive power (3) Bus voltage (4) Phase angle. For load flow solutions, among these four the number of quantities to be specified is
a) Any one b) Any two c) Any three d) All four

7) The voltage of a particular bus can be controlled by controlling the
a) Active power of the bus b) Reactive power of the bus
c) Phase angle d) Both a) and b)

8) The bus admittance matrix of the N/W shown in the given figure, for which the marked parameters are per unit impedance is

a) $\begin{pmatrix} 0.3 & 0.2 \\ -0.2 & 0.2 \end{pmatrix}$ b) $\begin{pmatrix} 0.3 & 0.2 \\ 0.2 & 0.2 \end{pmatrix}$ c) $\begin{pmatrix} 0.3 & -0.2 \\ -0.2 & 0.2 \end{pmatrix}$ d) $\begin{pmatrix} 15 & -5 \\ -5 & 5 \end{pmatrix}$

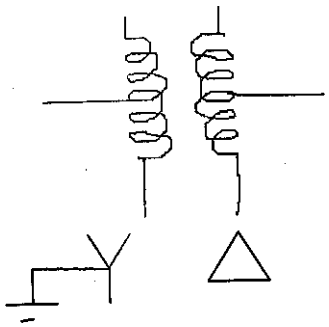
P.T.O.

9) Zero sequence currents flow in the transmission line when there is
   a) Double line to ground fault
   b) An over voltage in the caused by charged loads
   c) A line to line fault
   d) A fault across all the three lines

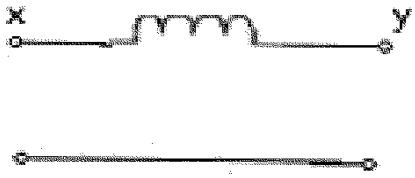
10) The value of the expression $1 + \alpha + \alpha^2$ is
   a) 0 b) 1 c) – 1 d) 2

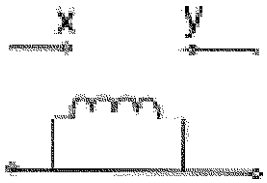
11) In case of balance three phase current, the zero sequence component of current is
   a) Minimum b) Maximum
   c) Sometimes minimum d) Sometimes maximum

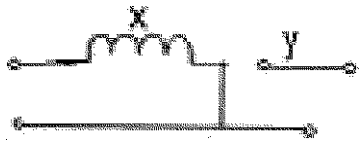
12) For the transformer connections shown below the zero sequence equivalent is



a) 

b) 

c) 

d) 

13) The positive sequence current of the transmission line is
   a) Always zero b) 1/3 of negative sequence current
   c) Equal to the negative sequence current d) Three time negative sequence current

14) For limiting short circuits we use
   a) Reactors b) Resistors c) Capacitors d) Any of these

15) The impedance per phase of 3 phase transmission line on a base of 100 MVA, 100 kV is 2 PU, the value of this impedance on a base of 400 MVA and 400 kV would be
   a) 1.5 PU b) 1.0 PU c) 0.5 PU d) 0.25 PU

16) Which of the following results in a symmetrical fault ?
   a) Single line to earth b) Phase to phase
   c) All the three phases to earth d) Two phases to earth

17) The magnitude of the fault current depends upon
   a) Total impedance up to fault
   b) Voltage at the fault point
   c) Load current being supplied before occurrence of the fault
   d) All of the above

18) The stability of the power system is not affected by
   a) Generator reactance b) Line reactance c) Line losses d) Excitation of generator

19) Transient disturbances are caused by
   a) Sudden load changes b) Switching operation
   c) Fault in the power system d) All of the above

20) Base impedance of power system is given as
   a) X' b) X'' c) X d) 0

SLR-EP – 271

Seat No.	

T.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
POWER SYSTEM – II

Day and Date : Saturday, 10-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) How buses are classified ?
   2) Starting from the first principle develop the equations for real and reactive bus powers.
   3) What is per unit system ? How the base quantities are selected ?
   4) A generator is rated at 200 MVA, 11 kV. Its reactance is 0.3 PU. Find the PU reactance on 100 MVA, 33 kV base.
   5) Discuss step by step method of formation of γ Bus.
   6) From the Y bus for the G bus system if the line series impedances are as under

Bus	**Impedance (PV)**
1-2	0.15 + j 0.6
1-3	0.1 + j 0.4
1-4	0.15 + j 0.6
2-3	0.05 + j 0.2
3-4	0.05 + j 0.2

3. a) Two generators rated at 10 MVA, 13.2 kV and 15 MVA, 13.2 kV resp. are connected in parallel to a bus. The bus feeds two motors rated at 8 MVA and 12 MVA resp. The rated voltage of motor is 12.5 kV. The reactance of each generator is 15% and that of motor is 20% each. Assume 50 MVA, 13.8 kV base and draw reactance diagram. **10**

   b) Explain the G-S method for solution of non linear algebraic equations. **10**

   OR

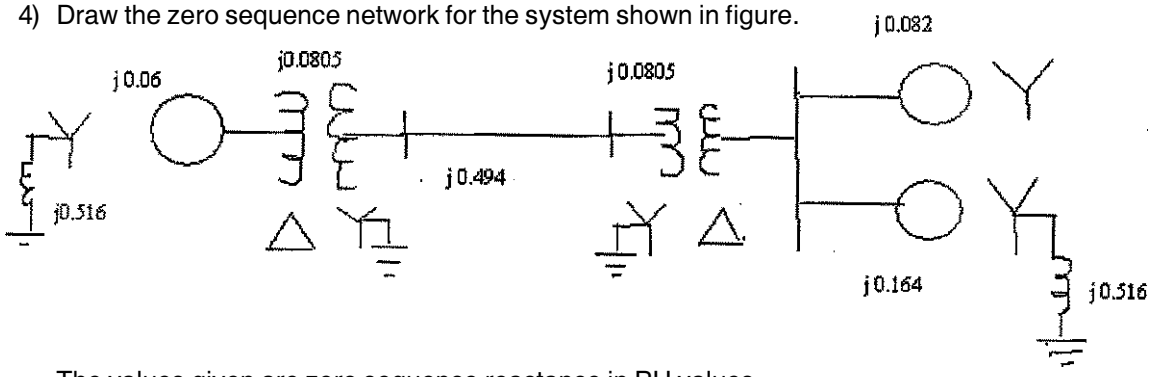
   Differentiate between steady state stability and transient stability. **10**

SECTION – II

4. Solve **any four** : **(4×5=20)**
   1) The line currents in a three phase system are Ia = 2500 < – 90° A, Ib = 2500 < 90° A and Ic = 0. Find the symmetrical components.
   2) A double line to ground fault occurs on the terminals of generator. Determine the symmetrical sub transient line current for X' = X2 = j 0.2 PU and X0 = 0.05 PU. Assume generative neutral is solidly grounded.
   3) What are symmetrical components ?

Set Q

4) Draw the zero sequence network for the system shown in figure.



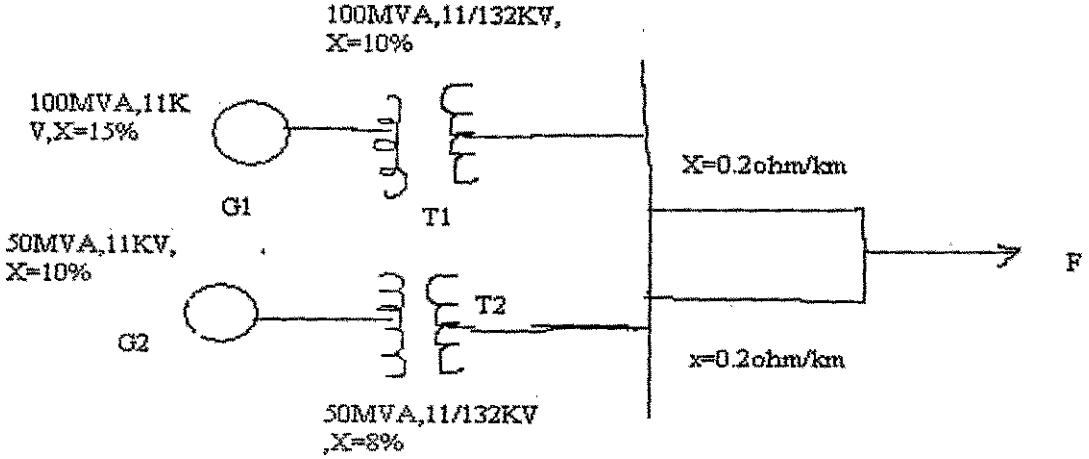
The values given are zero sequence reactance in PU values.

5) Derive the necessary equation to determine the fault current for single line to ground fault. Draw a diagram showing the interconnections of sequence networks.

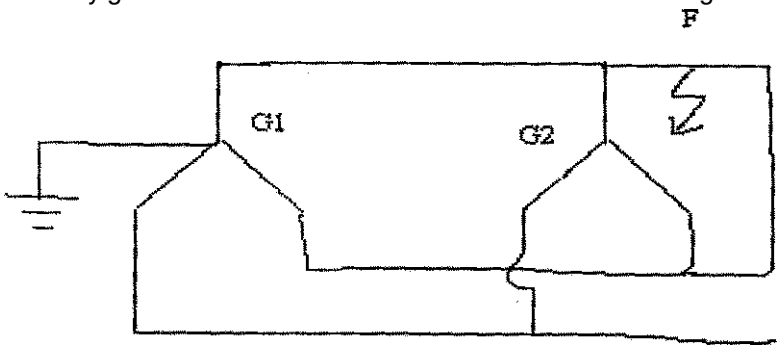
6) Which sequence current flows through ground and ground wires and why ?

5. Solve **any two** : **(10×2=20)**

a) Figure shows generating station feeding a 132 kV system. Determine the total fault current. The line is 200 Km long.



b) Two 11 kV 20 MVA, 3 phase, start connected generators operate in parallel as shown. The positive, negative and zero sequence reactance of each being respectively j0.18, j0.15, j0.1 PV. Assuming the neutral is solidly grounded. Find the fault current for a double line to ground fault.



c) Draw the zero sequence N/W of star/star transformer with star point grounded and delta/delta transformer.

SLR-EP – 271

Seat No.	

Set **R**

T.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
POWER SYSTEM – II

Day and Date : Saturday, 10-12-2016 Max. Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions:
1) *Assume the suitable data* ***whenever*** *necessary.*
2) *Attempt* ***any two*** *questions from* ***each*** *Section.*
3) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Which of the following results in a symmetrical fault ?
a) Single line to earth b) Phase to phase
c) All the three phases to earth d) Two phases to earth

2) The magnitude of the fault current depends upon
a) Total impedance up to fault
b) Voltage at the fault point
c) Load current being supplied before occurrence of the fault
d) All of the above

3) The stability of the power system is not affected by
a) Generator reactance b) Line reactance c) Line losses d) Excitation of generator

4) Transient disturbances are caused by
a) Sudden load changes b) Switching operation
c) Fault in the power system d) All of the above

5) Base impedance of power system is given as
a) X' b) X'' c) X d) 0

6) EMF source is present _____ sequence N/W.
a) Positive b) Zero c) Negative d) All of the above

7) A zero phase sequence is one in which all phasors are of
a) Equal in magnitude b) Equal angle c) a) and b) d) All of above

8) Primitive Y matrix is
a) Singular b) Diagonal c) Sparse d) Null

9) An acceleration factor is used in load flow studies using G-S method to
a) To increase the number of iterations b) To increase the speed of calculations
c) Both a) and b) d) None of above

10) In G-S method the number iterations of the load flow study depend upon
a) Number of buses b) Tolerance factor c) Slack bus d) None of above

11) In a power system, each bus is associated with four quantities, namely (1) Real power (2) Reactive power (3) Bus voltage (4) Phase angle. For load flow solutions, among these four the number of quantities to be specified is
a) Any one b) Any two c) Any three d) All four

P.T.O.

12) The voltage of a particular bus can be controlled by controlling the
   a) Active power of the bus
   b) Reactive power of the bus
   c) Phase angle
   d) Both a) and b)

13) The bus admittance matrix of the N/W shown in the given figure, for which the marked parameters are per unit impedance is

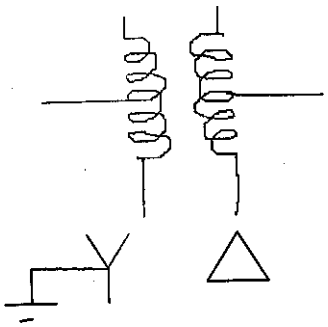
a) $\begin{pmatrix} 0.3 & 0.2 \\ -0.2 & 0.2 \end{pmatrix}$ b) $\begin{pmatrix} 0.3 & 0.2 \\ 0.2 & 0.2 \end{pmatrix}$ c) $\begin{pmatrix} 0.3 & -0.2 \\ -0.2 & 0.2 \end{pmatrix}$ d) $\begin{pmatrix} 15 & -5 \\ -5 & 5 \end{pmatrix}$

14) Zero sequence currents flow in the transmission line when there is
   a) Double line to ground fault
   b) An over voltage in the caused by charged loads
   c) A line to line fault
   d) A fault across all the three lines

15) The value of the expression $1 + \alpha + \alpha^2$ is
   a) 0 b) 1 c) – 1 d) 2

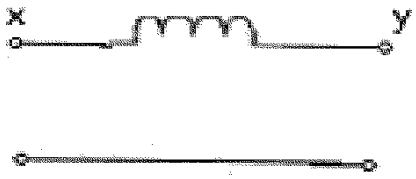
16) In case of balance three phase current, the zero sequence component of current is
   a) Minimum
   b) Maximum
   c) Sometimes minimum
   d) Sometimes maximum

17) For the transformer connections shown below the zero sequence equivalent is

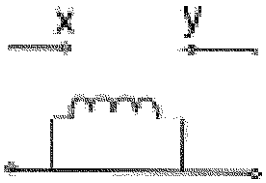


a)

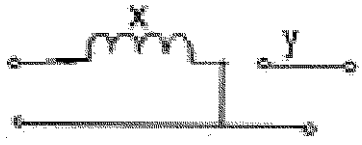
b)



c)



d)



18) The positive sequence current of the transmission line is
   a) Always zero
   b) 1/3 of negative sequence current
   c) Equal to the negative sequence current
   d) Three time negative sequence current

19) For limiting short circuits we use
   a) Reactors b) Resistors c) Capacitors d) Any of these

20) The impedance per phase of 3 phase transmission line on a base of 100 MVA, 100 kV is 2 PU, the value of this impedance on a base of 400 MVA and 400 kV would be
   a) 1.5 PU b) 1.0 PU c) 0.5 PU d) 0.25 PU

SLR-EP – 271

Seat No.	

T.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
POWER SYSTEM – II

Day and Date : Saturday, 10-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) How buses are classified ?
   2) Starting from the first principle develop the equations for real and reactive bus powers.
   3) What is per unit system ? How the base quantities are selected ?
   4) A generator is rated at 200 MVA, 11 kV. Its reactance is 0.3 PU. Find the PU reactance on 100 MVA, 33 kV base.
   5) Discuss step by step method of formation of γ Bus.
   6) From the Y bus for the G bus system if the line series impedances are as under

Bus	**Impedance (PV)**
1-2	0.15 + j 0.6
1-3	0.1 + j 0.4
1-4	0.15 + j 0.6
2-3	0.05 + j 0.2
3-4	0.05 + j 0.2

3. a) Two generators rated at 10 MVA, 13.2 kV and 15 MVA, 13.2 kV resp. are connected in parallel to a bus. The bus feeds two motors rated at 8 MVA and 12 MVA resp. The rated voltage of motor is 12.5 kV. The reactance of each generator is 15% and that of motor is 20% each. Assume 50 MVA, 13.8 kV base and draw reactance diagram. **10**

   b) Explain the G-S method for solution of non linear algebraic equations. **10**

   OR

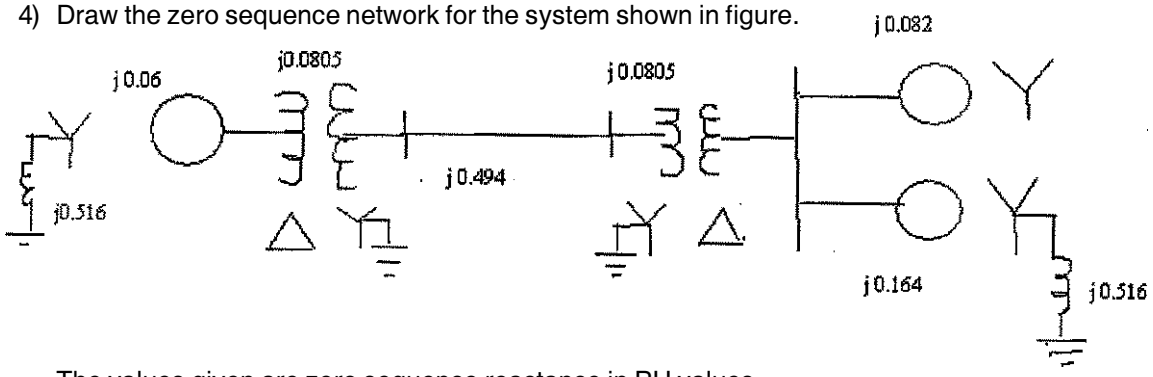
   Differentiate between steady state stability and transient stability. **10**

SECTION – II

4. Solve **any four** : **(4×5=20)**
   1) The line currents in a three phase system are Ia = 2500 < – 90° A, Ib = 2500 < 90° A and Ic = 0. Find the symmetrical components.
   2) A double line to ground fault occurs on the terminals of generator. Determine the symmetrical sub transient line current for X' = X2 = j 0.2 PU and X0 = 0.05 PU. Assume generative neutral is solidly grounded.
   3) What are symmetrical components ?

Set R

4) Draw the zero sequence network for the system shown in figure.



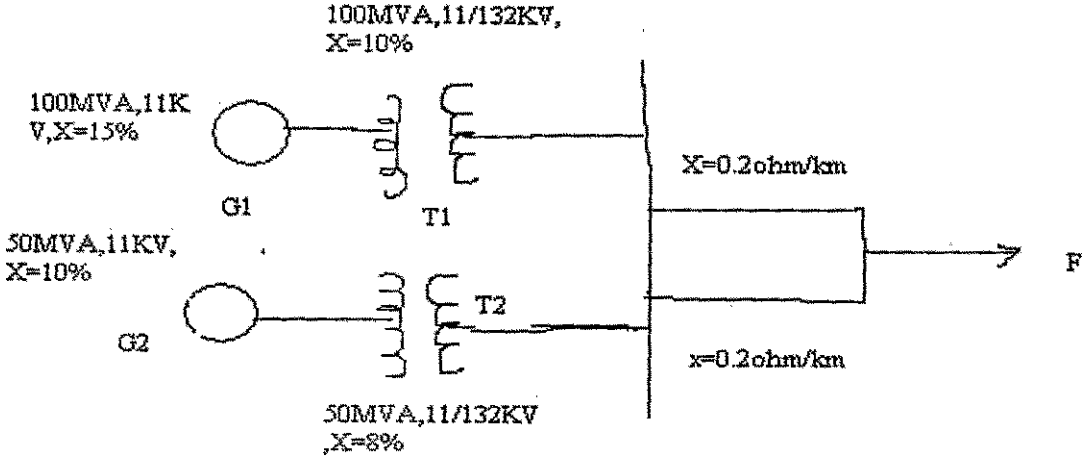
The values given are zero sequence reactance in PU values.

5) Derive the necessary equation to determine the fault current for single line to ground fault. Draw a diagram showing the interconnections of sequence networks.

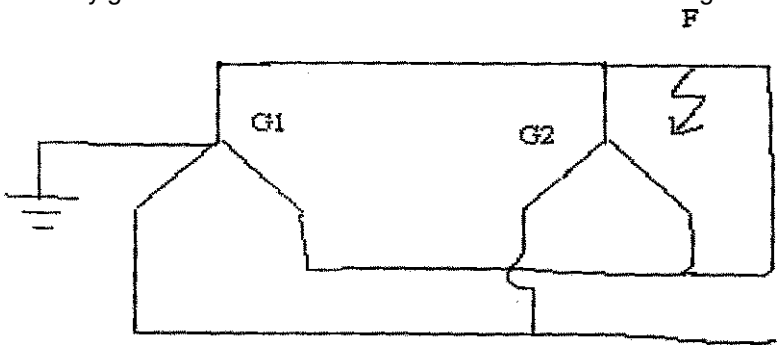
6) Which sequence current flows through ground and ground wires and why ?

5. Solve **any two** : **(10×2=20)**

a) Figure shows generating station feeding a 132 kV system. Determine the total fault current. The line is 200 Km long.



b) Two 11 kV 20 MVA, 3 phase, start connected generators operate in parallel as shown. The positive, negative and zero sequence reactance of each being respectively j0.18, j0.15, j0.1 PV. Assuming the neutral is solidly grounded. Find the fault current for a double line to ground fault.



c) Draw the zero sequence N/W of star/star transformer with star point grounded and delta/delta transformer.

Set R

SLR-EP – 271

Seat No.	

Set **S**

T.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
POWER SYSTEM – II

Day and Date : Saturday, 10-12-2016 Max. Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions *:*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) In case of balance three phase current, the zero sequence component of current is
   a) Minimum b) Maximum
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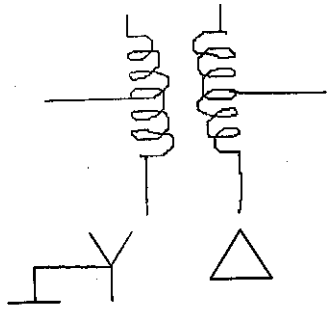
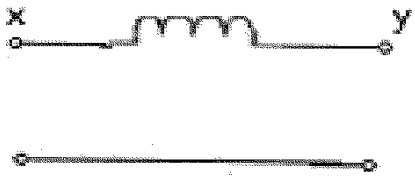
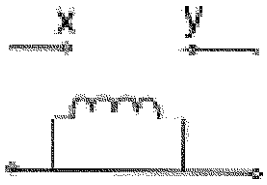
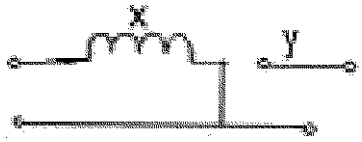


a) 

b) 

c) 

d) 

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P.T.O.

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19) Zero sequence currents flow in the transmission line when there is
   a) Double line to ground fault
   b) An over voltage in the caused by charged loads
   c) A line to line fault
   d) A fault across all the three lines

20) The value of the expression $1 + \alpha + \alpha^2$ is
   a) 0 b) 1 c) – 1 d) 2

SLR-EP – 271

Seat No.	

T.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
POWER SYSTEM – II

Day and Date : Saturday, 10-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) How buses are classified ?
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   5) Discuss step by step method of formation of γ Bus.
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Bus	**Impedance (PV)**
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3. a) Two generators rated at 10 MVA, 13.2 kV and 15 MVA, 13.2 kV resp. are connected in parallel to a bus. The bus feeds two motors rated at 8 MVA and 12 MVA resp. The rated voltage of motor is 12.5 kV. The reactance of each generator is 15% and that of motor is 20% each. Assume 50 MVA, 13.8 kV base and draw reactance diagram. **10**

   b) Explain the G-S method for solution of non linear algebraic equations. **10**

   OR

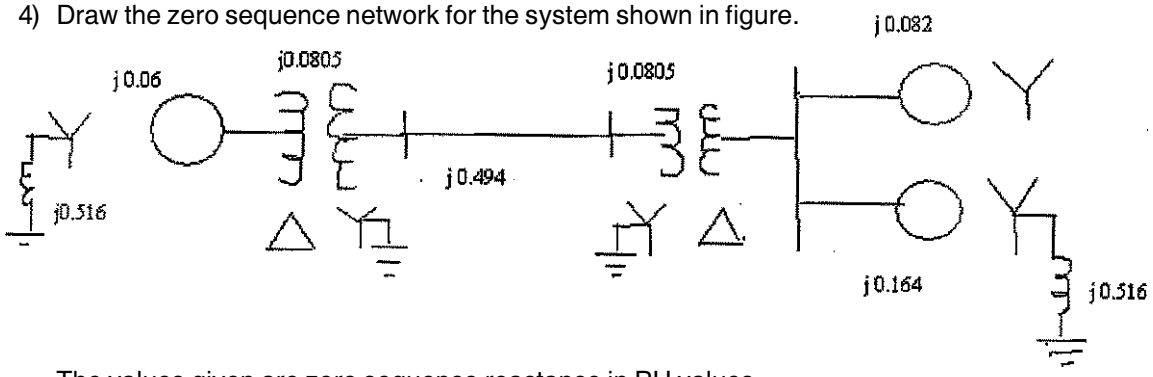
   Differentiate between steady state stability and transient stability. **10**

SECTION – II

4. Solve **any four** : **(4×5=20)**
   1) The line currents in a three phase system are Ia = 2500 < – 90° A, Ib = 2500 < 90° A and Ic = 0. Find the symmetrical components.
   2) A double line to ground fault occurs on the terminals of generator. Determine the symmetrical sub transient line current for X' = X2 = j 0.2 PU and X0 = 0.05 PU. Assume generative neutral is solidly grounded.
   3) What are symmetrical components ?

Set S

4) Draw the zero sequence network for the system shown in figure.



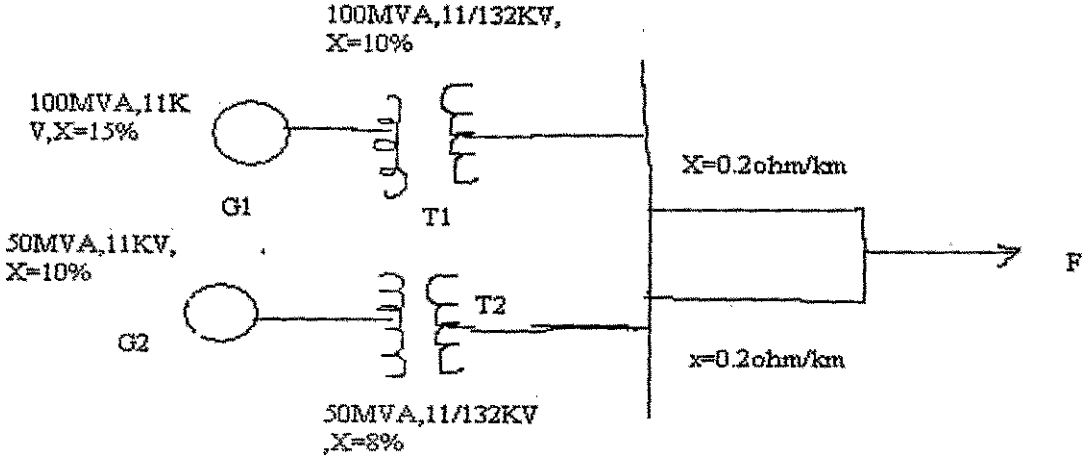
The values given are zero sequence reactance in PU values.

5) Derive the necessary equation to determine the fault current for single line to ground fault. Draw a diagram showing the interconnections of sequence networks.

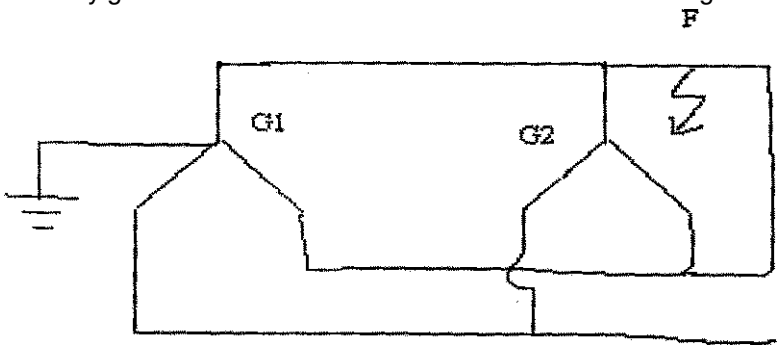
6) Which sequence current flows through ground and ground wires and why ?

5. Solve **any two** : **(10×2=20)**

a) Figure shows generating station feeding a 132 kV system. Determine the total fault current. The line is 200 Km long.



b) Two 11 kV 20 MVA, 3 phase, start connected generators operate in parallel as shown. The positive, negative and zero sequence reactance of each being respectively j0.18, j0.15, j0.1 PV. Assuming the neutral is solidly grounded. Find the fault current for a double line to ground fault.



c) Draw the zero sequence N/W of star/star transformer with star point grounded and delta/delta transformer.

SLR-EP – 272

Seat No.	

Set P

T.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Wednesday, 14-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) If f be the frequency then dielectric loss is proportional to
a) f b) f^2 c) 1/f d) $1/f^2$

2) For arc heating, the electrodes are made of
a) Copper b) Aluminum c) Graphite d) ACSR conductor

3) Desirable property of resistance heating element is
a) Low temperature coefficient b) High resistivity
c) High melting point d) All of the above

4) Which of the following is different from the remaining ?
a) Spot welding b) Seam welding
c) Butt welding d) Argon arc welding

5) Following weldings are varieties of resistance welding
a) Seam welding b) Butt welding c) Spot welding d) All of the above

6) In welding transformers taps are provided on
a) Primary side b) Secondary side c) Both d) None of above

7) Which motor has relatively wider range of speed control ?
a) D.C. Shunt motor b) Synchronous motor
c) Slip ring I.M. d) Squirrel cage I.M.

8) Flame proof motors are used in
a) Mines b) Steel mills c) Paper mills d) Moist atmosphere

9) Radiant efficiency of the luminous source depends on
a) Shape of the source b) Temperature of the source
c) Wavelength of light rays d) All of the above

P.T.O.

10) Candela is the unit of
a) Luminous flux b) Luminous intensity
c) Wavelength d) None of the above

11) Halogen lamps are useful for the illumination of
a) Sports grounds b) Parks c) Airports d) All of the above

12) One lux is the same as
a) one lumen/sq.cm. b) one lumen/sq.m.
c) one lumen 100 sq.m. d) one lumen/1000 sq.m.

13) An electric train is to have a braking retardation of 3.2 kmph. The ratio of maximum speed to average speed is 1.3, the time for stop is 26 seconds and acceleration is 0.8 kmph. The run is 1.5 km. Actual time of run is
a) 77 seconds b) 101 seconds
c) 154 seconds d) 231 seconds

14) Energy consumption in propelling the train is required for
a) acceleration
b) work against gravity while moving up the gradient
c) work against the resistance to motion
d) all of the above

15) Quadrilateral speed-time curve is the closer approximation for
a) main line service b) suburban service
c) urban service d) urban and suburban service

16) Which motor is used in tramways ?
a) AC single phase capacitor start motor b) AC three phase motor
c) DC series motor d) DC shunt motor

17) The coefficient of adhesion is
a) same on ac and dc traction systems
b) high in case of dc traction and low in ac traction
c) low in case of ac traction and high in dc traction
d) none of above

18) Free running and coasting periods arc generally long in ease if
a) urban service b) sub-urban service
c) main-line service d) all of the above

19) Which of the following factor affects specific energy consumption ?
a) Distance between stops b) Gradient
c) Retardation and acceleration values d) All of the above

20) The advantage of electric traction over other methods is
a) no pollution problems b) faster acceleration
c) better braking action d) all of the above

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SLR-EP – 272

Seat No.	

T.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Wednesday, 14-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Make suitable assumptions if ***necessary****.*

SECTION – I

2. Solve **any four** : **(5×4=20)**
   a) Explain selection of motors for textile industries.
   b) Explain four Quadrant Operation of Electric Motors.
   c) Explain dielectric heating.
   d) Explain how flood lighting is providing.
   e) Explain Ultrasonic Welding.

3. Solve **any two**: **(10×2=20)**
   a) What is polar curve ? How it is useful to and illumination engineer ?
   b) Explain construction and working of SV and MV Lamps.
   c) State and explain laws of illumination.

SECTION – II

4. Solve **any four** : **(5×4=20)**
   a) Explain quadrilateral speed time curve.
   b) Explain the factor affecting specific energy consumption of an electric train.
   c) Explain principle of energy conservation.
   d) Explain various methods of electric braking.
   e) Explain dead weight, accelerating weight and adhesive weight.

5. Solve **any two** : **(10×2=20)**
   a) Explain energy conservation legislation.
   b) Write an short note on :
      i) Electric braking
      ii) Regenerative braking
      iii) Plugging.
   c) Draw a typical speed time curve for an electric train and explain crest speed, average speed, schedule speed, acceleration and retardation.

———————

Set P

Set P

SLR-EP – 272

Seat No.	

Set Q

T.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Wednesday, 14-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which motor is used in tramways ?
   a) AC single phase capacitor start motor b) AC three phase motor
   c) DC series motor d) DC shunt motor

2) The coefficient of adhesion is
   a) same on ac and dc traction systems
   b) high in case of dc traction and low in ac traction
   c) low in case of ac traction and high in dc traction
   d) none of above

3) Free running and coasting periods arc generally long in ease if
   a) urban service b) sub-urban service
   c) main-line service d) all of the above

4) Which of the following factor affects specific energy consumption ?
   a) Distance between stops b) Gradient
   c) Retardation and acceleration values d) All of the above

5) The advantage of electric traction over other methods is
   a) no pollution problems b) faster acceleration
   c) better braking action d) all of the above

6) If f be the frequency then dielectric loss is proportional to
   a) f b) f^2 c) 1/f d) $1/f^2$

7) For arc heating, the electrodes are made of
   a) Copper b) Aluminum c) Graphite d) ACSR conductor

8) Desirable property of resistance heating element is
   a) Low temperature coefficient b) High resistivity
   c) High melting point d) All of the above

P.T.O.

9) Which of the following is different from the remaining ?
   a) Spot welding b) Seam welding
   c) Butt welding d) Argon arc welding

10) Following weldings are varieties of resistance welding
   a) Seam welding b) Butt welding c) Spot welding d) All of the above

11) In welding transformers taps are provided on
   a) Primary side b) Secondary side c) Both d) None of above

12) Which motor has relatively wider range of speed control ?
   a) D.C. Shunt motor b) Synchronous motor
   c) Slip ring I.M. d) Squirrel cage I.M.

13) Flame proof motors are used in
   a) Mines b) Steel mills c) Paper mills d) Moist atmosphere

14) Radiant efficiency of the luminous source depends on
   a) Shape of the source b) Temperature of the source
   c) Wavelength of light rays d) All of the above

15) Candela is the unit of
   a) Luminous flux b) Luminous intensity
   c) Wavelength d) None of the above

16) Halogen lamps are useful for the illumination of
   a) Sports grounds b) Parks c) Airports d) All of the above

17) One lux is the same as
   a) one lumen/sq.cm. b) one lumen/sq.m.
   c) one lumen 100 sq.m. d) one lumen/1000 sq.m.

18) An electric train is to have a braking retardation of 3.2 kmph. The ratio of maximum speed to average speed is 1.3, the time for stop is 26 seconds and acceleration is 0.8 kmph. The run is 1.5 km. Actual time of run is
   a) 77 seconds b) 101 seconds
   c) 154 seconds d) 231 seconds

19) Energy consumption in propelling the train is required for
   a) acceleration
   b) work against gravity while moving up the gradient
   c) work against the resistance to motion
   d) all of the above

20) Quadrilateral speed-time curve is the closer approximation for
   a) main line service b) suburban service
   c) urban service d) urban and suburban service

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SLR-EP – 272

Seat No.	

T.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Wednesday, 14-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Make suitable assumptions if ***necessary****.*

SECTION – I

2. Solve **any four** : **(5×4=20)**
   a) Explain selection of motors for textile industries.
   b) Explain four Quadrant Operation of Electric Motors.
   c) Explain dielectric heating.
   d) Explain how flood lighting is providing.
   e) Explain Ultrasonic Welding.

3. Solve **any two**: **(10×2=20)**
   a) What is polar curve ? How it is useful to and illumination engineer ?
   b) Explain construction and working of SV and MV Lamps.
   c) State and explain laws of illumination.

SECTION – II

4. Solve **any four** : **(5×4=20)**
   a) Explain quadrilateral speed time curve.
   b) Explain the factor affecting specific energy consumption of an electric train.
   c) Explain principle of energy conservation.
   d) Explain various methods of electric braking.
   e) Explain dead weight, accelerating weight and adhesive weight.

5. Solve **any two** : **(10×2=20)**
   a) Explain energy conservation legislation.
   b) Write an short note on :
      i) Electric braking
      ii) Regenerative braking
      iii) Plugging.
   c) Draw a typical speed time curve for an electric train and explain crest speed, average speed, schedule speed, acceleration and retardation.

Set Q

Set Q

SLR-EP – 272

Seat No.	

Set R

T.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Wednesday, 14-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Halogen lamps are useful for the illumination of
a) Sports grounds b) Parks c) Airports d) All of the above

2) One lux is the same as
a) one lumen/sq.cm. b) one lumen/sq.m.
c) one lumen 100 sq.m. d) one lumen/1000 sq.m.

3) An electric train is to have a braking retardation of 3.2 kmph. The ratio of maximum speed to average speed is 1.3, the time for stop is 26 seconds and acceleration is 0.8 kmph. The run is 1.5 km. Actual time of run is
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b) work against gravity while moving up the gradient
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d) all of the above

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b) high in case of dc traction and low in ac traction
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P.T.O.

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   a) Distance between stops b) Gradient
   c) Retardation and acceleration values d) All of the above

10) The advantage of electric traction over other methods is
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   c) better braking action d) all of the above

11) If f be the frequency then dielectric loss is proportional to
   a) f b) f^2 c) 1/f d) $1/f^2$

12) For arc heating, the electrodes are made of
   a) Copper b) Aluminum c) Graphite d) ACSR conductor

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   a) Low temperature coefficient b) High resistivity
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16) In welding transformers taps are provided on
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17) Which motor has relatively wider range of speed control ?
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18) Flame proof motors are used in
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19) Radiant efficiency of the luminous source depends on
   a) Shape of the source b) Temperature of the source
   c) Wavelength of light rays d) All of the above

20) Candela is the unit of
   a) Luminous flux b) Luminous intensity
   c) Wavelength d) None of the above

SLR-EP – 272

Seat No.	

T.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Wednesday, 14-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
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SECTION – I

2. Solve **any four** : **(5×4=20)**
   a) Explain selection of motors for textile industries.
   b) Explain four Quadrant Operation of Electric Motors.
   c) Explain dielectric heating.
   d) Explain how flood lighting is providing.
   e) Explain Ultrasonic Welding.

3. Solve **any two**: **(10×2=20)**
   a) What is polar curve ? How it is useful to and illumination engineer ?
   b) Explain construction and working of SV and MV Lamps.
   c) State and explain laws of illumination.

SECTION – II

4. Solve **any four** : **(5×4=20)**
   a) Explain quadrilateral speed time curve.
   b) Explain the factor affecting specific energy consumption of an electric train.
   c) Explain principle of energy conservation.
   d) Explain various methods of electric braking.
   e) Explain dead weight, accelerating weight and adhesive weight.

5. Solve **any two** : **(10×2=20)**
   a) Explain energy conservation legislation.
   b) Write an short note on :
      i) Electric braking
      ii) Regenerative braking
      iii) Plugging.
   c) Draw a typical speed time curve for an electric train and explain crest speed, average speed, schedule speed, acceleration and retardation.

Set R

Set R

SLR-EP – 272

Seat No.	

Set S

T.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Wednesday, 14-12-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) In welding transformers taps are provided on
a) Primary side b) Secondary side c) Both d) None of above

2) Which motor has relatively wider range of speed control ?
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c) 154 seconds d) 231 seconds

P.T.O.

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SLR-EP – 272

Seat No.	

T.E. (Part – II) (Electrical Engineering) (Old) Examination, 2016
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Wednesday, 14-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
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SECTION – I

2. Solve **any four** : **(5×4=20)**
   a) Explain selection of motors for textile industries.
   b) Explain four Quadrant Operation of Electric Motors.
   c) Explain dielectric heating.
   d) Explain how flood lighting is providing.
   e) Explain Ultrasonic Welding.

3. Solve **any two**: **(10×2=20)**
   a) What is polar curve ? How it is useful to and illumination engineer ?
   b) Explain construction and working of SV and MV Lamps.
   c) State and explain laws of illumination.

SECTION – II

4. Solve **any four** : **(5×4=20)**
   a) Explain quadrilateral speed time curve.
   b) Explain the factor affecting specific energy consumption of an electric train.
   c) Explain principle of energy conservation.
   d) Explain various methods of electric braking.
   e) Explain dead weight, accelerating weight and adhesive weight.

5. Solve **any two** : **(10×2=20)**
   a) Explain energy conservation legislation.
   b) Write an short note on :
      i) Electric braking
      ii) Regenerative braking
      iii) Plugging.
   c) Draw a typical speed time curve for an electric train and explain crest speed, average speed, schedule speed, acceleration and retardation.

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Set S

Set S

SLR-EP – 273

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) (New) Examination, 2016
ELECTRICAL DRIVES AND CONTROL

Day and Date : Tuesday, 29-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) For the motor to deliver a torque of 2.5 Nm at 1400 rpm, the armature voltage to be applied is
A) 125.5 V B) 193.3 V C) 200 V D) 241.7 V

2) The consideration involved in the selection of the type of electric drive for a particular application depends on
A) Speed control range and its nature B) Running torque
C) Power rating D) All of the above

3) In a constant power type load
A) Torque is proportional to speed
B) Torque is proportional to square of speed
C) Torque is inversely proportional to speed
D) Torque is independent of speed

4) The power consumption in case of centrifugal loads like pump, proportional to
A) Cube of speed B) Square of speed
C) Speed D) Not applicable

5) During acceleration of motor
A) Dynamic torque opposes developed torque
B) Dynamic torque assists developed torque
C) Dynamic torque and developed torque is equal
D) None of the above

6) Applications of dc motor is restricted to a few load speed applications because of
A) Cost of motor is high B) Mechanical commutation problems
C) Maintenance problem D) All of the above

7) A separately excited dc motor when fed from 1 phase full converter runs at speed of 1200 rpm. Load current remains continuous. If one of the four SCRs get open circuited the motor speed will reduce to
A) 600 rpm B) 900 rpm C) 800 rpm D) 400 rpm

P.T.O.

8) Regenerative braking of DC motor is achieved by
   A) Phase controlled rectifiers B) Inverter
   C) Cyclo-converter D) Chopper

9) Conduction period for the SCR in a 3-phase full converter connected to a highly inductive load is
   A) 120 degrees B) 60 degrees C) 180 degrees D) 360 degrees

10) Reduction in supply voltage by 10% will change the torque of motor by
   A) 38% B) 19% C) 9.5% D) No change

11) Output power requirements of constant torque loads vary with
   A) Speed B) Voltage C) Current D) Power factor

12) Efficiency by using rotor resistance control in IM is
   A) High B) Low C) Very high D) Very low

13) In single pulse modulation of PWM inverter fifth harmonic can be eliminated if pulse width is equal to
   A) 30° B) 72° C) 36° D) 108°

14) For plugging of IM the slip range is
   A) 0 to 1 B) Less than 0 C) 2-S D) Both A) and B)

15) A delta connected IM being fed by a three phase AC to DC inverter and operated in constant V/f mode requires during starting
   A) Star delta starter B) Autotransformer starter
   C) Rotor resistance starter D) DOL starter

16) 5% increase in supply frequency will change the speed of motor by
   A) – 5% B) + 5% C) – 10% D) + 10%

17) The advantage of a synchronous motor in addition to its constant speed is
   A) High power factor B) Better efficiency
   C) Lower cost D) All of the above

18) BLDC motor drive will be fed from
   A) 0° conduction mode of inverter B) 120° conduction mode of inverter
   C) 60° conduction mode of inverter D) 180° conduction mode of inverter

19) The efficiency of reluctance motor is around
   A) 95% B) 90% C) 75 to 85% D) 60 to 75%

20) For 1.8° step, two phase bipolar stepper motor, the stepping rate is 100 steps/sec. the rotational speed of motor in rpm is
   A) 15 rpm B) 30 rpm C) 60 rpm D) 90 rpm

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SLR-EP – 273

Seat No.	

B.E. (Electrical) (Part – I) (New) Examination, 2016
ELECTRICAL DRIVES AND CONTROL

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) What is overloading factor ? Derive expression of it for short time duty of motor rating.

b) Explain with suitable example why steady state stability of a drive depends on the relative characteristics of the motor.

c) A 220 V, 24 A, 100 rpm DC shunt motor has an armature resistance of 2Ω. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230 V. Calculate duty ratio for 1.2 times rated torque and 500 rpm.

d) A motor – load system has torque of T = 400-0.4 N, N-m where N is speed in rpm. A load of ± 200 N-m is coupled with motor. Calculate the motor speed for motoring and braking operations in the forward directions.

e) Explain how regenerative braking is employed for DC series motor.

3. Solve following : **(2×10=20)**

a) Explain speed torque characteristics for following speed transitions :
   i) Increase in speed in same direction
   ii) Decrease in speed
   iii) Speed reversal.

b) A 220 V, 1500 rpm, 50 A separately excited dc motor with armature resistance of 0.5Ω is fed from a three phase fully controlled rectifier. Available source voltage is 440 V, 50 Hz. A star delta transformer is used to fed armature then calculate transformer turns ratio. Also calculate converter firing angles if same motor is fed from dual converter with source voltage of 165 V when operating under motoring and braking operation at a rated motor torque and ± 1000 rpm.

OR

b) A 220 V, 1200 rpm,15 A separately excited dc motor has armature circuit resistance and inductance of 1.8 ohm and 32 mH, respectively. It is fed from a single phase fully controlled rectifier with an ac source voltage of 230 V, 50 Hz calculate
   a) Motor torque for $\alpha = 60°$ and speed = 450 rpm
   b) Motor speed for $\alpha = 45°$ and T = 40 N-m.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) A 400 V, 3 phase, 50 Hz, 6 pole star connected induction motor has following parameters referred to stator :

$R_s = 0.5$ ohm, $R_r' = 0.4$ ohm, $X_s = 1.2$ ohm, $X_r' = 1.2$ ohm, $X_m = 50$ ohm.

Stator to rotor turns ratio is 3.5 motor is controlled by static rotor resistance control. External resistance is chosen such that the breakdown torque is produced at standstill for a duty ratio of zero. Calculate the value of external resistance.

b) Explain bipolar drive for permanent magnet and hybrid motors.

c) Explain with block diagram indirect vector control.

d) A 500 kW, three phase 3.3 kV, 50 Hz, 0.8 lagging power factor, 4 pole star connected synchronous motor has $X_s = 15$ ohm. Neglect stator resistance and determine for regenerative braking operation, braking torque and field current for rated current and unity power factor.

e) With neat sketch explain the operation of regenerative breaking with VSI fed induction motor.

5. Solve **any two** : **(2×10=20)**

a) A 440 V, 3 phase, 50 Hz, 6 pole 945 rpm delta connected induction motor has following parameters referred to stator :

$R_s = 2$ ohm, $R_r' = 2$ ohm, $X_s = 3$ ohm, $X_r' = 4$ ohm.

When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine

i) Motor terminal voltage, current and torque at 800 rpm.

ii) Motor speed, current and torque for the terminal voltage of 280 V.

b) A 440 V, 3 phase, 50 Hz, 6 pole 970 rpm star connected wound rotor induction motor has following parameters referred to stator :

$R_s = 0.1$ ohm, $R_r' = 0.08$ ohm, $X_s = 0.3$ ohm, $X_r' = 0.4$ ohm.

The stator to rotor turns ratio is 2.

The motor speed is controlled by static scherbius drive. Drive is designed for a speed range of 25% below the synchronous speed. Maximum value of firing angle is 165°. Determine

i) torque for a speed of 780 rpm and $\alpha = 140°$

ii) firing angle for half the rated torque and speed of 800 rpm.

Dc link inductor has a resistance of 0.01 ohm.

c) Draw circuit diagram and output waveform and explain with torque equation brushless dc motor drive for servo application.

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SLR-EP – 273

Seat No.	

Set **Q**

B.E. (Electrical) (Part – I) (New) Examination, 2016
ELECTRICAL DRIVES AND CONTROL

Day and Date : Tuesday, 29-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) 5% increase in supply frequency will change the speed of motor by
A) – 5% B) + 5% C) – 10% D) + 10%

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A) High power factor B) Better efficiency
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3) BLDC motor drive will be fed from
A) 0° conduction mode of inverter B) 120° conduction mode of inverter
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SLR-EP – 273

Seat No.	

B.E. (Electrical) (Part – I) (New) Examination, 2016
ELECTRICAL DRIVES AND CONTROL

Day and Date : Tuesday, 29-11-2016 Marks : 80
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SECTION – I

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a) What is overloading factor ? Derive expression of it for short time duty of motor rating.

b) Explain with suitable example why steady state stability of a drive depends on the relative characteristics of the motor.

c) A 220 V, 24 A, 100 rpm DC shunt motor has an armature resistance of 2Ω. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230 V. Calculate duty ratio for 1.2 times rated torque and 500 rpm.

d) A motor – load system has torque of T = 400-0.4 N, N-m where N is speed in rpm. A load of ± 200 N-m is coupled with motor. Calculate the motor speed for motoring and braking operations in the forward directions.

e) Explain how regenerative braking is employed for DC series motor.

3. Solve following : **(2×10=20)**

a) Explain speed torque characteristics for following speed transitions :
   i) Increase in speed in same direction
   ii) Decrease in speed
   iii) Speed reversal.

b) A 220 V, 1500 rpm, 50 A separately excited dc motor with armature resistance of 0.5Ω is fed from a three phase fully controlled rectifier. Available source voltage is 440 V, 50 Hz. A star delta transformer is used to fed armature then calculate transformer turns ratio. Also calculate converter firing angles if same motor is fed from dual converter with source voltage of 165 V when operating under motoring and braking operation at a rated motor torque and ± 1000 rpm.

OR

b) A 220 V, 1200 rpm,15 A separately excited dc motor has armature circuit resistance and inductance of 1.8 ohm and 32 mH, respectively. It is fed from a single phase fully controlled rectifier with an ac source voltage of 230 V, 50 Hz calculate
   a) Motor torque for $\alpha = 60°$ and speed = 450 rpm
   b) Motor speed for $\alpha = 45°$ and T = 40 N-m.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) A 400 V, 3 phase, 50 Hz, 6 pole star connected induction motor has following parameters referred to stator :

R_s = 0.5 ohm, R'_r = 0.4 ohm, X_s = 1.2 ohm, X'_r = 1.2 ohm, X_m = 50 ohm.

Stator to rotor turns ratio is 3.5 motor is controlled by static rotor resistance control. External resistance is chosen such that the breakdown torque is produced at standstill for a duty ratio of zero. Calculate the value of external resistance.

b) Explain bipolar drive for permanent magnet and hybrid motors.

c) Explain with block diagram indirect vector control.

d) A 500 kW, three phase 3.3 kV, 50 Hz, 0.8 lagging power factor, 4 pole star connected synchronous motor has X_s = 15 ohm. Neglect stator resistance and determine for regenerative braking operation, braking torque and field current for rated current and unity power factor.

e) With neat sketch explain the operation of regenerative breaking with VSI fed induction motor.

5. Solve **any two** : **(2×10=20)**

a) A 440 V, 3 phase, 50 Hz, 6 pole 945 rpm delta connected induction motor has following parameters referred to stator :

R_s = 2 ohm, R'_r = 2 ohm, X_s = 3 ohm, X'_r = 4 ohm.

When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine

i) Motor terminal voltage, current and torque at 800 rpm.

ii) Motor speed, current and torque for the terminal voltage of 280 V.

b) A 440 V, 3 phase, 50 Hz, 6 pole 970 rpm star connected wound rotor induction motor has following parameters referred to stator :

R_s = 0.1 ohm, R'_r = 0.08 ohm, X_s = 0.3 ohm, X'_r = 0.4 ohm.

The stator to rotor turns ratio is 2.

The motor speed is controlled by static scherbius drive. Drive is designed for a speed range of 25% below the synchronous speed. Maximum value of firing angle is 165°. Determine

i) torque for a speed of 780 rpm and α = 140°

ii) firing angle for half the rated torque and speed of 800 rpm.

Dc link inductor has a resistance of 0.01 ohm.

c) Draw circuit diagram and output waveform and explain with torque equation brushless dc motor drive for servo application.

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SLR-EP – 273

Seat No.	

Set **R**

B.E. (Electrical) (Part – I) (New) Examination, 2016
ELECTRICAL DRIVES AND CONTROL

Day and Date : Tuesday, 29-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) Output power requirements of constant torque loads vary with
A) Speed B) Voltage C) Current D) Power factor

2) Efficiency by using rotor resistance control in IM is
A) High B) Low C) Very high D) Very low

3) In single pulse modulation of PWM inverter fifth harmonic can be eliminated if pulse width is equal to
A) 30° B) 72° C) 36° D) 108°

4) For plugging of IM the slip range is
A) 0 to 1 B) Less than 0 C) 2-S D) Both A) and B)

5) A delta connected IM being fed by a three phase AC to DC inverter and operated in constant V/f mode requires during starting
A) Star delta starter B) Autotransformer starter
C) Rotor resistance starter D) DOL starter

6) 5% increase in supply frequency will change the speed of motor by
A) – 5% B) + 5% C) – 10% D) + 10%

7) The advantage of a synchronous motor in addition to its constant speed is
A) High power factor B) Better efficiency
C) Lower cost D) All of the above

8) BLDC motor drive will be fed from
A) 0° conduction mode of inverter B) 120° conduction mode of inverter
C) 60° conduction mode of inverter D) 180° conduction mode of inverter

9) The efficiency of reluctance motor is around
A) 95% B) 90% C) 75 to 85% D) 60 to 75%

P.T.O.

10) For 1.8° step, two phase bipolar stepper motor, the stepping rate is 100 steps/sec. the rotational speed of motor in rpm is
A) 15 rpm B) 30 rpm C) 60 rpm D) 90 rpm

11) For the motor to deliver a torque of 2.5 Nm at 1400 rpm, the armature voltage to be applied is
A) 125.5 V B) 193.3 V C) 200 V D) 241.7 V

12) The consideration involved in the selection of the type of electric drive for a particular application depends on
A) Speed control range and its nature B) Running torque
C) Power rating D) All of the above

13) In a constant power type load
A) Torque is proportional to speed
B) Torque is proportional to square of speed
C) Torque is inversely proportional to speed
D) Torque is independent of speed

14) The power consumption in case of centrifugal loads like pump, proportional to
A) Cube of speed B) Square of speed
C) Speed D) Not applicable

15) During acceleration of motor
A) Dynamic torque opposes developed torque
B) Dynamic torque assists developed torque
C) Dynamic torque and developed torque is equal
D) None of the above

16) Applications of dc motor is restricted to a few load speed applications because of
A) Cost of motor is high B) Mechanical commutation problems
C) Maintenance problem D) All of the above

17) A separately excited dc motor when fed from 1 phase full converter runs at speed of 1200 rpm. Load current remains continuous. If one of the four SCRs get open circuited the motor speed will reduce to
A) 600 rpm B) 900 rpm C) 800 rpm D) 400 rpm

18) Regenerative braking of DC motor is achieved by
A) Phase controlled rectifiers B) Inverter
C) Cyclo-converter D) Chopper

19) Conduction period for the SCR in a 3-phase full converter connected to a highly inductive load is
A) 120 degrees B) 60 degrees C) 180 degrees D) 360 degrees

20) Reduction in supply voltage by 10% will change the torque of motor by
A) 38% B) 19% C) 9.5% D) No change

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SLR-EP – 273

Seat No.	

B.E. (Electrical) (Part – I) (New) Examination, 2016
ELECTRICAL DRIVES AND CONTROL

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) What is overloading factor ? Derive expression of it for short time duty of motor rating.

b) Explain with suitable example why steady state stability of a drive depends on the relative characteristics of the motor.

c) A 220 V, 24 A, 100 rpm DC shunt motor has an armature resistance of 2Ω. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230 V. Calculate duty ratio for 1.2 times rated torque and 500 rpm.

d) A motor – load system has torque of T = 400-0.4 N, N-m where N is speed in rpm. A load of ± 200 N-m is coupled with motor. Calculate the motor speed for motoring and braking operations in the forward directions.

e) Explain how regenerative braking is employed for DC series motor.

3. Solve following : **(2×10=20)**

a) Explain speed torque characteristics for following speed transitions :
   i) Increase in speed in same direction
   ii) Decrease in speed
   iii) Speed reversal.

b) A 220 V, 1500 rpm, 50 A separately excited dc motor with armature resistance of 0.5Ω is fed from a three phase fully controlled rectifier. Available source voltage is 440 V, 50 Hz. A star delta transformer is used to fed armature then calculate transformer turns ratio. Also calculate converter firing angles if same motor is fed from dual converter with source voltage of 165 V when operating under motoring and braking operation at a rated motor torque and ± 1000 rpm.

OR

b) A 220 V, 1200 rpm,15 A separately excited dc motor has armature circuit resistance and inductance of 1.8 ohm and 32 mH, respectively. It is fed from a single phase fully controlled rectifier with an ac source voltage of 230 V, 50 Hz calculate
   a) Motor torque for $\alpha = 60°$ and speed = 450 rpm
   b) Motor speed for $\alpha = 45°$ and T = 40 N-m.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) A 400 V, 3 phase, 50 Hz, 6 pole star connected induction motor has following parameters referred to stator :

R_s = 0.5 ohm, R'_r = 0.4 ohm, X_s = 1.2 ohm, X'_r = 1.2 ohm, X_m = 50 ohm.

Stator to rotor turns ratio is 3.5 motor is controlled by static rotor resistance control. External resistance is chosen such that the breakdown torque is produced at standstill for a duty ratio of zero. Calculate the value of external resistance.

b) Explain bipolar drive for permanent magnet and hybrid motors.

c) Explain with block diagram indirect vector control.

d) A 500 kW, three phase 3.3 kV, 50 Hz, 0.8 lagging power factor, 4 pole star connected synchronous motor has X_s = 15 ohm. Neglect stator resistance and determine for regenerative braking operation, braking torque and field current for rated current and unity power factor.

e) With neat sketch explain the operation of regenerative breaking with VSI fed induction motor.

5. Solve **any two** : **(2×10=20)**

a) A 440 V, 3 phase, 50 Hz, 6 pole 945 rpm delta connected induction motor has following parameters referred to stator :

R_s = 2 ohm, R'_r = 2 ohm, X_s = 3 ohm, X'_r = 4 ohm.

When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine

i) Motor terminal voltage, current and torque at 800 rpm.

ii) Motor speed, current and torque for the terminal voltage of 280 V.

b) A 440 V, 3 phase, 50 Hz, 6 pole 970 rpm star connected wound rotor induction motor has following parameters referred to stator :

R_s = 0.1 ohm, R'_r = 0.08 ohm, X_s = 0.3 ohm, X'_r = 0.4 ohm.

The stator to rotor turns ratio is 2.

The motor speed is controlled by static scherbius drive. Drive is designed for a speed range of 25% below the synchronous speed. Maximum value of firing angle is 165°. Determine

i) torque for a speed of 780 rpm and α = 140°

ii) firing angle for half the rated torque and speed of 800 rpm.

Dc link inductor has a resistance of 0.01 ohm.

c) Draw circuit diagram and output waveform and explain with torque equation brushless dc motor drive for servo application.

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SLR-EP – 273

Seat No.	

Set **S**

B.E. (Electrical) (Part – I) (New) Examination, 2016
ELECTRICAL DRIVES AND CONTROL

Day and Date : Tuesday, 29-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) Applications of dc motor is restricted to a few load speed applications because of
A) Cost of motor is high B) Mechanical commutation problems
C) Maintenance problem D) All of the above

2) A separately excited dc motor when fed from 1 phase full converter runs at speed of 1200 rpm. Load current remains continuous. If one of the four SCRs get open circuited the motor speed will reduce to
A) 600 rpm B) 900 rpm C) 800 rpm D) 400 rpm

3) Regenerative braking of DC motor is achieved by
A) Phase controlled rectifiers B) Inverter
C) Cyclo-converter D) Chopper

4) Conduction period for the SCR in a 3-phase full converter connected to a highly inductive load is
A) 120 degrees B) 60 degrees C) 180 degrees D) 360 degrees

5) Reduction in supply voltage by 10% will change the torque of motor by
A) 38% B) 19% C) 9.5% D) No change

6) Output power requirements of constant torque loads vary with
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A) 30° B) 72° C) 36° D) 108°

9) For plugging of IM the slip range is
A) 0 to 1 B) Less than 0 C) 2-S D) Both A) and B)

P.T.O.

10) A delta connected IM being fed by a three phase AC to DC inverter and operated in constant V/f mode requires during starting
A) Star delta starter B) Autotransformer starter
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11) 5% increase in supply frequency will change the speed of motor by
A) – 5% B) + 5% C) – 10% D) + 10%

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13) BLDC motor drive will be fed from
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14) The efficiency of reluctance motor is around
A) 95% B) 90% C) 75 to 85% D) 60 to 75%

15) For 1.8° step, two phase bipolar stepper motor, the stepping rate is 100 steps/sec. the rotational speed of motor in rpm is
A) 15 rpm B) 30 rpm C) 60 rpm D) 90 rpm

16) For the motor to deliver a torque of 2.5 Nm at 1400 rpm, the armature voltage to be applied is
A) 125.5 V B) 193.3 V C) 200 V D) 241.7 V

17) The consideration involved in the selection of the type of electric drive for a particular application depends on
A) Speed control range and its nature B) Running torque
C) Power rating D) All of the above

18) In a constant power type load
A) Torque is proportional to speed
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C) Torque is inversely proportional to speed
D) Torque is independent of speed

19) The power consumption in case of centrifugal loads like pump, proportional to
A) Cube of speed B) Square of speed
C) Speed D) Not applicable

20) During acceleration of motor
A) Dynamic torque opposes developed torque
B) Dynamic torque assists developed torque
C) Dynamic torque and developed torque is equal
D) None of the above

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SLR-EP – 273

Seat No.	

B.E. (Electrical) (Part – I) (New) Examination, 2016
ELECTRICAL DRIVES AND CONTROL

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) What is overloading factor ? Derive expression of it for short time duty of motor rating.

b) Explain with suitable example why steady state stability of a drive depends on the relative characteristics of the motor.

c) A 220 V, 24 A, 100 rpm DC shunt motor has an armature resistance of 2Ω. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230 V. Calculate duty ratio for 1.2 times rated torque and 500 rpm.

d) A motor – load system has torque of T = 400-0.4 N, N-m where N is speed in rpm. A load of ± 200 N-m is coupled with motor. Calculate the motor speed for motoring and braking operations in the forward directions.

e) Explain how regenerative braking is employed for DC series motor.

3. Solve following : **(2×10=20)**

a) Explain speed torque characteristics for following speed transitions :
   i) Increase in speed in same direction
   ii) Decrease in speed
   iii) Speed reversal.

b) A 220 V, 1500 rpm, 50 A separately excited dc motor with armature resistance of 0.5Ω is fed from a three phase fully controlled rectifier. Available source voltage is 440 V, 50 Hz. A star delta transformer is used to fed armature then calculate transformer turns ratio. Also calculate converter firing angles if same motor is fed from dual converter with source voltage of 165 V when operating under motoring and braking operation at a rated motor torque and ± 1000 rpm.

OR

b) A 220 V, 1200 rpm,15 A separately excited dc motor has armature circuit resistance and inductance of 1.8 ohm and 32 mH, respectively. It is fed from a single phase fully controlled rectifier with an ac source voltage of 230 V, 50 Hz calculate
   a) Motor torque for $\alpha = 60°$ and speed = 450 rpm
   b) Motor speed for $\alpha = 45°$ and T = 40 N-m.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) A 400 V, 3 phase, 50 Hz, 6 pole star connected induction motor has following parameters referred to stator :

$R_s = 0.5$ ohm, $R_r' = 0.4$ ohm, $X_s = 1.2$ ohm, $X_r' = 1.2$ ohm, $X_m = 50$ ohm.

Stator to rotor turns ratio is 3.5 motor is controlled by static rotor resistance control. External resistance is chosen such that the breakdown torque is produced at standstill for a duty ratio of zero. Calculate the value of external resistance.

b) Explain bipolar drive for permanent magnet and hybrid motors.

c) Explain with block diagram indirect vector control.

d) A 500 kW, three phase 3.3 kV, 50 Hz, 0.8 lagging power factor, 4 pole star connected synchronous motor has $X_s = 15$ ohm. Neglect stator resistance and determine for regenerative braking operation, braking torque and field current for rated current and unity power factor.

e) With neat sketch explain the operation of regenerative breaking with VSI fed induction motor.

5. Solve **any two** : **(2×10=20)**

a) A 440 V, 3 phase, 50 Hz, 6 pole 945 rpm delta connected induction motor has following parameters referred to stator :

$R_s = 2$ ohm, $R_r' = 2$ ohm, $X_s = 3$ ohm, $X_r' = 4$ ohm.

When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control. Determine

i) Motor terminal voltage, current and torque at 800 rpm.

ii) Motor speed, current and torque for the terminal voltage of 280 V.

b) A 440 V, 3 phase, 50 Hz, 6 pole 970 rpm star connected wound rotor induction motor has following parameters referred to stator :

$R_s = 0.1$ ohm, $R_r' = 0.08$ ohm, $X_s = 0.3$ ohm, $X_r' = 0.4$ ohm.

The stator to rotor turns ratio is 2.

The motor speed is controlled by static scherbius drive. Drive is designed for a speed range of 25% below the synchronous speed. Maximum value of firing angle is 165°. Determine

i) torque for a speed of 780 rpm and $\alpha = 140°$

ii) firing angle for half the rated torque and speed of 800 rpm.

Dc link inductor has a resistance of 0.01 ohm.

c) Draw circuit diagram and output waveform and explain with torque equation brushless dc motor drive for servo application.

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SLR-EP – 274

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) Examination, 2016
SWITCH GEAR AND PROTECTION

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Fuse material must have
a) High melting point and high specific resistance b) Low melting point and high specific resistance
c) Low melting point and low specific resistance d) High melting point and low specific resistance

2) Circuit breakers usually operate under
a) Steady state short circuit current b) Sub transient state of short circuit current
c) Transient state of short circuit current d) None of the above

3) The initiation of electric arc at the instant of contact separation is caused by
a) Thermionic emission of electrons b) Field emission of electrons
c) Both a) and b) d) None of the above

4) The normal frequency rms voltage that appears across the circuit breaker pole after final arc extinction has occurred is called the _____ voltage.
a) Supply b) Restriking c) Recovery d) Breaking

5) Sparking between contacts can be reduced by inserting
a) A capacitor in parallel with the contacts b) A capacitor in series with the contacts
c) A resistor in the line d) A reactor in the line

6) If the inductance and capacitance of a power system are respectively 1H and 0.01 μ F and the instantaneous value of interrupted current is 10A, then the voltage across the breaker contact will be
a) 50 kV b) 57 kV c) 60 kV d) 100 kV

7) In a vacuum circuit breaker, the vacuum is the order of
a) 1 torr b) 10^{-6} torr c) 10^{-12} torr d) 10^{-16} torr

8) Buchholz relay is used for
a) Carrier protection b) Transformer protection
c) Generator protection d) Motor protection

9) The impedance relaying scheme is used for protection of
a) Transformer b) Bus-bar
c) Synchronous generator d) Transmission line

10) The relay best suited for phase fault relaying for medium transmission lines is
a) mho relay b) Reactance relay c) Impedance relay d) None of these

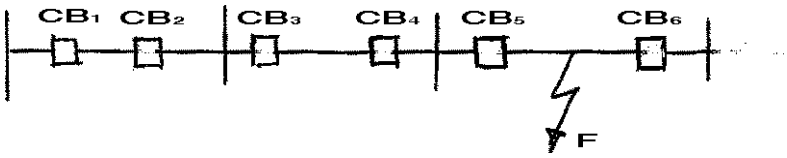
11) Both voltage and current signals are required for
a) A plain over current relay b) A differential relay
c) A directional relay d) A biased differential relay

12) Two input phase comparator in a static relay is made up a
a) Transformer amplifier b) Transistor logic circuit c) Rectifier bridge d) Thyristor bridge

13) The in rush current of a transformer at no load is maximum if the supply voltage is switched on
a) At peak voltage value b) At zero voltage value
c) At half voltage value d) At 0.866 time voltage value

P.T.O.

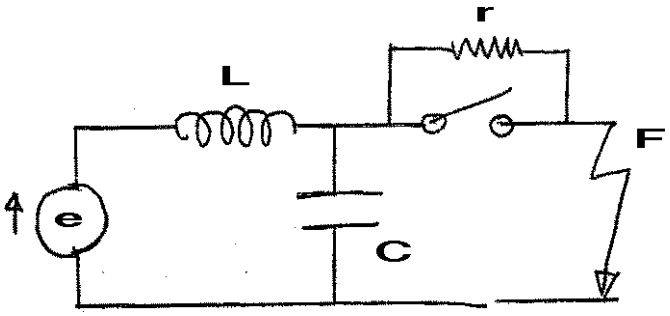
14) The sections of a feeder are provided with circuit breakers CB_1, CB_2, CB_3, CB_4, CB_5 and CB_6, for a fault at F, as indicated in Fig.



a) CB_5 must be set to trip after CB_1 trips
b) CB_5 must be set to trip after CB_3 and CB_4 trip
c) CB_5 must be set to trip after CB_2 trips
d) CB_5 must be set to trip before CB_1, CB_2, CB_3 and CB_4 trip

15) The arc voltage in a circuit breaker is
a) In the phase with the arc current
b) Lagging the arc current by 90°
c) Leading the arc current by 90°
d) Lagging the arc current by 180°

16) In connection with the arc extinction in the circuit breaker, resistance switching is employed wherein a resistance is placed in parallel with the poles of the circuit breaker as shown in the fig. This process introduces damping in the L-C circuit. For critical damping the value of 'r' should be equal to



a) $\sqrt{C/L}$ b) $0.5\sqrt{C/L}$ c) $0.5\sqrt{L/C}$ d) $\frac{1}{2\pi}\sqrt{\frac{L}{C}}$

17) The maximum value of restriking voltage in a circuit breaker in terms of system voltage will always be
a) 2 times the normal peak
b) 2.5 times the normal peak
c) Two times the voltage available at the time of current zero
d) 1.5 times the normal peak

18) The Rate of Rise Restriking Voltage (RRRV) depends upon
a) System voltage
b) Circuit pf only
c) Switching condition only
d) Both b) and c)

19) The single most important property that makes SF_6 a very efficient medium for circuit breaking is
a) It is non toxic and non inflammable
b) It has high dielectric constant
c) It has high breakdown strength
d) It is highly electro negative in character

20) An over current relay having a current setting of 125% is connected to a supply circuit through a current transformer of ratio 400/5. The pick-up value is
a) 6.25 A b) 10 A c) 12.5 A d) 15 A

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Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
SWITCH GEAR AND PROTECTION

Day and Date : Thursday, 1-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

2. Answer the following (Solve **any four**) : **(5×4=20)**

1) Discuss the essential qualities of protective relays.

2) Explain the working principle of induction disk relay. Derive the expression for torque produced by an induction relay.

3) Explain the terms :
   a) Plug setting multiplier
   b) Time setting multiplier

4) Discuss how an amplitude comparator can be converted to phase comparator and vice versa.

5) The current rating of over current relay is 5A, PSM = 2, TSM = 0.3, C ratio = 400/5, fault current = 4000 A. Determine the operating time of the relay at TSM = 1, operating time at various PSM are

PSM	2	4	5	8	10	20
OP time	10	5	4	3	2.8	2.4

3. Answer the following (Solve **any two**) : **(2×10=20)**

1) Describe with neat sketch the earth fault protection for small size generator.

2) Describe the principle of impedance type distance relay.

3) Discuss the protective scheme for ring main feeders.

4. Answer the following (Solve **any four**) : **(5×4=20)**

1) Discuss the arc phenomenon in a circuit breaker.

2) Describe briefly the action of an oil circuit breaker. How does oil help in arc extinction ?

3) Explain briefly the following types of air blast circuit breakers :
   a) Axial-blast type
   b) Cross blast type

4) Write short notes on the following :
   a) Resistance switching
   b) Circuit breaker rating

5) What is meant by insulation coordination ?

Set P

5. Answer the following (Solve **any two**) : **(2×10=20)**

   1) Explain the terms recovery voltage, restricting voltage and RRRV. Derive an expression for restriking voltage in terms of system capacitance and inductance.

   2) Explain the difference between fusing current and current carrying capacity of a fuse. Name important materials for fuse elements. Describe the essential requirements of a fuse material.

   3) In a 220 kV system, the reactance and capacitance up to the location of circuit breaker is 8 Ω and 0.025 μ F, respectively. A resistance of 600 ohms is connected across the contacts of the circuit breaker. Determine the following :
      a) Natural frequency of oscillation.
      b) Damped frequency of oscillation.
      c) Critical value of resistance which will give no transient oscillation.
      d) The value of resistance which will give damped frequency of oscillation, one fourth of the natural frequency of oscillation.

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Seat No.	

Set **Q**

B.E. (Electrical) (Part – I) Examination, 2016
SWITCH GEAR AND PROTECTION

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

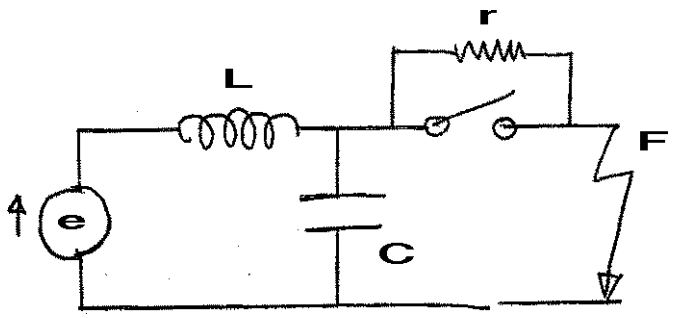
Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) In connection with the arc extinction in the circuit breaker, resistance switching is employed wherein a resistance is placed in parallel with the poles of the circuit breaker as shown in the fig. This process introduces damping in the L-C circuit. For critical damping the value of 'r' should be equal to



a) $\sqrt{C/L}$ b) $0.5\sqrt{C/L}$ c) $0.5\sqrt{L/C}$ d) $\frac{1}{2\pi}\sqrt{\frac{L}{C}}$

2) The maximum value of restriking voltage in a circuit breaker in terms of system voltage will always be
   a) 2 times the normal peak
   b) 2.5 times the normal peak
   c) Two times the voltage available at the time of current zero
   d) 1.5 times the normal peak

3) The Rate of Rise Restriking Voltage (RRRV) depends upon
   a) System voltage b) Circuit pf only
   c) Switching condition only d) Both b) and c)

4) The single most important property that makes SF_6 a very efficient medium for circuit breaking is
   a) It is non toxic and non inflammable b) It has high dielectric constant
   c) It has high breakdown strength d) It is highly electro negative in character

5) An over current relay having a current setting of 125% is connected to a supply circuit through a current transformer of ratio 400/5. The pick-up value is
   a) 6.25 A b) 10 A c) 12.5 A d) 15 A

6) Fuse material must have
   a) High melting point and high specific resistance b) Low melting point and high specific resistance
   c) Low melting point and low specific resistance d) High melting point and low specific resistance

P.T.O.

7) Circuit breakers usually operate under
   a) Steady state short circuit current
   b) Sub transient state of short circuit current
   c) Transient state of short circuit current
   d) None of the above

8) The initiation of electric arc at the instant of contact separation is caused by
   a) Thermionic emission of electrons
   b) Field emission of electrons
   c) Both a) and b)
   d) None of the above

9) The normal frequency rms voltage that appears across the circuit breaker pole after final arc extinction has occurred is called the _____ voltage.
   a) Supply b) Restriking c) Recovery d) Breaking

10) Sparking between contacts can be reduced by inserting
   a) A capacitor in parallel with the contacts
   b) A capacitor in series with the contacts
   c) A resistor in the line
   d) A reactor in the line

11) If the inductance and capacitance of a power system are respectively 1H and 0.01 μ F and the instantaneous value of interrupted current is 10A, then the voltage across the breaker contact will be
   a) 50 kV b) 57 kV c) 60 kV d) 100 kV

12) In a vacuum circuit breaker, the vacuum is the order of
   a) 1 torr b) 10^{-6} torr c) 10^{-12} torr d) 10^{-16} torr

13) Buchholz relay is used for
   a) Carrier protection
   b) Transformer protection
   c) Generator protection
   d) Motor protection

14) The impedance relaying scheme is used for protection of
   a) Transformer
   b) Bus-bar
   c) Synchronous generator
   d) Transmission line

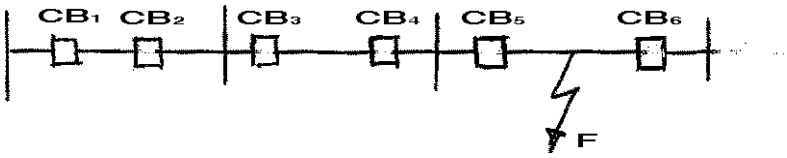
15) The relay best suited for phase fault relaying for medium transmission lines is
   a) mho relay b) Reactance relay c) Impedance relay d) None of these

16) Both voltage and current signals are required for
   a) A plain over current relay
   b) A differential relay
   c) A directional relay
   d) A biased differential relay

17) Two input phase comparator in a static relay is made up a
   a) Transformer amplifier b) Transistor logic circuit c) Rectifier bridge d) Thyristor bridge

18) The in rush current of a transformer at no load is maximum if the supply voltage is switched on
   a) At peak voltage value
   b) At zero voltage value
   c) At half voltage value
   d) At 0.866 time voltage value

19) The sections of a feeder are provided with circuit breakers CB_1, CB_2, CB_3, CB_4, CB_5 and CB_6, for a fault at F, as indicated in Fig.



   a) CB_5 must be set to trip after CB_1 trips
   b) CB_5 must be set to trip after CB_3 and CB_4 trip
   c) CB_5 must be set to trip after CB_2 trips
   d) CB_5 must be set to trip before CB_1, CB_2, CB_3 and CB_4 trip

20) The arc voltage in a circuit breaker is
   a) In the phase with the arc current
   b) Lagging the arc current by 90°
   c) Leading the arc current by 90°
   d) Lagging the arc current by 180°

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SLR-EP – 274

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
SWITCH GEAR AND PROTECTION

Day and Date : Thursday, 1-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

2. Answer the following (Solve **any four**) : **(5×4=20)**

1) Discuss the essential qualities of protective relays.

2) Explain the working principle of induction disk relay. Derive the expression for torque produced by an induction relay.

3) Explain the terms :
   a) Plug setting multiplier
   b) Time setting multiplier

4) Discuss how an amplitude comparator can be converted to phase comparator and vice versa.

5) The current rating of over current relay is 5A, PSM = 2, TSM = 0.3, C ratio = 400/5, fault current = 4000 A. Determine the operating time of the relay at TSM = 1, operating time at various PSM are

PSM	2	4	5	8	10	20
OP time	10	5	4	3	2.8	2.4

3. Answer the following (Solve **any two**) : **(2×10=20)**

1) Describe with neat sketch the earth fault protection for small size generator.

2) Describe the principle of impedance type distance relay.

3) Discuss the protective scheme for ring main feeders.

4. Answer the following (Solve **any four**) : **(5×4=20)**

1) Discuss the arc phenomenon in a circuit breaker.

2) Describe briefly the action of an oil circuit breaker. How does oil help in arc extinction ?

3) Explain briefly the following types of air blast circuit breakers :
   a) Axial-blast type
   b) Cross blast type

4) Write short notes on the following :
   a) Resistance switching
   b) Circuit breaker rating

5) What is meant by insulation coordination ?

Set Q

5. Answer the following (Solve **any two**) : **(2×10=20)**

   1) Explain the terms recovery voltage, restricting voltage and RRRV. Derive an expression for restriking voltage in terms of system capacitance and inductance.

   2) Explain the difference between fusing current and current carrying capacity of a fuse. Name important materials for fuse elements. Describe the essential requirements of a fuse material.

   3) In a 220 kV system, the reactance and capacitance up to the location of circuit breaker is 8 Ω and 0.025 μ F, respectively. A resistance of 600 ohms is connected across the contacts of the circuit breaker. Determine the following :
      a) Natural frequency of oscillation.
      b) Damped frequency of oscillation.
      c) Critical value of resistance which will give no transient oscillation.
      d) The value of resistance which will give damped frequency of oscillation, one fourth of the natural frequency of oscillation.

SLR-EP – 274

Seat No.	

Set **R**

B.E. (Electrical) (Part – I) Examination, 2016
SWITCH GEAR AND PROTECTION

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

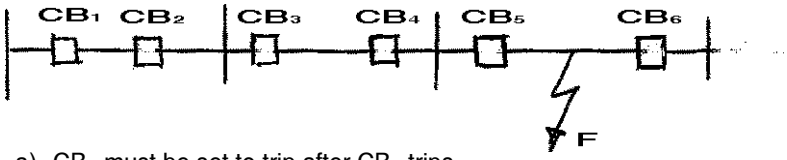
1. Choose the correct answer : **(20×1=20)**

1) Both voltage and current signals are required for
   a) A plain over current relay b) A differential relay
   c) A directional relay d) A biased differential relay

2) Two input phase comparator in a static relay is made up a
   a) Transformer amplifier b) Transistor logic circuit c) Rectifier bridge d) Thyristor bridge

3) The in rush current of a transformer at no load is maximum if the supply voltage is switched on
   a) At peak voltage value b) At zero voltage value
   c) At half voltage value d) At 0.866 time voltage value

4) The sections of a feeder are provided with circuit breakers CB_1, CB_2, CB_3, CB_4, CB_5 and CB_6, for a fault at F, as indicated in Fig.



   a) CB_5 must be set to trip after CB_1 trips
   b) CB_5 must be set to trip after CB_3 and CB_4 trip
   c) CB_5 must be set to trip after CB_2 trips
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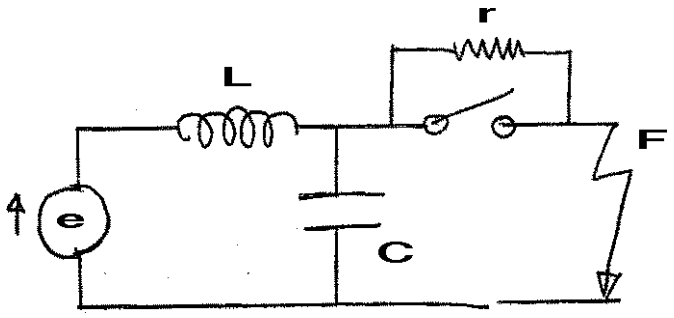
5) The arc voltage in a circuit breaker is
   a) In the phase with the arc current b) Lagging the arc current by 90°
   c) Leading the arc current by 90° d) Lagging the arc current by 180°

6) In connection with the arc extinction in the circuit breaker, resistance switching is employed wherein a resistance is placed in parallel with the poles of the circuit breaker as shown in the fig. This process introduces damping in the L-C circuit. For critical damping the value of 'r' should be equal to



   a) $\sqrt{C/L}$ b) $0.5\sqrt{C/L}$ c) $0.5\sqrt{L/C}$ d) $\frac{1}{2\pi}\sqrt{\frac{L}{C}}$

P.T.O.

7) The maximum value of restriking voltage in a circuit breaker in terms of system voltage will always be
   a) 2 times the normal peak
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8) The Rate of Rise Restriking Voltage (RRRV) depends upon
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9) The single most important property that makes SF_6 a very efficient medium for circuit breaking is
   a) It is non toxic and non inflammable
   b) It has high dielectric constant
   c) It has high breakdown strength
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10) An over current relay having a current setting of 125% is connected to a supply circuit through a current transformer of ratio 400/5. The pick-up value is
   a) 6.25 A
   b) 10 A
   c) 12.5 A
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   a) Steady state short circuit current
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13) The initiation of electric arc at the instant of contact separation is caused by
   a) Thermionic emission of electrons
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14) The normal frequency rms voltage that appears across the circuit breaker pole after final arc extinction has occurred is called the _____ voltage.
   a) Supply
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16) If the inductance and capacitance of a power system are respectively 1H and 0.01 μ F and the instantaneous value of interrupted current is 10A, then the voltage across the breaker contact will be
   a) 50 kV
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   b) Transformer protection
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19) The impedance relaying scheme is used for protection of
   a) Transformer
   b) Bus-bar
   c) Synchronous generator
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20) The relay best suited for phase fault relaying for medium transmission lines is
   a) mho relay
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   c) Impedance relay
   d) None of these

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SLR-EP – 274

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
SWITCH GEAR AND PROTECTION

Day and Date : Thursday, 1-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

2. Answer the following (Solve **any four**) : **(5×4=20)**

1) Discuss the essential qualities of protective relays.

2) Explain the working principle of induction disk relay. Derive the expression for torque produced by an induction relay.

3) Explain the terms :
   a) Plug setting multiplier
   b) Time setting multiplier

4) Discuss how an amplitude comparator can be converted to phase comparator and vice versa.

5) The current rating of over current relay is 5A, PSM = 2, TSM = 0.3, C ratio = 400/5, fault current = 4000 A. Determine the operating time of the relay at TSM = 1, operating time at various PSM are

PSM	2	4	5	8	10	20
OP time	10	5	4	3	2.8	2.4

3. Answer the following (Solve **any two**) : **(2×10=20)**

1) Describe with neat sketch the earth fault protection for small size generator.

2) Describe the principle of impedance type distance relay.

3) Discuss the protective scheme for ring main feeders.

4. Answer the following (Solve **any four**) : **(5×4=20)**

1) Discuss the arc phenomenon in a circuit breaker.

2) Describe briefly the action of an oil circuit breaker. How does oil help in arc extinction ?

3) Explain briefly the following types of air blast circuit breakers :
   a) Axial-blast type
   b) Cross blast type

4) Write short notes on the following :
   a) Resistance switching
   b) Circuit breaker rating

5) What is meant by insulation coordination ?

Set R

5. Answer the following (Solve **any two**) : **(2×10=20)**

   1) Explain the terms recovery voltage, restricting voltage and RRRV. Derive an expression for restriking voltage in terms of system capacitance and inductance.

   2) Explain the difference between fusing current and current carrying capacity of a fuse. Name important materials for fuse elements. Describe the essential requirements of a fuse material.

   3) In a 220 kV system, the reactance and capacitance up to the location of circuit breaker is 8 Ω and 0.025 μ F, respectively. A resistance of 600 ohms is connected across the contacts of the circuit breaker. Determine the following :
      a) Natural frequency of oscillation.
      b) Damped frequency of oscillation.
      c) Critical value of resistance which will give no transient oscillation.
      d) The value of resistance which will give damped frequency of oscillation, one fourth of the natural frequency of oscillation.

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SLR-EP – 274

Seat No.	

Set **S**

B.E. (Electrical) (Part – I) Examination, 2016
SWITCH GEAR AND PROTECTION

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) If the inductance and capacitance of a power system are respectively 1H and 0.01 μ F and the instantaneous value of interrupted current is 10A, then the voltage across the breaker contact will be
a) 50 kV b) 57 kV c) 60 kV d) 100 kV

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3) Buchholz relay is used for
a) Carrier protection b) Transformer protection
c) Generator protection d) Motor protection

4) The impedance relaying scheme is used for protection of
a) Transformer b) Bus-bar
c) Synchronous generator d) Transmission line

5) The relay best suited for phase fault relaying for medium transmission lines is
a) mho relay b) Reactance relay c) Impedance relay d) None of these

6) Both voltage and current signals are required for
a) A plain over current relay b) A differential relay
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7) Two input phase comparator in a static relay is made up a
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8) The in rush current of a transformer at no load is maximum if the supply voltage is switched on
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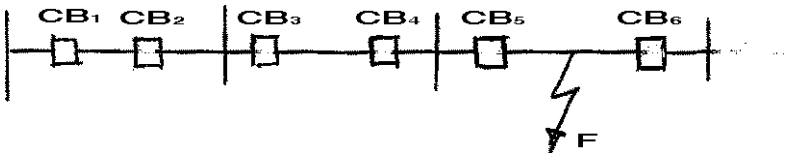

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10) The arc voltage in a circuit breaker is
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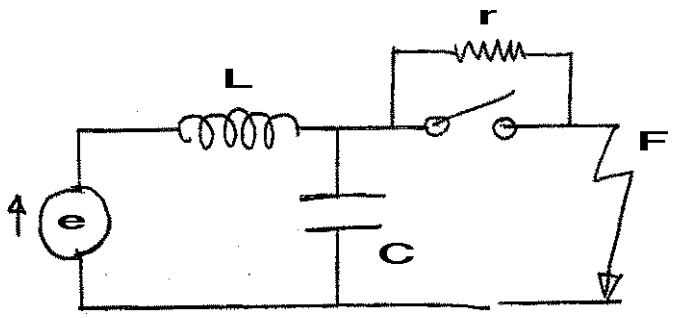
P.T.O.

11) In connection with the arc extinction in the circuit breaker, resistance switching is employed wherein a resistance is placed in parallel with the poles of the circuit breaker as shown in the fig. This process introduces damping in the L-C circuit. For critical damping the value of 'r' should be equal to



a) $\sqrt{C/L}$ b) $0.5\sqrt{C/L}$ c) $0.5\sqrt{L/C}$ d) $\frac{1}{2\pi}\sqrt{\frac{L}{C}}$

12) The maximum value of restriking voltage in a circuit breaker in terms of system voltage will always be
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a) A capacitor in parallel with the contacts b) A capacitor in series with the contacts
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SLR-EP – 274

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
SWITCH GEAR AND PROTECTION

Day and Date : Thursday, 1-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

2. Answer the following (Solve **any four**) : **(5×4=20)**

1) Discuss the essential qualities of protective relays.

2) Explain the working principle of induction disk relay. Derive the expression for torque produced by an induction relay.

3) Explain the terms :
   a) Plug setting multiplier
   b) Time setting multiplier

4) Discuss how an amplitude comparator can be converted to phase comparator and vice versa.

5) The current rating of over current relay is 5A, PSM = 2, TSM = 0.3, C ratio = 400/5, fault current = 4000 A. Determine the operating time of the relay at TSM = 1, operating time at various PSM are

PSM	2	4	5	8	10	20
OP time	10	5	4	3	2.8	2.4

3. Answer the following (Solve **any two**) : **(2×10=20)**

1) Describe with neat sketch the earth fault protection for small size generator.

2) Describe the principle of impedance type distance relay.

3) Discuss the protective scheme for ring main feeders.

4. Answer the following (Solve **any four**) : **(5×4=20)**

1) Discuss the arc phenomenon in a circuit breaker.

2) Describe briefly the action of an oil circuit breaker. How does oil help in arc extinction ?

3) Explain briefly the following types of air blast circuit breakers :
   a) Axial-blast type
   b) Cross blast type

4) Write short notes on the following :
   a) Resistance switching
   b) Circuit breaker rating

5) What is meant by insulation coordination ?

Set S

5. Answer the following (Solve **any two**) : **(2×10=20)**

   1) Explain the terms recovery voltage, restricting voltage and RRRV. Derive an expression for restriking voltage in terms of system capacitance and inductance.

   2) Explain the difference between fusing current and current carrying capacity of a fuse. Name important materials for fuse elements. Describe the essential requirements of a fuse material.

   3) In a 220 kV system, the reactance and capacitance up to the location of circuit breaker is 8 Ω and 0.025 μ F, respectively. A resistance of 600 ohms is connected across the contacts of the circuit breaker. Determine the following :
      a) Natural frequency of oscillation.
      b) Damped frequency of oscillation.
      c) Critical value of resistance which will give no transient oscillation.
      d) The value of resistance which will give damped frequency of oscillation, one fourth of the natural frequency of oscillation.

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SLR-EP-275

Seat No.	

Set P

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL UTILIZATION

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data if necessary and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) The distance between two stops divided by the actual time of run
   a) Crest speed b) Average speed
   c) Schedule speed d) None of these

2) For urban service the distance between stops is
   a) 1 km b) 5 km c) 10 to 25 km d) 8 km

3) The system which uses electrical energy is known as
   a) Electric traction system b) Non-electric traction system
   c) Both a) and b) d) None of these

4) The block diagram of AC LOCOMOTIVE consists
   a) pantograph b) circuit breakers
   c) transformer d) all of these

5) The total weight to be carried on the driving wheels is known as
   a) dead weight b) adhesive weight
   c) accelerating weight d) none of these

6) The specific energy consumption for suburban services is usually _____ watt hours per tonne km.
   a) 20-30 b) 30-45 c) 50-75 d) 100-150

7) The specific energy consumption for main line services is around _____ watt hours per tonne-km.
   a) 20-30 b) 30-45 c) 50-75 d) 100-150

8) When two or more motors are used for traction service the method of speed control used will
   a) Rheostatic control b) Series-parallel control
   c) Field control d) Motor generator control

9) The advantages of series-parallel starting are
   a) Small energy loss and higher efficiency
   b) Economical speed control
   c) Higher reliability of operation
   d) All of the above

10) Parallel operation of traction motors is easier with
   a) DC shunt motor b) DC series motor
   c) Induction motor d) None of these

11) The unit of solid angle is
   a) solid angle b) radian c) steradian d) candela

12) One lumen per square meter is the same as
   a) one lux b) one candela
   c) one foot candle d) one lumen meter

13) The most modern method for food processing is
   a) Induction Heating b) Resistance heating
   c) Dielectric heating d) Eddy current heating

14) The power factor will be leading in case of
   a) Induction Heating b) Resistance heating
   c) Dielectric heating d) Electric Arc heating

15) The method suitable for heating of conducting medium is
   a) Induction heating b) Indirect Arc heating
   c) Radiant heating d) Eddy current heating

16) The tips of the electrodes, for spot welding are made of
   a) carbon b) copper alloy c) mica d) porcelain

17) Spot Welding
   a) makes the weld air tight b) makes the weld water tight
   c) provides mechanical strength d) all of these

18) When a sodium vapour lamp is switched on, initially the colour is
   a) pink b) yellow c) green d) blue

19) Power factor is highest in case of
   a) mercury arc lamp b) sodium vapour lamps
   c) tube lights d) GLS lamps

20) The main application of indirect arc furnace is to melt
   a) iron b) steel
   c) non-ferrous metals d) none of these

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Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL UTILIZATION

Day and Date : Saturday, 3-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data if necessary and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

II. Solve **any four** : **(4×5=20)**

a) Explain Block Diagram of AC LOCOMOTIVE.

b) A suburban electric train has a maximum speed of 70 km/h. the schedule speed including a station stop of 30 seconds is 45 km/h. if the acceleration is 1.5 km/h/s, find the value of retardation when distance between stops is 4 km.

c) Explain with neat sketch Plugging.

d) Classify transition methods. Explain Open-Circuit Transition in detail.

e) Explain plainrheostatic starting.

f) What are advantages and disadvantages of Electric Traction ?

III. Solve **any two** : **(2×10=20)**

a) Explain Trapezoidal Speed-Time curve. Derive expression for Crest speed in terms of total time, total distance.

b) Explain with neat sketch Drum Controller.

c) Determine specific energy output by using simplified speed-time curve.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain Laws of Illumination.

b) Give short note on motor selection in Textile Industries.

c) Compare tungsten filament lamp and fluorescent tubes.

d) Explain Energy Conservation in Industries.

e) Explain with neat sketch Indirect Resistance Heating.

f) Give the classification of Electrical Heating. What are advantages of Electrical Heating ?

V. Solve **any two** : **(2×10=20)**

a) Explain with neat sketch Direct Arc Furnace and Indirect Arc Furnace.

b) Define and explain :
   i) Light
   ii) Luminous Flux
   iii) Maintenance Factor
   iv) Absorption Factor
   v) Illumination.

c) i) Explain energy conservation in small scale industries.

   ii) Explain motor selection in Sugar mills.

SLR-EP-275

Seat No.	

Set Q

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL UTILIZATION

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data if necessary and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) The tips of the electrodes, for spot welding are made of
a) carbon b) copper alloy c) mica d) porcelain

2) Spot Welding
a) makes the weld air tight b) makes the weld water tight
c) provides mechanical strength d) all of these

3) When a sodium vapour lamp is switched on, initially the colour is
a) pink b) yellow c) green d) blue

4) Power factor is highest in case of
a) mercury arc lamp b) sodium vapour lamps
c) tube lights d) GLS lamps

5) The main application of indirect arc furnace is to melt
a) iron b) steel
c) non-ferrous metals d) none of these

6) The distance between two stops divided by the actual time of run
a) Crest speed b) Average speed
c) Schedule speed d) None of these

7) For urban service the distance between stops is
a) 1 km b) 5 km c) 10 to 25 km d) 8 km

8) The system which uses electrical energy is known as
a) Electric traction system b) Non-electric traction system
c) Both a) and b) d) None of these

P.T.O.

9) The block diagram of AC LOCOMOTIVE consists
   a) pantograph b) circuit breakers
   c) transformer d) all of these

10) The total weight to be carried on the driving wheels is known as
   a) dead weight b) adhesive weight
   c) accelerating weight d) none of these

11) The specific energy consumption for suburban services is usually _____ watt hours per tonne km.
   a) 20-30 b) 30-45 c) 50-75 d) 100-150

12) The specific energy consumption for main line services is around _____ watt hours per tonne-km.
   a) 20-30 b) 30-45 c) 50-75 d) 100-150

13) When two or more motors are used for traction service the method of speed control used will
   a) Rheostatic control b) Series-parallel control
   c) Field control d) Motor generator control

14) The advantages of series-parallel starting are
   a) Small energy loss and higher efficiency
   b) Economical speed control
   c) Higher reliability of operation
   d) All of the above

15) Parallel operation of traction motors is easier with
   a) DC shunt motor b) DC series motor
   c) Induction motor d) None of these

16) The unit of solid angle is
   a) solid angle b) radian c) steradian d) candela

17) One lumen per square meter is the same as
   a) one lux b) one candela
   c) one foot candle d) one lumen meter

18) The most modern method for food processing is
   a) Induction Heating b) Resistance heating
   c) Dielectric heating d) Eddy current heating

19) The power factor will be leading in case of
   a) Induction Heating b) Resistance heating
   c) Dielectric heating d) Electric Arc heating

20) The method suitable for heating of conducting medium is
   a) Induction heating b) Indirect Arc heating
   c) Radiant heating d) Eddy current heating

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Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL UTILIZATION

Day and Date : Saturday, 3-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data if necessary and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

II. Solve **any four** : **(4×5=20)**

a) Explain Block Diagram of AC LOCOMOTIVE.

b) A suburban electric train has a maximum speed of 70 km/h. the schedule speed including a station stop of 30 seconds is 45 km/h. if the acceleration is 1.5 km/h/s, find the value of retardation when distance between stops is 4 km.

c) Explain with neat sketch Plugging.

d) Classify transition methods. Explain Open-Circuit Transition in detail.

e) Explain plainrheostatic starting.

f) What are advantages and disadvantages of Electric Traction ?

III. Solve **any two** : **(2×10=20)**

a) Explain Trapezoidal Speed-Time curve. Derive expression for Crest speed in terms of total time, total distance.

b) Explain with neat sketch Drum Controller.

c) Determine specific energy output by using simplified speed-time curve.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain Laws of Illumination.

b) Give short note on motor selection in Textile Industries.

Set Q

c) Compare tungsten filament lamp and fluorescent tubes.

d) Explain Energy Conservation in Industries.

e) Explain with neat sketch Indirect Resistance Heating.

f) Give the classification of Electrical Heating. What are advantages of Electrical Heating ?

V. Solve **any two** : **(2×10=20)**

a) Explain with neat sketch Direct Arc Furnace and Indirect Arc Furnace.

b) Define and explain :
   i) Light
   ii) Luminous Flux
   iii) Maintenance Factor
   iv) Absorption Factor
   v) Illumination.

c) i) Explain energy conservation in small scale industries.

   ii) Explain motor selection in Sugar mills.

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Seat No.	

Set R

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL UTILIZATION

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data if necessary and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) The unit of solid angle is
   a) solid angle b) radian c) steradian d) candela
2) One lumen per square meter is the same as
   a) one lux b) one candela
   c) one foot candle d) one lumen meter
3) The most modern method for food processing is
   a) Induction Heating b) Resistance heating
   c) Dielectric heating d) Eddy current heating
4) The power factor will be leading in case of
   a) Induction Heating b) Resistance heating
   c) Dielectric heating d) Electric Arc heating
5) The method suitable for heating of conducting medium is
   a) Induction heating b) Indirect Arc heating
   c) Radiant heating d) Eddy current heating
6) The tips of the electrodes, for spot welding are made of
   a) carbon b) copper alloy c) mica d) porcelain
7) Spot Welding
   a) makes the weld air tight b) makes the weld water tight
   c) provides mechanical strength d) all of these
8) When a sodium vapour lamp is switched on, initially the colour is
   a) pink b) yellow c) green d) blue

9) Power factor is highest in case of
   a) mercury arc lamp b) sodium vapour lamps
   c) tube lights d) GLS lamps

10) The main application of indirect arc furnace is to melt
   a) iron b) steel
   c) non-ferrous metals d) none of these

11) The distance between two stops divided by the actual time of run
   a) Crest speed b) Average speed
   c) Schedule speed d) None of these

12) For urban service the distance between stops is
   a) 1 km b) 5 km c) 10 to 25 km d) 8 km

13) The system which uses electrical energy is known as
   a) Electric traction system b) Non-electric traction system
   c) Both a) and b) d) None of these

14) The block diagram of AC LOCOMOTIVE consists
   a) pantograph b) circuit breakers
   c) transformer d) all of these

15) The total weight to be carried on the driving wheels is known as
   a) dead weight b) adhesive weight
   c) accelerating weight d) none of these

16) The specific energy consumption for suburban services is usually _____ watt hours per tonne km.
   a) 20-30 b) 30-45 c) 50-75 d) 100-150

17) The specific energy consumption for main line services is around _____ watt hours per tonne-km.
   a) 20-30 b) 30-45 c) 50-75 d) 100-150

18) When two or more motors are used for traction service the method of speed control used will
   a) Rheostatic control b) Series-parallel control
   c) Field control d) Motor generator control

19) The advantages of series-parallel starting are
   a) Small energy loss and higher efficiency
   b) Economical speed control
   c) Higher reliability of operation
   d) All of the above

20) Parallel operation of traction motors is easier with
   a) DC shunt motor b) DC series motor
   c) Induction motor d) None of these

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Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL UTILIZATION

Day and Date : Saturday, 3-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data if necessary and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

II. Solve **any four** : **(4×5=20)**

a) Explain Block Diagram of AC LOCOMOTIVE.

b) A suburban electric train has a maximum speed of 70 km/h. the schedule speed including a station stop of 30 seconds is 45 km/h. if the acceleration is 1.5 km/h/s, find the value of retardation when distance between stops is 4 km.

c) Explain with neat sketch Plugging.

d) Classify transition methods. Explain Open-Circuit Transition in detail.

e) Explain plainrheostatic starting.

f) What are advantages and disadvantages of Electric Traction ?

III. Solve **any two** : **(2×10=20)**

a) Explain Trapezoidal Speed-Time curve. Derive expression for Crest speed in terms of total time, total distance.

b) Explain with neat sketch Drum Controller.

c) Determine specific energy output by using simplified speed-time curve.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain Laws of Illumination.

b) Give short note on motor selection in Textile Industries.

Set R

c) Compare tungsten filament lamp and fluorescent tubes.

d) Explain Energy Conservation in Industries.

e) Explain with neat sketch Indirect Resistance Heating.

f) Give the classification of Electrical Heating. What are advantages of Electrical Heating ?

V. Solve **any two** : **(2×10=20)**

a) Explain with neat sketch Direct Arc Furnace and Indirect Arc Furnace.

b) Define and explain :
   i) Light
   ii) Luminous Flux
   iii) Maintenance Factor
   iv) Absorption Factor
   v) Illumination.

c) i) Explain energy conservation in small scale industries.

   ii) Explain motor selection in Sugar mills.

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Seat No.	

Set S

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL UTILIZATION

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data if necessary and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) The specific energy consumption for suburban services is usually _____ watt hours per tonne km.
a) 20-30 b) 30-45 c) 50-75 d) 100-150

2) The specific energy consumption for main line services is around _____ watt hours per tonne-km.
a) 20-30 b) 30-45 c) 50-75 d) 100-150

3) When two or more motors are used for traction service the method of speed control used will
a) Rheostatic control b) Series-parallel control
c) Field control d) Motor generator control

4) The advantages of series-parallel starting are
a) Small energy loss and higher efficiency
b) Economical speed control
c) Higher reliability of operation
d) All of the above

5) Parallel operation of traction motors is easier with
a) DC shunt motor b) DC series motor
c) Induction motor d) None of these

6) The unit of solid angle is
a) solid angle b) radian c) steradian d) candela

7) One lumen per square meter is the same as
   a) one lux b) one candela
   c) one foot candle d) one lumen meter

8) The most modern method for food processing is
   a) Induction Heating b) Resistance heating
   c) Dielectric heating d) Eddy current heating

9) The power factor will be leading in case of
   a) Induction Heating b) Resistance heating
   c) Dielectric heating d) Electric Arc heating

10) The method suitable for heating of conducting medium is
   a) Induction heating b) Indirect Arc heating
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11) The tips of the electrodes, for spot welding are made of
   a) carbon b) copper alloy c) mica d) porcelain

12) Spot Welding
   a) makes the weld air tight b) makes the weld water tight
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13) When a sodium vapour lamp is switched on, initially the colour is
   a) pink b) yellow c) green d) blue

14) Power factor is highest in case of
   a) mercury arc lamp b) sodium vapour lamps
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15) The main application of indirect arc furnace is to melt
   a) iron b) steel
   c) non-ferrous metals d) none of these

16) The distance between two stops divided by the actual time of run
   a) Crest speed b) Average speed
   c) Schedule speed d) None of these

17) For urban service the distance between stops is
   a) 1 km b) 5 km c) 10 to 25 km d) 8 km

18) The system which uses electrical energy is known as
   a) Electric traction system b) Non-electric traction system
   c) Both a) and b) d) None of these

19) The block diagram of AC LOCOMOTIVE consists
   a) pantograph b) circuit breakers
   c) transformer d) all of these

20) The total weight to be carried on the driving wheels is known as
   a) dead weight b) adhesive weight
   c) accelerating weight d) none of these

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Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL UTILIZATION

Day and Date : Saturday, 3-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data if necessary and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

II. Solve **any four** : **(4×5=20)**

a) Explain Block Diagram of AC LOCOMOTIVE.

b) A suburban electric train has a maximum speed of 70 km/h. the schedule speed including a station stop of 30 seconds is 45 km/h. if the acceleration is 1.5 km/h/s, find the value of retardation when distance between stops is 4 km.

c) Explain with neat sketch Plugging.

d) Classify transition methods. Explain Open-Circuit Transition in detail.

e) Explain plainrheostatic starting.

f) What are advantages and disadvantages of Electric Traction ?

III. Solve **any two** : **(2×10=20)**

a) Explain Trapezoidal Speed-Time curve. Derive expression for Crest speed in terms of total time, total distance.

b) Explain with neat sketch Drum Controller.

c) Determine specific energy output by using simplified speed-time curve.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain Laws of Illumination.

b) Give short note on motor selection in Textile Industries.

c) Compare tungsten filament lamp and fluorescent tubes.

d) Explain Energy Conservation in Industries.

e) Explain with neat sketch Indirect Resistance Heating.

f) Give the classification of Electrical Heating. What are advantages of Electrical Heating ?

V. Solve **any two** : **(2×10=20)**

a) Explain with neat sketch Direct Arc Furnace and Indirect Arc Furnace.

b) Define and explain :
   i) Light
   ii) Luminous Flux
   iii) Maintenance Factor
   iv) Absorption Factor
   v) Illumination.

c) i) Explain energy conservation in small scale industries.

   ii) Explain motor selection in Sugar mills.

SLR-EP – 277

Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Series capacitor is used in a transmission line to _____
   a) Compensate the voltage drop b) Reduce line losses
   c) Improve load power factor d) None

2) The best location for use of a booster transformer in a transmission line is _____
   a) At the sending end b) At the receiving end
   c) At the intermediate point d) Anywhere in the line

3) The concept of using synchronous voltage source of series compensation is based on _____ characteristics.
   a) Z vs F b) F vs Z c) I vs Z d) δ vs Z

4) The function of the series capacitor is simply to produce on appropriate at fundamental ac system frequency in with the transition the can
   a) Phase b) Same angle c) Quadrature d) None

5) _____ is operated without an external electric energy source.
   a) SSSC b) TCBR c) SVS d) IPFC

6) A combination of different _____ compensator whose outputs are co-ordinated.
   a) Static and mechanically coupled b) Static and mechanically switched
   c) Static and dynamic switched d) None

7) In midpoint compensation Vsmv and Vmr are _____
   a) Same b) Different c) Unity d) None

8) In SVC the Ism and Isr are _____
   a) Same b) Different c) Unity d) None

P.T.O.

9) In power oscillating damping the Var output is controlled in a _____
   a) Linear manner b) Non-linear manner
   c) Bang Bang manner d) None

10) Following controller is used for power transmission management in a multi-machine substation
   a) IPFC b) UPFC c) SVC d) TCSC

11) STATCOM operates whose capacitive or inductive output current can be controlled independent of _____
   a) ac system current b) ac system voltage
   c) ac system X d) ac system power factor

12) SVG is combination of _____
   a) SVC and battery b) Battery and controller
   c) SVC and controller d) None of the above

13) The time required to give full compensation to transmission line by TC-TCR is _____
   a) Half cycle b) At the instant of switching
   c) Delay of firing angle d) One cycle

14) In dynamic stability can sedaration current flow phaser is _____
   a) Parallel to driving vtg b) Series to driving vtg
   c) Perpendicular to driving vtg d) In phase to driving vtg

15) In GTO, the gate current pulse required for turn on may be _____
   a) 1-2% b) 2-5% c) 3-5% d) None of the above

16) In CSC in which d.c. current always has a _____
   a) Similar polarity b) Dissimilar polarity
   c) One polarity d) None of the above

17) In single phase full converter, device 1 and 2 on, 3 and 4 off give _____
   a) +ve vtg., –ve current b) +ve vtg., +ve current
   c) –ve vtg., +ve current d) –ve vtg., –ve current

18) The area “A margin” between _____ and _____ represent transient stability margin of the system.
   a) Delta 1 and delta 2 b) Delta 2 and ¶/2
   c) Delta ‘C’ to pi/2 d) None of the above

19) The admittance of TCR and TSR is _____
   a) $B_L = 1/\omega L(1\text{-}2/¶ \text{ alpha} – 1/¶ \sin 2 \text{ alpha})$
   b) $B_L = (1\text{-}2/¶ \text{ alpha} – 1/¶ \sin 2 \text{ alpha})$
   c) $B_L = 2/¶(1\text{- -}1/¶ \sin 2 \text{ alpha})$
   d) None of them

20) Midpoint voltage regulation for line segmentations used for a
   a) Series compensation b) Shunt compensation
   c) Series-series compensation d) None of the above

_____

SLR-EP – 277

Seat No.	

B.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions: *1)* ***All*** *questions are* ***compulsory****.*

2) Figures to ***right*** *indicate* ***full*** *marks.*

3) Assume suitable data ***if necessary****.*

SECTION – I

2. Solve **any four** of the following : **(5×4=20)**

1) Explain the TSSC.

2) What do you understand by flexible AC transmission ? List various FACTS devices.

3) Explain switching converter type VAR generator.

4) Explain the midpoint compensation over end point compensation.

5) Explain the basic of reactive power control in transmission system.

3. Solve **any two** : **(10×2=20)**

1) Write short notes on the following :

a) Benefits from FACTS Controllers

b) Objectives of static series compensation.

2) Discuss harmonics reduction method in TCR bank.

3) Draw block diagram and characteristics of FC-TCR.

SECTION – II

4. Solve **any four** of the following : **(5×4=20)**

   1) Explain power oscillation and damping for PAR.

   2) Describe how to improve the transient stability with static series compensation.

   3) Explain the objective of series capacitive compensation with neat diagram.

   4) Explain the GTO thyristor controlled series capacitor.

   5) Explain the TCVR.

5. Solve **any two** : **(10×2=20)**

   1) How transient stability obtained using equal area criteria to increase marginable area using with and without PAR ?

   2) Explain briefly TCSC with operation, characteristics and advantages.

   3) Compare in between IPFC and UPFC.

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Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) ***All*** *questions are* ***compulsory****.*
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3) *Assume suitable data* ***if necessary****.*
4) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) In CSC in which d.c. current always has a _____
   a) Similar polarity b) Dissimilar polarity
   c) One polarity d) None of the above

2) In single phase full converter, device 1 and 2 on, 3 and 4 off give _____
   a) +ve vtg., –ve current b) +ve vtg., +ve current
   c) –ve vtg., +ve current d) –ve vtg., –ve current

3) The area "A margin" between _____ and _____ represent transient stability margin of the system.
   a) Delta 1 and delta 2 b) Delta 2 and ¶/2
   c) Delta 'C' to pi/2 d) None of the above

4) The admittance of TCR and TSR is _____
   a) $B_L = 1/\omega L(1\text{-}2/¶ \text{ alpha} – 1/¶ \sin 2 \text{ alpha})$
   b) $B_L = (1\text{-}2/¶ \text{ alpha} – 1/¶ \sin 2 \text{ alpha})$
   c) $B_L = 2/¶(1\text{- -}1/¶ \sin 2 \text{ alpha})$
   d) None of them

5) Midpoint voltage regulation for line segmentations used for a
   a) Series compensation b) Shunt compensation
   c) Series-series compensation d) None of the above

6) Series capacitor is used in a transmission line to _____
   a) Compensate the voltage drop b) Reduce line losses
   c) Improve load power factor d) None

P.T.O.

7) The best location for use of a booster transformer in a transmission line is _____
   a) At the sending end b) At the receiving end
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8) The concept of using synchronous voltage source of series compensation is based on _____ characteristics.
   a) Z vs F b) F vs Z c) I vs Z d) δ vs Z

9) The function of the series capacitor is simply to produce on appropriate at fundamental ac system frequency in with the transition the can
   a) Phase b) Same angle c) Quadrature d) None

10) _____ is operated without an external electric energy source.
   a) SSSC b) TCBR c) SVS d) IPFC

11) A combination of different _____ compensator whose outputs are co-ordinated.
   a) Static and mechanically coupled b) Static and mechanically switched
   c) Static and dynamic switched d) None

12) In midpoint compensation Vsmv and Vmr are _____
   a) Same b) Different c) Unity d) None

13) In SVC the Ism and Isr are _____
   a) Same b) Different c) Unity d) None

14) In power oscillating damping the Var output is controlled in a _____
   a) Linear manner b) Non-linear manner
   c) Bang Bang manner d) None

15) Following controller is used for power transmission management in a multi-machine substation
   a) IPFC b) UPFC c) SVC d) TCSC

16) STATCOM operates whose capacitive or inductive output current can be controlled independent of _____
   a) ac system current b) ac system voltage
   c) ac system X d) ac system power factor

17) SVG is combination of _____
   a) SVC and battery b) Battery and controller
   c) SVC and controller d) None of the above

18) The time required to give full compensation to transmission line by TC-TCR is _____
   a) Half cycle b) At the instant of switching
   c) Delay of firing angle d) One cycle

19) In dynamic stability can sedaration current flow phaser is _____
   a) Parallel to driving vtg b) Series to driving vtg
   c) Perpendicular to driving vtg d) In phase to driving vtg

20) In GTO, the gate current pulse required for turn on may be _____
   a) 1-2% b) 2-5% c) 3-5% d) None of the above

_____

SLR-EP – 277

Seat No.	

B.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions: *1)* ***All*** *questions are* ***compulsory****.*

2) Figures to ***right*** *indicate* ***full*** *marks.*

3) Assume suitable data ***if necessary****.*

SECTION – I

2. Solve **any four** of the following : **(5×4=20)**

1) Explain the TSSC.

2) What do you understand by flexible AC transmission ? List various FACTS devices.

3) Explain switching converter type VAR generator.

4) Explain the midpoint compensation over end point compensation.

5) Explain the basic of reactive power control in transmission system.

3. Solve **any two** : **(10×2=20)**

1) Write short notes on the following :

a) Benefits from FACTS Controllers

b) Objectives of static series compensation.

2) Discuss harmonics reduction method in TCR bank.

3) Draw block diagram and characteristics of FC-TCR.

Set Q

SECTION – II

4. Solve **any four** of the following : **(5×4=20)**

   1) Explain power oscillation and damping for PAR.

   2) Describe how to improve the transient stability with static series compensation.

   3) Explain the objective of series capacitive compensation with neat diagram.

   4) Explain the GTO thyristor controlled series capacitor.

   5) Explain the TCVR.

5. Solve **any two** : **(10×2=20)**

   1) How transient stability obtained using equal area criteria to increase marginable area using with and without PAR ?

   2) Explain briefly TCSC with operation, characteristics and advantages.

   3) Compare in between IPFC and UPFC.

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SLR-EP – 277

Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) ***All*** *questions are* ***compulsory****.*
2) *Figures to* ***right*** *indicate* ***full*** *marks.*
3) *Assume suitable data* ***if necessary****.*
4) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) STATCOM operates whose capacitive or inductive output current can be controlled independent of _____
   a) ac system current b) ac system voltage
   c) ac system X d) ac system power factor

2) SVG is combination of _____
   a) SVC and battery b) Battery and controller
   c) SVC and controller d) None of the above

3) The time required to give full compensation to transmission line by TC-TCR is _____
   a) Half cycle b) At the instant of switching
   c) Delay of firing angle d) One cycle

4) In dynamic stability can sedaration current flow phaser is _____
   a) Parallel to driving vtg b) Series to driving vtg
   c) Perpendicular to driving vtg d) In phase to driving vtg

5) In GTO, the gate current pulse required for turn on may be _____
   a) 1-2% b) 2-5% c) 3-5% d) None of the above

6) In CSC in which d.c. current always has a _____
   a) Similar polarity b) Dissimilar polarity
   c) One polarity d) None of the above

7) In single phase full converter, device 1 and 2 on, 3 and 4 off give _____
   a) +ve vtg., –ve current b) +ve vtg., +ve current
   c) –ve vtg., +ve current d) –ve vtg., –ve current

P.T.O.

8) The area "A margin" between _____ and _____ represent transient stability margin of the system.
   a) Delta 1 and delta 2 b) Delta 2 and ¶/2
   c) Delta 'C' to pi/2 d) None of the above

9) The admittance of TCR and TSR is _____
   a) $B_L = 1/\omega L(1\text{-}2/¶ \text{ alpha} – 1/¶ \sin 2 \text{ alpha})$
   b) $B_L = (1\text{-}2/¶ \text{ alpha} – 1/¶ \sin 2 \text{ alpha})$
   c) $B_L = 2/¶(1\text{- -}1/¶ \sin 2 \text{ alpha})$
   d) None of them

10) Midpoint voltage regulation for line segmentations used for a
   a) Series compensation b) Shunt compensation
   c) Series-series compensation d) None of the above

11) Series capacitor is used in a transmission line to _____
   a) Compensate the voltage drop b) Reduce line losses
   c) Improve load power factor d) None

12) The best location for use of a booster transformer in a transmission line is _____
   a) At the sending end b) At the receiving end
   c) At the intermediate point d) Anywhere in the line

13) The concept of using synchronous voltage source of series compensation is based on _____ characteristics.
   a) Z vs F b) F vs Z c) I vs Z d) δ vs Z

14) The function of the series capacitor is simply to produce on appropriate at fundamental ac system frequency in with the transition the can
   a) Phase b) Same angle c) Quadrature d) None

15) _____ is operated without an external electric energy source.
   a) SSSC b) TCBR c) SVS d) IPFC

16) A combination of different _____ compensator whose outputs are co-ordinated.
   a) Static and mechanically coupled b) Static and mechanically switched
   c) Static and dynamic switched d) None

17) In midpoint compensation Vsmv and Vmr are _____
   a) Same b) Different c) Unity d) None

18) In SVC the Ism and Isr are _____
   a) Same b) Different c) Unity d) None

19) In power oscillating damping the Var output is controlled in a _____
   a) Linear manner b) Non-linear manner
   c) Bang Bang manner d) None

20) Following controller is used for power transmission management in a multi-machine substation
   a) IPFC b) UPFC c) SVC d) TCSC

_____

SLR-EP – 277

Seat No.	

B.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions: *1)* ***All*** *questions are* ***compulsory****.*

2) Figures to ***right*** *indicate* ***full*** *marks.*

3) Assume suitable data ***if necessary****.*

SECTION – I

2. Solve **any four** of the following : **(5×4=20)**

1) Explain the TSSC.

2) What do you understand by flexible AC transmission ? List various FACTS devices.

3) Explain switching converter type VAR generator.

4) Explain the midpoint compensation over end point compensation.

5) Explain the basic of reactive power control in transmission system.

3. Solve **any two** : **(10×2=20)**

1) Write short notes on the following :

a) Benefits from FACTS Controllers

b) Objectives of static series compensation.

2) Discuss harmonics reduction method in TCR bank.

3) Draw block diagram and characteristics of FC-TCR.

Set R

SECTION – II

4. Solve **any four** of the following : **(5×4=20)**

   1) Explain power oscillation and damping for PAR.

   2) Describe how to improve the transient stability with static series compensation.

   3) Explain the objective of series capacitive compensation with neat diagram.

   4) Explain the GTO thyristor controlled series capacitor.

   5) Explain the TCVR.

5. Solve **any two** : **(10×2=20)**

   1) How transient stability obtained using equal area criteria to increase marginable area using with and without PAR ?

   2) Explain briefly TCSC with operation, characteristics and advantages.

   3) Compare in between IPFC and UPFC.

SLR-EP – 277

Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) A combination of different _____ compensator whose outputs are co-ordinated.
   a) Static and mechanically coupled b) Static and mechanically switched
   c) Static and dynamic switched d) None

2) In midpoint compensation Vsmv and Vmr are _____
   a) Same b) Different c) Unity d) None

3) In SVC the Ism and Isr are _____
   a) Same b) Different c) Unity d) None

4) In power oscillating damping the Var output is controlled in a _____
   a) Linear manner b) Non-linear manner
   c) Bang Bang manner d) None

5) Following controller is used for power transmission management in a multi-machine substation
   a) IPFC b) UPFC c) SVC d) TCSC

6) STATCOM operates whose capacitive or inductive output current can be controlled independent of _____
   a) ac system current b) ac system voltage
   c) ac system X d) ac system power factor

7) SVG is combination of _____
   a) SVC and battery b) Battery and controller
   c) SVC and controller d) None of the above

P.T.O.

8) The time required to give full compensation to transmission line by TC-TCR is _____
   a) Half cycle
   b) At the instant of switching
   c) Delay of firing angle
   d) One cycle

9) In dynamic stability can sedaration current flow phaser is _____
   a) Parallel to driving vtg
   b) Series to driving vtg
   c) Perpendicular to driving vtg
   d) In phase to driving vtg

10) In GTO, the gate current pulse required for turn on may be _____
   a) 1-2% b) 2-5% c) 3-5% d) None of the above

11) In CSC in which d.c. current always has a _____
   a) Similar polarity
   b) Dissimilar polarity
   c) One polarity
   d) None of the above

12) In single phase full converter, device 1 and 2 on, 3 and 4 off give _____
   a) +ve vtg., –ve current
   b) +ve vtg., +ve current
   c) –ve vtg., +ve current
   d) –ve vtg., –ve current

13) The area "A margin" between _____ and _____ represent transient stability margin of the system.
   a) Delta 1 and delta 2
   b) Delta 2 and ¶/2
   c) Delta 'C' to pi/2
   d) None of the above

14) The admittance of TCR and TSR is _____
   a) $B_L = 1/\omega L(1\text{-}2/¶ \text{ alpha} – 1/¶ \sin 2 \text{ alpha})$
   b) $B_L = (1\text{-}2/¶ \text{ alpha} – 1/¶ \sin 2 \text{ alpha})$
   c) $B_L = 2/¶(1\text{- -}1/¶ \sin 2 \text{ alpha})$
   d) None of them

15) Midpoint voltage regulation for line segmentations used for a
   a) Series compensation
   b) Shunt compensation
   c) Series-series compensation
   d) None of the above

16) Series capacitor is used in a transmission line to _____
   a) Compensate the voltage drop
   b) Reduce line losses
   c) Improve load power factor
   d) None

17) The best location for use of a booster transformer in a transmission line is _____
   a) At the sending end
   b) At the receiving end
   c) At the intermediate point
   d) Anywhere in the line

18) The concept of using synchronous voltage source of series compensation is based on _____ characteristics.
   a) Z vs F b) F vs Z c) I vs Z d) δ vs Z

19) The function of the series capacitor is simply to produce on appropriate at fundamental ac system frequency in with the transition the can
   a) Phase b) Same angle c) Quadrature d) None

20) _____ is operated without an external electric energy source.
   a) SSSC b) TCBR c) SVS d) IPFC

_____

SLR-EP – 277

Seat No.	

B.E. (Electrical Engineering) (Part – II) (Old) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions: *1)* ***All*** *questions are* ***compulsory****.*

2) Figures to ***right*** *indicate* ***full*** *marks.*

3) Assume suitable data ***if necessary****.*

SECTION – I

2. Solve **any four** of the following : **(5×4=20)**

1) Explain the TSSC.

2) What do you understand by flexible AC transmission ? List various FACTS devices.

3) Explain switching converter type VAR generator.

4) Explain the midpoint compensation over end point compensation.

5) Explain the basic of reactive power control in transmission system.

3. Solve **any two** : **(10×2=20)**

1) Write short notes on the following :

a) Benefits from FACTS Controllers

b) Objectives of static series compensation.

2) Discuss harmonics reduction method in TCR bank.

3) Draw block diagram and characteristics of FC-TCR.

SECTION – II

4. Solve **any four** of the following : **(5×4=20)**

   1) Explain power oscillation and damping for PAR.

   2) Describe how to improve the transient stability with static series compensation.

   3) Explain the objective of series capacitive compensation with neat diagram.

   4) Explain the GTO thyristor controlled series capacitor.

   5) Explain the TCVR.

5. Solve **any two** : **(10×2=20)**

   1) How transient stability obtained using equal area criteria to increase marginable area using with and without PAR ?

   2) Explain briefly TCSC with operation, characteristics and advantages.

   3) Compare in between IPFC and UPFC.

SLR-EP – 278

Seat No.	

Set **P**

B.E. (Electrical Engineering) Part – II (Old) Examination, 2016
SWITCHGEAR PROTECTION

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Attempt **all** : **(20×1=20)**

1) The tripping circuit is
   a) AC b) DC
   c) Either AC or DC d) None of these

2) Which component ensures the safety of the line from damage ?
   a) Relay b) Circuit breaker
   c) Bus bar d) Current transformer

3) The fuse blows off by
   a) Arcing b) Burning
   c) Melting d) None of the above

4) The R.R.R.V. depends upon
   a) System voltage b) Circuit p.f. only
   c) Switching condition only d) Both b) and c)

5) A circuit breaker is essentially
   a) Arc extinguisher
   b) A current interrupting device
   c) A power factor correcting device
   d) A device for neutralizing the effect of transients

6) Which of the following statement about SF_6 gas is incorrect ?
   a) It is non-toxic gas
   b) It is non-inflammable
   c) It has density 5 times that of air at 20°C
   d) It has dark yellow color

7) In a vacuum circuit breaker, the vacuum is of the order of
   a) 10 mm Hg b) 10^{-2} mm Hg
   c) 10^{-6} mm Hg d) 10^{-9} mm Hg

P.T.O.

8) Which circuit breaker is generally used in railway traction ?
   a) SF_6 gas circuit breaker b) Air break circuit breaker
   c) Vacuum circuit breaker d) Minimum oil circuit breaker

9) The heat produced at the contact point, due to passage of current, will least depend on
   a) Contact resistance
   b) Time during which the current flows
   c) Current flowing
   d) Temperature of the surrounding medium

10) Oil immersion of contacts is the method of
   a) Arc dispersion b) Arc prevention
   c) De ionization d) None of the above

11) Mho relay have an R-X characteristics depicted by
   a) A straight line passing through origin b) A straight line parallel to X-axis
   c) A straight line parallel to R-axis d) A circle passing through the origin

12) The relay best suited for phase fault relaying for medium transmission lines is
   a) Mho relay b) Reactance relay
   c) Impedance relay d) None of the above

13) For ground fault, which of the relay is preferred
   a) Plain impedance relay b) Directional relay
   c) Reactance relay d) Over-current relay

14) The short circuit current of an alternator, in case of line to line fault depends on its
   a) Short circuit resistance b) Transient reactance
   c) Synchronous reactance d) None of the above

15) Solid earthing is provided for the voltage below
   a) 100 kV b) 600 V c) 11 kV d) 66 kV

16) The most efficient torque producing actuating structure for the induction type relays is
   a) Shaded pole structure b) Watt hour meter structure
   c) Induction cup structure d) Single induction loop structure

17) On what factor does the operating speed of the relay depend upon ?
   a) Rate of flux built up b) Armature core air gap
   c) Spring tension d) All of these

18) What is the actuating quantity for the relays ?
   a) Magnitude b) Frequency c) Phase angle d) All of these

19) What is the purpose of back up protection ?
   a) To increase the speed b) To increase the reach
   c) To leave no blind spot d) To guard against failure of primary

20) The relay best suited for phase fault relaying for long transmission lines is
   a) Mho relay b) Reactance relay
   c) Impedance relay d) None of the above

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SLR-EP – 278

Seat No.	

B.E. (Electrical Engineering) Part – II (Old) Examination, 2016
SWITCHGEAR PROTECTION

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   a) Explain interruption of capacitive current.
   b) Function and sequential operation of Isolator and earth blade.
   c) Principle and operation of MCB and M.C.C.Bs.
   d) Working of H.V.D.C.C.B. with its circuit diagram.
   e) Principle and operation of Air-blast C.B.
      i) Axially ii) Radially

3. Attempt **any two** : **(2×10=20)**
   a) Explain the terms – restriking voltage and recovery voltage and RRRV. Derive expression for restriking voltage and RRRV in terms of system voltage, inductance and capacitance.
   b) i) Explain arc extinction and recovery in Vacuum C.B.
      ii) Draw and describe the construction working and application of vacuum circuit breaker.
   c) i) Explain breaking and making capacity of C.B. along with the short circuit characteristics.
      ii) Write properties of SF6 gas.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   a) Explain static over current relay with block diagram.
   b) Write a short note on PSM and current setting.
   c) Write the causes of over voltages in power system.
   d) Explain the ZnO type arresters.
   e) Explain the differential protection of delta-star transformer.

5. Attempt **any two** : **(10×2=20)**
   a) Explain the construction and working of directional over current relay.
   b) Explain the different faults occur in the generators. Also explain the differential protection of generator.
   c) Explain the various structures of induction relay.

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Set P

Set P

SLR-EP – 278

Seat No.	

Set **Q**

B.E. (Electrical Engineering) Part – II (Old) Examination, 2016
SWITCHGEAR PROTECTION

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Attempt **all** : **(20×1=20)**

1) The most efficient torque producing actuating structure for the induction type relays is
   a) Shaded pole structure b) Watt hour meter structure
   c) Induction cup structure d) Single induction loop structure

2) On what factor does the operating speed of the relay depend upon ?
   a) Rate of flux built up b) Armature core air gap
   c) Spring tension d) All of these

3) What is the actuating quantity for the relays ?
   a) Magnitude b) Frequency c) Phase angle d) All of these

4) What is the purpose of back up protection ?
   a) To increase the speed b) To increase the reach
   c) To leave no blind spot d) To guard against failure of primary

5) The relay best suited for phase fault relaying for long transmission lines is
   a) Mho relay b) Reactance relay
   c) Impedance relay d) None of the above

6) The tripping circuit is
   a) AC b) DC
   c) Either AC or DC d) None of these

7) Which component ensures the safety of the line from damage ?
   a) Relay b) Circuit breaker
   c) Bus bar d) Current transformer

8) The fuse blows off by
   a) Arcing b) Burning
   c) Melting d) None of the above

9) The R.R.R.V. depends upon
   a) System voltage b) Circuit p.f. only
   c) Switching condition only d) Both b) and c)

P.T.O.

10) A circuit breaker is essentially
   a) Arc extinguisher
   b) A current interrupting device
   c) A power factor correcting device
   d) A device for neutralizing the effect of transients

11) Which of the following statement about SF_6 gas is incorrect ?
   a) It is non-toxic gas
   b) It is non-inflammable
   c) It has density 5 times that of air at 20°C
   d) It has dark yellow color

12) In a vacuum circuit breaker, the vacuum is of the order of
   a) 10 mm Hg
   b) 10^{-2} mm Hg
   c) 10^{-6} mm Hg
   d) 10^{-9} mm Hg

13) Which circuit breaker is generally used in railway traction ?
   a) SF_6 gas circuit breaker
   b) Air break circuit breaker
   c) Vacuum circuit breaker
   d) Minimum oil circuit breaker

14) The heat produced at the contact point, due to passage of current, will least depend on
   a) Contact resistance
   b) Time during which the current flows
   c) Current flowing
   d) Temperature of the surrounding medium

15) Oil immersion of contacts is the method of
   a) Arc dispersion
   b) Arc prevention
   c) De ionization
   d) None of the above

16) Mho relay have an R-X characteristics depicted by
   a) A straight line passing through origin
   b) A straight line parallel to X-axis
   c) A straight line parallel to R-axis
   d) A circle passing through the origin

17) The relay best suited for phase fault relaying for medium transmission lines is
   a) Mho relay
   b) Reactance relay
   c) Impedance relay
   d) None of the above

18) For ground fault, which of the relay is preferred
   a) Plain impedance relay
   b) Directional relay
   c) Reactance relay
   d) Over-current relay

19) The short circuit current of an alternator, in case of line to line fault depends on its
   a) Short circuit resistance
   b) Transient reactance
   c) Synchronous reactance
   d) None of the above

20) Solid earthing is provided for the voltage below
   a) 100 kV b) 600 V c) 11 kV d) 66 kV

———————

SLR-EP – 278

Seat No.	

B.E. (Electrical Engineering) Part – II (Old) Examination, 2016
SWITCHGEAR PROTECTION

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   a) Explain interruption of capacitive current.
   b) Function and sequential operation of Isolator and earth blade.
   c) Principle and operation of MCB and M.C.C.Bs.
   d) Working of H.V.D.C.C.B. with its circuit diagram.
   e) Principle and operation of Air-blast C.B.
      i) Axially ii) Radially

3. Attempt **any two** : **(2×10=20)**
   a) Explain the terms – restriking voltage and recovery voltage and RRRV. Derive expression for restriking voltage and RRRV in terms of system voltage, inductance and capacitance.
   b) i) Explain arc extinction and recovery in Vacuum C.B.
      ii) Draw and describe the construction working and application of vacuum circuit breaker.
   c) i) Explain breaking and making capacity of C.B. along with the short circuit characteristics.
      ii) Write properties of SF6 gas.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   a) Explain static over current relay with block diagram.
   b) Write a short note on PSM and current setting.
   c) Write the causes of over voltages in power system.
   d) Explain the ZnO type arresters.
   e) Explain the differential protection of delta-star transformer.

5. Attempt **any two** : **(10×2=20)**
   a) Explain the construction and working of directional over current relay.
   b) Explain the different faults occur in the generators. Also explain the differential protection of generator.
   c) Explain the various structures of induction relay.

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Set Q

Set Q

SLR-EP – 278

Seat No.	

Set **R**

B.E. (Electrical Engineering) Part – II (Old) Examination, 2016
SWITCHGEAR PROTECTION

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Attempt **all** : **(20×1=20)**

1) Mho relay have an R-X characteristics depicted by
   a) A straight line passing through origin b) A straight line parallel to X-axis
   c) A straight line parallel to R-axis d) A circle passing through the origin

2) The relay best suited for phase fault relaying for medium transmission lines is
   a) Mho relay b) Reactance relay
   c) Impedance relay d) None of the above

3) For ground fault, which of the relay is preferred
   a) Plain impedance relay b) Directional relay
   c) Reactance relay d) Over-current relay

4) The short circuit current of an alternator, in case of line to line fault depends on its
   a) Short circuit resistance b) Transient reactance
   c) Synchronous reactance d) None of the above

5) Solid earthing is provided for the voltage below
   a) 100 kV b) 600 V c) 11 kV d) 66 kV

6) The most efficient torque producing actuating structure for the induction type relays is
   a) Shaded pole structure b) Watt hour meter structure
   c) Induction cup structure d) Single induction loop structure

7) On what factor does the operating speed of the relay depend upon ?
   a) Rate of flux built up b) Armature core air gap
   c) Spring tension d) All of these

8) What is the actuating quantity for the relays ?
   a) Magnitude b) Frequency c) Phase angle d) All of these

9) What is the purpose of back up protection ?
   a) To increase the speed b) To increase the reach
   c) To leave no blind spot d) To guard against failure of primary

P.T.O.

10) The relay best suited for phase fault relaying for long transmission lines is
a) Mho relay b) Reactance relay
c) Impedance relay d) None of the above

11) The tripping circuit is
a) AC b) DC
c) Either AC or DC d) None of these

12) Which component ensures the safety of the line from damage ?
a) Relay b) Circuit breaker
c) Bus bar d) Current transformer

13) The fuse blows off by
a) Arcing b) Burning
c) Melting d) None of the above

14) The R.R.R.V. depends upon
a) System voltage b) Circuit p.f. only
c) Switching condition only d) Both b) and c)

15) A circuit breaker is essentially
a) Arc extinguisher
b) A current interrupting device
c) A power factor correcting device
d) A device for neutralizing the effect of transients

16) Which of the following statement about SF_6 gas is incorrect ?
a) It is non-toxic gas
b) It is non-inflammable
c) It has density 5 times that of air at 20°C
d) It has dark yellow color

17) In a vacuum circuit breaker, the vacuum is of the order of
a) 10 mm Hg b) 10^{-2} mm Hg
c) 10^{-6} mm Hg d) 10^{-9} mm Hg

18) Which circuit breaker is generally used in railway traction ?
a) SF_6 gas circuit breaker b) Air break circuit breaker
c) Vacuum circuit breaker d) Minimum oil circuit breaker

19) The heat produced at the contact point, due to passage of current, will least depend on
a) Contact resistance
b) Time during which the current flows
c) Current flowing
d) Temperature of the surrounding medium

20) Oil immersion of contacts is the method of
a) Arc dispersion b) Arc prevention
c) De ionization d) None of the above

SLR-EP – 278

Seat No.	

B.E. (Electrical Engineering) Part – II (Old) Examination, 2016
SWITCHGEAR PROTECTION

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   a) Explain interruption of capacitive current.
   b) Function and sequential operation of Isolator and earth blade.
   c) Principle and operation of MCB and M.C.C.Bs.
   d) Working of H.V.D.C.C.B. with its circuit diagram.
   e) Principle and operation of Air-blast C.B.
      i) Axially ii) Radially

3. Attempt **any two** : **(2×10=20)**
   a) Explain the terms – restriking voltage and recovery voltage and RRRV. Derive expression for restriking voltage and RRRV in terms of system voltage, inductance and capacitance.
   b) i) Explain arc extinction and recovery in Vacuum C.B.
      ii) Draw and describe the construction working and application of vacuum circuit breaker.
   c) i) Explain breaking and making capacity of C.B. along with the short circuit characteristics.
      ii) Write properties of SF6 gas.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   a) Explain static over current relay with block diagram.
   b) Write a short note on PSM and current setting.
   c) Write the causes of over voltages in power system.
   d) Explain the ZnO type arresters.
   e) Explain the differential protection of delta-star transformer.

5. Attempt **any two** : **(10×2=20)**
   a) Explain the construction and working of directional over current relay.
   b) Explain the different faults occur in the generators. Also explain the differential protection of generator.
   c) Explain the various structures of induction relay.

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Set R

Set R

SLR-EP – 278

Seat No.	

Set **S**

B.E. (Electrical Engineering) Part – II (Old) Examination, 2016
SWITCHGEAR PROTECTION

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Attempt **all** : **(20×1=20)**

1) Which of the following statement about SF_6 gas is incorrect ?
   a) It is non-toxic gas
   b) It is non-inflammable
   c) It has density 5 times that of air at 20°C
   d) It has dark yellow color

2) In a vacuum circuit breaker, the vacuum is of the order of
   a) 10 mm Hg b) 10^{-2} mm Hg
   c) 10^{-6} mm Hg d) 10^{-9} mm Hg

3) Which circuit breaker is generally used in railway traction ?
   a) SF_6 gas circuit breaker b) Air break circuit breaker
   c) Vacuum circuit breaker d) Minimum oil circuit breaker

4) The heat produced at the contact point, due to passage of current, will least depend on
   a) Contact resistance
   b) Time during which the current flows
   c) Current flowing
   d) Temperature of the surrounding medium

5) Oil immersion of contacts is the method of
   a) Arc dispersion b) Arc prevention
   c) De ionization d) None of the above

6) Mho relay have an R-X characteristics depicted by
   a) A straight line passing through origin b) A straight line parallel to X-axis
   c) A straight line parallel to R-axis d) A circle passing through the origin

7) The relay best suited for phase fault relaying for medium transmission lines is
   a) Mho relay b) Reactance relay
   c) Impedance relay d) None of the above

P.T.O.

8) For ground fault, which of the relay is preferred
   a) Plain impedance relay b) Directional relay
   c) Reactance relay d) Over-current relay

9) The short circuit current of an alternator, in case of line to line fault depends on its
   a) Short circuit resistance b) Transient reactance
   c) Synchronous reactance d) None of the above

10) Solid earthing is provided for the voltage below
   a) 100 kV b) 600 V c) 11 kV d) 66 kV

11) The most efficient torque producing actuating structure for the induction type relays is
   a) Shaded pole structure b) Watt hour meter structure
   c) Induction cup structure d) Single induction loop structure

12) On what factor does the operating speed of the relay depend upon ?
   a) Rate of flux built up b) Armature core air gap
   c) Spring tension d) All of these

13) What is the actuating quantity for the relays ?
   a) Magnitude b) Frequency c) Phase angle d) All of these

14) What is the purpose of back up protection ?
   a) To increase the speed b) To increase the reach
   c) To leave no blind spot d) To guard against failure of primary

15) The relay best suited for phase fault relaying for long transmission lines is
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   c) Impedance relay d) None of the above

16) The tripping circuit is
   a) AC b) DC
   c) Either AC or DC d) None of these

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   a) Relay b) Circuit breaker
   c) Bus bar d) Current transformer

18) The fuse blows off by
   a) Arcing b) Burning
   c) Melting d) None of the above

19) The R.R.R.V. depends upon
   a) System voltage b) Circuit p.f. only
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   a) Arc extinguisher
   b) A current interrupting device
   c) A power factor correcting device
   d) A device for neutralizing the effect of transients

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SLR-EP – 278

Seat No.	

B.E. (Electrical Engineering) Part – II (Old) Examination, 2016
SWITCHGEAR PROTECTION

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   a) Explain interruption of capacitive current.
   b) Function and sequential operation of Isolator and earth blade.
   c) Principle and operation of MCB and M.C.C.Bs.
   d) Working of H.V.D.C.C.B. with its circuit diagram.
   e) Principle and operation of Air-blast C.B.
      i) Axially ii) Radially

3. Attempt **any two** : **(2×10=20)**
   a) Explain the terms – restriking voltage and recovery voltage and RRRV. Derive expression for restriking voltage and RRRV in terms of system voltage, inductance and capacitance.
   b) i) Explain arc extinction and recovery in Vacuum C.B.
      ii) Draw and describe the construction working and application of vacuum circuit breaker.
   c) i) Explain breaking and making capacity of C.B. along with the short circuit characteristics.
      ii) Write properties of SF6 gas.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   a) Explain static over current relay with block diagram.
   b) Write a short note on PSM and current setting.
   c) Write the causes of over voltages in power system.
   d) Explain the ZnO type arresters.
   e) Explain the differential protection of delta-star transformer.

5. Attempt **any two** : **(10×2=20)**
   a) Explain the construction and working of directional over current relay.
   b) Explain the different faults occur in the generators. Also explain the differential protection of generator.
   c) Explain the various structures of induction relay.

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Set S

Set S

SLR-EP – 279

Seat No.	

Set **P**

B.E. (Electrical) (Part – II) Examination, 2016
DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The linear phase realization structure is used to represent
   a) FIR system b) IIR system
   c) Both FIR and IIR d) All DT systems

2) When a sequence is circularly shifted in time by 4 units, the phase changes per frequency unit by
   a) $2\times\pi\times4/N$ radians b) $2\times\pi\times2/N$ radians
   c) $2\times\pi/N$ radians d) $2\times\pi\times8/N$ radians

3) If the sequence x (n) is of finite duration then ROC is entire Z plane except possibly
   a) Z = 0 b) Z = ∞
   c) Z = 0 and /or Z = ∞ d) Z = 0 and Z = ∞

4) When an impulse response of ideal filter is truncated, in Fourier domain there is
   a) Multiplication of filter with rectangular window
   b) Multiplication of two waveforms
   c) Convolution of two waveforms
   d) Convolution of filter with rectangular window

5) FIR filter is always stable as
   a) All its poles are at origin b) All its zeros are at origin
   c) h (n) = h (N–1–n) d) None of the above

6) Gibbs phenomenon occurred due to
   a) Window method b) Truncation of infinite Fourier series
   c) Linear phase d) None of the above

7) The symmetrical impulse response for N odd can be used for the application as
   a) LPF b) HPF c) BPF d) All of the above

8) The magnitude of $e^{(-j\omega t)}$ is
   a) ωt b) sin (ωt) c) infinity d) one

P.T.O.

9) If DFT [x[n]] = X (k) then DFT [x* (n)] =
   a) X*(k) b) X*(N – k) c) $X^*((+k))_N$ d) None of these

10) For linear phase realization of FIR filters, for N even; number of multipliers required are
   a) N b) $\frac{N+1}{2}$ c) N/2 d) N^2

11) The linear phase FIR filter
   a) Doesn't alter the shape of original signal
   b) Preserves shape in passband
   c) Symmetric about its mid point
   d) All of the above

12) IIR filter design is based on
   a) Analog b) Digital c) Discrete time d) None of these

13) When a sequence is circularly shifted in time by 5 units, the magnitude response
   a) Increases by 5 b) Remains unchanged
   c) Remains constant d) Shifts by 5 units

14) When recovered samples overlap due to aliasing, which of the following operation takes place ?
   a) Substraction of overlapping samples
   b) Multiplication of overlapping samples
   c) Addition of overlapping samples
   d) None of the above

15) Overlap and save algorithm uses overlap for
   a) Output sequences b) Input sequences
   c) Both input and output sequences d) Adds the overlapped output

16) Kaiser window has an adjustable parameter that controls
   a) The stop band width b) Main lobe width
   c) Stop band attenuation d) None of these

17) To avoid the overflow or adders, scaling is added
   a) At the output of the adder b) At the input of the first adder
   c) At the input of the second adder d) At the output of the second adder

18) In which of FFT algorithm, phase factor is multiplied after add substract operations ?
   a) DIT b) Both DIF and DIT
   c) DIF d) None of the above

19) In place computation is recommended as it
   a) Reduces memory requirement b) Increases memory requirement
   c) Reduces computations d) None of these

20) If two systems are connected in cascade then the overall system is
   a) Multiplication of individual impulse responses
   b) Addition of individual impulse responses
   c) Convolution of individual impulse responses
   d) None of these

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SLR-EP – 279

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2016
DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Wednesday, 23-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) Find the cross-correlation of two finite length sequences x (n) = {0, 1, 2, 3, 4} y (n) = {1, 2, 3, 4, 5}

b) State the difference between overlap-add and overlap-save method.

c) Find the DFT of the sequence x (n) = {1, 1, 0, 0}

d) Compute circular convolution of following DT signals.

x_1 (n) = {2, 1, 2, 1} x_2 (n) = {1, 2, 3, 4}

e) Find the output y(n) of a filter whose impulse response is h (n) = {1, 1, 1} and input signal x (n) = {3, –1, 0, 1, 3, 2, 0, 1, 2, 1} using overlap-save method.

3. Solve **any two** : **(10×2=20)**

a) Find the DFT of the sequence x (n) = {1, 2, 3, 4, 4, 3, 2, 1} using DIT algorithm.

b) Compute the 8-point DFT of t he sequence x (n) = {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using the radix-2 DIT and DIF algorithm.

c) Determine the direct form II and Transposed direct form II for the given system y (n) = 0.5y (n – 1) – 0.25y (n – 2) + x (n) + x (n – 1).

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Write the steps involved in digital FIR filter design.

   b) List down the characteristics of FIR filter.

   c) Explain bilinear transformation in IIR filter.

   d) What is special addressing modes in DSP processor ?

   e) Difference in fixed point and floating point DSP.

5. Solve **any two** : **(2×10=20)**

   a) Explain in detail the application of DSP in control system .

   b) Draw the internal architecture of TMS 320C54XX DSP processor.

   c) Discuss on FIR filter realization techniques.

SLR-EP – 279

Seat No.	

Set **Q**

B.E. (Electrical) (Part – II) Examination, 2016
DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Kaiser window has an adjustable parameter that controls
   a) The stop band width b) Main lobe width
   c) Stop band attenuation d) None of these

2) To avoid the overflow or adders, scaling is added
   a) At the output of the adder b) At the input of the first adder
   c) At the input of the second adder d) At the output of the second adder

3) In which of FFT algorithm, phase factor is multiplied after add substract operations ?
   a) DIT b) Both DIF and DIT
   c) DIF d) None of the above

4) In place computation is recommended as it
   a) Reduces memory requirement b) Increases memory requirement
   c) Reduces computations d) None of these

5) If two systems are connected in cascade then the overall system is
   a) Multiplication of individual impulse responses
   b) Addition of individual impulse responses
   c) Convolution of individual impulse responses
   d) None of these

6) The linear phase realization structure is used to represent
   a) FIR system b) IIR system
   c) Both FIR and IIR d) All DT systems

7) When a sequence is circularly shifted in time by 4 units, the phase changes per frequency unit by
   a) $2\times\pi\times4/N$ radians b) $2\times\pi\times2/N$ radians
   c) $2\times\pi/N$ radians d) $2\times\pi\times8/N$ radians

8) If the sequence x (n) is of finite duration then ROC is entire Z plane except possibly
   a) $Z = 0$ b) $Z = \infty$
   c) $Z = 0$ and /or $Z = \infty$ d) $Z = 0$ and $Z = \infty$

P.T.O.

9) When an impulse response of ideal filter is truncated, in Fourier domain there is
   a) Multiplication of filter with rectangular window
   b) Multiplication of two waveforms
   c) Convolution of two waveforms
   d) Convolution of filter with rectangular window

10) FIR filter is always stable as
   a) All its poles are at origin
   b) All its zeros are at origin
   c) h (n) = h (N–1–n)
   d) None of the above

11) Gibbs phenomenon occurred due to
   a) Window method
   b) Truncation of infinite Fourier series
   c) Linear phase
   d) None of the above

12) The symmetrical impulse response for N odd can be used for the application as
   a) LPF b) HPF c) BPF d) All of the above

13) The magnitude of $e^{(-j\omega t)}$ is
   a) ωt b) sin (ωt) c) infinity d) one

14) If DFT [x[n]] = X (k) then DFT [x* (n)] =
   a) X*(k) b) X*(N – k) c) X* $((+k))_N$ d) None of these

15) For linear phase realization of FIR filters, for N even; number of multipliers required are
   a) N b) $\frac{N+1}{2}$ c) N/2 d) N^2

16) The linear phase FIR filter
   a) Doesn't alter the shape of original signal
   b) Preserves shape in passband
   c) Symmetric about its mid point
   d) All of the above

17) IIR filter design is based on
   a) Analog b) Digital c) Discrete time d) None of these

18) When a sequence is circularly shifted in time by 5 units, the magnitude response
   a) Increases by 5
   b) Remains unchanged
   c) Remains constant
   d) Shifts by 5 units

19) When recovered samples overlap due to aliasing, which of the following operation takes place ?
   a) Substraction of overlapping samples
   b) Multiplication of overlapping samples
   c) Addition of overlapping samples
   d) None of the above

20) Overlap and save algorithm uses overlap for
   a) Output sequences
   b) Input sequences
   c) Both input and output sequences
   d) Adds the overlapped output

SLR-EP – 279

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2016
DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Wednesday, 23-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) Find the cross-correlation of two finite length sequences x (n) = {0, 1, 2, 3, 4} y (n) = {1, 2, 3, 4, 5}

b) State the difference between overlap-add and overlap-save method.

c) Find the DFT of the sequence x (n) = {1, 1, 0, 0}

d) Compute circular convolution of following DT signals.

x_1 (n) = {2, 1, 2, 1} x_2 (n) = {1, 2, 3, 4}

e) Find the output y(n) of a filter whose impulse response is h (n) = {1, 1, 1} and input signal x (n) = {3, –1, 0, 1, 3, 2, 0, 1, 2, 1} using overlap-save method.

3. Solve **any two** : **(10×2=20)**

a) Find the DFT of the sequence x (n) = {1, 2, 3, 4, 4, 3, 2, 1} using DIT algorithm.

b) Compute the 8-point DFT of t he sequence x (n) = {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using the radix-2 DIT and DIF algorithm.

c) Determine the direct form II and Transposed direct form II for the given system y (n) = 0.5y (n – 1) – 0.25y (n – 2) + x (n) + x (n – 1).

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Write the steps involved in digital FIR filter design.

   b) List down the characteristics of FIR filter.

   c) Explain bilinear transformation in IIR filter.

   d) What is special addressing modes in DSP processor ?

   e) Difference in fixed point and floating point DSP.

5. Solve **any two** : **(2×10=20)**

   a) Explain in detail the application of DSP in control system .

   b) Draw the internal architecture of TMS 320C54XX DSP processor.

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SLR-EP – 279

Seat No.	

Set **R**

B.E. (Electrical) (Part – II) Examination, 2016
DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The linear phase FIR filter
   a) Doesn't alter the shape of original signal
   b) Preserves shape in passband
   c) Symmetric about its mid point
   d) All of the above

2) IIR filter design is based on
   a) Analog b) Digital c) Discrete time d) None of these

3) When a sequence is circularly shifted in time by 5 units, the magnitude response
   a) Increases by 5 b) Remains unchanged
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4) When recovered samples overlap due to aliasing, which of the following operation takes place ?
   a) Substraction of overlapping samples
   b) Multiplication of overlapping samples
   c) Addition of overlapping samples
   d) None of the above

5) Overlap and save algorithm uses overlap for
   a) Output sequences b) Input sequences
   c) Both input and output sequences d) Adds the overlapped output

6) Kaiser window has an adjustable parameter that controls
   a) The stop band width b) Main lobe width
   c) Stop band attenuation d) None of these

7) To avoid the overflow or adders, scaling is added
   a) At the output of the adder b) At the input of the first adder
   c) At the input of the second adder d) At the output of the second adder

8) In which of FFT algorithm, phase factor is multiplied after add substract operations ?
   a) DIT b) Both DIF and DIT
   c) DIF d) None of the above

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10) If two systems are connected in cascade then the overall system is
   a) Multiplication of individual impulse responses
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13) If the sequence x (n) is of finite duration then ROC is entire Z plane except possibly
   a) $Z = 0$ b) $Z = \infty$
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16) Gibbs phenomenon occurred due to
   a) Window method b) Truncation of infinite Fourier series
   c) Linear phase d) None of the above

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   a) LPF b) HPF c) BPF d) All of the above

18) The magnitude of $e^{(-j\omega t)}$ is
   a) ωt b) sin (ωt) c) infinity d) one

19) If DFT [x[n]] = X (k) then DFT [x* (n)] =
   a) X*(k) b) X*(N – k) c) $X^*((+k))_N$ d) None of these

20) For linear phase realization of FIR filters, for N even; number of multipliers required are
   a) N b) $\frac{N+1}{2}$ c) N/2 d) N^2

Set R

SLR-EP – 279

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2016
DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Wednesday, 23-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) Find the cross-correlation of two finite length sequences x (n) = {0, 1, 2, 3, 4} y (n) = {1, 2, 3, 4, 5}

b) State the difference between overlap-add and overlap-save method.

c) Find the DFT of the sequence x (n) = {1, 1, 0, 0}

d) Compute circular convolution of following DT signals.

x_1 (n) = {2, 1, 2, 1} x_2 (n) = {1, 2, 3, 4}

e) Find the output y(n) of a filter whose impulse response is h (n) = {1, 1, 1} and input signal x (n) = {3, –1, 0, 1, 3, 2, 0, 1, 2, 1} using overlap-save method.

3. Solve **any two** : **(10×2=20)**

a) Find the DFT of the sequence x (n) = {1, 2, 3, 4, 4, 3, 2, 1} using DIT algorithm.

b) Compute the 8-point DFT of t he sequence x (n) = {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using the radix-2 DIT and DIF algorithm.

c) Determine the direct form II and Transposed direct form II for the given system y (n) = 0.5y (n – 1) – 0.25y (n – 2) + x (n) + x (n – 1).

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Write the steps involved in digital FIR filter design.

   b) List down the characteristics of FIR filter.

   c) Explain bilinear transformation in IIR filter.

   d) What is special addressing modes in DSP processor ?

   e) Difference in fixed point and floating point DSP.

5. Solve **any two** : **(2×10=20)**

   a) Explain in detail the application of DSP in control system .

   b) Draw the internal architecture of TMS 320C54XX DSP processor.

   c) Discuss on FIR filter realization techniques.

SLR-EP – 279

Seat No.	

Set **S**

B.E. (Electrical) (Part – II) Examination, 2016
DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Gibbs phenomenon occurred due to
   a) Window method b) Truncation of infinite Fourier series
   c) Linear phase d) None of the above

2) The symmetrical impulse response for N odd can be used for the application as
   a) LPF b) HPF c) BPF d) All of the above

3) The magnitude of $e^{(-j\omega t)}$ is
   a) ωt b) sin (ωt) c) infinity d) one

4) If DFT [x[n]] = X (k) then DFT [x* (n)] =
   a) X*(k) b) X*(N – k) c) X* $((+k))_N$ d) None of these

5) For linear phase realization of FIR filters, for N even; number of multipliers required are
   a) N b) $\frac{N+1}{2}$ c) N/2 d) N^2

6) The linear phase FIR filter
   a) Doesn't alter the shape of original signal
   b) Preserves shape in passband
   c) Symmetric about its mid point
   d) All of the above

7) IIR filter design is based on
   a) Analog b) Digital c) Discrete time d) None of these

8) When a sequence is circularly shifted in time by 5 units, the magnitude response
   a) Increases by 5 b) Remains unchanged
   c) Remains constant d) Shifts by 5 units

P.T.O.

9) When recovered samples overlap due to aliasing, which of the following operation takes place ?
   a) Substraction of overlapping samples
   b) Multiplication of overlapping samples
   c) Addition of overlapping samples
   d) None of the above

10) Overlap and save algorithm uses overlap for
   a) Output sequences
   b) Input sequences
   c) Both input and output sequences
   d) Adds the overlapped output

11) Kaiser window has an adjustable parameter that controls
   a) The stop band width
   b) Main lobe width
   c) Stop band attenuation
   d) None of these

12) To avoid the overflow or adders, scaling is added
   a) At the output of the adder
   b) At the input of the first adder
   c) At the input of the second adder
   d) At the output of the second adder

13) In which of FFT algorithm, phase factor is multiplied after add substract operations ?
   a) DIT
   b) Both DIF and DIT
   c) DIF
   d) None of the above

14) In place computation is recommended as it
   a) Reduces memory requirement
   b) Increases memory requirement
   c) Reduces computations
   d) None of these

15) If two systems are connected in cascade then the overall system is
   a) Multiplication of individual impulse responses
   b) Addition of individual impulse responses
   c) Convolution of individual impulse responses
   d) None of these

16) The linear phase realization structure is used to represent
   a) FIR system
   b) IIR system
   c) Both FIR and IIR
   d) All DT systems

17) When a sequence is circularly shifted in time by 4 units, the phase changes per frequency unit by
   a) $2\times\pi\times4/N$ radians
   b) $2\times\pi\times2/N$ radians
   c) $2\times\pi/N$ radians
   d) $2\times\pi\times8/N$ radians

18) If the sequence x (n) is of finite duration then ROC is entire Z plane except possibly
   a) $Z = 0$
   b) $Z = \infty$
   c) $Z = 0$ and /or $Z = \infty$
   d) $Z = 0$ and $Z = \infty$

19) When an impulse response of ideal filter is truncated, in Fourier domain there is
   a) Multiplication of filter with rectangular window
   b) Multiplication of two waveforms
   c) Convolution of two waveforms
   d) Convolution of filter with rectangular window

20) FIR filter is always stable as
   a) All its poles are at origin
   b) All its zeros are at origin
   c) $h(n) = h(N-1-n)$
   d) None of the above

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SLR-EP – 279

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2016
DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Wednesday, 23-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) Find the cross-correlation of two finite length sequences x (n) = {0, 1, 2, 3, 4} y (n) = {1, 2, 3, 4, 5}

b) State the difference between overlap-add and overlap-save method.

c) Find the DFT of the sequence x (n) = {1, 1, 0, 0}

d) Compute circular convolution of following DT signals.

x_1 (n) = {2, 1, 2, 1} x_2 (n) = {1, 2, 3, 4}

e) Find the output y(n) of a filter whose impulse response is h (n) = {1, 1, 1} and input signal x (n) = {3, –1, 0, 1, 3, 2, 0, 1, 2, 1} using overlap-save method.

3. Solve **any two** : **(10×2=20)**

a) Find the DFT of the sequence x (n) = {1, 2, 3, 4, 4, 3, 2, 1} using DIT algorithm.

b) Compute the 8-point DFT of t he sequence x (n) = {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using the radix-2 DIT and DIF algorithm.

c) Determine the direct form II and Transposed direct form II for the given system y (n) = 0.5y (n – 1) – 0.25y (n – 2) + x (n) + x (n – 1).

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Write the steps involved in digital FIR filter design.

   b) List down the characteristics of FIR filter.

   c) Explain bilinear transformation in IIR filter.

   d) What is special addressing modes in DSP processor ?

   e) Difference in fixed point and floating point DSP.

5. Solve **any two** : **(2×10=20)**

   a) Explain in detail the application of DSP in control system .

   b) Draw the internal architecture of TMS 320C54XX DSP processor.

   c) Discuss on FIR filter realization techniques.

SLR-EP – 280

Seat No.	

Set **P**

B.E. (Electrical) (Part – II) (Old) Examination, 2016
Elective – II : HVDC TRANSMISSION

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) In HVDC transmission system, rectifier firing angle a is kept near
a) 0° b) 15° c) 30° d) 90°

2) The HVDC converter
a) Does not consume reactive power
b) Consumes as much reactive power as real power
c) Consumes 50% of the real power
d) None of the above

3) A 12-pulse bridge is preferred in HVDC because
a) It eliminates certain harmonics
b) It results in better power factor
c) Series connection of converters on D.C. side is better
d) All of the above

4) CCC stands for
a) Capacitor Compressed Converter b) Capacitor Commutator Converter
c) Capacitor Commutated Converter d) None of the above

5) Pulse Phase Control (PPC) is the variations of
a) IPC b) EPC c) CCC d) VGC

6) Harmonic instability problem particularly with low short circuit ratios, is the drawback of
a) IPC scheme b) EPC scheme
c) Current controller d) Current extinguish angle controller

7) Under unbalanced voltage conditions, EPC results in
a) More DC voltage b) Less DC voltage
c) Moderate DC voltage d) None of the above

8) A commutation group is defined as, group of valves in which only _____ valves conducts.
a) One b) Two c) Three d) Four

9) _____ is a non-self clearing fault.
a) Commutation failure b) Arc-through
c) Arc-back d) Misfire

P.T.O.

10) In _____ pulse frequency control, gain K1 of integrator is given by
    a) $K1 = Pf_0V3/V1$ b) $K1 = Pf_0V3$
    c) K1 = P(V3/V1) d) None of the above

11) Fault on a two terminal DC link is removed by
    a) Breakers on DC side b) Breakers on AC side
    c) Current control of converters d) None of the above

12) Passive filters acts as source of
    a) Active power b) Reactive power c) Apparent power d) Only a) and c)

13) Protection of MTDC system can be done by
    a) High speed disconnecting switches b) Fast current control
    c) Differential type protection d) All of the above

14) The characteristics of DC breakers can be determined by
    a) Voltage capability b) Current capability
    c) Energy capability d) All of the above

15) A DC tie used in parallel with an AC tie to damp the low frequency oscillations, for the controllers
    a) Frequency and power/frequency control
    b) Stabilization of AC ties control
    c) Subsynchronous damping control
    d) Reactive power control

16) Current extinction can occur when current flowing through valve is less than
    a) Latching current b) Holding current
    c) Rated current d) None of the above

17) Short gate pulse or long gate pulse used for
    a) To start AC link b) To stop AC link c) To start DC link d) To stop DC link

18) Tuned filters are used to filter out
    a) Characteristic harmonics b) Non-characteristic harmonics
    c) Both a) and b) d) Transients only

19) Arc-back is a _____ fault and results in severe stress on transformer winding
    a) Self clearing b) Non-self clearing
    c) Commutation failure d) Both a) and b)

20) Misfire occurs
    a) The presence of an unwanted signals
    b) Because of duplicated converter controls
    c) The required gate pulse is missing
    d) Both a) and b)

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SLR-EP – 280

Seat No.	

B.E. (Electrical) (Part – II) (Old) Examination, 2016
Elective – II : HVDC TRANSMISSION

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(Five marks each)**
   a) Explain the IPC scheme of firing angle generation.
   b) Draw and explain the basic power controller of HVDC system.
   c) Write the advantages and disadvantages of HVDC transmission system.
   d) Define SCR and pulse number.
   e) Explain starting and stopping of valves in converter stations.

3. Solve following : **(Ten marks each)**
   a) Find the expression of DC output for 6 pulse converter in HVDC system considering overlap angle more than 60°.

      OR

      Draw the basic converter control hierarchy and explain firing angle control in detail.
   b) Explain with neat diagram the different types of DC links.

SECTION – II

4. Solve **any four** : **(Five marks each)**
   a) Explain DC filters.
   b) Explain static VAR systems.
   c) Explain potential applications of MTDC system.
   d) Explain the basic faults that occur in converters.
   e) Explain the TCR with VI characteristics.

5. Solve **any two** : **(Ten marks each)**
   a) State and explain the design of active and passive filters.
   b) Define the Non-characteristic harmonics and explain i) Harmonic distortion ii) IT product iii) Telephone influence factor iv) THFF.
   c) Explain the causes of overvoltage and protections against them.

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Set P

Set P

SLR-EP – 280

Seat No.	

Set Q

B.E. (Electrical) (Part – II) (Old) Examination, 2016
Elective – II : HVDC TRANSMISSION

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Current extinction can occur when current flowing through valve is less than
   a) Latching current b) Holding current
   c) Rated current d) None of the above

2) Short gate pulse or long gate pulse used for
   a) To start AC link b) To stop AC link c) To start DC link d) To stop DC link

3) Tuned filters are used to filter out
   a) Characteristic harmonics b) Non-characteristic harmonics
   c) Both a) and b) d) Transients only

4) Arc-back is a _____ fault and results in severe stress on transformer winding
   a) Self clearing b) Non-self clearing
   c) Commutation failure d) Both a) and b)

5) Misfire occurs
   a) The presence of an unwanted signals
   b) Because of duplicated converter controls
   c) The required gate pulse is missing
   d) Both a) and b)

6) In HVDC transmission system, rectifier firing angle a is kept near
   a) 0° b) 15° c) 30° d) 90°

7) The HVDC converter
   a) Does not consume reactive power
   b) Consumes as much reactive power as real power
   c) Consumes 50% of the real power
   d) None of the above

8) A 12-pulse bridge is preferred in HVDC because
   a) It eliminates certain harmonics
   b) It results in better power factor
   c) Series connection of converters on D.C. side is better
   d) All of the above

P.T.O.

9) CCC stands for
   a) Capacitor Compressed Converter
   b) Capacitor Commutator Converter
   c) Capacitor Commutated Converter
   d) None of the above

10) Pulse Phase Control (PPC) is the variations of
   a) IPC b) EPC c) CCC d) VGC

11) Harmonic instability problem particularly with low short circuit ratios, is the drawback of
   a) IPC scheme
   b) EPC scheme
   c) Current controller
   d) Current extinguish angle controller

12) Under unbalanced voltage conditions, EPC results in
   a) More DC voltage
   b) Less DC voltage
   c) Moderate DC voltage
   d) None of the above

13) A commutation group is defined as, group of valves in which only _____ valves conducts.
   a) One b) Two c) Three d) Four

14) _____ is a non-self clearing fault.
   a) Commutation failure
   b) Arc-through
   c) Arc-back
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15) In _____ pulse frequency control, gain K1 of integrator is given by
   a) $K1 = Pf_0V3/V1$
   b) $K1 = Pf_0V3$
   c) K1 = P(V3/V1)
   d) None of the above

16) Fault on a two terminal DC link is removed by
   a) Breakers on DC side
   b) Breakers on AC side
   c) Current control of converters
   d) None of the above

17) Passive filters acts as source of
   a) Active power b) Reactive power c) Apparent power d) Only a) and c)

18) Protection of MTDC system can be done by
   a) High speed disconnecting switches
   b) Fast current control
   c) Differential type protection
   d) All of the above

19) The characteristics of DC breakers can be determined by
   a) Voltage capability
   b) Current capability
   c) Energy capability
   d) All of the above

20) A DC tie used in parallel with an AC tie to damp the low frequency oscillations, for the controllers
   a) Frequency and power/frequency control
   b) Stabilization of AC ties control
   c) Subsynchronous damping control
   d) Reactive power control

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Seat No.	

B.E. (Electrical) (Part – II) (Old) Examination, 2016
Elective – II : HVDC TRANSMISSION

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(Five marks each)**
   a) Explain the IPC scheme of firing angle generation.
   b) Draw and explain the basic power controller of HVDC system.
   c) Write the advantages and disadvantages of HVDC transmission system.
   d) Define SCR and pulse number.
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3. Solve following : **(Ten marks each)**
   a) Find the expression of DC output for 6 pulse converter in HVDC system considering overlap angle more than 60°.

      OR

      Draw the basic converter control hierarchy and explain firing angle control in detail.
   b) Explain with neat diagram the different types of DC links.

SECTION – II

4. Solve **any four** : **(Five marks each)**
   a) Explain DC filters.
   b) Explain static VAR systems.
   c) Explain potential applications of MTDC system.
   d) Explain the basic faults that occur in converters.
   e) Explain the TCR with VI characteristics.

5. Solve **any two** : **(Ten marks each)**
   a) State and explain the design of active and passive filters.
   b) Define the Non-characteristic harmonics and explain i) Harmonic distortion ii) IT product iii) Telephone influence factor iv) THFF.
   c) Explain the causes of overvoltage and protections against them.

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Set Q

Set Q

SLR-EP – 280

Seat No.	

Set R

B.E. (Electrical) (Part – II) (Old) Examination, 2016
Elective – II : HVDC TRANSMISSION

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Fault on a two terminal DC link is removed by
   a) Breakers on DC side b) Breakers on AC side
   c) Current control of converters d) None of the above

2) Passive filters acts as source of
   a) Active power b) Reactive power c) Apparent power d) Only a) and c)

3) Protection of MTDC system can be done by
   a) High speed disconnecting switches b) Fast current control
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   d) Reactive power control

6) Current extinction can occur when current flowing through valve is less than
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7) Short gate pulse or long gate pulse used for
   a) To start AC link b) To stop AC link c) To start DC link d) To stop DC link

8) Tuned filters are used to filter out
   a) Characteristic harmonics b) Non-characteristic harmonics
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9) Arc-back is a _____ fault and results in severe stress on transformer winding
   a) Self clearing b) Non-self clearing
   c) Commutation failure d) Both a) and b)

P.T.O.

10) Misfire occurs
   a) The presence of an unwanted signals
   b) Because of duplicated converter controls
   c) The required gate pulse is missing
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   a) 0° b) 15° c) 30° d) 90°

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   a) Does not consume reactive power
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   a) It eliminates certain harmonics
   b) It results in better power factor
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14) CCC stands for
   a) Capacitor Compressed Converter b) Capacitor Commutator Converter
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16) Harmonic instability problem particularly with low short circuit ratios, is the drawback of
   a) IPC scheme b) EPC scheme
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17) Under unbalanced voltage conditions, EPC results in
   a) More DC voltage b) Less DC voltage
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18) A commutation group is defined as, group of valves in which only _____ valves conducts.
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Seat No.	

B.E. (Electrical) (Part – II) (Old) Examination, 2016
Elective – II : HVDC TRANSMISSION

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(Five marks each)**
   a) Explain the IPC scheme of firing angle generation.
   b) Draw and explain the basic power controller of HVDC system.
   c) Write the advantages and disadvantages of HVDC transmission system.
   d) Define SCR and pulse number.
   e) Explain starting and stopping of valves in converter stations.

3. Solve following : **(Ten marks each)**
   a) Find the expression of DC output for 6 pulse converter in HVDC system considering overlap angle more than 60°.

      OR

      Draw the basic converter control hierarchy and explain firing angle control in detail.
   b) Explain with neat diagram the different types of DC links.

SECTION – II

4. Solve **any four** : **(Five marks each)**
   a) Explain DC filters.
   b) Explain static VAR systems.
   c) Explain potential applications of MTDC system.
   d) Explain the basic faults that occur in converters.
   e) Explain the TCR with VI characteristics.

5. Solve **any two** : **(Ten marks each)**
   a) State and explain the design of active and passive filters.
   b) Define the Non-characteristic harmonics and explain i) Harmonic distortion ii) IT product iii) Telephone influence factor iv) THFF.
   c) Explain the causes of overvoltage and protections against them.

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Set R

Set R

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Seat No.	

Set S

B.E. (Electrical) (Part – II) (Old) Examination, 2016
Elective – II : HVDC TRANSMISSION

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Harmonic instability problem particularly with low short circuit ratios, is the drawback of
   a) IPC scheme b) EPC scheme
   c) Current controller d) Current extinguish angle controller

2) Under unbalanced voltage conditions, EPC results in
   a) More DC voltage b) Less DC voltage
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3) A commutation group is defined as, group of valves in which only _____ valves conducts.
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4) _____ is a non-self clearing fault.
   a) Commutation failure b) Arc-through
   c) Arc-back d) Misfire

5) In _____ pulse frequency control, gain K1 of integrator is given by
   a) $K1 = Pf_0V3/V1$ b) $K1 = Pf_0V3$
   c) K1 = P(V3/V1) d) None of the above

6) Fault on a two terminal DC link is removed by
   a) Breakers on DC side b) Breakers on AC side
   c) Current control of converters d) None of the above

7) Passive filters acts as source of
   a) Active power b) Reactive power c) Apparent power d) Only a) and c)

8) Protection of MTDC system can be done by
   a) High speed disconnecting switches b) Fast current control
   c) Differential type protection d) All of the above

9) The characteristics of DC breakers can be determined by
   a) Voltage capability b) Current capability
   c) Energy capability d) All of the above

P.T.O.

10) A DC tie used in parallel with an AC tie to damp the low frequency oscillations, for the controllers
   a) Frequency and power/frequency control
   b) Stabilization of AC ties control
   c) Subsynchronous damping control
   d) Reactive power control

11) Current extinction can occur when current flowing through valve is less than
   a) Latching current b) Holding current
   c) Rated current d) None of the above

12) Short gate pulse or long gate pulse used for
   a) To start AC link b) To stop AC link c) To start DC link d) To stop DC link

13) Tuned filters are used to filter out
   a) Characteristic harmonics b) Non-characteristic harmonics
   c) Both a) and b) d) Transients only

14) Arc-back is a _____ fault and results in severe stress on transformer winding
   a) Self clearing b) Non-self clearing
   c) Commutation failure d) Both a) and b)

15) Misfire occurs
   a) The presence of an unwanted signals
   b) Because of duplicated converter controls
   c) The required gate pulse is missing
   d) Both a) and b)

16) In HVDC transmission system, rectifier firing angle a is kept near
   a) 0° b) 15° c) 30° d) 90°

17) The HVDC converter
   a) Does not consume reactive power
   b) Consumes as much reactive power as real power
   c) Consumes 50% of the real power
   d) None of the above

18) A 12-pulse bridge is preferred in HVDC because
   a) It eliminates certain harmonics
   b) It results in better power factor
   c) Series connection of converters on D.C. side is better
   d) All of the above

19) CCC stands for
   a) Capacitor Compressed Converter b) Capacitor Commutator Converter
   c) Capacitor Commutated Converter d) None of the above

20) Pulse Phase Control (PPC) is the variations of
   a) IPC b) EPC c) CCC d) VGC

_____

SLR-EP – 280

Seat No.	

B.E. (Electrical) (Part – II) (Old) Examination, 2016
Elective – II : HVDC TRANSMISSION

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(Five marks each)**
   a) Explain the IPC scheme of firing angle generation.
   b) Draw and explain the basic power controller of HVDC system.
   c) Write the advantages and disadvantages of HVDC transmission system.
   d) Define SCR and pulse number.
   e) Explain starting and stopping of valves in converter stations.

3. Solve following : **(Ten marks each)**
   a) Find the expression of DC output for 6 pulse converter in HVDC system considering overlap angle more than 60°.

      OR

      Draw the basic converter control hierarchy and explain firing angle control in detail.
   b) Explain with neat diagram the different types of DC links.

SECTION – II

4. Solve **any four** : **(Five marks each)**
   a) Explain DC filters.
   b) Explain static VAR systems.
   c) Explain potential applications of MTDC system.
   d) Explain the basic faults that occur in converters.
   e) Explain the TCR with VI characteristics.

5. Solve **any two** : **(Ten marks each)**
   a) State and explain the design of active and passive filters.
   b) Define the Non-characteristic harmonics and explain i) Harmonic distortion ii) IT product iii) Telephone influence factor iv) THFF.
   c) Explain the causes of overvoltage and protections against them.

_____

Set S

Set S

SLR-EP – 281

Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Assume*** *suitable data* ***wherever*** *necessary.*
3) Non-programmable calculators are ***permitted****.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) FACTS provides _____
   a) Power transfer capability and controllability
   b) Phase sequence and comparability
   c) a) and b)
   d) None

2) K is _____
   a) X/Xc b) 1/Xc c) X d) Xc/X

3) TSSC can be operated line _____
   a) Continuous b) Discrete c) Step d) None

4) In tap changing transformers, the tapping are provided on _____
   a) Secondary winding b) Primary winding
   c) Tertiary winding d) High voltage winding

5) Shunt compensation in an EHV line is used to _____
   a) Improve stability
   b) Reduce fault level
   c) Improve voltage profile
   d) Substitute for synchronous phase modifier

6) Series capacitor is used in a transmission line to _____
   a) Compensate the voltage drop b) Reduce line losses
   c) Improve load power factor d) None

7) The function of the series capacitor is simply to produce on appropriate at fundamental ac system frequency in with the transition the can
   a) Phase b) Same angle c) Quadrature d) None

8) In midpoint compensation Vsm and Vmr are _____
   a) Same b) Different c) Unity d) None

9) TCSC is a combination of _____
   a) Capacitor and thyristor valves b) Thyristor valve and TCR
   c) Capacitor and TCR d) Either capacitor or TCR

10) The most fast operation of compensator is _____
   a) TSSC b) TCSC c) GCSC d) None

11) For desirable operation of a DC link without ground return, _____ link are most commonly used.
   a) Monopolar b) Bipolar c) Homopolar d) All of the above

12) Bipolar link has two conductors, _____
   a) One positive and other negative b) One positive and other positive
   c) One negative and other negative d) Both are negative

13) Individual operation of firing pulses for each valve is the feature of _____
   a) IPC b) EPC c) CCC d) VGC

14) The main advantage of inverse cosine control scheme is that _____
   a) Avg. dc voltage across bridge varies linearly with the control voltage
   b) Avg. dc voltage across bridge becomes equal to the control voltage
   c) The delay angle is nominally proportional to the inverse cosine of the control voltage
   d) b) and c) only

15) In HVDC converter stations, the provision of SVC mainly helps to overcome _____
   a) Voltage instability b) Under voltages
   c) Resonance frequency d) Harmonics

16) High speed reversal of power is possible in _____
   a) Parallel system b) Radial system
   c) Mesh system d) Series system

17) SVC is a _____ device.
   a) Variable reactance b) Variable impedance
   c) Only reactive d) All of the above

18) The bypassing of the bridge can be done with the help of _____
   a) Replacing a single valve in the arm
   b) Replacing both valve in same arm
   c) Activating a bypass pair in the bridge
   d) Deactivating same arm from converter set

19) A commutation group is defined as, group of valves in which only _____ valves conducts.
   a) One b) Two c) Three d) Four

20) _____ is a non-self clearing fault.
   a) Commutation failure b) Arc-through
   c) Arc-back d) Misfire

_____

SLR-EP – 281

Seat No.	

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Assume*** *suitable data* ***wherever*** *necessary.*

2) Non-programmable calculators are ***permitted****.*

SECTION – I

2. Solve **any four** of the following : **20**

   1) Draw block diagram and characteristics of FC-TCR.

   2) Explain the objectives of shunt compensator.

   3) Explain merits and demerits of SSSC.

   4) Compare TCVC and TCPAR.

   5) Explain Hybrid Phase Angle Regulators.

3. Solve **any two** : **20**

   1) Compare FC-TCR and converter based static VAR generator on points :

      1) Type

      2) Maximum compensating current

      3) Losses at zero output and

      4) Harmonics.

   2) Explain the operational and performance characteristics of STATCOM and SVC.

   3) Describe GTO thyristor controlled series capacitor with neat diagram and waveforms.

SECTION – II

4. Solve **any four** of the following : **20**
   1) Explain basic control system for P and Q control.
   2) Give classification of HVDC links.
   3) Explain the IPC scheme of firing angle generation.
   4) Explain the basic principle of overvoltage protection.
   5) Enlist the various types of faults and explain misfire operation as one of the fault.

5. Solve **any two** : **20**
   1) Explain the concept of series capacitive compensation with neat diagram.
   2) Explain the following faults :
      i) Commutation failure
      ii) Short circuit in bridge
      iii) Arc through and
      iv) Arc back.
   3) Explain the design of active and passive filters.

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Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Assume*** *suitable data* ***wherever*** *necessary.*
3) Non-programmable calculators are ***permitted****.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) High speed reversal of power is possible in _____
   a) Parallel system b) Radial system
   c) Mesh system d) Series system

2) SVC is a _____ device.
   a) Variable reactance b) Variable impedance
   c) Only reactive d) All of the above

3) The bypassing of the bridge can be done with the help of _____
   a) Replacing a single valve in the arm
   b) Replacing both valve in same arm
   c) Activating a bypass pair in the bridge
   d) Deactivating same arm from converter set

4) A commutation group is defined as, group of valves in which only _____ valves conducts.
   a) One b) Two c) Three d) Four

5) _____ is a non-self clearing fault.
   a) Commutation failure b) Arc-through
   c) Arc-back d) Misfire

6) FACTS provides _____
   a) Power transfer capability and controllability
   b) Phase sequence and comparability
   c) a) and b)
   d) None

7) K is _____
   a) X/Xc b) 1/Xc c) X d) Xc/X

8) TSSC can be operated line _____
   a) Continuous b) Discrete c) Step d) None

9) In tap changing transformers, the tapping are provided on _____
   a) Secondary winding b) Primary winding
   c) Tertiary winding d) High voltage winding

10) Shunt compensation in an EHV line is used to _____
   a) Improve stability
   b) Reduce fault level
   c) Improve voltage profile
   d) Substitute for synchronous phase modifier

11) Series capacitor is used in a transmission line to _____
   a) Compensate the voltage drop b) Reduce line losses
   c) Improve load power factor d) None

12) The function of the series capacitor is simply to produce on appropriate at fundamental ac system frequency in with the transition the can
   a) Phase b) Same angle c) Quadrature d) None

13) In midpoint compensation Vsm and Vmr are _____
   a) Same b) Different c) Unity d) None

14) TCSC is a combination of _____
   a) Capacitor and thyristor valves b) Thyristor valve and TCR
   c) Capacitor and TCR d) Either capacitor or TCR

15) The most fast operation of compensator is _____
   a) TSSC b) TCSC c) GCSC d) None

16) For desirable operation of a DC link without ground return, _____ link are most commonly used.
   a) Monopolar b) Bipolar c) Homopolar d) All of the above

17) Bipolar link has two conductors, _____
   a) One positive and other negative b) One positive and other positive
   c) One negative and other negative d) Both are negative

18) Individual operation of firing pulses for each valve is the feature of _____
   a) IPC b) EPC c) CCC d) VGC

19) The main advantage of inverse cosine control scheme is that _____
   a) Avg. dc voltage across bridge varies linearly with the control voltage
   b) Avg. dc voltage across bridge becomes equal to the control voltage
   c) The delay angle is nominally proportional to the inverse cosine of the control voltage
   d) b) and c) only

20) In HVDC converter stations, the provision of SVC mainly helps to overcome _____
   a) Voltage instability b) Under voltages
   c) Resonance frequency d) Harmonics

_____

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Seat No.	

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Assume*** *suitable data* ***wherever*** *necessary.*

2) Non-programmable calculators are ***permitted****.*

SECTION – I

2. Solve **any four** of the following : **20**

   1) Draw block diagram and characteristics of FC-TCR.

   2) Explain the objectives of shunt compensator.

   3) Explain merits and demerits of SSSC.

   4) Compare TCVC and TCPAR.

   5) Explain Hybrid Phase Angle Regulators.

3. Solve **any two** : **20**

   1) Compare FC-TCR and converter based static VAR generator on points :

      1) Type

      2) Maximum compensating current

      3) Losses at zero output and

      4) Harmonics.

   2) Explain the operational and performance characteristics of STATCOM and SVC.

   3) Describe GTO thyristor controlled series capacitor with neat diagram and waveforms.

SECTION – II

4. Solve **any four** of the following : **20**
   1) Explain basic control system for P and Q control.
   2) Give classification of HVDC links.
   3) Explain the IPC scheme of firing angle generation.
   4) Explain the basic principle of overvoltage protection.
   5) Enlist the various types of faults and explain misfire operation as one of the fault.

5. Solve **any two** : **20**
   1) Explain the concept of series capacitive compensation with neat diagram.
   2) Explain the following faults :
      i) Commutation failure
      ii) Short circuit in bridge
      iii) Arc through and
      iv) Arc back.
   3) Explain the design of active and passive filters.

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Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Assume*** *suitable data* ***wherever*** *necessary.*
3) Non-programmable calculators are ***permitted****.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) For desirable operation of a DC link without ground return, _____ link are most commonly used.
a) Monopolar b) Bipolar c) Homopolar d) All of the above

2) Bipolar link has two conductors, _____
a) One positive and other negative b) One positive and other positive
c) One negative and other negative d) Both are negative

3) Individual operation of firing pulses for each valve is the feature of _____
a) IPC b) EPC c) CCC d) VGC

4) The main advantage of inverse cosine control scheme is that _____
a) Avg. dc voltage across bridge varies linearly with the control voltage
b) Avg. dc voltage across bridge becomes equal to the control voltage
c) The delay angle is nominally proportional to the inverse cosine of the control voltage
d) b) and c) only

5) In HVDC converter stations, the provision of SVC mainly helps to overcome _____
a) Voltage instability b) Under voltages
c) Resonance frequency d) Harmonics

6) High speed reversal of power is possible in _____
a) Parallel system b) Radial system
c) Mesh system d) Series system

7) SVC is a _____ device.
a) Variable reactance b) Variable impedance
c) Only reactive d) All of the above

8) The bypassing of the bridge can be done with the help of _____
   a) Replacing a single valve in the arm
   b) Replacing both valve in same arm
   c) Activating a bypass pair in the bridge
   d) Deactivating same arm from converter set

9) A commutation group is defined as, group of valves in which only _____ valves conducts.
   a) One b) Two c) Three d) Four

10) _____ is a non-self clearing fault.
   a) Commutation failure b) Arc-through
   c) Arc-back d) Misfire

11) FACTS provides _____
   a) Power transfer capability and controllability
   b) Phase sequence and comparability
   c) a) and b)
   d) None

12) K is _____
   a) X/Xc b) 1/Xc c) X d) Xc/X

13) TSSC can be operated line _____
   a) Continuous b) Discrete c) Step d) None

14) In tap changing transformers, the tapping are provided on _____
   a) Secondary winding b) Primary winding
   c) Tertiary winding d) High voltage winding

15) Shunt compensation in an EHV line is used to _____
   a) Improve stability
   b) Reduce fault level
   c) Improve voltage profile
   d) Substitute for synchronous phase modifier

16) Series capacitor is used in a transmission line to _____
   a) Compensate the voltage drop b) Reduce line losses
   c) Improve load power factor d) None

17) The function of the series capacitor is simply to produce on appropriate at fundamental ac system frequency in with the transition the can
   a) Phase b) Same angle c) Quadrature d) None

18) In midpoint compensation Vsm and Vmr are _____
   a) Same b) Different c) Unity d) None

19) TCSC is a combination of _____
   a) Capacitor and thyristor valves b) Thyristor valve and TCR
   c) Capacitor and TCR d) Either capacitor or TCR

20) The most fast operation of compensator is _____
   a) TSSC b) TCSC c) GCSC d) None

_____

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Seat No.	

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Assume*** *suitable data* ***wherever*** *necessary.*

2) Non-programmable calculators are ***permitted****.*

SECTION – I

2. Solve **any four** of the following : **20**

   1) Draw block diagram and characteristics of FC-TCR.

   2) Explain the objectives of shunt compensator.

   3) Explain merits and demerits of SSSC.

   4) Compare TCVC and TCPAR.

   5) Explain Hybrid Phase Angle Regulators.

3. Solve **any two** : **20**

   1) Compare FC-TCR and converter based static VAR generator on points :

      1) Type

      2) Maximum compensating current

      3) Losses at zero output and

      4) Harmonics.

   2) Explain the operational and performance characteristics of STATCOM and SVC.

   3) Describe GTO thyristor controlled series capacitor with neat diagram and waveforms.

SECTION – II

4. Solve **any four** of the following : **20**
   1) Explain basic control system for P and Q control.
   2) Give classification of HVDC links.
   3) Explain the IPC scheme of firing angle generation.
   4) Explain the basic principle of overvoltage protection.
   5) Enlist the various types of faults and explain misfire operation as one of the fault.

5. Solve **any two** : **20**
   1) Explain the concept of series capacitive compensation with neat diagram.
   2) Explain the following faults :
      i) Commutation failure
      ii) Short circuit in bridge
      iii) Arc through and
      iv) Arc back.
   3) Explain the design of active and passive filters.

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Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Assume*** *suitable data* ***wherever*** *necessary.*
3) Non-programmable calculators are ***permitted****.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Series capacitor is used in a transmission line to _____
   a) Compensate the voltage drop b) Reduce line losses
   c) Improve load power factor d) None

2) The function of the series capacitor is simply to produce on appropriate at fundamental ac system frequency in with the transition the can
   a) Phase b) Same angle c) Quadrature d) None

3) In midpoint compensation Vsm and Vmr are _____
   a) Same b) Different c) Unity d) None

4) TCSC is a combination of _____
   a) Capacitor and thyristor valves b) Thyristor valve and TCR
   c) Capacitor and TCR d) Either capacitor or TCR

5) The most fast operation of compensator is _____
   a) TSSC b) TCSC c) GCSC d) None

6) For desirable operation of a DC link without ground return, _____ link are most commonly used.
   a) Monopolar b) Bipolar c) Homopolar d) All of the above

7) Bipolar link has two conductors, _____
   a) One positive and other negative b) One positive and other positive
   c) One negative and other negative d) Both are negative

8) Individual operation of firing pulses for each valve is the feature of _____
   a) IPC b) EPC c) CCC d) VGC

9) The main advantage of inverse cosine control scheme is that _____
   a) Avg. dc voltage across bridge varies linearly with the control voltage
   b) Avg. dc voltage across bridge becomes equal to the control voltage
   c) The delay angle is nominally proportional to the inverse cosine of the control voltage
   d) b) and c) only

10) In HVDC converter stations, the provision of SVC mainly helps to overcome _____
   a) Voltage instability b) Under voltages
   c) Resonance frequency d) Harmonics

11) High speed reversal of power is possible in _____
   a) Parallel system b) Radial system
   c) Mesh system d) Series system

12) SVC is a _____ device.
   a) Variable reactance b) Variable impedance
   c) Only reactive d) All of the above

13) The bypassing of the bridge can be done with the help of _____
   a) Replacing a single valve in the arm
   b) Replacing both valve in same arm
   c) Activating a bypass pair in the bridge
   d) Deactivating same arm from converter set

14) A commutation group is defined as, group of valves in which only _____ valves conducts.
   a) One b) Two c) Three d) Four

15) _____ is a non-self clearing fault.
   a) Commutation failure b) Arc-through
   c) Arc-back d) Misfire

16) FACTS provides _____
   a) Power transfer capability and controllability
   b) Phase sequence and comparability
   c) a) and b)
   d) None

17) K is _____
   a) X/Xc b) 1/Xc c) X d) Xc/X

18) TSSC can be operated line _____
   a) Continuous b) Discrete c) Step d) None

19) In tap changing transformers, the tapping are provided on _____
   a) Secondary winding b) Primary winding
   c) Tertiary winding d) High voltage winding

20) Shunt compensation in an EHV line is used to _____
   a) Improve stability
   b) Reduce fault level
   c) Improve voltage profile
   d) Substitute for synchronous phase modifier

_____

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Seat No.	

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Monday, 21-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Assume*** *suitable data* ***wherever*** *necessary.*

2) Non-programmable calculators are ***permitted****.*

SECTION – I

2. Solve **any four** of the following : **20**

   1) Draw block diagram and characteristics of FC-TCR.

   2) Explain the objectives of shunt compensator.

   3) Explain merits and demerits of SSSC.

   4) Compare TCVC and TCPAR.

   5) Explain Hybrid Phase Angle Regulators.

3. Solve **any two** : **20**

   1) Compare FC-TCR and converter based static VAR generator on points :

      1) Type

      2) Maximum compensating current

      3) Losses at zero output and

      4) Harmonics.

   2) Explain the operational and performance characteristics of STATCOM and SVC.

   3) Describe GTO thyristor controlled series capacitor with neat diagram and waveforms.

SECTION – II

4. Solve **any four** of the following : **20**
   1) Explain basic control system for P and Q control.
   2) Give classification of HVDC links.
   3) Explain the IPC scheme of firing angle generation.
   4) Explain the basic principle of overvoltage protection.
   5) Enlist the various types of faults and explain misfire operation as one of the fault.

5. Solve **any two** : **20**
   1) Explain the concept of series capacitive compensation with neat diagram.
   2) Explain the following faults :
      i) Commutation failure
      ii) Short circuit in bridge
      iii) Arc through and
      iv) Arc back.
   3) Explain the design of active and passive filters.

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Seat No.	

Set P

B.E. (Part – II) (Electrical) (New) Examination, 2016
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **I** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data if **necessary** and mention it clearly.*
*4) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer :

1) Factors affecting on preventive maintenance schedule is
   a) Position of machine b) Age of machine
   c) New technology d) All of these

2) Swinburne test is _____ method of testing machine.
   a) Regenerative b) Direct c) Indirect d) All of these

3) Which of the following fire extinguisher are toxic ?
   a) Carbon tetrachloride b) Sulphur hexachloride
   c) Carbon hexachloride d) Sulphur tetrachloride

4) Which of the following methods providing artificial respiration ?
   a) Schafer's prone pressure method b) Silvester's method
   c) Both a) and b) d) Narcol method

5) The torque of induction motor is
   a) Directly proportional to V b) Directly proportional to V^2
   c) Inversly proportional to V d) Inversly proportional to V^2

6) While conducting momentary overload test on induction motor, the duration of excess load above 500 H.P. motor is
   a) 5 sec. b) 10 sec. c) 15 sec. d) 20 sec.

7) In moisture proofness test, temperature is maintained to
   a) 32°C b) 42°C c) 52°C d) 62°C

8) In insulation resistance test of 132 kv transformer, minimum insulation resistance is
   a) 250 MΩ b) 500 MΩ c) 750 MΩ d) 1000 MΩ

9) For induced type transformer test, test voltage is equal to _____ highest system voltage + 1000 volt.
   a) Twice b) Thrice c) Four times d) Can't say

10) As per I.E.C. for 132 kv system voltage, the impulse withstand voltage is
   a) 250 kv b) 350 kv c) 450 kv d) 550 kv

11) In dielectric absorption test by using megger, insulation resistance is measured at regular interval of _____ and recorded.
   a) 24 hour b) 12 hour c) 30 min. d) 5 min.

12) For class A insulating material, maximum operating temperature is
   a) 60°C b) 90°C c) 95°C d) 105°C

13) Polarization index is greater than _____ for class A insulation.
   a) 1 b) 1.5 c) 2 d) 2.5

14) Which of the following factors affects on life of insulating material ?
   a) Temperature b) Deposition of dust
   c) Impurities d) All of these

15) In lead acid battery positive plate (anode) made up of
   a) PbO_2 b) Pb c) SO_2 d) PbO_3

16) _____ is a special type of megger and it has some modifications like rotating current reverse and rectifier.
   a) Spirit level b) Dial indicator
   c) Earth tester d) Filler gauge

17) Dial indicator are generally provided with _____ mm scale division.
   a) 0.1 b) 0.01 c) 0.001 d) 0.0001

18) While doing procedure for leveling and alignment for gear and pulley drive, we should ensure that both shafts are
   a) Parallel b) Perpendicular c) Any position d) Can't say

19) For 20 H.P to 50 H.P. rating machine, depth of foundation is
   a) 1 cm to 10 cm b) 5 cm to 15 cm
   c) 20 cm to 25 cm d) 35 cm to 60 cm

20) Depth of foundation is dependent on
   a) Cost of equipment b) Frequency
   c) H.P. rating d) None of these

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SLR-EP – 282

Seat No.	

B.E. (Part – II) (Electrical) (New) Examination, 2016
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it clearly.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

II. Attempt **any four** : **(4×5=20)**

a) Define the following terms in connection with safety :
   i) Responsibility
   ii) Authority
   iii) Accountability
   iv) Monitoring
   v) Major accident hazard.

b) What are the factors affecting on preventive maintenance schedule ? Explain in short.

c) Explain with neat sketch and resistance equation measurement of DC resistance of three phase induction motor.

d) What are the methods to measure winding resistance of transformer ? Explain any one in detail.

e) Classify methods of providing artificial respiration. Explain any one in detail.

f) A brake test was carried out on shunt motor and following the observations for one reading.

Voltage	Current	Speed (rpm)	Spring Balance	
			W_1 (kg)	W_2 (kg)
250 V	2 A	1500	3	0.2

The radius of break pulley = 7.5 cm. Calculate :
i) Input ii) Torque
iii) Output iv) Efficiency.

III. Attempt **any two** : **(10×2=20)**

a) On Swinburne's test following results were obtained when the machine was run at rated speed and rated voltage on no load.

Motor Voltage = 500 V

No load current = 5 A

Armature resistance = 0.22 Ω

Field resistance = 250 Ω

Calculate efficiency when motor current is 100 A.

b) Classify methods of measurement of slip in case of three phase induction motor. Explain any two methods in detail.

c) Explain with neat sketch any two methods of temperature rise test in case of transformer.

SECTION – II

IV. Attempt **any four** : **(4×5=20)**

a) State the factors affecting life of insulating material. Explain in brief.

b) State and explain properties of good transformer oil.

c) Explain with neat sketch bearing puller.

d) Discuss in detail electrical fault on the basis of reasons for development of faults and remedial measures.

e) Discuss in short factors involved in designing machine foundation.

f) What are the effects of misalignment in case of directly coupled drives and indirectly coupled drives ?

V. Attempt **any two** : **(10×2=20)**

a) Explain hot dip method and vacuum impregnation for revarnishing insulation.

b) i) Write a short note on general maintenance of lead acid batteries.

ii) Write a short note on internal and external causes of failure of equipment.

c) Explain with neat sketch requirement of different dimensions of foundations for rotating and static machines.

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SLR-EP – 282

Seat No.	

Set **Q**

B.E. (Part – II) (Electrical) (New) Examination, 2016
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **I** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data if **necessary** and mention it clearly.*
*4) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer :

1) _____ is a special type of megger and it has some modifications like rotating current reverse and rectifier.
   a) Spirit level b) Dial indicator
   c) Earth tester d) Filler gauge

2) Dial indicator are generally provided with _____ mm scale division.
   a) 0.1 b) 0.01 c) 0.001 d) 0.0001

3) While doing procedure for leveling and alignment for gear and pulley drive, we should ensure that both shafts are
   a) Parallel b) Perpendicular c) Any position d) Can't say

4) For 20 H.P to 50 H.P. rating machine, depth of foundation is
   a) 1 cm to 10 cm b) 5 cm to 15 cm
   c) 20 cm to 25 cm d) 35 cm to 60 cm

5) Depth of foundation is dependent on
   a) Cost of equipment b) Frequency
   c) H.P. rating d) None of these

6) Factors affecting on preventive maintenance schedule is
   a) Position of machine b) Age of machine
   c) New technology d) All of these

7) Swinburne test is _____ method of testing machine.
   a) Regenerative b) Direct c) Indirect d) All of these

8) Which of the following fire extinguisher are toxic ?
   a) Carbon tetrachloride b) Sulphur hexachloride
   c) Carbon hexachloride d) Sulphur tetrachloride

9) Which of the following methods providing artificial respiration ?
   a) Schafer's prone pressure method b) Silvester's method
   c) Both a) and b) d) Narcol method

10) The torque of induction motor is
   a) Directly proportional to V b) Directly proportional to V^2
   c) Inversly proportional to V d) Inversly proportional to V^2

11) While conducting momentary overload test on induction motor, the duration of excess load above 500 H.P. motor is
   a) 5 sec. b) 10 sec. c) 15 sec. d) 20 sec.

12) In moisture proofness test, temperature is maintained to
   a) 32°C b) 42°C c) 52°C d) 62°C

13) In insulation resistance test of 132 kv transformer, minimum insulation resistance is
   a) 250 MΩ b) 500 MΩ c) 750 MΩ d) 1000 MΩ

14) For induced type transformer test, test voltage is equal to _____ highest system voltage + 1000 volt.
   a) Twice b) Thrice c) Four times d) Can't say

15) As per I.E.C. for 132 kv system voltage, the impulse withstand voltage is
   a) 250 kv b) 350 kv c) 450 kv d) 550 kv

16) In dielectric absorption test by using megger, insulation resistance is measured at regular interval of _____ and recorded.
   a) 24 hour b) 12 hour c) 30 min. d) 5 min.

17) For class A insulating material, maximum operating temperature is
   a) 60°C b) 90°C c) 95°C d) 105°C

18) Polarization index is greater than _____ for class A insulation.
   a) 1 b) 1.5 c) 2 d) 2.5

19) Which of the following factors affects on life of insulating material ?
   a) Temperature b) Deposition of dust
   c) Impurities d) All of these

20) In lead acid battery positive plate (anode) made up of
   a) PbO_2 b) Pb c) SO_2 d) PbO_3

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Set Q

SLR-EP – 282

Seat No.	

B.E. (Part – II) (Electrical) (New) Examination, 2016
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it clearly.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

II. Attempt **any four** : **(4×5=20)**

a) Define the following terms in connection with safety :
   i) Responsibility
   ii) Authority
   iii) Accountability
   iv) Monitoring
   v) Major accident hazard.

b) What are the factors affecting on preventive maintenance schedule ? Explain in short.

c) Explain with neat sketch and resistance equation measurement of DC resistance of three phase induction motor.

d) What are the methods to measure winding resistance of transformer ? Explain any one in detail.

e) Classify methods of providing artificial respiration. Explain any one in detail.

f) A brake test was carried out on shunt motor and following the observations for one reading.

Voltage	Current	Speed (rpm)	Spring Balance	
			W_1 (kg)	W_2 (kg)
250 V	2 A	1500	3	0.2

The radius of break pulley = 7.5 cm. Calculate :
i) Input ii) Torque
iii) Output iv) Efficiency.

III. Attempt **any two** : **(10×2=20)**

a) On Swinburne's test following results were obtained when the machine was run at rated speed and rated voltage on no load.

Motor Voltage = 500 V

No load current = 5 A

Armature resistance = 0.22 Ω

Field resistance = 250 Ω

Calculate efficiency when motor current is 100 A.

b) Classify methods of measurement of slip in case of three phase induction motor. Explain any two methods in detail.

c) Explain with neat sketch any two methods of temperature rise test in case of transformer.

SECTION – II

IV. Attempt **any four** : **(4×5=20)**

a) State the factors affecting life of insulating material. Explain in brief.

b) State and explain properties of good transformer oil.

c) Explain with neat sketch bearing puller.

d) Discuss in detail electrical fault on the basis of reasons for development of faults and remedial measures.

e) Discuss in short factors involved in designing machine foundation.

f) What are the effects of misalignment in case of directly coupled drives and indirectly coupled drives ?

V. Attempt **any two** : **(10×2=20)**

a) Explain hot dip method and vacuum impregnation for revarnishing insulation.

b) i) Write a short note on general maintenance of lead acid batteries.

ii) Write a short note on internal and external causes of failure of equipment.

c) Explain with neat sketch requirement of different dimensions of foundations for rotating and static machines.

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Seat No.	

Set **R**

B.E. (Part – II) (Electrical) (New) Examination, 2016
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***I*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Assume suitable data if ***necessary*** *and mention it clearly.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer :

1) In dielectric absorption test by using megger, insulation resistance is measured at regular interval of _____ and recorded.
a) 24 hour b) 12 hour c) 30 min. d) 5 min.

2) For class A insulating material, maximum operating temperature is
a) 60°C b) 90°C c) 95°C d) 105°C

3) Polarization index is greater than _____ for class A insulation.
a) 1 b) 1.5 c) 2 d) 2.5

4) Which of the following factors affects on life of insulating material ?
a) Temperature b) Deposition of dust
c) Impurities d) All of these

5) In lead acid battery positive plate (anode) made up of
a) PbO_2 b) Pb c) SO_2 d) PbO_3

6) _____ is a special type of megger and it has some modifications like rotating current reverse and rectifier.
a) Spirit level b) Dial indicator
c) Earth tester d) Filler gauge

7) Dial indicator are generally provided with _____ mm scale division.
a) 0.1 b) 0.01 c) 0.001 d) 0.0001

8) While doing procedure for leveling and alignment for gear and pulley drive, we should ensure that both shafts are
a) Parallel b) Perpendicular c) Any position d) Can't say

9) For 20 H.P to 50 H.P. rating machine, depth of foundation is
   a) 1 cm to 10 cm b) 5 cm to 15 cm
   c) 20 cm to 25 cm d) 35 cm to 60 cm

10) Depth of foundation is dependent on
   a) Cost of equipment b) Frequency
   c) H.P. rating d) None of these

11) Factors affecting on preventive maintenance schedule is
   a) Position of machine b) Age of machine
   c) New technology d) All of these

12) Swinburne test is _____ method of testing machine.
   a) Regenerative b) Direct c) Indirect d) All of these

13) Which of the following fire extinguisher are toxic ?
   a) Carbon tetrachloride b) Sulphur hexachloride
   c) Carbon hexachloride d) Sulphur tetrachloride

14) Which of the following methods providing artificial respiration ?
   a) Schafer's prone pressure method b) Silvester's method
   c) Both a) and b) d) Narcol method

15) The torque of induction motor is
   a) Directly proportional to V b) Directly proportional to V^2
   c) Inversly proportional to V d) Inversly proportional to V^2

16) While conducting momentary overload test on induction motor, the duration of excess load above 500 H.P. motor is
   a) 5 sec. b) 10 sec. c) 15 sec. d) 20 sec.

17) In moisture proofness test, temperature is maintained to
   a) 32°C b) 42°C c) 52°C d) 62°C

18) In insulation resistance test of 132 kv transformer, minimum insulation resistance is
   a) 250 MΩ b) 500 MΩ c) 750 MΩ d) 1000 MΩ

19) For induced type transformer test, test voltage is equal to _____ highest system voltage + 1000 volt.
   a) Twice b) Thrice c) Four times d) Can't say

20) As per I.E.C. for 132 kv system voltage, the impulse withstand voltage is
   a) 250 kv b) 350 kv c) 450 kv d) 550 kv

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Seat No.	

B.E. (Part – II) (Electrical) (New) Examination, 2016
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it clearly.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

II. Attempt **any four** : **(4×5=20)**

a) Define the following terms in connection with safety :
   i) Responsibility
   ii) Authority
   iii) Accountability
   iv) Monitoring
   v) Major accident hazard.

b) What are the factors affecting on preventive maintenance schedule ? Explain in short.

c) Explain with neat sketch and resistance equation measurement of DC resistance of three phase induction motor.

d) What are the methods to measure winding resistance of transformer ? Explain any one in detail.

e) Classify methods of providing artificial respiration. Explain any one in detail.

f) A brake test was carried out on shunt motor and following the observations for one reading.

Voltage	Current	Speed (rpm)	Spring Balance	
			W_1 (kg)	W_2 (kg)
250 V	2 A	1500	3	0.2

The radius of break pulley = 7.5 cm. Calculate :
i) Input ii) Torque
iii) Output iv) Efficiency.

III. Attempt **any two** : **(10×2=20)**

a) On Swinburne's test following results were obtained when the machine was run at rated speed and rated voltage on no load.

Motor Voltage = 500 V

No load current = 5 A

Armature resistance = 0.22 Ω

Field resistance = 250 Ω

Calculate efficiency when motor current is 100 A.

b) Classify methods of measurement of slip in case of three phase induction motor. Explain any two methods in detail.

c) Explain with neat sketch any two methods of temperature rise test in case of transformer.

SECTION – II

IV. Attempt **any four** : **(4×5=20)**

a) State the factors affecting life of insulating material. Explain in brief.

b) State and explain properties of good transformer oil.

c) Explain with neat sketch bearing puller.

d) Discuss in detail electrical fault on the basis of reasons for development of faults and remedial measures.

e) Discuss in short factors involved in designing machine foundation.

f) What are the effects of misalignment in case of directly coupled drives and indirectly coupled drives ?

V. Attempt **any two** : **(10×2=20)**

a) Explain hot dip method and vacuum impregnation for revarnishing insulation.

b) i) Write a short note on general maintenance of lead acid batteries.

ii) Write a short note on internal and external causes of failure of equipment.

c) Explain with neat sketch requirement of different dimensions of foundations for rotating and static machines.

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Seat No.	

Set S

B.E. (Part – II) (Electrical) (New) Examination, 2016
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***I*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Assume suitable data if ***necessary*** *and mention it clearly.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer :

1) While conducting momentary overload test on induction motor, the duration of excess load above 500 H.P. motor is
   a) 5 sec. b) 10 sec. c) 15 sec. d) 20 sec.

2) In moisture proofness test, temperature is maintained to
   a) 32°C b) 42°C c) 52°C d) 62°C

3) In insulation resistance test of 132 kv transformer, minimum insulation resistance is
   a) 250 MΩ b) 500 MΩ c) 750 MΩ d) 1000 MΩ

4) For induced type transformer test, test voltage is equal to _____ highest system voltage + 1000 volt.
   a) Twice b) Thrice c) Four times d) Can't say

5) As per I.E.C. for 132 kv system voltage, the impulse withstand voltage is
   a) 250 kv b) 350 kv c) 450 kv d) 550 kv

6) In dielectric absorption test by using megger, insulation resistance is measured at regular interval of _____ and recorded.
   a) 24 hour b) 12 hour c) 30 min. d) 5 min.

7) For class A insulating material, maximum operating temperature is
   a) 60°C b) 90°C c) 95°C d) 105°C

8) Polarization index is greater than _____ for class A insulation.
   a) 1 b) 1.5 c) 2 d) 2.5

9) Which of the following factors affects on life of insulating material ?
   a) Temperature b) Deposition of dust
   c) Impurities d) All of these

10) In lead acid battery positive plate (anode) made up of
   a) PbO_2 b) Pb c) SO_2 d) PbO_3

11) _____ is a special type of megger and it has some modifications like rotating current reverse and rectifier.
   a) Spirit level b) Dial indicator
   c) Earth tester d) Filler gauge

12) Dial indicator are generally provided with _____ mm scale division.
   a) 0.1 b) 0.01 c) 0.001 d) 0.0001

13) While doing procedure for leveling and alignment for gear and pulley drive, we should ensure that both shafts are
   a) Parallel b) Perpendicular c) Any position d) Can't say

14) For 20 H.P to 50 H.P. rating machine, depth of foundation is
   a) 1 cm to 10 cm b) 5 cm to 15 cm
   c) 20 cm to 25 cm d) 35 cm to 60 cm

15) Depth of foundation is dependent on
   a) Cost of equipment b) Frequency
   c) H.P. rating d) None of these

16) Factors affecting on preventive maintenance schedule is
   a) Position of machine b) Age of machine
   c) New technology d) All of these

17) Swinburne test is _____ method of testing machine.
   a) Regenerative b) Direct c) Indirect d) All of these

18) Which of the following fire extinguisher are toxic ?
   a) Carbon tetrachloride b) Sulphur hexachloride
   c) Carbon hexachloride d) Sulphur tetrachloride

19) Which of the following methods providing artificial respiration ?
   a) Schafer's prone pressure method b) Silvester's method
   c) Both a) and b) d) Narcol method

20) The torque of induction motor is
   a) Directly proportional to V b) Directly proportional to V^2
   c) Inversly proportional to V d) Inversly proportional to V^2

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SLR-EP – 282

Seat No.	

B.E. (Part – II) (Electrical) (New) Examination, 2016
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it clearly.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

II. Attempt **any four** : **(4×5=20)**

a) Define the following terms in connection with safety :
   i) Responsibility
   ii) Authority
   iii) Accountability
   iv) Monitoring
   v) Major accident hazard.

b) What are the factors affecting on preventive maintenance schedule ? Explain in short.

c) Explain with neat sketch and resistance equation measurement of DC resistance of three phase induction motor.

d) What are the methods to measure winding resistance of transformer ? Explain any one in detail.

e) Classify methods of providing artificial respiration. Explain any one in detail.

f) A brake test was carried out on shunt motor and following the observations for one reading.

Voltage	Current	Speed (rpm)	Spring Balance	
			W_1 (kg)	W_2 (kg)
250 V	2 A	1500	3	0.2

The radius of break pulley = 7.5 cm. Calculate :
i) Input ii) Torque
iii) Output iv) Efficiency.

III. Attempt **any two** : **(10×2=20)**

a) On Swinburne's test following results were obtained when the machine was run at rated speed and rated voltage on no load.

Motor Voltage = 500 V

No load current = 5 A

Armature resistance = 0.22 Ω

Field resistance = 250 Ω

Calculate efficiency when motor current is 100 A.

b) Classify methods of measurement of slip in case of three phase induction motor. Explain any two methods in detail.

c) Explain with neat sketch any two methods of temperature rise test in case of transformer.

SECTION – II

IV. Attempt **any four** : **(4×5=20)**

a) State the factors affecting life of insulating material. Explain in brief.

b) State and explain properties of good transformer oil.

c) Explain with neat sketch bearing puller.

d) Discuss in detail electrical fault on the basis of reasons for development of faults and remedial measures.

e) Discuss in short factors involved in designing machine foundation.

f) What are the effects of misalignment in case of directly coupled drives and indirectly coupled drives ?

V. Attempt **any two** : **(10×2=20)**

a) Explain hot dip method and vacuum impregnation for revarnishing insulation.

b) i) Write a short note on general maintenance of lead acid batteries.

ii) Write a short note on internal and external causes of failure of equipment.

c) Explain with neat sketch requirement of different dimensions of foundations for rotating and static machines.

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SLR-EP – 283

Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The diversity factor
   a) is always more than 1
   b) is always less than 1
   c) may be less or more than 1
   d) may be as high as 100

2) A synchronous capacitor can supply
   a) lagging vars only
   b) leading vars only
   c) both leading and lagging vars
   d) neither leading vars nor lagging vars

3) The principle of incremental costs is used
   a) to decide the total plant capacity to be operated
   b) to decide the load allocation between units in operation
   c) to decide the sequence of adding units
   d) all the above

4) A generating unit in a power system is generating 100 MW. It is known that transfer of 100 MW from this unit to the load centre causes a transmission loss of 15 MW. The penalty factor for this unit is
   a) 0.7 b) 0.85 c) 1.15 d) 1.43

5) The advantage of hydro plants is
   a) low operating cost
   b) they can be started and loaded very quickly
   c) they can be used as base load plants as well as peak load plants
   d) all the above

6) Two alternators A and B are operating in parallel. If excitation of A is increased
   a) reactive power of A is increased while that of B is decreased
   b) reactive power of A is increased while that of B is remains unchanged
   c) reactive power of A is decreased
   d) both real and reactive power of A are increased

7) A power system needs injection of vars
   a) at peak load
   b) off-peak load
   c) both at peak load and off-peak load
   d) when the load is neither too high nor too low

8) The speed regulation R for a large size alternator is about
   a) 10 Hz per MW b) 5 Hz per MW c) 1 Hz per MW d) 0.02 Hz per MW

9) A high diversity factor of the load in a power system
   a) educes the installation cost of plant
   b) increases the installation cost of plant
   c) does not affect the installation cost of plant
   d) any of the above

10) The advantage of static capacitors for improvement of power factor is
   a) low loss b) little maintenance cost
   c) ease in installation d) all the above

11) A hydro electric power station is commonly found in
   a) desert areas b) hilly areas c) swamps d) grass lands

12) If a synchronous machine is under excited, it operates at lagging power factor when operated as
   a) synchronous motor b) synchronous generator
   c) either a) or b) d) none of the above

13) When power is transferred between two power systems, power will flow from the power system with
   a) the greater leading power angle b) the lesser leading power angle
   c) the higher voltage level d) the lower voltage level

14) When a 100 MVA generator is operating at 0.8 logging power factor the vars produced are
   a) 80 b) –80 c) 60 d) –60

15) In a power system with long transmission lines, economic dispatch means
   a) equal incremental costs at generator buses
   b) equal incremental costs at load buses
   c) equal load on all generators
   d) that generators share the load proportional to their rating

16) In two systems with interconnecting facility, each system
   a) keep its own reserve capacity
   b) can depend on the other system for reserve capacity
   c) need not keep any reserve capacity
   d) any of above depending on system size

17) If mechanical inputs to prime movers of generators of a power system does not match load changes
   a) system frequency will be low
   b) system losses will be increased
   c) system losses will be decreased
   d) system frequency and voltage will deviate from normal

18) Shunt reactors are connected at the terminals of high voltage lines to
   a) increase the receiving end current
   b) increase the receiving end voltage under peak load conditions
   c) decrease the receiving end voltage under peak load conditions
   d) decrease the receiving end voltage under off-peak load conditions

19) Security analysis is executed
   a) real time analysis b) pre contingency analysis
   c) post contingency analysis d) none of them

20) Real power is affected due to
   a) voltage at receiving end b) power factor
   c) rotor angle d) resistance of transmission line

SLR-EP – 283

Seat No.	

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Wednesday, 23-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*

*2) Figures to the **right** indicate **full** marks.*

*3) Assume suitable data **if necessary**.*

SECTION – I

2. Solve **any 4** of the following : **(5×4=20)**

a) Explain differentiate between integrated and unintegrated interconnected systems.

b) Write a short note on 'Automatic Load Dispatching'.

c) What techniques are available for unit commitment ?

d) How can the effect of transmission loss be included in optimum scheduling in power plants ?

e) What do you understand by production cost of power generated ?

3. Solve **any 2** of the following : **(10×2=20)**

a) Write short note on Physical interpretation of co-ordination equations.

b) The fuel inputs F_1 and F_2 in kcal/hour for two units having output P_1 and P_2 MW are as under :

$F_1 = P_1 + 0.02P_1^2 + 20$

$F_2 = 1.2P_2 + 0.015P_2^2 + 10$

The maximum and minimum loads on the two units are 250 MW and 25 MW respectively. Find and pot the variation of load on each unit as a function of the total load which varies from 50 MW to 500 MW. Also plot incremental cost against total load.

c) What is area control error ? Explain its significance.

SECTION – II

4. Solve **any 4** of the following : **(5×4=20)**

   a) What is voltage collapse ?

   b) What is the power pool ? Explain in brief.

   c) What is the rotor angle ?

   d) What are methods to improve the voltage stability ?

   e) What is security analysis ?

5. Solve **any 2** of the following : **(10×2=20)**

   a) Draw a block diagram, with illustrative transfer functions, of a two area load frequency control system. Explain the functions of different components of such a control system.

   b) Explain the combined use of tap changing transformers and reactive power injection in a power system.

   c) Explain the Steady state load frequency characteristics of a speed governor system.

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SLR-EP – 283

Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) In two systems with interconnecting facility, each system
   a) keep its own reserve capacity
   b) can depend on the other system for reserve capacity
   c) need not keep any reserve capacity
   d) any of above depending on system size

2) If mechanical inputs to prime movers of generators of a power system does not match load changes
   a) system frequency will be low
   b) system losses will be increased
   c) system losses will be decreased
   d) system frequency and voltage will deviate from normal

3) Shunt reactors are connected at the terminals of high voltage lines to
   a) increase the receiving end current
   b) increase the receiving end voltage under peak load conditions
   c) decrease the receiving end voltage under peak load conditions
   d) decrease the receiving end voltage under off-peak load conditions

4) Security analysis is executed
   a) real time analysis
   b) pre contingency analysis
   c) post contingency analysis
   d) none of them

5) Real power is affected due to
   a) voltage at receiving end
   b) power factor
   c) rotor angle
   d) resistance of transmission line

6) The diversity factor
   a) is always more than 1
   b) is always less than 1
   c) may be less or more than 1
   d) may be as high as 100

7) A synchronous capacitor can supply
   a) lagging vars only
   b) leading vars only
   c) both leading and lagging vars
   d) neither leading vars nor lagging vars

P.T.O.

8) The principle of incremental costs is used
   a) to decide the total plant capacity to be operated
   b) to decide the load allocation between units in operation
   c) to decide the sequence of adding units
   d) all the above

9) A generating unit in a power system is generating 100 MW. It is known that transfer of 100 MW from this unit to the load centre causes a transmission loss of 15 MW. The penalty factor for this unit is
   a) 0.7 b) 0.85 c) 1.15 d) 1.43

10) The advantage of hydro plants is
   a) low operating cost
   b) they can be started and loaded very quickly
   c) they can be used as base load plants as well as peak load plants
   d) all the above

11) Two alternators A and B are operating in parallel. If excitation of A is increased
   a) reactive power of A is increased while that of B is decreased
   b) reactive power of A is increased while that of B is remains unchanged
   c) reactive power of A is decreased
   d) both real and reactive power of A are increased

12) A power system needs injection of vars
   a) at peak load
   b) off-peak load
   c) both at peak load and off-peak load
   d) when the load is neither too high nor too low

13) The speed regulation R for a large size alternator is about
   a) 10 Hz per MW b) 5 Hz per MW c) 1 Hz per MW d) 0.02 Hz per MW

14) A high diversity factor of the load in a power system
   a) educes the installation cost of plant
   b) increases the installation cost of plant
   c) does not affect the installation cost of plant
   d) any of the above

15) The advantage of static capacitors for improvement of power factor is
   a) low loss b) little maintenance cost
   c) ease in installation d) all the above

16) A hydro electric power station is commonly found in
   a) desert areas b) hilly areas c) swamps d) grass lands

17) If a synchronous machine is under excited, it operates at lagging power factor when operated as
   a) synchronous motor b) synchronous generator
   c) either a) or b) d) none of the above

18) When power is transferred between two power systems, power will flow from the power system with
   a) the greater leading power angle b) the lesser leading power angle
   c) the higher voltage level d) the lower voltage level

19) When a 100 MVA generator is operating at 0.8 logging power factor the vars produced are
   a) 80 b) –80 c) 60 d) –60

20) In a power system with long transmission lines, economic dispatch means
   a) equal incremental costs at generator buses
   b) equal incremental costs at load buses
   c) equal load on all generators
   d) that generators share the load proportional to their rating

SLR-EP – 283

Seat No.	

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Wednesday, 23-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*

*2) Figures to the **right** indicate **full** marks.*

*3) Assume suitable data **if necessary**.*

SECTION – I

2. Solve **any 4** of the following : **(5×4=20)**

a) Explain differentiate between integrated and unintegrated interconnected systems.

b) Write a short note on 'Automatic Load Dispatching'.

c) What techniques are available for unit commitment ?

d) How can the effect of transmission loss be included in optimum scheduling in power plants ?

e) What do you understand by production cost of power generated ?

3. Solve **any 2** of the following : **(10×2=20)**

a) Write short note on Physical interpretation of co-ordination equations.

b) The fuel inputs F_1 and F_2 in kcal/hour for two units having output P_1 and P_2 MW are as under :

$F_1 = P_1 + 0.02P_1^2 + 20$

$F_2 = 1.2P_2 + 0.015P_2^2 + 10$

The maximum and minimum loads on the two units are 250 MW and 25 MW respectively. Find and pot the variation of load on each unit as a function of the total load which varies from 50 MW to 500 MW. Also plot incremental cost against total load.

c) What is area control error ? Explain its significance.

SECTION – II

4. Solve **any 4** of the following : **(5×4=20)**

   a) What is voltage collapse ?

   b) What is the power pool ? Explain in brief.

   c) What is the rotor angle ?

   d) What are methods to improve the voltage stability ?

   e) What is security analysis ?

5. Solve **any 2** of the following : **(10×2=20)**

   a) Draw a block diagram, with illustrative transfer functions, of a two area load frequency control system. Explain the functions of different components of such a control system.

   b) Explain the combined use of tap changing transformers and reactive power injection in a power system.

   c) Explain the Steady state load frequency characteristics of a speed governor system.

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SLR-EP – 283

Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) A hydro electric power station is commonly found in
a) desert areas b) hilly areas c) swamps d) grass lands

2) If a synchronous machine is under excited, it operates at lagging power factor when operated as
a) synchronous motor b) synchronous generator
c) either a) or b) d) none of the above

3) When power is transferred between two power systems, power will flow from the power system with
a) the greater leading power angle b) the lesser leading power angle
c) the higher voltage level d) the lower voltage level

4) When a 100 MVA generator is operating at 0.8 logging power factor the vars produced are
a) 80 b) –80 c) 60 d) –60

5) In a power system with long transmission lines, economic dispatch means
a) equal incremental costs at generator buses
b) equal incremental costs at load buses
c) equal load on all generators
d) that generators share the load proportional to their rating

6) In two systems with interconnecting facility, each system
a) keep its own reserve capacity
b) can depend on the other system for reserve capacity
c) need not keep any reserve capacity
d) any of above depending on system size

7) If mechanical inputs to prime movers of generators of a power system does not match load changes
a) system frequency will be low
b) system losses will be increased
c) system losses will be decreased
d) system frequency and voltage will deviate from normal

8) Shunt reactors are connected at the terminals of high voltage lines to
a) increase the receiving end current
b) increase the receiving end voltage under peak load conditions
c) decrease the receiving end voltage under peak load conditions
d) decrease the receiving end voltage under off-peak load conditions

9) Security analysis is executed
   a) real time analysis
   b) pre contingency analysis
   c) post contingency analysis
   d) none of them

10) Real power is affected due to
   a) voltage at receiving end
   b) power factor
   c) rotor angle
   d) resistance of transmission line

11) The diversity factor
   a) is always more than 1
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   a) lagging vars only
   b) leading vars only
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   d) neither leading vars nor lagging vars

13) The principle of incremental costs is used
   a) to decide the total plant capacity to be operated
   b) to decide the load allocation between units in operation
   c) to decide the sequence of adding units
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14) A generating unit in a power system is generating 100 MW. It is known that transfer of 100 MW from this unit to the load centre causes a transmission loss of 15 MW. The penalty factor for this unit is
   a) 0.7 b) 0.85 c) 1.15 d) 1.43

15) The advantage of hydro plants is
   a) low operating cost
   b) they can be started and loaded very quickly
   c) they can be used as base load plants as well as peak load plants
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16) Two alternators A and B are operating in parallel. If excitation of A is increased
   a) reactive power of A is increased while that of B is decreased
   b) reactive power of A is increased while that of B is remains unchanged
   c) reactive power of A is decreased
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   a) at peak load
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   c) both at peak load and off-peak load
   d) when the load is neither too high nor too low

18) The speed regulation R for a large size alternator is about
   a) 10 Hz per MW b) 5 Hz per MW c) 1 Hz per MW d) 0.02 Hz per MW

19) A high diversity factor of the load in a power system
   a) educes the installation cost of plant
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20) The advantage of static capacitors for improvement of power factor is
   a) low loss
   b) little maintenance cost
   c) ease in installation
   d) all the above

SLR-EP – 283

Seat No.	

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Wednesday, 23-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) Assume suitable data ***if necessary****.*

SECTION – I

2. Solve **any 4** of the following : **(5×4=20)**

a) Explain differentiate between integrated and unintegrated interconnected systems.

b) Write a short note on 'Automatic Load Dispatching'.

c) What techniques are available for unit commitment ?

d) How can the effect of transmission loss be included in optimum scheduling in power plants ?

e) What do you understand by production cost of power generated ?

3. Solve **any 2** of the following : **(10×2=20)**

a) Write short note on Physical interpretation of co-ordination equations.

b) The fuel inputs F_1 and F_2 in kcal/hour for two units having output P_1 and P_2 MW are as under :

$F_1 = P_1 + 0.02P_1^2 + 20$

$F_2 = 1.2P_2 + 0.015P_2^2 + 10$

The maximum and minimum loads on the two units are 250 MW and 25 MW respectively. Find and pot the variation of load on each unit as a function of the total load which varies from 50 MW to 500 MW. Also plot incremental cost against total load.

c) What is area control error ? Explain its significance.

SECTION – II

4. Solve **any 4** of the following : **(5×4=20)**

   a) What is voltage collapse ?

   b) What is the power pool ? Explain in brief.

   c) What is the rotor angle ?

   d) What are methods to improve the voltage stability ?

   e) What is security analysis ?

5. Solve **any 2** of the following : **(10×2=20)**

   a) Draw a block diagram, with illustrative transfer functions, of a two area load frequency control system. Explain the functions of different components of such a control system.

   b) Explain the combined use of tap changing transformers and reactive power injection in a power system.

   c) Explain the Steady state load frequency characteristics of a speed governor system.

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SLR-EP – 283

Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Two alternators A and B are operating in parallel. If excitation of A is increased
   a) reactive power of A is increased while that of B is decreased
   b) reactive power of A is increased while that of B is remains unchanged
   c) reactive power of A is decreased
   d) both real and reactive power of A are increased

2) A power system needs injection of vars
   a) at peak load
   b) off-peak load
   c) both at peak load and off-peak load
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3) The speed regulation R for a large size alternator is about
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5) The advantage of static capacitors for improvement of power factor is
   a) low loss b) little maintenance cost
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6) A hydro electric power station is commonly found in
   a) desert areas b) hilly areas c) swamps d) grass lands

7) If a synchronous machine is under excited, it operates at lagging power factor when operated as
   a) synchronous motor b) synchronous generator
   c) either a) or b) d) none of the above

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   a) the greater leading power angle b) the lesser leading power angle
   c) the higher voltage level d) the lower voltage level

P.T.O.

9) When a 100 MVA generator is operating at 0.8 logging power factor the vars produced are
   a) 80 b) –80 c) 60 d) –60

10) In a power system with long transmission lines, economic dispatch means
   a) equal incremental costs at generator buses
   b) equal incremental costs at load buses
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14) Security analysis is executed
   a) real time analysis b) pre contingency analysis
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   a) voltage at receiving end b) power factor
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   a) 0.7 b) 0.85 c) 1.15 d) 1.43

20) The advantage of hydro plants is
   a) low operating cost
   b) they can be started and loaded very quickly
   c) they can be used as base load plants as well as peak load plants
   d) all the above

SLR-EP – 283

Seat No.	

B.E. (Electrical Engineering) (Part – II) (New) Examination, 2016
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Wednesday, 23-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) Assume suitable data ***if necessary****.*

SECTION – I

2. Solve **any 4** of the following : **(5×4=20)**

a) Explain differentiate between integrated and unintegrated interconnected systems.

b) Write a short note on 'Automatic Load Dispatching'.

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The maximum and minimum loads on the two units are 250 MW and 25 MW respectively. Find and pot the variation of load on each unit as a function of the total load which varies from 50 MW to 500 MW. Also plot incremental cost against total load.

c) What is area control error ? Explain its significance.

SECTION – II

4. Solve **any 4** of the following : **(5×4=20)**

   a) What is voltage collapse ?

   b) What is the power pool ? Explain in brief.

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5. Solve **any 2** of the following : **(10×2=20)**

   a) Draw a block diagram, with illustrative transfer functions, of a two area load frequency control system. Explain the functions of different components of such a control system.

   b) Explain the combined use of tap changing transformers and reactive power injection in a power system.

   c) Explain the Steady state load frequency characteristics of a speed governor system.

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SLR-EP – 370

Seat No.	

Set P

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2016
MICROCONTROLLERS AND APPLICATIONS

Day and Date : Tuesday, 13-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data whenever* ***required****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which of the following command copy the content of RAM whose address is in R0 to P1 ?
   a) MOV @P1, R0 b) MOV @R0, P1
   c) MOV P1, @R0 d) MOV P1, R0

2) What is the difference between 8031 and 8051 ?
   a) 8031 has no interrupts b) 8031 is ROM-less
   c) 8051 is ROM-less d) 8051 has 64 bytes more memory

3) SJMP is _____ byte instruction.
   a) 2 b) 3 c) 4 d) 1

4) MOVC A,@ A + PC is a example of _____ addressing mode.
   a) Immediate b) Direct c) Indexed d) None of these

5) _____ number of address line required to select registers of internal 8K byte of ROM.
   a) 10 b) 14 c) 13 d) 16

6) _____ SFR is not bit addressable.
   a) TCON b) PSW c) SBUF d) Port 0

7) ISR ends with
   a) IE b) RET c) RETI d) RI, TI

P.T.O.

8) The bit addressable memory locations are
   a) 30H to 7FH b) 20H to 7FH c) 20H to 30H d) 20H to 2FH
9) In LCALL instruction the target address of subroutine must be within _____ KB.
   a) 1 b) 2 c) 64 d) 8
10) The contents of ACC after this operation

    MOV A, #0BH

    ANL A, #2CH
    a) 80H b) 08H c) 0BH d) 2CH
11) Pins used in SPI mode are
    a) SDO b) $\overline{SS}$ c) SCK d) ALL
12) To transfer a data serially by using T_{XD} pin of 8051, the data must be placed in
    a) SCON b) SMOD c) SBUF d) PCON
13) PIC 16F877A consist of _____ channel _____ bit of ADC.
    a) 8, 8 b) 8, 10 c) 10, 8 d) None of these
14) ADFM bit of ADCONI set to 'I' results in
    a) Right justified b) Left justified
    c) A/D module interrupt d) None of these
15) The reset vector and interrupt vector for PIC 16F877 respectively are
    a) 0000h, 0004h b) 0000h, 0007h
    c) 0000h, 30h d) 0007h, 0000h
16) MOV TMOD, #50H means
    a) Timer 0 in Mode 1 b) Timer 1 in Mode 2
    c) Counter 1 in Mode 1 d) Counter 1 in Mode 2
17) For ADC 0809 start of conversion (SOC) is
    a) Input pin
    b) Output pin
    c) Sometimes input and sometimes output
    d) None of these
18) PSA (Prescalar Assignment) bit in option register set then
    a) Prescalar assigned to Timer0 b) Prescalar assigned to WDT
    c) Prescalar enabled d) Prescalar disabled
19) The 8051, a stack is implemented in
    a) External RAM b) External ROM c) Internal RAM d) Internal ROM
20) PIC instruction set is
    a) Mutually dependent b) Mutually independent
    c) Orthogonal d) Both b) and c)

_____

SLR-EP – 370

Seat No.	

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2016
MICROCONTROLLERS AND APPLICATIONS

Day and Date : Tuesday, 13-12-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) ***Assume*** *suitable data whenever* ***required****.*

2. Attempt **any four** : **(4×5=20)**

a) Write ALP to transfer a block of data from internal memory to external memory.

b) Explain the following instructions :

i) XCHD A,@R0

ii) JBC radd

iii) CJNE A, add, radd .

c) Explain the SFRs associated with the serial communication.

d) Explain the power ON reset and oscillator circuit required for 8051.

e) Explain the various bits of PSW of 8051.

3. a) What are the various interrupts of 8051 ? Describe the ISR of each and the steps in enabling an interrupt. Use suitable SFRs and block diagram for explanation. **10**

OR

a) Interface ADC0809 to 8051. Write assembly language program to read a analog signal connected to channel 3 and store its equivalent digital value in one of the memory location.

b) Explain TMOD and TCON special function register. Write a ALP to generate a square wave of 50% duty cycle. (Assume XTAL = 11.0592 MHz). **10**

4. Attempt **any four** : **(4×5=20)**

   a) Explain with suitable diagram the harvard architecture of PIC 16f877.

   b) Explain different addressing modes of PIC 16f877.

   c) Explain internal memory structure of 8051.

   d) Explain logical instructions related to PIC 16f877.

   e) Give the significance of every bit of IE register.

5. Attempt **any two** : **(2×10=20)**

   a) Explain the different addressing modes of 8051. Write a ALP for block exchange which is stored at the memory location 20H and 30H.

   b) Explain in detail different memories available in PIC 16f877.

   c) Interface 16KB of EPROM and 8 KB of RAM to 8051. Determine the initial and final address of these memories.

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SLR-EP – 370

Seat No.	

Set Q

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2016
MICROCONTROLLERS AND APPLICATIONS

Day and Date : Tuesday, 13-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data whenever **required**.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) MOV TMOD, #50H means
   a) Timer 0 in Mode 1 b) Timer 1 in Mode 2
   c) Counter 1 in Mode 1 d) Counter 1 in Mode 2

2) For ADC 0809 start of conversion (SOC) is
   a) Input pin
   b) Output pin
   c) Sometimes input and sometimes output
   d) None of these

3) PSA (Prescalar Assignment) bit in option register set then
   a) Prescalar assigned to Timer0 b) Prescalar assigned to WDT
   c) Prescalar enabled d) Prescalar disabled

4) The 8051, a stack is implemented in
   a) External RAM b) External ROM c) Internal RAM d) Internal ROM

5) PIC instruction set is
   a) Mutually dependent b) Mutually independent
   c) Orthogonal d) Both b) and c)

6) Which of the following command copy the content of RAM whose address is in R0 to P1 ?
   a) MOV @P1, R0 b) MOV @R0, P1
   c) MOV P1, @R0 d) MOV P1, R0

P.T.O.

7) What is the difference between 8031 and 8051 ?
   a) 8031 has no interrupts b) 8031 is ROM-less
   c) 8051 is ROM-less d) 8051 has 64 bytes more memory

8) SJMP is _____ byte instruction.
   a) 2 b) 3 c) 4 d) 1

9) MOVC A, @ A + PC is a example of _____ addressing mode.
   a) Immediate b) Direct c) Indexed d) None of these

10) _____ number of address line required to select registers of internal 8K byte of ROM.
   a) 10 b) 14 c) 13 d) 16

11) _____ SFR is not bit addressable.
   a) TCON b) PSW c) SBUF d) Port 0

12) ISR ends with
   a) IE b) RET c) RETI d) RI, TI

13) The bit addressable memory locations are
   a) 30H to 7FH b) 20H to 7FH c) 20H to 30H d) 20H to 2FH

14) In LCALL instruction the target address of subroutine must be within _____ KB.
   a) 1 b) 2 c) 64 d) 8

15) The contents of ACC after this operation

   MOV A, #0BH

   ANL A, #2CH
   a) 80H b) 08H c) 0BH d) 2CH

16) Pins used in SPI mode are
   a) SDO b) $\overline{SS}$ c) SCK d) ALL

17) To transfer a data serially by using T_{XD} pin of 8051, the data must be placed in
   a) SCON b) SMOD c) SBUF d) PCON

18) PIC 16F877A consist of _____ channel _____ bit of ADC.
   a) 8, 8 b) 8, 10 c) 10, 8 d) None of these

19) ADFM bit of ADCONI set to 'I' results in
   a) Right justified b) Left justified
   c) A/D module interrupt d) None of these

20) The reset vector and interrupt vector for PIC 16F877 respectively are
   a) 0000h, 0004h b) 0000h, 0007h
   c) 0000h, 30h d) 0007h, 0000h

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SLR-EP – 370

Seat No.	

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2016
MICROCONTROLLERS AND APPLICATIONS

Day and Date : Tuesday, 13-12-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) ***Assume*** *suitable data whenever* ***required****.*

2. Attempt **any four** : **(4×5=20)**

a) Write ALP to transfer a block of data from internal memory to external memory.

b) Explain the following instructions :

i) XCHD A,@R0

ii) JBC radd

iii) CJNE A, add, radd .

c) Explain the SFRs associated with the serial communication.

d) Explain the power ON reset and oscillator circuit required for 8051.

e) Explain the various bits of PSW of 8051.

3. a) What are the various interrupts of 8051 ? Describe the ISR of each and the steps in enabling an interrupt. Use suitable SFRs and block diagram for explanation. **10**

OR

a) Interface ADC0809 to 8051. Write assembly language program to read a analog signal connected to channel 3 and store its equivalent digital value in one of the memory location.

b) Explain TMOD and TCON special function register. Write a ALP to generate a square wave of 50% duty cycle. (Assume XTAL = 11.0592 MHz). **10**

4. Attempt **any four** : **(4×5=20)**

   a) Explain with suitable diagram the harvard architecture of PIC 16f877.

   b) Explain different addressing modes of PIC 16f877.

   c) Explain internal memory structure of 8051.

   d) Explain logical instructions related to PIC 16f877.

   e) Give the significance of every bit of IE register.

5. Attempt **any two** : **(2×10=20)**

   a) Explain the different addressing modes of 8051. Write a ALP for block exchange which is stored at the memory location 20H and 30H.

   b) Explain in detail different memories available in PIC 16f877.

   c) Interface 16KB of EPROM and 8 KB of RAM to 8051. Determine the initial and final address of these memories.

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SLR-EP – 370

Seat No.	

Set R

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2016
MICROCONTROLLERS AND APPLICATIONS

Day and Date : Tuesday, 13-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data whenever* ***required****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Pins used in SPI mode are
a) SDO b) $\overline{SS}$ c) SCK d) ALL

2) To transfer a data serially by using T_{XD} pin of 8051, the data must be placed in
a) SCON b) SMOD c) SBUF d) PCON

3) PIC 16F877A consist of _____ channel _____ bit of ADC.
a) 8, 8 b) 8, 10 c) 10, 8 d) None of these

4) ADFM bit of ADCONI set to 'I' results in
a) Right justified b) Left justified
c) A/D module interrupt d) None of these

5) The reset vector and interrupt vector for PIC 16F877 respectively are
a) 0000h, 0004h b) 0000h, 0007h
c) 0000h, 30h d) 0007h, 0000h

6) MOV TMOD, #50H means
a) Timer 0 in Mode 1 b) Timer 1 in Mode 2
c) Counter 1 in Mode 1 d) Counter 1 in Mode 2

7) For ADC 0809 start of conversion (SOC) is
a) Input pin
b) Output pin
c) Sometimes input and sometimes output
d) None of these

P.T.O.

8) PSA (Prescalar Assignment) bit in option register set then
   a) Prescalar assigned to Timer0 b) Prescalar assigned to WDT
   c) Prescalar enabled d) Prescalar disabled

9) The 8051, a stack is implemented in
   a) External RAM b) External ROM c) Internal RAM d) Internal ROM

10) PIC instruction set is
   a) Mutually dependent b) Mutually independent
   c) Orthogonal d) Both b) and c)

11) Which of the following command copy the content of RAM whose address is in R0 to P1 ?
   a) MOV @P1, R0 b) MOV @R0, P1
   c) MOV P1, @R0 d) MOV P1, R0

12) What is the difference between 8031 and 8051 ?
   a) 8031 has no interrupts b) 8031 is ROM-less
   c) 8051 is ROM-less d) 8051 has 64 bytes more memory

13) SJMP is _____ byte instruction.
   a) 2 b) 3 c) 4 d) 1

14) MOVC A,@ A + PC is a example of _____ addressing mode.
   a) Immediate b) Direct c) Indexed d) None of these

15) _____ number of address line required to select registers of internal 8K byte of ROM.
   a) 10 b) 14 c) 13 d) 16

16) _____ SFR is not bit addressable.
   a) TCON b) PSW c) SBUF d) Port 0

17) ISR ends with
   a) IE b) RET c) RETI d) RI, TI

18) The bit addressable memory locations are
   a) 30H to 7FH b) 20H to 7FH c) 20H to 30H d) 20H to 2FH

19) In LCALL instruction the target address of subroutine must be within _____ KB.
   a) 1 b) 2 c) 64 d) 8

20) The contents of ACC after this operation

   MOV A, #0BH

   ANL A, #2CH
   a) 80H b) 08H c) 0BH d) 2CH

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SLR-EP – 370

Seat No.	

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2016
MICROCONTROLLERS AND APPLICATIONS

Day and Date : Tuesday, 13-12-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) ***Assume*** *suitable data whenever* ***required****.*

2. Attempt **any four** : **(4×5=20)**

a) Write ALP to transfer a block of data from internal memory to external memory.

b) Explain the following instructions :

i) XCHD A,@R0

ii) JBC radd

iii) CJNE A, add, radd .

c) Explain the SFRs associated with the serial communication.

d) Explain the power ON reset and oscillator circuit required for 8051.

e) Explain the various bits of PSW of 8051.

3. a) What are the various interrupts of 8051 ? Describe the ISR of each and the steps in enabling an interrupt. Use suitable SFRs and block diagram for explanation. **10**

OR

a) Interface ADC0809 to 8051. Write assembly language program to read a analog signal connected to channel 3 and store its equivalent digital value in one of the memory location.

b) Explain TMOD and TCON special function register. Write a ALP to generate a square wave of 50% duty cycle. (Assume XTAL = 11.0592 MHz). **10**

4. Attempt **any four** : **(4×5=20)**

   a) Explain with suitable diagram the harvard architecture of PIC 16f877.

   b) Explain different addressing modes of PIC 16f877.

   c) Explain internal memory structure of 8051.

   d) Explain logical instructions related to PIC 16f877.

   e) Give the significance of every bit of IE register.

5. Attempt **any two** : **(2×10=20)**

   a) Explain the different addressing modes of 8051. Write a ALP for block exchange which is stored at the memory location 20H and 30H.

   b) Explain in detail different memories available in PIC 16f877.

   c) Interface 16KB of EPROM and 8 KB of RAM to 8051. Determine the initial and final address of these memories.

SLR-EP – 370

Seat No.	

Set S

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2016
MICROCONTROLLERS AND APPLICATIONS

Day and Date : Tuesday, 13-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data whenever **required**.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) _____ SFR is not bit addressable.
a) TCON b) PSW c) SBUF d) Port 0

2) ISR ends with
a) IE b) RET c) RETI d) RI, TI

3) The bit addressable memory locations are
a) 30H to 7FH b) 20H to 7FH c) 20H to 30H d) 20H to 2FH

4) In LCALL instruction the target address of subroutine must be within _____ KB.
a) 1 b) 2 c) 64 d) 8

5) The contents of ACC after this operation

MOV A, #0BH

ANL A, #2CH
a) 80H b) 08H c) 0BH d) 2CH

6) Pins used in SPI mode are
a) SDO b) $\overline{SS}$ c) SCK d) ALL

7) To transfer a data serially by using T_{XD} pin of 8051, the data must be placed in
a) SCON b) SMOD c) SBUF d) PCON

8) PIC 16F877A consist of _____ channel _____ bit of ADC.
a) 8, 8 b) 8, 10 c) 10, 8 d) None of these

P.T.O.

9) ADFM bit of ADCONI set to 'I' results in
   a) Right justified b) Left justified
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10) The reset vector and interrupt vector for PIC 16F877 respectively are
   a) 0000h, 0004h b) 0000h, 0007h
   c) 0000h, 30h d) 0007h, 0000h

11) MOV TMOD, #50H means
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   c) Counter 1 in Mode 1 d) Counter 1 in Mode 2

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   c) Sometimes input and sometimes output
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   a) MOV @P1, R0 b) MOV @R0, P1
   c) MOV P1, @R0 d) MOV P1, R0

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18) SJMP is _____ byte instruction.
   a) 2 b) 3 c) 4 d) 1

19) MOVC A, @ A + PC is a example of _____ addressing mode.
   a) Immediate b) Direct c) Indexed d) None of these

20) _____ number of address line required to select registers of internal 8K byte of ROM.
   a) 10 b) 14 c) 13 d) 16

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SLR-EP – 370

Seat No.	

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2016
MICROCONTROLLERS AND APPLICATIONS

Day and Date : Tuesday, 13-12-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) ***Assume*** *suitable data whenever* ***required****.*

2. Attempt **any four** : **(4×5=20)**

a) Write ALP to transfer a block of data from internal memory to external memory.

b) Explain the following instructions :

i) XCHD A,@R0

ii) JBC radd

iii) CJNE A, add, radd .

c) Explain the SFRs associated with the serial communication.

d) Explain the power ON reset and oscillator circuit required for 8051.

e) Explain the various bits of PSW of 8051.

3. a) What are the various interrupts of 8051 ? Describe the ISR of each and the steps in enabling an interrupt. Use suitable SFRs and block diagram for explanation. **10**

OR

a) Interface ADC0809 to 8051. Write assembly language program to read a analog signal connected to channel 3 and store its equivalent digital value in one of the memory location.

b) Explain TMOD and TCON special function register. Write a ALP to generate a square wave of 50% duty cycle. (Assume XTAL = 11.0592 MHz). **10**

4. Attempt **any four** : **(4×5=20)**

   a) Explain with suitable diagram the harvard architecture of PIC 16f877.

   b) Explain different addressing modes of PIC 16f877.

   c) Explain internal memory structure of 8051.

   d) Explain logical instructions related to PIC 16f877.

   e) Give the significance of every bit of IE register.

5. Attempt **any two** : **(2×10=20)**

   a) Explain the different addressing modes of 8051. Write a ALP for block exchange which is stored at the memory location 20H and 30H.

   b) Explain in detail different memories available in PIC 16f877.

   c) Interface 16KB of EPROM and 8 KB of RAM to 8051. Determine the initial and final address of these memories.

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SLR-EP – 371

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL MACHINE DESIGN (Old)

Day and Date : Wednesday, 14-12-2016 Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Unbalance magnetic pull is proportional to
   a) Directly with d b) Inversely with d
   c) Directly with d^2 d) Inversely with d^2

2) Core of a transformer is built with silicon steel laminations to reduce
   a) Copper loss b) Eddy current loss
   c) Hysteresis loss d) Core loss

3) Cooling of a transformer is mainly used to
   a) Limit current rise b) Voltage rise
   c) Temperature rise d) Flux rise

4) Following loss is absent in transformer
   a) Copper loss b) Hysteresis loss
   c) Eddy current loss d) Rotation a loss

5) If rotor resistance in 3 phase induction motor increases then starting torque
   a) Decreases b) Increases
   c) Remains constant d) None of above

6) In 3-phase induction motor, if rotor resistance decreases then maximum torque
   a) Increases b) Decreases
   c) Remains constant d) None of above

7) In 3-phase induction motor if air-gap reduces then power factor of motor
   a) Decreases b) Increases
   c) Remains constant d) None of above

8) Rotor bar current density in 3 phase induction motor is nearly
   a) 10 – 15 Amp/mm^2 b) 4 – 7 Amp/mm^2
   c) 1 – 2 Amp/mm^2 d) 0 – 1 Amp/mm^2

P.T.O.

9) To get maximum torque at the time of starting, the condition is
   a) X2 > R2 b) X2 < R2
   c) X2 = R2 d) None of these

10) Rotor of single phase induction motor is of type
   a) Smooth cylindrical type b) Squirrel cage type
   c) Salient pole type d) None of the above

11) If forward slip is then backward slip according to double revolving field theory is
   a) S b) (1 – S)
   c) (2 – S) d) (S – 1)

12) Self-starting single phase induction motor carries _____ Nos. of windings.
   a) 4 b) 2
   c) 3 d) 1

13) Single phase induction motor is used to drive
   a) Traction b) Crane
   c) Hoist d) Tape-recorder

14) Synchronous motor is
   a) Singly excited b) Doubly excited
   c) Triply excited d) None of the above

15) For large capacity power transformers the core laminations are prepared from
   a) Hot rolled silicon sheet steel
   b) Cold rolled silicon sheet steel
   c) Cold rolled grain oriented silicon sheet steel
   d) Any one of the above

16) Radiator type cooling is used above
   a) 22 KVA b) 30 KVA
   c) 10000 KVA d) None

17) Which material has low reluctance ?
   a) Silicon steel b) Iron
   c) Steel d) CRGO

18) The humming noise in the transformer is due to
   a) Magnetostriction b) Oil circulation
   c) Vibration of tank walls d) Windings

19) Which of the following quantity is affected by the leakage reactance of an induction motor ?
   a) Starting current b) Starting torque
   c) Maximum torque d) All of the above

20) When a synchronous generator is design with lower value of SCR it
   a) Will give higher stability limit b) Will have lower SC current
   c) Will give better voltage regulation d) Will have higher synchronizing power

SLR-EP – 371

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL MACHINE DESIGN (Old)

Day and Date : Wednesday, 14-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** of the following : **(4×5=20)**

1) Find per phase induced EMF in transformer and also show that EMF lags the flux by $\frac{\pi}{2}$ angle.

2) Show that gross core area of 3 stepped transformer core is approximately 85% of the area of the circumscribing circle.

3) Show that Et = KS where S is KVA rating and K is some constant.

4) Find the current in bars and end rings of cage rotor of 3 φ induction motor, 6-poles, 72 stator slots with 15 conductors in each slot. If the stator current per phase is 20 A and rotor slots are 55.

5) Show that overload capacity of 3 phase induction motor is given by $\sigma + \sigma 2$ 1 where σ is dispersion co-efficient.

3. Solve **any two** questions : **(2×10=20)**

1) Calculate the main dimensions of a 125 KVA 6.6/0.4 KV, 50 Hz – 1 phase shell type transformer taking Et = 10 V. Flux density in core is 1.1 web/m^2 current density = 2 Amp/mm^2. Window space factor = 0.33, staking factor = 0.9.

2) Find the main dimensions, Nos. of stator turns Nos. of stator slots of 5 HP, 400 V, 1500 syn. RPM sq. cage induction motor with following data Bav = 0.46 web/m^2 A.C. = 22000, Full load efficiency = 0.83 Full load P.f. = 0.84

3) Determine the main dimension for a 1000 KVA, 50 Hz, 3-ph, 375 rpm alternator. The average air gap flux density is 0.55 Wb/m^2 and the ampere conductor per meter are 28000. Use rectangular pole and assume suitable value for ratio of core length to pole pitch in order that bolted on pole construction is used for which the maximum permissible peripheral speed is 50 m/s. the runaway speed is 1.8 times the synchronous speed.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**

   1) Explain clearly double revolving field theory of single phase induction. Find expression for backward slip.

   2) A 3-ph, 50 Hz, oil cooled core type transformer has the following dimension : distance between core centers = 0.2 m, height of window = 0.24m, diameter of circumscribing circle = 0.14m. The flux density in the core is 1.25 Wb/m^2 and the current density in the conductor is 2.5 A/mm^2. Estimate the KVA rating. Assume window space factor of 0.2 and the core is 2 stepped.

   3) Why synchronous motor is not self-starting list the different methods of starting synchronous motor ?

   4) Derive an expression for power in case of smooth cylindrical rotor synchronous machine.

   5) Draw and explain equivalent circuit of single phase induction motor referred to stator on the basis of double revolving field theory.

5. Solve **any two** questions : **(2×10=20)**

   1) For 2500 KVA, 3.3 KV, 32 poles 50 Hz find 1) Dia. D 2) Length L 3) Peripheral speed Sp. Electric loading = 30,000 specific magnetic loading = 0.68 web/m^2 ratio of pole are to pole pitch is 0.65.

   2) In the design of a 30 HP, 3-ph, 440 V. 960 rpm, 50 Hz. Delta connected induction motor. Assume specific electric loading of 25000 ac/m and specific magnetic loading of 0.46 Wb/m^3 full load efficiency 86% and power factor 0.87. Estimate :

      1) Diameter of stator bore
      2) Length of stator core
      3) Peripheral velocity
      4) Turns per phase
      5) Slot pitch.

   3) With neat circuit diagram and vector diagram, explain how torque is produced in capacitor split phase single phase induction motor ?

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SLR-EP – 371

Seat No.	

Set Q

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL MACHINE DESIGN (Old)

Day and Date : Wednesday, 14-12-2016 Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Radiator type cooling is used above
   a) 22 KVA b) 30 KVA
   c) 10000 KVA d) None

2) Which material has low reluctance ?
   a) Silicon steel b) Iron
   c) Steel d) CRGO

3) The humming noise in the transformer is due to
   a) Magnetostriction b) Oil circulation
   c) Vibration of tank walls d) Windings

4) Which of the following quantity is affected by the leakage reactance of an induction motor ?
   a) Starting current b) Starting torque
   c) Maximum torque d) All of the above

5) When a synchronous generator is design with lower value of SCR it
   a) Will give higher stability limit b) Will have lower SC current
   c) Will give better voltage regulation d) Will have higher synchronizing power

6) Unbalance magnetic pull is proportional to
   a) Directly with d b) Inversely with d
   c) Directly with d^2 d) Inversely with d^2

7) Core of a transformer is built with silicon steel laminations to reduce
   a) Copper loss b) Eddy current loss
   c) Hysteresis loss d) Core loss

8) Cooling of a transformer is mainly used to
   a) Limit current rise b) Voltage rise
   c) Temperature rise d) Flux rise

P.T.O.

9) Following loss is absent in transformer
   a) Copper loss
   b) Hysteresis loss
   c) Eddy current loss
   d) Rotation a loss

10) If rotor resistance in 3 phase induction motor increases then starting torque
   a) Decreases
   b) Increases
   c) Remains constant
   d) None of above

11) In 3-phase induction motor, if rotor resistance decreases then maximum torque
   a) Increases
   b) Decreases
   c) Remains constant
   d) None of above

12) In 3-phase induction motor if air-gap reduces then power factor of motor
   a) Decreases
   b) Increases
   c) Remains constant
   d) None of above

13) Rotor bar current density in 3 phase induction motor is nearly
   a) 10 – 15 Amp/mm^2
   b) 4 – 7 Amp/mm^2
   c) 1 – 2 Amp/mm^2
   d) 0 – 1 Amp/mm^2

14) To get maximum torque at the time of starting, the condition is
   a) X2 > R2
   b) X2 < R2
   c) X2 = R2
   d) None of these

15) Rotor of single phase induction motor is of type
   a) Smooth cylindrical type
   b) Squirrel cage type
   c) Salient pole type
   d) None of the above

16) If forward slip is then backward slip according to double revolving field theory is
   a) S
   b) (1 – S)
   c) (2 – S)
   d) (S – 1)

17) Self-starting single phase induction motor carries _____ Nos. of windings.
   a) 4
   b) 2
   c) 3
   d) 1

18) Single phase induction motor is used to drive
   a) Traction
   b) Crane
   c) Hoist
   d) Tape-recorder

19) Synchronous motor is
   a) Singly excited
   b) Doubly excited
   c) Triply excited
   d) None of the above

20) For large capacity power transformers the core laminations are prepared from
   a) Hot rolled silicon sheet steel
   b) Cold rolled silicon sheet steel
   c) Cold rolled grain oriented silicon sheet steel
   d) Any one of the above

_____

SLR-EP – 371

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL MACHINE DESIGN (Old)

Day and Date : Wednesday, 14-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** of the following : **(4×5=20)**

1) Find per phase induced EMF in transformer and also show that EMF lags the flux by $\frac{\pi}{2}$ angle.

2) Show that gross core area of 3 stepped transformer core is approximately 85% of the area of the circumscribing circle.

3) Show that Et = KS where S is KVA rating and K is some constant.

4) Find the current in bars and end rings of cage rotor of 3 φ induction motor, 6-poles, 72 stator slots with 15 conductors in each slot. If the stator current per phase is 20 A and rotor slots are 55.

5) Show that overload capacity of 3 phase induction motor is given by $\sigma + \sigma 2\ 1$ where σ is dispersion co-efficient.

3. Solve **any two** questions : **(2×10=20)**

1) Calculate the main dimensions of a 125 KVA 6.6/0.4 KV, 50 Hz – 1 phase shell type transformer taking Et = 10 V. Flux density in core is 1.1 web/m^2 current density = 2 Amp/mm^2. Window space factor = 0.33, staking factor = 0.9.

2) Find the main dimensions, Nos. of stator turns Nos. of stator slots of 5 HP, 400 V, 1500 syn. RPM sq. cage induction motor with following data Bav = 0.46 web/m^2 A.C. = 22000, Full load efficiency = 0.83 Full load P.f. = 0.84

3) Determine the main dimension for a 1000 KVA, 50 Hz, 3-ph, 375 rpm alternator. The average air gap flux density is 0.55 Wb/m^2 and the ampere conductor per meter are 28000. Use rectangular pole and assume suitable value for ratio of core length to pole pitch in order that bolted on pole construction is used for which the maximum permissible peripheral speed is 50 m/s. the runaway speed is 1.8 times the synchronous speed.

Set Q

SECTION – II

4. Solve **any four** questions : **(4×5=20)**

   1) Explain clearly double revolving field theory of single phase induction. Find expression for backward slip.

   2) A 3-ph, 50 Hz, oil cooled core type transformer has the following dimension : distance between core centers = 0.2 m, height of window = 0.24m, diameter of circumscribing circle = 0.14m. The flux density in the core is 1.25 Wb/m^2 and the current density in the conductor is 2.5 A/mm^2. Estimate the KVA rating. Assume window space factor of 0.2 and the core is 2 stepped.

   3) Why synchronous motor is not self-starting list the different methods of starting synchronous motor ?

   4) Derive an expression for power in case of smooth cylindrical rotor synchronous machine.

   5) Draw and explain equivalent circuit of single phase induction motor referred to stator on the basis of double revolving field theory.

5. Solve **any two** questions : **(2×10=20)**

   1) For 2500 KVA, 3.3 KV, 32 poles 50 Hz find 1) Dia. D 2) Length L 3) Peripheral speed Sp. Electric loading = 30,000 specific magnetic loading = 0.68 web/m^2 ratio of pole are to pole pitch is 0.65.

   2) In the design of a 30 HP, 3-ph, 440 V. 960 rpm, 50 Hz. Delta connected induction motor. Assume specific electric loading of 25000 ac/m and specific magnetic loading of 0.46 Wb/m^3 full load efficiency 86% and power factor 0.87. Estimate :

      1) Diameter of stator bore
      2) Length of stator core
      3) Peripheral velocity
      4) Turns per phase
      5) Slot pitch.

   3) With neat circuit diagram and vector diagram, explain how torque is produced in capacitor split phase single phase induction motor ?

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SLR-EP – 371

Seat No.	

Set R

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL MACHINE DESIGN (Old)

Day and Date : Wednesday, 14-12-2016 Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) If forward slip is then backward slip according to double revolving field theory is
   a) S b) (1 – S)
   c) (2 – S) d) (S – 1)

2) Self-starting single phase induction motor carries _____ Nos. of windings.
   a) 4 b) 2
   c) 3 d) 1

3) Single phase induction motor is used to drive
   a) Traction b) Crane
   c) Hoist d) Tape-recorder

4) Synchronous motor is
   a) Singly excited b) Doubly excited
   c) Triply excited d) None of the above

5) For large capacity power transformers the core laminations are prepared from
   a) Hot rolled silicon sheet steel
   b) Cold rolled silicon sheet steel
   c) Cold rolled grain oriented silicon sheet steel
   d) Any one of the above

6) Radiator type cooling is used above
   a) 22 KVA b) 30 KVA
   c) 10000 KVA d) None

7) Which material has low reluctance ?
   a) Silicon steel b) Iron
   c) Steel d) CRGO

P.T.O.

8) The humming noise in the transformer is due to
   a) Magnetostriction
   b) Oil circulation
   c) Vibration of tank walls
   d) Windings

9) Which of the following quantity is affected by the leakage reactance of an induction motor ?
   a) Starting current
   b) Starting torque
   c) Maximum torque
   d) All of the above

10) When a synchronous generator is design with lower value of SCR it
   a) Will give higher stability limit
   b) Will have lower SC current
   c) Will give better voltage regulation
   d) Will have higher synchronizing power

11) Unbalance magnetic pull is proportional to
   a) Directly with d
   b) Inversely with d
   c) Directly with d^2
   d) Inversely with d^2

12) Core of a transformer is built with silicon steel laminations to reduce
   a) Copper loss
   b) Eddy current loss
   c) Hysteresis loss
   d) Core loss

13) Cooling of a transformer is mainly used to
   a) Limit current rise
   b) Voltage rise
   c) Temperature rise
   d) Flux rise

14) Following loss is absent in transformer
   a) Copper loss
   b) Hysteresis loss
   c) Eddy current loss
   d) Rotation a loss

15) If rotor resistance in 3 phase induction motor increases then starting torque
   a) Decreases
   b) Increases
   c) Remains constant
   d) None of above

16) In 3-phase induction motor, if rotor resistance decreases then maximum torque
   a) Increases
   b) Decreases
   c) Remains constant
   d) None of above

17) In 3-phase induction motor if air-gap reduces then power factor of motor
   a) Decreases
   b) Increases
   c) Remains constant
   d) None of above

18) Rotor bar current density in 3 phase induction motor is nearly
   a) 10 – 15 Amp/mm^2
   b) 4 – 7 Amp/mm^2
   c) 1 – 2 Amp/mm^2
   d) 0 – 1 Amp/mm^2

19) To get maximum torque at the time of starting, the condition is
   a) X2 > R2
   b) X2 < R2
   c) X2 = R2
   d) None of these

20) Rotor of single phase induction motor is of type
   a) Smooth cylindrical type
   b) Squirrel cage type
   c) Salient pole type
   d) None of the above

SLR-EP – 371

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL MACHINE DESIGN (Old)

Day and Date : Wednesday, 14-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** of the following : **(4×5=20)**

1) Find per phase induced EMF in transformer and also show that EMF lags the flux by $\frac{\pi}{2}$ angle.

2) Show that gross core area of 3 stepped transformer core is approximately 85% of the area of the circumscribing circle.

3) Show that Et = KS where S is KVA rating and K is some constant.

4) Find the current in bars and end rings of cage rotor of 3 φ induction motor, 6-poles, 72 stator slots with 15 conductors in each slot. If the stator current per phase is 20 A and rotor slots are 55.

5) Show that overload capacity of 3 phase induction motor is given by $\sigma + \sigma 2$ 1 where σ is dispersion co-efficient.

3. Solve **any two** questions : **(2×10=20)**

1) Calculate the main dimensions of a 125 KVA 6.6/0.4 KV, 50 Hz – 1 phase shell type transformer taking Et = 10 V. Flux density in core is 1.1 web/m^2 current density = 2 Amp/mm^2. Window space factor = 0.33, staking factor = 0.9.

2) Find the main dimensions, Nos. of stator turns Nos. of stator slots of 5 HP, 400 V, 1500 syn. RPM sq. cage induction motor with following data Bav = 0.46 web/m^2 A.C. = 22000, Full load efficiency = 0.83 Full load P.f. = 0.84

3) Determine the main dimension for a 1000 KVA, 50 Hz, 3-ph, 375 rpm alternator. The average air gap flux density is 0.55 Wb/m^2 and the ampere conductor per meter are 28000. Use rectangular pole and assume suitable value for ratio of core length to pole pitch in order that bolted on pole construction is used for which the maximum permissible peripheral speed is 50 m/s. the runaway speed is 1.8 times the synchronous speed.

Set R

SECTION – II

4. Solve **any four** questions : **(4×5=20)**

   1) Explain clearly double revolving field theory of single phase induction. Find expression for backward slip.

   2) A 3-ph, 50 Hz, oil cooled core type transformer has the following dimension : distance between core centers = 0.2 m, height of window = 0.24m, diameter of circumscribing circle = 0.14m. The flux density in the core is 1.25 Wb/m^2 and the current density in the conductor is 2.5 A/mm^2. Estimate the KVA rating. Assume window space factor of 0.2 and the core is 2 stepped.

   3) Why synchronous motor is not self-starting list the different methods of starting synchronous motor ?

   4) Derive an expression for power in case of smooth cylindrical rotor synchronous machine.

   5) Draw and explain equivalent circuit of single phase induction motor referred to stator on the basis of double revolving field theory.

5. Solve **any two** questions : **(2×10=20)**

   1) For 2500 KVA, 3.3 KV, 32 poles 50 Hz find 1) Dia. D 2) Length L 3) Peripheral speed Sp. Electric loading = 30,000 specific magnetic loading = 0.68 web/m^2 ratio of pole are to pole pitch is 0.65.

   2) In the design of a 30 HP, 3-ph, 440 V. 960 rpm, 50 Hz. Delta connected induction motor. Assume specific electric loading of 25000 ac/m and specific magnetic loading of 0.46 Wb/m^3 full load efficiency 86% and power factor 0.87. Estimate :

      1) Diameter of stator bore
      2) Length of stator core
      3) Peripheral velocity
      4) Turns per phase
      5) Slot pitch.

   3) With neat circuit diagram and vector diagram, explain how torque is produced in capacitor split phase single phase induction motor ?

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SLR-EP – 371

Seat No.	

Set **S**

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL MACHINE DESIGN (Old)

Day and Date : Wednesday, 14-12-2016 Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) In 3-phase induction motor, if rotor resistance decreases then maximum torque
   a) Increases b) Decreases
   c) Remains constant d) None of above

2) In 3-phase induction motor if air-gap reduces then power factor of motor
   a) Decreases b) Increases
   c) Remains constant d) None of above

3) Rotor bar current density in 3 phase induction motor is nearly
   a) 10 – 15 Amp/mm^2 b) 4 – 7 Amp/mm^2
   c) 1 – 2 Amp/mm^2 d) 0 – 1 Amp/mm^2

4) To get maximum torque at the time of starting, the condition is
   a) X2 > R2 b) X2 < R2
   c) X2 = R2 d) None of these

5) Rotor of single phase induction motor is of type
   a) Smooth cylindrical type b) Squirrel cage type
   c) Salient pole type d) None of the above

6) If forward slip is then backward slip according to double revolving field theory is
   a) S b) (1 – S)
   c) (2 – S) d) (S – 1)

7) Self-starting single phase induction motor carries _____ Nos. of windings.
   a) 4 b) 2
   c) 3 d) 1

8) Single phase induction motor is used to drive
   a) Traction b) Crane
   c) Hoist d) Tape-recorder

P.T.O.

9) Synchronous motor is
   a) Singly excited
   b) Doubly excited
   c) Triply excited
   d) None of the above

10) For large capacity power transformers the core laminations are prepared from
   a) Hot rolled silicon sheet steel
   b) Cold rolled silicon sheet steel
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   d) Any one of the above

11) Radiator type cooling is used above
   a) 22 KVA
   b) 30 KVA
   c) 10000 KVA
   d) None

12) Which material has low reluctance ?
   a) Silicon steel
   b) Iron
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13) The humming noise in the transformer is due to
   a) Magnetostriction
   b) Oil circulation
   c) Vibration of tank walls
   d) Windings

14) Which of the following quantity is affected by the leakage reactance of an induction motor ?
   a) Starting current
   b) Starting torque
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   d) All of the above

15) When a synchronous generator is design with lower value of SCR it
   a) Will give higher stability limit
   b) Will have lower SC current
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16) Unbalance magnetic pull is proportional to
   a) Directly with d
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17) Core of a transformer is built with silicon steel laminations to reduce
   a) Copper loss
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   c) Hysteresis loss
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18) Cooling of a transformer is mainly used to
   a) Limit current rise
   b) Voltage rise
   c) Temperature rise
   d) Flux rise

19) Following loss is absent in transformer
   a) Copper loss
   b) Hysteresis loss
   c) Eddy current loss
   d) Rotation a loss

20) If rotor resistance in 3 phase induction motor increases then starting torque
   a) Decreases
   b) Increases
   c) Remains constant
   d) None of above

SLR-EP – 371

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ELECTRICAL MACHINE DESIGN (Old)

Day and Date : Wednesday, 14-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** of the following : **(4×5=20)**
   1) Find per phase induced EMF in transformer and also show that EMF lags the flux by $\frac{\pi}{2}$ angle.
   2) Show that gross core area of 3 stepped transformer core is approximately 85% of the area of the circumscribing circle.
   3) Show that Et = KS where S is KVA rating and K is some constant.
   4) Find the current in bars and end rings of cage rotor of 3φ induction motor, 6-poles, 72 stator slots with 15 conductors in each slot. If the stator current per phase is 20 A and rotor slots are 55.
   5) Show that overload capacity of 3 phase induction motor is given by $\sigma + \sigma 2\ 1$ where σ is dispersion co-efficient.

3. Solve **any two** questions : **(2×10=20)**
   1) Calculate the main dimensions of a 125 KVA 6.6/0.4 KV, 50 Hz – 1 phase shell type transformer taking Et = 10 V. Flux density in core is 1.1 web/m^2 current density = 2 Amp/mm^2. Window space factor = 0.33, staking factor = 0.9.
   2) Find the main dimensions, Nos. of stator turns Nos. of stator slots of 5 HP, 400 V, 1500 syn. RPM sq. cage induction motor with following data Bav = 0.46 web/m^2 A.C. = 22000, Full load efficiency = 0.83 Full load P.f. = 0.84
   3) Determine the main dimension for a 1000 KVA, 50 Hz, 3-ph, 375 rpm alternator. The average air gap flux density is 0.55 Wb/m^2 and the ampere conductor per meter are 28000. Use rectangular pole and assume suitable value for ratio of core length to pole pitch in order that bolted on pole construction is used for which the maximum permissible peripheral speed is 50 m/s. the runaway speed is 1.8 times the synchronous speed.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**

   1) Explain clearly double revolving field theory of single phase induction. Find expression for backward slip.

   2) A 3-ph, 50 Hz, oil cooled core type transformer has the following dimension : distance between core centers = 0.2 m, height of window = 0.24m, diameter of circumscribing circle = 0.14m. The flux density in the core is 1.25 Wb/m^2 and the current density in the conductor is 2.5 A/mm^2. Estimate the KVA rating. Assume window space factor of 0.2 and the core is 2 stepped.

   3) Why synchronous motor is not self-starting list the different methods of starting synchronous motor ?

   4) Derive an expression for power in case of smooth cylindrical rotor synchronous machine.

   5) Draw and explain equivalent circuit of single phase induction motor referred to stator on the basis of double revolving field theory.

5. Solve **any two** questions : **(2×10=20)**

   1) For 2500 KVA, 3.3 KV, 32 poles 50 Hz find 1) Dia. D 2) Length L 3) Peripheral speed Sp. Electric loading = 30,000 specific magnetic loading = 0.68 web/m^2 ratio of pole are to pole pitch is 0.65.

   2) In the design of a 30 HP, 3-ph, 440 V. 960 rpm, 50 Hz. Delta connected induction motor. Assume specific electric loading of 25000 ac/m and specific magnetic loading of 0.46 Wb/m^3 full load efficiency 86% and power factor 0.87. Estimate :

      1) Diameter of stator bore
      2) Length of stator core
      3) Peripheral velocity
      4) Turns per phase
      5) Slot pitch.

   3) With neat circuit diagram and vector diagram, explain how torque is produced in capacitor split phase single phase induction motor ?

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SLR-EP – 372

Seat No.	

Set **P**

B.E. (Electrical Engg.) (Part – I) (Old) Examination, 2016
POWER PLANT ENGINEERING

Day and Date : Thursday, 15-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Assume the suitable data ***whenever*** *necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Solve the following : **(20×1=20)**

1) The main function of economizer of a boiler plant is to
   a) Increase steam production b) Reduce fuel consumption
   c) Increase steam pressure d) Increase life of the boiler

2) A graphical representation between discharge and time is known as
   a) Monograph b) Hectograph c) Topograph d) Hydrograph

3) Which of the following enters the super heater of a boiler ?
   a) Cold water b) Hot water
   c) Wet steam d) Super-heated steam

4) In which of the following power plant the availability of power is least reliable
   a) Solar power plant b) Wind energy
   c) Tidal power plant d) Geothermal power plant

5) The equipment installed in power plants to reduce air pollution due to smoke is
   a) Induced draft fans b) De-super heaters
   c) Electrostatic precipitators d) Re-heaters

6) Particles having the same atomic number but different mass numbers are called
   a) Positrons b) Beta particles
   c) Isotopes d) Decayed panicles

7) Water is supplied to a boiler
   a) at atmospheric pressure
   b) at slightly more than atmospheric pressure
   c) at 100 cm/kg^2
   d) at more than the steam pressure on the boiler

8) Which of the following is a disadvantage of most of the renewable energy sources ?
   a) Highly polluting b) High waste disposal cost
   c) Unreliable supply d) High running cost

P.T.O.

9) Cost of operation of which plant is least ?
   a) Hydroelectric plant
   b) Thermal power plant
   c) Nuclear power plant
   d) Gas turbine plant

10) How many kg of air are required for the combustion of one kg of diesel fuel ?
   a) 1 kg
   b) 15 kg
   c) 4 kg
   d) 1.3 kg

11) Super heated steam is always
   a) at a temperature higher than the saturation temperature corresponding to a steam pressure
   b) at a pressure more than the boiler steam pressure
   c) separated from water particles before being supplied to turbine
   d) at a pressure less than the maximum cycle pressure

12) Geothermal energy is
   a) a renewable energy resource
   b) alternative energy source
   c) inexhaustible energy source
   d) none of the above

13) Running away speed of a Pelton wheel is
   a) Actual operating speed on no load
   b) Full load speed
   c) No load speed when governor mechanism fails
   d) 90% greater than the normal speed

14) A fuel cell, in order to produce electricity, burns :
   a) Helium
   b) Nitrogen
   c) Hydrogen
   d) None of the above

15) Photovoltaic solar energy conversion system makes use of
   a) fuel cell
   b) solar cell
   c) solar pond
   d) none of the above

16) Low grade fuels have
   a) low moisture content
   b) low ash content
   c) low calorific value
   d) low carbon content

17) Dam : Hydro plant ::
   a) Chimney : Gases
   b) Reactor : Nuclear plant
   c) Gas turbine : Steam turbine
   d) Coal : Steam plant

18) A Kaplan turbine is
   a) An reaction turbine, outward flow type
   b) An impulse turbine, inward flow type
   c) A high head mixed flow turbine
   d) Low head axial flow turbine

19) The total power of a wind stream is proportional to
   a) velocity of stream
   b) $(\text{velocity of stream})^2$
   c) $(\text{velocity of stream})^3$
   d) 1/(velocity of stream)

20) In Kaplan turbine runner, the number of blades is usually of the order of
   a) 16 – 24
   b) 8 – 10
   c) 6 – 8
   d) 3 – 6

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SLR-EP – 372

Seat No.	

B.E. (Electrical Engg.) (Part – I) (Old) Examination, 2016
POWER PLANT ENGINEERING

Day and Date : Thursday, 15-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Assume the suitable data **whenever** necessary.*

SECTION – I

2. Solve **any four** : **20**
   1) Define the following.
      Load factor, utilization factor, average demand, and connected load.
   2) State different types of boilers and explain any one among them.
   3) Explain with a neat plots the thermodynamics cycle related to power plant.
   4) With neat sketch explain horizontal axis wind mill.
   5) What do you understand by load curve ? What information's are conveyed by a load curve ?

3. Solve **any two** : **20**
   1) Explain in brief different types of tariff.
   2) With neat sketches explain briefly the Tidal power plant and Geo thermal power plant.
   3) Explain different methods to calculate the efficiency of boiler.

SECTION – II

4. Solve **any four** : **20**
   1) Write short note on condenser and cooling tower system.
   2) Explain Run off, steam flow, hydro graph and flow duration curve in hydro power plant.
   3) Discuss the harmful effect of emission and steps taken for and their impact.
   4) Draw any two types of Hydro turbines.
   5) What are different factors to be considered for site selection of nuclear power plant ?

5. Solve **any two** : **20**
   1) With a neat diagram explain PWR type and BWR type reactor.
   2) With brief layout explain diesel power plant.
   3) Discuss the different areas responsible for environmental pollution.

Set P

Set P

SLR-EP – 372

Seat No.	

Set **Q**

B.E. (Electrical Engg.) (Part – I) (Old) Examination, 2016
POWER PLANT ENGINEERING

Day and Date : Thursday, 15-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Assume the suitable data ***whenever*** *necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Solve the following : **(20×1=20)**

1) Low grade fuels have
   a) low moisture content b) low ash content
   c) low calorific value d) low carbon content

2) Dam : Hydro plant ::
   a) Chimney : Gases b) Reactor : Nuclear plant
   c) Gas turbine : Steam turbine d) Coal : Steam plant

3) A Kaplan turbine is
   a) An reaction turbine, outward flow type b) An impulse turbine, inward flow type
   c) A high head mixed flow turbine d) Low head axial flow turbine

4) The total power of a wind stream is proportional to
   a) velocity of stream b) $(\text{velocity of stream})^2$
   c) $(\text{velocity of stream})^3$ d) 1/(velocity of stream)

5) In Kaplan turbine runner, the number of blades is usually of the order of
   a) 16 – 24 b) 8 – 10 c) 6 – 8 d) 3 – 6

6) The main function of economizer of a boiler plant is to
   a) Increase steam production b) Reduce fuel consumption
   c) Increase steam pressure d) Increase life of the boiler

7) A graphical representation between discharge and time is known as
   a) Monograph b) Hectograph c) Topograph d) Hydrograph

8) Which of the following enters the super heater of a boiler ?
   a) Cold water b) Hot water
   c) Wet steam d) Super-heated steam

9) In which of the following power plant the availability of power is least reliable
   a) Solar power plant b) Wind energy
   c) Tidal power plant d) Geothermal power plant

P.T.O.

10) The equipment installed in power plants to reduce air pollution due to smoke is
a) Induced draft fans b) De-super heaters
c) Electrostatic precipitators d) Re-heaters

11) Particles having the same atomic number but different mass numbers are called
a) Positrons b) Beta particles
c) Isotopes d) Decayed panicles

12) Water is supplied to a boiler
a) at atmospheric pressure
b) at slightly more than atmospheric pressure
c) at 100 cm/kg^2
d) at more than the steam pressure on the boiler

13) Which of the following is a disadvantage of most of the renewable energy sources ?
a) Highly polluting b) High waste disposal cost
c) Unreliable supply d) High running cost

14) Cost of operation of which plant is least ?
a) Hydroelectric plant b) Thermal power plant
c) Nuclear power plant d) Gas turbine plant

15) How many kg of air are required for the combustion of one kg of diesel fuel ?
a) 1 kg b) 15 kg c) 4 kg d) 1.3 kg

16) Super heated steam is always
a) at a temperature higher than the saturation temperature corresponding to a steam pressure
b) at a pressure more than the boiler steam pressure
c) separated from water particles before being supplied to turbine
d) at a pressure less than the maximum cycle pressure

17) Geothermal energy is
a) a renewable energy resource b) alternative energy source
c) inexhaustible energy source d) none of the above

18) Running away speed of a Pelton wheel is
a) Actual operating speed on no load
b) Full load speed
c) No load speed when governor mechanism fails
d) 90% greater than the normal speed

19) A fuel cell, in order to produce electricity, burns :
a) Helium b) Nitrogen
c) Hydrogen d) None of the above

20) Photovoltaic solar energy conversion system makes use of
a) fuel cell b) solar cell
c) solar pond d) none of the above

———————

SLR-EP – 372

Seat No.	

B.E. (Electrical Engg.) (Part – I) (Old) Examination, 2016
POWER PLANT ENGINEERING

Day and Date : Thursday, 15-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Assume the suitable data **whenever** necessary.*

SECTION – I

2. Solve **any four** : **20**
   1) Define the following.
      Load factor, utilization factor, average demand, and connected load.
   2) State different types of boilers and explain any one among them.
   3) Explain with a neat plots the thermodynamics cycle related to power plant.
   4) With neat sketch explain horizontal axis wind mill.
   5) What do you understand by load curve ? What information's are conveyed by a load curve ?

3. Solve **any two** : **20**
   1) Explain in brief different types of tariff.
   2) With neat sketches explain briefly the Tidal power plant and Geo thermal power plant.
   3) Explain different methods to calculate the efficiency of boiler.

SECTION – II

4. Solve **any four** : **20**
   1) Write short note on condenser and cooling tower system.
   2) Explain Run off, steam flow, hydro graph and flow duration curve in hydro power plant.
   3) Discuss the harmful effect of emission and steps taken for and their impact.
   4) Draw any two types of Hydro turbines.
   5) What are different factors to be considered for site selection of nuclear power plant ?

5. Solve **any two** : **20**
   1) With a neat diagram explain PWR type and BWR type reactor.
   2) With brief layout explain diesel power plant.
   3) Discuss the different areas responsible for environmental pollution.

Set Q

Set Q

SLR-EP – 372

Seat No.	

Set **R**

B.E. (Electrical Engg.) (Part – I) (Old) Examination, 2016
POWER PLANT ENGINEERING

Day and Date : Thursday, 15-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Assume the suitable data ***whenever*** *necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Solve the following : **(20×1=20)**

1) Super heated steam is always
   a) at a temperature higher than the saturation temperature corresponding to a steam pressure
   b) at a pressure more than the boiler steam pressure
   c) separated from water particles before being supplied to turbine
   d) at a pressure less than the maximum cycle pressure

2) Geothermal energy is
   a) a renewable energy resource
   b) alternative energy source
   c) inexhaustible energy source
   d) none of the above

3) Running away speed of a Pelton wheel is
   a) Actual operating speed on no load
   b) Full load speed
   c) No load speed when governor mechanism fails
   d) 90% greater than the normal speed

4) A fuel cell, in order to produce electricity, burns :
   a) Helium
   b) Nitrogen
   c) Hydrogen
   d) None of the above

5) Photovoltaic solar energy conversion system makes use of
   a) fuel cell
   b) solar cell
   c) solar pond
   d) none of the above

6) Low grade fuels have
   a) low moisture content
   b) low ash content
   c) low calorific value
   d) low carbon content

7) Dam : Hydro plant ::
   a) Chimney : Gases
   b) Reactor : Nuclear plant
   c) Gas turbine : Steam turbine
   d) Coal : Steam plant

P.T.O.

8) A Kaplan turbine is
   a) An reaction turbine, outward flow type
   b) An impulse turbine, inward flow type
   c) A high head mixed flow turbine
   d) Low head axial flow turbine

9) The total power of a wind stream is proportional to
   a) velocity of stream
   b) (velocity of stream)^2
   c) (velocity of stream)^3
   d) 1/(velocity of stream)

10) In Kaplan turbine runner, the number of blades is usually of the order of
   a) 16 – 24 b) 8 – 10 c) 6 – 8 d) 3 – 6

11) The main function of economizer of a boiler plant is to
   a) Increase steam production
   b) Reduce fuel consumption
   c) Increase steam pressure
   d) Increase life of the boiler

12) A graphical representation between discharge and time is known as
   a) Monograph b) Hectograph c) Topograph d) Hydrograph

13) Which of the following enters the super heater of a boiler ?
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   b) Hot water
   c) Wet steam
   d) Super-heated steam

14) In which of the following power plant the availability of power is least reliable
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   b) Wind energy
   c) Tidal power plant
   d) Geothermal power plant

15) The equipment installed in power plants to reduce air pollution due to smoke is
   a) Induced draft fans
   b) De-super heaters
   c) Electrostatic precipitators
   d) Re-heaters

16) Particles having the same atomic number but different mass numbers are called
   a) Positrons
   b) Beta particles
   c) Isotopes
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17) Water is supplied to a boiler
   a) at atmospheric pressure
   b) at slightly more than atmospheric pressure
   c) at 100 cm/kg^2
   d) at more than the steam pressure on the boiler

18) Which of the following is a disadvantage of most of the renewable energy sources ?
   a) Highly polluting
   b) High waste disposal cost
   c) Unreliable supply
   d) High running cost

19) Cost of operation of which plant is least ?
   a) Hydroelectric plant
   b) Thermal power plant
   c) Nuclear power plant
   d) Gas turbine plant

20) How many kg of air are required for the combustion of one kg of diesel fuel ?
   a) 1 kg b) 15 kg c) 4 kg d) 1.3 kg

SLR-EP – 372

Seat No.	

B.E. (Electrical Engg.) (Part – I) (Old) Examination, 2016
POWER PLANT ENGINEERING

Day and Date : Thursday, 15-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

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SECTION – I

2. Solve **any four** : **20**
   1) Define the following.
      Load factor, utilization factor, average demand, and connected load.
   2) State different types of boilers and explain any one among them.
   3) Explain with a neat plots the thermodynamics cycle related to power plant.
   4) With neat sketch explain horizontal axis wind mill.
   5) What do you understand by load curve ? What information's are conveyed by a load curve ?

3. Solve **any two** : **20**
   1) Explain in brief different types of tariff.
   2) With neat sketches explain briefly the Tidal power plant and Geo thermal power plant.
   3) Explain different methods to calculate the efficiency of boiler.

SECTION – II

4. Solve **any four** : **20**
   1) Write short note on condenser and cooling tower system.
   2) Explain Run off, steam flow, hydro graph and flow duration curve in hydro power plant.
   3) Discuss the harmful effect of emission and steps taken for and their impact.
   4) Draw any two types of Hydro turbines.
   5) What are different factors to be considered for site selection of nuclear power plant ?

5. Solve **any two** : **20**
   1) With a neat diagram explain PWR type and BWR type reactor.
   2) With brief layout explain diesel power plant.
   3) Discuss the different areas responsible for environmental pollution.

Set R

Set R

SLR-EP – 372

Seat No.	

Set **S**

B.E. (Electrical Engg.) (Part – I) (Old) Examination, 2016
POWER PLANT ENGINEERING

Day and Date : Thursday, 15-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Assume the suitable data ***whenever*** *necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Solve the following : **(20×1=20)**

1) Particles having the same atomic number but different mass numbers are called
   a) Positrons b) Beta particles
   c) Isotopes d) Decayed panicles

2) Water is supplied to a boiler
   a) at atmospheric pressure
   b) at slightly more than atmospheric pressure
   c) at 100 cm/kg^2
   d) at more than the steam pressure on the boiler

3) Which of the following is a disadvantage of most of the renewable energy sources ?
   a) Highly polluting b) High waste disposal cost
   c) Unreliable supply d) High running cost

4) Cost of operation of which plant is least ?
   a) Hydroelectric plant b) Thermal power plant
   c) Nuclear power plant d) Gas turbine plant

5) How many kg of air are required for the combustion of one kg of diesel fuel ?
   a) 1 kg b) 15 kg c) 4 kg d) 1.3 kg

6) Super heated steam is always
   a) at a temperature higher than the saturation temperature corresponding to a steam pressure
   b) at a pressure more than the boiler steam pressure
   c) separated from water particles before being supplied to turbine
   d) at a pressure less than the maximum cycle pressure

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   c) inexhaustible energy source d) none of the above

P.T.O.

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   a) Actual operating speed on no load
   b) Full load speed
   c) No load speed when governor mechanism fails
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9) A fuel cell, in order to produce electricity, burns :
   a) Helium b) Nitrogen
   c) Hydrogen d) None of the above

10) Photovoltaic solar energy conversion system makes use of
   a) fuel cell b) solar cell
   c) solar pond d) none of the above

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   a) low moisture content b) low ash content
   c) low calorific value d) low carbon content

12) Dam : Hydro plant ::
   a) Chimney : Gases b) Reactor : Nuclear plant
   c) Gas turbine : Steam turbine d) Coal : Steam plant

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   a) An reaction turbine, outward flow type b) An impulse turbine, inward flow type
   c) A high head mixed flow turbine d) Low head axial flow turbine

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   a) velocity of stream b) $(\text{velocity of stream})^2$
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15) In Kaplan turbine runner, the number of blades is usually of the order of
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16) The main function of economizer of a boiler plant is to
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   c) Increase steam pressure d) Increase life of the boiler

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18) Which of the following enters the super heater of a boiler ?
   a) Cold water b) Hot water
   c) Wet steam d) Super-heated steam

19) In which of the following power plant the availability of power is least reliable
   a) Solar power plant b) Wind energy
   c) Tidal power plant d) Geothermal power plant

20) The equipment installed in power plants to reduce air pollution due to smoke is
   a) Induced draft fans b) De-super heaters
   c) Electrostatic precipitators d) Re-heaters

———————

SLR-EP – 372

Seat No.	

B.E. (Electrical Engg.) (Part – I) (Old) Examination, 2016
POWER PLANT ENGINEERING

Day and Date : Thursday, 15-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Assume the suitable data **whenever** necessary.*

SECTION – I

2. Solve **any four** : **20**
   1) Define the following.
      Load factor, utilization factor, average demand, and connected load.
   2) State different types of boilers and explain any one among them.
   3) Explain with a neat plots the thermodynamics cycle related to power plant.
   4) With neat sketch explain horizontal axis wind mill.
   5) What do you understand by load curve ? What information's are conveyed by a load curve ?

3. Solve **any two** : **20**
   1) Explain in brief different types of tariff.
   2) With neat sketches explain briefly the Tidal power plant and Geo thermal power plant.
   3) Explain different methods to calculate the efficiency of boiler.

SECTION – II

4. Solve **any four** : **20**
   1) Write short note on condenser and cooling tower system.
   2) Explain Run off, steam flow, hydro graph and flow duration curve in hydro power plant.
   3) Discuss the harmful effect of emission and steps taken for and their impact.
   4) Draw any two types of Hydro turbines.
   5) What are different factors to be considered for site selection of nuclear power plant ?

5. Solve **any two** : **20**
   1) With a neat diagram explain PWR type and BWR type reactor.
   2) With brief layout explain diesel power plant.
   3) Discuss the different areas responsible for environmental pollution.

Set S

Set S

SLR-EP – 506

Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – I) Examination, 2016
Elective – I : PLC AND SCADA

Day and Date : Tuesday, 6-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Make ***suitable*** *assumptions* ***if necessary****.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) PLCs are _____ designed for use in the control of a wide variety of manufacturing machines and systems
   a) Special-purpose industrial computers b) Personal computers
   c) Electromechanical systems d) All of the above

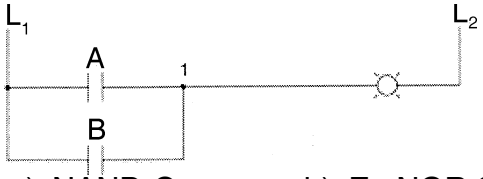
2) PLC stands for
   a) Programmable Logo Controller b) Programmed Latching Circuit
   c) Programmable Logic Controller d) Pneumatic Latching Circuit

3) The PLC was invented by
   a) Bills Gates b) Dick Morley c) Bill Landis d) Tod Cunningham

4) SCAN Cycle time of PLC is in
   a) Hour b) Minute c) Millisecond d) Sec.

5) _____ instructions is used to program a time delay to begin after rung input goes false.
   a) ON delay timer b) Off delay timer c) Pulse timer d) Repetitive timer

6) Figure shows the ladder logic for



   a) NAND Gate b) Ex-NOR Gate c) Ex-OR Gate d) OR Gate

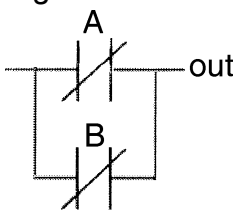
7) The term reset control refers to
   a) Proportional b) Integral c) Derivative d) None of the above

P.T.O.

8) The integral control
   a) Increases the steady state error b) Decreases the steady state error
   c) Increases the noise and stability d) Decreases the damping coefficient

9) What type of application curve used inside VFD to operate cooling tower fan correctly ?
   a) Constant torque b) Variable torque c) Constant power d) Variable power

10) Figure shows the ladder logic for



   a) NAND Gate b) Ex-NOR Gate c) Ex-OR Gate d) NOR Gate

11) TCP/IP model does not have _____ layer but OSI model have this layer.
   a) Session layer b) Presentation layer
   c) Application layer d) Both a) and b)

12) Which layer links the network support layers and user support layers ?
   a) Session layer b) Data link layer c) Transport layer d) Network layer

13) Which of the following are layers in the TCP/IP model ?
   1. Application 2. Session 3. Transport
   4. Internet 5. Data Link 6. Physical
   a) 1 and 2 b) 1, 3 and 4 c) 2, 3 and 5 d) 3, 4 and 5

14) Which layer 4 protocols is used for a Telnet connection ?
   a) IP b) TCP c) TCP/IP d) UDP

15) _____ have always been used in situations where the communication are more difficult.
   a) RTU b) PLC c) MTU d) HMI

16) _____ is usually a form of a parallel resonant circuit in PLCC.
   a) Line trap Unit b) Line Tuners c) Coupling circuit d) Power amplifier

17) Data Collection and Data Transfer is the function of
   a) SCADA software b) SCADA hardware
   c) a) and b) d) None of the above

18) In SCADA Evolution 1990 system called
   a) EMS b) DCS
   c) Energy control centre d) LDS

19) In OSI model layer No. 4 consist of
   a) Physical layer b) Data link layer
   c) Network layer d) Transport layer

20) In TCP/IP model layer No. 2 consist of
   a) Application b) Transport c) Internet d) Network Access

_____

SLR-EP – 506

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2016
Elective – I : PLC AND SCADA

Day and Date : Tuesday, 6-12-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) **All** questions are **compulsory**.*

*2) Make **suitable** assumptions **if necessary**.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) State and explain advantages and disadvantages of PLC.

b) What are the different programming languages used in PLC ? Explain each in detail.

c) Write a short note on input module.

d) Explain Input ON/OFF and Analog devices in detail.

e) Explain speed control of DC motor with DC Source.

f) Write a short note on Variable Frequency Drive.

3. Solve **any two** : **(10×2=20)**

a) What is PID tuning ? What are the different methods of PID tuning ? Explain each in detail.

b) Develop the PLC Ladder logic and Relay Logic for

1) Forward Stop Reverse Starter

2) Forward-Reverse Starter.

c) When the lights are turned off in a building, an exit door light is to remain on for an additional 42 seconds. In Addition the parking lot light are to remain on for an additional 3 minutes after the door light goes out.

Develop PLC Ladder logic and Relay Logic for above problem.

SECTION – II

4. Solve **any four** : **(5×4=20)**

   a) Draw and explain SCADA architecture in detail.

   b) Explain Second generation SCADA architecture.

   c) Explain IEC61850 layered architecture protocol.

   d) Explain SCADA data transfer through PLCC.

   e) What Ethernet / IP Protocol ?

   f) Write a short note on EMS.

5. Solve **any two** : **(10×2=20)**

   a) What is open system Interconnection Protocols ? Explain function of each layer in detail. What is the difference between OSI and TCP/ IP Model.

   b) Explain how SCADA system is used in electric power generation.

   c) Draw and explain SCADA system in water purification system.

SLR-EP – 506

Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – I) Examination, 2016
Elective – I : PLC AND SCADA

Day and Date : Tuesday, 6-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Make ***suitable*** *assumptions* ***if necessary****.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) _____ is usually a form of a parallel resonant circuit in PLCC.
a) Line trap Unit b) Line Tuners c) Coupling circuit d) Power amplifier

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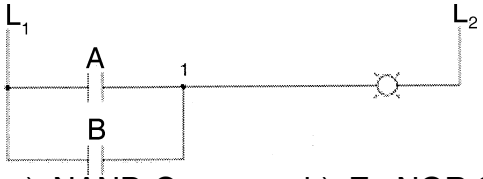

a) NAND Gate b) Ex-NOR Gate c) Ex-OR Gate d) OR Gate

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a) Proportional b) Integral c) Derivative d) None of the above

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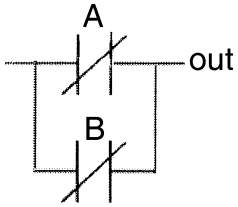

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SLR-EP – 506

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2016
Elective – I : PLC AND SCADA

Day and Date : Tuesday, 6-12-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) **All** questions are **compulsory**.*

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SECTION – I

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a) State and explain advantages and disadvantages of PLC.

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1) Forward Stop Reverse Starter

2) Forward-Reverse Starter.

c) When the lights are turned off in a building, an exit door light is to remain on for an additional 42 seconds. In Addition the parking lot light are to remain on for an additional 3 minutes after the door light goes out.

Develop PLC Ladder logic and Relay Logic for above problem.

SECTION – II

4. Solve **any four** : **(5×4=20)**

   a) Draw and explain SCADA architecture in detail.

   b) Explain Second generation SCADA architecture.

   c) Explain IEC61850 layered architecture protocol.

   d) Explain SCADA data transfer through PLCC.

   e) What Ethernet / IP Protocol ?

   f) Write a short note on EMS.

5. Solve **any two** : **(10×2=20)**

   a) What is open system Interconnection Protocols ? Explain function of each layer in detail. What is the difference between OSI and TCP/ IP Model.

   b) Explain how SCADA system is used in electric power generation.

   c) Draw and explain SCADA system in water purification system.

SLR-EP – 506

Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – I) Examination, 2016
Elective – I : PLC AND SCADA

Day and Date : Tuesday, 6-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Make ***suitable*** *assumptions* ***if necessary****.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) TCP/IP model does not have _____ layer but OSI model have this layer.
   a) Session layer b) Presentation layer
   c) Application layer d) Both a) and b)

2) Which layer links the network support layers and user support layers ?
   a) Session layer b) Data link layer c) Transport layer d) Network layer

3) Which of the following are layers in the TCP/IP model ?
   1. Application 2. Session 3. Transport
   4. Internet 5. Data Link 6. Physical
   a) 1 and 2 b) 1, 3 and 4 c) 2, 3 and 5 d) 3, 4 and 5

4) Which layer 4 protocols is used for a Telnet connection ?
   a) IP b) TCP c) TCP/IP d) UDP

5) _____ have always been used in situations where the communication are more difficult.
   a) RTU b) PLC c) MTU d) HMI

6) _____ is usually a form of a parallel resonant circuit in PLCC.
   a) Line trap Unit b) Line Tuners c) Coupling circuit d) Power amplifier

7) Data Collection and Data Transfer is the function of
   a) SCADA software b) SCADA hardware
   c) a) and b) d) None of the above

8) In SCADA Evolution 1990 system called
   a) EMS b) DCS
   c) Energy control centre d) LDS

9) In OSI model layer No. 4 consist of
   a) Physical layer b) Data link layer
   c) Network layer d) Transport layer

10) In TCP/IP model layer No. 2 consist of
   a) Application b) Transport c) Internet d) Network Access

11) PLCs are _____ designed for use in the control of a wide variety of manufacturing machines and systems
   a) Special-purpose industrial computers b) Personal computers
   c) Electromechanical systems d) All of the above

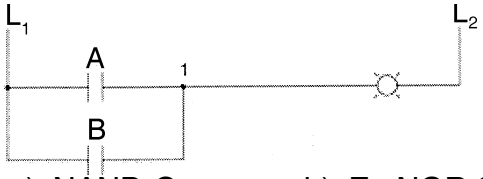
12) PLC stands for
   a) Programmable Logo Controller b) Programmed Latching Circuit
   c) Programmable Logic Controller d) Pneumatic Latching Circuit

13) The PLC was invented by
   a) Bills Gates b) Dick Morley c) Bill Landis d) Tod Cunningham

14) SCAN Cycle time of PLC is in
   a) Hour b) Minute c) Millisecond d) Sec.

15) _____ instructions is used to program a time delay to begin after rung input goes false.
   a) ON delay timer b) Off delay timer c) Pulse timer d) Repetitive timer

16) Figure shows the ladder logic for



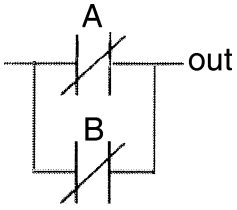
   a) NAND Gate b) Ex-NOR Gate c) Ex-OR Gate d) OR Gate

17) The term reset control refers to
   a) Proportional b) Integral c) Derivative d) None of the above

18) The integral control
   a) Increases the steady state error b) Decreases the steady state error
   c) Increases the noise and stability d) Decreases the damping coefficient

19) What type of application curve used inside VFD to operate cooling tower fan correctly ?
   a) Constant torque b) Variable torque c) Constant power d) Variable power

20) Figure shows the ladder logic for



   a) NAND Gate b) Ex-NOR Gate c) Ex-OR Gate d) NOR Gate

_____

SLR-EP – 506

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2016
Elective – I : PLC AND SCADA

Day and Date : Tuesday, 6-12-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) **All** questions are **compulsory**.*

*2) Make **suitable** assumptions **if necessary**.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) State and explain advantages and disadvantages of PLC.

b) What are the different programming languages used in PLC ? Explain each in detail.

c) Write a short note on input module.

d) Explain Input ON/OFF and Analog devices in detail.

e) Explain speed control of DC motor with DC Source.

f) Write a short note on Variable Frequency Drive.

3. Solve **any two** : **(10×2=20)**

a) What is PID tuning ? What are the different methods of PID tuning ? Explain each in detail.

b) Develop the PLC Ladder logic and Relay Logic for

1) Forward Stop Reverse Starter

2) Forward-Reverse Starter.

c) When the lights are turned off in a building, an exit door light is to remain on for an additional 42 seconds. In Addition the parking lot light are to remain on for an additional 3 minutes after the door light goes out.

Develop PLC Ladder logic and Relay Logic for above problem.

SECTION – II

4. Solve **any four** : **(5×4=20)**

   a) Draw and explain SCADA architecture in detail.

   b) Explain Second generation SCADA architecture.

   c) Explain IEC61850 layered architecture protocol.

   d) Explain SCADA data transfer through PLCC.

   e) What Ethernet / IP Protocol ?

   f) Write a short note on EMS.

5. Solve **any two** : **(10×2=20)**

   a) What is open system Interconnection Protocols ? Explain function of each layer in detail. What is the difference between OSI and TCP/ IP Model.

   b) Explain how SCADA system is used in electric power generation.

   c) Draw and explain SCADA system in water purification system.

SLR-EP – 506

Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – I) Examination, 2016
Elective – I : PLC AND SCADA

Day and Date : Tuesday, 6-12-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

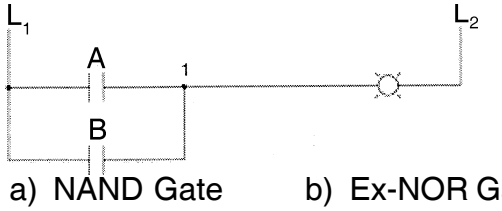
Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Make ***suitable*** *assumptions* ***if necessary****.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Figure shows the ladder logic for



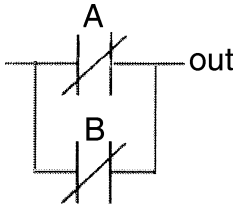
a) NAND Gate b) Ex-NOR Gate c) Ex-OR Gate d) OR Gate

2) The term reset control refers to
a) Proportional b) Integral c) Derivative d) None of the above

3) The integral control
a) Increases the steady state error b) Decreases the steady state error
c) Increases the noise and stability d) Decreases the damping coefficient

4) What type of application curve used inside VFD to operate cooling tower fan correctly ?
a) Constant torque b) Variable torque c) Constant power d) Variable power

5) Figure shows the ladder logic for



a) NAND Gate b) Ex-NOR Gate c) Ex-OR Gate d) NOR Gate

6) TCP/IP model does not have _____ layer but OSI model have this layer.
a) Session layer b) Presentation layer
c) Application layer d) Both a) and b)

P.T.O.

7) Which layer links the network support layers and user support layers ?
   a) Session layer b) Data link layer c) Transport layer d) Network layer

8) Which of the following are layers in the TCP/IP model ?
   1. Application 2. Session 3. Transport
   4. Internet 5. Data Link 6. Physical
   a) 1 and 2 b) 1, 3 and 4 c) 2, 3 and 5 d) 3, 4 and 5

9) Which layer 4 protocols is used for a Telnet connection ?
   a) IP b) TCP c) TCP/IP d) UDP

10) _____ have always been used in situations where the communication are more difficult.
   a) RTU b) PLC c) MTU d) HMI

11) _____ is usually a form of a parallel resonant circuit in PLCC.
   a) Line trap Unit b) Line Tuners c) Coupling circuit d) Power amplifier

12) Data Collection and Data Transfer is the function of
   a) SCADA software b) SCADA hardware
   c) a) and b) d) None of the above

13) In SCADA Evolution 1990 system called
   a) EMS b) DCS
   c) Energy control centre d) LDS

14) In OSI model layer No. 4 consist of
   a) Physical layer b) Data link layer
   c) Network layer d) Transport layer

15) In TCP/IP model layer No. 2 consist of
   a) Application b) Transport c) Internet d) Network Access

16) PLCs are _____ designed for use in the control of a wide variety of manufacturing machines and systems
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17) PLC stands for
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   c) Programmable Logic Controller d) Pneumatic Latching Circuit

18) The PLC was invented by
   a) Bills Gates b) Dick Morley c) Bill Landis d) Tod Cunningham

19) SCAN Cycle time of PLC is in
   a) Hour b) Minute c) Millisecond d) Sec.

20) _____ instructions is used to program a time delay to begin after rung input goes false.
   a) ON delay timer b) Off delay timer c) Pulse timer d) Repetitive timer

_____

SLR-EP – 506

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2016
Elective – I : PLC AND SCADA

Day and Date : Tuesday, 6-12-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) **All** questions are **compulsory**.*

*2) Make **suitable** assumptions **if necessary**.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

a) State and explain advantages and disadvantages of PLC.

b) What are the different programming languages used in PLC ? Explain each in detail.

c) Write a short note on input module.

d) Explain Input ON/OFF and Analog devices in detail.

e) Explain speed control of DC motor with DC Source.

f) Write a short note on Variable Frequency Drive.

3. Solve **any two** : **(10×2=20)**

a) What is PID tuning ? What are the different methods of PID tuning ? Explain each in detail.

b) Develop the PLC Ladder logic and Relay Logic for

1) Forward Stop Reverse Starter

2) Forward-Reverse Starter.

c) When the lights are turned off in a building, an exit door light is to remain on for an additional 42 seconds. In Addition the parking lot light are to remain on for an additional 3 minutes after the door light goes out.

Develop PLC Ladder logic and Relay Logic for above problem.

SECTION – II

4. Solve **any four** : **(5×4=20)**

   a) Draw and explain SCADA architecture in detail.

   b) Explain Second generation SCADA architecture.

   c) Explain IEC61850 layered architecture protocol.

   d) Explain SCADA data transfer through PLCC.

   e) What Ethernet / IP Protocol ?

   f) Write a short note on EMS.

5. Solve **any two** : **(10×2=20)**

   a) What is open system Interconnection Protocols ? Explain function of each layer in detail. What is the difference between OSI and TCP/ IP Model.

   b) Explain how SCADA system is used in electric power generation.

   c) Draw and explain SCADA system in water purification system.

SLR-EP – 507

Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – I) Examination, 2016
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) ***All*** *questions are* ***compulsory****.*
2) *Figures to* ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *necessary data* ***if necessary****.*
4) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) A discrete time signal has
   a) Continuous time continuous amplitude
   b) Continuous time discrete amplitude
   c) Discrete time continuous amplitude
   d) Discrete time discrete amplitude

2) Circular convolution of the sequences x(n) = {1, 2, 1} and h(n) = {1, –2, 2} is
   a) {1, 2, 1} b) {3, 2, 1} c) {3, 2, –1} d) {3, 2, 2}

3) Additions are required to compute N point DFT
   a) N b) N(N –1) c) N^2 d) N^3

4) The magnitude response for DFT exhibits complex conjugate property if time sequence is
   a) a real sequence b) a complex sequence
   c) an imaginary sequence d) not a real sequence

5) Decimation in time FFT decimates
   a) Input sequence b) DFT coefficients
   c) Both sequence and DFT d) None

6) Circular convolution can be performed using the methods
   a) Concentric circle b) Matrix Multiplication
   c) Both a) and b) d) None of above

7) In DIF, the data x(n) is stored in _____ order.
   a) Reversed order b) Bit reversal c) Sequence order d) None

8) With zero padding DFT used as
   a) Circular filtering b) FFT calculations
   c) Linear filtering d) Overlap add method

P.T.O.

9) FFT algorithm calculates
   a) DTFT b) DCT c) DFT d) DST

10) The circular convolution can be converted to linear convolution for sequence x(n) of length L and sequence h(n) of length M by
   a) L + M – 1 b) L or m c) L + M + 1 d) None of the above

11) Convolution of ideal filter response and sync function results in
   a) Side Lobe oscillations b) Main Lobe oscillations
   c) Sharpening of a transition width d) Decrease in main lobe

12) Unwrapped phase response of FIR filter in pass band is
   a) Exponentially increasing b) Exponentially decreasing
   c) Non-linear d) Linear

13) When analog butter worth filter is converted to DT filter using Impulse Invariance Method, then
   a) Aliasing can be eliminated
   b) Aliasing is always present
   c) Aliasing can be reduced by reducing T
   d) Aliasing cannot be reduced by reducing T

14) Properties of butter worth low pass filter is given by
   a) The poles of butter worth filter lies on a circle
   b) The poles of butter worth filter lies outside the circle
   c) The poles of butter worth filter lies inside the circle
   d) Not a real sequence

15) The mapping for Impulse Invariance Method is
   a) Many to many mapping b) Many to one mapping
   c) One to one mapping d) None of above

16) The relation between Laplace transform and z-transform is
   a) $z = e^{st}$ b) $z = e^{jst}$ c) $s = e^{zt}$ d) $z = e^{-st}$

17) If impulse response of a system is over a finite duration, then it is
   a) Moving average system b) Auto regressive system
   c) ARMA system d) IIR system

18) The mapping for bilinear transformation is
   a) Many to many mapping b) Many to one mapping
   c) One to one mapping d) None of above

19) The impulse response of FIR system has a linear phase linear characteristics
   a) $\theta(\omega) = \alpha\omega$ b) $\theta(\omega) = -\frac{\partial\theta}{\partial\omega}$ c) $\theta(\omega) = -\alpha\omega$ d) None of above

20) FIR filter is also known as
   a) Cascade structure filter b) Transversal filter
   c) ARMA filter d) AR filter

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SLR-EP – 507

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2016
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *necessary data* ***if necessary****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

a) Explain the DSP systems.

b) Compute the correlation of given sequence h(n) = {1, 1, 1} and x(n) = {1, 2, 3, 1}.

c) Derive the relation between Z-Transform and DFT.

d) Find DFT of sequence x (n) = {1, 2, 3, 4}.

e) Derive the property of DFT multiplication in time domain.

f) Compute circular convolution.

$x_1(n) = \{2, 3, 1, 1\}$

$x_2(n) = \{1, 3, 5, 3\}$

3. Attempt **any two** : **(2×10=20)**

a) Given x(n) = {1, 2, 3, 4, 4, 3, 2, 1} and N = 8, find X(k) using DIF-FFT algorithm.

b) Determine the output of a linear FIR filter whose impulse response h(n) = {1, 2, 3} and the input signal x(n) = {1, 2, 3, 4, 5, 6, 7, 8, 9} using overlap save method, verify by linear convolution.

c) Compute the circular convolution of the following sequence x(n) = {1, 1, 2, 1} and h(n) = {1, 2, 3, 4}. Using DFT and IDFT method and compare the result with linear convolution.

SECTION – II

4. Solve **any four** : **(4×5=20)**

a) Explain in detail Fourier Series Design Method.

b) Explain the finite word length effect in FIR filter.

c) What is warping effect ? What is its effect on magnitude and phase response ?

d) Explain in detail Adaptive Signal Processing.

e) For given specification find the order of analog Butterworth filter

$0.9 \le |H(j\Omega)| \le 1$ for $0 \le \Omega \le 0.2\pi$

$|H(j\Omega)| \le 0.2$ for $0.4\pi \le \Omega \le \pi$

f) Compare analog and digital filters.

5. Solve **any two** : **(2×10=20)**

a) Design a ideal high pass filter with a frequency response

$Hd(e^{j\omega}) = 1$ for $\frac{\pi}{4} \le |\omega| \le \pi$

$= 0$ for $|\omega| \le \frac{\pi}{4}$

Find the values of h(n) for N = 11 and Find H(Z).

b) An analog filter has a transfer function H(s) = $\frac{10}{s^2 + 7s + 10}$. Design a digital filter equivalent to this using impulse invariant method for T = 0.2 Sec.

c) Using Bilinear transformation obtain H(z) if H(s) = $\frac{1}{(s+1)^2}$ and T = 0.1 Sec.

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SLR-EP – 507

Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – I) Examination, 2016
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *necessary data* ***if necessary****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The relation between Laplace transform and z-transform is
a) $z = e^{st}$ b) $z = e^{jst}$ c) $s = e^{zt}$ d) $z = e^{-st}$

2) If impulse response of a system is over a finite duration, then it is
a) Moving average system b) Auto regressive system
c) ARMA system d) IIR system

3) The mapping for bilinear transformation is
a) Many to many mapping b) Many to one mapping
c) One to one mapping d) None of above

4) The impulse response of FIR system has a linear phase linear characteristics
a) $\theta(\omega) = \alpha\omega$ b) $\theta(\omega) = -\frac{\partial\theta}{\partial\omega}$ c) $\theta(\omega) = -\alpha\omega$ d) None of above

5) FIR filter is also known as
a) Cascade structure filter b) Transversal filter
c) ARMA filter d) AR filter

6) A discrete time signal has
a) Continuous time continuous amplitude
b) Continuous time discrete amplitude
c) Discrete time continuous amplitude
d) Discrete time discrete amplitude

7) Circular convolution of the sequences x(n) = {1, 2, 1} and h(n) = {1, –2, 2} is
a) {1, 2, 1} b) {3, 2, 1} c) {3, 2, –1} d) {3, 2, 2}

8) Additions are required to compute N point DFT
a) N b) N(N –1) c) N^2 d) N^3

P.T.O.

9) The magnitude response for DFT exhibits complex conjugate property if time sequence is
   a) a real sequence b) a complex sequence
   c) an imaginary sequence d) not a real sequence

10) Decimation in time FFT decimates
   a) Input sequence b) DFT coefficients
   c) Both sequence and DFT d) None

11) Circular convolution can be performed using the methods
   a) Concentric circle b) Matrix Multiplication
   c) Both a) and b) d) None of above

12) In DIF, the data x(n) is stored in _____ order.
   a) Reversed order b) Bit reversal c) Sequence order d) None

13) With zero padding DFT used as
   a) Circular filtering b) FFT calculations
   c) Linear filtering d) Overlap add method

14) FFT algorithm calculates
   a) DTFT b) DCT c) DFT d) DST

15) The circular convolution can be converted to linear convolution for sequence x(n) of length L and sequence h(n) of length M by
   a) L + M – 1 b) L or m c) L + M + 1 d) None of the above

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18) When analog butter worth filter is converted to DT filter using Impulse Invariance Method, then
   a) Aliasing can be eliminated
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19) Properties of butter worth low pass filter is given by
   a) The poles of butter worth filter lies on a circle
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   d) Not a real sequence

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   a) Many to many mapping b) Many to one mapping
   c) One to one mapping d) None of above

_____

SLR-EP – 507

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2016
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *necessary data* ***if necessary****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

a) Explain the DSP systems.

b) Compute the correlation of given sequence h(n) = {1, 1, 1} and x(n) = {1, 2, 3, 1}.

c) Derive the relation between Z-Transform and DFT.

d) Find DFT of sequence x (n) = {1, 2, 3, 4}.

e) Derive the property of DFT multiplication in time domain.

f) Compute circular convolution.
$x_1(n) = \{2, 3, 1, 1\}$
$x_2(n) = \{1, 3, 5, 3\}$

3. Attempt **any two** : **(2×10=20)**

a) Given x(n) = {1, 2, 3, 4, 4, 3, 2, 1} and N = 8, find X(k) using DIF-FFT algorithm.

b) Determine the output of a linear FIR filter whose impulse response h(n) = {1, 2, 3} and the input signal x(n) = {1, 2, 3, 4, 5, 6, 7, 8, 9} using overlap save method, verify by linear convolution.

c) Compute the circular convolution of the following sequence x(n) = {1, 1, 2, 1} and h(n) = {1, 2, 3, 4}. Using DFT and IDFT method and compare the result with linear convolution.

SECTION – II

4. Solve **any four** : **(4×5=20)**

a) Explain in detail Fourier Series Design Method.

b) Explain the finite word length effect in FIR filter.

c) What is warping effect ? What is its effect on magnitude and phase response ?

d) Explain in detail Adaptive Signal Processing.

e) For given specification find the order of analog Butterworth filter

$0.9 \le |H(j\Omega)| \le 1 \quad$ for $\quad 0 \le \Omega \le 0.2\pi$

$|H(j\Omega)| \le 0.2 \quad$ for $\quad 0.4\pi \le \Omega \le \pi$

f) Compare analog and digital filters.

5. Solve **any two** : **(2×10=20)**

a) Design a ideal high pass filter with a frequency response

$$Hd(e^{j\omega}) = 1 \quad \text{for } \frac{\pi}{4} \le |\omega| \le \pi$$

$$= 0 \quad \text{for } |\omega| \le \frac{\pi}{4}$$

Find the values of h(n) for N = 11 and Find H(Z).

b) An analog filter has a transfer function H(s) = $\frac{10}{s^2 + 7s + 10}$. Design a digital filter equivalent to this using impulse invariant method for T = 0.2 Sec.

c) Using Bilinear transformation obtain H(z) if H(s) = $\frac{1}{(s+1)^2}$ and T = 0.1 Sec.

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SLR-EP – 507

Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – I) Examination, 2016
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *necessary data* ***if necessary****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Convolution of ideal filter response and sync function results in
   a) Side Lobe oscillations b) Main Lobe oscillations
   c) Sharpening of a transition width d) Decrease in main lobe

2) Unwrapped phase response of FIR filter in pass band is
   a) Exponentially increasing b) Exponentially decreasing
   c) Non-linear d) Linear

3) When analog butter worth filter is converted to DT filter using Impulse Invariance Method, then
   a) Aliasing can be eliminated
   b) Aliasing is always present
   c) Aliasing can be reduced by reducing T
   d) Aliasing cannot be reduced by reducing T

4) Properties of butter worth low pass filter is given by
   a) The poles of butter worth filter lies on a circle
   b) The poles of butter worth filter lies outside the circle
   c) The poles of butter worth filter lies inside the circle
   d) Not a real sequence

5) The mapping for Impulse Invariance Method is
   a) Many to many mapping b) Many to one mapping
   c) One to one mapping d) None of above

6) The relation between Laplace transform and z-transform is
   a) $z = e^{st}$ b) $z = e^{jst}$ c) $s = e^{zt}$ d) $z = e^{-st}$

7) If impulse response of a system is over a finite duration, then it is
   a) Moving average system b) Auto regressive system
   c) ARMA system d) IIR system

8) The mapping for bilinear transformation is
   a) Many to many mapping b) Many to one mapping
   c) One to one mapping d) None of above

9) The impulse response of FIR system has a linear phase linear characteristics
   a) $\theta(\omega) = \alpha\omega$ b) $\theta(\omega) = -\frac{\partial\theta}{\partial\omega}$ c) $\theta(\omega) = -\alpha\omega$ d) None of above

10) FIR filter is also known as
   a) Cascade structure filter b) Transversal filter
   c) ARMA filter d) AR filter

11) A discrete time signal has
   a) Continuous time continuous amplitude
   b) Continuous time discrete amplitude
   c) Discrete time continuous amplitude
   d) Discrete time discrete amplitude

12) Circular convolution of the sequences x(n) = {1, 2, 1} and h(n) = {1, –2, 2} is
   a) {1, 2, 1} b) {3, 2, 1} c) {3, 2, –1} d) {3, 2, 2}

13) Additions are required to compute N point DFT
   a) N b) N(N –1) c) N^2 d) N^3

14) The magnitude response for DFT exhibits complex conjugate property if time sequence is
   a) a real sequence b) a complex sequence
   c) an imaginary sequence d) not a real sequence

15) Decimation in time FFT decimates
   a) Input sequence b) DFT coefficients
   c) Both sequence and DFT d) None

16) Circular convolution can be performed using the methods
   a) Concentric circle b) Matrix Multiplication
   c) Both a) and b) d) None of above

17) In DIF, the data x(n) is stored in _____ order.
   a) Reversed order b) Bit reversal c) Sequence order d) None

18) With zero padding DFT used as
   a) Circular filtering b) FFT calculations
   c) Linear filtering d) Overlap add method

19) FFT algorithm calculates
   a) DTFT b) DCT c) DFT d) DST

20) The circular convolution can be converted to linear convolution for sequence x(n) of length L and sequence h(n) of length M by
   a) L + M – 1 b) L or m c) L + M + 1 d) None of the above

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SLR-EP – 507

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2016
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *necessary data* ***if necessary****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

a) Explain the DSP systems.

b) Compute the correlation of given sequence h(n) = {1, 1, 1} and x(n) = {1, 2, 3, 1}.

c) Derive the relation between Z-Transform and DFT.

d) Find DFT of sequence x (n) = {1, 2, 3, 4}.

e) Derive the property of DFT multiplication in time domain.

f) Compute circular convolution.

$x_1(n) = \{2, 3, 1, 1\}$

$x_2(n) = \{1, 3, 5, 3\}$

3. Attempt **any two** : **(2×10=20)**

a) Given x(n) = {1, 2, 3, 4, 4, 3, 2, 1} and N = 8, find X(k) using DIF-FFT algorithm.

b) Determine the output of a linear FIR filter whose impulse response h(n) = {1, 2, 3} and the input signal x(n) = {1, 2, 3, 4, 5, 6, 7, 8, 9} using overlap save method, verify by linear convolution.

c) Compute the circular convolution of the following sequence x(n) = {1, 1, 2, 1} and h(n) = {1, 2, 3, 4}. Using DFT and IDFT method and compare the result with linear convolution.

SECTION – II

4. Solve **any four** : **(4×5=20)**

a) Explain in detail Fourier Series Design Method.

b) Explain the finite word length effect in FIR filter.

c) What is warping effect ? What is its effect on magnitude and phase response ?

d) Explain in detail Adaptive Signal Processing.

e) For given specification find the order of analog Butterworth filter

$0.9 \le |H(j\Omega)| \le 1 \quad \text{for} \quad 0 \le \Omega \le 0.2\pi$

$|H(j\Omega)| \le 0.2 \quad \text{for} \quad 0.4\pi \le \Omega \le \pi$

f) Compare analog and digital filters.

5. Solve **any two** : **(2×10=20)**

a) Design a ideal high pass filter with a frequency response

$Hd(e^{j\omega}) = 1 \quad \text{for} \quad \frac{\pi}{4} \le |\omega| \le \pi$

$= 0 \quad \text{for} \quad |\omega| \le \frac{\pi}{4}$

Find the values of h(n) for N = 11 and Find H(Z).

b) An analog filter has a transfer function $H(s) = \frac{10}{s^2 + 7s + 10}$. Design a digital filter equivalent to this using impulse invariant method for T = 0.2 Sec.

c) Using Bilinear transformation obtain H(z) if $H(s) = \frac{1}{(s+1)^2}$ and T = 0.1 Sec.

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SLR-EP – 507

Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – I) Examination, 2016
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) ***All*** *questions are* ***compulsory****.*
2) *Figures to* ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *necessary data* ***if necessary****.*
4) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Circular convolution can be performed using the methods
   a) Concentric circle b) Matrix Multiplication
   c) Both a) and b) d) None of above

2) In DIF, the data x(n) is stored in _____ order.
   a) Reversed order b) Bit reversal c) Sequence order d) None

3) With zero padding DFT used as
   a) Circular filtering b) FFT calculations
   c) Linear filtering d) Overlap add method

4) FFT algorithm calculates
   a) DTFT b) DCT c) DFT d) DST

5) The circular convolution can be converted to linear convolution for sequence x(n) of length L and sequence h(n) of length M by
   a) L + M – 1 b) L or m c) L + M + 1 d) None of the above

6) Convolution of ideal filter response and sync function results in
   a) Side Lobe oscillations b) Main Lobe oscillations
   c) Sharpening of a transition width d) Decrease in main lobe

7) Unwrapped phase response of FIR filter in pass band is
   a) Exponentially increasing b) Exponentially decreasing
   c) Non-linear d) Linear

8) When analog butter worth filter is converted to DT filter using Impulse Invariance Method, then
   a) Aliasing can be eliminated
   b) Aliasing is always present
   c) Aliasing can be reduced by reducing T
   d) Aliasing cannot be reduced by reducing T

9) Properties of butter worth low pass filter is given by
   a) The poles of butter worth filter lies on a circle
   b) The poles of butter worth filter lies outside the circle
   c) The poles of butter worth filter lies inside the circle
   d) Not a real sequence

10) The mapping for Impulse Invariance Method is
   a) Many to many mapping
   b) Many to one mapping
   c) One to one mapping
   d) None of above

11) The relation between Laplace transform and z-transform is
   a) $z = e^{st}$
   b) $z = e^{jst}$
   c) $s = e^{zt}$
   d) $z = e^{-st}$

12) If impulse response of a system is over a finite duration, then it is
   a) Moving average system
   b) Auto regressive system
   c) ARMA system
   d) IIR system

13) The mapping for bilinear transformation is
   a) Many to many mapping
   b) Many to one mapping
   c) One to one mapping
   d) None of above

14) The impulse response of FIR system has a linear phase linear characteristics
   a) $\theta(\omega) = \alpha\omega$
   b) $\theta(\omega) = -\frac{\partial\theta}{\partial\omega}$
   c) $\theta(\omega) = -\alpha\omega$
   d) None of above

15) FIR filter is also known as
   a) Cascade structure filter
   b) Transversal filter
   c) ARMA filter
   d) AR filter

16) A discrete time signal has
   a) Continuous time continuous amplitude
   b) Continuous time discrete amplitude
   c) Discrete time continuous amplitude
   d) Discrete time discrete amplitude

17) Circular convolution of the sequences x(n) = {1, 2, 1} and h(n) = {1, –2, 2} is
   a) {1, 2, 1}
   b) {3, 2, 1}
   c) {3, 2, –1}
   d) {3, 2, 2}

18) Additions are required to compute N point DFT
   a) N
   b) N(N –1)
   c) N^2
   d) N^3

19) The magnitude response for DFT exhibits complex conjugate property if time sequence is
   a) a real sequence
   b) a complex sequence
   c) an imaginary sequence
   d) not a real sequence

20) Decimation in time FFT decimates
   a) Input sequence
   b) DFT coefficients
   c) Both sequence and DFT
   d) None

Set S

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SLR-EP – 507

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2016
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *necessary data* ***if necessary****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

a) Explain the DSP systems.

b) Compute the correlation of given sequence h(n) = {1, 1, 1} and x(n) = {1, 2, 3, 1}.

c) Derive the relation between Z-Transform and DFT.

d) Find DFT of sequence x (n) = {1, 2, 3, 4}.

e) Derive the property of DFT multiplication in time domain.

f) Compute circular convolution.

$x_1(n) = \{2, 3, 1, 1\}$

$x_2(n) = \{1, 3, 5, 3\}$

3. Attempt **any two** : **(2×10=20)**

a) Given x(n) = {1, 2, 3, 4, 4, 3, 2, 1} and N = 8, find X(k) using DIF-FFT algorithm.

b) Determine the output of a linear FIR filter whose impulse response h(n) = {1, 2, 3} and the input signal x(n) = {1, 2, 3, 4, 5, 6, 7, 8, 9} using overlap save method, verify by linear convolution.

c) Compute the circular convolution of the following sequence x(n) = {1, 1, 2, 1} and h(n) = {1, 2, 3, 4}. Using DFT and IDFT method and compare the result with linear convolution.

SECTION – II

4. Solve **any four** : **(4×5=20)**

a) Explain in detail Fourier Series Design Method.

b) Explain the finite word length effect in FIR filter.

c) What is warping effect ? What is its effect on magnitude and phase response ?

d) Explain in detail Adaptive Signal Processing.

e) For given specification find the order of analog Butterworth filter

$0.9 \le |H(j\Omega)| \le 1 \quad \text{for} \quad 0 \le \Omega \le 0.2\pi$

$|H(j\Omega)| \le 0.2 \quad \text{for} \quad 0.4\pi \le \Omega \le \pi$

f) Compare analog and digital filters.

5. Solve **any two** : **(2×10=20)**

a) Design a ideal high pass filter with a frequency response

$Hd(e^{j\omega}) = 1 \quad \text{for} \quad \frac{\pi}{4} \le |\omega| \le \pi$

$= 0 \quad \text{for} \quad |\omega| \le \frac{\pi}{4}$

Find the values of h(n) for N = 11 and Find H(Z).

b) An analog filter has a transfer function $H(s) = \frac{10}{s^2 + 7s + 10}$. Design a digital filter equivalent to this using impulse invariant method for T = 0.2 Sec.

c) Using Bilinear transformation obtain H(z) if $H(s) = \frac{1}{(s+1)^2}$ and T = 0.1 Sec.

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SLR-EP – 508

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) Examination, 2016
ENERGY AUDIT AND MANAGEMENT
(Elective – I)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The sum of individual maximum demand of the plant to the sum of individual maximum demand of various equipments is
   a) load factor b) diversity factor c) demand factor d) maximum demand

2) What is specific energy consumption ?
   a) Energy consumption per month
   b) Energy consumed per unit of production
   c) Energy consumption per year
   d) None of the above

3) Sankey diagram shows in graphics
   a) Energy input b) Energy output c) Energy balance d) All the above

4) Which of the following is the predominant loss in furnace oil fired boiler ?
   a) Dry flue gas losses
   b) Heat loss due to moisture in air
   c) Heat loss due to radiation and convection
   d) Heat loss due to moisture in fuel

5) The heat input required for generating 'one' kilo watt-hour of electrical output is called as
   a) Efficiency b) Heat Rate c) Calorific Value d) Heat Value

6) Presenting the load demand of a consumer against time of the day is known as
   a) Time curve b) Load curve c) Demand curve d) Energy curve

7) In material balance of a process, recycle product is always considered as
   a) Input to process b) Output to process
   c) Both (a) and (b) d) None of above

P.T.O.

8) The objective of material and energy balance is to assess the
   a) Input-output b) Conversion efficiency
   c) Losses d) All the above

9) A CUSUM graph follows a random fluctuation trend and oscillates around
   a) 100 b) 100% c) 0 d) None of the above

10) The force field analysis in energy action planning deals with barriers having
   a) Positive forces only b) Negative forces only
   c) Both negative and positive forces d) No forces

11) The support for energy management is expressed in a formal written declaration of commitment. This is called
   a) Company policy b) Management policy
   c) Energy policy d) Energy efficiency policy

12) Providing information to BEE is the role of energy manager as per
   a) Energy Conservation Act 2003 b) Energy Conservation Act 2004
   c) Energy Conservation Act 2002 d) Energy Conservation Act 2001

13) Poor scattering on trend line of production Vs energy consumption indicates
   a) Poor level of control b) Good level of control
   c) Both the above d) None of above

14) The energy used by any manufacturing process varies with
   a) Production volume b) Type of process
   c) Resource input d) All the above

15) What determines the thermal loading on the motor ?
   a) Duty/Load cycle b) Temperature of the winding
   c) Age of the motor d) Ambient conditions

16) The ozone layer in the stratosphere acts as an efficient filter for
   a) Solar UV-B rays b) X-rays c) Gamma rays d) UV-A rays

17) Unbalance in voltages at motor terminals is caused by
   a) Supplying single phase loads disproportionately
   b) Use of different sizes of cables
   c) Both (a) and (b)
   d) None of the above

18) The energy sources that are either found or stored in nature are
   a) Secondary energy sources b) Primary energy sources
   c) Both (a) and (b) d) None of the above

19) Energy consumption per unit of GDP is called as
   a) Energy ratio b) Energy intensity
   c) Per capita consumption d) None

20) If the distribution voltage is raised from 11 kV to 33 kV, the line loss would be lower by a factor
   a) 1/9 b) 9 c) 3 d) None

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SLR-EP – 508

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ENERGY AUDIT AND MANAGEMENT
(Elective – I)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

A) What is energy conservation ? Explain its importance.

B) What is Kyoto protocol, and what are its implications for developed and developing countries ?

C) What do you understand by the term “benchmarking” and list few benefits.

D) Explain the classification of energy with suitable examples.

E) State energy policy statement of an organization/company with an appropriate example.

3. Attempt the following questions : **(10×2=20)**

A) Explain Clean Development Mechanism (CDM). How CDM works and also explain project cycle for CDM.

B) Responsibilities and duties to be assigned under The Energy Conservation Act, 2001.

OR

B) Enlist the salient features of Energy Conservation Act 2001.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   A) Explain how a CUSUM chart is drawn with an example.

   B) What are the direct and indirect benefits of waste heat recovery ? Give two examples of waste heat recovery.

   C) Define energy management and state objectives of energy management.

   D) Explain why managerial skills are as important as technical skills in energy management.

   E) Explain the need of energy audit.

5. Attempt **any two** : **(10×2=20)**

   A) Explain briefly the difference between preliminary and detailed energy audits.

   B) Briefly explain about " Force Field Analysis" and also explain the need for an energy policy.

   C) What is discounted cash flow method ? What are the advantages and disadvantages of it ?

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Seat No.	

Set **Q**

B.E. (Electrical) (Part – I) Examination, 2016
ENERGY AUDIT AND MANAGEMENT
(Elective – I)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions **compulsory**.*
*2) Assume suitable data if **necessary** and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The ozone layer in the stratosphere acts as an efficient filter for
   a) Solar UV-B rays b) X-rays c) Gamma rays d) UV-A rays

2) Unbalance in voltages at motor terminals is caused by
   a) Supplying single phase loads disproportionately
   b) Use of different sizes of cables
   c) Both (a) and (b)
   d) None of the above

3) The energy sources that are either found or stored in nature are
   a) Secondary energy sources b) Primary energy sources
   c) Both (a) and (b) d) None of the above

4) Energy consumption per unit of GDP is called as
   a) Energy ratio b) Energy intensity
   c) Per capita consumption d) None

5) If the distribution voltage is raised from 11 kV to 33 kV, the line loss would be lower by a factor
   a) 1/9 b) 9 c) 3 d) None

6) The sum of individual maximum demand of the plant to the sum of individual maximum demand of various equipments is
   a) load factor b) diversity factor c) demand factor d) maximum demand

P.T.O.

7) What is specific energy consumption ?
   a) Energy consumption per month
   b) Energy consumed per unit of production
   c) Energy consumption per year
   d) None of the above

8) Sankey diagram shows in graphics
   a) Energy input b) Energy output c) Energy balance d) All the above

9) Which of the following is the predominant loss in furnace oil fired boiler ?
   a) Dry flue gas losses
   b) Heat loss due to moisture in air
   c) Heat loss due to radiation and convection
   d) Heat loss due to moisture in fuel

10) The heat input required for generating 'one' kilo watt-hour of electrical output is called as
   a) Efficiency b) Heat Rate c) Calorific Value d) Heat Value

11) Presenting the load demand of a consumer against time of the day is known as
   a) Time curve b) Load curve c) Demand curve d) Energy curve

12) In material balance of a process, recycle product is always considered as
   a) Input to process
   b) Output to process
   c) Both (a) and (b)
   d) None of above

13) The objective of material and energy balance is to assess the
   a) Input-output
   b) Conversion efficiency
   c) Losses
   d) All the above

14) A CUSUM graph follows a random fluctuation trend and oscillates around
   a) 100 b) 100% c) 0 d) None of the above

15) The force field analysis in energy action planning deals with barriers having
   a) Positive forces only
   b) Negative forces only
   c) Both negative and positive forces
   d) No forces

16) The support for energy management is expressed in a formal written declaration of commitment. This is called
   a) Company policy
   b) Management policy
   c) Energy policy
   d) Energy efficiency policy

17) Providing information to BEE is the role of energy manager as per
   a) Energy Conservation Act 2003
   b) Energy Conservation Act 2004
   c) Energy Conservation Act 2002
   d) Energy Conservation Act 2001

18) Poor scattering on trend line of production Vs energy consumption indicates
   a) Poor level of control
   b) Good level of control
   c) Both the above
   d) None of above

19) The energy used by any manufacturing process varies with
   a) Production volume
   b) Type of process
   c) Resource input
   d) All the above

20) What determines the thermal loading on the motor ?
   a) Duty/Load cycle
   b) Temperature of the winding
   c) Age of the motor
   d) Ambient conditions

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SLR-EP – 508

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ENERGY AUDIT AND MANAGEMENT
(Elective – I)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

A) What is energy conservation ? Explain its importance.

B) What is Kyoto protocol, and what are its implications for developed and developing countries ?

C) What do you understand by the term “benchmarking” and list few benefits.

D) Explain the classification of energy with suitable examples.

E) State energy policy statement of an organization/company with an appropriate example.

3. Attempt the following questions : **(10×2=20)**

A) Explain Clean Development Mechanism (CDM). How CDM works and also explain project cycle for CDM.

B) Responsibilities and duties to be assigned under The Energy Conservation Act, 2001.

OR

B) Enlist the salient features of Energy Conservation Act 2001.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   A) Explain how a CUSUM chart is drawn with an example.

   B) What are the direct and indirect benefits of waste heat recovery ? Give two examples of waste heat recovery.

   C) Define energy management and state objectives of energy management.

   D) Explain why managerial skills are as important as technical skills in energy management.

   E) Explain the need of energy audit.

5. Attempt **any two** : **(10×2=20)**

   A) Explain briefly the difference between preliminary and detailed energy audits.

   B) Briefly explain about " Force Field Analysis" and also explain the need for an energy policy.

   C) What is discounted cash flow method ? What are the advantages and disadvantages of it ?

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SLR-EP – 508

Seat No.	

Set **R**

B.E. (Electrical) (Part – I) Examination, 2016
ENERGY AUDIT AND MANAGEMENT
(Elective – I)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The support for energy management is expressed in a formal written declaration of commitment. This is called
   a) Company policy b) Management policy
   c) Energy policy d) Energy efficiency policy

2) Providing information to BEE is the role of energy manager as per
   a) Energy Conservation Act 2003 b) Energy Conservation Act 2004
   c) Energy Conservation Act 2002 d) Energy Conservation Act 2001

3) Poor scattering on trend line of production Vs energy consumption indicates
   a) Poor level of control b) Good level of control
   c) Both the above d) None of above

4) The energy used by any manufacturing process varies with
   a) Production volume b) Type of process
   c) Resource input d) All the above

5) What determines the thermal loading on the motor ?
   a) Duty/Load cycle b) Temperature of the winding
   c) Age of the motor d) Ambient conditions

6) The ozone layer in the stratosphere acts as an efficient filter for
   a) Solar UV-B rays b) X-rays c) Gamma rays d) UV-A rays

P.T.O.

7) Unbalance in voltages at motor terminals is caused by
   a) Supplying single phase loads disproportionately
   b) Use of different sizes of cables
   c) Both (a) and (b)
   d) None of the above

8) The energy sources that are either found or stored in nature are
   a) Secondary energy sources b) Primary energy sources
   c) Both (a) and (b) d) None of the above

9) Energy consumption per unit of GDP is called as
   a) Energy ratio b) Energy intensity
   c) Per capita consumption d) None

10) If the distribution voltage is raised from 11 kV to 33 kV, the line loss would be lower by a factor
   a) 1/9 b) 9 c) 3 d) None

11) The sum of individual maximum demand of the plant to the sum of individual maximum demand of various equipments is
   a) load factor b) diversity factor c) demand factor d) maximum demand

12) What is specific energy consumption ?
   a) Energy consumption per month b) Energy consumed per unit of production
   c) Energy consumption per year d) None of the above

13) Sankey diagram shows in graphics
   a) Energy input b) Energy output c) Energy balance d) All the above

14) Which of the following is the predominant loss in furnace oil fired boiler ?
   a) Dry flue gas losses
   b) Heat loss due to moisture in air
   c) Heat loss due to radiation and convection
   d) Heat loss due to moisture in fuel

15) The heat input required for generating 'one' kilo watt-hour of electrical output is called as
   a) Efficiency b) Heat Rate c) Calorific Value d) Heat Value

16) Presenting the load demand of a consumer against time of the day is known as
   a) Time curve b) Load curve c) Demand curve d) Energy curve

17) In material balance of a process, recycle product is always considered as
   a) Input to process b) Output to process
   c) Both (a) and (b) d) None of above

18) The objective of material and energy balance is to assess the
   a) Input-output b) Conversion efficiency
   c) Losses d) All the above

19) A CUSUM graph follows a random fluctuation trend and oscillates around
   a) 100 b) 100% c) 0 d) None of the above

20) The force field analysis in energy action planning deals with barriers having
   a) Positive forces only b) Negative forces only
   c) Both negative and positive forces d) No forces

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SLR-EP – 508

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ENERGY AUDIT AND MANAGEMENT
(Elective – I)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

A) What is energy conservation ? Explain its importance.

B) What is Kyoto protocol, and what are its implications for developed and developing countries ?

C) What do you understand by the term “benchmarking” and list few benefits.

D) Explain the classification of energy with suitable examples.

E) State energy policy statement of an organization/company with an appropriate example.

3. Attempt the following questions : **(10×2=20)**

A) Explain Clean Development Mechanism (CDM). How CDM works and also explain project cycle for CDM.

B) Responsibilities and duties to be assigned under The Energy Conservation Act, 2001.

OR

B) Enlist the salient features of Energy Conservation Act 2001.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   A) Explain how a CUSUM chart is drawn with an example.

   B) What are the direct and indirect benefits of waste heat recovery ? Give two examples of waste heat recovery.

   C) Define energy management and state objectives of energy management.

   D) Explain why managerial skills are as important as technical skills in energy management.

   E) Explain the need of energy audit.

5. Attempt **any two** : **(10×2=20)**

   A) Explain briefly the difference between preliminary and detailed energy audits.

   B) Briefly explain about " Force Field Analysis" and also explain the need for an energy policy.

   C) What is discounted cash flow method ? What are the advantages and disadvantages of it ?

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Seat No.	

Set **S**

B.E. (Electrical) (Part – I) Examination, 2016
ENERGY AUDIT AND MANAGEMENT
(Elective – I)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Presenting the load demand of a consumer against time of the day is known as
a) Time curve b) Load curve c) Demand curve d) Energy curve

2) In material balance of a process, recycle product is always considered as
a) Input to process b) Output to process
c) Both (a) and (b) d) None of above

3) The objective of material and energy balance is to assess the
a) Input-output b) Conversion efficiency
c) Losses d) All the above

4) A CUSUM graph follows a random fluctuation trend and oscillates around
a) 100 b) 100% c) 0 d) None of the above

5) The force field analysis in energy action planning deals with barriers having
a) Positive forces only b) Negative forces only
c) Both negative and positive forces d) No forces

6) The support for energy management is expressed in a formal written declaration of commitment. This is called
a) Company policy b) Management policy
c) Energy policy d) Energy efficiency policy

7) Providing information to BEE is the role of energy manager as per
a) Energy Conservation Act 2003 b) Energy Conservation Act 2004
c) Energy Conservation Act 2002 d) Energy Conservation Act 2001

P.T.O.

8) Poor scattering on trend line of production Vs energy consumption indicates
   a) Poor level of control b) Good level of control
   c) Both the above d) None of above

9) The energy used by any manufacturing process varies with
   a) Production volume b) Type of process
   c) Resource input d) All the above

10) What determines the thermal loading on the motor ?
   a) Duty/Load cycle b) Temperature of the winding
   c) Age of the motor d) Ambient conditions

11) The ozone layer in the stratosphere acts as an efficient filter for
   a) Solar UV-B rays b) X-rays c) Gamma rays d) UV-A rays

12) Unbalance in voltages at motor terminals is caused by
   a) Supplying single phase loads disproportionately
   b) Use of different sizes of cables
   c) Both (a) and (b)
   d) None of the above

13) The energy sources that are either found or stored in nature are
   a) Secondary energy sources b) Primary energy sources
   c) Both (a) and (b) d) None of the above

14) Energy consumption per unit of GDP is called as
   a) Energy ratio b) Energy intensity
   c) Per capita consumption d) None

15) If the distribution voltage is raised from 11 kV to 33 kV, the line loss would be lower by a factor
   a) 1/9 b) 9 c) 3 d) None

16) The sum of individual maximum demand of the plant to the sum of individual maximum demand of various equipments is
   a) load factor b) diversity factor c) demand factor d) maximum demand

17) What is specific energy consumption ?
   a) Energy consumption per month
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   c) Energy consumption per year
   d) None of the above

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   a) Energy input b) Energy output c) Energy balance d) All the above

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   a) Dry flue gas losses
   b) Heat loss due to moisture in air
   c) Heat loss due to radiation and convection
   d) Heat loss due to moisture in fuel

20) The heat input required for generating 'one' kilo watt-hour of electrical output is called as
   a) Efficiency b) Heat Rate c) Calorific Value d) Heat Value

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Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
ENERGY AUDIT AND MANAGEMENT
(Elective – I)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

A) What is energy conservation ? Explain its importance.

B) What is Kyoto protocol, and what are its implications for developed and developing countries ?

C) What do you understand by the term “benchmarking” and list few benefits.

D) Explain the classification of energy with suitable examples.

E) State energy policy statement of an organization/company with an appropriate example.

3. Attempt the following questions : **(10×2=20)**

A) Explain Clean Development Mechanism (CDM). How CDM works and also explain project cycle for CDM.

B) Responsibilities and duties to be assigned under The Energy Conservation Act, 2001.

OR

B) Enlist the salient features of Energy Conservation Act 2001.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   A) Explain how a CUSUM chart is drawn with an example.

   B) What are the direct and indirect benefits of waste heat recovery ? Give two examples of waste heat recovery.

   C) Define energy management and state objectives of energy management.

   D) Explain why managerial skills are as important as technical skills in energy management.

   E) Explain the need of energy audit.

5. Attempt **any two** : **(10×2=20)**

   A) Explain briefly the difference between preliminary and detailed energy audits.

   B) Briefly explain about " Force Field Analysis" and also explain the need for an energy policy.

   C) What is discounted cash flow method ? What are the advantages and disadvantages of it ?

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SLR-EP – 509

Seat No.	

Set P

B.E. (Electrical) (Part – I) Examination, 2016
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) A sphere-sphere gap is used in HV laboratories for
   a) Measurement of EHV
   b) Calibrating other measuring apparatus
   c) Both a and b
   d) None of these

2) The type of EHV cable is
   a) High pressure oil filled
   b) Cross linked polyethylene
   c) Gas insulated lines
   d) All of the above

3) For reducing tower footing resistance it is better to use
   a) Chemical and ground only
   b) Chemical and counter poise only
   c) Ground rod and counter poise only
   d) Chemical ground rod and counter poise only

4) By increasing transmission line voltage to double of its original value the same power can be despatched keeping the line loss
   a) Equal to original value
   b) Half of original value
   c) One fourth or original value
   d) Double the original value

5) The allowable noise level at one MHz is
   a) 22 dB b) 26 dB c) 30 dB d) 32 dB

6) The conductivity of moist is of magnitude
   a) 10^{-1} mho/metre b) 10^{0} mho/metre c) 10^{-2} mho/metre d) 10^{-3} mho/metre

7) Third mode of propagation is called as
   a) Line to ground b) Phase to phase c) Homopolar d) Inter-phase

8) Operating 750 KV line gives AN at a level of
   a) 50 dB b) 55.4 dB c) 52 dB d) 58.5 dB

9) In general method of Laplace transform the series and shunt impedance operator per unit length of line is
   a) z (s) = r + l (s)
   b) y (s) = g + c (s)
   c) both a) and b)
   d) none of the above

P.T.O.

10) For Aeolian vibration the frequency of vibration is usually limited to _____ Hz and the amplitudes less than _____ cm.
a) 20 Hz, 2.5 cm b) 25 Hz, 2.5 cm c) 50 Hz, 2.5 cm d) 50 Hz, 3.5 cm

11) Reflection coefficient of voltage (K_r) for open circuit is
a) 0 b) + 2 c) + 1 d) – 1

12) The dimensions of constants B and C are respectively _____ and _____
a) Ohm, Siemen b) Mho, Siemen
c) Both are dimensionless d) Siemen, Ohm

13) For 100 % series compensation, resonance occur at
a) Power frequency b) 50 % of power frequency
c) 40 % of power frequency d) None of the above

14) Find out the wrong relationship.
a) $[Q] = 2\pi\varepsilon[M][V]$ b) $[V] = [P]\left[\frac{Q}{2\pi\varepsilon}\right]$
c) $\left[\frac{Q}{2\pi\varepsilon}\right] = [P]\,[V]$ d) All equations are correct

15) The positive sequence reactance per phase in ohms 1 km in 750 transmission line is
a) 0.272 b) 0.227 c) 0.722 d) none of these

16) The radio interference level is governed by
a) Amplitude of single phase b) Wave shape of single pulse
c) Repetitive nature of pulse d) All of these

17) The main drawback of overhead system over underground system is
a) Underground system is more flexible than overhead system
b) Higher charging current
c) Surge problem
d) High initial cost

18) In lossless transmission line theoretically have
a) r = l = 0 b) l = g = 0 c) g = c = 0 d) r = g = 0

19) Refraction coefficient of current (J_T) is given by
a) $\frac{2Zo}{Zo + Zt}$ b) $\frac{Zo - Zt}{Zo + Zt}$ c) $\frac{2Zt}{Zo + Zt}$ d) $\frac{Zt - Zo}{Zo + Zt}$

20) Which type of corona discharge gives interference to radio broadcast ?
a) Pulse type b) Pulse less type
c) Glow corona d) None of the above

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SLR-EP – 509

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Write short notes on **any four** : **(4×5=20)**
   a) Explain in detail the advantages and disadvantages of high voltages.
   b) Explain :
      i) Aeolian vibration
      ii) Galloping vibration
   c) Brief the charge potential relations of the multi conductor lines.
   d) Explain Reflection and refraction of travelling waves.
   e) Lightning stroke mechanism.
   f) Explain tower footing resistance.
   g) Limits for radio interference.

3. Solve **any two** : **(2×10=20)**
   a) Describe the line parameters of modes of propagation.
   b) Explain in detail the sequence inductance and capacitance.
   c) Derive the expression $P_C = \frac{1}{2} KC \left(V_m^2 - V_o^2 \right)$ for the energy loss from charge-voltage diagram.

SECTION – II

4. Write short notes on **any four** : **(4×5=20)**
   a) Power circle diagram and its use.
   b) Enlist sources of overvoltage and explain Ferro resonance voltages.
   c) Sub-synchronous resonance in series capacitors compensated lines.
   d) Reduction of switching surge over voltages.
   e) Construction and characteristics of ZnO gapless arrester.
   f) Describe the insulation co-ordination and over voltage protection based on lightning.

Set P

5. Solve **any two** : **(2×10=20)**

   a) Expression for generalized constants.

   b) What are the factors under steady state in design of EHV lines ?

   c) 100 MVA 230 KV 50 Hz transformer has X_f = 12 % and is connected to a line 200 Km long which has an inductance of 1 mH/Km. The filter connected to the L.V side 33 KV of the transformer, is required to suppress the 5^{th} harmonic generated by the TCR to 1 % of I_n. Calculate the value of filter capacitor if the filter inductance used in 2 mH.

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Seat No.	

Set **Q**

B.E. (Electrical) (Part – I) Examination, 2016
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The radio interference level is governed by
   a) Amplitude of single phase
   b) Wave shape of single pulse
   c) Repetitive nature of pulse
   d) All of these

2) The main drawback of overhead system over underground system is
   a) Underground system is more flexible than overhead system
   b) Higher charging current
   c) Surge problem
   d) High initial cost

3) In lossless transmission line theoretically have
   a) r = l = 0 b) l = g = 0 c) g = c = 0 d) r = g = 0

4) Refraction coefficient of current (J_T) is given by
   a) $\frac{2Zo}{Zo + Zt}$ b) $\frac{Zo - Zt}{Zo + Zt}$ c) $\frac{2Zt}{Zo + Zt}$ d) $\frac{Zt - Zo}{Zo + Zt}$

5) Which type of corona discharge gives interference to radio broadcast ?
   a) Pulse type
   b) Pulse less type
   c) Glow corona
   d) None of the above

6) A sphere-sphere gap is used in HV laboratories for
   a) Measurement of EHV
   b) Calibrating other measuring apparatus
   c) Both a and b
   d) None of these

7) The type of EHV cable is
   a) High pressure oil filled
   b) Cross linked polyethylene
   c) Gas insulated lines
   d) All of the above

8) For reducing tower footing resistance it is better to use
   a) Chemical and ground only
   b) Chemical and counter poise only
   c) Ground rod and counter poise only
   d) Chemical ground rod and counter poise only

P.T.O.

9) By increasing transmission line voltage to double of its original value the same power can be despatched keeping the line loss
   a) Equal to original value
   b) Half of original value
   c) One fourth or original value
   d) Double the original value

10) The allowable noise level at one MHz is
   a) 22 dB b) 26 dB c) 30 dB d) 32 dB

11) The conductivity of moist is of magnitude
   a) 10^{-1} mho/metre b) 10^{0} mho/metre c) 10^{-2} mho/metre d) 10^{-3} mho/metre

12) Third mode of propagation is called as
   a) Line to ground b) Phase to phase c) Homopolar d) Inter-phase

13) Operating 750 KV line gives AN at a level of
   a) 50 dB b) 55.4 dB c) 52 dB d) 58.5 dB

14) In general method of Laplace transform the series and shunt impedance operator per unit length of line is
   a) z (s) = r + l (s)
   b) y (s) = g + c (s)
   c) both a) and b)
   d) none of the above

15) For Aeolian vibration the frequency of vibration is usually limited to _____ Hz and the amplitudes less than _____ cm.
   a) 20 Hz, 2.5 cm b) 25 Hz, 2.5 cm c) 50 Hz, 2.5 cm d) 50 Hz, 3.5 cm

16) Reflection coefficient of voltage (K_r) for open circuit is
   a) 0 b) + 2 c) + 1 d) – 1

17) The dimensions of constants B and C are respectively _____ and _____
   a) Ohm, Siemen
   b) Mho, Siemen
   c) Both are dimensionless
   d) Siemen, Ohm

18) For 100 % series compensation, resonance occur at
   a) Power frequency
   b) 50 % of power frequency
   c) 40 % of power frequency
   d) None of the above

19) Find out the wrong relationship.
   a) $[Q] = 2\pi\varepsilon[M][V]$
   b) $[V] = [P]\left[\frac{Q}{2\pi\varepsilon}\right]$
   c) $\left[\frac{Q}{2\pi\varepsilon}\right] = [P]\,[V]$
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20) The positive sequence reactance per phase in ohms 1 km in 750 transmission line is
   a) 0.272 b) 0.227 c) 0.722 d) none of these

_____

SLR-EP – 509

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Write short notes on **any four** : **(4×5=20)**
   a) Explain in detail the advantages and disadvantages of high voltages.
   b) Explain :
      i) Aeolian vibration
      ii) Galloping vibration
   c) Brief the charge potential relations of the multi conductor lines.
   d) Explain Reflection and refraction of travelling waves.
   e) Lightning stroke mechanism.
   f) Explain tower footing resistance.
   g) Limits for radio interference.

3. Solve **any two** : **(2×10=20)**
   a) Describe the line parameters of modes of propagation.
   b) Explain in detail the sequence inductance and capacitance.
   c) Derive the expression $P_C = \frac{1}{2} KC \left(V_m^2 - V_o^2 \right)$ for the energy loss from charge-voltage diagram.

SECTION – II

4. Write short notes on **any four** : **(4×5=20)**
   a) Power circle diagram and its use.
   b) Enlist sources of overvoltage and explain Ferro resonance voltages.
   c) Sub-synchronous resonance in series capacitors compensated lines.
   d) Reduction of switching surge over voltages.
   e) Construction and characteristics of ZnO gapless arrester.
   f) Describe the insulation co-ordination and over voltage protection based on lightning.

Set Q

5. Solve **any two** : **(2×10=20)**

   a) Expression for generalized constants.

   b) What are the factors under steady state in design of EHV lines ?

   c) 100 MVA 230 KV 50 Hz transformer has X_f = 12 % and is connected to a line 200 Km long which has an inductance of 1 mH/Km. The filter connected to the L.V side 33 KV of the transformer, is required to suppress the 5^{th} harmonic generated by the TCR to 1 % of I_n. Calculate the value of filter capacitor if the filter inductance used in 2 mH.

SLR-EP – 509

Seat No.	

Set R

B.E. (Electrical) (Part – I) Examination, 2016
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Reflection coefficient of voltage (K_r) for open circuit is
a) 0 b) + 2 c) + 1 d) – 1

2) The dimensions of constants B and C are respectively _____ and _____
a) Ohm, Siemen b) Mho, Siemen
c) Both are dimensionless d) Siemen, Ohm

3) For 100 % series compensation, resonance occur at
a) Power frequency b) 50 % of power frequency
c) 40 % of power frequency d) None of the above

4) Find out the wrong relationship.
a) $[Q] = 2\pi\varepsilon[M][V]$ b) $[V] = [P]\left[\frac{Q}{2\pi\varepsilon}\right]$
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5) The positive sequence reactance per phase in ohms 1 km in 750 transmission line is
a) 0.272 b) 0.227 c) 0.722 d) none of these

6) The radio interference level is governed by
a) Amplitude of single phase b) Wave shape of single pulse
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7) The main drawback of overhead system over underground system is
a) Underground system is more flexible than overhead system
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c) Surge problem
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8) In lossless transmission line theoretically have
a) r = l = 0 b) l = g = 0 c) g = c = 0 d) r = g = 0

P.T.O.

9) Refraction coefficient of current (J_T) is given by

a) $\frac{2Zo}{Zo + Zt}$ b) $\frac{Zo - Zt}{Zo + Zt}$ c) $\frac{2Zt}{Zo + Zt}$ d) $\frac{Zt - Zo}{Zo + Zt}$

10) Which type of corona discharge gives interference to radio broadcast ?
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c) Ground rod and counter poise only
d) Chemical ground rod and counter poise only

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a) 50 dB b) 55.4 dB c) 52 dB d) 58.5 dB

19) In general method of Laplace transform the series and shunt impedance operator per unit length of line is
a) z (s) = r + l (s) b) y (s) = g + c (s)
c) both a) and b) d) none of the above

20) For Aeolian vibration the frequency of vibration is usually limited to _____ Hz and the amplitudes less than _____ cm.
a) 20 Hz, 2.5 cm b) 25 Hz, 2.5 cm c) 50 Hz, 2.5 cm d) 50 Hz, 3.5 cm

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SLR-EP – 509

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Write short notes on **any four** : **(4×5=20)**
   a) Explain in detail the advantages and disadvantages of high voltages.
   b) Explain :
      i) Aeolian vibration
      ii) Galloping vibration
   c) Brief the charge potential relations of the multi conductor lines.
   d) Explain Reflection and refraction of travelling waves.
   e) Lightning stroke mechanism.
   f) Explain tower footing resistance.
   g) Limits for radio interference.

3. Solve **any two** : **(2×10=20)**
   a) Describe the line parameters of modes of propagation.
   b) Explain in detail the sequence inductance and capacitance.
   c) Derive the expression $P_C = \frac{1}{2} KC \left(V_m^2 - V_o^2 \right)$ for the energy loss from charge-voltage diagram.

SECTION – II

4. Write short notes on **any four** : **(4×5=20)**
   a) Power circle diagram and its use.
   b) Enlist sources of overvoltage and explain Ferro resonance voltages.
   c) Sub-synchronous resonance in series capacitors compensated lines.
   d) Reduction of switching surge over voltages.
   e) Construction and characteristics of ZnO gapless arrester.
   f) Describe the insulation co-ordination and over voltage protection based on lightning.

Set R

5. Solve **any two** : **(2×10=20)**

   a) Expression for generalized constants.

   b) What are the factors under steady state in design of EHV lines ?

   c) 100 MVA 230 KV 50 Hz transformer has X_f = 12 % and is connected to a line 200 Km long which has an inductance of 1 mH/Km. The filter connected to the L.V side 33 KV of the transformer, is required to suppress the 5^{th} harmonic generated by the TCR to 1 % of I_n. Calculate the value of filter capacitor if the filter inductance used in 2 mH.

SLR-EP – 509

Seat No.	

Set **S**

B.E. (Electrical) (Part – I) Examination, 2016
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The conductivity of moist is of magnitude
a) 10^{-1} mho/metre b) 10^{0} mho/metre c) 10^{-2} mho/metre d) 10^{-3} mho/metre

2) Third mode of propagation is called as
a) Line to ground b) Phase to phase c) Homopolar d) Inter-phase

3) Operating 750 KV line gives AN at a level of
a) 50 dB b) 55.4 dB c) 52 dB d) 58.5 dB

4) In general method of Laplace transform the series and shunt impedance operator per unit length of line is
a) z (s) = r + l (s) b) y (s) = g + c (s)
c) both a) and b) d) none of the above

5) For Aeolian vibration the frequency of vibration is usually limited to _____ Hz and the amplitudes less than _____ cm.
a) 20 Hz, 2.5 cm b) 25 Hz, 2.5 cm c) 50 Hz, 2.5 cm d) 50 Hz, 3.5 cm

6) Reflection coefficient of voltage (K_r) for open circuit is
a) 0 b) + 2 c) + 1 d) – 1

7) The dimensions of constants B and C are respectively _____ and _____
a) Ohm, Siemen b) Mho, Siemen
c) Both are dimensionless d) Siemen, Ohm

8) For 100 % series compensation, resonance occur at
a) Power frequency b) 50 % of power frequency
c) 40 % of power frequency d) None of the above

9) Find out the wrong relationship.

a) $[Q] = 2\pi\varepsilon[M][V]$ b) $[V] = [P]\left[\frac{Q}{2\pi\varepsilon}\right]$

c) $\left[\frac{Q}{2\pi\varepsilon}\right] = [P]\,[V]$ d) All equations are correct

P.T.O.

10) The positive sequence reactance per phase in ohms 1 km in 750 transmission line is
a) 0.272 b) 0.227 c) 0.722 d) none of these

11) The radio interference level is governed by
a) Amplitude of single phase
b) Wave shape of single pulse
c) Repetitive nature of pulse
d) All of these

12) The main drawback of overhead system over underground system is
a) Underground system is more flexible than overhead system
b) Higher charging current
c) Surge problem
d) High initial cost

13) In lossless transmission line theoretically have
a) r = l = 0 b) l = g = 0 c) g = c = 0 d) r = g = 0

14) Refraction coefficient of current (J_T) is given by

a) $\frac{2Zo}{Zo + Zt}$ b) $\frac{Zo - Zt}{Zo + Zt}$ c) $\frac{2Zt}{Zo + Zt}$ d) $\frac{Zt - Zo}{Zo + Zt}$

15) Which type of corona discharge gives interference to radio broadcast ?
a) Pulse type
b) Pulse less type
c) Glow corona
d) None of the above

16) A sphere-sphere gap is used in HV laboratories for
a) Measurement of EHV
b) Calibrating other measuring apparatus
c) Both a and b
d) None of these

17) The type of EHV cable is
a) High pressure oil filled
b) Cross linked polyethylene
c) Gas insulated lines
d) All of the above

18) For reducing tower footing resistance it is better to use
a) Chemical and ground only
b) Chemical and counter poise only
c) Ground rod and counter poise only
d) Chemical ground rod and counter poise only

19) By increasing transmission line voltage to double of its original value the same power can be despatched keeping the line loss
a) Equal to original value
b) Half of original value
c) One fourth or original value
d) Double the original value

20) The allowable noise level at one MHz is
a) 22 dB b) 26 dB c) 30 dB d) 32 dB

SLR-EP – 509

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2016
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Write short notes on **any four** : **(4×5=20)**
   a) Explain in detail the advantages and disadvantages of high voltages.
   b) Explain :
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      ii) Galloping vibration
   c) Brief the charge potential relations of the multi conductor lines.
   d) Explain Reflection and refraction of travelling waves.
   e) Lightning stroke mechanism.
   f) Explain tower footing resistance.
   g) Limits for radio interference.

3. Solve **any two** : **(2×10=20)**
   a) Describe the line parameters of modes of propagation.
   b) Explain in detail the sequence inductance and capacitance.
   c) Derive the expression $P_C = \frac{1}{2} KC \left(V_m^2 - V_o^2 \right)$ for the energy loss from charge-voltage diagram.

SECTION – II

4. Write short notes on **any four** : **(4×5=20)**
   a) Power circle diagram and its use.
   b) Enlist sources of overvoltage and explain Ferro resonance voltages.
   c) Sub-synchronous resonance in series capacitors compensated lines.
   d) Reduction of switching surge over voltages.
   e) Construction and characteristics of ZnO gapless arrester.
   f) Describe the insulation co-ordination and over voltage protection based on lightning.

Set S

5. Solve **any two** : **(2×10=20)**

   a) Expression for generalized constants.

   b) What are the factors under steady state in design of EHV lines ?

   c) 100 MVA 230 KV 50 Hz transformer has X_f = 12 % and is connected to a line 200 Km long which has an inductance of 1 mH/Km. The filter connected to the L.V side 33 KV of the transformer, is required to suppress the 5^{th} harmonic generated by the TCR to 1 % of I_n. Calculate the value of filter capacitor if the filter inductance used in 2 mH.

SLR-EP – 510

Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – II) Examination, 2016
Elective – II : POWER SYSTEM DYNAMICS (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
*2) Assume data, **if necessary**.*
*3) **All** questions are **compulsory**.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The heart of the speed governor system, which control the change in speed is
   A) Linkage mechanism B) Fly ball speed governor
   C) Speed changer D) Hydraulic amplifier

2) The function of exciter is the structure of excitation
   A) To supply terminal voltage to the rotor circuit
   B) To supply current to the rotor field circuit of a synchronous generator
   C) To supply current to the stator circuit of a synchronous generator
   D) All of these

3) The equal area criteria is applicable for
   A) Multi machine system
   B) To any system with any number of loads and generators
   C) Single machine connected to infinite bus system
   D) System with induction machines

4) Steady state limit of a power system is improved by
   A) Reducing fault clearing time
   B) Using double circuit line instead of single circuit line
   C) Single pole switching
   D) Decreasing generator inertia

5) The transient stability limit of a power system can be increased by introducing
   A) Shunt capacitance B) Series capacitance C) Shunt inductance D) Series inductance

6) For turbo alternator of 100 MVA, inertia constant is 5. The value of H for a alternator of 50 MVA is
   A) 8 B) 12 C) 10 D) 15

7) For stable operation, the normal value δ normally lies between
   A) 0 to 30° B) 0 to 90° C) 0 to 60° D) 0 to 180°

8) The electrical angle (δ_e) = _____ mechanical angle (δ_m). P is the number of poles.
   A) P B) 2P C) P/2 D) 2/P

9) The swing equation is a non-linear equation.
   A) True B) False

P.T.O.

10) $\frac{\partial Pe}{\partial \delta}$ is known as

A) Synchronising coefficient
B) Stiffness of synchronous machine
C) Both A) and B)
D) None

11) The excitation system consists of
A) An exciter
B) An AVR
C) Both an exciter and an AVR
D) None of these

12) Dynamic stability characteristics of a power system are effective in the period
A) Immediately following a loss of load or generation
B) While governor action is taking place
C) Between the time at which governors begin to react and time at which steady state equilibrium is established
D) Both A) and B)

13) A synchronous motor connected to an infinite bus delivers takes power at a lag p.f. If its excitation is increased
A) The terminal voltage increases
B) The load angle increases
C) The p.f. of motor increases
D) Both B) and C)

14) For a steam turbine, the mechanical hydraulic controlled speed governing system consists of which of the following ?
A) A speed governor and speed relay
B) A speed governor, speed relay and a hydraulic servomotor
C) A speed governor, speed relay and a hydraulic servomotor governor controlled valves
D) None

15) For a fault in a power system, the term critical clearing time is related to
A) Steady state stability limit
B) Short circuit current limit
C) Transient stability limit
D) Reactive power limit

16) A shunt reactor is added at the infinite bus, which is fed by the synchronous generator. The stability limit will
A) Decrease
B) Increase
C) Remains the same
D) None of the above

17) Which one of the following enhances the transient stability of a system the most ?
A) Proper choice of make and break capabilities of the circuit breakers
B) Installation of 3-pole auto-reclose circuit breakers
C) Installation of single pole auto-reclose circuit breakers
D) None of the above

18) Hydraulic servomotors are used in _____ type of speed governing system.
A) Mechanical-hydraulic controlled
B) Electro-hydraulic controlled
C) Either A) or B)
D) Both A) and B)

19) The self inductance of any stator phase of synchronous machine is least when
A) The q-axis of field coincides with the axis of armature phase
B) The d-axis of field coincides with the axis of armature phase
C) Either A) or B)
D) None

20) Park's transformation matrix is
A) Linear
B) Time dependent
C) Power-variant
D) All of these

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SLR-EP – 510

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2016
Elective – II : POWER SYSTEM DYNAMICS (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
*2) Assume data, **if** necessary.*
*3) **All** questions are **compulsory**.*

SECTION – I

2. Attempt **any four** of the following : **(4×5=20)**
   a) Write comparison between transient and dynamic stability.
   b) Formulate stator and rotor flux linkage equations with the help of relevant diagrams.
   c) Write short notes on sub-transient, transient inductances and time constants.
   d) Write a short notes on concept and importance of stability in operation and design of power system.
   e) Explain DC excitation system with block diagram.
   f) Explain state space representation of IEEE type 1 excitation system.

3. Attempt **any two** of the following : **(2×10=20)**
   a) What are the classifications of excitation systems ? Discuss in detail the functional block diagram of the excitation control system.
   b) Write notes on following with reference to synchronous machine.
      i) Park's transformation
      ii) Per unit conversion
   c) Write notes on :
      i) Why we need to model the power system ?
      ii) Stability problem in large interconnected system.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**
   a) A 50 Hz, four pole turbo-generator rated 100 MVA, 11 KV has an inertia constant 8 MJ/MVA.
      i) Find the stored energy in the rotor at synchronous speed.
      ii) Find rotor acceleration, if the mechanical input is suddenly raised 80 MW for an electrical load of 50 MW. Neglect mechanical and electrical losses.
   b) Derive the swing equation for a single machine connected to infinite bus system.

c) Explain how the speed governor for hydraulic turbine different from the governor for steam turbine.

d) Explain DC excitation system with voltage regulator.

e) Discuss the various methods of improving steady state stability.

f) Explain mechanical hydraulic governor for hydro and steam turbines.

5. Attempt **any two** of the following : **(2×10=20)**

a) Explain the turbine speed governing mechanism and write the overall transfer function of speed governing system.

b) List the methods of improving the transient stability limit of a power system and explain any one method to improve the transient stability.

c) Differentiate between steady state stability and transient stability of a power system. Discuss the factors that affect i) steady state stability, and ii) transient stability of a power system.

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SLR-EP – 510

Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – II) Examination, 2016
Elective – II : POWER SYSTEM DYNAMICS (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
*2) Assume data, **if necessary**.*
*3) **All** questions are **compulsory**.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) A shunt reactor is added at the infinite bus, which is fed by the synchronous generator. The stability limit will
   A) Decrease B) Increase
   C) Remains the same D) None of the above

2) Which one of the following enhances the transient stability of a system the most ?
   A) Proper choice of make and break capabilities of the circuit breakers
   B) Installation of 3-pole auto-reclose circuit breakers
   C) Installation of single pole auto-reclose circuit breakers
   D) None of the above

3) Hydraulic servomotors are used in _____ type of speed governing system.
   A) Mechanical-hydraulic controlled B) Electro-hydraulic controlled
   C) Either A) or B) D) Both A) and B)

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   A) The q-axis of field coincides with the axis of armature phase
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   C) Either A) or B)
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5) Park's transformation matrix is
   A) Linear B) Time dependent
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6) The heart of the speed governor system, which control the change in speed is
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   A) To supply terminal voltage to the rotor circuit
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   C) To supply current to the stator circuit of a synchronous generator
   D) All of these

P.T.O.

8) The equal area criteria is applicable for
   A) Multi machine system
   B) To any system with any number of loads and generators
   C) Single machine connected to infinite bus system
   D) System with induction machines

9) Steady state limit of a power system is improved by
   A) Reducing fault clearing time
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   C) Single pole switching
   D) Decreasing generator inertia

10) The transient stability limit of a power system can be increased by introducing
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12) For stable operation, the normal value δ normally lies between
   A) 0 to 30° B) 0 to 90° C) 0 to 60° D) 0 to 180°

13) The electrical angle (δ_e) = _____ mechanical angle (δ_m). P is the number of poles.
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   A) Synchronising coefficient B) Stiffness of synchronous machine
   C) Both A) and B) D) None

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   A) Immediately following a loss of load or generation
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18) A synchronous motor connected to an infinite bus delivers takes power at a lag p.f. If its excitation is increased
   A) The terminal voltage increases B) The load angle increases
   C) The p.f. of motor increases D) Both B) and C)

19) For a steam turbine, the mechanical hydraulic controlled speed governing system consists of which of the following ?
   A) A speed governor and speed relay
   B) A speed governor, speed relay and a hydraulic servomotor
   C) A speed governor, speed relay and a hydraulic servomotor governor controlled valves
   D) None

20) For a fault in a power system, the term critical clearing time is related to
   A) Steady state stability limit B) Short circuit current limit
   C) Transient stability limit D) Reactive power limit

SLR-EP – 510

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2016
Elective – II : POWER SYSTEM DYNAMICS (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
*2) Assume data, **if** necessary.*
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SECTION – I

2. Attempt **any four** of the following : **(4×5=20)**
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   c) Write notes on :
      i) Why we need to model the power system ?
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SECTION – II

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   a) A 50 Hz, four pole turbo-generator rated 100 MVA, 11 KV has an inertia constant 8 MJ/MVA.
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   b) Derive the swing equation for a single machine connected to infinite bus system.

Set Q

c) Explain how the speed governor for hydraulic turbine different from the governor for steam turbine.

d) Explain DC excitation system with voltage regulator.

e) Discuss the various methods of improving steady state stability.

f) Explain mechanical hydraulic governor for hydro and steam turbines.

5. Attempt **any two** of the following : **(2×10=20)**

a) Explain the turbine speed governing mechanism and write the overall transfer function of speed governing system.

b) List the methods of improving the transient stability limit of a power system and explain any one method to improve the transient stability.

c) Differentiate between steady state stability and transient stability of a power system. Discuss the factors that affect i) steady state stability, and ii) transient stability of a power system.

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SLR-EP – 510

Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – II) Examination, 2016
Elective – II : POWER SYSTEM DYNAMICS (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

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   A) Steady state stability limit B) Short circuit current limit
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6) A shunt reactor is added at the infinite bus, which is fed by the synchronous generator. The stability limit will
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P.T.O.

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16) For turbo alternator of 100 MVA, inertia constant is 5. The value of H for a alternator of 50 MVA is
   A) 8 B) 12 C) 10 D) 15

17) For stable operation, the normal value δ normally lies between
   A) 0 to 30° B) 0 to 90° C) 0 to 60° D) 0 to 180°

18) The electrical angle (δ_e) = _____ mechanical angle (δ_m). P is the number of poles.
   A) P B) 2P C) P/2 D) 2/P

19) The swing equation is a non-linear equation.
   A) True B) False

20) $\frac{\partial Pe}{\partial \delta}$ is known as
   A) Synchronising coefficient B) Stiffness of synchronous machine
   C) Both A) and B) D) None

_____

Set R

SLR-EP – 510

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2016
Elective – II : POWER SYSTEM DYNAMICS (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
*2) Assume data, **if** necessary.*
*3) **All** questions are **compulsory**.*

SECTION – I

2. Attempt **any four** of the following : **(4×5=20)**
   a) Write comparison between transient and dynamic stability.
   b) Formulate stator and rotor flux linkage equations with the help of relevant diagrams.
   c) Write short notes on sub-transient, transient inductances and time constants.
   d) Write a short notes on concept and importance of stability in operation and design of power system.
   e) Explain DC excitation system with block diagram.
   f) Explain state space representation of IEEE type 1 excitation system.

3. Attempt **any two** of the following : **(2×10=20)**
   a) What are the classifications of excitation systems ? Discuss in detail the functional block diagram of the excitation control system.
   b) Write notes on following with reference to synchronous machine.
      i) Park's transformation
      ii) Per unit conversion
   c) Write notes on :
      i) Why we need to model the power system ?
      ii) Stability problem in large interconnected system.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**
   a) A 50 Hz, four pole turbo-generator rated 100 MVA, 11 KV has an inertia constant 8 MJ/MVA.
      i) Find the stored energy in the rotor at synchronous speed.
      ii) Find rotor acceleration, if the mechanical input is suddenly raised 80 MW for an electrical load of 50 MW. Neglect mechanical and electrical losses.
   b) Derive the swing equation for a single machine connected to infinite bus system.

c) Explain how the speed governor for hydraulic turbine different from the governor for steam turbine.

d) Explain DC excitation system with voltage regulator.

e) Discuss the various methods of improving steady state stability.

f) Explain mechanical hydraulic governor for hydro and steam turbines.

5. Attempt **any two** of the following : **(2×10=20)**

a) Explain the turbine speed governing mechanism and write the overall transfer function of speed governing system.

b) List the methods of improving the transient stability limit of a power system and explain any one method to improve the transient stability.

c) Differentiate between steady state stability and transient stability of a power system. Discuss the factors that affect i) steady state stability, and ii) transient stability of a power system.

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SLR-EP – 510

Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – II) Examination, 2016
Elective – II : POWER SYSTEM DYNAMICS (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data, ***if necessary****.*
3) ***All*** *questions are* ***compulsory****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) For turbo alternator of 100 MVA, inertia constant is 5. The value of H for a alternator of 50 MVA is
A) 8 B) 12 C) 10 D) 15

2) For stable operation, the normal value δ normally lies between
A) 0 to 30° B) 0 to 90° C) 0 to 60° D) 0 to 180°

3) The electrical angle (δ_e) = _____ mechanical angle (δ_m). P is the number of poles.
A) P B) 2P C) P/2 D) 2/P

4) The swing equation is a non-linear equation.
A) True B) False

5) $\frac{\partial Pe}{\partial \delta}$ is known as
A) Synchronising coefficient B) Stiffness of synchronous machine
C) Both A) and B) D) None

6) The excitation system consists of
A) An exciter B) An AVR
C) Both an exciter and an AVR D) None of these

7) Dynamic stability characteristics of a power system are effective in the period
A) Immediately following a loss of load or generation
B) While governor action is taking place
C) Between the time at which governors begin to react and time at which steady state equilibrium is established
D) Both A) and B)

8) A synchronous motor connected to an infinite bus delivers takes power at a lag p.f. If its excitation is increased
A) The terminal voltage increases B) The load angle increases
C) The p.f. of motor increases D) Both B) and C)

P.T.O.

9) For a steam turbine, the mechanical hydraulic controlled speed governing system consists of which of the following ?
   A) A speed governor and speed relay
   B) A speed governor, speed relay and a hydraulic servomotor
   C) A speed governor, speed relay and a hydraulic servomotor governor controlled valves
   D) None

10) For a fault in a power system, the term critical clearing time is related to
   A) Steady state stability limit
   B) Short circuit current limit
   C) Transient stability limit
   D) Reactive power limit

11) A shunt reactor is added at the infinite bus, which is fed by the synchronous generator. The stability limit will
   A) Decrease
   B) Increase
   C) Remains the same
   D) None of the above

12) Which one of the following enhances the transient stability of a system the most ?
   A) Proper choice of make and break capabilities of the circuit breakers
   B) Installation of 3-pole auto-reclose circuit breakers
   C) Installation of single pole auto-reclose circuit breakers
   D) None of the above

13) Hydraulic servomotors are used in _____ type of speed governing system.
   A) Mechanical-hydraulic controlled
   B) Electro-hydraulic controlled
   C) Either A) or B)
   D) Both A) and B)

14) The self inductance of any stator phase of synchronous machine is least when
   A) The q-axis of field coincides with the axis of armature phase
   B) The d-axis of field coincides with the axis of armature phase
   C) Either A) or B)
   D) None

15) Park's transformation matrix is
   A) Linear B) Time dependent C) Power-variant D) All of these

16) The heart of the speed governor system, which control the change in speed is
   A) Linkage mechanism
   B) Fly ball speed governor
   C) Speed changer
   D) Hydraulic amplifier

17) The function of exciter is the structure of excitation
   A) To supply terminal voltage to the rotor circuit
   B) To supply current to the rotor field circuit of a synchronous generator
   C) To supply current to the stator circuit of a synchronous generator
   D) All of these

18) The equal area criteria is applicable for
   A) Multi machine system
   B) To any system with any number of loads and generators
   C) Single machine connected to infinite bus system
   D) System with induction machines

19) Steady state limit of a power system is improved by
   A) Reducing fault clearing time
   B) Using double circuit line instead of single circuit line
   C) Single pole switching
   D) Decreasing generator inertia

20) The transient stability limit of a power system can be increased by introducing
   A) Shunt capacitance B) Series capacitance C) Shunt inductance D) Series inductance

SLR-EP – 510

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2016
Elective – II : POWER SYSTEM DYNAMICS (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
*2) Assume data, **if** necessary.*
*3) **All** questions are **compulsory**.*

SECTION – I

2. Attempt **any four** of the following : **(4×5=20)**
   a) Write comparison between transient and dynamic stability.
   b) Formulate stator and rotor flux linkage equations with the help of relevant diagrams.
   c) Write short notes on sub-transient, transient inductances and time constants.
   d) Write a short notes on concept and importance of stability in operation and design of power system.
   e) Explain DC excitation system with block diagram.
   f) Explain state space representation of IEEE type 1 excitation system.

3. Attempt **any two** of the following : **(2×10=20)**
   a) What are the classifications of excitation systems ? Discuss in detail the functional block diagram of the excitation control system.
   b) Write notes on following with reference to synchronous machine.
      i) Park's transformation
      ii) Per unit conversion
   c) Write notes on :
      i) Why we need to model the power system ?
      ii) Stability problem in large interconnected system.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**
   a) A 50 Hz, four pole turbo-generator rated 100 MVA, 11 KV has an inertia constant 8 MJ/MVA.
      i) Find the stored energy in the rotor at synchronous speed.
      ii) Find rotor acceleration, if the mechanical input is suddenly raised 80 MW for an electrical load of 50 MW. Neglect mechanical and electrical losses.
   b) Derive the swing equation for a single machine connected to infinite bus system.

c) Explain how the speed governor for hydraulic turbine different from the governor for steam turbine.

d) Explain DC excitation system with voltage regulator.

e) Discuss the various methods of improving steady state stability.

f) Explain mechanical hydraulic governor for hydro and steam turbines.

5. Attempt **any two** of the following : **(2×10=20)**

a) Explain the turbine speed governing mechanism and write the overall transfer function of speed governing system.

b) List the methods of improving the transient stability limit of a power system and explain any one method to improve the transient stability.

c) Differentiate between steady state stability and transient stability of a power system. Discuss the factors that affect i) steady state stability, and ii) transient stability of a power system.

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SLR-EP – 511

Seat No.	

Set P

B.E. (Electrical) (Part – II) (New) Examination, 2016
HIGH VOLTAGE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *and* ***4*** *are* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Figures to* ***right*** *indicate* ***full*** *marks.*
4) ***Assume*** *suitable data,* ***if necessary*** *with justification.*
5) ***Draw*** *neat diagrams and circuit diagrams* ***whenever*** *necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

Choose the correct answer :

SECTION – I **(1×10=10)**

1. 1) The requirement of gases for insulation purpose is
   a) High dielectric strength and thermal stability
   b) High dielectric strength only
   c) High thermal stability only
   d) None of the above

   2) Minimum sparking potential of air is about
   a) 100 volts b) 4.4 kV c) 40 volts d) 325 volts

   3) The usual mechanism of breakdown in solid dielectric is
   a) Intrinsic breakdown b) Electrochemical breakdown
   c) Thermal breakdown d) Chemical breakdown

   4) Breakdown is permanently occurs in
   a) Gases b) Liquids c) Solids d) All in these

   5) Paper insulation is mainly used in
   a) Cables and capacitors b) Transformers
   c) Rotating machines d) Circuit breakers

   6) Intrinsic strength of solid dielectric is about
   a) 50 to 100 kV/mm b) 500 to 1000 kV/mm
   c) 5 to 10 kV/mm d) 1 to 5 kV/mm

   7) The material used as insulation which is exposed to atmosphere is
   a) Ceramic and glass b) Polyvinyl Chloride (PVC)
   c) Polyester d) Polystyrene

P.T.O.

8) The most commonly used liquid as insulating medium is
   a) Mineral oil
   b) Cable oil
   c) Compound oil
   d) Organic or inorganic contained oil mixture

9) In Townsend's criterion, ionization process, the α and β (alpha and beeta) are functions of
   a) Applied voltage
   b) Pressure and temperature
   c) Electrical field
   d) Ratio of electrical field to pressure

10) In Townsend's current growth process the current (I) in uniform electric field is
   a) $I_o e^{-\alpha d}$
   b) $I_o e^{\alpha d}$
   c) $I_o e^{rd}$
   d) $I_o e^{-rd}$

SECTION – II **(1×10=10)**

4. 11) Electrostatic voltmeters can measure
   a) only d.c. voltage
   b) both d.c. and a.c. voltages upto high frequency
   c) impulse voltages
   d) a.c., d.c. and impulse voltage

12) Sphere gaps are used to measure
   a) d.c. voltage
   b) a.c. peak voltages
   c) d.c, a.c peak and impulse voltages
   d) only d.c. and a.c. peak voltages

13) The surge impedance measuring cable with its resistance neglected is
   a) $\sqrt{L/C}$
   b) $2\sqrt{L/C}$
   c) $2\sqrt{LC}$
   d) $\sqrt{C/L}$

14) In impulse testing of transformer fault location is usually done by
   a) neutral current oscillogram
   b) chopped wave oscillogram
   c) from its noise
   d) scanning method

15) Switching impulse test on UHV and EHV transformers can result in
   a) failure of transformer winding
   b) induce high voltage in other winding
   c) drive the transformer core saturation
   d) both b) and c)

16) Most important test conducted on Isolation and circuit breakers are
   a) voltage withstanding test
   b) short circuit test
   c) high current test
   d) temperature rise test

17) In a doubler circuit peak to peak ripple is
   a) 3 If/c
   b) 2 If/c
   c) 3 I/fc
   d) I/fc

18) In an impulse current generator the capacitors are connected in
   a) series
   b) parallel
   c) any type
   d) none of these

19) Trigetron gap is used with
   a) cascade transformer unit
   b) impulse current generator
   c) impulse voltage generator
   d) d.c. voltage doubler circuit

20) Hall generators are normally used to measure
   a) impulse voltage
   b) unidirectional impulse currents
   c) any type of impulse current
   d) large a.c. currents

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SLR-EP – 511

Seat No.	

B.E. (Electrical) (Part – II) (New) Examination, 2016
HIGH VOLTAGE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to **right** indicate **full** marks.*

*2) **Assume** suitable data, **if necessary** with justification.*

*3) **Draw** neat diagrams and circuit diagrams **whenever** necessary.*

SECTION – I

2. Write short note on **any four** : **(4×5=20)**

1) Townsend's current growth equation and its secondary ionization process with current equation.

2) State and drive Paschen's law and draw V and pd curve and describe in short.

3) Characteristics of liquid dielectrics.

4) Breakdown in solid dielectrics due to Treeing and tracking.

5) Classification in liquid dielectrics.

3. Solve **any two** questions : **(2×10=20)**

1) Write all three types of breakdown mechanism in case of commercial liquids.

2) Explain post-breakdown phenomena in gases along with Glow and Arc discharge from neat drawn figure.

3) Describe characteristics and applications of following three solid dielectrics –

a) Paper and Board

b) Ceramic

c) Polyvinyl Chloride (PVC).

SECTION – II

5. Write short notes on **any four** : **(4×5=20)**

   1) Describe with diagram Van-de-Graaff generator.

   2) Components of multistage impulse generator.

   3) Analysis of impulse generator circuit of series R-L-C circuit.

   4) Principle and operation of resonance transformer.

   5) Voltage doubler circuit with circuit and description.

6. Solve **any two** questions : **(2×10=20)**

   1) Draw and describe the circuit for generating high alternating voltages by using cascade transformer and also describe with diagram the second scheme for providing excitation to second and third stages.

   2) Draw and describe the circuit for producing impulse current generator using capacitors, R-L-C circuit and explain front and tail time of impulse wave giving all equations.

   3) What are different types of testing on insulators and bushings.

SLR-EP – 511

Seat No.	

Set **Q**

B.E. (Electrical) (Part – II) (New) Examination, 2016
HIGH VOLTAGE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No. **1** and **4** are **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Figures to **right** indicate **full** marks.*
4) ***Assume** suitable data, **if necessary** with justification.*
5) ***Draw** neat diagrams and circuit diagrams **whenever** necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

Choose the correct answer :

SECTION – I **(1×10=10)**

1. 1) In Townsend's criterion, ionization process, the α and β (alpha and beeta) are functions of
   a) Applied voltage
   b) Pressure and temperature
   c) Electrical field
   d) Ratio of electrical field to pressure

   2) In Townsend's current growth process the current (I) in uniform electric field is

   a) $I_o e^{-\alpha d}$ b) $I_o e^{\alpha d}$ c) $I_o e^{rd}$ d) $I_o e^{-rd}$

   3) The material used as insulation which is exposed to atmosphere is
   a) Ceramic and glass
   b) Polyvinyl Chloride (PVC)
   c) Polyester
   d) Polystyrene

   4) The most commonly used liquid as insulating medium is
   a) Mineral oil
   b) Cable oil
   c) Compound oil
   d) Organic or inorganic contained oil mixture

   5) The requirement of gases for insulation purpose is
   a) High dielectric strength and thermal stability
   b) High dielectric strength only
   c) High thermal stability only
   d) None of the above

   6) Minimum sparking potential of air is about
   a) 100 volts b) 4.4 kV c) 40 volts d) 325 volts

P.T.O.

7) The usual mechanism of breakdown in solid dielectric is
   a) Intrinsic breakdown b) Electrochemical breakdown
   c) Thermal breakdown d) Chemical breakdown

8) Breakdown is permanently occurs in
   a) Gases b) Liquids c) Solids d) All in these

9) Paper insulation is mainly used in
   a) Cables and capacitors b) Transformers
   c) Rotating machines d) Circuit breakers

10) Intrinsic strength of solid dielectric is about
   a) 50 to 100 kV/mm b) 500 to 1000 kV/mm
   c) 5 to 10 kV/mm d) 1 to 5 kV/mm

SECTION – II **(1×10=10)**

4. 11) Trigetron gap is used with
   a) cascade transformer unit b) impulse current generator
   c) impulse voltage generator d) d.c. voltage doubler circuit

12) Hall generators are normally used to measure
   a) impulse voltage b) unidirectional impulse currents
   c) any type of impulse current d) large a.c. currents

13) In a doubler circuit peak to peak ripple is
   a) 3 If/c b) 2 If/c c) 3 I/fc d) I/fc

14) In an impulse current generator the capacitors are connected in
   a) series b) parallel c) any type d) none of these

15) Electrostatic voltmeters can measure
   a) only d.c. voltage b) both d.c. and a.c. voltages upto high frequency
   c) impulse voltages d) a.c., d.c. and impulse voltage

16) Sphere gaps are used to measure
   a) d.c. voltage b) a.c. peak voltages
   c) d.c, a.c peak and impulse voltages d) only d.c. and a.c. peak voltages

17) The surge impedance measuring cable with its resistance neglected is
   a) $\sqrt{L/C}$ b) $2\sqrt{L/C}$ c) $2\sqrt{LC}$ d) $\sqrt{C/L}$

18) In impulse testing of transformer fault location is usually done by
   a) neutral current oscillogram b) chopped wave oscillogram
   c) from its noise d) scanning method

19) Switching impulse test on UHV and EHV transformers can result in
   a) failure of transformer winding b) induce high voltage in other winding
   c) drive the transformer core saturation d) both b) and c)

20) Most important test conducted on Isolation and circuit breakers are
   a) voltage withstanding test b) short circuit test
   c) high current test d) temperature rise test

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Set Q

SLR-EP – 511

Seat No.	

B.E. (Electrical) (Part – II) (New) Examination, 2016
HIGH VOLTAGE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to **right** indicate **full** marks.*

*2) **Assume** suitable data, **if necessary** with justification.*

*3) **Draw** neat diagrams and circuit diagrams **whenever** necessary.*

SECTION – I

2. Write short note on **any four** : **(4×5=20)**

   1) Townsend's current growth equation and its secondary ionization process with current equation.

   2) State and drive Paschen's law and draw V and pd curve and describe in short.

   3) Characteristics of liquid dielectrics.

   4) Breakdown in solid dielectrics due to Treeing and tracking.

   5) Classification in liquid dielectrics.

3. Solve **any two** questions : **(2×10=20)**

   1) Write all three types of breakdown mechanism in case of commercial liquids.

   2) Explain post-breakdown phenomena in gases along with Glow and Arc discharge from neat drawn figure.

   3) Describe characteristics and applications of following three solid dielectrics –

      a) Paper and Board

      b) Ceramic

      c) Polyvinyl Chloride (PVC).

SECTION – II

5. Write short notes on **any four** : **(4×5=20)**

   1) Describe with diagram Van-de-Graaff generator.

   2) Components of multistage impulse generator.

   3) Analysis of impulse generator circuit of series R-L-C circuit.

   4) Principle and operation of resonance transformer.

   5) Voltage doubler circuit with circuit and description.

6. Solve **any two** questions : **(2×10=20)**

   1) Draw and describe the circuit for generating high alternating voltages by using cascade transformer and also describe with diagram the second scheme for providing excitation to second and third stages.

   2) Draw and describe the circuit for producing impulse current generator using capacitors, R-L-C circuit and explain front and tail time of impulse wave giving all equations.

   3) What are different types of testing on insulators and bushings.

SLR-EP – 511

Seat No.	

Set R

B.E. (Electrical) (Part – II) (New) Examination, 2016
HIGH VOLTAGE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *and* ***4*** *are* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Figures to* ***right*** *indicate* ***full*** *marks.*
4) ***Assume*** *suitable data,* ***if necessary*** *with justification.*
5) ***Draw*** *neat diagrams and circuit diagrams* ***whenever*** *necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

Choose the correct answer :

SECTION – I **(1×10=10)**

1. 1) Paper insulation is mainly used in
   a) Cables and capacitors b) Transformers
   c) Rotating machines d) Circuit breakers

   2) Intrinsic strength of solid dielectric is about
   a) 50 to 100 kV/mm b) 500 to 1000 kV/mm
   c) 5 to 10 kV/mm d) 1 to 5 kV/mm

   3) In Townsend's criterion, ionization process, the α and β (alpha and beeta) are functions of
   a) Applied voltage b) Pressure and temperature
   c) Electrical field d) Ratio of electrical field to pressure

   4) In Townsend's current growth process the current (I) in uniform electric field is
   a) $I_o e^{-\alpha d}$ b) $I_o e^{\alpha d}$ c) $I_o e^{rd}$ d) $I_o e^{-rd}$

   5) The usual mechanism of breakdown in solid dielectric is
   a) Intrinsic breakdown b) Electrochemical breakdown
   c) Thermal breakdown d) Chemical breakdown

   6) Breakdown is permanently occurs in
   a) Gases b) Liquids c) Solids d) All in these

   7) The requirement of gases for insulation purpose is
   a) High dielectric strength and thermal stability
   b) High dielectric strength only
   c) High thermal stability only
   d) None of the above

P.T.O.

8) Minimum sparking potential of air is about
   a) 100 volts b) 4.4 kV c) 40 volts d) 325 volts

9) The material used as insulation which is exposed to atmosphere is
   a) Ceramic and glass b) Polyvinyl Chloride (PVC)
   c) Polyester d) Polystyrene

10) The most commonly used liquid as insulating medium is
   a) Mineral oil
   b) Cable oil
   c) Compound oil
   d) Organic or inorganic contained oil mixture

SECTION – II **(1×10=10)**

4. 11) Switching impulse test on UHV and EHV transformers can result in
   a) failure of transformer winding b) induce high voltage in other winding
   c) drive the transformer core saturation d) both b) and c)

12) Most important test conducted on Isolation and circuit breakers are
   a) voltage withstanding test b) short circuit test
   c) high current test d) temperature rise test

13) Trigetron gap is used with
   a) cascade transformer unit b) impulse current generator
   c) impulse voltage generator d) d.c. voltage doubler circuit

14) Hall generators are normally used to measure
   a) impulse voltage b) unidirectional impulse currents
   c) any type of impulse current d) large a.c. currents

15) The surge impedance measuring cable with its resistance neglected is
   a) $\sqrt{L/C}$ b) $2\sqrt{L/C}$ c) $2\sqrt{LC}$ d) $\sqrt{C/L}$

16) In impulse testing of transformer fault location is usually done by
   a) neutral current oscillogram b) chopped wave oscillogram
   c) from its noise d) scanning method

17) Electrostatic voltmeters can measure
   a) only d.c. voltage b) both d.c. and a.c. voltages upto high frequency
   c) impulse voltages d) a.c., d.c. and impulse voltage

18) Sphere gaps are used to measure
   a) d.c. voltage b) a.c. peak voltages
   c) d.c, a.c peak and impulse voltages d) only d.c. and a.c. peak voltages

19) In a doubler circuit peak to peak ripple is
   a) 3 If/c b) 2 If/c c) 3 I/fc d) I/fc

20) In an impulse current generator the capacitors are connected in
   a) series b) parallel c) any type d) none of these

SLR-EP – 511

Seat No.	

B.E. (Electrical) (Part – II) (New) Examination, 2016
HIGH VOLTAGE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to **right** indicate **full** marks.*

*2) **Assume** suitable data, **if necessary** with justification.*

*3) **Draw** neat diagrams and circuit diagrams **whenever** necessary.*

SECTION – I

2. Write short note on **any four** : **(4×5=20)**

   1) Townsend's current growth equation and its secondary ionization process with current equation.

   2) State and drive Paschen's law and draw V and pd curve and describe in short.

   3) Characteristics of liquid dielectrics.

   4) Breakdown in solid dielectrics due to Treeing and tracking.

   5) Classification in liquid dielectrics.

3. Solve **any two** questions : **(2×10=20)**

   1) Write all three types of breakdown mechanism in case of commercial liquids.

   2) Explain post-breakdown phenomena in gases along with Glow and Arc discharge from neat drawn figure.

   3) Describe characteristics and applications of following three solid dielectrics –

      a) Paper and Board

      b) Ceramic

      c) Polyvinyl Chloride (PVC).

SECTION – II

5. Write short notes on **any four** : **(4×5=20)**

   1) Describe with diagram Van-de-Graaff generator.

   2) Components of multistage impulse generator.

   3) Analysis of impulse generator circuit of series R-L-C circuit.

   4) Principle and operation of resonance transformer.

   5) Voltage doubler circuit with circuit and description.

6. Solve **any two** questions : **(2×10=20)**

   1) Draw and describe the circuit for generating high alternating voltages by using cascade transformer and also describe with diagram the second scheme for providing excitation to second and third stages.

   2) Draw and describe the circuit for producing impulse current generator using capacitors, R-L-C circuit and explain front and tail time of impulse wave giving all equations.

   3) What are different types of testing on insulators and bushings.

SLR-EP – 511

Seat No.	

Set **S**

B.E. (Electrical) (Part – II) (New) Examination, 2016
HIGH VOLTAGE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *and* ***4*** *are* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Figures to* ***right*** *indicate* ***full*** *marks.*
4) ***Assume*** *suitable data,* ***if necessary*** *with justification.*
5) ***Draw*** *neat diagrams and circuit diagrams* ***whenever*** *necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

Choose the correct answer :

SECTION – I **(1×10=10)**

1. 1) The usual mechanism of breakdown in solid dielectric is
   a) Intrinsic breakdown b) Electrochemical breakdown
   c) Thermal breakdown d) Chemical breakdown

   2) Breakdown is permanently occurs in
   a) Gases b) Liquids c) Solids d) All in these

   3) Paper insulation is mainly used in
   a) Cables and capacitors b) Transformers
   c) Rotating machines d) Circuit breakers

   4) Intrinsic strength of solid dielectric is about
   a) 50 to 100 kV/mm b) 500 to 1000 kV/mm
   c) 5 to 10 kV/mm d) 1 to 5 kV/mm

   5) The material used as insulation which is exposed to atmosphere is
   a) Ceramic and glass b) Polyvinyl Chloride (PVC)
   c) Polyester d) Polystyrene

   6) The most commonly used liquid as insulating medium is
   a) Mineral oil
   b) Cable oil
   c) Compound oil
   d) Organic or inorganic contained oil mixture

   7) In Townsend's criterion, ionization process, the α and β (alpha and beeta) are functions of
   a) Applied voltage b) Pressure and temperature
   c) Electrical field d) Ratio of electrical field to pressure

P.T.O.

8) In Townsend's current growth process the current (I) in uniform electric field is

a) $I_o e^{-\alpha d}$ b) $I_o e^{\alpha d}$ c) $I_o e^{rd}$ d) $I_o e^{-rd}$

9) The requirement of gases for insulation purpose is
   a) High dielectric strength and thermal stability
   b) High dielectric strength only
   c) High thermal stability only
   d) None of the above

10) Minimum sparking potential of air is about
   a) 100 volts b) 4.4 kV c) 40 volts d) 325 volts

SECTION – II **(1×10=10)**

4. 11) The surge impedance measuring cable with its resistance neglected is

a) $\sqrt{L/C}$ b) $2\sqrt{L/C}$ c) $2\sqrt{LC}$ d) $\sqrt{C/L}$

12) In impulse testing of transformer fault location is usually done by
   a) neutral current oscillogram b) chopped wave oscillogram
   c) from its noise d) scanning method

13) Switching impulse test on UHV and EHV transformers can result in
   a) failure of transformer winding b) induce high voltage in other winding
   c) drive the transformer core saturation d) both b) and c)

14) Most important test conducted on Isolation and circuit breakers are
   a) voltage withstanding test b) short circuit test
   c) high current test d) temperature rise test

15) In a doubler circuit peak to peak ripple is
   a) 3 If/c b) 2 If/c c) 3 I/fc d) I/fc

16) In an impulse current generator the capacitors are connected in
   a) series b) parallel c) any type d) none of these

17) Trigetron gap is used with
   a) cascade transformer unit b) impulse current generator
   c) impulse voltage generator d) d.c. voltage doubler circuit

18) Hall generators are normally used to measure
   a) impulse voltage b) unidirectional impulse currents
   c) any type of impulse current d) large a.c. currents

19) Electrostatic voltmeters can measure
   a) only d.c. voltage b) both d.c. and a.c. voltages upto high frequency
   c) impulse voltages d) a.c., d.c. and impulse voltage

20) Sphere gaps are used to measure
   a) d.c. voltage b) a.c. peak voltages
   c) d.c, a.c peak and impulse voltages d) only d.c. and a.c. peak voltages

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SLR-EP – 511

Seat No.	

B.E. (Electrical) (Part – II) (New) Examination, 2016
HIGH VOLTAGE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to **right** indicate **full** marks.*

*2) **Assume** suitable data, **if necessary** with justification.*

*3) **Draw** neat diagrams and circuit diagrams **whenever** necessary.*

SECTION – I

2. Write short note on **any four** : **(4×5=20)**

   1) Townsend's current growth equation and its secondary ionization process with current equation.

   2) State and drive Paschen's law and draw V and pd curve and describe in short.

   3) Characteristics of liquid dielectrics.

   4) Breakdown in solid dielectrics due to Treeing and tracking.

   5) Classification in liquid dielectrics.

3. Solve **any two** questions : **(2×10=20)**

   1) Write all three types of breakdown mechanism in case of commercial liquids.

   2) Explain post-breakdown phenomena in gases along with Glow and Arc discharge from neat drawn figure.

   3) Describe characteristics and applications of following three solid dielectrics –

      a) Paper and Board

      b) Ceramic

      c) Polyvinyl Chloride (PVC).

SECTION – II

5. Write short notes on **any four** : **(4×5=20)**

   1) Describe with diagram Van-de-Graaff generator.

   2) Components of multistage impulse generator.

   3) Analysis of impulse generator circuit of series R-L-C circuit.

   4) Principle and operation of resonance transformer.

   5) Voltage doubler circuit with circuit and description.

6. Solve **any two** questions : **(2×10=20)**

   1) Draw and describe the circuit for generating high alternating voltages by using cascade transformer and also describe with diagram the second scheme for providing excitation to second and third stages.

   2) Draw and describe the circuit for producing impulse current generator using capacitors, R-L-C circuit and explain front and tail time of impulse wave giving all equations.

   3) What are different types of testing on insulators and bushings.

SLR-EP – 512

Seat No.	

Set P

B.E. (Electrical) (Part – II) Examination, 2016
RENEWABLE ENERGY SOURCES (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The percentage of the incoming radiation reflected back to space by the earth is
   a) 10% b) 20% c) 30% d) 40%

2) A geothermal resource tapped for electricity generation could provide energy for about
   a) 50 years b) 1000 years c) 5 years d) 1 year

3) The zone of likely geothermal sites corresponds roughly to
   a) cold, hilly regions
   b) hot, flat regions
   c) tropical regions
   d) the regions of seismic and volcanic activities

4) Pumping of water from ocean to basin during high tide
   a) Increases the net energy generation
   b) Decreases the net energy generation
   c) Helps in the uniform power generation
   d) Decreases the net tidal range

5) Small Hydro Plants (SHPs) have
   a) High head and small capacity b) Low head and small capacity
   c) Low head and large capacity d) Large head and large capacity

6) What is the standard value of solar constant ?
   a) 1 KWm^2 b) 1.367 KWm^2 c) 1.5 KWm^2 d) 5 KWm^2

7) Most of the world's geothermal sites today are located
   a) in south hemi sphere of the globe b) near the coast of Atlantic ocean
   c) near the edges of pacific plate d) near the equator

8) Compared to the fixed-dome model of a biogas plant, a floating-drumd-type plant
   a) is more efficient
   b) is less efficient
   c) is equally efficient
   d) is very cheap

9) The energy payback period an single crystal silicon cell is
   a) 6 months to 1 year
   b) 10 to 20 years
   c) 1 to 2 years
   d) 3 to 5 years

10) A solar thermal collector
   a) Collects the solar energy and reflects it back
   b) Absorbs the solar radiation and dissipates it to the ambient
   c) Collects and converts the solar energy into electrical energy
   d) Collects and converts the solar energy in to thermal energy and delivers it to the next stage of the system

11) The value of concentration ratio of a flat-plate collector is
   a) 1 b) 10 c) 100 d) 1000

12) In most hydrothermal fields, hot spots occur at a depth of about
   a) 10 km b) 10 m c) 2 to 3 km d) 30 km

13) The concentration-type solar collector
   a) First absorbs the radiation and then increases its concentration
   b) Increases the density of solar radiation before absorbing it
   c) Dilutes the density of solar radiation before absorbing it
   d) Increases the intensity of solar radiation and then reflects it back

14) The minimum temperature difference between source and sink in an ocean required by a practical heat engine is
   a) 540°C b) 120°C c) 10°C d) 20°C

15) The range of wind speed suitable for wind power generator is
   a) 0 to 5 m/s b) 5 to 25 m/s c) 25 to 50 m/s d) 50 to 75 m/s

16) The temperature in the crust increases with depth at a rate of about
   a) 300°C/km b) 10°C/km c) 1°C/km d) 30°C/km

17) The radiation received on the earth's surface directly without change in direction is called
   a) terrestrial b) extra-terrestrial c) diffuse d) beam

18) C.R. varies from 1 to 4 in case of
   a) flat-plate collector
   b) plane receiver with plane collector
   c) cylindrical parabolic collector
   d) both a and b

19) Which region of sun constitutes main mass of the sun ?
   a) solar interior
   b) photosphere
   c) solar atmosphere
   d) chromosphere

20) A device which is used to produces potable water by utilizing solar heat energy is called
   a) Solar water still
   b) Solar constant
   c) Solar cooling system
   d) Solar ponds

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Seat No.	

B.E. (Electrical) (Part – II) Examination, 2016
RENEWABLE ENERGY SOURCES (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

2. Solve **any four** : **(5×4=20)**
   1) Draw and describe the working of pyrheliometer, how it is different from pyranometer.
   2) Draw and describe the working of sun-shine recorder.
   3) Explain the advantages and disadvantages of concentrating collectors over flat plate type collectors.
   4) What is solar pond ? Discuss the principle of operation on which the solar pond works.
   5) Write short note on photovoltaic energy conversion.
   6) Draw and explain flat-plat collector. What are the advantages and disadvantages of flat plate collector ?

3. Solve **any two** : **(10×2=20)**
   1) With the help of neat diagram explain terrestrial an extra-terrestrial solar radiation.
   2) Draw and describe the different types of horizontal axis wind mills. Explain the advantages and disadvantages of wind energy.
   3) Draw and describe the solar cooling system.

4. Solve **any four** : **(5×4=20)**
   1) Draw and explain the fixed drum type biogas plant.
   2) With the help of bacterial reactions explain principle of biogas generation.
   3) Draw and describe the flash steam geothermal power plant.
   4) Explain the different types of geothermal resources.
   5) Write short note on Aerobic and Anaerobic digestion.
   6) Write a note on wave energy potential in India.

5. Solve **any two** : **(10×2=20)**
   1) Draw and explain the floating drum type biogas plant. Explain the comparison between fixed and float drum biodigesters.
   2) Draw and describe the wave energy conversion systems. What are the advantages and disadvantages of wave energy ?
   3) Describe the working of closed cycle OTEC system.

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SLR-EP – 512

Seat No.	

Set Q

B.E. (Electrical) (Part – II) Examination, 2016
RENEWABLE ENERGY SOURCES (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The temperature in the crust increases with depth at a rate of about
a) 300°C/km b) 10°C/km c) 1°C/km d) 30°C/km

2) The radiation received on the earth's surface directly without change in direction is called
a) terrestrial b) extra-terrestrial c) diffuse d) beam

3) C.R. varies from 1 to 4 in case of
a) flat-plate collector b) plane receiver with plane collector
c) cylindrical parabolic collector d) both a and b

4) Which region of sun constitutes main mass of the sun ?
a) solar interior b) photosphere
c) solar atmosphere d) chromosphere

5) A device which is used to produces potable water by utilizing solar heat energy is called
a) Solar water still b) Solar constant
c) Solar cooling system d) Solar ponds

6) The percentage of the incoming radiation reflected back to space by the earth is
a) 10% b) 20% c) 30% d) 40%

7) A geothermal resource tapped for electricity generation could provide energy for about
a) 50 years b) 1000 years c) 5 years d) 1 year

8) The zone of likely geothermal sites corresponds roughly to
a) cold, hilly regions
b) hot, flat regions
c) tropical regions
d) the regions of seismic and volcanic activities

9) Pumping of water from ocean to basin during high tide
   a) Increases the net energy generation
   b) Decreases the net energy generation
   c) Helps in the uniform power generation
   d) Decreases the net tidal range

10) Small Hydro Plants (SHPs) have
   a) High head and small capacity
   b) Low head and small capacity
   c) Low head and large capacity
   d) Large head and large capacity

11) What is the standard value of solar constant ?
   a) 1 KWm^2 b) 1.367 KWm^2 c) 1.5 KWm^2 d) 5 KWm^2

12) Most of the world's geothermal sites today are located
   a) in south hemi sphere of the globe
   b) near the coast of Atlantic ocean
   c) near the edges of pacific plate
   d) near the equator

13) Compared to the fixed-dome model of a biogas plant, a floating-drumd-type plant
   a) is more efficient
   b) is less efficient
   c) is equally efficient
   d) is very cheap

14) The energy payback period an single crystal silicon cell is
   a) 6 months to 1 year
   b) 10 to 20 years
   c) 1 to 2 years
   d) 3 to 5 years

15) A solar thermal collector
   a) Collects the solar energy and reflects it back
   b) Absorbs the solar radiation and dissipates it to the ambient
   c) Collects and converts the solar energy into electrical energy
   d) Collects and converts the solar energy in to thermal energy and delivers it to the next stage of the system

16) The value of concentration ratio of a flat-plate collector is
   a) 1 b) 10 c) 100 d) 1000

17) In most hydrothermal fields, hot spots occur at a depth of about
   a) 10 km b) 10 m c) 2 to 3 km d) 30 km

18) The concentration-type solar collector
   a) First absorbs the radiation and then increases its concentration
   b) Increases the density of solar radiation before absorbing it
   c) Dilutes the density of solar radiation before absorbing it
   d) Increases the intensity of solar radiation and then reflects it back

19) The minimum temperature difference between source and sink in an ocean required by a practical heat engine is
   a) 540°C b) 120°C c) 10°C d) 20°C

20) The range of wind speed suitable for wind power generator is
   a) 0 to 5 m/s b) 5 to 25 m/s c) 25 to 50 m/s d) 50 to 75 m/s

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Seat No.	

B.E. (Electrical) (Part – II) Examination, 2016
RENEWABLE ENERGY SOURCES (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

2. Solve **any four** : **(5×4=20)**
   1) Draw and describe the working of pyrheliometer, how it is different from pyranometer.
   2) Draw and describe the working of sun-shine recorder.
   3) Explain the advantages and disadvantages of concentrating collectors over flat plate type collectors.
   4) What is solar pond ? Discuss the principle of operation on which the solar pond works.
   5) Write short note on photovoltaic energy conversion.
   6) Draw and explain flat-plat collector. What are the advantages and disadvantages of flat plate collector ?

3. Solve **any two** : **(10×2=20)**
   1) With the help of neat diagram explain terrestrial an extra-terrestrial solar radiation.
   2) Draw and describe the different types of horizontal axis wind mills. Explain the advantages and disadvantages of wind energy.
   3) Draw and describe the solar cooling system.

4. Solve **any four** : **(5×4=20)**
   1) Draw and explain the fixed drum type biogas plant.
   2) With the help of bacterial reactions explain principle of biogas generation.
   3) Draw and describe the flash steam geothermal power plant.
   4) Explain the different types of geothermal resources.
   5) Write short note on Aerobic and Anaerobic digestion.
   6) Write a note on wave energy potential in India.

5. Solve **any two** : **(10×2=20)**
   1) Draw and explain the floating drum type biogas plant. Explain the comparison between fixed and float drum biodigesters.
   2) Draw and describe the wave energy conversion systems. What are the advantages and disadvantages of wave energy ?
   3) Describe the working of closed cycle OTEC system.

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Set Q

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Seat No.	

Set R

B.E. (Electrical) (Part – II) Examination, 2016
RENEWABLE ENERGY SOURCES (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The value of concentration ratio of a flat-plate collector is
a) 1 b) 10 c) 100 d) 1000

2) In most hydrothermal fields, hot spots occur at a depth of about
a) 10 km b) 10 m c) 2 to 3 km d) 30 km

3) The concentration-type solar collector
a) First absorbs the radiation and then increases its concentration
b) Increases the density of solar radiation before absorbing it
c) Dilutes the density of solar radiation before absorbing it
d) Increases the intensity of solar radiation and then reflects it back

4) The minimum temperature difference between source and sink in an ocean required by a practical heat engine is
a) 540°C b) 120°C c) 10°C d) 20°C

5) The range of wind speed suitable for wind power generator is
a) 0 to 5 m/s b) 5 to 25 m/s c) 25 to 50 m/s d) 50 to 75 m/s

6) The temperature in the crust increases with depth at a rate of about
a) 300°C/km b) 10°C/km c) 1°C/km d) 30°C/km

7) The radiation received on the earth's surface directly without change in direction is called
a) terrestrial b) extra-terrestrial c) diffuse d) beam

8) C.R. varies from 1 to 4 in case of
a) flat-plate collector b) plane receiver with plane collector
c) cylindrical parabolic collector d) both a and b

9) Which region of sun constitutes main mass of the sun ?
a) solar interior b) photosphere
c) solar atmosphere d) chromosphere

10) A device which is used to produces potable water by utilizing solar heat energy is called
   a) Solar water still
   b) Solar constant
   c) Solar cooling system
   d) Solar ponds

11) The percentage of the incoming radiation reflected back to space by the earth is
   a) 10%
   b) 20%
   c) 30%
   d) 40%

12) A geothermal resource tapped for electricity generation could provide energy for about
   a) 50 years
   b) 1000 years
   c) 5 years
   d) 1 year

13) The zone of likely geothermal sites corresponds roughly to
   a) cold, hilly regions
   b) hot, flat regions
   c) tropical regions
   d) the regions of seismic and volcanic activities

14) Pumping of water from ocean to basin during high tide
   a) Increases the net energy generation
   b) Decreases the net energy generation
   c) Helps in the uniform power generation
   d) Decreases the net tidal range

15) Small Hydro Plants (SHPs) have
   a) High head and small capacity
   b) Low head and small capacity
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   d) Large head and large capacity

16) What is the standard value of solar constant ?
   a) 1 KWm^2
   b) 1.367 KWm^2
   c) 1.5 KWm^2
   d) 5 KWm^2

17) Most of the world's geothermal sites today are located
   a) in south hemi sphere of the globe
   b) near the coast of Atlantic ocean
   c) near the edges of pacific plate
   d) near the equator

18) Compared to the fixed-dome model of a biogas plant, a floating-drumd-type plant
   a) is more efficient
   b) is less efficient
   c) is equally efficient
   d) is very cheap

19) The energy payback period an single crystal silicon cell is
   a) 6 months to 1 year
   b) 10 to 20 years
   c) 1 to 2 years
   d) 3 to 5 years

20) A solar thermal collector
   a) Collects the solar energy and reflects it back
   b) Absorbs the solar radiation and dissipates it to the ambient
   c) Collects and converts the solar energy into electrical energy
   d) Collects and converts the solar energy in to thermal energy and delivers it to the next stage of the system

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SLR-EP – 512

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2016
RENEWABLE ENERGY SOURCES (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

2. Solve **any four** : **(5×4=20)**
   1) Draw and describe the working of pyrheliometer, how it is different from pyranometer.
   2) Draw and describe the working of sun-shine recorder.
   3) Explain the advantages and disadvantages of concentrating collectors over flat plate type collectors.
   4) What is solar pond ? Discuss the principle of operation on which the solar pond works.
   5) Write short note on photovoltaic energy conversion.
   6) Draw and explain flat-plat collector. What are the advantages and disadvantages of flat plate collector ?

3. Solve **any two** : **(10×2=20)**
   1) With the help of neat diagram explain terrestrial an extra-terrestrial solar radiation.
   2) Draw and describe the different types of horizontal axis wind mills. Explain the advantages and disadvantages of wind energy.
   3) Draw and describe the solar cooling system.

4. Solve **any four** : **(5×4=20)**
   1) Draw and explain the fixed drum type biogas plant.
   2) With the help of bacterial reactions explain principle of biogas generation.
   3) Draw and describe the flash steam geothermal power plant.
   4) Explain the different types of geothermal resources.
   5) Write short note on Aerobic and Anaerobic digestion.
   6) Write a note on wave energy potential in India.

5. Solve **any two** : **(10×2=20)**
   1) Draw and explain the floating drum type biogas plant. Explain the comparison between fixed and float drum biodigesters.
   2) Draw and describe the wave energy conversion systems. What are the advantages and disadvantages of wave energy ?
   3) Describe the working of closed cycle OTEC system.

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Set R

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Seat No.	

Set S

B.E. (Electrical) (Part – II) Examination, 2016
RENEWABLE ENERGY SOURCES (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) What is the standard value of solar constant ?
   a) 1 KWm^2 b) 1.367 KWm^2 c) 1.5 KWm^2 d) 5 KWm^2

2) Most of the world's geothermal sites today are located
   a) in south hemi sphere of the globe b) near the coast of Atlantic ocean
   c) near the edges of pacific plate d) near the equator

3) Compared to the fixed-dome model of a biogas plant, a floating-drumd-type plant
   a) is more efficient b) is less efficient
   c) is equally efficient d) is very cheap

4) The energy payback period an single crystal silicon cell is
   a) 6 months to 1 year b) 10 to 20 years
   c) 1 to 2 years d) 3 to 5 years

5) A solar thermal collector
   a) Collects the solar energy and reflects it back
   b) Absorbs the solar radiation and dissipates it to the ambient
   c) Collects and converts the solar energy into electrical energy
   d) Collects and converts the solar energy in to thermal energy and delivers it to the next stage of the system

6) The value of concentration ratio of a flat-plate collector is
   a) 1 b) 10 c) 100 d) 1000

7) In most hydrothermal fields, hot spots occur at a depth of about
   a) 10 km b) 10 m c) 2 to 3 km d) 30 km

8) The concentration-type solar collector
   a) First absorbs the radiation and then increases its concentration
   b) Increases the density of solar radiation before absorbing it
   c) Dilutes the density of solar radiation before absorbing it
   d) Increases the intensity of solar radiation and then reflects it back

P.T.O.

9) The minimum temperature difference between source and sink in an ocean required by a practical heat engine is
   a) 540°C b) 120°C c) 10°C d) 20°C

10) The range of wind speed suitable for wind power generator is
   a) 0 to 5 m/s b) 5 to 25 m/s c) 25 to 50 m/s d) 50 to 75 m/s

11) The temperature in the crust increases with depth at a rate of about
   a) 300°C/km b) 10°C/km c) 1°C/km d) 30°C/km

12) The radiation received on the earth's surface directly without change in direction is called
   a) terrestrial b) extra-terrestrial c) diffuse d) beam

13) C.R. varies from 1 to 4 in case of
   a) flat-plate collector b) plane receiver with plane collector
   c) cylindrical parabolic collector d) both a and b

14) Which region of sun constitutes main mass of the sun ?
   a) solar interior b) photosphere
   c) solar atmosphere d) chromosphere

15) A device which is used to produces potable water by utilizing solar heat energy is called
   a) Solar water still b) Solar constant
   c) Solar cooling system d) Solar ponds

16) The percentage of the incoming radiation reflected back to space by the earth is
   a) 10% b) 20% c) 30% d) 40%

17) A geothermal resource tapped for electricity generation could provide energy for about
   a) 50 years b) 1000 years c) 5 years d) 1 year

18) The zone of likely geothermal sites corresponds roughly to
   a) cold, hilly regions
   b) hot, flat regions
   c) tropical regions
   d) the regions of seismic and volcanic activities

19) Pumping of water from ocean to basin during high tide
   a) Increases the net energy generation
   b) Decreases the net energy generation
   c) Helps in the uniform power generation
   d) Decreases the net tidal range

20) Small Hydro Plants (SHPs) have
   a) High head and small capacity b) Low head and small capacity
   c) Low head and large capacity d) Large head and large capacity

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SLR-EP – 512

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2016
RENEWABLE ENERGY SOURCES (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

2. Solve **any four** : **(5×4=20)**
   1) Draw and describe the working of pyrheliometer, how it is different from pyranometer.
   2) Draw and describe the working of sun-shine recorder.
   3) Explain the advantages and disadvantages of concentrating collectors over flat plate type collectors.
   4) What is solar pond ? Discuss the principle of operation on which the solar pond works.
   5) Write short note on photovoltaic energy conversion.
   6) Draw and explain flat-plat collector. What are the advantages and disadvantages of flat plate collector ?

3. Solve **any two** : **(10×2=20)**
   1) With the help of neat diagram explain terrestrial an extra-terrestrial solar radiation.
   2) Draw and describe the different types of horizontal axis wind mills. Explain the advantages and disadvantages of wind energy.
   3) Draw and describe the solar cooling system.

4. Solve **any four** : **(5×4=20)**
   1) Draw and explain the fixed drum type biogas plant.
   2) With the help of bacterial reactions explain principle of biogas generation.
   3) Draw and describe the flash steam geothermal power plant.
   4) Explain the different types of geothermal resources.
   5) Write short note on Aerobic and Anaerobic digestion.
   6) Write a note on wave energy potential in India.

5. Solve **any two** : **(10×2=20)**
   1) Draw and explain the floating drum type biogas plant. Explain the comparison between fixed and float drum biodigesters.
   2) Draw and describe the wave energy conversion systems. What are the advantages and disadvantages of wave energy ?
   3) Describe the working of closed cycle OTEC system.

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Set S

Set S

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Seat No.	

Set P

B.E. (Electrical Engineering) (Part – II) Examination, 2016
POWER QUALITY (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) The duration of voltage sag can be
   a) Less than a minute b) Several minutes
   c) Several hours d) Not defined

2) Power system faults can result to
   a) Sags b) Swells
   c) Both sag and swell d) None of the above

3) Interruption is characterized by
   a) Magnitude b) Frequency
   c) Duration d) Magnitude and duration

4) Percentage unbalance can be described as
   a) $\frac{V_0}{V_2} \times 100\%$ b) $\frac{V_0}{V_1} \times 100\%$ c) $\frac{V_2}{V_1} \times 100\%$ d) Either b) or c)

5) IEEE standard 519 is related to
   a) Power quality monitoring b) Flicker
   c) Harmonics d) Grounding

6) _____ is the area of vulnerability _____ will be the immunity of equipments for voltage sag.
   a) Smaller, Greater b) Greater, Greater
   c) Smaller, smaller d) None of these

7) Minimum voltage sag ride through capability of equipment A and B are 80% and 50% respectively. Which device will be more sensitive to voltage sag ?
   a) Equipment A
   b) Equipment B
   c) Both equipments will have same sensitivity to voltage sag
   d) None of the above

8) Duration of transients produced by capacitor switching depends on value of
   a) Capacitance b) System inductance
   c) Resistance d) None of the above

9) Oscillatory transients with a frequency component less than _____ kHz is considered low-frequency transients.
   a) 5 b) 10 c) 20 d) 500

10) To have minimum transients due to capacitor switching ; capacitor must be switched ON at the instant when
   a) Voltage across capacitor is zero b) Current through capacitor is zero
   c) Voltage across capacitor is maximum d) None of the above

11) RMS value of the third harmonic current in a nonlinear load is 20 A, the RMS value of the fifth harmonic current is 15 A and the RMS value of the fundamental is 60 A. Then, by IEEE definition ; the individual third harmonic distortion is
   a) 33.3% b) 30.8% c) 25% d) 23.1%

12) Harmonic number 0 is assigned to
   a) Fundamental frequency b) DC Component
   c) Ripple content d) Crest factor

13) Controlling harmonic current distortion is the responsibility of
   a) End-user b) Utility c) Both a) and b) d) None of these

14) Phase sequence of fifteenth harmonic current is
   a) Positive b) Negative c) Zero d) None of these

15) As we move from source to load ; in general ; harmonic voltage distortion will go on
   a) Decreasing b) Increasing c) Can't predict d) None of these

16) Power factor can be improved by
   a) Capacitor banks b) Synchronous condenser
   c) Phase advancers d) All of the above

17) What is the power factor of a resistive/ inductive circuit characterized by R = 2 L = 2.0 mH, f = 60 Hz ?
   a) 0.936 b) 0.656 c) 1 d) 0.543

18) In effectively grounded system ; the ratio of zero sequence reactance to positive sequence reactance (X0 / X1) is positive and less than
   a) 2 b) 3 c) 1 d) 4

19) Power quality monitoring instrument should be located as close as possible to
   a) Service entrance
   b) Primary side of distribution transformer
   c) Equipment affected due to poor power quality
   d) None of these

20) Which of the following is not objective of power quality monitoring ?
   a) To characterize system performance b) To characterize specific problems
   c) To do predictive maintenance d) To perform stability study

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SLR-EP – 513

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2016
POWER QUALITY (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×5=20)**

   1) Define power quality. Explain why power quality is important.

   2) Explain with neat diagram working of isolation transformer for protection against overvoltage.

   3) Explain power quality susceptibility criteria.

   4) Explain different methods of preventing fault.

   5) Explain with neat diagram transients produced by single capacitor switching.

   6) With neat diagram, define, explain the causes and effects of overvoltage.

3. Solve **any two** questions : **(2×10=20)**

   1) Explain with neat diagram working of following equipments :

      a) Online UPS

      b) Dynamic Voltage Restorer (DVR).

   2) With neat waveform define, explain the causes and effects of the following power quality problems :

      a) Voltage sag

      b) Flicker.

   3) With the help of flow chart explain the procedure of power quality problem evaluation.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**

1) Explain with neat circuit diagram and phasor diagram, principle of power factor correction. What are the advantages of improving power factor ?

2) Define and write equation of following harmonic indices

a) Individual Harmonic Distortion

b) Total Harmonic Distortion

c) Total Demand Distortion.

3) Explain with block diagram power quality monitoring system along with compensating equipment.

4) Explain windowed FFT technique of power quality monitoring and analysis.

5) 12 pulse PWM variable speed drive has following specifications :

Output : 0 to 250 V, 0 – 150 Hz, 8A, 6 KVA

Harmonic spectrum for the drive is as given in the table :

Order	1	3	11	13	15	17	23	25	35	37
Angle (Degree)	0°	60°	52°	–34°	163°	45°	67°	–96°	15°	67°
Magnitude r.m.s % of fundamental	100	9	40	30	6	20	15	3	10	8

Calculate total harmonic distortion in current.

6) Explain different effects of harmonics on power system equipments.

5. Solve **any two** questions : **(2×10=20)**

1) With neat diagram explain working of following harmonic mitigation equipments :

a) Shunt passive filter

b) Shunt active filter.

2) Explain with neat diagram following grounding systems :

   a) Properly grounded electrical system

   b) Isolated grounded electrical system.

3) Voltage and currents are analyzed at the load center and are established as follows :

$$v(t) = \sqrt{2}\{230\sin\omega t + 10\sin(3\omega t + 30^\circ) + 20\sin(5\omega t + 150) + 26\sin(7\omega t - 84^\circ) + 20\sin(11\omega t + 66^\circ) + 15\sin(13\omega t - 91^\circ)\}$$

$$i(t) = \sqrt{2}\{25\sin(\omega t - 20^\circ) + 3\sin(3\omega t - 60^\circ) + 5.5\sin(5\omega t + 75^\circ) + 4\sin(7\omega t - 42^\circ) + 4.5\sin(11\omega t - 110^\circ) + 3.5\sin(13\omega t - 35^\circ)\}.$$

Calculate the following :

   a) RMS voltage due to harmonic components

   b) Equivalent rms current

   c) Displacement power factor

   d) Voltage distortion power

   e) Current distortion power

   f) True power factor.

Set P

SLR-EP – 513

Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – II) Examination, 2016
POWER QUALITY (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Power factor can be improved by
   a) Capacitor banks b) Synchronous condenser
   c) Phase advancers d) All of the above

2) What is the power factor of a resistive/ inductive circuit characterized by R = 2 L = 2.0 mH, f = 60 Hz ?
   a) 0.936 b) 0.656 c) 1 d) 0.543

3) In effectively grounded system ; the ratio of zero sequence reactance to positive sequence reactance (X0 / X1) is positive and less than
   a) 2 b) 3 c) 1 d) 4

4) Power quality monitoring instrument should be located as close as possible to
   a) Service entrance
   b) Primary side of distribution transformer
   c) Equipment affected due to poor power quality
   d) None of these

5) Which of the following is not objective of power quality monitoring ?
   a) To characterize system performance b) To characterize specific problems
   c) To do predictive maintenance d) To perform stability study

6) The duration of voltage sag can be
   a) Less than a minute b) Several minutes
   c) Several hours d) Not defined

7) Power system faults can result to
   a) Sags b) Swells
   c) Both sag and swell d) None of the above

8) Interruption is characterized by
   a) Magnitude b) Frequency
   c) Duration d) Magnitude and duration

9) Percentage unbalance can be described as

a) $\frac{V_0}{V_2} \times 100\%$ b) $\frac{V_0}{V_1} \times 100\%$ c) $\frac{V_2}{V_1} \times 100\%$ d) Either b) or c)

10) IEEE standard 519 is related to
a) Power quality monitoring b) Flicker
c) Harmonics d) Grounding

11) _____ is the area of vulnerability _____ will be the immunity of equipments for voltage sag.
a) Smaller, Greater b) Greater, Greater
c) Smaller, smaller d) None of these

12) Minimum voltage sag ride through capability of equipment A and B are 80% and 50% respectively. Which device will be more sensitive to voltage sag ?
a) Equipment A
b) Equipment B
c) Both equipments will have same sensitivity to voltage sag
d) None of the above

13) Duration of transients produced by capacitor switching depends on value of
a) Capacitance b) System inductance
c) Resistance d) None of the above

14) Oscillatory transients with a frequency component less than _____ kHz is considered low-frequency transients.
a) 5 b) 10 c) 20 d) 500

15) To have minimum transients due to capacitor switching ; capacitor must be switched ON at the instant when
a) Voltage across capacitor is zero b) Current through capacitor is zero
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16) RMS value of the third harmonic current in a nonlinear load is 20 A, the RMS value of the fifth harmonic current is 15 A and the RMS value of the fundamental is 60 A. Then, by IEEE definition ; the individual third harmonic distortion is
a) 33.3% b) 30.8% c) 25% d) 23.1%

17) Harmonic number 0 is assigned to
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c) Ripple content d) Crest factor

18) Controlling harmonic current distortion is the responsibility of
a) End-user b) Utility c) Both a) and b) d) None of these

19) Phase sequence of fifteenth harmonic current is
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20) As we move from source to load ; in general ; harmonic voltage distortion will go on
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Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2016
POWER QUALITY (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×5=20)**

   1) Define power quality. Explain why power quality is important.

   2) Explain with neat diagram working of isolation transformer for protection against overvoltage.

   3) Explain power quality susceptibility criteria.

   4) Explain different methods of preventing fault.

   5) Explain with neat diagram transients produced by single capacitor switching.

   6) With neat diagram, define, explain the causes and effects of overvoltage.

3. Solve **any two** questions : **(2×10=20)**

   1) Explain with neat diagram working of following equipments :

      a) Online UPS

      b) Dynamic Voltage Restorer (DVR).

   2) With neat waveform define, explain the causes and effects of the following power quality problems :

      a) Voltage sag

      b) Flicker.

   3) With the help of flow chart explain the procedure of power quality problem evaluation.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**

   1) Explain with neat circuit diagram and phasor diagram, principle of power factor correction. What are the advantages of improving power factor ?

   2) Define and write equation of following harmonic indices

      a) Individual Harmonic Distortion

      b) Total Harmonic Distortion

      c) Total Demand Distortion.

   3) Explain with block diagram power quality monitoring system along with compensating equipment.

   4) Explain windowed FFT technique of power quality monitoring and analysis.

   5) 12 pulse PWM variable speed drive has following specifications :

      Output : 0 to 250 V, 0 – 150 Hz, 8A, 6 KVA

      Harmonic spectrum for the drive is as given in the table :

Order	1	3	11	13	15	17	23	25	35	37
Angle (Degree)	0°	60°	52°	–34°	163°	45°	67°	–96°	15°	67°
Magnitude r.m.s % of fundamental	100	9	40	30	6	20	15	3	10	8

      Calculate total harmonic distortion in current.

   6) Explain different effects of harmonics on power system equipments.

5. Solve **any two** questions : **(2×10=20)**

   1) With neat diagram explain working of following harmonic mitigation equipments :

      a) Shunt passive filter

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2) Explain with neat diagram following grounding systems :

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$$i(t) = \sqrt{2}\{25\sin(\omega t - 20^\circ) + 3\sin(3\omega t - 60^\circ) + 5.5\sin(5\omega t + 75^\circ) + 4\sin(7\omega t - 42^\circ) + 4.5\sin(11\omega t - 110^\circ) + 3.5\sin(13\omega t - 35^\circ)\}.$$

Calculate the following :

a) RMS voltage due to harmonic components

b) Equivalent rms current

c) Displacement power factor

d) Voltage distortion power

e) Current distortion power

f) True power factor.

Set Q

SLR-EP – 513

Seat No.	

Set R

B.E. (Electrical Engineering) (Part – II) Examination, 2016
POWER QUALITY (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) RMS value of the third harmonic current in a nonlinear load is 20 A, the RMS value of the fifth harmonic current is 15 A and the RMS value of the fundamental is 60 A. Then, by IEEE definition ; the individual third harmonic distortion is
a) 33.3% b) 30.8% c) 25% d) 23.1%

2) Harmonic number 0 is assigned to
a) Fundamental frequency b) DC Component
c) Ripple content d) Crest factor

3) Controlling harmonic current distortion is the responsibility of
a) End-user b) Utility c) Both a) and b) d) None of these

4) Phase sequence of fifteenth harmonic current is
a) Positive b) Negative c) Zero d) None of these

5) As we move from source to load ; in general ; harmonic voltage distortion will go on
a) Decreasing b) Increasing c) Can't predict d) None of these

6) Power factor can be improved by
a) Capacitor banks b) Synchronous condenser
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7) What is the power factor of a resistive/ inductive circuit characterized by R = 2 L = 2.0 mH, f = 60 Hz ?
a) 0.936 b) 0.656 c) 1 d) 0.543

8) In effectively grounded system ; the ratio of zero sequence reactance to positive sequence reactance (X0 / X1) is positive and less than
a) 2 b) 3 c) 1 d) 4

9) Power quality monitoring instrument should be located as close as possible to
a) Service entrance
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c) Equipment affected due to poor power quality
d) None of these

10) Which of the following is not objective of power quality monitoring ?
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a) Capacitance b) System inductance
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19) Oscillatory transients with a frequency component less than _____ kHz is considered low-frequency transients.
a) 5 b) 10 c) 20 d) 500

20) To have minimum transients due to capacitor switching ; capacitor must be switched ON at the instant when
a) Voltage across capacitor is zero b) Current through capacitor is zero
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SLR-EP – 513

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2016
POWER QUALITY (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×5=20)**

   1) Define power quality. Explain why power quality is important.

   2) Explain with neat diagram working of isolation transformer for protection against overvoltage.

   3) Explain power quality susceptibility criteria.

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   5) Explain with neat diagram transients produced by single capacitor switching.

   6) With neat diagram, define, explain the causes and effects of overvoltage.

3. Solve **any two** questions : **(2×10=20)**

   1) Explain with neat diagram working of following equipments :

      a) Online UPS

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      a) Voltage sag

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   3) With the help of flow chart explain the procedure of power quality problem evaluation.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**

   1) Explain with neat circuit diagram and phasor diagram, principle of power factor correction. What are the advantages of improving power factor ?

   2) Define and write equation of following harmonic indices

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$$i(t) = \sqrt{2}\{25\sin(\omega t - 20^\circ) + 3\sin(3\omega t - 60^\circ) + 5.5\sin(5\omega t + 75^\circ) + 4\sin(7\omega t - 42^\circ) + 4.5\sin(11\omega t - 110^\circ) + 3.5\sin(13\omega t - 35^\circ)\}.$$

Calculate the following :

   a) RMS voltage due to harmonic components

   b) Equivalent rms current

   c) Displacement power factor

   d) Voltage distortion power

   e) Current distortion power

   f) True power factor.

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Seat No.	

Set S

B.E. (Electrical Engineering) (Part – II) Examination, 2016
POWER QUALITY (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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1) _____ is the area of vulnerability _____ will be the immunity of equipments for voltage sag.
   a) Smaller, Greater b) Greater, Greater
   c) Smaller, smaller d) None of these

2) Minimum voltage sag ride through capability of equipment A and B are 80% and 50% respectively. Which device will be more sensitive to voltage sag ?
   a) Equipment A
   b) Equipment B
   c) Both equipments will have same sensitivity to voltage sag
   d) None of the above

3) Duration of transients produced by capacitor switching depends on value of
   a) Capacitance b) System inductance
   c) Resistance d) None of the above

4) Oscillatory transients with a frequency component less than _____ kHz is considered low-frequency transients.
   a) 5 b) 10 c) 20 d) 500

5) To have minimum transients due to capacitor switching ; capacitor must be switched ON at the instant when
   a) Voltage across capacitor is zero b) Current through capacitor is zero
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6) RMS value of the third harmonic current in a nonlinear load is 20 A, the RMS value of the fifth harmonic current is 15 A and the RMS value of the fundamental is 60 A. Then, by IEEE definition ; the individual third harmonic distortion is
   a) 33.3% b) 30.8% c) 25% d) 23.1%

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8) Controlling harmonic current distortion is the responsibility of
   a) End-user b) Utility c) Both a) and b) d) None of these
9) Phase sequence of fifteenth harmonic current is
   a) Positive b) Negative c) Zero d) None of these
10) As we move from source to load ; in general ; harmonic voltage distortion will go on
   a) Decreasing b) Increasing c) Can't predict d) None of these
11) Power factor can be improved by
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   a) 0.936 b) 0.656 c) 1 d) 0.543
13) In effectively grounded system ; the ratio of zero sequence reactance to positive sequence reactance (X0 / X1) is positive and less than
   a) 2 b) 3 c) 1 d) 4
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   a) Service entrance
   b) Primary side of distribution transformer
   c) Equipment affected due to poor power quality
   d) None of these
15) Which of the following is not objective of power quality monitoring ?
   a) To characterize system performance b) To characterize specific problems
   c) To do predictive maintenance d) To perform stability study
16) The duration of voltage sag can be
   a) Less than a minute b) Several minutes
   c) Several hours d) Not defined
17) Power system faults can result to
   a) Sags b) Swells
   c) Both sag and swell d) None of the above
18) Interruption is characterized by
   a) Magnitude b) Frequency
   c) Duration d) Magnitude and duration
19) Percentage unbalance can be described as
   a) $\frac{V_0}{V_2} \times 100\%$ b) $\frac{V_0}{V_1} \times 100\%$ c) $\frac{V_2}{V_1} \times 100\%$ d) Either b) or c)
20) IEEE standard 519 is related to
   a) Power quality monitoring b) Flicker
   c) Harmonics d) Grounding

SLR-EP – 513

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2016
POWER QUALITY (Elective – II) (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×5=20)**

   1) Define power quality. Explain why power quality is important.

   2) Explain with neat diagram working of isolation transformer for protection against overvoltage.

   3) Explain power quality susceptibility criteria.

   4) Explain different methods of preventing fault.

   5) Explain with neat diagram transients produced by single capacitor switching.

   6) With neat diagram, define, explain the causes and effects of overvoltage.

3. Solve **any two** questions : **(2×10=20)**

   1) Explain with neat diagram working of following equipments :

      a) Online UPS

      b) Dynamic Voltage Restorer (DVR).

   2) With neat waveform define, explain the causes and effects of the following power quality problems :

      a) Voltage sag

      b) Flicker.

   3) With the help of flow chart explain the procedure of power quality problem evaluation.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**

1) Explain with neat circuit diagram and phasor diagram, principle of power factor correction. What are the advantages of improving power factor ?

2) Define and write equation of following harmonic indices

a) Individual Harmonic Distortion

b) Total Harmonic Distortion

c) Total Demand Distortion.

3) Explain with block diagram power quality monitoring system along with compensating equipment.

4) Explain windowed FFT technique of power quality monitoring and analysis.

5) 12 pulse PWM variable speed drive has following specifications :

Output : 0 to 250 V, 0 – 150 Hz, 8A, 6 KVA

Harmonic spectrum for the drive is as given in the table :

Order	1	3	11	13	15	17	23	25	35	37
Angle (Degree)	0°	60°	52°	–34°	163°	45°	67°	–96°	15°	67°
Magnitude r.m.s % of fundamental	100	9	40	30	6	20	15	3	10	8

Calculate total harmonic distortion in current.

6) Explain different effects of harmonics on power system equipments.

5. Solve **any two** questions : **(2×10=20)**

1) With neat diagram explain working of following harmonic mitigation equipments :

a) Shunt passive filter

b) Shunt active filter.

2) Explain with neat diagram following grounding systems :

   a) Properly grounded electrical system

   b) Isolated grounded electrical system.

3) Voltage and currents are analyzed at the load center and are established as follows :

$$v(t) = \sqrt{2}\{230\sin\omega t + 10\sin(3\omega t + 30^\circ) + 20\sin(5\omega t + 150) + 26\sin(7\omega t - 84^\circ) + 20\sin(11\omega t + 66^\circ) + 15\sin(13\omega t - 91^\circ)\}$$

$$i(t) = \sqrt{2}\{25\sin(\omega t - 20^\circ) + 3\sin(3\omega t - 60^\circ) + 5.5\sin(5\omega t + 75^\circ) + 4\sin(7\omega t - 42^\circ) + 4.5\sin(11\omega t - 110^\circ) + 3.5\sin(13\omega t - 35^\circ)\}.$$

Calculate the following :

   a) RMS voltage due to harmonic components

   b) Equivalent rms current

   c) Displacement power factor

   d) Voltage distortion power

   e) Current distortion power

   f) True power factor.

Set S