SLR-VB – 301

Seat No.	

Set P

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Use of calculator is **allowed**.*
*2) Figures to the **right** indicate **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 alternative : **14**

1) The general solution of $(D^2 + 2D + 1)y = 2e^{3x}$ is

a) $C_1e^{-x} + C_2e^{-x} + \frac{e^{3x}}{8}$ b) $(C_1 + C_2x)\, e^{-x} + \frac{e^{3x}}{8}$

c) $(C_1\cos x + C_2 \sin x) + \frac{e^{3x}}{16}$ d) $(C_1 + C_2x)\, e^{-x} + \frac{e^{3x}}{18}$

2) $\frac{1}{D^2 + 9} \sin 3x =$

a) $-\frac{x}{2} \cos 3x$ b) $\frac{x}{2} \cos 3x$

c) $-\frac{x}{6} \cos 3x$ d) $\frac{x}{6} \sin 3x$

3) The particular integral of the differential equation $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = x$ is

a) $\frac{x}{2}$ b) x c) e^x d) $\frac{e^x}{2}$

4) The solution of $\sqrt{p} + \sqrt{q} = 1$ is

a) $z = ax + (1 - a)y + c$ b) $z = (1 - a)x + a^2y + c$

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

P.T.O.

5) Which of the following is Lagrange's equation ?
   a) $p^2x + q^2y = z$ b) $qy = px + z$
   c) $px + q^2y = z$ d) $p^2x - qy = z^2$

6) If $z\{f(k)\} = F(z)$ then $z\{a^k f(k)\}$ =
   a) $F\left(\frac{a}{z}\right)$ b) $\frac{1}{a}F\left(\frac{z}{a}\right)$ c) $\frac{1}{a}F\left(\frac{a}{z}\right)$ d) $F\left(\frac{z}{a}\right)$

7) $z^{-1}\left\{\frac{z}{z-3}\right\}$ = ... for $k \geq 0$, $|z|>3$
   a) 3^k b) 3^{-k} c) $(-3)^k$ d) 3

8) The speed of a particle moving along the curve $x = 2\sin 3t$, $y = 2\cos 3t$, $z = 8t$ at time $t = 0$ is
   a) 8 b) 10 c) 14 d) 20

9) If $\bar{r} = ae^{3t}\,i + b\,e^{2t}\,j$, then at $t = 0$, $\frac{d\bar{r}}{dt} - 2\bar{r}$ =
   a) ai b) aj c) ai + bj d) $ae^{3t}\,i$

10) _____ is the constant term in the Fourier expansion of $f(x) = \frac{a}{2} - x$, $0 < x < a$.
   a) 0 b) $\frac{a^2}{2\pi}$ c) $\frac{a^2}{4\pi}$ d) $\frac{2\pi}{a^2}$

11) Fourier expansion of $f(x) = \begin{cases} -x, & -2 \leq x \leq 0 \\ x, & 0 \leq x \leq 2 \end{cases}$ in the interval [–2, 2] has
   a) No cosine terms b) No sine terms
   c) Both cosine and sine terms d) None of these

12) $L\left\{\int_0^t \sin 2u\,du\right\}$ =
   a) $\frac{2}{s^2+4}$ b) $\frac{2}{s^2}$ c) $\frac{2}{(s^2+4)^2}$ d) $\frac{2}{s(s^2+4)}$

13) $L\{e^{-t}\sinh t\}$ =
   a) $\frac{1}{(s+1)^2-1}$ b) $\frac{1}{(s-1)^2-1}$ c) $\frac{s+1}{(s+1)^2-1}$ d) $\frac{s-1}{(s-1)^2-1}$

14) $L^{-1}\{\varphi(s+a)\}$ =
   a) $e^{at}\,L^{-1}\{\varphi(s)\}$ b) $e^{-at}\,L^{-1}\{\varphi(s)\}$ c) $-t\,L^{-1}\{\varphi(s)\}$ d) $t\,L^{-1}\{\varphi(s)\}$

SLR-VB – 301

Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

2. a) Solve $\frac{d^3y}{dx^3} - 2\frac{dy}{dx} + 4y = 3x^2 - 5x + 2$ **3**

   b) Solve $z(p^2 - q^2) = x - y$ **3**

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

3. a) Solve $(D^2 + 6D + 9)y = \frac{e^{-3x}}{x^3} + 2x$ **3**

   b) Solve $px - qy = y^2 - x^2$ **3**

   c) Find $z^{-1}\left\{\frac{1}{(z-5)^3}\right\}$, $|z| > 5$ **3**

4. a) Solve $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = \frac{12\log x}{x^2}$ **3**

   b) Solve the following partial differential equation by the method of separation of variables

   $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$ given $u(x, 0) = 4e^{-x}$. **3**

   c) Find $z\{2^k \sin(3k+2)\}$, $k \geq 0$. **4**

   OR

   c) An electric circuit consists of an inductance L, a condenser of capacity C and emf. $E = E_0 \cos\omega t$, so that the charge Q satisfies the differential equation $\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{Eo}{L}\cos\omega t$. If $\omega^2 = \frac{1}{LC}$, find the charge Q at time t. **4**

Set P

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

   b) Solve $p - q = \log(x + y)$ **3**

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

SECTION – II

6. a) Prove that $\nabla\left(\frac{\bar{a}\times\bar{r}}{r}\right) = 0$ where $\bar{a} = 5i - 6j - 8k$ and $\bar{r} = xi + yj + zk$. **3**

   b) Find the tangential and normal components of acceleration of particle moving on the curve $x = t^3 + 1$, $y = t^2$, $z = t$ at $t = 1$. **4**

   c) Find the directional derivative of $\varphi = 2x^3y - 3y^2z$ at P(1, 2, –1) in the direction towards Q(3, –1, 5). In what direction from P is the directional derivative maximum ? Find the magnitude of maximum directional derivative. **3**

7. a) Is $\bar{F} = \frac{\bar{a}\times\bar{r}}{r^n}$ a solenoidal vector ? [$\bar{a}$ is a constant vector]. **3**

   b) Expand $f(x) = x$, $0 < x < 2$ as a half-range sine series. **3**

   c) Show that $\int_0^\infty \frac{\sin at}{t}\,dt = \frac{\pi}{2}$. **3**

8. a) Find the Fourier series of $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$. **5**

   b) Obtain the Fourier expansions of $f(x) = 2 - \frac{x^2}{2}$ in $0 \le x \le 2$. **4**

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

   a) Find the Laplace transform of f(t) where $f(t) = t$, $0 < t < 3$ and $f(t) = 6$, $t > 3$.

   b) Find $L^{-1}\left\{\frac{1}{s^2(s+2)}\right\}$.

   c) By using convolution theorem find inverse Laplace transform of $\frac{1}{s^2 + 2s - 3}$.

   d) Use Laplace transform to solve $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 8y = 1$ where $y(0) = 0$, $y'(0) = 1$.

Set P

SLR-VB – 301

Seat No.	

Set Q

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ENGINEERING MATHEMATICS – III

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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P.T.O.

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Set Q

SLR-VB – 301

Seat No.	

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ENGINEERING MATHEMATICS – III

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SECTION – I

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Set Q

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Set Q

SLR-VB – 301

Seat No.	

Set **R**

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MCQ/Objective Type Questions

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Set R

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SECTION – II

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Set R

SLR-VB – 301

Seat No.	

Set **S**

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Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Use of calculator is **allowed**.*
*2) Figures to the **right** indicate **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 alternative : **14**

1) _____ is the constant term in the Fourier expansion of $f(x) = \frac{a}{2} - x$, $0 < x < a$.

a) 0 b) $\frac{a^2}{2\pi}$ c) $\frac{a^2}{4\pi}$ d) $\frac{2\pi}{a^2}$

2) Fourier expansion of $f(x) = \begin{cases} -x, & -2 \le x \le 0 \\ x, & 0 \le x \le 2 \end{cases}$ in the interval [–2, 2] has

a) No cosine terms b) No sine terms
c) Both cosine and sine terms d) None of these

3) $L\left\{\int_0^t \sin 2u \, du\right\} =$

a) $\frac{2}{s^2+4}$ b) $\frac{2}{s^2}$ c) $\frac{2}{(s^2+4)^2}$ d) $\frac{2}{s(s^2+4)}$

4) $L\{e^{-t} \sinh t\} =$

a) $\frac{1}{(s+1)^2-1}$ b) $\frac{1}{(s-1)^2-1}$ c) $\frac{s+1}{(s+1)^2-1}$ d) $\frac{s-1}{(s-1)^2-1}$

5) $L^{-1}\{\varphi(s+a)\} =$

a) $e^{at} L^{-1}\{\varphi(s)\}$ b) $e^{-at} L^{-1}\{\varphi(s)\}$ c) $-t\, L^{-1}\{\varphi(s)\}$ d) $t\, L^{-1}\{\varphi(s)\}$

P.T.O.

6) The general solution of $(D^2 + 2D + 1)y = 2e^{3x}$ is

a) $C_1e^{-x} + C_2e^{-x} + \frac{e^{3x}}{8}$ b) $(C_1 + C_2x)\, e^{-x} + \frac{e^{3x}}{8}$

c) $(C_1\cos x + C_2 \sin x) + \frac{e^{3x}}{16}$ d) $(C_1 + C_2x)\, e^{-x} + \frac{e^{3x}}{18}$

7) $\frac{1}{D^2+9} \sin 3x =$

a) $-\frac{x}{2}\cos 3x$ b) $\frac{x}{2}\cos 3x$ c) $-\frac{x}{6}\cos 3x$ d) $\frac{x}{6}\sin 3x$

8) The particular integral of the differential equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = x$ is

a) $\frac{x}{2}$ b) x c) e^x d) $\frac{e^x}{2}$

9) The solution of $\sqrt{p} + \sqrt{q} = 1$ is

a) $z = ax + (1 - a)y + c$ b) $z = (1 - a)x + a^2y + c$

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

10) Which of the following is Lagrange's equation ?

a) $p^2x + q^2y = z$ b) $qy = px + z$

c) $px + q^2y = z$ d) $p^2x - qy = z^2$

11) If $z\{f(k)\} = F(z)$ then $z\{a^kf(k)\} =$

a) $F\left(\frac{a}{z}\right)$ b) $\frac{1}{a}F\left(\frac{z}{a}\right)$ c) $\frac{1}{a}F\left(\frac{a}{z}\right)$ d) $F\left(\frac{z}{a}\right)$

12) $z^{-1}\left\{\frac{z}{z-3}\right\} =$ ... for $k \geq 0$, $|z|>3$

a) 3^k b) 3^{-k} c) $(-3)^k$ d) 3

13) The speed of a particle moving along the curve $x = 2\sin 3t$, $y = 2\cos 3t$, $z = 8t$ at time $t = 0$ is

a) 8 b) 10 c) 14 d) 20

14) If $\bar{r} = ae^{3t}\,i + b\,e^{2t}\,j$, then at $t = 0$, $\frac{d\bar{r}}{dt} - 2\bar{r} =$

a) ai b) aj c) ai + bj d) $ae^{3t}\,i$

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Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 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 $\frac{d^3y}{dx^3} - 2\frac{dy}{dx} + 4y = 3x^2 - 5x + 2$ **3**

   b) Solve $z(p^2 - q^2) = x - y$ **3**

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

3. a) Solve $(D^2 + 6D + 9)y = \frac{e^{-3x}}{x^3} + 2x$ **3**

   b) Solve $px - qy = y^2 - x^2$ **3**

   c) Find $z^{-1}\left\{\frac{1}{(z-5)^3}\right\}$, $|z| > 5$ **3**

4. a) Solve $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = \frac{12\log x}{x^2}$ **3**

   b) Solve the following partial differential equation by the method of separation of variables

   $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$ given $u(x, 0) = 4e^{-x}$. **3**

   c) Find $z\{2^k \sin(3k+2)\}$, $k \geq 0$. **4**

   OR

   c) An electric circuit consists of an inductance L, a condenser of capacity C and emf. $E = E_0 \cos\omega t$, so that the charge Q satisfies the differential equation $\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{Eo}{L}\cos\omega t$. If $\omega^2 = \frac{1}{LC}$, find the charge Q at time t. **4**

Set S

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

   b) Solve $p - q = \log(x + y)$ **3**

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

SECTION – II

6. a) Prove that $\nabla\left(\frac{\bar{a}\times\bar{r}}{r}\right) = 0$ where $\bar{a} = 5i - 6j - 8k$ and $\bar{r} = xi + yj + zk$. **3**

   b) Find the tangential and normal components of acceleration of particle moving on the curve $x = t^3 + 1$, $y = t^2$, $z = t$ at $t = 1$. **4**

   c) Find the directional derivative of $\varphi = 2x^3y - 3y^2z$ at P(1, 2, –1) in the direction towards Q(3, –1, 5). In what direction from P is the directional derivative maximum ? Find the magnitude of maximum directional derivative. **3**

7. a) Is $\bar{F} = \frac{\bar{a}\times\bar{r}}{r^n}$ a solenoidal vector ? [$\bar{a}$ is a constant vector]. **3**

   b) Expand $f(x) = x$, $0 < x < 2$ as a half-range sine series. **3**

   c) Show that $\int_0^\infty \frac{\sin at}{t}\,dt = \frac{\pi}{2}$. **3**

8. a) Find the Fourier series of $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$. **5**

   b) Obtain the Fourier expansions of $f(x) = 2 - \frac{x^2}{2}$ in $0 \le x \le 2$. **4**

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

   a) Find the Laplace transform of f(t) where $f(t) = t$, $0 < t < 3$ and $f(t) = 6$, $t > 3$.

   b) Find $L^{-1}\left\{\frac{1}{s^2(s+2)}\right\}$.

   c) By using convolution theorem find inverse Laplace transform of $\frac{1}{s^2 + 2s - 3}$.

   d) Use Laplace transform to solve $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 8y = 1$ where $y(0) = 0$, $y'(0) = 1$.

Set S

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Seat No.	

Set P

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ELECTRICAL MACHINE – I

Day and Date : Friday, 5-5-2017 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 answers : **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 0.3 Ω. What value of resistance must be added to obtain rated torque at starting ?
a) 2.4 Ω b) 1.5 Ω c) 3.2 Ω d) 5.7 Ω

P.T.O.

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

8) The main purpose of performing open circuit test of a transformer is to measure its _____
   a) copper loss b) core loss
   c) both a) and b) d) none of these

9) The efficiencies of two identical transformers under load conditions can be determined by
   a) back to back test b) open circuit test
   c) short circuit test d) any of these

10) Transformer will operate at maximum efficiency when
   a) copper loss = iron loss b) eddy current loss = copper loss
   c) iron loss = eddy current loss d) none of these

11) The size of transformer core depends on
   a) frequency b) flux density
   c) area of core d) both a) and b)

12) A 230/2300 V transformer takes no load current of 5A at 0.25 p.f. lagging. The core loss is
   a) 300.2 W b) 192.5 W c) 287.5 W d) 212.6 W

13) A transformer has 200 W as iron loss at full load. The iron loss at half full load will be
   a) 50 W b) 100 W c) 400 W d) 200 W

14) A transformer will have zero efficiency at _____
   a) full load b) no load
   c) half the full load d) none of these

_____

SLR-VB – 302

Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ELECTRICAL MACHINE – I

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 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 40A. 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 96A 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) A 100 kW, 500 V shunt generator was run as motor on no load at its rated speed and voltage. The total current taken was 9.5A including a shunt field current of 2.5A. The resistance of the armature circuit is 0.1 Ω. Calculate the efficiency of the generator at :

i) full load

ii) half the full load.

b) A DC shunt motor gave the following results of Swinburne's test.
Voltage = 600 V; current = 8A; armature resistance = 0.1 Ω;
field resistance = 300 Ω.
Find the efficiency of the machine :

i) as a generator delivering 100 A at 600 V.

ii) as a motor having a line current of 100 A at 600 V.

Assume stray load losses as 1% of output.

OR

b) The Hopkinson's test on two similar DC shunt machines gave following full load data :

Line voltage = 110 V Line current = 48A

Motor armature current = 230A Field currents are 3A and 3.5A.

The armature resistance of each machine is 0.035 Ω. Calculate the efficiency of each machine assuming brush contact drop of 1 V per brush.

SECTION – II

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

a) Derive an emf equation of transformer.

b) A transformer takes a current of 0.6A 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 5A at 0.2 p.f. lagging. If the secondary supplies a current of 120A 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 resistance 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) Two single phase transformers with equal voltage ratios have impedance of $(0.5 + j3)\Omega$ and $(0.6 + j10)\Omega$ with respect to the secondary. If they operate in parallel, determine how they share a total load of 100 kW at 0.8 p.f. lagging.

b) A 5kVA distribution transformer has a full load efficiency of 95% at which copper loss is equal to iron loss. Transformer is loaded for 24 hrs as under :

No load for 10 hrs, one fourth full load for 7 hrs, half full load for 5 hrs and full load for 2 hrs. Calculate the all-day efficiency of the transformer. Assume unity power factor.

c) Explain in detail the difference between ideal transformer and practical transformer with the help of phasor diagrams.

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Seat No.	

Set Q

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ELECTRICAL MACHINE – I

Day and Date : Friday, 5-5-2017 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 answers : **14**

1) The main purpose of performing open circuit test of a transformer is to measure its _____
   a) copper loss b) core loss
   c) both a) and b) d) none of these

2) The efficiencies of two identical transformers under load conditions can be determined by
   a) back to back test b) open circuit test
   c) short circuit test d) any of these

3) Transformer will operate at maximum efficiency when
   a) copper loss = iron loss b) eddy current loss = copper loss
   c) iron loss = eddy current loss d) none of these

4) The size of transformer core depends on
   a) frequency b) flux density
   c) area of core d) both a) and b)

5) A 230/2300 V transformer takes no load current of 5A at 0.25 p.f. lagging. The core loss is
   a) 300.2 W b) 192.5 W
   c) 287.5 W d) 212.6 W

P.T.O.

6) A transformer has 200 W as iron loss at full load. The iron loss at half full load will be
   a) 50 W b) 100 W c) 400 W d) 200 W

7) A transformer will have zero efficiency at _____
   a) full load b) no load
   c) half the full load d) none of these

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 Ω . What value of resistance must be added to obtain rated torque at starting ?
   a) 2.4 Ω b) 1.5 Ω c) 3.2 Ω d) 5.7 Ω

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

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Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ELECTRICAL MACHINE – I

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 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 40A. 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 96A 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) A 100 kW, 500 V shunt generator was run as motor on no load at its rated speed and voltage. The total current taken was 9.5A including a shunt field current of 2.5A. The resistance of the armature circuit is 0.1 Ω. Calculate the efficiency of the generator at :

i) full load

ii) half the full load.

b) A DC shunt motor gave the following results of Swinburne's test.
Voltage = 600 V; current = 8A; armature resistance = 0.1 Ω;
field resistance = 300 Ω.
Find the efficiency of the machine :

i) as a generator delivering 100 A at 600 V.

ii) as a motor having a line current of 100 A at 600 V.

Assume stray load losses as 1% of output.

OR

b) The Hopkinson's test on two similar DC shunt machines gave following full load data :

Line voltage = 110 V Line current = 48A

Motor armature current = 230A Field currents are 3A and 3.5A.

The armature resistance of each machine is 0.035 Ω. Calculate the efficiency of each machine assuming brush contact drop of 1 V per brush.

SECTION – II

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

a) Derive an emf equation of transformer.

b) A transformer takes a current of 0.6A 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 5A at 0.2 p.f. lagging. If the secondary supplies a current of 120A 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 resistance 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) Two single phase transformers with equal voltage ratios have impedance of $(0.5 + j3)\Omega$ and $(0.6 + j10)\Omega$ with respect to the secondary. If they operate in parallel, determine how they share a total load of 100 kW at 0.8 p.f. lagging.

b) A 5kVA distribution transformer has a full load efficiency of 95% at which copper loss is equal to iron loss. Transformer is loaded for 24 hrs as under :

No load for 10 hrs, one fourth full load for 7 hrs, half full load for 5 hrs and full load for 2 hrs. Calculate the all-day efficiency of the transformer. Assume unity power factor.

c) Explain in detail the difference between ideal transformer and practical transformer with the help of phasor diagrams.

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SLR-VB – 302

Seat No.	

Set R

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ELECTRICAL MACHINE – I

Day and Date : Friday, 5-5-2017 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 answers : **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 Ω. What value of resistance must be added to obtain rated torque at starting ?
a) 2.4 Ω b) 1.5 Ω c) 3.2 Ω d) 5.7 Ω

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

4) The main purpose of performing open circuit test of a transformer is to measure its _____
a) copper loss b) core loss
c) both a) and b) d) none of these

5) The efficiencies of two identical transformers under load conditions can be determined by
a) back to back test b) open circuit test
c) short circuit test d) any of these

P.T.O.

6) Transformer will operate at maximum efficiency when
   a) copper loss = iron loss b) eddy current loss = copper loss
   c) iron loss = eddy current loss d) none of these

7) The size of transformer core depends on
   a) frequency b) flux density
   c) area of core d) both a) and b)

8) A 230/2300 V transformer takes no load current of 5A at 0.25 p.f. lagging. The core loss is
   a) 300.2 W b) 192.5 W c) 287.5 W d) 212.6 W

9) A transformer has 200 W as iron loss at full load. The iron loss at half full load will be
   a) 50 W b) 100 W c) 400 W d) 200 W

10) A transformer will have zero efficiency at _____
   a) full load b) no load
   c) half the full load d) none of these

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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Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ELECTRICAL MACHINE – I

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 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 40A. 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 96A 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) A 100 kW, 500 V shunt generator was run as motor on no load at its rated speed and voltage. The total current taken was 9.5A including a shunt field current of 2.5A. The resistance of the armature circuit is 0.1 Ω. Calculate the efficiency of the generator at :

i) full load

ii) half the full load.

b) A DC shunt motor gave the following results of Swinburne's test.
Voltage = 600 V; current = 8A; armature resistance = 0.1 Ω;
field resistance = 300 Ω.
Find the efficiency of the machine :

i) as a generator delivering 100 A at 600 V.

ii) as a motor having a line current of 100 A at 600 V.

Assume stray load losses as 1% of output.

OR

b) The Hopkinson's test on two similar DC shunt machines gave following full load data :

Line voltage = 110 V Line current = 48A

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The armature resistance of each machine is 0.035 Ω. Calculate the efficiency of each machine assuming brush contact drop of 1 V per brush.

SECTION – II

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

a) Derive an emf equation of transformer.

b) A transformer takes a current of 0.6A 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 5A at 0.2 p.f. lagging. If the secondary supplies a current of 120A 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 resistance 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 $\times$ weight of copper in ordinary transformer. Where K is the transformation ratio.

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

a) Two single phase transformers with equal voltage ratios have impedance of $(0.5 + j3)\Omega$ and $(0.6 + j10)\Omega$ with respect to the secondary. If they operate in parallel, determine how they share a total load of 100 kW at 0.8 p.f. lagging.

b) A 5kVA distribution transformer has a full load efficiency of 95% at which copper loss is equal to iron loss. Transformer is loaded for 24 hrs as under :

No load for 10 hrs, one fourth full load for 7 hrs, half full load for 5 hrs and full load for 2 hrs. Calculate the all-day efficiency of the transformer. Assume unity power factor.

c) Explain in detail the difference between ideal transformer and practical transformer with the help of phasor diagrams.

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SLR-VB – 302

Seat No.	

Set S

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ELECTRICAL MACHINE – I

Day and Date : Friday, 5-5-2017 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 answers : **14**

1) Transformer will operate at maximum efficiency when
   a) copper loss = iron loss b) eddy current loss = copper loss
   c) iron loss = eddy current loss d) none of these

2) The size of transformer core depends on
   a) frequency b) flux density
   c) area of core d) both a) and b)

3) A 230/2300 V transformer takes no load current of 5A at 0.25 p.f. lagging. The core loss is
   a) 300.2 W b) 192.5 W c) 287.5 W d) 212.6 W

4) A transformer has 200 W as iron loss at full load. The iron loss at half full load will be
   a) 50 W b) 100 W c) 400 W d) 200 W

5) A transformer will have zero efficiency at _____
   a) full load b) no load
   c) half the full load d) none of these

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

P.T.O.

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 0.3 Ω . What value of resistance must be added to obtain rated torque at starting ?
   a) 2.4 Ω b) 1.5 Ω c) 3.2 Ω d) 5.7 Ω

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

13) The main purpose of performing open circuit test of a transformer is to measure its _____
   a) copper loss b) core loss
   c) both a) and b) d) none of these

14) The efficiencies of two identical transformers under load conditions can be determined by
   a) back to back test b) open circuit test
   c) short circuit test d) any of these

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SLR-VB – 302

Seat No.	

S.E. (Part – I) (Electrical) (CGPA) Examination, 2017
ELECTRICAL MACHINE – I

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 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 40A. 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 96A 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) A 100 kW, 500 V shunt generator was run as motor on no load at its rated speed and voltage. The total current taken was 9.5A including a shunt field current of 2.5A. The resistance of the armature circuit is 0.1 Ω. Calculate the efficiency of the generator at :

i) full load

ii) half the full load.

b) A DC shunt motor gave the following results of Swinburne's test.
Voltage = 600 V; current = 8A; armature resistance = 0.1 Ω;
field resistance = 300 Ω.
Find the efficiency of the machine :

i) as a generator delivering 100 A at 600 V.

ii) as a motor having a line current of 100 A at 600 V.

Assume stray load losses as 1% of output.

OR

b) The Hopkinson's test on two similar DC shunt machines gave following full load data :

Line voltage = 110 V Line current = 48A

Motor armature current = 230A Field currents are 3A and 3.5A.

The armature resistance of each machine is 0.035 Ω. Calculate the efficiency of each machine assuming brush contact drop of 1 V per brush.

SECTION – II

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

a) Derive an emf equation of transformer.

b) A transformer takes a current of 0.6A 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 5A at 0.2 p.f. lagging. If the secondary supplies a current of 120A 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 resistance 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) Two single phase transformers with equal voltage ratios have impedance of $(0.5 + j3)\Omega$ and $(0.6 + j10)\Omega$ with respect to the secondary. If they operate in parallel, determine how they share a total load of 100 kW at 0.8 p.f. lagging.

b) A 5kVA distribution transformer has a full load efficiency of 95% at which copper loss is equal to iron loss. Transformer is loaded for 24 hrs as under :

No load for 10 hrs, one fourth full load for 7 hrs, half full load for 5 hrs and full load for 2 hrs. Calculate the all-day efficiency of the transformer. Assume unity power factor.

c) Explain in detail the difference between ideal transformer and practical transformer with the help of phasor diagrams.

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SLR-VB – 303

Seat No.	

Set P

S.E. (Electrical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***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) Transistor Biasing is done to keep _____ in the circuit.
   a) Proper direct current b) Proper alternating current
   c) The base current small d) Collector current small

2) The point of intersection of d.c. and a.c. load lines represents
   a) Operating point b) Current gain
   c) Voltage gain d) None of the above

3) The disadvantages of voltage divider bias that it has
   a) High stability factor b) Low base current
   c) Many resistors d) None of the above

4) A transistor amplifier has high output impedance because
   a) Emitter is heavily doped
   b) Collector has reverse biased
   c) Collector is wider than emitter or base
   d) None of the above

5) The input capacitor in an amplifier is the _____ capacitor.
   a) Coupling b) Bypass
   c) Leakage d) None of the above

6) A JFET is called as _____ transistor.
   a) Unipolar b) Bipolar
   c) Unijunction d) None of the above

7) The JFET is a _____ driven device.
   a) Current b) Voltage
   c) Both current and voltage d) None of the above

8) Which of the following filter circuit is having ripple independent of load ?
   a) L b) C c) LC d) CLC

9) The effect of –ve feedback on stability is that it
   a) Increases b) Decreases c) Remains same d) Achieves S = 1

10) The procedure for obtaining the output resistance with feedback is to apply a voltage V at the output and the output current I flows with Vs set to
   a) 0 b) Vin c) V d) Vf

11) The power amplifiers are basically the _____ amplifiers.
   a) Voltage b) Current c) Small signal d) High resistance

12) The feedback signal in a(n) _____ oscillator is derived from a capacitive voltage divider in the LC circuit.
   a) Hartley b) Colpitts c) Armstrong d) None of these

13) In an unregulated power supply without filter the
   a) Output varies with input b) The output is ripple free
   c) The output is $\sqrt{2}$ of input d) The output is independent of input

14) Which of the following statement is false ?
   a) Oscillators use +ve feedback
   b) Oscillator circuit should satisfy Barkhausen's criteria
   c) Oscillator circuit only generate sinusoidal oscillation
   d) Oscillator circuit output frequency can be varied

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SLR-VB – 303

Seat No.	

S.E. (Electrical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to **right** indicate **full** marks.*

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

a) Draw and explain collector base bias method of biasing of a BJT.

b) Explain direct coupling and its advantages for BJT amplifier.

c) Explain BJT as an amplifier in CE arrangement.

d) Explain V-I characteristics of JFET.

e) Explain DC biasing of JFET.

f) State how transistor affects the characteristics of an amplifier at high frequency response ?

3. a) What are h-parameters ? Draw hybrid model for CE configuration. **6**

b) Explain different biasing techniques and derive expression for stability factor for any one technique.

OR

b) Explain construction and operation with transfer function characteristics of enhancement type MOSFET. **6**

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

a) Explain the concept of critical inductance in LC filter.

b) What is feedback circuit ? Explain how it provides feedback in amplifiers ?

c) What is cross-over distortion ? Explain it with the help of suitable diagram.

d) Explain UJT relaxation oscillator with the help of waveforms.

e) Differentiate between positive and negative Feedback.

f) Derive the expression of ripple factor for capacitor filter.

5. Attempt **any two** : **(6×2=12)**

   a) Explain the effect of –ve feedback on input impedance, output impedance, voltage gain and bandwidth for voltage shunt feedback.

   b) Draw class AB amplifier and explain it with the help of waveform. Also derive the expression for efficiency of class AB amplifier.

   c) Define Oscillator. Explain Hartley Oscillator.

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SLR-VB – 303

Seat No.	

Set Q

S.E. (Electrical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***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) Which of the following filter circuit is having ripple independent of load ?
a) L b) C c) LC d) CLC

2) The effect of –ve feedback on stability is that it
a) Increases b) Decreases c) Remains same d) Achieves S = 1

3) The procedure for obtaining the output resistance with feedback is to apply a voltage V at the output and the output current I flows with Vs set to
a) 0 b) Vin c) V d) Vf

4) The power amplifiers are basically the _____ amplifiers.
a) Voltage b) Current c) Small signal d) High resistance

5) The feedback signal in a(n) _____ oscillator is derived from a capacitive voltage divider in the LC circuit.
a) Hartley b) Colpitts c) Armstrong d) None of these

6) In an unregulated power supply without filter the
a) Output varies with input b) The output is ripple free
c) The output is $\sqrt{2}$ of input d) The output is independent of input

7) Which of the following statement is false ?
a) Oscillators use +ve feedback
b) Oscillator circuit should satisfy Barkhausen's criteria
c) Oscillator circuit only generate sinusoidal oscillation
d) Oscillator circuit output frequency can be varied

P.T.O.

8) Transistor Biasing is done to keep _____ in the circuit.
   a) Proper direct current b) Proper alternating current
   c) The base current small d) Collector current small

9) The point of intersection of d.c. and a.c. load lines represents
   a) Operating point b) Current gain
   c) Voltage gain d) None of the above

10) The disadvantages of voltage divider bias that it has
   a) High stability factor b) Low base current
   c) Many resistors d) None of the above

11) A transistor amplifier has high output impedance because
   a) Emitter is heavily doped
   b) Collector has reverse biased
   c) Collector is wider than emitter or base
   d) None of the above

12) The input capacitor in an amplifier is the _____ capacitor.
   a) Coupling b) Bypass
   c) Leakage d) None of the above

13) A JFET is called as _____ transistor.
   a) Unipolar b) Bipolar
   c) Unijunction d) None of the above

14) The JFET is a _____ driven device.
   a) Current b) Voltage
   c) Both current and voltage d) None of the above

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SLR-VB – 303

Seat No.	

S.E. (Electrical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to **right** indicate **full** marks.*

2. Attempt **any four** : **(4×4=16)**
   a) Draw and explain collector base bias method of biasing of a BJT.
   b) Explain direct coupling and its advantages for BJT amplifier.
   c) Explain BJT as an amplifier in CE arrangement.
   d) Explain V-I characteristics of JFET.
   e) Explain DC biasing of JFET.
   f) State how transistor affects the characteristics of an amplifier at high frequency response ?

3. a) What are h-parameters ? Draw hybrid model for CE configuration. **6**
   b) Explain different biasing techniques and derive expression for stability factor for any one technique.

   OR

   b) Explain construction and operation with transfer function characteristics of enhancement type MOSFET. **6**

4. Attempt **any four** : **(4×4=16)**
   a) Explain the concept of critical inductance in LC filter.
   b) What is feedback circuit ? Explain how it provides feedback in amplifiers ?
   c) What is cross-over distortion ? Explain it with the help of suitable diagram.
   d) Explain UJT relaxation oscillator with the help of waveforms.
   e) Differentiate between positive and negative Feedback.
   f) Derive the expression of ripple factor for capacitor filter.

Set Q

5. Attempt **any two** : **(6×2=12)**

   a) Explain the effect of –ve feedback on input impedance, output impedance, voltage gain and bandwidth for voltage shunt feedback.

   b) Draw class AB amplifier and explain it with the help of waveform. Also derive the expression for efficiency of class AB amplifier.

   c) Define Oscillator. Explain Hartley Oscillator.

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SLR-VB – 303

Seat No.	

Set **R**

S.E. (Electrical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***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 input capacitor in an amplifier is the _____ capacitor.
   a) Coupling b) Bypass
   c) Leakage d) None of the above

2) A JFET is called as _____ transistor.
   a) Unipolar b) Bipolar
   c) Unijunction d) None of the above

3) The JFET is a _____ driven device.
   a) Current b) Voltage
   c) Both current and voltage d) None of the above

4) Which of the following filter circuit is having ripple independent of load ?
   a) L b) C c) LC d) CLC

5) The effect of –ve feedback on stability is that it
   a) Increases b) Decreases
   c) Remains same d) Achieves S = 1

6) The procedure for obtaining the output resistance with feedback is to apply a voltage V at the output and the output current I flows with Vs set to
   a) 0 b) Vin c) V d) Vf

7) The power amplifiers are basically the _____ amplifiers.
   a) Voltage b) Current
   c) Small signal d) High resistance

P.T.O.

8) The feedback signal in a(n) _____ oscillator is derived from a capacitive voltage divider in the LC circuit.
   a) Hartley b) Colpitts c) Armstrong d) None of these

9) In an unregulated power supply without filter the
   a) Output varies with input b) The output is ripple free
   c) The output is $\sqrt{2}$ of input d) The output is independent of input

10) Which of the following statement is false ?
   a) Oscillators use +ve feedback
   b) Oscillator circuit should satisfy Barkhausen's criteria
   c) Oscillator circuit only generate sinusoidal oscillation
   d) Oscillator circuit output frequency can be varied

11) Transistor Biasing is done to keep _____ in the circuit.
   a) Proper direct current b) Proper alternating current
   c) The base current small d) Collector current small

12) The point of intersection of d.c. and a.c. load lines represents
   a) Operating point b) Current gain
   c) Voltage gain d) None of the above

13) The disadvantages of voltage divider bias that it has
   a) High stability factor b) Low base current
   c) Many resistors d) None of the above

14) A transistor amplifier has high output impedance because
   a) Emitter is heavily doped
   b) Collector has reverse biased
   c) Collector is wider than emitter or base
   d) None of the above

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SLR-VB – 303

Seat No.	

S.E. (Electrical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*

2. Attempt **any four** : **(4×4=16)**
   a) Draw and explain collector base bias method of biasing of a BJT.
   b) Explain direct coupling and its advantages for BJT amplifier.
   c) Explain BJT as an amplifier in CE arrangement.
   d) Explain V-I characteristics of JFET.
   e) Explain DC biasing of JFET.
   f) State how transistor affects the characteristics of an amplifier at high frequency response ?

3. a) What are h-parameters ? Draw hybrid model for CE configuration. **6**
   b) Explain different biasing techniques and derive expression for stability factor for any one technique.

   OR

   b) Explain construction and operation with transfer function characteristics of enhancement type MOSFET. **6**

4. Attempt **any four** : **(4×4=16)**
   a) Explain the concept of critical inductance in LC filter.
   b) What is feedback circuit ? Explain how it provides feedback in amplifiers ?
   c) What is cross-over distortion ? Explain it with the help of suitable diagram.
   d) Explain UJT relaxation oscillator with the help of waveforms.
   e) Differentiate between positive and negative Feedback.
   f) Derive the expression of ripple factor for capacitor filter.

5. Attempt **any two** : **(6×2=12)**

   a) Explain the effect of –ve feedback on input impedance, output impedance, voltage gain and bandwidth for voltage shunt feedback.

   b) Draw class AB amplifier and explain it with the help of waveform. Also derive the expression for efficiency of class AB amplifier.

   c) Define Oscillator. Explain Hartley Oscillator.

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SLR-VB – 303

Seat No.	

Set S

S.E. (Electrical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to **right** indicate **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 procedure for obtaining the output resistance with feedback is to apply a voltage V at the output and the output current I flows with Vs set to
a) 0 b) Vin c) V d) Vf

2) The power amplifiers are basically the _____ amplifiers.
a) Voltage b) Current c) Small signal d) High resistance

3) The feedback signal in a(n) _____ oscillator is derived from a capacitive voltage divider in the LC circuit.
a) Hartley b) Colpitts c) Armstrong d) None of these

4) In an unregulated power supply without filter the
a) Output varies with input b) The output is ripple free
c) The output is $\sqrt{2}$ of input d) The output is independent of input

5) Which of the following statement is false ?
a) Oscillators use +ve feedback
b) Oscillator circuit should satisfy Barkhausen's criteria
c) Oscillator circuit only generate sinusoidal oscillation
d) Oscillator circuit output frequency can be varied

6) Transistor Biasing is done to keep _____ in the circuit.
a) Proper direct current b) Proper alternating current
c) The base current small d) Collector current small

P.T.O.

7) The point of intersection of d.c. and a.c. load lines represents
   a) Operating point b) Current gain
   c) Voltage gain d) None of the above

8) The disadvantages of voltage divider bias that it has
   a) High stability factor b) Low base current
   c) Many resistors d) None of the above

9) A transistor amplifier has high output impedance because
   a) Emitter is heavily doped
   b) Collector has reverse biased
   c) Collector is wider than emitter or base
   d) None of the above

10) The input capacitor in an amplifier is the _____ capacitor.
   a) Coupling b) Bypass
   c) Leakage d) None of the above

11) A JFET is called as _____ transistor.
   a) Unipolar b) Bipolar
   c) Unijunction d) None of the above

12) The JFET is a _____ driven device.
   a) Current b) Voltage
   c) Both current and voltage d) None of the above

13) Which of the following filter circuit is having ripple independent of load ?
   a) L b) C c) LC d) CLC

14) The effect of –ve feedback on stability is that it
   a) Increases b) Decreases c) Remains same d) Achieves S = 1

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SLR-VB – 303

Seat No.	

S.E. (Electrical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC DEVICES AND CIRCUITS

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to **right** indicate **full** marks.*

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

a) Draw and explain collector base bias method of biasing of a BJT.

b) Explain direct coupling and its advantages for BJT amplifier.

c) Explain BJT as an amplifier in CE arrangement.

d) Explain V-I characteristics of JFET.

e) Explain DC biasing of JFET.

f) State how transistor affects the characteristics of an amplifier at high frequency response ?

3. a) What are h-parameters ? Draw hybrid model for CE configuration. **6**

b) Explain different biasing techniques and derive expression for stability factor for any one technique.

OR

b) Explain construction and operation with transfer function characteristics of enhancement type MOSFET. **6**

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

a) Explain the concept of critical inductance in LC filter.

b) What is feedback circuit ? Explain how it provides feedback in amplifiers ?

c) What is cross-over distortion ? Explain it with the help of suitable diagram.

d) Explain UJT relaxation oscillator with the help of waveforms.

e) Differentiate between positive and negative Feedback.

f) Derive the expression of ripple factor for capacitor filter.

5. Attempt **any two** : **(6×2=12)**

   a) Explain the effect of –ve feedback on input impedance, output impedance, voltage gain and bandwidth for voltage shunt feedback.

   b) Draw class AB amplifier and explain it with the help of waveform. Also derive the expression for efficiency of class AB amplifier.

   c) Define Oscillator. Explain Hartley Oscillator.

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SLR-VB – 304

Seat No.	

Set **P**

S.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
2) Figures to ***right*** *indicate* ***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 : **(14×1=14)**

1) A null type instrument as compared to a deflection type instrument has
   a) A higher accuracy b) A lower sensitivity
   c) A faster response d) All of the above

2) High torque to weight ratio in analog indicating instrument indicates
   a) High friction loss b) Low friction loss
   c) Nothing as regards friction loss d) None of the above

3) Which instrument is cheapest disregarding accuracy ?
   a) PMMC b) Moving iron
   c) Electrodynamometer d) Rectifier

4) The units whose sizes cannot be chosen independently are called _____ units.
   a) Derived b) Fundamental
   c) Absolute d) Auxiliary fundamental

5) Frequency can be measured by using _____ bridge.
   a) Maxwell b) Schering c) De-sauty's d) Wien's

6) Four arm ac bridge balance is obtained when
   a) $I_1 = I_3$ & $I_2 = I_4$ b) $Z_1Z_4 = Z_2Z_3$
   c) $L\theta_1 + L\theta_4 = L\theta_2 + L\theta_3$ d) All of above

7) A potentiometer is a basically
   a) Deflection type instrument
   b) Null type instrument
   c) Digital instrument
   d) Both (a) and (b)

8) 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

9) Ratio and Phase angle errors in PT may be reduced by
   a) Increasing the exciting current
   b) Increasing resistance and leakage reactance in transformer
   c) Not employing turns compensation
   d) None of these

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) Strip chart recorders records
   a) One quantity with respect to time
   b) One quantity with respect to another quantity
   c) Both (a) and (b)
   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) Q meter works on principle of
   a) Mutual inductance
   b) Series resonance
   c) Self inductance
   d) Parallel resonance

14) Multimeter measures
   a) Both AC/DC current and voltage
   b) Only AC current
   c) Only DC voltage
   d) None of the above

SLR-VB – 304

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

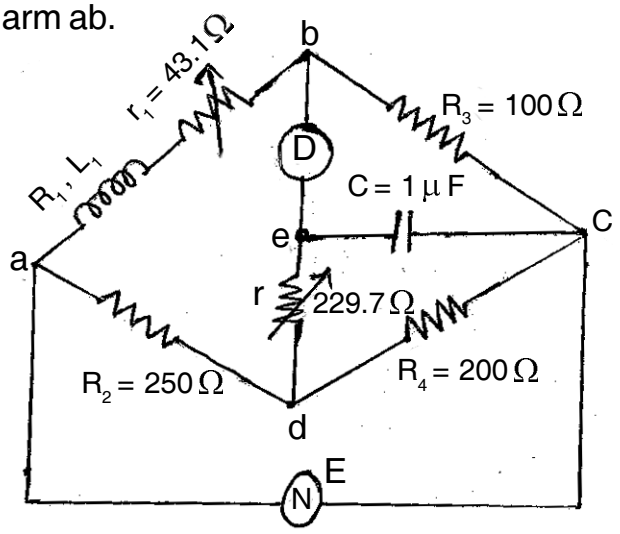
Day and Date : Monday, 8-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
2) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Define the following terms :
      a) Accuracy b) Sensitivity c) Dead zone d) Linearity
   2) A milliammeter of 2.5 resistance reads upto 100 mA. Calculate the resistance which is necessary to enable it to be used as
      i) A voltmeter reading upto 10 V ii) An ammeter reading upto 10 A
   3) Draw a neat sketch of a Weston synchroscope and explain its working.
   4) How the standards of measurements are classified ?
   5) Explain simple DC potentiometer for measurement of unknown emf.

3. Solve **any two** : **(2×6=12)**
   1) A 3 phase 440 V motor has a power factor of 0.6. Two watt meters connected to measure the power show the input to be 25 kW. Find the reading on each instrument.
   2) An AC bridge is connected as shown. Determine the resistance and inductance of arm ab.



   3) Explain with neat diagram the working of Weston frequency meter.

Set P

SECTION – II

4. Solve **any four** : **(4×4=16)**
   a) Write a note on Q-meter.
   b) Draw and explain strip chart recorder.
   c) Explain with block diagram dual slope integration type analog to digital converter.
   d) Explain data acquisition system.
   e) Explain with neat block diagram working of digital multimeter.

5. Solve **any two** : **(2×6=12)**
   a) Explain the use of multiplexing in data acquisition system.
   b) Draw typical phasor diagram of a current transformer. Derive expression for actual transformation ratio.
   c) Describe different parts of CRT. Also describe how the following measurements can be made with the help of CRO : (i) frequency (ii) phase angle.

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SLR-VB – 304

Seat No.	

Set **Q**

S.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
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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 : **(14×1=14)**

1) 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

2) Ratio and Phase angle errors in PT may be reduced by
   a) Increasing the exciting current
   b) Increasing resistance and leakage reactance in transformer
   c) Not employing turns compensation
   d) None of these

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
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4) Strip chart recorders records
   a) One quantity with respect to time
   b) One quantity with respect to another quantity
   c) Both (a) and (b)
   d) None of these

P.T.O.

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
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SLR-VB – 304

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
2) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Define the following terms :
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   2) A milliammeter of 2.5 resistance reads upto 100 mA. Calculate the resistance which is necessary to enable it to be used as
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   1) A 3 phase 440 V motor has a power factor of 0.6. Two watt meters connected to measure the power show the input to be 25 kW. Find the reading on each instrument.
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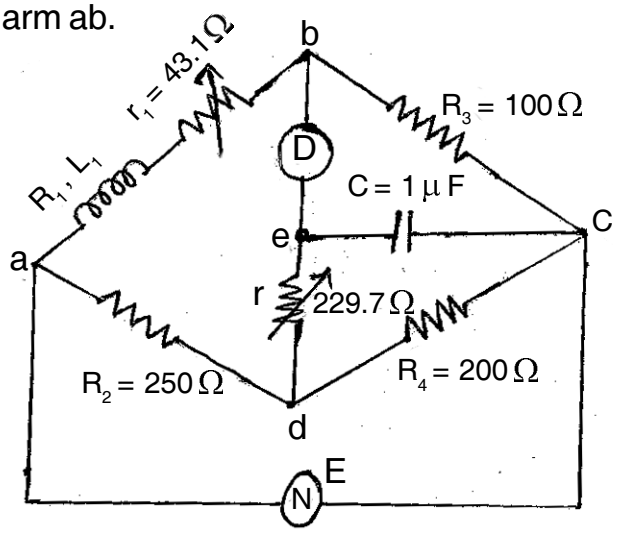

   3) Explain with neat diagram the working of Weston frequency meter.

Set Q

SECTION – II

4. Solve **any four** : **(4×4=16)**
   a) Write a note on Q-meter.
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5. Solve **any two** : **(2×6=12)**
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SLR-VB – 304

Seat No.	

Set **R**

S.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
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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 : **(14×1=14)**

1) Frequency can be measured by using _____ bridge.
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2) Four arm ac bridge balance is obtained when
a) $I_1 = I_3$ & $I_2 = I_4$ b) $Z_1Z_4 = Z_2Z_3$
c) $L\theta_1 + L\theta_4 = L\theta_2 + L\theta_3$ d) All of above

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SLR-VB – 304

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
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SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Define the following terms :
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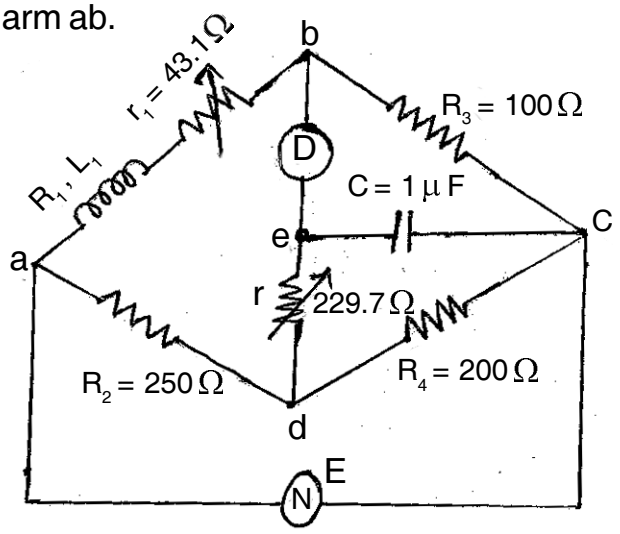

   3) Explain with neat diagram the working of Weston frequency meter.

Set R

SECTION – II

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SLR-VB – 304

Seat No.	

Set **S**

S.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

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

2) Strip chart recorders records
   a) One quantity with respect to time
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   c) Both (a) and (b)
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SLR-VB – 304

Seat No.	

S.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***all*** *questions.*
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SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Define the following terms :
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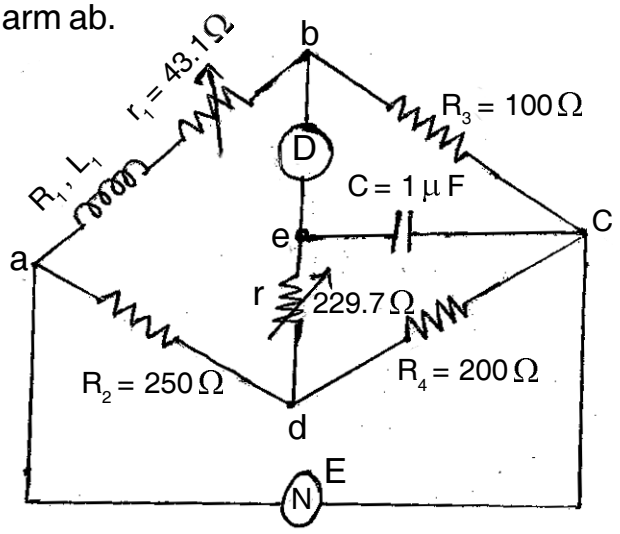

   3) Explain with neat diagram the working of Weston frequency meter.

Set S

SECTION – II

4. Solve **any four** : **(4×4=16)**
   a) Write a note on Q-meter.
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SLR-VB – 305

Seat No.	

Set **P**

S.E. (Electrical Engineering) (Part – I) (CGPA) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Tuesday, 9-5-2017 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 : **(14×1=14)**

1) Interconnected systems have the advantage of
   a) Reduced reserve plant capacity, capital cost per kW and economy in operation
   b) Improved load factor, diversity factor and operation efficiency and increased reliability of supply
   c) All of the above
   d) None of the above

2) The essential requirement(s) of the power plants to be operated as base-load plants is/are
   a) Low-operating cost
   b) The capability of operating continuously for long periods
   c) Requirement of few operating personnel and economical repair
   d) All of the above

3) A load curve is a plot of
   a) Load vs generation capacity
   b) Load vs current
   c) Load vs time
   d) Load vs power

4) Which of the following category of consumers can provide highest load factor ?
   a) A domestic consumer
   b) A continuous process plant
   c) A steel melting unit using arc furnace
   d) A cold storage plant

P.T.O.

5) A system having connected load of 100 kW, peak load of 80 kW, base load of 20 kW and average load of 40 kW, will have a load factor of
   a) 40 % b) 50 % c) 60 % d) 80 %

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

7) The temperatures 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 enriched uranium consists of approximately
   a) 10 % of U^{235} and 90 % of U^{238}
   b) 20 % of U^{235} and 80 % of U^{238}
   c) 30 % of U^{235} and 70 % of U^{238}
   d) None of these

12) Nuclear power station is suitable as
   a) Base-load plant b) Peak-load plant
   c) Base or peak load d) None

13) One a.m.u. is approximately equal to
   a) 1.66×10^{-24} kg b) 1.66×10^{-27} kg
   c) 1.6×10^{-16} kg d) 1.6×10^{-13} kg

14) The main daily solar radiation at many places in India is about
   a) 100 kwh m^{-2} b) 20 kwh m^{-2}
   c) 5 kwh m^{-2} d) 1 kwh m^{-2}

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SLR-VB – 305

Seat No.	

S.E. (Electrical Engineering) (Part – I) (CGPA) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) What is depreciation ? Explain any one method of depreciation in detail.
   2) What is a tariff ? Explain different methods of tariffs.
   3) Elaborate advantages and disadvantages of thermal power plant.
   4) Give the general layout of ash handling system and dust collecting system.
   5) Explain ash and dust collection system in thermal power plant.
   6) Explain different types of turbines used in hydropower plant.

3. Attempt **any two** : **(2×6=12)**
   1) Explain the layout of thermal power plant in detail.
   2) Explain the layout of hydro power plant in detail.

   OR

   2) Write a short note on fluidized bed combustion.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain with neat diagram the function of BWR and PWR. Mention advantages and disadvantages.
   2) Explain the working of diesel engine power plant in detail.
   3) Discuss the factors governing the choice of site for gas turbine power plant.
   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 ?

Set P

5. Attempt **any two** : **(2×6=12)**

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

   2) Explain with neat sketch open cycle and closed cycle gas turbine power plant.

   OR

   2) Explain different types of wind power plants.

SLR-VB – 305

Seat No.	

Set **Q**

S.E. (Electrical Engineering) (Part – I) (CGPA) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Tuesday, 9-5-2017 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 : **(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 enriched uranium consists of approximately
   a) 10 % of U^{235} and 90 % of U^{238}
   b) 20 % of U^{235} and 80 % of U^{238}
   c) 30 % of U^{235} and 70 % of U^{238}
   d) None of these

5) Nuclear power station is suitable as
   a) Base-load plant b) Peak-load plant
   c) Base or peak load d) None

6) One a.m.u. is approximately equal to
   a) 1.66×10^{-24} kg b) 1.66×10^{-27} kg
   c) 1.6×10^{-16} kg d) 1.6×10^{-13} kg

7) The main daily solar radiation at many places in India is about
   a) 100 kwh m^{-2} b) 20 kwh m^{-2}
   c) 5 kwh m^{-2} d) 1 kwh m^{-2}

8) Interconnected systems have the advantage of
   a) Reduced reserve plant capacity, capital cost per kW and economy in operation
   b) Improved load factor, diversity factor and operation efficiency and increased reliability of supply
   c) All of the above
   d) None of the above

9) The essential requirement(s) of the power plants to be operated as base-load plants is/are
   a) Low-operating cost
   b) The capability of operating continuously for long periods
   c) Requirement of few operating personnel and economical repair
   d) All of the above

10) A load curve is a plot of
   a) Load vs generation capacity b) Load vs current
   c) Load vs time d) Load vs power

11) Which of the following category of consumers can provide highest load factor ?
   a) A domestic consumer
   b) A continuous process plant
   c) A steel melting unit using arc furnace
   d) A cold storage plant

12) A system having connected load of 100 kW, peak load of 80 kW, base load of 20 kW and average load of 40 kW, will have a load factor of
   a) 40 % b) 50 % c) 60 % d) 80 %

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

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

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SLR-VB – 305

Seat No.	

S.E. (Electrical Engineering) (Part – I) (CGPA) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) What is depreciation ? Explain any one method of depreciation in detail.
   2) What is a tariff ? Explain different methods of tariffs.
   3) Elaborate advantages and disadvantages of thermal power plant.
   4) Give the general layout of ash handling system and dust collecting system.
   5) Explain ash and dust collection system in thermal power plant.
   6) Explain different types of turbines used in hydropower plant.

3. Attempt **any two** : **(2×6=12)**
   1) Explain the layout of thermal power plant in detail.
   2) Explain the layout of hydro power plant in detail.

   OR

   2) Write a short note on fluidized bed combustion.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain with neat diagram the function of BWR and PWR. Mention advantages and disadvantages.
   2) Explain the working of diesel engine power plant in detail.
   3) Discuss the factors governing the choice of site for gas turbine power plant.
   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 ?

Set Q

5. Attempt **any two** : **(2×6=12)**

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

   2) Explain with neat sketch open cycle and closed cycle gas turbine power plant.

   OR

   2) Explain different types of wind power plants.

SLR-VB – 305

Seat No.	

Set **R**

S.E. (Electrical Engineering) (Part – I) (CGPA) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Tuesday, 9-5-2017 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 : **(14×1=14)**

1) A system having connected load of 100 kW, peak load of 80 kW, base load of 20 kW and average load of 40 kW, will have a load factor of
   a) 40 % b) 50 % c) 60 % d) 80 %

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

3) The temperatures 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 enriched uranium consists of approximately
   a) 10 % of U^{235} and 90 % of U^{238}
   b) 20 % of U^{235} and 80 % of U^{238}
   c) 30 % of U^{235} and 70 % of U^{238}
   d) None of these

8) Nuclear power station is suitable as
   a) Base-load plant
   b) Peak-load plant
   c) Base or peak load
   d) None

9) One a.m.u. is approximately equal to
   a) 1.66×10^{-24} kg
   b) 1.66×10^{-27} kg
   c) 1.6×10^{-16} kg
   d) 1.6×10^{-13} kg

10) The main daily solar radiation at many places in India is about
   a) 100 kwh m^{-2}
   b) 20 kwh m^{-2}
   c) 5 kwh m^{-2}
   d) 1 kwh m^{-2}

11) Interconnected systems have the advantage of
   a) Reduced reserve plant capacity, capital cost per kW and economy in operation
   b) Improved load factor, diversity factor and operation efficiency and increased reliability of supply
   c) All of the above
   d) None of the above

12) The essential requirement(s) of the power plants to be operated as base-load plants is/are
   a) Low-operating cost
   b) The capability of operating continuously for long periods
   c) Requirement of few operating personnel and economical repair
   d) All of the above

13) A load curve is a plot of
   a) Load vs generation capacity
   b) Load vs current
   c) Load vs time
   d) Load vs power

14) Which of the following category of consumers can provide highest load factor ?
   a) A domestic consumer
   b) A continuous process plant
   c) A steel melting unit using arc furnace
   d) A cold storage plant

SLR-VB – 305

Seat No.	

S.E. (Electrical Engineering) (Part – I) (CGPA) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) What is depreciation ? Explain any one method of depreciation in detail.
   2) What is a tariff ? Explain different methods of tariffs.
   3) Elaborate advantages and disadvantages of thermal power plant.
   4) Give the general layout of ash handling system and dust collecting system.
   5) Explain ash and dust collection system in thermal power plant.
   6) Explain different types of turbines used in hydropower plant.

3. Attempt **any two** : **(2×6=12)**
   1) Explain the layout of thermal power plant in detail.
   2) Explain the layout of hydro power plant in detail.

   OR

   2) Write a short note on fluidized bed combustion.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain with neat diagram the function of BWR and PWR. Mention advantages and disadvantages.
   2) Explain the working of diesel engine power plant in detail.
   3) Discuss the factors governing the choice of site for gas turbine power plant.
   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 ?

Set R

5. Attempt **any two** : **(2×6=12)**

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

   2) Explain with neat sketch open cycle and closed cycle gas turbine power plant.

   OR

   2) Explain different types of wind power plants.

SLR-VB – 305

Seat No.	

Set **S**

S.E. (Electrical Engineering) (Part – I) (CGPA) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Tuesday, 9-5-2017 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 : **(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 enriched uranium consists of approximately
   a) 10 % of U^{235} and 90 % of U^{238}
   b) 20 % of U^{235} and 80 % of U^{238}
   c) 30 % of U^{235} and 70 % of U^{238}
   d) None of these

3) Nuclear power station is suitable as
   a) Base-load plant b) Peak-load plant
   c) Base or peak load d) None

4) One a.m.u. is approximately equal to
   a) 1.66×10^{-24} kg b) 1.66×10^{-27} kg
   c) 1.6×10^{-16} kg d) 1.6×10^{-13} kg

5) The main daily solar radiation at many places in India is about
   a) 100 kwh m^{-2} b) 20 kwh m^{-2}
   c) 5 kwh m^{-2} d) 1 kwh m^{-2}

6) Interconnected systems have the advantage of
   a) Reduced reserve plant capacity, capital cost per kW and economy in operation
   b) Improved load factor, diversity factor and operation efficiency and increased reliability of supply
   c) All of the above
   d) None of the above

7) The essential requirement(s) of the power plants to be operated as base-load plants is/are
   a) Low-operating cost
   b) The capability of operating continuously for long periods
   c) Requirement of few operating personnel and economical repair
   d) All of the above

8) A load curve is a plot of
   a) Load vs generation capacity
   b) Load vs current
   c) Load vs time
   d) Load vs power

9) Which of the following category of consumers can provide highest load factor ?
   a) A domestic consumer
   b) A continuous process plant
   c) A steel melting unit using arc furnace
   d) A cold storage plant

10) A system having connected load of 100 kW, peak load of 80 kW, base load of 20 kW and average load of 40 kW, will have a load factor of
   a) 40 % b) 50 % c) 60 % d) 80 %

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

12) The temperatures 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 %

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SLR-VB – 305

Seat No.	

S.E. (Electrical Engineering) (Part – I) (CGPA) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) What is depreciation ? Explain any one method of depreciation in detail.
   2) What is a tariff ? Explain different methods of tariffs.
   3) Elaborate advantages and disadvantages of thermal power plant.
   4) Give the general layout of ash handling system and dust collecting system.
   5) Explain ash and dust collection system in thermal power plant.
   6) Explain different types of turbines used in hydropower plant.

3. Attempt **any two** : **(2×6=12)**
   1) Explain the layout of thermal power plant in detail.
   2) Explain the layout of hydro power plant in detail.

   OR

   2) Write a short note on fluidized bed combustion.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain with neat diagram the function of BWR and PWR. Mention advantages and disadvantages.
   2) Explain the working of diesel engine power plant in detail.
   3) Discuss the factors governing the choice of site for gas turbine power plant.
   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 ?

Set S

5. Attempt **any two** : **(2×6=12)**

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

   2) Explain with neat sketch open cycle and closed cycle gas turbine power plant.

   OR

   2) Explain different types of wind power plants.

SLR-VB – 306

Seat No.	

Set **P**

S.E. (Electrical) (Part – I) (Old) Examination, 2017
DATA STRUCTURE

Day and Date : Monday, 15-5-2017 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 answers :

1) Which is not dynamic memory allocation function ?
A) malloc B) free C) alloc D) calloc

2) Which one of the below mentioned is linear data structure ?
A) Queue B) Stack C) Arrays D) All of the above

3) The size of array int a[5] = {1, 2} is
A) 4 B) 12 C) 10 D) 6

4) The variable that are declared outside all the functions are called
A) Local variable B) Global variable
C) Auto variable D) None of the above

5) The function used to read a character from a file that has been opened in read mode is
A) putc B) getc C) getchar D) putchar

6) push() and pop() functions are found in
A) queues B) lists C) stacks D) trees

7) Which of the following linked list below have last mode of the list pointing to the first node ?
A) singly linked list B) linked list
C) circular singly linked list D) doubly linked list

8) What value strcmp() function returns when two strings are the same ?
A) 0 B) 2 C) 1 D) error

P.T.O.

9) What is the only function all C programs must contain ?
A) start() B) system() C) main() D) program()

10) Which of the following is a valid function call (assuming the function exists) ?
A) funct; B) funct x, y; C) funct(); D) int funct();

11) What punctuation is used to signal the beginning and end of code blocks ?
A) { } B) -> and <-
C) BEGIN and END D) (and)

12) If the given input array is sorted or nearly sorted, which of the following algorithm gives the best performance ?
A) Insertion sort B) Selection sort C) Quick sort D) Merge sort

13) A linear collection of data elements where the linear node is given by means of pointer is called
A) linked list B) node list C) primitive list D) none of these

14) Which of the following is FIFO data structure ?
A) Queue B) Stack C) Hash Table D) Binary search tree

15) Which of the following functions compares two strings ?
A) compare(); B) stringcompare();
C) cmp(); D) strcmp()

16) The binary equivalent of 50 is
A) 110010 B) 1010110
C) 101 D) 101.011.00.00

17) In linked list implementation of a queue, where does a new element be inserted ?
A) At the head of link list
B) At the tail of the link list
C) At the centre position in the link list
D) None

18) Which of the following is the proper declaration of a pointer ?
A) int x; B) int &x; C) ptr x; D) int *x;

19) What is the index number of the last element of an array with 29 elements ?
A) 29 B) 28
C) 0 D) Programmer-defined

20) Which is the built in library function to adjust the allocated dynamic memory size ?
A) malloc B) calloc C) realloc D) resize

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SLR-VB – 306

Seat No.	

S.E. (Electrical) (Part – I) (Old) Examination, 2017
DATA STRUCTURE

Day and Date : Monday, 15-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**
   1) Define the data structure. What is ADT ?
   2) Explain PUSH and POP operation of STACK.
   3) Explain with example Dynamic Memory Allocation Function in C.
   4) Difference between Structure and Union.
   5) Explain structure and pointer to structure with proper example.

3. Explain with e.g. conversation of infix to postfix. **10**

   OR

   What is FILE ? Explain any five file operation in C with examples.

4. Write a short note **(any 2)** : **10**
   A) Union Data Type in C.
   B) Function in C.
   C) Type_casting.

SECTION – II

5. Solve **any four** : **(4×5=20)**
   1) What is Recursion ? Explain with example.
   2) Write a note on queue as a data structure.

3) What is linked list ? Explain its types with diagrams.

4) Explain the procedure for inserting and deleting node in the doubly linked list ?

5) What is Hashing ? Explain.

6. Solve : **10**

Explain Hashing functions along with example in detail.

OR

Explain collision resolution methods in detail.

7. Solve **any one** : **10**

1) Write a C program to implement Circular Queue ?

2) Write a note on **any one** :

a) Bubble sort.

b) Merge sort.

SLR-VB – 306

Seat No.	

Set Q

S.E. (Electrical) (Part – I) (Old) Examination, 2017
DATA STRUCTURE

Day and Date : Monday, 15-5-2017 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 answers :

1) The binary equivalent of 50 is
A) 110010 B) 1010110
C) 101 D) 101.011.00.00

2) In linked list implementation of a queue, where does a new element be inserted ?
A) At the head of link list
B) At the tail of the link list
C) At the centre position in the link list
D) None

3) Which of the following is the proper declaration of a pointer ?
A) int x; B) int &x; C) ptr x; D) int *x;

4) What is the index number of the last element of an array with 29 elements ?
A) 29 B) 28
C) 0 D) Programmer-defined

5) Which is the built in library function to adjust the allocated dynamic memory size ?
A) malloc B) calloc C) realloc D) resize

6) Which is not dynamic memory allocation function ?
A) malloc B) free C) alloc D) calloc

7) Which one of the below mentioned is linear data structure ?
A) Queue B) Stack C) Arrays D) All of the above

8) The size of array int a[5] = {1, 2} is
A) 4 B) 12 C) 10 D) 6

9) The variable that are declared outside all the functions are called
A) Local variable B) Global variable
C) Auto variable D) None of the above

10) The function used to read a character from a file that has been opened in read mode is
A) putc B) getc C) getchar D) putchar

11) push() and pop() functions are found in
A) queues B) lists C) stacks D) trees

12) Which of the following linked list below have last mode of the list pointing to the first node ?
A) singly linked list B) linked list
C) circular singly linked list D) doubly linked list

13) What value strcmp() function returns when two strings are the same ?
A) 0 B) 2 C) 1 D) error

14) What is the only function all C programs must contain ?
A) start() B) system() C) main() D) program()

15) Which of the following is a valid function call (assuming the function exists) ?
A) funct; B) funct x, y; C) funct(); D) int funct();

16) What punctuation is used to signal the beginning and end of code blocks ?
A) { } B) -> and <-
C) BEGIN and END D) (and)

17) If the given input array is sorted or nearly sorted, which of the following algorithm gives the best performance ?
A) Insertion sort B) Selection sort C) Quick sort D) Merge sort

18) A linear collection of data elements where the linear node is given by means of pointer is called
A) linked list B) node list C) primitive list D) none of these

19) Which of the following is FIFO data structure ?
A) Queue B) Stack C) Hash Table D) Binary search tree

20) Which of the following functions compares two strings ?
A) compare(); B) stringcompare();
C) cmp(); D) strcmp()

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SLR-VB – 306

Seat No.	

S.E. (Electrical) (Part – I) (Old) Examination, 2017
DATA STRUCTURE

Day and Date : Monday, 15-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**
   1) Define the data structure. What is ADT ?
   2) Explain PUSH and POP operation of STACK.
   3) Explain with example Dynamic Memory Allocation Function in C.
   4) Difference between Structure and Union.
   5) Explain structure and pointer to structure with proper example.

3. Explain with e.g. conversation of infix to postfix. **10**

   OR

   What is FILE ? Explain any five file operation in C with examples.

4. Write a short note **(any 2)** : **10**
   A) Union Data Type in C.
   B) Function in C.
   C) Type_casting.

SECTION – II

5. Solve **any four** : **(4×5=20)**
   1) What is Recursion ? Explain with example.
   2) Write a note on queue as a data structure.

3) What is linked list ? Explain its types with diagrams.

4) Explain the procedure for inserting and deleting node in the doubly linked list ?

5) What is Hashing ? Explain.

6. Solve : **10**

Explain Hashing functions along with example in detail.

OR

Explain collision resolution methods in detail.

7. Solve **any one** : **10**

1) Write a C program to implement Circular Queue ?

2) Write a note on **any one** :

a) Bubble sort.

b) Merge sort.

SLR-VB – 306

Seat No.	

Set R

S.E. (Electrical) (Part – I) (Old) Examination, 2017
DATA STRUCTURE

Day and Date : Monday, 15-5-2017 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 answers :

1) What punctuation is used to signal the beginning and end of code blocks ?
A) { } B) -> and <-
C) BEGIN and END D) (and)

2) If the given input array is sorted or nearly sorted, which of the following algorithm gives the best performance ?
A) Insertion sort B) Selection sort C) Quick sort D) Merge sort

3) A linear collection of data elements where the linear node is given by means of pointer is called
A) linked list B) node list C) primitive list D) none of these

4) Which of the following is FIFO data structure ?
A) Queue B) Stack C) Hash Table D) Binary search tree

5) Which of the following functions compares two strings ?
A) compare(); B) stringcompare();
C) cmp(); D) strcmp()

6) The binary equivalent of 50 is
A) 110010 B) 1010110
C) 101 D) 101.011.00.00

7) In linked list implementation of a queue, where does a new element be inserted ?
   A) At the head of link list
   B) At the tail of the link list
   C) At the centre position in the link list
   D) None

8) Which of the following is the proper declaration of a pointer ?
   A) int x; B) int &x; C) ptr x; D) int *x;

9) What is the index number of the last element of an array with 29 elements ?
   A) 29 B) 28
   C) 0 D) Programmer-defined

10) Which is the built in library function to adjust the allocated dynamic memory size ?
   A) malloc B) calloc C) realloc D) resize

11) Which is not dynamic memory allocation function ?
   A) malloc B) free C) alloc D) calloc

12) Which one of the below mentioned is linear data structure ?
   A) Queue B) Stack C) Arrays D) All of the above

13) The size of array int a[5] = {1, 2} is
   A) 4 B) 12 C) 10 D) 6

14) The variable that are declared outside all the functions are called
   A) Local variable B) Global variable
   C) Auto variable D) None of the above

15) The function used to read a character from a file that has been opened in read mode is
   A) putc B) getc C) getchar D) putchar

16) push() and pop() functions are found in
   A) queues B) lists C) stacks D) trees

17) Which of the following linked list below have last mode of the list pointing to the first node ?
   A) singly linked list B) linked list
   C) circular singly linked list D) doubly linked list

18) What value strcmp() function returns when two strings are the same ?
   A) 0 B) 2 C) 1 D) error

19) What is the only function all C programs must contain ?
   A) start() B) system() C) main() D) program()

20) Which of the following is a valid function call (assuming the function exists) ?
   A) funct; B) funct x, y; C) funct(); D) int funct();

SLR-VB – 306

Seat No.	

S.E. (Electrical) (Part – I) (Old) Examination, 2017
DATA STRUCTURE

Day and Date : Monday, 15-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**
   1) Define the data structure. What is ADT ?
   2) Explain PUSH and POP operation of STACK.
   3) Explain with example Dynamic Memory Allocation Function in C.
   4) Difference between Structure and Union.
   5) Explain structure and pointer to structure with proper example.

3. Explain with e.g. conversation of infix to postfix. **10**

   OR

   What is FILE ? Explain any five file operation in C with examples.

4. Write a short note **(any 2)** : **10**
   A) Union Data Type in C.
   B) Function in C.
   C) Type_casting.

SECTION – II

5. Solve **any four** : **(4×5=20)**
   1) What is Recursion ? Explain with example.
   2) Write a note on queue as a data structure.

3) What is linked list ? Explain its types with diagrams.

4) Explain the procedure for inserting and deleting node in the doubly linked list ?

5) What is Hashing ? Explain.

6. Solve : **10**

Explain Hashing functions along with example in detail.

OR

Explain collision resolution methods in detail.

7. Solve **any one** : **10**

1) Write a C program to implement Circular Queue ?

2) Write a note on **any one** :

a) Bubble sort.

b) Merge sort.

SLR-VB – 306

Seat No.	

Set **S**

S.E. (Electrical) (Part – I) (Old) Examination, 2017
DATA STRUCTURE

Day and Date : Monday, 15-5-2017 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 answers :

1) push() and pop() functions are found in
A) queues B) lists C) stacks D) trees

2) Which of the following linked list below have last mode of the list pointing to the first node ?
A) singly linked list B) linked list
C) circular singly linked list D) doubly linked list

3) What value strcmp() function returns when two strings are the same ?
A) 0 B) 2 C) 1 D) error

4) What is the only function all C programs must contain ?
A) start() B) system() C) main() D) program()

5) Which of the following is a valid function call (assuming the function exists) ?
A) funct; B) funct x, y; C) funct(); D) int funct();

6) What punctuation is used to signal the beginning and end of code blocks ?
A) { } B) -> and <-
C) BEGIN and END D) (and)

7) If the given input array is sorted or nearly sorted, which of the following algorithm gives the best performance ?
A) Insertion sort B) Selection sort
C) Quick sort D) Merge sort

P.T.O.

8) A linear collection of data elements where the linear node is given by means of pointer is called
A) linked list B) node list C) primitive list D) none of these

9) Which of the following is FIFO data structure ?
A) Queue B) Stack C) Hash Table D) Binary search tree

10) Which of the following functions compares two strings ?
A) compare(); B) stringcompare();
C) cmp(); D) strcmp()

11) The binary equivalent of 50 is
A) 110010 B) 1010110
C) 101 D) 101.011.00.00

12) In linked list implementation of a queue, where does a new element be inserted ?
A) At the head of link list
B) At the tail of the link list
C) At the centre position in the link list
D) None

13) Which of the following is the proper declaration of a pointer ?
A) int x; B) int &x; C) ptr x; D) int *x;

14) What is the index number of the last element of an array with 29 elements ?
A) 29 B) 28
C) 0 D) Programmer-defined

15) Which is the built in library function to adjust the allocated dynamic memory size ?
A) malloc B) calloc C) realloc D) resize

16) Which is not dynamic memory allocation function ?
A) malloc B) free C) alloc D) calloc

17) Which one of the below mentioned is linear data structure ?
A) Queue B) Stack C) Arrays D) All of the above

18) The size of array int a[5] = {1, 2} is
A) 4 B) 12 C) 10 D) 6

19) The variable that are declared outside all the functions are called
A) Local variable B) Global variable
C) Auto variable D) None of the above

20) The function used to read a character from a file that has been opened in read mode is
A) putc B) getc C) getchar D) putchar

SLR-VB – 306

Seat No.	

S.E. (Electrical) (Part – I) (Old) Examination, 2017
DATA STRUCTURE

Day and Date : Monday, 15-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**
   1) Define the data structure. What is ADT ?
   2) Explain PUSH and POP operation of STACK.
   3) Explain with example Dynamic Memory Allocation Function in C.
   4) Difference between Structure and Union.
   5) Explain structure and pointer to structure with proper example.

3. Explain with e.g. conversation of infix to postfix. **10**

   OR

   What is FILE ? Explain any five file operation in C with examples.

4. Write a short note **(any 2)** : **10**
   A) Union Data Type in C.
   B) Function in C.
   C) Type_casting.

SECTION – II

5. Solve **any four** : **(4×5=20)**
   1) What is Recursion ? Explain with example.
   2) Write a note on queue as a data structure.

3) What is linked list ? Explain its types with diagrams.

4) Explain the procedure for inserting and deleting node in the doubly linked list ?

5) What is Hashing ? Explain.

6. Solve : **10**

Explain Hashing functions along with example in detail.

OR

Explain collision resolution methods in detail.

7. Solve **any one** : **10**

1) Write a C program to implement Circular Queue ?

2) Write a note on **any one** :

a) Bubble sort.

b) Merge sort.

SLR-VB – 307

Seat No.	

Set **P**

S.E. (Part – II) (Electrical) (CGPA) Examination, 2017
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Tuesday, 16-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Use** of scientific calculator is **allowed**.*
*2) Q. No. **1** 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

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

1) If f(x) is continuous in the interval (a, b) such that f(a) and f(b) are of opposite signs then

a) $f(a) \cdot f(b) > 0$ b) $\frac{f(a)}{f(b)} > 0$ c) $f(a) \cdot f(b) < 0$ d) $f(a) \cdot f(b) = 0$

2) If a function f(x) contains same other functions such as trigonometric, logarithmic, exponential then f(x) = 0 is called
a) algebraic equation b) transcendental equation
c) linear equation d) quadratic equation

3) In case of bisection method, the convergence is
a) quadratic b) very slow c) very fast d) linear

4) 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) 35 b) 40 c) 18 d) 72

5) If $y = x^2 + 1$, then the first divided difference of the argument 1 and 2 is
a) 3 b) 1 c) 2 d) – 1

6) As soon as a new value of variable is found in the iteration, it is used immediately in the next step, this method is called
a) Gauss – Jacobe b) Gauss – Seidel
c) Gauss – Jordan d) Gauss – elimination

7) LU-Decomposition of a matrix is possible for
a) any square matrix b) any ordered matrix
c) only invertible matrix d) singular matrix

8) To apply Trapezoidal rule the number of sub intervals must be
   a) multiple of 6 b) multiple of 3 c) any d) even

9) The Laplace equation $u_{xx} + u_{yy} = 0$ is
   a) Parabolic b) Elliptic c) Hyperbolic d) Circular

10) Romberg's method improves accuracy of
   a) Trapezoidal method b) Milne's method
   c) Liebmann method d) None

11) For the following data :

   x : 0 0.5 1 1.5 2

   y : 0 0.25 1 2.25 4

   the value of $\int_0^2 y\,dx$ by Simpson's $^1/_3{}^{rd}$ rule is
   a) 26.67 b) 0.2667 c) 2.6667 d) 25

12) In solving a ODE by Runge Kutta method if $y(0) = 1$, $h = 0.1$, $k_1 = 0.1$, $k_2 = 0.1150$, $k_3 = 0.1171$, $k_4 = 0.1359$ then the value of $y(0.1)$ =
   a) 0.11668 b) 0.16186 c) 1.11668 d) 0.16186

13) The general second order linear differential equation in two independent variables x, y is given by
   $Au_{xx} + Bu_{xy} + Cu_{yy} + Du_x + Eu_y + Fu = 0$
   where A, B, C, D, E and F are given functions of x and y. The equation is hyperbolic if
   a) $B^2 - 4AC > 0$ b) $B^2 - 4AC = 0$ c) $B^2 - 4AC < 0$ d) None

14) The power method is used to find
   a) smallest eigen value of the matrix
   b) largest eigen value of the matrix
   c) only integer valued eigen value
   d) none of the above

SLR-VB – 307

Seat No.	

S.E. (Part – II) (Electrical) (CGPA) Examination, 2017
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Tuesday, 16-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) **Use** of scientific calculator is **allowed**.*

SECTION – I

2. a) Find the root of the equation $\tan x + \tan hx = 0$ which lies in the interval (1.6, 3.0) correct to four significant digits using any one of the numerical method. (Perform three iterations only taking radian mode.) **3**

   b) Use the method of false position to find the root of the equation $x^3 - 18 = 0$, given that it lies between 2 and 3. Perform three iterations of the procedure. **3**

   c) Find by Newton-Raphson method a root of the equation $x \sin x + \cos x = 0$ which is near $x = \pi$. (Perform three iterations only taking radian mode.) **3**

3. a) Use Jacobi's method to solve
   $10x - 2y - 3z = 205$
   $2x - 10y + 2z = -154$
   $2x + y - 10z = -120$
   upto the end of fifth iteration. **3**

   b) Apply Crouts-Triangulatization method (LU-factorization method) to solve the equations
   $x_1 + 2x_2 + 3x_3 = 14$
   $2x_1 + 5x_2 + 2x_3 = 18$
   $3x_1 + 2x_2 + 5x_3 = 22$ **6**

4. a) Given $\log_{10} 654 = 2.8156$, $\log_{10} 658 = 2.8182$, $\log_{10} 659 = 2.8189$, $\log_{10} 661 = 2.8202$ find by using Lagrange's formula, the value of $\log_{10} 656$. **3**

   b) Find least square polynomial of second degree parabola to the data

x :	0	1	2	3	4
y :	– 4	– 1	4	11	20

   3

   c) Using Newton's divided differences interpolation find u(3), given that u(1) = – 26, u(2) = 12, u(4) = 256, u(6) = 844. **3**

   OR

   c) Fit a curve of the form $y = ax^b$ to the following data

x :	61	26	7	2.6
y :	350	400	500	600

   3

5. a) Find the cubic splines for the following table of values

x :	1	2	3
y :	– 6	– 1	16

   5

   b) Apply Lin-Bairstow's method to find a quadratic factor of the equation
   $x^4 + 5x^3 + 3x^2 - 5x - 9 = 0$
   close to $x^2 + 3x - 5$.
   (Perform only single iteration) **5**

Set P

SECTION – II

6. a) Use Simpson's $\frac{1}{3}^{rd}$ rule and Simpson's $\frac{3}{8}^{th}$ to find $\int_0^1 e^{-x^2}\,dx$ by taking 6 subintervales. **5**

   b) Evaluate $\int_0^1 \frac{dx}{1+x}$ correct to three decimal places using Romberg's method.

   Take h = 0.5, 0.25, 0.125. **5**

7. a) Obtain by power method, numerically dominant eigen value and eigen vector of the matrix

   $A = \begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$ taking $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ as initial eigen vector. Perform 5 iterations. **5**

   b) Find the bounds of eigen values of the following matrix using Gerschgorin

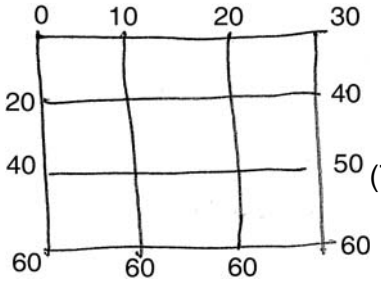
   circle theorem $\begin{bmatrix} 1 & 2 & -1 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$ **4**

8. a) Find the first and second derivative at x = 1 if

   x : −2 −1 0 1 2 3 4

   y : 104 17 0 −1 8 69 272 **3**

   b) Solve $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary conditions as shown below



   (Take 4 iterations) **6**

9. a) Using Runge Kutta method of fourth order find y(0.8) correct to 4 decimal places if $\frac{dy}{dx} = y - x^2$ y(0.6) = 1.7379, h = 0.2. **3**

   b) Find the first and second derivative of the function at x = 0.8

x :	0.4	0.5	0.6	0.7	0.8
y :	1.5836	1.7974	2.0442	2.3275	2.6511

   3

   OR

   b) Compute $\int_0^1 \frac{dx}{1+x^2}$ by using trapezoidal rule with h = $\frac{1}{4}$. **3**

   c) Using Crank-Nicholson's scheme, solve $u_{xx} = 16\,u_t$, $0 < x < 1$, $t > 0$, given u(x, 0) = 0, u(0, t) = 0, u(1, t) = 100 t. Compute u for one step in t direction taking h = $\frac{1}{4}$. **3**

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Set P

SLR-VB – 307

Seat No.	

Set **Q**

S.E. (Part – II) (Electrical) (CGPA) Examination, 2017
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Tuesday, 16-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***Use*** *of scientific calculator is* ***allowed****.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) To apply Trapezoidal rule the number of sub intervals must be

a) multiple of 6 b) multiple of 3 c) any d) even

2) The Laplace equation $u_{xx} + u_{yy} = 0$ is

a) Parabolic b) Elliptic c) Hyperbolic d) Circular

3) Romberg's method improves accuracy of

a) Trapezoidal method b) Milne's method
c) Liebmann method d) None

4) For the following data :

x : 0 0.5 1 1.5 2
y : 0 0.25 1 2.25 4

the value of $\int_0^2 y\,dx$ by Simpson's $^1/_3{}^{rd}$ rule is

a) 26.67 b) 0.2667 c) 2.6667 d) 25

5) In solving a ODE by Runge Kutta method if y(0) = 1, h = 0.1, $k_1 = 0.1$, $k_2 = 0.1150$, $k_3 = 0.1171$, $k_4 = 0.1359$ then the value of y(0.1) =

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P.T.O.

6) The general second order linear differential equation in two independent variables x, y is given by

$Au_{xx} + Bu_{xy} + Cu_{yy} + Du_x + Eu_y + Fu = 0$

where A, B, C, D, E and F are given functions of x and y. The equation is hyperbolic if

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13) As soon as a new value of variable is found in the iteration, it is used immediately in the next step, this method is called

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SLR-VB – 307

Seat No.	

S.E. (Part – II) (Electrical) (CGPA) Examination, 2017
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Tuesday, 16-5-2017 Marks : 56
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Set Q

SECTION – II

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   b) Evaluate $\int_0^1 \frac{dx}{1+x}$ correct to three decimal places using Romberg's method.

   Take h = 0.5, 0.25, 0.125. **5**

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   x : −2 −1 0 1 2 3 4

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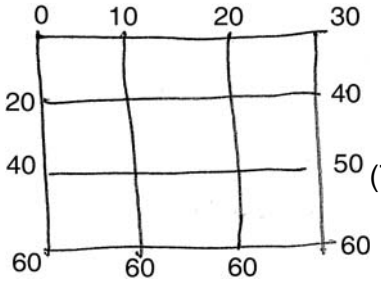

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Set Q

SLR-VB – 307

Seat No.	

Set **R**

S.E. (Part – II) (Electrical) (CGPA) Examination, 2017
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Tuesday, 16-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) If $y = x^2 + 1$, then the first divided difference of the argument 1 and 2 is

a) 3 b) 1 c) 2 d) – 1

2) As soon as a new value of variable is found in the iteration, it is used immediately in the next step, this method is called

a) Gauss – Jacobe b) Gauss – Seidel
c) Gauss – Jordan d) Gauss – elimination

3) LU-Decomposition of a matrix is possible for

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6) Romberg's method improves accuracy of

a) Trapezoidal method b) Milne's method
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P.T.O.

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a) 0.11668 b) 0.16186 c) 1.11668 d) 0.16186

9) The general second order linear differential equation in two independent variables x, y is given by

$Au_{xx} + Bu_{xy} + Cu_{yy} + Du_x + Eu_y + Fu = 0$

where A, B, C, D, E and F are given functions of x and y. The equation is hyperbolic if

a) $B^2 - 4AC > 0$ b) $B^2 - 4AC = 0$ c) $B^2 - 4AC < 0$ d) None

10) The power method is used to find

a) smallest eigen value of the matrix
b) largest eigen value of the matrix
c) only integer valued eigen value
d) none of the above

11) If f(x) is continuous in the interval (a, b) such that f(a) and f(b) are of opposite signs then

a) $f(a)\cdot f(b) > 0$ b) $\frac{f(a)}{f(b)} > 0$ c) $f(a)\cdot f(b) < 0$ d) $f(a)\cdot f(b) = 0$

12) If a function f(x) contains same other functions such as trigonometric, logarithmic, exponential then f(x) = 0 is called

a) algebraic equation b) transcendental equation
c) linear equation d) quadratic equation

13) In case of bisection method, the convergence is

a) quadratic b) very slow c) very fast d) linear

14) 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) 35 b) 40 c) 18 d) 72

SLR-VB – 307

Seat No.	

S.E. (Part – II) (Electrical) (CGPA) Examination, 2017
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Tuesday, 16-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) **Use** of scientific calculator is **allowed**.*

SECTION – I

2. a) Find the root of the equation $\tan x + \tan hx = 0$ which lies in the interval (1.6, 3.0) correct to four significant digits using any one of the numerical method. (Perform three iterations only taking radian mode.) **3**

   b) Use the method of false position to find the root of the equation $x^3 - 18 = 0$, given that it lies between 2 and 3. Perform three iterations of the procedure. **3**

   c) Find by Newton-Raphson method a root of the equation $x \sin x + \cos x = 0$ which is near $x = \pi$. (Perform three iterations only taking radian mode.) **3**

3. a) Use Jacobi's method to solve
   $10x - 2y - 3z = 205$
   $2x - 10y + 2z = -154$
   $2x + y - 10z = -120$
   upto the end of fifth iteration. **3**

   b) Apply Crouts-Triangulatization method (LU-factorization method) to solve the equations
   $x_1 + 2x_2 + 3x_3 = 14$
   $2x_1 + 5x_2 + 2x_3 = 18$
   $3x_1 + 2x_2 + 5x_3 = 22$ **6**

4. a) Given $\log_{10} 654 = 2.8156$, $\log_{10} 658 = 2.8182$, $\log_{10} 659 = 2.8189$, $\log_{10} 661 = 2.8202$ find by using Lagrange's formula, the value of $\log_{10} 656$. **3**

   b) Find least square polynomial of second degree parabola to the data

x :	0	1	2	3	4
y :	– 4	– 1	4	11	20

   3

   c) Using Newton's divided differences interpolation find u(3), given that u(1) = – 26, u(2) = 12, u(4) = 256, u(6) = 844. **3**

   OR

   c) Fit a curve of the form $y = ax^b$ to the following data

x :	61	26	7	2.6
y :	350	400	500	600

   3

5. a) Find the cubic splines for the following table of values

x :	1	2	3
y :	– 6	– 1	16

   5

   b) Apply Lin-Bairstow's method to find a quadratic factor of the equation
   $x^4 + 5x^3 + 3x^2 - 5x - 9 = 0$
   close to $x^2 + 3x - 5$.
   (Perform only single iteration) **5**

Set R

SECTION – II

6. a) Use Simpson's $\frac{1}{3}^{rd}$ rule and Simpson's $\frac{3}{8}^{th}$ to find $\int_0^1 e^{-x^2}\,dx$ by taking 6 subintervales. **5**

   b) Evaluate $\int_0^1 \frac{dx}{1+x}$ correct to three decimal places using Romberg's method.

   Take h = 0.5, 0.25, 0.125. **5**

7. a) Obtain by power method, numerically dominant eigen value and eigen vector of the matrix

   $A = \begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$ taking $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ as initial eigen vector. Perform 5 iterations. **5**

   b) Find the bounds of eigen values of the following matrix using Gerschgorin

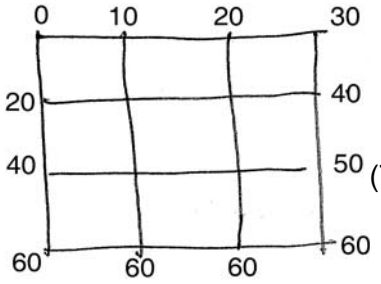
   circle theorem $\begin{bmatrix} 1 & 2 & -1 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$ **4**

8. a) Find the first and second derivative at x = 1 if

   x : −2 −1 0 1 2 3 4

   y : 104 17 0 −1 8 69 272 **3**

   b) Solve $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary conditions as shown below



   (Take 4 iterations) **6**

9. a) Using Runge Kutta method of fourth order find y(0.8) correct to 4 decimal places if $\frac{dy}{dx} = y - x^2$ y(0.6) = 1.7379, h = 0.2. **3**

   b) Find the first and second derivative of the function at x = 0.8

x :	0.4	0.5	0.6	0.7	0.8
y :	1.5836	1.7974	2.0442	2.3275	2.6511

   3

   OR

   b) Compute $\int_0^1 \frac{dx}{1+x^2}$ by using trapezoidal rule with h = $\frac{1}{4}$. **3**

   c) Using Crank-Nicholson's scheme, solve $u_{xx} = 16\,u_t$, $0 < x < 1$, $t > 0$, given u(x, 0) = 0, u(0, t) = 0, u(1, t) = 100 t. Compute u for one step in t direction taking h = $\frac{1}{4}$. **3**

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SLR-VB – 307

Seat No.	

Set **S**

S.E. (Part – II) (Electrical) (CGPA) Examination, 2017
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Tuesday, 16-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***Use*** *of scientific calculator is* ***allowed****.*
2) Q. No. ***1*** *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

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

1) Romberg's method improves accuracy of
   a) Trapezoidal method b) Milne's method
   c) Liebmann method d) None

2) For the following data :

   x : 0 0.5 1 1.5 2

   y : 0 0.25 1 2.25 4

   the value of $\int_0^2 y\,dx$ by Simpson's $^1/_3{}^{rd}$ rule is

   a) 26.67 b) 0.2667 c) 2.6667 d) 25

3) In solving a ODE by Runge Kutta method if y(0) = 1, h = 0.1, $k_1 = 0.1$, $k_2 = 0.1150$, $k_3 = 0.1171$, $k_4 = 0.1359$ then the value of y(0.1) =
   a) 0.11668 b) 0.16186 c) 1.11668 d) 0.16186

4) The general second order linear differential equation in two independent variables x, y is given by
   $Au_{xx} + Bu_{xy} + Cu_{yy} + Du_x + Eu_y + Fu = 0$
   where A, B, C, D, E and F are given functions of x and y. The equation is hyperbolic if
   a) $B^2 - 4AC > 0$ b) $B^2 - 4AC = 0$ c) $B^2 - 4AC < 0$ d) None

5) The power method is used to find
   a) smallest eigen value of the matrix b) largest eigen value of the matrix
   c) only integer valued eigen value d) none of the above

P.T.O.

6) If f(x) is continuous in the interval (a, b) such that f(a) and f(b) are of opposite signs then

a) $f(a) \cdot f(b) > 0$ b) $\frac{f(a)}{f(b)} > 0$ c) $f(a) \cdot f(b) < 0$ d) $f(a) \cdot f(b) = 0$

7) If a function f(x) contains same other functions such as trigonometric, logarithmic, exponential then f(x) = 0 is called

a) algebraic equation b) transcendental equation
c) linear equation d) quadratic equation

8) In case of bisection method, the convergence is

a) quadratic b) very slow c) very fast d) linear

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) 35 b) 40 c) 18 d) 72

10) If $y = x^2 + 1$, then the first divided difference of the argument 1 and 2 is

a) 3 b) 1 c) 2 d) – 1

11) As soon as a new value of variable is found in the iteration, it is used immediately in the next step, this method is called

a) Gauss – Jacobe b) Gauss – Seidel
c) Gauss – Jordan d) Gauss – elimination

12) LU-Decomposition of a matrix is possible for

a) any square matrix b) any ordered matrix
c) only invertible matrix d) singular matrix

13) To apply Trapezoidal rule the number of sub intervals must be

a) multiple of 6 b) multiple of 3 c) any d) even

14) The Laplace equation $u_{xx} + u_{yy} = 0$ is

a) Parabolic b) Elliptic c) Hyperbolic d) Circular

SLR-VB – 307

Seat No.	

S.E. (Part – II) (Electrical) (CGPA) Examination, 2017
NUMERICAL METHODS AND COMPUTER PROGRAMMING

Day and Date : Tuesday, 16-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) **Use** of scientific calculator is **allowed**.*

SECTION – I

2. a) Find the root of the equation $\tan x + \tan hx = 0$ which lies in the interval (1.6, 3.0) correct to four significant digits using any one of the numerical method. (Perform three iterations only taking radian mode.) **3**

   b) Use the method of false position to find the root of the equation $x^3 - 18 = 0$, given that it lies between 2 and 3. Perform three iterations of the procedure. **3**

   c) Find by Newton-Raphson method a root of the equation $x \sin x + \cos x = 0$ which is near $x = \pi$. (Perform three iterations only taking radian mode.) **3**

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   b) Find least square polynomial of second degree parabola to the data

x :	0	1	2	3	4
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5. a) Find the cubic splines for the following table of values

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   b) Apply Lin-Bairstow's method to find a quadratic factor of the equation
   $x^4 + 5x^3 + 3x^2 - 5x - 9 = 0$
   close to $x^2 + 3x - 5$.
   (Perform only single iteration) **5**

Set S

SECTION – II

6. a) Use Simpson's $\frac{1}{3}^{rd}$ rule and Simpson's $\frac{3}{8}^{th}$ to find $\int_0^1 e^{-x^2}\,dx$ by taking 6 subintervales. **5**

   b) Evaluate $\int_0^1 \frac{dx}{1+x}$ correct to three decimal places using Romberg's method.

   Take h = 0.5, 0.25, 0.125. **5**

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   b) Find the bounds of eigen values of the following matrix using Gerschgorin

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8. a) Find the first and second derivative at x = 1 if

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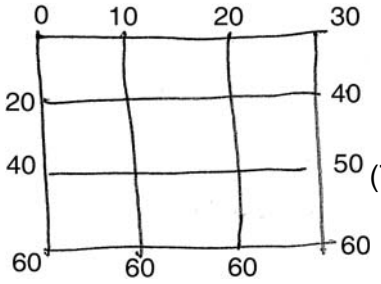
   y : 104 17 0 −1 8 69 272 **3**

   b) Solve $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary conditions as shown below



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9. a) Using Runge Kutta method of fourth order find y(0.8) correct to 4 decimal places if $\frac{dy}{dx} = y - x^2$ y(0.6) = 1.7379, h = 0.2. **3**

   b) Find the first and second derivative of the function at x = 0.8

x :	0.4	0.5	0.6	0.7	0.8
y :	1.5836	1.7974	2.0442	2.3275	2.6511

   3

   OR

   b) Compute $\int_0^1 \frac{dx}{1+x^2}$ by using trapezoidal rule with h = $\frac{1}{4}$. **3**

   c) Using Crank-Nicholson's scheme, solve $u_{xx} = 16\,u_t$, $0 < x < 1$, $t > 0$, given u(x, 0) = 0, u(0, t) = 0, u(1, t) = 100 t. Compute u for one step in t direction taking h = $\frac{1}{4}$. **3**

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Set S

SLR-VB – 308

Seat No.	

Set P

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL MACHINES – II

Day and Date : Thursday, 18-5-2017 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 : **(1×14=14)**

1) The no-load speed of an induction motor is of the order of
a) 8% b) 4% c) 2% d) 6%

2) Iron losses in the rotor of a 3-phase induction motor are negligible, because
a) frequency of rotor emf is too low
b) flux linking the rotor is of constant magnitude
c) flux density in the rotor parts is too low
d) none of these

3) Full-load copper losses in a 3-phase 50 Hz 4-pole induction motor running at 1455 rpm are 300 W. The rotor input is
a) 5 kW b) 10 kW c) 20 kW d) 50 kW

4) The starting torque of a 3-phase induction motor can be increased by increasing
a) the rotor reactance b) the rotor resistance
c) the stator resistance d) none of these

5) The crawling in the induction motor is caused by
a) improper design of the machine b) low supply voltage
c) high loads d) harmonics developed in the motor

6) When rotor is at standstill
a) slip is zero b) slip is one c) any slip d) slip is infinity

7) Under which of the following starting methods an induction motor draws high starting currents ?
a) Star-delta starter b) Auto transformer starter
c) Direct on line starter d) Reduced voltage starter

8) In a shaded pole motor, the direction of rotation is from
   a) Main pole to shaded pole
   b) Shaded pole to main pole
   c) Depends on supply line polarity
   d) None of the above

9) The transformation ratio of an induction motor can be found by
   a) Blocked rotor test
   b) Open circuit test
   c) Slip test
   d) Stator resistance test

10) In a capacitor start motor, the capacitor is connected in series with
   a) Running winding
   b) Starting winding
   c) Compensating winding
   d) None of the above

11) Line joining tangent and torque line in a circle diagram gives
   a) Cu loss
   b) Stator loss
   c) Maximum output
   d) Maximum torque

12) If the stator voltage of an I.M. is reduced by 10% the torque of the motor will drop by
   a) 10% b) 40% c) 20% d) 30%

13) In the circle diagram for I.M. the diameter of the circle represents
   a) Slip
   b) Rotor current
   c) Running torque
   d) Line voltage

14) In squirrel cage I.M. torque with auto transformer starter is _____ times the torque with direct switching.
   a) K^2
   b) 1/K
   c) K
   d) None of the above

_____

SLR-VB – 308

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL MACHINES – II

Day and Date : Thursday, 18-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   A) 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.
   B) 15 H.P., 4-pole, 50 Hz 3-phase I.M. is running at 1440 RPM and giving rated output. Friction and windage losses are 1000 W and stator Cu and core losses are 1500 W. Find the overall efficiency of the motor.
   C) Draw and explain torque slip characteristics of three phase induction motor assuming torque equation at slip s.
   D) Explain the following terms regarding three phase IM
      a) Crawling
      b) Cogging
   E) Explain DOL starter with neat circuit diagram.
   F) 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.

3. Solve the following : **(2×6=12)**
   A) A 100 kW, 3300 V, 50 Hz, 3-phase, Y connected induction motor has Ns = 500 rpm. The full load slip is 1.8% and full load p.f. 0.85. Stator Cu loss = 2440 W. Iron loss = 3500 W. Rotational losses = 1200 W. Calculate
      i) The rotor Cu loss
      ii) The line current
      iii) The full load efficiency.
   B) Three phase 50 Hz, 8 pole induction motor has full load slip of 2%, rotor standstill resistance and reactances are 0.001 Ohm and 0.005 Ohm respectively. Find the ratio of Tmax/Tfl and speed at which maximum torque occures.

OR

   B) Describe with circuit diagram the working of
      1) autotransformer starter
      2) rotor resistance starter.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   a) Explain speed control of induction motor by pole changing method.
   b) Explain operation of induction machine as an induction generator.
   c) A 220 V, 1ϕ I.M. gave following test results.

      Blocked Rotor Test : 120 V, 9.6 A, 460 W

      No load Test : 220 V, 4.6 A, 125 W

      Stator resistance is 1.5Ω. Determine the equivalent circuit parameters.
   d) Explain why single phase I.M. is not self starting.
   e) Explain slip power recovery scheme for speed control of 3-ϕ I.M.

5. Attempt **any two** : **(6×2=12)**
   a) Explain in detail any two types of single phase induction motors.
   b) Explain procedure to construct a circle diagram for induction motor from no load test and blocked rotor test data.
   c) Explain in detail the speed control of induction motor by
      a) Cascade connection
      b) Emf injection.

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SLR-VB – 308

Seat No.	

Set Q

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL MACHINES – II

Day and Date : Thursday, 18-5-2017 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 : **(1×14=14)**

1) In a shaded pole motor, the direction of rotation is from
   a) Main pole to shaded pole b) Shaded pole to main pole
   c) Depends on supply line polarity d) None of the above

2) The transformation ratio of an induction motor can be found by
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   a) Running winding b) Starting winding
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   a) Cu loss b) Stator loss
   c) Maximum output d) Maximum torque

5) If the stator voltage of an I.M. is reduced by 10% the torque of the motor will drop by
   a) 10% b) 40% c) 20% d) 30%

6) In the circle diagram for I.M. the diameter of the circle represents
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   a) K^2 b) 1/K
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P.T.O.

8) The no-load speed of an induction motor is of the order of
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12) The crawling in the induction motor is caused by
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   c) high loads d) harmonics developed in the motor

13) When rotor is at standstill
   a) slip is zero b) slip is one c) any slip d) slip is infinity

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SLR-VB – 308

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL MACHINES – II

Day and Date : Thursday, 18-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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C) Draw and explain torque slip characteristics of three phase induction motor assuming torque equation at slip s.

D) Explain the following terms regarding three phase IM
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E) Explain DOL starter with neat circuit diagram.

F) 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.

3. Solve the following : **(2×6=12)**

A) A 100 kW, 3300 V, 50 Hz, 3-phase, Y connected induction motor has Ns = 500 rpm. The full load slip is 1.8% and full load p.f. 0.85. Stator Cu loss = 2440 W. Iron loss = 3500 W. Rotational losses = 1200 W. Calculate
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   ii) The line current
   iii) The full load efficiency.

B) Three phase 50 Hz, 8 pole induction motor has full load slip of 2%, rotor standstill resistance and reactances are 0.001 Ohm and 0.005 Ohm respectively. Find the ratio of Tmax/Tfl and speed at which maximum torque occures.

OR

B) Describe with circuit diagram the working of
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Set Q

SECTION – II

4. Solve **any four** : **(4×4=16)**
   a) Explain speed control of induction motor by pole changing method.
   b) Explain operation of induction machine as an induction generator.
   c) A 220 V, 1ϕ I.M. gave following test results.

      Blocked Rotor Test : 120 V, 9.6 A, 460 W

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5. Attempt **any two** : **(6×2=12)**
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SLR-VB – 308

Seat No.	

Set R

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL MACHINES – II

Day and Date : Thursday, 18-5-2017 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 : **(1×14=14)**

1) The crawling in the induction motor is caused by
   a) improper design of the machine b) low supply voltage
   c) high loads d) harmonics developed in the motor

2) When rotor is at standstill
   a) slip is zero b) slip is one c) any slip d) slip is infinity

3) Under which of the following starting methods an induction motor draws high starting currents ?
   a) Star-delta starter b) Auto transformer starter
   c) Direct on line starter d) Reduced voltage starter

4) In a shaded pole motor, the direction of rotation is from
   a) Main pole to shaded pole b) Shaded pole to main pole
   c) Depends on supply line polarity d) None of the above

5) The transformation ratio of an induction motor can be found by
   a) Blocked rotor test b) Open circuit test
   c) Slip test d) Stator resistance test

6) In a capacitor start motor, the capacitor is connected in series with
   a) Running winding b) Starting winding
   c) Compensating winding d) None of the above

7) Line joining tangent and torque line in a circle diagram gives
   a) Cu loss b) Stator loss
   c) Maximum output d) Maximum torque

8) If the stator voltage of an I.M. is reduced by 10% the torque of the motor will drop by

a) 10% b) 40% c) 20% d) 30%

9) In the circle diagram for I.M. the diameter of the circle represents

a) Slip b) Rotor current
c) Running torque d) Line voltage

10) In squirrel cage I.M. torque with auto transformer starter is _____ times the torque with direct switching.

a) K^2 b) 1/K
c) K d) None of the above

11) The no-load speed of an induction motor is of the order of

a) 8% b) 4% c) 2% d) 6%

12) Iron losses in the rotor of a 3-phase induction motor are negligible, because

a) frequency of rotor emf is too low
b) flux linking the rotor is of constant magnitude
c) flux density in the rotor parts is too low
d) none of these

13) Full-load copper losses in a 3-phase 50 Hz 4-pole induction motor running at 1455 rpm are 300 W. The rotor input is

a) 5 kW b) 10 kW c) 20 kW d) 50 kW

14) The starting torque of a 3-phase induction motor can be increased by increasing

a) the rotor reactance b) the rotor resistance
c) the stator resistance d) none of these

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SLR-VB – 308

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL MACHINES – II

Day and Date : Thursday, 18-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

A) 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.

B) 15 H.P., 4-pole, 50 Hz 3-phase I.M. is running at 1440 RPM and giving rated output. Friction and windage losses are 1000 W and stator Cu and core losses are 1500 W. Find the overall efficiency of the motor.

C) Draw and explain torque slip characteristics of three phase induction motor assuming torque equation at slip s.

D) Explain the following terms regarding three phase IM
   a) Crawling
   b) Cogging

E) Explain DOL starter with neat circuit diagram.

F) 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.

3. Solve the following : **(2×6=12)**

A) A 100 kW, 3300 V, 50 Hz, 3-phase, Y connected induction motor has Ns = 500 rpm. The full load slip is 1.8% and full load p.f. 0.85. Stator Cu loss = 2440 W. Iron loss = 3500 W. Rotational losses = 1200 W. Calculate
   i) The rotor Cu loss
   ii) The line current
   iii) The full load efficiency.

B) Three phase 50 Hz, 8 pole induction motor has full load slip of 2%, rotor standstill resistance and reactances are 0.001 Ohm and 0.005 Ohm respectively. Find the ratio of Tmax/Tfl and speed at which maximum torque occures.

OR

B) Describe with circuit diagram the working of
   1) autotransformer starter
   2) rotor resistance starter.

Set R

SECTION – II

4. Solve **any four** : **(4×4=16)**
   a) Explain speed control of induction motor by pole changing method.
   b) Explain operation of induction machine as an induction generator.
   c) A 220 V, 1ϕ I.M. gave following test results.

      Blocked Rotor Test : 120 V, 9.6 A, 460 W

      No load Test : 220 V, 4.6 A, 125 W

      Stator resistance is 1.5Ω. Determine the equivalent circuit parameters.
   d) Explain why single phase I.M. is not self starting.
   e) Explain slip power recovery scheme for speed control of 3-ϕ I.M.

5. Attempt **any two** : **(6×2=12)**
   a) Explain in detail any two types of single phase induction motors.
   b) Explain procedure to construct a circle diagram for induction motor from no load test and blocked rotor test data.
   c) Explain in detail the speed control of induction motor by
      a) Cascade connection
      b) Emf injection.

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SLR-VB – 308

Seat No.	

Set S

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL MACHINES – II

Day and Date : Thursday, 18-5-2017 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 : **(1×14=14)**

1) In a capacitor start motor, the capacitor is connected in series with
   a) Running winding b) Starting winding
   c) Compensating winding d) None of the above

2) Line joining tangent and torque line in a circle diagram gives
   a) Cu loss b) Stator loss
   c) Maximum output d) Maximum torque

3) If the stator voltage of an I.M. is reduced by 10% the torque of the motor will drop by
   a) 10% b) 40% c) 20% d) 30%

4) In the circle diagram for I.M. the diameter of the circle represents
   a) Slip b) Rotor current
   c) Running torque d) Line voltage

5) In squirrel cage I.M. torque with auto transformer starter is _____ times the torque with direct switching.
   a) K^2 b) 1/K
   c) K d) None of the above

6) The no-load speed of an induction motor is of the order of
   a) 8% b) 4% c) 2% d) 6%

7) Iron losses in the rotor of a 3-phase induction motor are negligible, because
   a) frequency of rotor emf is too low
   b) flux linking the rotor is of constant magnitude
   c) flux density in the rotor parts is too low
   d) none of these

P.T.O.

8) Full-load copper losses in a 3-phase 50 Hz 4-pole induction motor running at 1455 rpm are 300 W. The rotor input is
   a) 5 kW b) 10 kW c) 20 kW d) 50 kW

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   a) the rotor reactance b) the rotor resistance
   c) the stator resistance d) none of these

10) The crawling in the induction motor is caused by
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   c) high loads d) harmonics developed in the motor

11) When rotor is at standstill
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12) Under which of the following starting methods an induction motor draws high starting currents ?
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   c) Direct on line starter d) Reduced voltage starter

13) In a shaded pole motor, the direction of rotation is from
   a) Main pole to shaded pole b) Shaded pole to main pole
   c) Depends on supply line polarity d) None of the above

14) The transformation ratio of an induction motor can be found by
   a) Blocked rotor test b) Open circuit test
   c) Slip test d) Stator resistance test

SLR-VB – 308

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL MACHINES – II

Day and Date : Thursday, 18-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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B) 15 H.P., 4-pole, 50 Hz 3-phase I.M. is running at 1440 RPM and giving rated output. Friction and windage losses are 1000 W and stator Cu and core losses are 1500 W. Find the overall efficiency of the motor.

C) Draw and explain torque slip characteristics of three phase induction motor assuming torque equation at slip s.

D) Explain the following terms regarding three phase IM
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E) Explain DOL starter with neat circuit diagram.

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3. Solve the following : **(2×6=12)**

A) A 100 kW, 3300 V, 50 Hz, 3-phase, Y connected induction motor has Ns = 500 rpm. The full load slip is 1.8% and full load p.f. 0.85. Stator Cu loss = 2440 W. Iron loss = 3500 W. Rotational losses = 1200 W. Calculate
   i) The rotor Cu loss
   ii) The line current
   iii) The full load efficiency.

B) Three phase 50 Hz, 8 pole induction motor has full load slip of 2%, rotor standstill resistance and reactances are 0.001 Ohm and 0.005 Ohm respectively. Find the ratio of Tmax/Tfl and speed at which maximum torque occures.

OR

B) Describe with circuit diagram the working of
   1) autotransformer starter
   2) rotor resistance starter.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   a) Explain speed control of induction motor by pole changing method.
   b) Explain operation of induction machine as an induction generator.
   c) A 220 V, 1ϕ I.M. gave following test results.

      Blocked Rotor Test : 120 V, 9.6 A, 460 W

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      Stator resistance is 1.5Ω. Determine the equivalent circuit parameters.
   d) Explain why single phase I.M. is not self starting.
   e) Explain slip power recovery scheme for speed control of 3-ϕ I.M.

5. Attempt **any two** : **(6×2=12)**
   a) Explain in detail any two types of single phase induction motors.
   b) Explain procedure to construct a circle diagram for induction motor from no load test and blocked rotor test data.
   c) Explain in detail the speed control of induction motor by
      a) Cascade connection
      b) Emf injection.

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SLR-VB – 309

Seat No.	

Set **P**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELEMENTS OF POWER SYSTEMS

Day and Date : Saturday, 20-5-2017 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. Solve all : **(14×1=14)**

1) The material commonly used for sheath of underground cable is
   A) Rubber B) Copper
   C) Lead D) Iron

2) In A.C.S.R conductor the function of the steel is to
   A) Provide additional mechanical strength
   B) Prevent corona
   C) Take care of surge
   D) Reduce inductance and consequently improve power factor

3) Charging current in the cable
   A) Leads the voltage by 180° B) Leads the voltage by 90°
   C) Lags the voltage by 90° D) Lags the voltage by 180°

4) Which of the following is not usually generating voltage ?
   A) 6.6 KV B) 11 KV
   C) 9.9 KV D) 132 KV

5) In the 3 unit insulator string voltage across lower unit is 17.5 KV and string efficiency is 84.28%, the voltage across string will be equal to
   A) 8.285 KV B) 44.25 KV
   C) 88.25 KV D) 442.5 KV

P.T.O.

6) In the intersheath grading insulation in cable is
   A) Composite B) Homogeneous
   C) Both (A) and (B) D) Either (A) or (B)

7) The distribution system in India are mostly
   A) Radial B) Parallel C) Network D) Either (A) or (C)

8) Grading of cables
   A) Reduces insulation cost and increases current rating
   B) Reduces insulation cost but decreases current rating
   C) Increases both
   D) None of these

9) For medium transmission line, A is
   A) Equal to B B) Equal to C
   C) Equal to D D) None

10) The inductance of a transmission line is minimum when
   A) GMD is high B) GMR is high
   C) Both GMD and GMR are high D) GMD is low and GMR is high

11) Under no load condition the current in a transmission line is because of
   A) Capacitance effect B) Corona effect
   C) Proximity effect D) Back flow from earth

12) The sag of the conductor of a transmission line is 2.5 m when the span is 250 m. Now if the height of supporting tower is increased by 25%, the sag will be
   A) Reduced by 25% B) Increased by 25%
   C) Reduced by 12.5% D) Remain unchanged

13) A conductor due to sag between two equal supports takes the form of
   A) Ellipse B) Hyperbola
   C) Catenary D) Semi-circle

14) In medium transmission line the shunt capacitance is taken into account in
   A) T-methods B) Π-methods
   C) Steinmetz method D) All

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SLR-VB – 309

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELEMENTS OF POWER SYSTEMS

Day and Date : Saturday, 20-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

1) Explain typical AC power supply system.

2) The cost of a 3 phase overhead transmission line is Rs. (25,000a + 2,500) 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 p.f. lag assumed to be constant throughout the year. Energy cost 4 paise per kwh and interest and depreciation total 10% per annum. Find most economical size of the conductor. Given that specific resistance of conductor material is $10^{-6}\,\Omega - cm$.

3) The self-capacitance of each unit in a string of 3 suspension insulator is 'C'. The shunt capacitance of connecting metal work of each insulator to earth is 0.15 C while for line it is 0.1C. Calculate i) The voltage cross each insulator as percentage of line voltage to earth ii) String efficiency.

4) What are the factors affecting corona ?

5) A single core cable of conductor diameter of 2 cm and lead sheath of diameter 5.3 cm is to be used on a 66 KV, 3-ph system. Two intersheath of diameter 3.1 cm and 4.2 cm are introduced between the core and sheath. If the maximum stress in the layer is the same, find the voltage on intersheath.

3. Solve **any two** : **(2×6=12)**

1) Derive expression for voltage distribution in 3 insulators in a string.

2) The tower of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kg. find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1.5 kg/m. Base of the tower can be considered to be at water level.

3) A single core lead sheath cable is graded by using three dielectrics of relative permittivity 5, 4 and 3 respectively. The conductor diameter is 2 cm and overall diameter is 8 cm. If the three dielectrics are worked at same maximum stress of 40 KV/cm, find the safe working voltage of the cable. What will be the value of safe working voltage for an ungraded cable, assuming the same conductor and overall diameter and maximum dielectric stress ?

SECTION – II

1. Solve **any four** : **(4×4=16)**
   1) Write a short note on substation equipment.
   2) Define and explain the term :
      i) Feeder
      ii) Distributor
      iii) Service mains
   3) Deduce an expression for voltage regulation of a short transmission line giving the vector diagram.
   4) Derive an expression for a inductance of a single phase two wire line.
   5) What do you understand by medium transmission line ? How capacitance effects are taken into account in such lines ?

2. Solve **any two** : **(2×6=12)**
   1) A 3-ph 50 Hz 150 km line has a resistance, inductive reactance and capacitive shunt admittance of 0.1 Ω , 0.5 Ω and 3×10^{-6} S per km per phase. If the line delivers 50 MW at 110 KV and 0.8 p.f lagging determine the sending end voltage and current. Assume a nominal π circuit for the line.
   2) A single phase distributor 2 km long supplied a load of 120 A at 0.8 p.f. lagging at its far end and a load of 80 A at 0.9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at far end. The resistance and reactance per km (go and return) are 0.05 Ω and 0.1 Ω respectively. If the voltage at the far end is maintained at 230 V calculate :
      i) Voltage at sending end
      ii) Phase angle between voltage at the two ends.
   3) Explain the following system of distribution :
      i) Radial system
      ii) Ring main system
      iii) Interconnected system.

SLR-VB – 309

Seat No.	

Set Q

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELEMENTS OF POWER SYSTEMS

Day and Date : Saturday, 20-5-2017 Max. Marks : 70
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Solve all : **(14×1=14)**

1) Grading of cables
   A) Reduces insulation cost and increases current rating
   B) Reduces insulation cost but decreases current rating
   C) Increases both
   D) None of these

2) For medium transmission line, A is
   A) Equal to B B) Equal to C
   C) Equal to D D) None

3) The inductance of a transmission line is minimum when
   A) GMD is high B) GMR is high
   C) Both GMD and GMR are high D) GMD is low and GMR is high

4) Under no load condition the current in a transmission line is because of
   A) Capacitance effect B) Corona effect
   C) Proximity effect D) Back flow from earth

5) The sag of the conductor of a transmission line is 2.5 m when the span is 250 m. Now if the height of supporting tower is increased by 25%, the sag will be
   A) Reduced by 25% B) Increased by 25%
   C) Reduced by 12.5% D) Remain unchanged

P.T.O.

6) A conductor due to sag between two equal supports takes the form of
   A) Ellipse B) Hyperbola
   C) Catenary D) Semi-circle

7) In medium transmission line the shunt capacitance is taken into account in
   A) T-methods B) $\prod$-methods
   C) Steinmetz method D) All

8) The material commonly used for sheath of underground cable is
   A) Rubber B) Copper
   C) Lead D) Iron

9) In A.C.S.R conductor the function of the steel is to
   A) Provide additional mechanical strength
   B) Prevent corona
   C) Take care of surge
   D) Reduce inductance and consequently improve power factor

10) Charging current in the cable
   A) Leads the voltage by 180° B) Leads the voltage by 90°
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   C) 9.9 KV D) 132 KV

12) In the 3 unit insulator string voltage across lower unit is 17.5 KV and string efficiency is 84.28%, the voltage across string will be equal to
   A) 8.285 KV B) 44.25 KV
   C) 88.25 KV D) 442.5 KV

13) In the intersheath grading insulation in cable is
   A) Composite B) Homogeneous
   C) Both (A) and (B) D) Either (A) or (B)

14) The distribution system in India are mostly
   A) Radial B) Parallel
   C) Network D) Either (A) or (C)

SLR-VB – 309

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELEMENTS OF POWER SYSTEMS

Day and Date : Saturday, 20-5-2017 Marks : 56
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SECTION – I

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3) The self-capacitance of each unit in a string of 3 suspension insulator is 'C'. The shunt capacitance of connecting metal work of each insulator to earth is 0.15 C while for line it is 0.1C. Calculate i) The voltage cross each insulator as percentage of line voltage to earth ii) String efficiency.

4) What are the factors affecting corona ?

5) A single core cable of conductor diameter of 2 cm and lead sheath of diameter 5.3 cm is to be used on a 66 KV, 3-ph system. Two intersheath of diameter 3.1 cm and 4.2 cm are introduced between the core and sheath. If the maximum stress in the layer is the same, find the voltage on intersheath.

3. Solve **any two** : **(2×6=12)**

1) Derive expression for voltage distribution in 3 insulators in a string.

2) The tower of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kg. find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1.5 kg/m. Base of the tower can be considered to be at water level.

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SECTION – II

1. Solve **any four** : **(4×4=16)**
   1) Write a short note on substation equipment.
   2) Define and explain the term :
      i) Feeder
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      iii) Service mains
   3) Deduce an expression for voltage regulation of a short transmission line giving the vector diagram.
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      i) Voltage at sending end
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SLR-VB – 309

Seat No.	

Set **R**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELEMENTS OF POWER SYSTEMS

Day and Date : Saturday, 20-5-2017 Max. Marks : 70
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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   A) 8.285 KV B) 44.25 KV
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2) In the intersheath grading insulation in cable is
   A) Composite B) Homogeneous
   C) Both (A) and (B) D) Either (A) or (B)

3) The distribution system in India are mostly
   A) Radial B) Parallel
   C) Network D) Either (A) or (C)

4) Grading of cables
   A) Reduces insulation cost and increases current rating
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   C) Increases both
   D) None of these

5) For medium transmission line, A is
   A) Equal to B B) Equal to C
   C) Equal to D D) None

P.T.O.

6) The inductance of a transmission line is minimum when
   A) GMD is high
   B) GMR is high
   C) Both GMD and GMR are high
   D) GMD is low and GMR is high

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   A) Capacitance effect
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   A) Reduced by 25%
   B) Increased by 25%
   C) Reduced by 12.5%
   D) Remain unchanged

9) A conductor due to sag between two equal supports takes the form of
   A) Ellipse
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   C) Catenary
   D) Semi-circle

10) In medium transmission line the shunt capacitance is taken into account in
   A) T-methods
   B) Π-methods
   C) Steinmetz method
   D) All

11) The material commonly used for sheath of underground cable is
   A) Rubber
   B) Copper
   C) Lead
   D) Iron

12) In A.C.S.R conductor the function of the steel is to
   A) Provide additional mechanical strength
   B) Prevent corona
   C) Take care of surge
   D) Reduce inductance and consequently improve power factor

13) Charging current in the cable
   A) Leads the voltage by 180°
   B) Leads the voltage by 90°
   C) Lags the voltage by 90°
   D) Lags the voltage by 180°

14) Which of the following is not usually generating voltage ?
   A) 6.6 KV
   B) 11 KV
   C) 9.9 KV
   D) 132 KV

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SLR-VB – 309

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELEMENTS OF POWER SYSTEMS

Day and Date : Saturday, 20-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

1) Explain typical AC power supply system.

2) The cost of a 3 phase overhead transmission line is Rs. (25,000a + 2,500) 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 p.f. lag assumed to be constant throughout the year. Energy cost 4 paise per kwh and interest and depreciation total 10% per annum. Find most economical size of the conductor. Given that specific resistance of conductor material is $10^{-6}\,\Omega - cm$.

3) The self-capacitance of each unit in a string of 3 suspension insulator is 'C'. The shunt capacitance of connecting metal work of each insulator to earth is 0.15 C while for line it is 0.1C. Calculate i) The voltage cross each insulator as percentage of line voltage to earth ii) String efficiency.

4) What are the factors affecting corona ?

5) A single core cable of conductor diameter of 2 cm and lead sheath of diameter 5.3 cm is to be used on a 66 KV, 3-ph system. Two intersheath of diameter 3.1 cm and 4.2 cm are introduced between the core and sheath. If the maximum stress in the layer is the same, find the voltage on intersheath.

3. Solve **any two** : **(2×6=12)**

1) Derive expression for voltage distribution in 3 insulators in a string.

2) The tower of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kg. find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1.5 kg/m. Base of the tower can be considered to be at water level.

3) A single core lead sheath cable is graded by using three dielectrics of relative permittivity 5, 4 and 3 respectively. The conductor diameter is 2 cm and overall diameter is 8 cm. If the three dielectrics are worked at same maximum stress of 40 KV/cm, find the safe working voltage of the cable. What will be the value of safe working voltage for an ungraded cable, assuming the same conductor and overall diameter and maximum dielectric stress ?

SECTION – II

1. Solve **any four** : **(4×4=16)**
   1) Write a short note on substation equipment.
   2) Define and explain the term :
      i) Feeder
      ii) Distributor
      iii) Service mains
   3) Deduce an expression for voltage regulation of a short transmission line giving the vector diagram.
   4) Derive an expression for a inductance of a single phase two wire line.
   5) What do you understand by medium transmission line ? How capacitance effects are taken into account in such lines ?

2. Solve **any two** : **(2×6=12)**
   1) A 3-ph 50 Hz 150 km line has a resistance, inductive reactance and capacitive shunt admittance of 0.1 Ω , 0.5 Ω and 3×10^{-6} S per km per phase. If the line delivers 50 MW at 110 KV and 0.8 p.f lagging determine the sending end voltage and current. Assume a nominal π circuit for the line.
   2) A single phase distributor 2 km long supplied a load of 120 A at 0.8 p.f. lagging at its far end and a load of 80 A at 0.9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at far end. The resistance and reactance per km (go and return) are 0.05 Ω and 0.1 Ω respectively. If the voltage at the far end is maintained at 230 V calculate :
      i) Voltage at sending end
      ii) Phase angle between voltage at the two ends.
   3) Explain the following system of distribution :
      i) Radial system
      ii) Ring main system
      iii) Interconnected system.

SLR-VB – 309

Seat No.	

Set **S**

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELEMENTS OF POWER SYSTEMS

Day and Date : Saturday, 20-5-2017 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. Solve all : **(14×1=14)**

1) The inductance of a transmission line is minimum when
   A) GMD is high B) GMR is high
   C) Both GMD and GMR are high D) GMD is low and GMR is high

2) Under no load condition the current in a transmission line is because of
   A) Capacitance effect B) Corona effect
   C) Proximity effect D) Back flow from earth

3) The sag of the conductor of a transmission line is 2.5 m when the span is 250 m. Now if the height of supporting tower is increased by 25%, the sag will be
   A) Reduced by 25% B) Increased by 25%
   C) Reduced by 12.5% D) Remain unchanged

4) A conductor due to sag between two equal supports takes the form of
   A) Ellipse B) Hyperbola
   C) Catenary D) Semi-circle

5) In medium transmission line the shunt capacitance is taken into account in
   A) T-methods B) Π-methods
   C) Steinmetz method D) All

P.T.O.

6) The material commonly used for sheath of underground cable is
   A) Rubber B) Copper
   C) Lead D) Iron

7) In A.C.S.R conductor the function of the steel is to
   A) Provide additional mechanical strength
   B) Prevent corona
   C) Take care of surge
   D) Reduce inductance and consequently improve power factor

8) Charging current in the cable
   A) Leads the voltage by 180° B) Leads the voltage by 90°
   C) Lags the voltage by 90° D) Lags the voltage by 180°

9) Which of the following is not usually generating voltage ?
   A) 6.6 KV B) 11 KV
   C) 9.9 KV D) 132 KV

10) In the 3 unit insulator string voltage across lower unit is 17.5 KV and string efficiency is 84.28%, the voltage across string will be equal to
   A) 8.285 KV B) 44.25 KV
   C) 88.25 KV D) 442.5 KV

11) In the intersheath grading insulation in cable is
   A) Composite B) Homogeneous
   C) Both (A) and (B) D) Either (A) or (B)

12) The distribution system in India are mostly
   A) Radial B) Parallel
   C) Network D) Either (A) or (C)

13) Grading of cables
   A) Reduces insulation cost and increases current rating
   B) Reduces insulation cost but decreases current rating
   C) Increases both
   D) None of these

14) For medium transmission line, A is
   A) Equal to B B) Equal to C
   C) Equal to D D) None

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SLR-VB – 309

Seat No.	

S.E. (Electrical) (Part – II) (CGPA) Examination, 2017
ELEMENTS OF POWER SYSTEMS

Day and Date : Saturday, 20-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

1) Explain typical AC power supply system.

2) The cost of a 3 phase overhead transmission line is Rs. (25,000a + 2,500) 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 p.f. lag assumed to be constant throughout the year. Energy cost 4 paise per kwh and interest and depreciation total 10% per annum. Find most economical size of the conductor. Given that specific resistance of conductor material is $10^{-6}\,\Omega - cm$.

3) The self-capacitance of each unit in a string of 3 suspension insulator is 'C'. The shunt capacitance of connecting metal work of each insulator to earth is 0.15 C while for line it is 0.1C. Calculate i) The voltage cross each insulator as percentage of line voltage to earth ii) String efficiency.

4) What are the factors affecting corona ?

5) A single core cable of conductor diameter of 2 cm and lead sheath of diameter 5.3 cm is to be used on a 66 KV, 3-ph system. Two intersheath of diameter 3.1 cm and 4.2 cm are introduced between the core and sheath. If the maximum stress in the layer is the same, find the voltage on intersheath.

3. Solve **any two** : **(2×6=12)**

1) Derive expression for voltage distribution in 3 insulators in a string.

2) The tower of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m. If the tension in the conductor is 1600 kg. find the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1.5 kg/m. Base of the tower can be considered to be at water level.

3) A single core lead sheath cable is graded by using three dielectrics of relative permittivity 5, 4 and 3 respectively. The conductor diameter is 2 cm and overall diameter is 8 cm. If the three dielectrics are worked at same maximum stress of 40 KV/cm, find the safe working voltage of the cable. What will be the value of safe working voltage for an ungraded cable, assuming the same conductor and overall diameter and maximum dielectric stress ?

SECTION – II

1. Solve **any four** : **(4×4=16)**
   1) Write a short note on substation equipment.
   2) Define and explain the term :
      i) Feeder
      ii) Distributor
      iii) Service mains
   3) Deduce an expression for voltage regulation of a short transmission line giving the vector diagram.
   4) Derive an expression for a inductance of a single phase two wire line.
   5) What do you understand by medium transmission line ? How capacitance effects are taken into account in such lines ?

2. Solve **any two** : **(2×6=12)**
   1) A 3-ph 50 Hz 150 km line has a resistance, inductive reactance and capacitive shunt admittance of 0.1 Ω , 0.5 Ω and 3×10^{-6} S per km per phase. If the line delivers 50 MW at 110 KV and 0.8 p.f lagging determine the sending end voltage and current. Assume a nominal π circuit for the line.
   2) A single phase distributor 2 km long supplied a load of 120 A at 0.8 p.f. lagging at its far end and a load of 80 A at 0.9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at far end. The resistance and reactance per km (go and return) are 0.05 Ω and 0.1 Ω respectively. If the voltage at the far end is maintained at 230 V calculate :
      i) Voltage at sending end
      ii) Phase angle between voltage at the two ends.
   3) Explain the following system of distribution :
      i) Radial system
      ii) Ring main system
      iii) Interconnected system.

SLR-VB – 310

Seat No.	

Set P

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Tuesday, 23-5-2017 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

SECTION – I

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

1) Change in input offset voltage caused by variations in supply voltage is called
   a) Output offset voltage
   b) Output voltage adjustment range
   c) SVRR
   d) Power consumption

2) Open loop bandwidth of IC 741 is approximately
   a) 1 KHz
   b) 1 MHz
   c) 10 KHz
   d) 5 Hz

3) Output offset voltage is cause by
   a) Input bias current
   b) Input offset voltage
   c) Both a) and b)
   d) None of the above

4) For voltage follower, which of the following is true ?
   a) Non-inverting amplifier with feedback
   b) Output = Input
   c) Gain = 1
   d) All of the above

5) Since input resistance of an ideal opamp is infinite,
   a) its output resistance is zero
   b) its output becomes independent of load resistance
   c) its input current is zero
   d) it becomes a current controlled device

6) For inverting amplifier, if R_f = 100 K and R_i = 1 K, then closed loop gain is
   a) 100000 b) 1000
   c) 101 d) 100

7) Basic integrator circuit contains feedback
   a) Resistor b) Capacitor
   c) Inductor d) None of the above

SECTION – II

8) The logic family with complementary logic levels is
   a) TTL b) ECL
   c) DTL d) CMOS

9) In K-map, 4-square eliminates _____ variables.
   a) 2 b) 3
   c) 4 d) 5

10) _____ can also be called as data selector.
   a) Multiplexer b) Demultiplexer
   c) Adder d) Subtractor

11) Toggle state for JK flip flop is when
   a) J = 0, K = 0 b) J = 0, K = 1
   c) J = 1, K = 1 d) None of the above

12) When a flip flop is reset, its outputs will be
   a) Q = 0, $\bar{Q}$ = 1 b) Q = 1, $\bar{Q}$ = 0
   c) Q = 0, $\bar{Q}$ = 0 d) Q = 1, $\bar{Q}$ = 1

13) Universal shift register
   a) accepts serial input b) accepts parallel input
   c) gives serial and parallel outputs d) is capable of all of the above

14) Twisted Ring counter is _____ register.
   a) Serial in serial out b) Serial in parallel out
   c) Parallel in serial out d) Parallel in parallel out

_____

SLR-VB – 310

Seat No.	

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Tuesday, 23-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

2. Solve **any four** : **16**
   a) Explain DC analysis of differential amplifier (DIBO).
   b) Mention the ideal characteristics of an ideal op-amp.
   c) Draw and explain op-amp as a adder.
   d) With the help of neat diagram explain concept of virtual ground.
   e) Draw and explain integrator.

3. Solve **any two** : **12**
   a) Derive an expression for closed loop gain, input resistance, bandwidth and output resistance for voltage series feedback amplifier.
   b) Define the following with respect to op-amp :
      i) CMRR ii) SVRR iii) Slew rate
   c) Explain opamp as a differentiator and draw frequency response of it.

4. Solve **any four** : **16**
   a) Define the following characteristics of digital ICs.
      i) Propagation delay ii) Fan-out iii) Noise margin iv) Fan in
   b) Simplify the following function using K-map.
      $F(A, B, C) = (1, 3, 5, 7)$
   c) Explain 4 : 1 MUX with the help of neat diagram and truth table.
   d) Define flip flop. Draw the logical diagram and truth table of SR flip flop.
   e) Draw and explain SISO register.

5. Solve **any two** : **12**
   a) Simplify the following function using K-map and realize it using NOR gates only. $F(A, B, C, D) = \sum m(0, 2, 4, 6, 7, 8, 10, 12, 13, 15) + d(3, 9)$.
   b) Design BCD ripple counter.
   c) Design a sequence detector which produces an output 1 every time the input sequence 1010 is detected.

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Set P

Set P

SLR-VB – 310

Seat No.	

Set Q

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Tuesday, 23-5-2017 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

SECTION – I

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

1) Output offset voltage is cause by
   a) Input bias current
   b) Input offset voltage
   c) Both a) and b)
   d) None of the above

2) For voltage follower, which of the following is true ?
   a) Non-inverting amplifier with feedback
   b) Output = Input
   c) Gain = 1
   d) All of the above

3) Since input resistance of an ideal opamp is infinite,
   a) its output resistance is zero
   b) its output becomes independent of load resistance
   c) its input current is zero
   d) it becomes a current controlled device

4) For inverting amplifier, if R_f = 100 K and R_i = 1 K, then closed loop gain is
   a) 100000
   b) 1000
   c) 101
   d) 100

P.T.O.

5) Basic integrator circuit contains feedback
   a) Resistor b) Capacitor
   c) Inductor d) None of the above

6) Change in input offset voltage caused by variations in supply voltage is called
   a) Output offset voltage b) Output voltage adjustment range
   c) SVRR d) Power consumption

7) Open loop bandwidth of IC 741 is approximately
   a) 1 KHz b) 1 MHz
   c) 10 KHz d) 5 Hz

SECTION – II

8) _____ can also be called as data selector.
   a) Multiplexer b) Demultiplexer
   c) Adder d) Subtractor

9) Toggle state for JK flip flop is when
   a) J = 0, K = 0 b) J = 0, K = 1
   c) J = 1, K = 1 d) None of the above

10) When a flip flop is reset, its outputs will be
   a) Q = 0, $\bar{Q}$ = 1 b) Q = 1, $\bar{Q}$ = 0
   c) Q = 0, $\bar{Q}$ = 0 d) Q = 1, $\bar{Q}$ = 1

11) Universal shift register
   a) accepts serial input b) accepts parallel input
   c) gives serial and parallel outputs d) is capable of all of the above

12) Twisted Ring counter is _____ register.
   a) Serial in serial out b) Serial in parallel out
   c) Parallel in serial out d) Parallel in parallel out

13) The logic family with complementary logic levels is
   a) TTL b) ECL
   c) DTL d) CMOS

14) In K-map, 4-square eliminates _____ variables.
   a) 2 b) 3
   c) 4 d) 5

_____

SLR-VB – 310

Seat No.	

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Tuesday, 23-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

2. Solve **any four** : **16**
   a) Explain DC analysis of differential amplifier (DIBO).
   b) Mention the ideal characteristics of an ideal op-amp.
   c) Draw and explain op-amp as a adder.
   d) With the help of neat diagram explain concept of virtual ground.
   e) Draw and explain integrator.

3. Solve **any two** : **12**
   a) Derive an expression for closed loop gain, input resistance, bandwidth and output resistance for voltage series feedback amplifier.
   b) Define the following with respect to op-amp :
      i) CMRR ii) SVRR iii) Slew rate
   c) Explain opamp as a differentiator and draw frequency response of it.

4. Solve **any four** : **16**
   a) Define the following characteristics of digital ICs.
      i) Propagation delay ii) Fan-out iii) Noise margin iv) Fan in
   b) Simplify the following function using K-map.
      F(A, B, C) = (1, 3, 5, 7)
   c) Explain 4 : 1 MUX with the help of neat diagram and truth table.
   d) Define flip flop. Draw the logical diagram and truth table of SR flip flop.
   e) Draw and explain SISO register.

5. Solve **any two** : **12**
   a) Simplify the following function using K-map and realize it using NOR gates only. $F(A, B, C, D) = \sum m(0, 2, 4, 6, 7, 8, 10, 12, 13, 15) + d(3, 9)$.
   b) Design BCD ripple counter.
   c) Design a sequence detector which produces an output 1 every time the input sequence 1010 is detected.

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Set Q

Set Q

SLR-VB – 310

Seat No.	

Set R

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Tuesday, 23-5-2017 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

SECTION – I

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

1) Since input resistance of an ideal opamp is infinite,
   a) its output resistance is zero
   b) its output becomes independent of load resistance
   c) its input current is zero
   d) it becomes a current controlled device

2) For inverting amplifier, if R_f = 100 K and R_i = 1 K, then closed loop gain is
   a) 100000 b) 1000
   c) 101 d) 100

3) Basic integrator circuit contains feedback
   a) Resistor b) Capacitor
   c) Inductor d) None of the above

4) Change in input offset voltage caused by variations in supply voltage is called
   a) Output offset voltage b) Output voltage adjustment range
   c) SVRR d) Power consumption

P.T.O.

5) Open loop bandwidth of IC 741 is approximately
   a) 1 KHz b) 1 MHz
   c) 10 KHz d) 5 Hz

6) Output offset voltage is cause by
   a) Input bias current b) Input offset voltage
   c) Both a) and b) d) None of the above

7) For voltage follower, which of the following is true ?
   a) Non-inverting amplifier with feedback
   b) Output = Input
   c) Gain = 1
   d) All of the above

SECTION – II

8) When a flip flop is reset, its outputs will be
   a) Q = 0, $\bar{Q}$ = 1 b) Q = 1, $\bar{Q}$ = 0
   c) Q = 0, $\bar{Q}$ = 0 d) Q = 1, $\bar{Q}$ = 1

9) Universal shift register
   a) accepts serial input b) accepts parallel input
   c) gives serial and parallel outputs d) is capable of all of the above

10) Twisted Ring counter is _____ register.
   a) Serial in serial out b) Serial in parallel out
   c) Parallel in serial out d) Parallel in parallel out

11) The logic family with complementary logic levels is
   a) TTL b) ECL
   c) DTL d) CMOS

12) In K-map, 4-square eliminates _____ variables.
   a) 2 b) 3
   c) 4 d) 5

13) _____ can also be called as data selector.
   a) Multiplexer b) Demultiplexer
   c) Adder d) Subtractor

14) Toggle state for JK flip flop is when
   a) J = 0, K = 0 b) J = 0, K = 1
   c) J = 1, K = 1 d) None of the above

_____

SLR-VB – 310

Seat No.	

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Tuesday, 23-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

2. Solve **any four** : **16**
   a) Explain DC analysis of differential amplifier (DIBO).
   b) Mention the ideal characteristics of an ideal op-amp.
   c) Draw and explain op-amp as a adder.
   d) With the help of neat diagram explain concept of virtual ground.
   e) Draw and explain integrator.

3. Solve **any two** : **12**
   a) Derive an expression for closed loop gain, input resistance, bandwidth and output resistance for voltage series feedback amplifier.
   b) Define the following with respect to op-amp :
      i) CMRR ii) SVRR iii) Slew rate
   c) Explain opamp as a differentiator and draw frequency response of it.

4. Solve **any four** : **16**
   a) Define the following characteristics of digital ICs.
      i) Propagation delay ii) Fan-out iii) Noise margin iv) Fan in
   b) Simplify the following function using K-map.
      $F(A, B, C) = (1, 3, 5, 7)$
   c) Explain 4 : 1 MUX with the help of neat diagram and truth table.
   d) Define flip flop. Draw the logical diagram and truth table of SR flip flop.
   e) Draw and explain SISO register.

5. Solve **any two** : **12**
   a) Simplify the following function using K-map and realize it using NOR gates only. $F(A, B, C, D) = \sum m(0, 2, 4, 6, 7, 8, 10, 12, 13, 15) + d(3, 9)$.
   b) Design BCD ripple counter.
   c) Design a sequence detector which produces an output 1 every time the input sequence 1010 is detected.

———————

Set R

Set R

SLR-VB – 310

Seat No.	

Set S

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Tuesday, 23-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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*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

SECTION – I

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

1) For voltage follower, which of the following is true ?
   a) Non-inverting amplifier with feedback
   b) Output = Input
   c) Gain = 1
   d) All of the above

2) Since input resistance of an ideal opamp is infinite,
   a) its output resistance is zero
   b) its output becomes independent of load resistance
   c) its input current is zero
   d) it becomes a current controlled device

3) For inverting amplifier, if R_f = 100 K and R_i = 1 K, then closed loop gain is
   a) 100000 b) 1000
   c) 101 d) 100

4) Basic integrator circuit contains feedback
   a) Resistor b) Capacitor
   c) Inductor d) None of the above

P.T.O.

5) Change in input offset voltage caused by variations in supply voltage is called
   a) Output offset voltage
   b) Output voltage adjustment range
   c) SVRR
   d) Power consumption

6) Open loop bandwidth of IC 741 is approximately
   a) 1 KHz
   b) 1 MHz
   c) 10 KHz
   d) 5 Hz

7) Output offset voltage is cause by
   a) Input bias current
   b) Input offset voltage
   c) Both a) and b)
   d) None of the above

SECTION – II

8) Toggle state for JK flip flop is when
   a) J = 0, K = 0
   b) J = 0, K = 1
   c) J = 1, K = 1
   d) None of the above

9) When a flip flop is reset, its outputs will be
   a) Q = 0, $\bar{Q}$ = 1
   b) Q = 1, $\bar{Q}$ = 0
   c) Q = 0, $\bar{Q}$ = 0
   d) Q = 1, $\bar{Q}$ = 1

10) Universal shift register
   a) accepts serial input
   b) accepts parallel input
   c) gives serial and parallel outputs
   d) is capable of all of the above

11) Twisted Ring counter is _____ register.
   a) Serial in serial out
   b) Serial in parallel out
   c) Parallel in serial out
   d) Parallel in parallel out

12) The logic family with complementary logic levels is
   a) TTL
   b) ECL
   c) DTL
   d) CMOS

13) In K-map, 4-square eliminates _____ variables.
   a) 2
   b) 3
   c) 4
   d) 5

14) _____ can also be called as data selector.
   a) Multiplexer
   b) Demultiplexer
   c) Adder
   d) Subtractor

_____

SLR-VB – 310

Seat No.	

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
ANALOG AND DIGITAL INTEGRATED CIRCUITS

Day and Date : Tuesday, 23-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

2. Solve **any four** : **16**
   a) Explain DC analysis of differential amplifier (DIBO).
   b) Mention the ideal characteristics of an ideal op-amp.
   c) Draw and explain op-amp as a adder.
   d) With the help of neat diagram explain concept of virtual ground.
   e) Draw and explain integrator.

3. Solve **any two** : **12**
   a) Derive an expression for closed loop gain, input resistance, bandwidth and output resistance for voltage series feedback amplifier.
   b) Define the following with respect to op-amp :
      i) CMRR ii) SVRR iii) Slew rate
   c) Explain opamp as a differentiator and draw frequency response of it.

4. Solve **any four** : **16**
   a) Define the following characteristics of digital ICs.
      i) Propagation delay ii) Fan-out iii) Noise margin iv) Fan in
   b) Simplify the following function using K-map.
      $F(A, B, C) = (1, 3, 5, 7)$
   c) Explain 4 : 1 MUX with the help of neat diagram and truth table.
   d) Define flip flop. Draw the logical diagram and truth table of SR flip flop.
   e) Draw and explain SISO register.

5. Solve **any two** : **12**
   a) Simplify the following function using K-map and realize it using NOR gates only. $F(A, B, C, D) = \sum m(0, 2, 4, 6, 7, 8, 10, 12, 13, 15) + d(3, 9)$.
   b) Design BCD ripple counter.
   c) Design a sequence detector which produces an output 1 every time the input sequence 1010 is detected.

———————

Set S

Set S

SLR-VB – 311

Seat No.	

Set **P**

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
NETWORK ANALYSIS

Day and Date : Thursday, 25-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***Assume*** *the suitable data* ***whenever*** *necessary.*
2) Q. No. ***1*** *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

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

1) Conductivity is expressed in terms of
   a) Ohm/m b) Siemens-m
   c) Mho/m d) Mho

2) Kirchhoff's voltage law is related to
   a) Battery E.M.F's and IR drops b) Battery E.M.F's only
   c) IR drops only d) Junction currents

3) Time constant of a circuit is the time in seconds taken after application of current to reach
   a) 25% of maximum value b) 50% of maximum value
   c) 63% of maximum value d) 90% of the maximum value

4) For three phase star connected circuit,
   a) Line voltage = $\sqrt{3}$ phase voltage b) Line voltage = phase voltage
   c) Line current = $\sqrt{3}$ phase current d) None of the above

5) An ideal voltage source should have
   a) Large value of E.M.F. b) Small value of E.M.F.
   c) Zero source resistance d) Infinite source resistance

6) For DC, at switching condition, which of the following acts as open circuit ?
   a) Inductor b) Capacitor c) Resistor d) All of the above

7) Second order circuit is under damped when
   a) $LC > 4R^2C^2$ b) $LC = 4R^2C^2$
   c) $LC < 4R^2C^2$ d) None of the above

P.T.O.

8) In Nortons theorem, to find Z_N
   a) All independent current sources are short circuited and independent voltage sources are open circuited
   b) All independent voltage and current sources are open circuited
   c) All independent voltage and current sources are short circuited
   d) All independent voltage sources are short circuited and independent current sources are open circuited

9) Application of Thevenin's theorem to a circuit yields
   a) Equivalent voltage source and impedance in series
   b) Equivalent current source and impedance in parallel
   c) Equivalent impedance
   d) Equivalent current source

10) Ohm's law is not applicable to
   a) DC circuits
   b) High currents
   c) Small resistors
   d) Semi-conductors

11) Time constant of a capacitive circuit
   a) Increases with the decrease of capacitance and resistance
   b) Increases with the decrease of capacitance and increase of resistance
   c) Increases with the increase of capacitance and decrease of resistance
   d) Increase with increase of capacitance and resistance

12) The concept on which Superposition theorem is based is
   a) reciprocity b) duality c) non-linearity d) linearity

13) In an electrical circuit's transient are due to
   a) inductor
   b) capacitor
   c) inductor and capacitor
   d) none of the above

14) Millman's theorem yields
   a) Equivalent resistance
   b) Equivalent impedance
   c) Equivalent voltage source
   d) Equivalent voltage or current source

SLR-VB – 311

Seat No.	

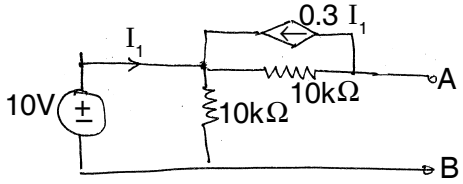
S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
NETWORK ANALYSIS

Day and Date : Thursday, 25-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***Assume*** *the suitable data* ***whenever*** *necessary.*

2. Solve **any four** : **12**

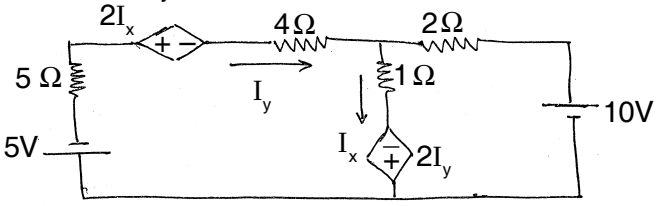
1) Obtain the Thevenin's equivalent network between A and B.



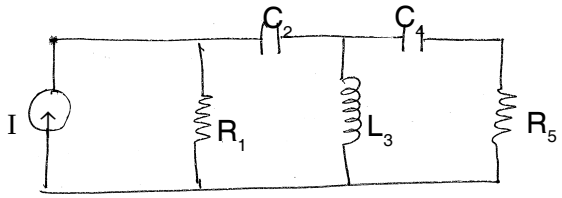
2) Derive the condition for maximum power transfer.

3) State and explain Superposition theorem.

4) Find the I_x and I_y for the circuit shown by mesh method.

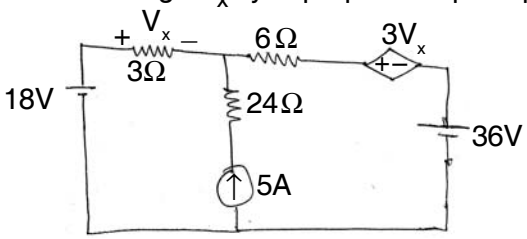


5) Draw the dual of the network.



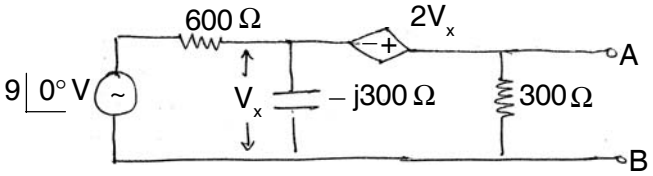
3. Solve **any two** : **16**

1) Find the voltage V_x by superposition principle.

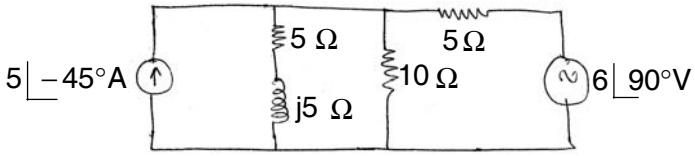


Set P

2) Find the Norton's equivalent network for the circuit shown.



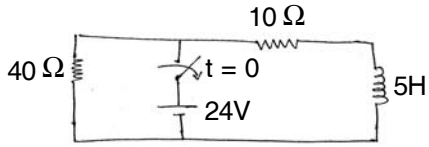
3) Find current I in 10 Ω resistance using Millmans theorem.



4. Solve **any four** : **12**

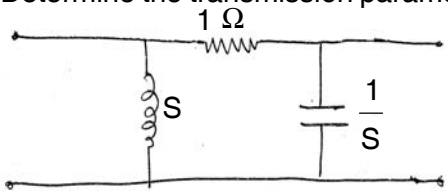
1) Derive Y-Parameter in terms of Z and transmission parameters.

2) Find the current through 5H inductor at t = 200 msec.

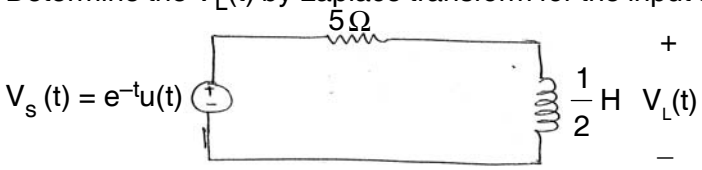


3) Derive an expression for response given by RL circuit.

4) Determine the transmission parameter for the two port network shown.



5) Determine the $V_L(t)$ by Laplace transform for the input shown in the network.



5. Solve **any two** : **16**

1) Find the response given by RC circuit for the following inputs by Laplace transform.
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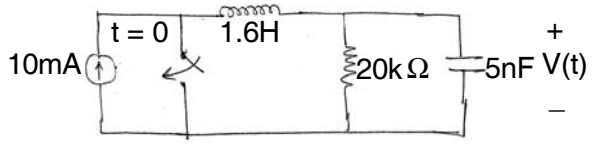
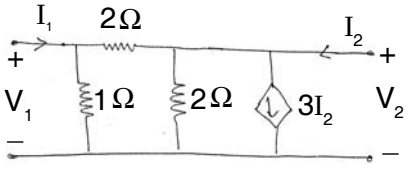
2) The switch in the circuit closed at t = 0, find V(t).



3) Find Y and Z parameter for the two port network shown.



Set P

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Seat No.	

Set **Q**

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
NETWORK ANALYSIS

Day and Date : Thursday, 25-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *:* 1) ***Assume*** *the suitable data* ***whenever*** *necessary.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) In Nortons theorem, to find Z_N
   a) All independent current sources are short circuited and independent voltage sources are open circuited
   b) All independent voltage and current sources are open circuited
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2) Application of Thevenin's theorem to a circuit yields
   a) Equivalent voltage source and impedance in series
   b) Equivalent current source and impedance in parallel
   c) Equivalent impedance
   d) Equivalent current source

3) Ohm's law is not applicable to
   a) DC circuits b) High currents
   c) Small resistors d) Semi-conductors

4) Time constant of a capacitive circuit
   a) Increases with the decrease of capacitance and resistance
   b) Increases with the decrease of capacitance and increase of resistance
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   a) inductor b) capacitor
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7) Millman's theorem yields
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P.T.O.

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   a) Ohm/m
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   a) Line voltage = $\sqrt{3}$ phase voltage
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Seat No.	

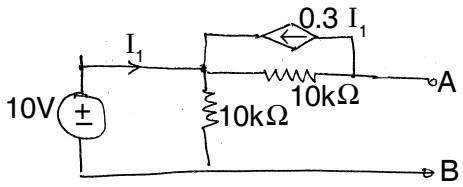
S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
NETWORK ANALYSIS

Day and Date : Thursday, 25-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***Assume*** *the suitable data* ***whenever*** *necessary.*

2. Solve **any four** : **12**

1) Obtain the Thevenin's equivalent network between A and B.



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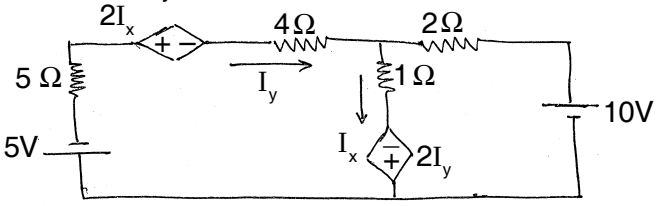
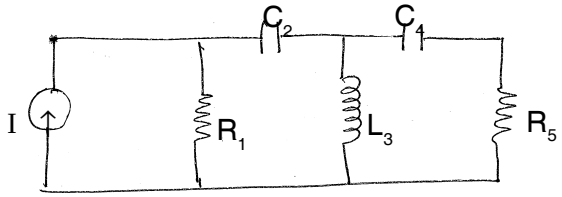
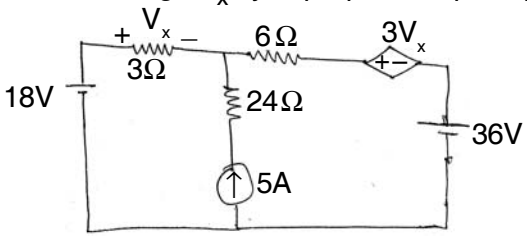


5) Draw the dual of the network.



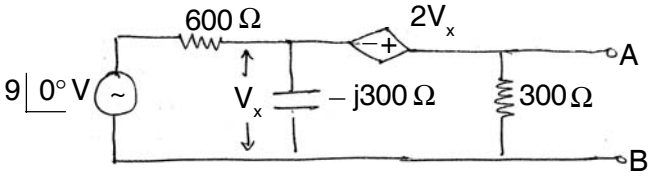
3. Solve **any two** : **16**

1) Find the voltage V_x by superposition principle.

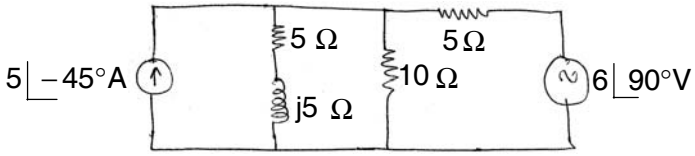


Set Q

2) Find the Norton's equivalent network for the circuit shown.



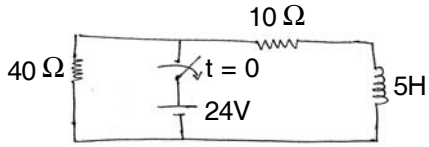
3) Find current I in 10 Ω resistance using Millmans theorem.



4. Solve **any four** : **12**

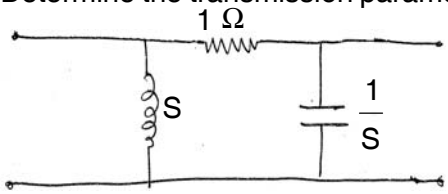
1) Derive Y-Parameter in terms of Z and transmission parameters.

2) Find the current through 5H inductor at t = 200 msec.

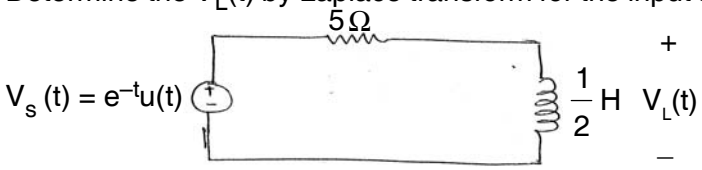


3) Derive an expression for response given by RL circuit.

4) Determine the transmission parameter for the two port network shown.



5) Determine the $V_L(t)$ by Laplace transform for the input shown in the network.



5. Solve **any two** : **16**

1) Find the response given by RC circuit for the following inputs by Laplace transform.
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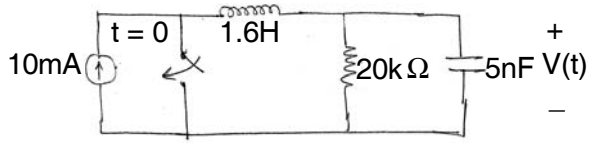
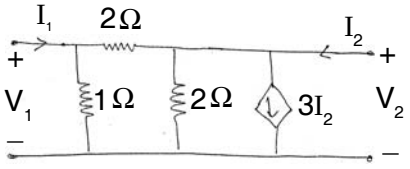


3) Find Y and Z parameter for the two port network shown.



Set Q

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Seat No.	

Set **R**

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
NETWORK ANALYSIS

Day and Date : Thursday, 25-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***Assume*** *the suitable data* ***whenever*** *necessary.*
2) 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) An ideal voltage source should have
   a) Large value of E.M.F. b) Small value of E.M.F.
   c) Zero source resistance d) Infinite source resistance

2) For DC, at switching condition, which of the following acts as open circuit ?
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3) Second order circuit is under damped when
   a) $LC > 4R^2C^2$ b) $LC = 4R^2C^2$
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4) In Nortons theorem, to find Z_N
   a) All independent current sources are short circuited and independent voltage sources are open circuited
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P.T.O.

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13) Time constant of a circuit is the time in seconds taken after application of current to reach
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14) For three phase star connected circuit,
   a) Line voltage = $\sqrt{3}$ phase voltage b) Line voltage = phase voltage
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SLR-VB – 311

Seat No.	

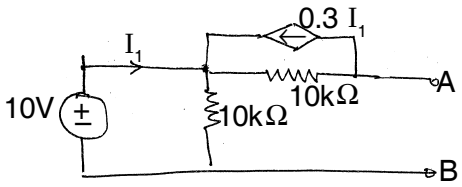
S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
NETWORK ANALYSIS

Day and Date : Thursday, 25-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***Assume*** *the suitable data* ***whenever*** *necessary.*

2. Solve **any four** : **12**

1) Obtain the Thevenin's equivalent network between A and B.



2) Derive the condition for maximum power transfer.

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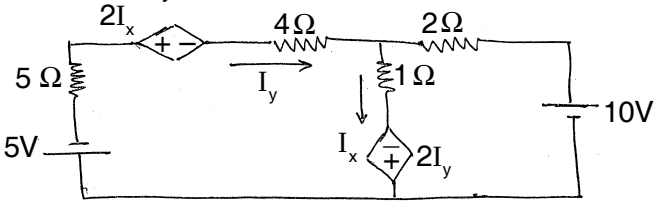
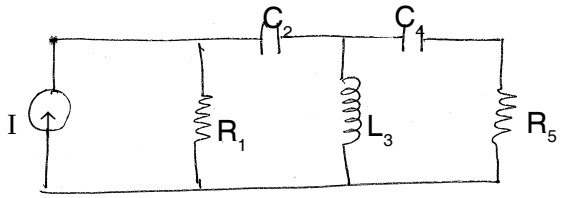
4) Find the I_x and I_y for the circuit shown by mesh method.



5) Draw the dual of the network.



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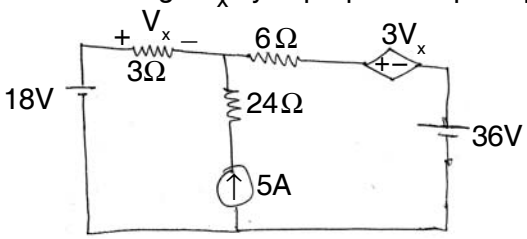
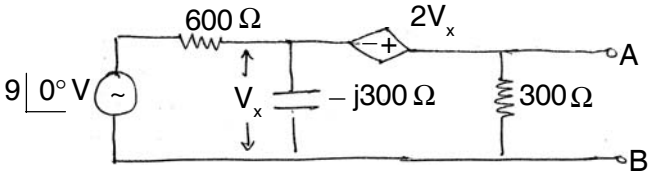
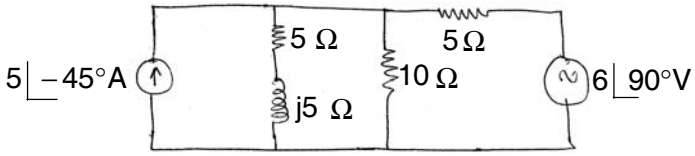


Set R

2) Find the Norton's equivalent network for the circuit shown.



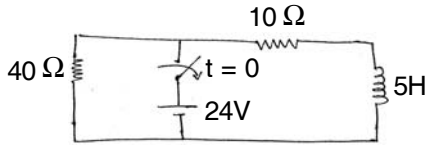
3) Find current I in 10 Ω resistance using Millmans theorem.



4. Solve **any four** : **12**

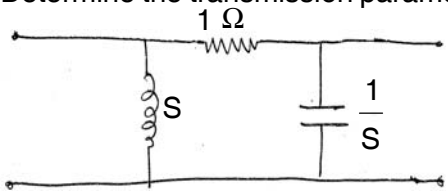
1) Derive Y-Parameter in terms of Z and transmission parameters.

2) Find the current through 5H inductor at t = 200 msec.

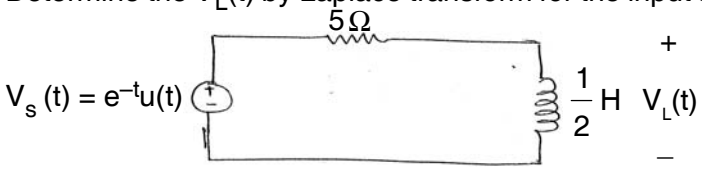


3) Derive an expression for response given by RL circuit.

4) Determine the transmission parameter for the two port network shown.



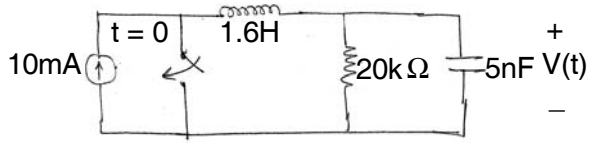
5) Determine the $V_L(t)$ by Laplace transform for the input shown in the network.



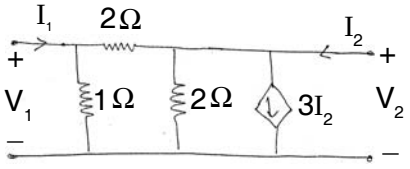
5. Solve **any two** : **16**

1) Find the response given by RC circuit for the following inputs by Laplace transform.
   i) Unit step function ii) Ramp function iii) Impulse function.

2) The switch in the circuit closed at t = 0, find V(t).



3) Find Y and Z parameter for the two port network shown.



Set R

SLR-VB – 311

Seat No.	

Set **S**

S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
NETWORK ANALYSIS

Day and Date : Thursday, 25-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *:* 1) ***Assume*** *the suitable data* ***whenever*** *necessary.*
2) *Q. No.* ***1*** *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

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

1) Ohm's law is not applicable to
   a) DC circuits b) High currents
   c) Small resistors d) Semi-conductors

2) Time constant of a capacitive circuit
   a) Increases with the decrease of capacitance and resistance
   b) Increases with the decrease of capacitance and increase of resistance
   c) Increases with the increase of capacitance and decrease of resistance
   d) Increase with increase of capacitance and resistance

3) The concept on which Superposition theorem is based is
   a) reciprocity b) duality c) non-linearity d) linearity

4) In an electrical circuit's transient are due to
   a) inductor b) capacitor
   c) inductor and capacitor d) none of the above

5) Millman's theorem yields
   a) Equivalent resistance b) Equivalent impedance
   c) Equivalent voltage source d) Equivalent voltage or current source

6) Conductivity is expressed in terms of
   a) Ohm/m b) Siemens-m
   c) Mho/m d) Mho

7) Kirchhoff's voltage law is related to
   a) Battery E.M.F's and IR drops b) Battery E.M.F's only
   c) IR drops only d) Junction currents

P.T.O.

8) Time constant of a circuit is the time in seconds taken after application of current to reach
   a) 25% of maximum value
   b) 50% of maximum value
   c) 63% of maximum value
   d) 90% of the maximum value

9) For three phase star connected circuit,
   a) Line voltage = $\sqrt{3}$ phase voltage
   b) Line voltage = phase voltage
   c) Line current = $\sqrt{3}$ phase current
   d) None of the above

10) An ideal voltage source should have
   a) Large value of E.M.F.
   b) Small value of E.M.F.
   c) Zero source resistance
   d) Infinite source resistance

11) For DC, at switching condition, which of the following acts as open circuit ?
   a) Inductor b) Capacitor c) Resistor d) All of the above

12) Second order circuit is under damped when
   a) $LC > 4R^2C^2$
   b) $LC = 4R^2C^2$
   c) $LC < 4R^2C^2$
   d) None of the above

13) In Nortons theorem, to find Z_N
   a) All independent current sources are short circuited and independent voltage sources are open circuited
   b) All independent voltage and current sources are open circuited
   c) All independent voltage and current sources are short circuited
   d) All independent voltage sources are short circuited and independent current sources are open circuited

14) Application of Thevenin's theorem to a circuit yields
   a) Equivalent voltage source and impedance in series
   b) Equivalent current source and impedance in parallel
   c) Equivalent impedance
   d) Equivalent current source

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Seat No.	

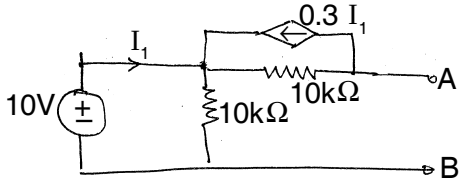
S.E. (Part – II) (Electrical Engg.) (CGPA) Examination, 2017
NETWORK ANALYSIS

Day and Date : Thursday, 25-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instruction *:* ***Assume*** *the suitable data* ***whenever*** *necessary.*

2. Solve **any four** : **12**

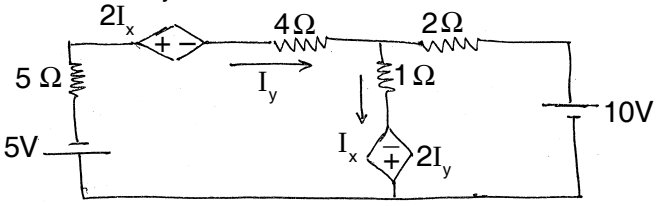
1) Obtain the Thevenin's equivalent network between A and B.



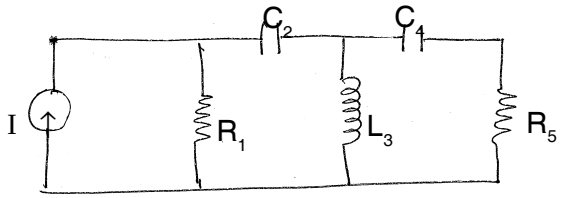
2) Derive the condition for maximum power transfer.

3) State and explain Superposition theorem.

4) Find the I_x and I_y for the circuit shown by mesh method.

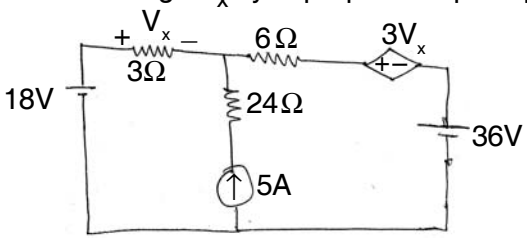


5) Draw the dual of the network.



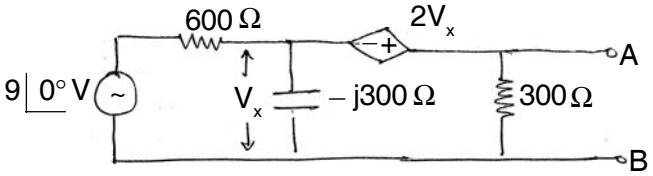
3. Solve **any two** : **16**

1) Find the voltage V_x by superposition principle.

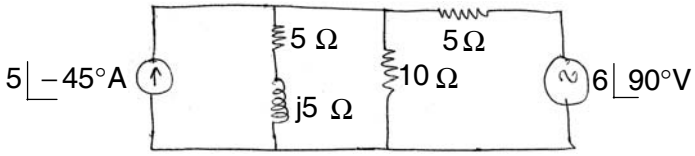


Set S

2) Find the Norton's equivalent network for the circuit shown.



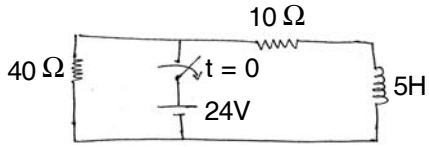
3) Find current I in 10 Ω resistance using Millmans theorem.



4. Solve **any four** : **12**

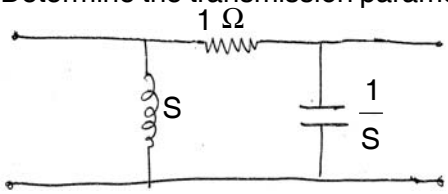
1) Derive Y-Parameter in terms of Z and transmission parameters.

2) Find the current through 5H inductor at t = 200 msec.

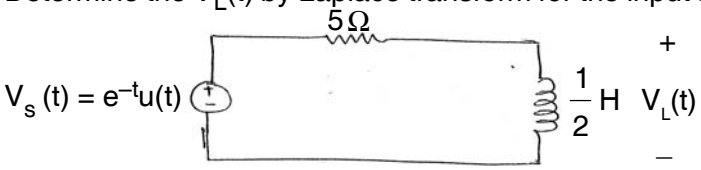


3) Derive an expression for response given by RL circuit.

4) Determine the transmission parameter for the two port network shown.



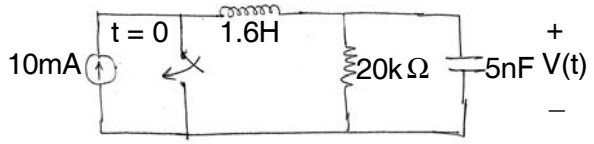
5) Determine the $V_L(t)$ by Laplace transform for the input shown in the network.



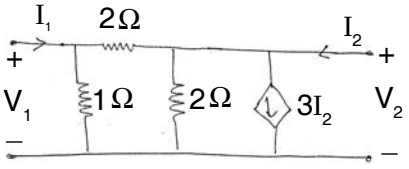
5. Solve **any two** : **16**

1) Find the response given by RC circuit for the following inputs by Laplace transform.
   i) Unit step function ii) Ramp function iii) Impulse function.

2) The switch in the circuit closed at t = 0, find V(t).



3) Find Y and Z parameter for the two port network shown.



Set S

SLR-VB – 312

Seat No.	

Set P

S.E. (Electrical) (Part – II) (Old) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Friday, 19-5-2017 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.***
*3) Make suitable assumptions **if necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) If average power of the signal satisfies the condition $0 < p < \infty$ is called
   a) Energy signal b) Power signal
   c) Neither energy nor power signal d) Both energy and power signal

2) Which of the following is causal system ?
   a) $y(t) = x(t+1)$ b) $y(t) = x(t^2)$ c) $y(t) = x(t-2)$ d) $y(t) = x(-t)$

3) Which of the following is static system ?
   a) $y(t) = x(1-t)$ b) $y(t) = x(t^2)$ c) $y(t) = x(t+5)$ d) $y(t) = x(t) + 1$

4) Any signal x(t) can be represented as
   a) $x_e(t) + x_0(t)$ b) $x_e(t) - x_0(t)$ c) $x_e(t) / x_0(t)$ d) $x_e(t) . x_0(t)$

5) The convolution of x(n) = {1 2 2 1} and h(n) = {1 1 1} is
   a) {1 3 5 5 3 1} b) {1 3 5 5} c) {1 2 3 5 6} d) {1 2 2 2 1}

6) The time period of x(t) = cos(50t) is
   a) 25π b) 50 c) $\pi/2$ d) $\pi/25$

7) When the system has poles inside the unit circle in z-domain, then system is
   a) Stable b) Unstable c) Can't say d) None of these

8) Sampling a signal is equivalent to multiplying it with
   a) A sync function b) A train of impulse
   c) A train of sync function d) A rectangular window

9) Which signal is anticausal ?
   a) $x(t) = 0, t < 0$ b) $x(t) = 0, t > 0$ c) $x(t) = 1, t > 0$ d) none

P.T.O.

10) The Fourier transform of u(t) is
a) $1/j\omega$ b) $1/(1 + j\omega)$ c) $j\omega$ d) $\pi\delta(\omega) + (1/j\omega)$

11) The z-transform of u(n) is
a) $\frac{z}{z-1}$ b) $\frac{1}{z-1}$ c) 1 d) $\frac{1}{z}$

12) The Fourier transform of a rectangular pulse is a _____ function.
a) Sine b) Cosine c) Sinc d) Rectangular

13) A signal x(t) = cos(50 π t) has Nyquist sampling rate as
a) 50 Hz b) 25 Hz c) 100 Hz d) 200 Hz

14) The Laplace transform of unit step function is
a) 1 b) 1/s c) 1/(s + 1) d) $1/s^2$

15) If x(n) = u(n) – u(n – 4) then ROC is
a) Entire z-plane, except z = 0
b) Entire z-plane, except z = ∞
c) Entire z-plane
d) Entire z-plane, except z = 0 and z = ∞

16) The time shifting property of Fourier transform can be expressed as
a) $x(t + t_0) \leftrightarrow e^{-j\omega t0} X(W)$ b) $x(t - t_0) \leftrightarrow e^{-j\omega t0} X(W)$
c) $x(t - t_0) \leftrightarrow x(W - W_0)$ d) None of these

17) If x(t) is an odd signal then
a) x(–t) is even b) x^2(–t) is even
c) x^2(–t) is odd d) x^2(t) is odd

18) If x(n) exist only for $n \leq 0$ then it is called as _____ sequence.
a) Unilateral b) Bilateral c) Both a and b d) None

19) With $\delta(t)$ as unit impulse sequence, $x(t).\delta(t - t_0)$ is
a) $x(t).\delta(t)$ b) $x(t_0)$ c) $x(t_0).\delta(t - t_0)$ d) $x(t - t_0)$

20) In order to get original signal from sampled signal it is necessary to use
a) Low pass filter b) High pass filter
c) Band pass filter d) Band stop filter

_____

SLR-VB – 312

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2017
SIGNALS AND SYSTEMS

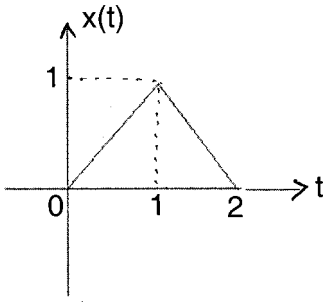
Day and Date : Friday, 19-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Make suitable assumptions **if necessary**.*

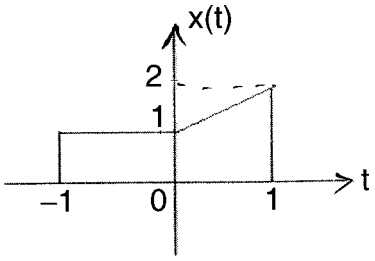
SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Which of the following signals are causal or non-causal ?
   i) $x(t) = e^{-3t}\, u(t)$ ii) $x(t) = u(1 - t)$
2) Determine fundamental period of following signals.
   i) $x(t) = 2 \cos 5t + 6 \sin 2t$
   ii) $x(n) = \cos (6\pi n) + 3 \sin (2\pi n)$
3) Find Laplace transform of the signal $x(t) = e^{-3t}\, u(t)$.
4) Prove the linearity property of Laplace transform.
5) Find even and odd part of given signal.



3. A) A continuous time signal x(t) is shown below. Sketch the following transformations. **10**



i) $x(t - 2)$ ii) $x(1 - t)$ iii) $3x(t + 1)$
iv) $x(t/2)$ v) $x(3t)$.

Set P

B) Perform the convolution of following signals. **10**
$x(t) = u(t)$ and $h(t) = e^{-5t}\, u(t)$.

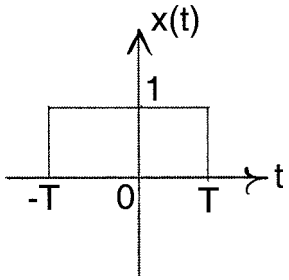
OR

B) Obtain Laplace transform of $x(t) = e^{-at} \cos w_0 t\, u(t)$. **10**

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Find z-transform of signal $x(n) = (0.5)^n\, u(n)$.
   2) Find DFT of the signal x(n) = (1 2 3 4).
   3) Explain sampling theorem.
   4) The analog signal x(t) is given as $x(t) = 2\cos 100\pi t + 5 \sin 200\pi t$. Find Nyquist sampling rate.
   5) Find Fourier transform of unit step function.

5. Attempt **any two** : **(2×10=20)**
   1) Find fourier transform of signal shown below.



   2) Find inverse z-transform of

$$X(z) = \frac{1+2z^{-1}}{1-2z^{-1}+z^{-2}}$$ for x(n) is

      i) Causal
      ii) Anticausal using power series method.

   3) Find inverse z-transform of

$$X(z) = \frac{1+2z+3z^2}{2+3z+z^2}$$

using partial fraction expansion method.

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Seat No.	

Set Q

S.E. (Electrical) (Part – II) (Old) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Friday, 19-5-2017 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.***
*3) Make suitable assumptions **if necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The time shifting property of Fourier transform can be expressed as
   a) $x(t + t_0) \leftrightarrow e^{-j\omega t0} X(W)$ b) $x(t - t_0) \leftrightarrow e^{-j\omega t0} X(W)$
   c) $x(t - t_0) \leftrightarrow x(W - W_0)$ d) None of these

2) If x(t) is an odd signal then
   a) x(–t) is even b) $x^2(-t)$ is even
   c) $x^2(-t)$ is odd d) $x^2(t)$ is odd

3) If x(n) exist only for $n \leq 0$ then it is called as _____ sequence.
   a) Unilateral b) Bilateral c) Both a and b d) None

4) With $\delta(t)$ as unit impulse sequence, $x(t).\delta(t - t_0)$ is
   a) $x(t).\delta(t)$ b) $x(t_0)$ c) $x(t_0).\delta(t - t_0)$ d) $x(t - t_0)$

5) In order to get original signal from sampled signal it is necessary to use
   a) Low pass filter b) High pass filter
   c) Band pass filter d) Band stop filter

6) If average power of the signal satisfies the condition $0 < p < \infty$ is called
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   c) Neither energy nor power signal d) Both energy and power signal

7) Which of the following is causal system ?
   a) y(t) = x(t+1) b) $y(t) = x(t^2)$ c) y(t) = x(t – 2) d) y(t) = x(– t)

8) Which of the following is static system ?
   a) y(t) = x(1 – t) b) $y(t) = x(t^2)$ c) y(t) = x(t + 5) d) y(t) = x(t) + 1

P.T.O.

9) Any signal x(t) can be represented as
   a) $x_e(t) + x_0(t)$ b) $x_e(t) - x_0(t)$ c) $x_e(t) / x_0(t)$ d) $x_e(t) . x_0(t)$
10) The convolution of x(n) = {1 2 2 1} and h(n) = {1 1 1} is
   a) {1 3 5 5 3 1} b) {1 3 5 5} c) {1 2 3 5 6} d) {1 2 2 2 1}
11) The time period of x(t) = cos(50t) is
   a) 25π b) 50 c) $\pi/2$ d) $\pi/25$
12) When the system has poles inside the unit circle in z-domain, then system is
   a) Stable b) Unstable c) Can't say d) None of these
13) Sampling a signal is equivalent to multiplying it with
   a) A sync function b) A train of impulse
   c) A train of sync function d) A rectangular window
14) Which signal is anticausal ?
   a) x(t) = 0, t < 0 b) x(t) = 0, t > 0 c) x(t) = 1, t > 0 d) none
15) The Fourier transform of u(t) is
   a) $1/j\omega$ b) $1/(1 + j\omega)$ c) $j\omega$ d) $\pi\delta(\omega) + (1/j\omega)$
16) The z-transform of u(n) is
   a) $\frac{z}{z-1}$ b) $\frac{1}{z-1}$ c) 1 d) $\frac{1}{z}$
17) The Fourier transform of a rectangular pulse is a _____ function.
   a) Sine b) Cosine c) Sinc d) Rectangular
18) A signal x(t) = cos(50 π t) has Nyquist sampling rate as
   a) 50 Hz b) 25 Hz c) 100 Hz d) 200 Hz
19) The Laplace transform of unit step function is
   a) 1 b) 1/s c) 1/(s + 1) d) $1/s^2$
20) If x(n) = u(n) – u(n – 4) then ROC is
   a) Entire z-plane, except z = 0
   b) Entire z-plane, except z = ∞
   c) Entire z-plane
   d) Entire z-plane, except z = 0 and z = ∞

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SLR-VB – 312

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Friday, 19-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
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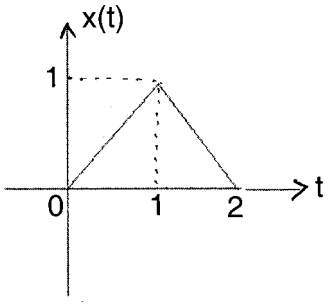
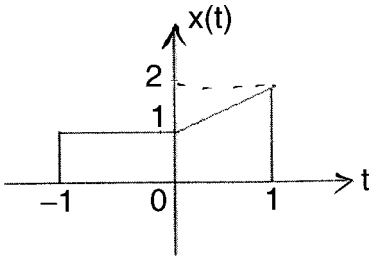
SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Which of the following signals are causal or non-causal ?
   i) $x(t) = e^{-3t}\, u(t)$ ii) $x(t) = u(1 - t)$
2) Determine fundamental period of following signals.
   i) $x(t) = 2 \cos 5t + 6 \sin 2t$
   ii) $x(n) = \cos (6\pi n) + 3 \sin (2\pi n)$
3) Find Laplace transform of the signal $x(t) = e^{-3t}\, u(t)$.
4) Prove the linearity property of Laplace transform.
5) Find even and odd part of given signal.



3. A) A continuous time signal x(t) is shown below. Sketch the following transformations. **10**



i) $x(t - 2)$ ii) $x(1 - t)$ iii) $3x(t + 1)$
iv) $x(t/2)$ v) $x(3t)$.

Set Q

B) Perform the convolution of following signals. **10**
$x(t) = u(t)$ and $h(t) = e^{-5t}\, u(t)$.

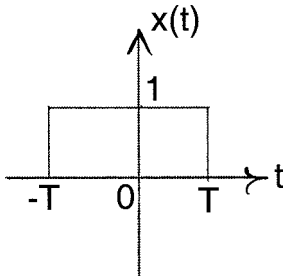
OR

B) Obtain Laplace transform of $x(t) = e^{-at} \cos w_0 t\, u(t)$. **10**

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Find z-transform of signal $x(n) = (0.5)^n\, u(n)$.
   2) Find DFT of the signal x(n) = (1 2 3 4).
   3) Explain sampling theorem.
   4) The analog signal x(t) is given as $x(t) = 2\cos 100\pi t + 5 \sin 200\pi t$. Find Nyquist sampling rate.
   5) Find Fourier transform of unit step function.

5. Attempt **any two** : **(2×10=20)**
   1) Find fourier transform of signal shown below.



   2) Find inverse z-transform of

$$X(z) = \frac{1+2z^{-1}}{1-2z^{-1}+z^{-2}}$$ for x(n) is

      i) Causal
      ii) Anticausal using power series method.

   3) Find inverse z-transform of

$$X(z) = \frac{1+2z+3z^2}{2+3z+z^2}$$

using partial fraction expansion method.

SLR-VB – 312

Seat No.	

Set **R**

S.E. (Electrical) (Part – II) (Old) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Friday, 19-5-2017 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.***
*3) Make suitable assumptions **if necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The z-transform of u(n) is

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

2) The Fourier transform of a rectangular pulse is a _____ function.
a) Sine b) Cosine c) Sinc d) Rectangular

3) A signal x(t) = cos(50 π t) has Nyquist sampling rate as
a) 50 Hz b) 25 Hz c) 100 Hz d) 200 Hz

4) The Laplace transform of unit step function is
a) 1 b) 1/s c) 1/(s + 1) d) $1/s^2$

5) If x(n) = u(n) – u(n – 4) then ROC is
a) Entire z-plane, except z = 0
b) Entire z-plane, except z = ∞
c) Entire z-plane
d) Entire z-plane, except z = 0 and z = ∞

6) The time shifting property of Fourier transform can be expressed as
a) $x(t + t_0) \leftrightarrow e^{-j\omega t0} X(W)$ b) $x(t - t_0) \leftrightarrow e^{-j\omega t0} X(W)$
c) $x(t - t_0) \leftrightarrow x(W - W_0)$ d) None of these

7) If x(t) is an odd signal then
a) x(–t) is even b) x^2(–t) is even
c) x^2(–t) is odd d) x^2(t) is odd

P.T.O.

8) If x(n) exist only for $n \leq 0$ then it is called as _____ sequence.
   a) Unilateral b) Bilateral c) Both a and b d) None

9) With $\delta(t)$ as unit impulse sequence, $x(t).\delta(t - t_0)$ is
   a) $x(t).\delta(t)$ b) $x(t_0)$ c) $x(t_0).\delta(t - t_0)$ d) $x(t - t_0)$

10) In order to get original signal from sampled signal it is necessary to use
   a) Low pass filter b) High pass filter
   c) Band pass filter d) Band stop filter

11) If average power of the signal satisfies the condition $0 < p < \infty$ is called
   a) Energy signal b) Power signal
   c) Neither energy nor power signal d) Both energy and power signal

12) Which of the following is causal system ?
   a) y(t) = x(t+1) b) $y(t) = x(t^2)$ c) y(t) = x(t – 2) d) y(t) = x(– t)

13) Which of the following is static system ?
   a) y(t) = x(1 – t) b) $y(t) = x(t^2)$ c) y(t) = x(t + 5) d) y(t) = x(t) + 1

14) Any signal x(t) can be represented as
   a) $x_e(t) + x_0(t)$ b) $x_e(t) - x_0(t)$ c) $x_e(t) / x_0(t)$ d) $x_e(t) . x_0(t)$

15) The convolution of x(n) = {1 2 2 1} and h(n) = {1 1 1} is
   a) {1 3 5 5 3 1} b) {1 3 5 5} c) {1 2 3 5 6} d) {1 2 2 2 1}

16) The time period of x(t) = cos(50t) is
   a) 25π b) 50 c) $\pi/2$ d) $\pi/25$

17) When the system has poles inside the unit circle in z-domain, then system is
   a) Stable b) Unstable c) Can't say d) None of these

18) Sampling a signal is equivalent to multiplying it with
   a) A sync function b) A train of impulse
   c) A train of sync function d) A rectangular window

19) Which signal is anticausal ?
   a) x(t) = 0, t < 0 b) x(t) = 0, t > 0 c) x(t) = 1, t > 0 d) none

20) The Fourier transform of u(t) is
   a) $1/j\omega$ b) $1/(1 + j\omega)$ c) $j\omega$ d) $\pi\delta(\omega) + (1/j\omega)$

_____

SLR-VB – 312

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2017
SIGNALS AND SYSTEMS

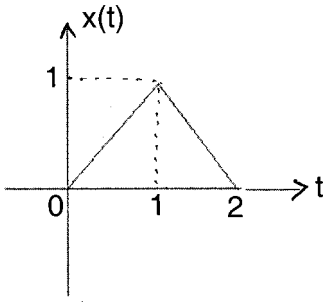
Day and Date : Friday, 19-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Make suitable assumptions **if necessary**.*

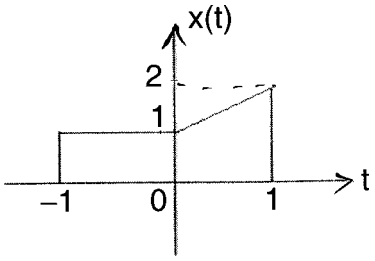
SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Which of the following signals are causal or non-causal ?
   i) $x(t) = e^{-3t}\, u(t)$ ii) $x(t) = u(1 - t)$
2) Determine fundamental period of following signals.
   i) $x(t) = 2 \cos 5t + 6 \sin 2t$
   ii) $x(n) = \cos (6\pi n) + 3 \sin (2\pi n)$
3) Find Laplace transform of the signal $x(t) = e^{-3t}\, u(t)$.
4) Prove the linearity property of Laplace transform.
5) Find even and odd part of given signal.



3. A) A continuous time signal x(t) is shown below. Sketch the following transformations. **10**



i) $x(t - 2)$ ii) $x(1 - t)$ iii) $3x(t + 1)$
iv) $x(t/2)$ v) $x(3t)$.

Set R

B) Perform the convolution of following signals. **10**
$x(t) = u(t)$ and $h(t) = e^{-5t}\, u(t)$.

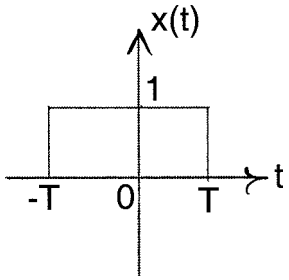
OR

B) Obtain Laplace transform of $x(t) = e^{-at} \cos w_0 t\, u(t)$. **10**

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Find z-transform of signal $x(n) = (0.5)^n\, u(n)$.
   2) Find DFT of the signal x(n) = (1 2 3 4).
   3) Explain sampling theorem.
   4) The analog signal x(t) is given as $x(t) = 2\cos 100\pi t + 5 \sin 200\pi t$. Find Nyquist sampling rate.
   5) Find Fourier transform of unit step function.

5. Attempt **any two** : **(2×10=20)**
   1) Find fourier transform of signal shown below.



   2) Find inverse z-transform of

$$X(z) = \frac{1+2z^{-1}}{1-2z^{-1}+z^{-2}}$$ for x(n) is

      i) Causal
      ii) Anticausal using power series method.

   3) Find inverse z-transform of

$$X(z) = \frac{1+2z+3z^2}{2+3z+z^2}$$

using partial fraction expansion method.

SLR-VB – 312

Seat No.	

Set S

S.E. (Electrical) (Part – II) (Old) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Friday, 19-5-2017 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.***
*3) Make suitable assumptions **if necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The time period of x(t) = cos(50t) is
a) 25π b) 50 c) $\pi/2$ d) $\pi/25$

2) When the system has poles inside the unit circle in z-domain, then system is
a) Stable b) Unstable c) Can't say d) None of these

3) Sampling a signal is equivalent to multiplying it with
a) A sync function b) A train of impulse
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4) Which signal is anticausal ?
a) x(t) = 0, t < 0 b) x(t) = 0, t > 0 c) x(t) = 1, t > 0 d) none

5) The Fourier transform of u(t) is
a) $1/j\omega$ b) $1/(1 + j\omega)$ c) $j\omega$ d) $\pi\delta(\omega) + (1/j\omega)$

6) The z-transform of u(n) is
a) $\frac{z}{z-1}$ b) $\frac{1}{z-1}$ c) 1 d) $\frac{1}{z}$

7) The Fourier transform of a rectangular pulse is a _____ function.
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8) A signal x(t) = cos(50 π t) has Nyquist sampling rate as
a) 50 Hz b) 25 Hz c) 100 Hz d) 200 Hz

9) The Laplace transform of unit step function is
a) 1 b) 1/s c) 1/(s + 1) d) $1/s^2$

P.T.O.

10) If x(n) = u(n) – u(n – 4) then ROC is
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   b) Entire z-plane, except z = ∞
   c) Entire z-plane
   d) Entire z-plane, except z = 0 and z = ∞

11) The time shifting property of Fourier transform can be expressed as
   a) $x(t + t_0) \leftrightarrow e^{-j\omega t0} X(W)$ b) $x(t - t_0) \leftrightarrow e^{-j\omega t0} X(W)$
   c) $x(t - t_0) \leftrightarrow x(W - W_0)$ d) None of these

12) If x(t) is an odd signal then
   a) x(–t) is even b) x^2(–t) is even
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13) If x(n) exist only for $n \leq 0$ then it is called as _____ sequence.
   a) Unilateral b) Bilateral c) Both a and b d) None

14) With $\delta(t)$ as unit impulse sequence, $x(t).\delta(t - t_0)$ is
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19) Any signal x(t) can be represented as
   a) $x_e(t) + x_0(t)$ b) $x_e(t) - x_0(t)$ c) $x_e(t) / x_0(t)$ d) $x_e(t) . x_0(t)$

20) The convolution of x(n) = {1 2 2 1} and h(n) = {1 1 1} is
   a) {1 3 5 5 3 1} b) {1 3 5 5} c) {1 2 3 5 6} d) {1 2 2 2 1}

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SLR-VB – 312

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2017
SIGNALS AND SYSTEMS

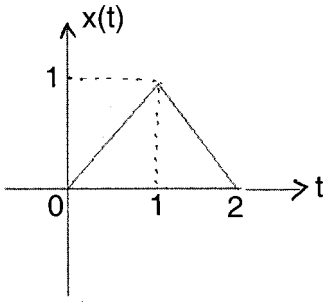
Day and Date : Friday, 19-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Make suitable assumptions ***if necessary****.*

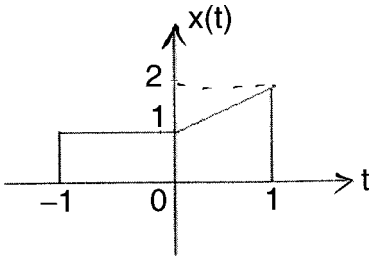
SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Which of the following signals are causal or non-causal ?
   i) $x(t) = e^{-3t}\, u(t)$ ii) $x(t) = u(1 - t)$
2) Determine fundamental period of following signals.
   i) $x(t) = 2 \cos 5t + 6 \sin 2t$
   ii) $x(n) = \cos (6\pi n) + 3 \sin (2\pi n)$
3) Find Laplace transform of the signal $x(t) = e^{-3t}\, u(t)$.
4) Prove the linearity property of Laplace transform.
5) Find even and odd part of given signal.



3. A) A continuous time signal x(t) is shown below. Sketch the following transformations. **10**



i) $x(t - 2)$ ii) $x(1 - t)$ iii) $3x(t + 1)$
iv) $x(t/2)$ v) $x(3t)$.

Set S

B) Perform the convolution of following signals. **10**
$x(t) = u(t)$ and $h(t) = e^{-5t}\, u(t)$.

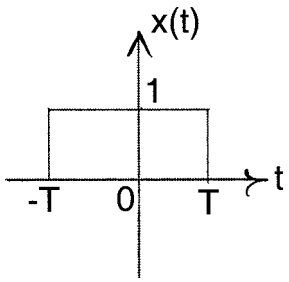
OR

B) Obtain Laplace transform of $x(t) = e^{-at} \cos w_0 t\, u(t)$. **10**

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Find z-transform of signal $x(n) = (0.5)^n\, u(n)$.
   2) Find DFT of the signal x(n) = (1 2 3 4).
   3) Explain sampling theorem.
   4) The analog signal x(t) is given as $x(t) = 2\cos 100\pi t + 5 \sin 200\pi t$. Find Nyquist sampling rate.
   5) Find Fourier transform of unit step function.

5. Attempt **any two** : **(2×10=20)**
   1) Find fourier transform of signal shown below.



   2) Find inverse z-transform of

$$X(z) = \frac{1+2z^{-1}}{1-2z^{-1}+z^{-2}}$$ for x(n) is

      i) Causal
      ii) Anticausal using power series method.

   3) Find inverse z-transform of

$$X(z) = \frac{1+2z+3z^2}{2+3z+z^2}$$

using partial fraction expansion method.

SLR-VB – 313

Seat No.	

Set **P**

S.E. (Electrical) (Part – II) (Old) Examination, 2017
COMPUTER PROGRAMMING – C++

Day and Date : Monday, 22-5-2017 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Each*** *Section carries* ***40*** *marks.*
2) Attempt ***all*** *questions in* ***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 : **20**

1) Which of the following is not a type of constructor ?
A) Copy constructor B) Friend constructor
C) Default constructor D) Parameterized constructor

2) In C++ _____ operator is used for dynamic memory allocation.
A) Scope resolution B) Conditional C) New D) Membership access

3) Cout is a/an
A) Operator B) Function C) Object D) Macro

4) Which of the following statement is correct ?
A) A constructor is called at the time of declaration of an object
B) A constructor is called at the time of use of an object
C) A constructor is called at the time of declaration of a class
D) A constructor is called at the time of use of a class

5) A destructor takes _____ arguments.
A) One B) Two C) Three D) No

6) Which of the following is not the member of class ?
A) Static function B) Friend function C) Const function D) Virtual function

7) Which of the following is correct about function overloading ?
A) The types of arguments are different B) The order of argument is different
C) The number of argument is same D) Both A) and B)

8) Which of the following is correct about class and structure ?
A) Class can have member functions while structure cannot
B) Class data members are public by default while that of structure are private.
C) Pointer to structure or classes cannot be declared
D) Class data members are private by default while that of structure are public by default

9) Which of the following concepts means wrapping up of data and functions together ?
A) Abstraction B) Encapsulation C) Inheritance D) Polymorphism

P.T.O.

10) Which of the following concepts means determining at run time what method to invoke ?
A) Data hiding B) Dynamic typing C) Dynamic binding D) Dynamic loading

11) Which of the following concepts of OOPS means exposing only necessary information of class to outer world ?
A) Encapsulation B) Abstraction C) Data hiding D) Data binding

12) Which of the following ways are legal to access a class data member using this pointer ?
A) this–>x B) this.x C) *this.x D) *this-x

13) Which of the following is correct about the statements given below ?
I) All operators can be overloaded in C++
II) We can change the basic meaning of an operator in C++
A) Only I is true B) Both I and II are false
C) Only II is true D) Both I and II are true

14) What happens if the base and derived class contains definition of a function with same prototype ?
A) Compiler reports an error on compilation
B) Only base class function will get called irrespective of object
C) Only derived class function will get called irrespective of object
D) Base class object will call base class function and derived class object will call derived class function

15) Which inheritance type is used in the class given below ?

Class A : Public X, Public Y

{ }
A) Multilevel inheritance B) Multiple inheritance
C) Hybrid inheritance D) Hierarchical Inheritance

16) Which one of the following is correct about the statements given below ?

I. All function calls are resolved at compile-time in Procedure Oriented Programming.

II. All function calls are resolved at run time in OOPS.
A) Only II is correct B) Both I and II are correct
C) Only I is correct D) Both I and II are incorrect

17) Which of the following is an invalid visibility label while inheriting a class ?
A) Public B) Private C) Protected D) Friend

18) Which of the following term is used for a function defined inside a class ?
A) Member variable B) Member function C) Class function D) Classic function

19) How many instances of an abstract class can be created ?
A) 1 B) 5 C) 13 D) 0

20) Destructor has the same name as the constructor and its is preceded by
A) ! B) ? C) ~ D) $

SLR-VB – 313

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2017
COMPUTER PROGRAMMING – C++

Day and Date : Monday, 22-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Each*** *Section carries* ***40*** *marks.*
2) ***All*** *questions are* ***compulsory****.*
3) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

   1) Explain basic concepts of OOP.

   2) Explain looping statements in C++.

   3) With example discuss function declaration in C++.

   4) Differentiate structure and class in C++.

   5) What is destructor ? How it is called ? Give example.

   6) What is function overloading, give example.

3. What is constructor and its types ? With a proper code example, explain constructor overloading. **10**

4. Explain with example : **10**

   A) Object as data type

   B) Object as function argument.

   OR

   Explain following concepts : **10**

   a) Declaration of structure

   b) Inline function.

SECTION – II

5. Solve **any four** : **(5×4=20)**
   1) What is concept of inheritance in OOP ? Explain in brief.
   2) Explain :
      a) Array declaration
      b) Array initialization with code example.
   3) What a program to demonstrate overloading a unary operator ?
   4) Explain type conversion/casting in C++.
   5) Write a short note on 'this' keyword in C++.
   6) Write a short note on pointers.

6. With code example explain : **10**
   a) Friend function
   b) Virtual function.

7. With a proper code example explain various inheritance types in C++. **10**

   OR

   With a suitable code example explain binary operator overloading.

SLR-VB – 313

Seat No.	

Set **Q**

S.E. (Electrical) (Part – II) (Old) Examination, 2017
COMPUTER PROGRAMMING – C++

Day and Date : Monday, 22-5-2017 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***Each*** *Section carries* ***40*** *marks.*
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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 : 20

1. Choose the correct answer : **20**

1) Which one of the following is correct about the statements given below ?
I. All function calls are resolved at compile-time in Procedure Oriented Programming.
II. All function calls are resolved at run time in OOPS.
A) Only II is correct B) Both I and II are correct
C) Only I is correct D) Both I and II are incorrect

2) Which of the following is an invalid visibility label while inheriting a class ?
A) Public B) Private C) Protected D) Friend

3) Which of the following term is used for a function defined inside a class ?
A) Member variable B) Member function C) Class function D) Classic function

4) How many instances of an abstract class can be created ?
A) 1 B) 5 C) 13 D) 0

5) Destructor has the same name as the constructor and its is preceded by
A) ! B) ? C) ~ D) $

6) Which of the following is not a type of constructor ?
A) Copy constructor B) Friend constructor
C) Default constructor D) Parameterized constructor

7) In C++ _____ operator is used for dynamic memory allocation.
A) Scope resolution B) Conditional C) New D) Membership access

8) Cout is a/an
A) Operator B) Function C) Object D) Macro

9) Which of the following statement is correct ?
A) A constructor is called at the time of declaration of an object
B) A constructor is called at the time of use of an object
C) A constructor is called at the time of declaration of a class
D) A constructor is called at the time of use of a class

10) A destructor takes _____ arguments.
A) One B) Two C) Three D) No

11) Which of the following is not the member of class ?
A) Static function B) Friend function C) Const function D) Virtual function

12) Which of the following is correct about function overloading ?
A) The types of arguments are different B) The order of argument is different
C) The number of argument is same D) Both A) and B)

13) Which of the following is correct about class and structure ?
A) Class can have member functions while structure cannot
B) Class data members are public by default while that of structure are private.
C) Pointer to structure or classes cannot be declared
D) Class data members are private by default while that of structure are public by default

14) Which of the following concepts means wrapping up of data and functions together ?
A) Abstraction B) Encapsulation C) Inheritance D) Polymorphism

15) Which of the following concepts means determining at run time what method to invoke ?
A) Data hiding B) Dynamic typing C) Dynamic binding D) Dynamic loading

16) Which of the following concepts of OOPS means exposing only necessary information of class to outer world ?
A) Encapsulation B) Abstraction C) Data hiding D) Data binding

17) Which of the following ways are legal to access a class data member using this pointer ?
A) this–>x B) this.x C) *this.x D) *this-x

18) Which of the following is correct about the statements given below ?
I) All operators can be overloaded in C++
II) We can change the basic meaning of an operator in C++
A) Only I is true B) Both I and II are false
C) Only II is true D) Both I and II are true

19) What happens if the base and derived class contains definition of a function with same prototype ?
A) Compiler reports an error on compilation
B) Only base class function will get called irrespective of object
C) Only derived class function will get called irrespective of object
D) Base class object will call base class function and derived class object will call derived class function

20) Which inheritance type is used in the class given below ?

Class A : Public X, Public Y

{ }
A) Multilevel inheritance B) Multiple inheritance
C) Hybrid inheritance D) Hierarchical Inheritance

_____

SLR-VB – 313

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2017
COMPUTER PROGRAMMING – C++

Day and Date : Monday, 22-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Each*** *Section carries* ***40*** *marks.*
2) ***All*** *questions are* ***compulsory****.*
3) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

   1) Explain basic concepts of OOP.

   2) Explain looping statements in C++.

   3) With example discuss function declaration in C++.

   4) Differentiate structure and class in C++.

   5) What is destructor ? How it is called ? Give example.

   6) What is function overloading, give example.

3. What is constructor and its types ? With a proper code example, explain constructor overloading. **10**

4. Explain with example : **10**

   A) Object as data type

   B) Object as function argument.

   OR

   Explain following concepts : **10**

   a) Declaration of structure

   b) Inline function.

SECTION – II

5. Solve **any four** : **(5×4=20)**
   1) What is concept of inheritance in OOP ? Explain in brief.
   2) Explain :
      a) Array declaration
      b) Array initialization with code example.
   3) What a program to demonstrate overloading a unary operator ?
   4) Explain type conversion/casting in C++.
   5) Write a short note on 'this' keyword in C++.
   6) Write a short note on pointers.

6. With code example explain : **10**
   a) Friend function
   b) Virtual function.

7. With a proper code example explain various inheritance types in C++. **10**

   OR

   With a suitable code example explain binary operator overloading.

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SLR-VB – 313

Seat No.	

Set **R**

S.E. (Electrical) (Part – II) (Old) Examination, 2017
COMPUTER PROGRAMMING – C++

Day and Date : Monday, 22-5-2017 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Each*** *Section carries* ***40*** *marks.*
2) Attempt ***all*** *questions in* ***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 : **20**

1) Which of the following concepts of OOPS means exposing only necessary information of class to outer world ?
A) Encapsulation B) Abstraction C) Data hiding D) Data binding

2) Which of the following ways are legal to access a class data member using this pointer ?
A) this–>x B) this.x C) *this.x D) *this-x

3) Which of the following is correct about the statements given below ?
I) All operators can be overloaded in C++
II) We can change the basic meaning of an operator in C++
A) Only I is true B) Both I and II are false
C) Only II is true D) Both I and II are true

4) What happens if the base and derived class contains definition of a function with same prototype ?
A) Compiler reports an error on compilation
B) Only base class function will get called irrespective of object
C) Only derived class function will get called irrespective of object
D) Base class object will call base class function and derived class object will call derived class function

5) Which inheritance type is used in the class given below ?

Class A : Public X, Public Y

{ }
A) Multilevel inheritance B) Multiple inheritance
C) Hybrid inheritance D) Hierarchical Inheritance

6) Which one of the following is correct about the statements given below ?

I. All function calls are resolved at compile-time in Procedure Oriented Programming.

II. All function calls are resolved at run time in OOPS.
A) Only II is correct B) Both I and II are correct
C) Only I is correct D) Both I and II are incorrect

P.T.O.

7) Which of the following is an invalid visibility label while inheriting a class ?
A) Public B) Private C) Protected D) Friend

8) Which of the following term is used for a function defined inside a class ?
A) Member variable B) Member function C) Class function D) Classic function

9) How many instances of an abstract class can be created ?
A) 1 B) 5 C) 13 D) 0

10) Destructor has the same name as the constructor and its is preceded by
A) ! B) ? C) ~ D) $

11) Which of the following is not a type of constructor ?
A) Copy constructor B) Friend constructor
C) Default constructor D) Parameterized constructor

12) In C++ _____ operator is used for dynamic memory allocation.
A) Scope resolution B) Conditional C) New D) Membership access

13) Cout is a/an
A) Operator B) Function C) Object D) Macro

14) Which of the following statement is correct ?
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C) A constructor is called at the time of declaration of a class
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15) A destructor takes _____ arguments.
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A) The types of arguments are different B) The order of argument is different
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A) Class can have member functions while structure cannot
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19) Which of the following concepts means wrapping up of data and functions together ?
A) Abstraction B) Encapsulation C) Inheritance D) Polymorphism

20) Which of the following concepts means determining at run time what method to invoke ?
A) Data hiding B) Dynamic typing C) Dynamic binding D) Dynamic loading

_____

SLR-VB – 313

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2017
COMPUTER PROGRAMMING – C++

Day and Date : Monday, 22-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Each*** *Section carries* ***40*** *marks.*
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SECTION – I

2. Solve **any four** : **(5×4=20)**

   1) Explain basic concepts of OOP.

   2) Explain looping statements in C++.

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   4) Differentiate structure and class in C++.

   5) What is destructor ? How it is called ? Give example.

   6) What is function overloading, give example.

3. What is constructor and its types ? With a proper code example, explain constructor overloading. **10**

4. Explain with example : **10**

   A) Object as data type

   B) Object as function argument.

   OR

   Explain following concepts : **10**

   a) Declaration of structure

   b) Inline function.

SECTION – II

5. Solve **any four** : **(5×4=20)**
   1) What is concept of inheritance in OOP ? Explain in brief.
   2) Explain :
      a) Array declaration
      b) Array initialization with code example.
   3) What a program to demonstrate overloading a unary operator ?
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   5) Write a short note on 'this' keyword in C++.
   6) Write a short note on pointers.

6. With code example explain : **10**
   a) Friend function
   b) Virtual function.

7. With a proper code example explain various inheritance types in C++. **10**

   OR

   With a suitable code example explain binary operator overloading.

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SLR-VB – 313

Seat No.	

Set **S**

S.E. (Electrical) (Part – II) (Old) Examination, 2017
COMPUTER PROGRAMMING – C++

Day and Date : Monday, 22-5-2017 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Each*** *Section carries* ***40*** *marks.*
2) Attempt ***all*** *questions in* ***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 : **20**

1) Which of the following is not the member of class ?
A) Static function B) Friend function C) Const function D) Virtual function

2) Which of the following is correct about function overloading ?
A) The types of arguments are different B) The order of argument is different
C) The number of argument is same D) Both A) and B)

3) Which of the following is correct about class and structure ?
A) Class can have member functions while structure cannot
B) Class data members are public by default while that of structure are private.
C) Pointer to structure or classes cannot be declared
D) Class data members are private by default while that of structure are public by default

4) Which of the following concepts means wrapping up of data and functions together ?
A) Abstraction B) Encapsulation C) Inheritance D) Polymorphism

5) Which of the following concepts means determining at run time what method to invoke ?
A) Data hiding B) Dynamic typing C) Dynamic binding D) Dynamic loading

6) Which of the following concepts of OOPS means exposing only necessary information of class to outer world ?
A) Encapsulation B) Abstraction C) Data hiding D) Data binding

7) Which of the following ways are legal to access a class data member using this pointer ?
A) this–>x B) this.x C) *this.x D) *this-x

8) Which of the following is correct about the statements given below ?
I) All operators can be overloaded in C++
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A) Only I is true B) Both I and II are false
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P.T.O.

9) What happens if the base and derived class contains definition of a function with same prototype ?
   A) Compiler reports an error on compilation
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10) Which inheritance type is used in the class given below ?

    Class A : Public X, Public Y

    { }

   A) Multilevel inheritance B) Multiple inheritance
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11) Which one of the following is correct about the statements given below ?

    I. All function calls are resolved at compile-time in Procedure Oriented Programming.

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18) Cout is a/an
   A) Operator B) Function C) Object D) Macro

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   C) A constructor is called at the time of declaration of a class
   D) A constructor is called at the time of use of a class

20) A destructor takes _____ arguments.
   A) One B) Two C) Three D) No

_____

SLR-VB – 313

Seat No.	

S.E. (Electrical) (Part – II) (Old) Examination, 2017
COMPUTER PROGRAMMING – C++

Day and Date : Monday, 22-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Each*** *Section carries* ***40*** *marks.*
2) ***All*** *questions are* ***compulsory****.*
3) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(5×4=20)**

   1) Explain basic concepts of OOP.

   2) Explain looping statements in C++.

   3) With example discuss function declaration in C++.

   4) Differentiate structure and class in C++.

   5) What is destructor ? How it is called ? Give example.

   6) What is function overloading, give example.

3. What is constructor and its types ? With a proper code example, explain constructor overloading. **10**

4. Explain with example : **10**

   A) Object as data type

   B) Object as function argument.

   OR

   Explain following concepts : **10**

   a) Declaration of structure

   b) Inline function.

SECTION – II

5. Solve **any four** : **(5×4=20)**
   1) What is concept of inheritance in OOP ? Explain in brief.
   2) Explain :
      a) Array declaration
      b) Array initialization with code example.
   3) What a program to demonstrate overloading a unary operator ?
   4) Explain type conversion/casting in C++.
   5) Write a short note on 'this' keyword in C++.
   6) Write a short note on pointers.

6. With code example explain : **10**
   a) Friend function
   b) Virtual function.

7. With a proper code example explain various inheritance types in C++. **10**

   OR

   With a suitable code example explain binary operator overloading.

SLR-VB– 314

Seat No.	

Set **P**

T.E. (Electrical Engineering) Part – I (CGPA) Examination, 2017
POWER SYSTEM ANALYSIS

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data 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 : 14

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

1) The magnitude of p.u. impedance of a transformer determined from the HT side and LT side of a transformer are
   a) Unequal b) Equal
   c) Depends on the turn's ratio d) None of the above

2) A 25MVA, 33 kV transformer has a p.u. impedance of 0.9. The p.u. impedance at a new base of 50MVA at 11kV would be
   a) 16.2 b) 10.4 c) 14.4 d) 12.2

3) The p.u. value of a 2ohm resistor at 100MVA base and 10kV base voltage is _____ p.u.
   a) 4 b) 2 c) ½ d) 0.2

4) Normally Z_{bus} matrix is a
   a) Null matrix b) Sparse matrix c) Full matrix d) Unity matrix

5) For accurate load flow calculations on large power systems, the best method is
   a) Newton-Raphson method b) Gauss-Seidel method
   c) Decoupled Newton method d) None of these

6) Fault level means
   a) Voltage at the point of fault b) Fault current
   c) Fault power factor d) Fault MVA

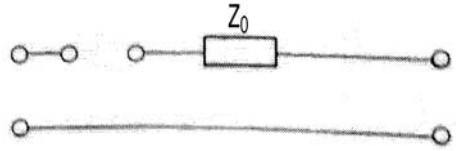
P.T.O.

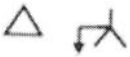
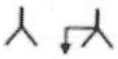
7) The three phase SC MVA to be interrupted by a circuit breaker in a power system is given by
   a) $\sqrt{3}\times$ post fault line voltage in kV × SC current in kA
   b) 3 × prefault line voltage in kV × SC current in kA
   c) $\sqrt{3}\times$ prefault line voltage in kV × SC current in kA
   d) $\frac{1}{\sqrt{3}}$ × prefault line voltage in kV × SC current in kA

8) A balanced 3-phase system consist of
   a) Zero sequence currents only
   b) Positive sequence currents only
   c) Negative sequence currents only
   d) Zero, positive and negative sequence currents only

9) Symmetrical components are used in power system for the analysis of
   a) Balanced three phase faults
   b) Unbalanced faults
   c) Normal power system under steady conditions
   d) Stability of system

10) Below figure shows the zero sequence network of transformer. Transformer connections are



a)  b)  c)  d) 

11) The three sequence voltages at the point of fault in a power system are found to be equal. The nature of fault is
   a) L-G b) L-L-L c) L-L d) L-L-G

12) Equal area criterion is used to study
   a) Load flow analysis b) Fault analysis
   c) Stability analysis d) None of these

13) Stability of a power system can be improved by
   a) Using series compensators
   b) Using parallel transmission lines
   c) Reducing voltage of transmission line
   d) Both a) and b)

14) Lightening arresters should be located
   a) Near the circuit breaker b) Away from circuit breaker
   c) Near the transformer d) Away from transformer

SLR-VB– 314

Seat No.	

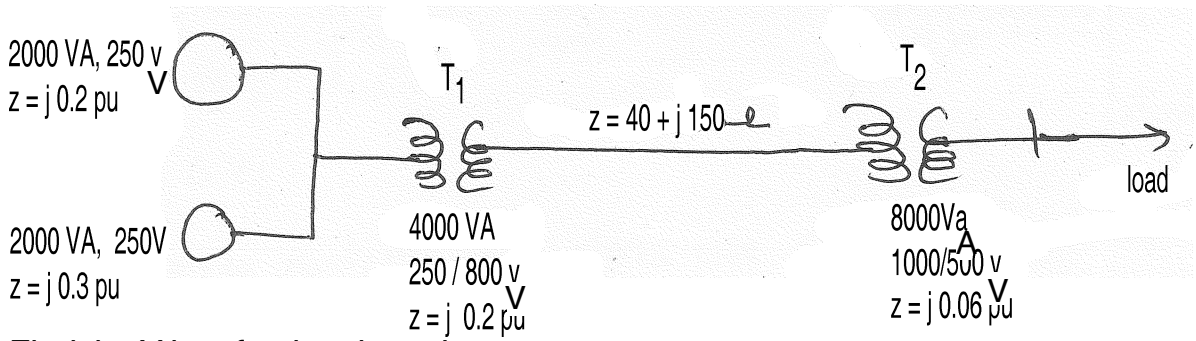
T.E. (Electrical Engineering) Part – I (CGPA) Examination, 2017
POWER SYSTEM ANALYSIS

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary****.*

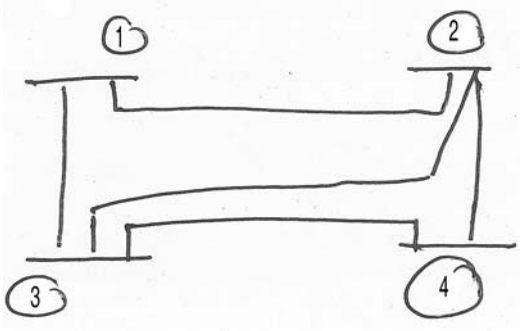
SECTION – I

2. Solve **any four** : **(4×3=12)**
   a) Explain short circuit of synchronous machine at no load condition.
   b) Express the representation of transformer model in per unit (pu) system.
   c) Draw per unit impedance diagram represented on 5000 VA base and common system base voltage of 250 V for G1



   d) Find the Y bus for the given data.

Line	R	X
1 – 2	0.05	0.15
1 – 3	0.1	0.3
2 – 3	0.15	0.45
2 – 4	0.1	0.3
3 – 4	0.05	0.15

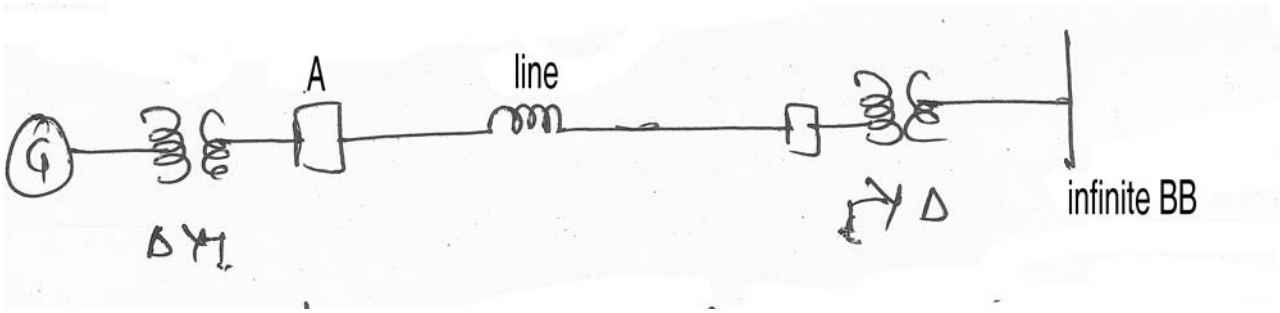


   e) Explain per unit representation of 3ϕ supply system.

Set P

3. Solve **any two** : **(8×2=16)**

a) The system shown in figure below is delivering 50 MVA at 11kV, 0.8 lagging pf into a bus which may be regarded as infinite. Particulars of various components are Gen^r = 60 MVA, 12 kV, X_d' = 0.35 pu.
Transformer (each) = 80 MVA, 12/66 kV, X = 0.08pu.
Line = Reactance 12 Ω , resistance negligible.
Calculate the symmetrical current that the circuit breaker A and B will be called upon to interrupt in the event of 3 ϕ fault occurring at f near the circuit breaker B.



b) For the sample system generators are connected to all the three buses, while load are at bus 2 and 3. Values of reactive and real powers are listed in table. All the buses other than slack buses are PQ. Assuming flat voltage start, find voltage and bus angle at three buses at end of first GS iteration.

Bus	**Pi pu**	**Qi pu**	**Vi pu**	**Remark**
1	–	–	1.04 < 00	slack bus
2	0.5	– 0.2	–	PQ bus
3	– 1.0	0.5	–	PG bus
4	0.3	– 0.1	–	PG bus

The calculated Y bus for the above sample system is as follows :

$$\begin{bmatrix} 3-j9 & -2+j6 & -1+j3 & 0 \\ -2+j6 & 3.666-j11 & -0.666+j2 & -1+j3 \\ -1+j3 & -0.666+j2 & 3.666-j11 & -2+j6 \\ 0 & -1+j3 & -2+j6 & 3-j9 \end{bmatrix}$$

c) Derive an expression for Newton Raphson Algorithm method. Also draw a flow chart.

SECTION – II

4. Solve **any four** : **(4×3=12)**

a) A 2 pole, 50Hz, 11kV, turbo alternator has a rating of 100mw, pf of 0.85 lagging. The rotor has a moment of inertia of a 10000 kg-m. Calculate H & M.

b) Write detail note on zero sequence network of 3ϕ transformer for the different types of connection with the help of neat diagram.

c) The phase voltage across a certain unbalanced load are given as (r = 176 – j132, Gy = –128 – j96, Gb = –160 + j 100). Find the symmetrical components.

d) Compare symmetrical and unsymmetrical fault.

e) Explain the principle of lightening arrestor, explain any one brief.

5. Solve **any two** : **(8×2=16)**

a) Draw a diagram showing interconnection of sequence n/w for size to size fault. Derive equation for sequence currents and voltages.

b) A synchronous generator is rated 25 MVA, 11 kV, it is star connected with the neutral point is solidly grounded. The generator is operating at rated no load condition at rated voltage. Its reactances are x_1'' = x2 = 0.2 and x0 = 0.08 pu. Calculate the symmetrical subtransient line currents for single line to ground fault. Also calculate the actual current and sc MVA of SLG fault.

c) The voltages at the terminals of a balanced load consisting of three 20Ω Y connected resistors are $200 \angle 0°$, $100 \angle 255.50°$ and $200 \angle 151°$V. Find the like currents from the symmetrical components of the line voltage in the neutral of the load is isolated. What relation exists between the symmetrical component of size and phase voltages. Find the power expanded in three 20Ω resistor from symmetrical components of current and voltages.

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Set P

SLR-VB– 314

Seat No.	

Set **Q**

T.E. (Electrical Engineering) Part – I (CGPA) Examination, 2017
POWER SYSTEM ANALYSIS

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
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MCQ/Objective Type Questions

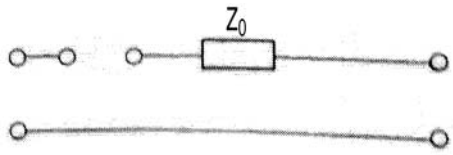
Duration : 30 Minutes Marks : 14

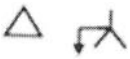
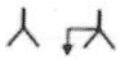
1. Choose the correct answer : **(14×1=14)**

1) A balanced 3-phase system consist of
   a) Zero sequence currents only
   b) Positive sequence currents only
   c) Negative sequence currents only
   d) Zero, positive and negative sequence currents only

2) Symmetrical components are used in power system for the analysis of
   a) Balanced three phase faults
   b) Unbalanced faults
   c) Normal power system under steady conditions
   d) Stability of system

3) Below figure shows the zero sequence network of transformer. Transformer connections are



a)  b)  c)  d) 

4) The three sequence voltages at the point of fault in a power system are found to be equal. The nature of fault is
   a) L-G b) L-L-L c) L-L d) L-L-G

5) Equal area criterion is used to study
   a) Load flow analysis b) Fault analysis
   c) Stability analysis d) None of these

6) Stability of a power system can be improved by
   a) Using series compensators
   b) Using parallel transmission lines
   c) Reducing voltage of transmission line
   d) Both a) and b)

7) Lightening arresters should be located
   a) Near the circuit breaker b) Away from circuit breaker
   c) Near the transformer d) Away from transformer

8) The magnitude of p.u. impedance of a transformer determined from the HT side and LT side of a transformer are
   a) Unequal b) Equal
   c) Depends on the turn's ratio d) None of the above

9) A 25MVA, 33 kV transformer has a p.u. impedance of 0.9. The p.u. impedance at a new base of 50MVA at 11kV would be
   a) 16.2 b) 10.4 c) 14.4 d) 12.2

10) The p.u. value of a 2ohm resistor at 100MVA base and 10kV base voltage is _____ p.u.
   a) 4 b) 2 c) ½ d) 0.2

11) Normally Z_{bus} matrix is a
   a) Null matrix b) Sparse matrix c) Full matrix d) Unity matrix

12) For accurate load flow calculations on large power systems, the best method is
   a) Newton-Raphson method b) Gauss-Seidel method
   c) Decoupled Newton method d) None of these

13) Fault level means
   a) Voltage at the point of fault b) Fault current
   c) Fault power factor d) Fault MVA

14) The three phase SC MVA to be interrupted by a circuit breaker in a power system is given by
   a) $\sqrt{3}\times$post fault line voltage in kV × SC current in kA
   b) 3 × prefault line voltage in kV × SC current in kA
   c) $\sqrt{3}\times$ prefault line voltage in kV × SC current in kA
   d) $\frac{1}{\sqrt{3}}$ × prefault line voltage in kV × SC current in kA

SLR-VB– 314

Seat No.	

T.E. (Electrical Engineering) Part – I (CGPA) Examination, 2017
POWER SYSTEM ANALYSIS

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary****.*

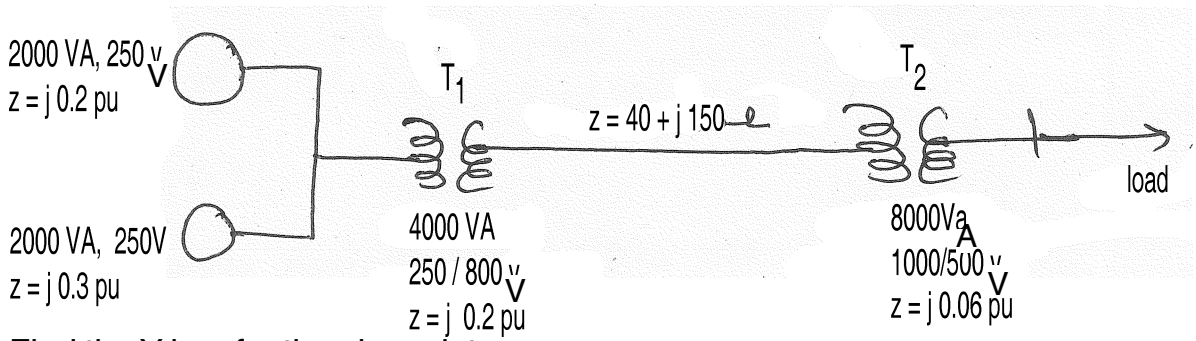
SECTION – I

2. Solve **any four** : **(4×3=12)**

a) Explain short circuit of synchronous machine at no load condition.

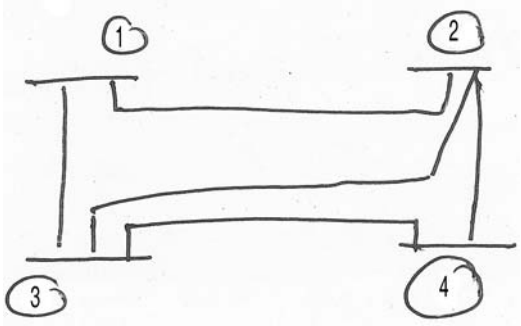
b) Express the representation of transformer model in per unit (pu) system.

c) Draw per unit impedance diagram represented on 5000 VA base and common system base voltage of 250 V for G1



d) Find the Y bus for the given data.

Line	R	X
1 – 2	0.05	0.15
1 – 3	0.1	0.3
2 – 3	0.15	0.45
2 – 4	0.1	0.3
3 – 4	0.05	0.15

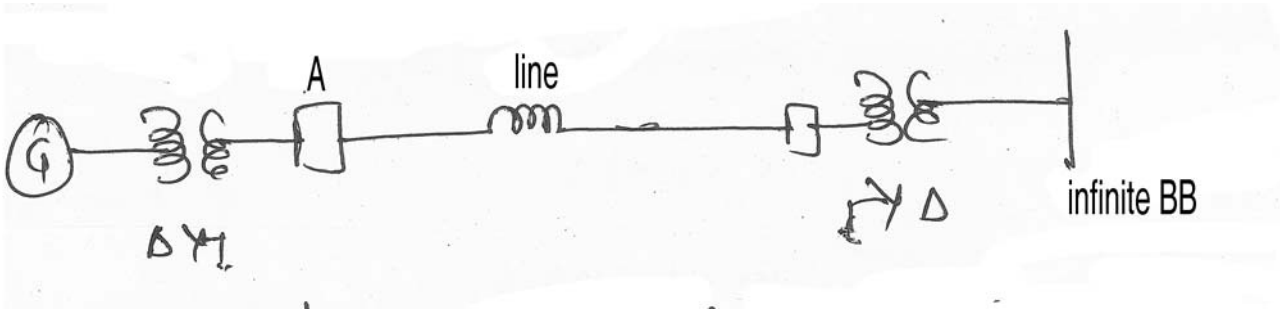


e) Explain per unit representation of 3ϕ supply system.

Set Q

3. Solve **any two** : **(8×2=16)**

a) The system shown in figure below is delivering 50 MVA at 11kV, 0.8 lagging pf into a bus which may be regarded as infinite. Particulars of various components are Gen^r = 60 MVA, 12 kV, X_d' = 0.35 pu.
Transformer (each) = 80 MVA, 12/66 kV, X = 0.08pu.
Line = Reactance 12 Ω , resistance negligible.
Calculate the symmetrical current that the circuit breaker A and B will be called upon to interrupt in the event of 3 ϕ fault occurring at f near the circuit breaker B.



b) For the sample system generators are connected to all the three buses, while load are at bus 2 and 3. Values of reactive and real powers are listed in table. All the buses other than slack buses are PQ. Assuming flat voltage start, find voltage and bus angle at three buses at end of first GS iteration.

Bus	**Pi pu**	**Qi pu**	**Vi pu**	**Remark**
1	–	–	1.04 < 00	slack bus
2	0.5	– 0.2	–	PQ bus
3	– 1.0	0.5	–	PG bus
4	0.3	– 0.1	–	PG bus

The calculated Y bus for the above sample system is as follows :

$$\begin{bmatrix} 3-j9 & -2+j6 & -1+j3 & 0 \\ -2+j6 & 3.666-j11 & -0.666+j2 & -1+j3 \\ -1+j3 & -0.666+j2 & 3.666-j11 & -2+j6 \\ 0 & -1+j3 & -2+j6 & 3-j9 \end{bmatrix}$$

c) Derive an expression for Newton Raphson Algorithm method. Also draw a flow chart.

SECTION – II

4. Solve **any four** : **(4×3=12)**

a) A 2 pole, 50Hz, 11kV, turbo alternator has a rating of 100mw, pf of 0.85 lagging. The rotor has a moment of inertia of a 10000 kg-m. Calculate H & M.

b) Write detail note on zero sequence network of 3ϕ transformer for the different types of connection with the help of neat diagram.

c) The phase voltage across a certain unbalanced load are given as (r = 176 – j132, Gy = –128 – j96, Gb = –160 + j 100). Find the symmetrical components.

d) Compare symmetrical and unsymmetrical fault.

e) Explain the principle of lightening arrestor, explain any one brief.

5. Solve **any two** : **(8×2=16)**

a) Draw a diagram showing interconnection of sequence n/w for size to size fault. Derive equation for sequence currents and voltages.

b) A synchronous generator is rated 25 MVA, 11 kV, it is star connected with the neutral point is solidly grounded. The generator is operating at rated no load condition at rated voltage. Its reactances are x_1'' = x2 = 0.2 and x0 = 0.08 pu. Calculate the symmetrical subtransient line currents for single line to ground fault. Also calculate the actual current and sc MVA of SLG fault.

c) The voltages at the terminals of a balanced load consisting of three 20Ω Y connected resistors are $200 \angle 0°$, $100 \angle 255.50°$ and $200 \angle 151°$V. Find the like currents from the symmetrical components of the line voltage in the neutral of the load is isolated. What relation exists between the symmetrical component of size and phase voltages. Find the power expanded in three 20Ω resistor from symmetrical components of current and voltages.

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Set Q

SLR-VB– 314

Seat No.	

Set **R**

T.E. (Electrical Engineering) Part – I (CGPA) Examination, 2017
POWER SYSTEM ANALYSIS

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data 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 : 14

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

1) For accurate load flow calculations on large power systems, the best method is
   a) Newton-Raphson method b) Gauss-Seidel method
   c) Decoupled Newton method d) None of these

2) Fault level means
   a) Voltage at the point of fault b) Fault current
   c) Fault power factor d) Fault MVA

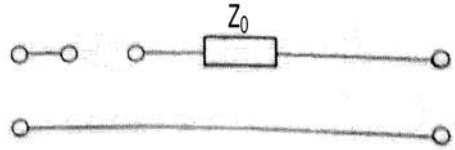
3) The three phase SC MVA to be interrupted by a circuit breaker in a power system is given by
   a) $\sqrt{3} \times$ post fault line voltage in kV × SC current in kA
   b) 3 × prefault line voltage in kV × SC current in kA
   c) $\sqrt{3} \times$ prefault line voltage in kV × SC current in kA
   d) $\frac{1}{\sqrt{3}}$ × prefault line voltage in kV × SC current in kA

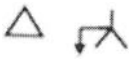
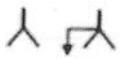
4) A balanced 3-phase system consist of
   a) Zero sequence currents only
   b) Positive sequence currents only
   c) Negative sequence currents only
   d) Zero, positive and negative sequence currents only

P.T.O.

5) Symmetrical components are used in power system for the analysis of
   a) Balanced three phase faults
   b) Unbalanced faults
   c) Normal power system under steady conditions
   d) Stability of system

6) Below figure shows the zero sequence network of transformer. Transformer connections are



a)  b)  c)  d) 

7) The three sequence voltages at the point of fault in a power system are found to be equal. The nature of fault is
   a) L-G b) L-L-L c) L-L d) L-L-G

8) Equal area criterion is used to study
   a) Load flow analysis b) Fault analysis
   c) Stability analysis d) None of these

9) Stability of a power system can be improved by
   a) Using series compensators
   b) Using parallel transmission lines
   c) Reducing voltage of transmission line
   d) Both a) and b)

10) Lightening arresters should be located
   a) Near the circuit breaker b) Away from circuit breaker
   c) Near the transformer d) Away from transformer

11) The magnitude of p.u. impedance of a transformer determined from the HT side and LT side of a transformer are
   a) Unequal b) Equal
   c) Depends on the turn's ratio d) None of the above

12) A 25MVA, 33 kV transformer has a p.u. impedance of 0.9. The p.u. impedance at a new base of 50MVA at 11kV would be
   a) 16.2 b) 10.4 c) 14.4 d) 12.2

13) The p.u. value of a 2ohm resistor at 100MVA base and 10kV base voltage is _____ p.u.
   a) 4 b) 2 c) ½ d) 0.2

14) Normally Z_{bus} matrix is a
   a) Null matrix b) Sparse matrix c) Full matrix d) Unity matrix

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SLR-VB– 314

Seat No.	

T.E. (Electrical Engineering) Part – I (CGPA) Examination, 2017
POWER SYSTEM ANALYSIS

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary****.*

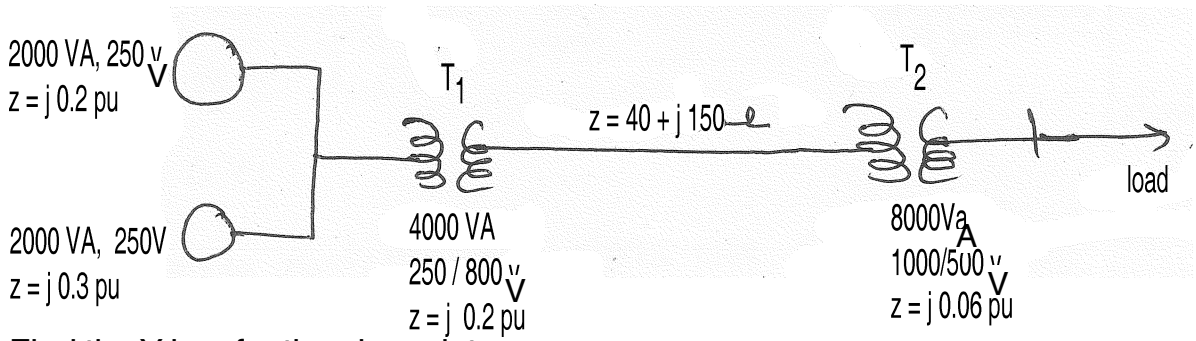
SECTION – I

2. Solve **any four** : **(4×3=12)**

a) Explain short circuit of synchronous machine at no load condition.

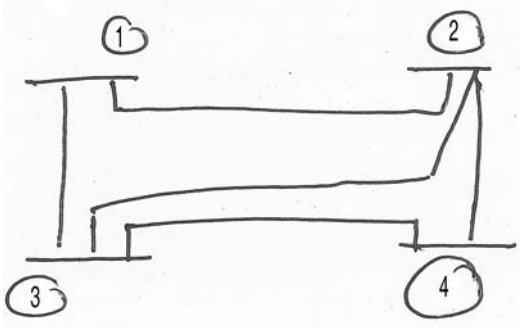
b) Express the representation of transformer model in per unit (pu) system.

c) Draw per unit impedance diagram represented on 5000 VA base and common system base voltage of 250 V for G1



d) Find the Y bus for the given data.

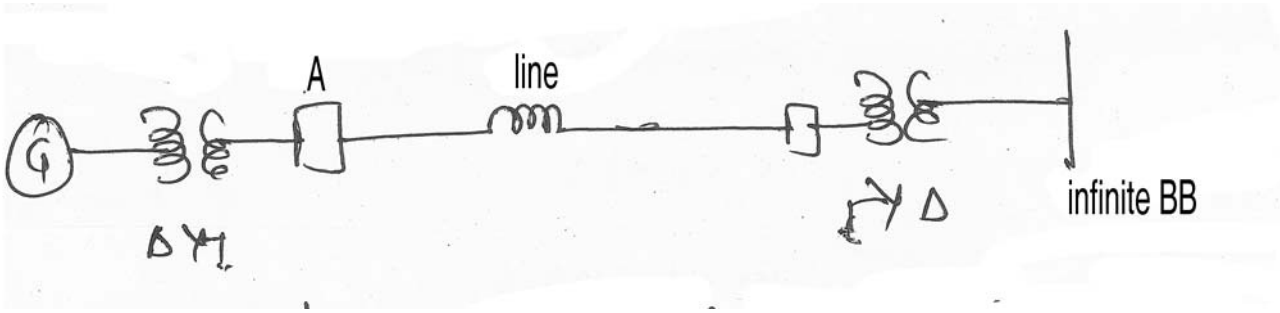
Line	R	X
1 – 2	0.05	0.15
1 – 3	0.1	0.3
2 – 3	0.15	0.45
2 – 4	0.1	0.3
3 – 4	0.05	0.15



e) Explain per unit representation of 3ϕ supply system.

3. Solve **any two** : **(8×2=16)**

a) The system shown in figure below is delivering 50 MVA at 11kV, 0.8 lagging pf into a bus which may be regarded as infinite. Particulars of various components are Gen^r = 60 MVA, 12 kV, X_d' = 0.35 pu.
Transformer (each) = 80 MVA, 12/66 kV, X = 0.08pu.
Line = Reactance 12 Ω , resistance negligible.
Calculate the symmetrical current that the circuit breaker A and B will be called upon to interrupt in the event of 3 ϕ fault occurring at f near the circuit breaker B.



b) For the sample system generators are connected to all the three buses, while load are at bus 2 and 3. Values of reactive and real powers are listed in table. All the buses other than slack buses are PQ. Assuming flat voltage start, find voltage and bus angle at three buses at end of first GS iteration.

Bus	**Pi pu**	**Qi pu**	**Vi pu**	**Remark**
1	–	–	1.04 < 00	slack bus
2	0.5	– 0.2	–	PQ bus
3	– 1.0	0.5	–	PG bus
4	0.3	– 0.1	–	PG bus

The calculated Y bus for the above sample system is as follows :

$$\begin{bmatrix} 3-j9 & -2+j6 & -1+j3 & 0 \\ -2+j6 & 3.666-j11 & -0.666+j2 & -1+j3 \\ -1+j3 & -0.666+j2 & 3.666-j11 & -2+j6 \\ 0 & -1+j3 & -2+j6 & 3-j9 \end{bmatrix}$$

c) Derive an expression for Newton Raphson Algorithm method. Also draw a flow chart.

SECTION – II

4. Solve **any four** : **(4×3=12)**

a) A 2 pole, 50Hz, 11kV, turbo alternator has a rating of 100mw, pf of 0.85 lagging. The rotor has a moment of inertia of a 10000 kg-m. Calculate H & M.

b) Write detail note on zero sequence network of 3ϕ transformer for the different types of connection with the help of neat diagram.

c) The phase voltage across a certain unbalanced load are given as (r = 176 – j132, Gy = –128 – j96, Gb = –160 + j 100). Find the symmetrical components.

d) Compare symmetrical and unsymmetrical fault.

e) Explain the principle of lightening arrestor, explain any one brief.

5. Solve **any two** : **(8×2=16)**

a) Draw a diagram showing interconnection of sequence n/w for size to size fault. Derive equation for sequence currents and voltages.

b) A synchronous generator is rated 25 MVA, 11 kV, it is star connected with the neutral point is solidly grounded. The generator is operating at rated no load condition at rated voltage. Its reactances are $x_1'' = x2 = 0.2$ and x0 = 0.08 pu. Calculate the symmetrical subtransient line currents for single line to ground fault. Also calculate the actual current and sc MVA of SLG fault.

c) The voltages at the terminals of a balanced load consisting of three 20Ω Y connected resistors are $200 \angle 0°$, $100 \angle 255.50°$ and $200 \angle 151°$V. Find the like currents from the symmetrical components of the line voltage in the neutral of the load is isolated. What relation exists between the symmetrical component of size and phase voltages. Find the power expanded in three 20Ω resistor from symmetrical components of current and voltages.

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Set R

SLR-VB– 314

Seat No.	

Set **S**

T.E. (Electrical Engineering) Part – I (CGPA) Examination, 2017
POWER SYSTEM ANALYSIS

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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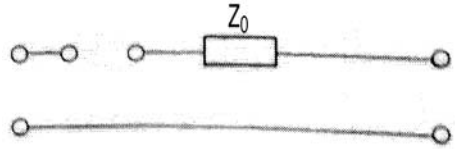
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

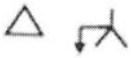
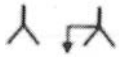
MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Below figure shows the zero sequence network of transformer. Transformer connections are



a)  b)  c)  d) 

2) The three sequence voltages at the point of fault in a power system are found to be equal. The nature of fault is
a) L-G b) L-L-L c) L-L d) L-L-G

3) Equal area criterion is used to study
a) Load flow analysis b) Fault analysis
c) Stability analysis d) None of these

4) Stability of a power system can be improved by
a) Using series compensators
b) Using parallel transmission lines
c) Reducing voltage of transmission line
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P.T.O.

5) Lightening arresters should be located
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6) The magnitude of p.u. impedance of a transformer determined from the HT side and LT side of a transformer are
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7) A 25MVA, 33 kV transformer has a p.u. impedance of 0.9. The p.u. impedance at a new base of 50MVA at 11kV would be
   a) 16.2 b) 10.4 c) 14.4 d) 12.2

8) The p.u. value of a 2ohm resistor at 100MVA base and 10kV base voltage is _____ p.u.
   a) 4 b) 2 c) ½ d) 0.2

9) Normally Z_{bus} matrix is a
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10) For accurate load flow calculations on large power systems, the best method is
   a) Newton-Raphson method b) Gauss-Seidel method
   c) Decoupled Newton method d) None of these

11) Fault level means
   a) Voltage at the point of fault b) Fault current
   c) Fault power factor d) Fault MVA

12) The three phase SC MVA to be interrupted by a circuit breaker in a power system is given by
   a) $\sqrt{3}\times$ post fault line voltage in kV × SC current in kA
   b) 3 × prefault line voltage in kV × SC current in kA
   c) $\sqrt{3}\times$ prefault line voltage in kV × SC current in kA
   d) $\frac{}{\sqrt{3}}$ × prefault line voltage in kV × SC current in kA

13) A balanced 3-phase system consist of
   a) Zero sequence currents only
   b) Positive sequence currents only
   c) Negative sequence currents only
   d) Zero, positive and negative sequence currents only

14) Symmetrical components are used in power system for the analysis of
   a) Balanced three phase faults
   b) Unbalanced faults
   c) Normal power system under steady conditions
   d) Stability of system

_____

SLR-VB– 314

Seat No.	

T.E. (Electrical Engineering) Part – I (CGPA) Examination, 2017
POWER SYSTEM ANALYSIS

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary****.*

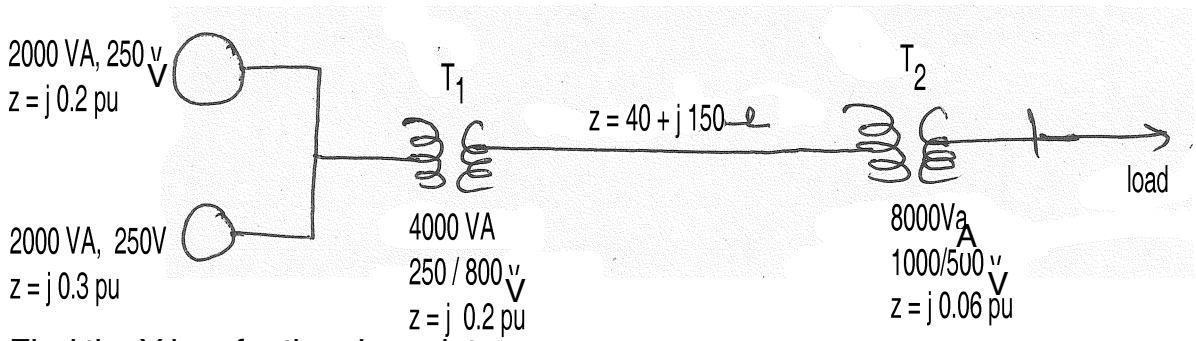
SECTION – I

2. Solve **any four** : **(4×3=12)**

a) Explain short circuit of synchronous machine at no load condition.

b) Express the representation of transformer model in per unit (pu) system.

c) Draw per unit impedance diagram represented on 5000 VA base and common system base voltage of 250 V for G1



d) Find the Y bus for the given data.

Line	R	X
1 – 2	0.05	0.15
1 – 3	0.1	0.3
2 – 3	0.15	0.45
2 – 4	0.1	0.3
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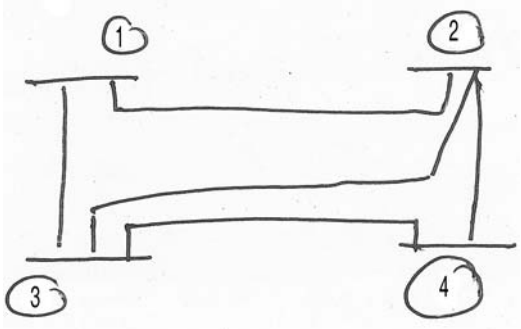
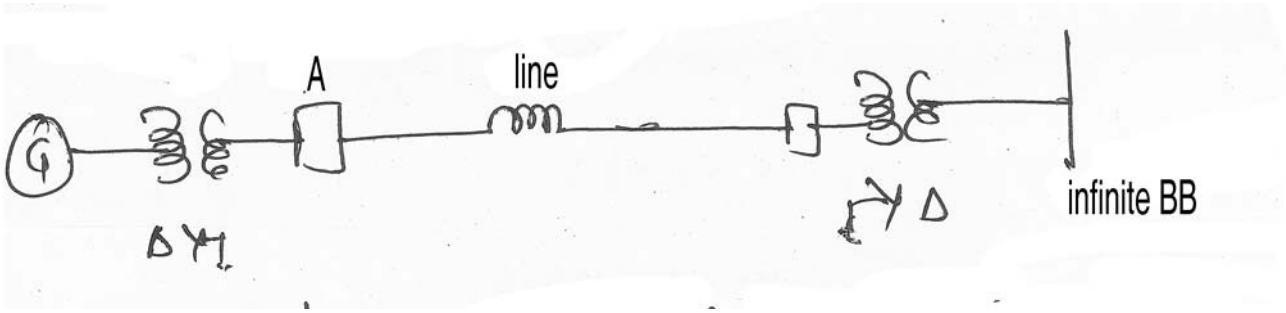


e) Explain per unit representation of 3ϕ supply system.

Set S

3. Solve **any two** : **(8×2=16)**

a) The system shown in figure below is delivering 50 MVA at 11kV, 0.8 lagging pf into a bus which may be regarded as infinite. Particulars of various components are Gen^r = 60 MVA, 12 kV, X_d' = 0.35 pu.
Transformer (each) = 80 MVA, 12/66 kV, X = 0.08pu.
Line = Reactance 12 Ω , resistance negligible.
Calculate the symmetrical current that the circuit breaker A and B will be called upon to interrupt in the event of 3 ϕ fault occurring at f near the circuit breaker B.



b) For the sample system generators are connected to all the three buses, while load are at bus 2 and 3. Values of reactive and real powers are listed in table. All the buses other than slack buses are PQ. Assuming flat voltage start, find voltage and bus angle at three buses at end of first GS iteration.

Bus	**Pi pu**	**Qi pu**	**Vi pu**	**Remark**
1	–	–	1.04 < 00	slack bus
2	0.5	– 0.2	–	PQ bus
3	– 1.0	0.5	–	PG bus
4	0.3	– 0.1	–	PG bus

The calculated Y bus for the above sample system is as follows :

$$\begin{bmatrix} 3-j9 & -2+j6 & -1+j3 & 0 \\ -2+j6 & 3.666-j11 & -0.666+j2 & -1+j3 \\ -1+j3 & -0.666+j2 & 3.666-j11 & -2+j6 \\ 0 & -1+j3 & -2+j6 & 3-j9 \end{bmatrix}$$

c) Derive an expression for Newton Raphson Algorithm method. Also draw a flow chart.

SECTION – II

4. Solve **any four** : **(4×3=12)**

a) A 2 pole, 50Hz, 11kV, turbo alternator has a rating of 100mw, pf of 0.85 lagging. The rotor has a moment of inertia of a 10000 kg-m. Calculate H & M.

b) Write detail note on zero sequence network of 3ϕ transformer for the different types of connection with the help of neat diagram.

c) The phase voltage across a certain unbalanced load are given as (r = 176 – j132, Gy = –128 – j96, Gb = –160 + j 100). Find the symmetrical components.

d) Compare symmetrical and unsymmetrical fault.

e) Explain the principle of lightening arrestor, explain any one brief.

5. Solve **any two** : **(8×2=16)**

a) Draw a diagram showing interconnection of sequence n/w for size to size fault. Derive equation for sequence currents and voltages.

b) A synchronous generator is rated 25 MVA, 11 kV, it is star connected with the neutral point is solidly grounded. The generator is operating at rated no load condition at rated voltage. Its reactances are x_1'' = x2 = 0.2 and x0 = 0.08 pu. Calculate the symmetrical subtransient line currents for single line to ground fault. Also calculate the actual current and sc MVA of SLG fault.

c) The voltages at the terminals of a balanced load consisting of three 20Ω Y connected resistors are $200 \angle 0°$, $100 \angle 255.50°$ and $200 \angle 151°$V. Find the like currents from the symmetrical components of the line voltage in the neutral of the load is isolated. What relation exists between the symmetrical component of size and phase voltages. Find the power expanded in three 20Ω resistor from symmetrical components of current and voltages.

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Set S

SLR-VB– 315

Seat No.	

Set **P**

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Friday, 5-5-2017 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) Economics is the science which studies
   A) Moral things
   B) Human behaviour with reference to human needs and its means
   C) Only profits and loss in the business
   D) Human psychology

2) Inventory is nothing but
   A) Infrastructure in the business
   B) Shares of the businessman
   C) List of movable items required to produce the product in the factory
   D) Production cost of the product

3) In ABC analysis, 'C' items are
   A) Maximum in value minimum numbers
   B) Medium in value medium in numbers
   C) Low valued and maximum in numbers
   D) None of the above

4) Joint stock company has
   A) Unlimited liability
   B) Limited liability
   C) No liability
   D) None of the above

5) Controlling function includes
   A) Prepare a strategy plan
   B) Guiding the staff wherever necessary
   C) Measuring the actual results in relations to the plans made
   D) Identification and classification of activities

P.T.O.

6) What is CSIR ?
   A) Council of Sub Industrial Research
   B) Council of Scientific and Industrial Research
   C) Council for State Industrial Research
   D) Commission for State and Industry Review

7) The coal reserves in India are sufficient only for
   A) Approximately next 20 years
   B) Approximately next 70 years
   C) Approximately next 130 years
   D) Approximately next 5 years

8) Measures to tackle energy problem is
   A) To stepping up oil production
   B) Control over consumption of coal
   C) Expansion of electric power
   D) All of the above

9) Short term planning means
   A) Period upto one year
   B) More than two year
   C) More than one year but less than two year
   D) Period upto three year

10) Working hours of adults in factory is
   A) 49 hours in a week
   B) 30 hours in a week
   C) 51 hours in a week
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11) The Factory Act of 1948 came into existence on
   A) 26th Dec. 1948
   B) 1st April 1948
   C) 1st April 1949
   D) 2nd October 1948

12) The opportunity cost of factor of production with specific use is
   A) Very high
   B) Infinite
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13) High tech industries may find it difficult to set
   A) Short term plans
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14) Function of Entrepreneur is
   A) To bear risk and uncertainty
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Seat No.	

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Write an short note on (**any four**) : **(4×4=16)**
   A) Micro and Macro economics.
   B) Science and Technological development in India since independence.
   C) Features of Indian Economy.
   D) EOQ
   E) Advantages and Disadvantages of partnership firm.

3. A) Explain in detail what is make or buy decision ? List the factors influencing make or buy decision. **6**
   B) Distinguish between Private and Public limited company. List the advantage and disadvantages ?

   OR

   B) Discuss the problems of power sector and suggest the remedies. **6**

SECTION – II

4. Write a short note on (**any four**) : **(4×4=16)**
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   C) Management Information System
   D) Entrepreneurship Development
   E) Industrial safety and its advantages.

5. Explain in detail PERT and CPM methods with suitable diagram in Project Implementation. **6**

6. List the stages of setting of SSI. **6**

   OR

   Explain Electricity Act, 2003 and suggest measures to reduce theft of Electricity.

_____

Set P

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Seat No.	

Set **Q**

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Friday, 5-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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Seat No.	

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

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SECTION – II

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Set Q

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Set **R**

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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SLR-VB– 315

Seat No.	

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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Set R

Set R

SLR-VB– 315

Seat No.	

Set S

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

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P.T.O.

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SLR-VB– 315

Seat No.	

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ENGINEERING ECONOMICS AND INDUSTRIAL MANAGEMENT

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SECTION – II

4. Write a short note on (**any four**) : **(4×4=16)**
   A) Functions of Management.
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Set S

Set S

SLR-VB – 316

Seat No.	

Set **P**

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTROMAGNETIC ENGINEERING

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data and mention it,* ***if necessary****.*
iii) ***Use*** *of no-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 : 14

1. Choose the correct answer :

1) Two concentric hollow spheres of radii R_1 and R_2 ($R_1 > R_2$) have respective charges Q_1 and Q_2 distributed uniformly over their surfaces, the electric flux density D at the gaussian surface of radius r such that ($R_1 > r > R_2$) will be

_____

a) $\frac{Q_1}{4\pi R_1^2}$ b) $\frac{Q_1}{4\pi r^2}$ c) $\frac{Q_2}{4\pi R_2^2}$ d) $\frac{Q_2}{4\pi r^2}$

2) Usually a collection of positive charges is considered for constructing gaussian surface. If the gaussian surface encloses a collection of negative charges, then for such a surface
   a) Normal component of D will point inward
   b) Normal component of D will point outward
   c) Normal component of D will become zero
   d) Normal component of D will become infinite

3) Electric flux density D is measured in
   a) c/m b) c/m^2 c) c/m^3 d) c

P.T.O.

4) In dot product of unit vector in cylindrical and rectangular coordinate system for $a_n \cdot a_\phi$ is

a) $\cos\phi$ b) $-\sin\phi$ c) $\sin\phi$ d) $-\cos\phi$

5) A field line and an equipotential surface are
a) always parallel b) always at 90°
c) inclined at any angle d) none

6) The unit of capacitance is
a) Volts/coulomb b) Coulombs/volt
c) Ohms d) Henry/Wb

7) The unit of dipole moment is
a) c/m b) c/m^2 c) c/m^3 d) c

8) Which conceptual notion introduced by Maxwell, indicates the generation of magnetic field in an empty free space ?
a) Displacement current b) Velocity vector current
c) Acceleration current d) Projectile current

9) Which of the following statement for a divergence of electric and magnetic flux densities ?
a) Both are zero
b) It is zero for the electric flux density
c) These are zero for static densities but non zero for time varying densities
d) It is zero for the magnetic flux density

10) A magnetic vector potential is given by the expression $A = (-\cos x)(\cos y)u_z$. The flux density at the origin is
a) 0 b) $-u_y$ c) $-2u_x$ d) $2u_x$

11) Which of the statements is not characteristic of static magnetic field ?
a) It is solenoid
b) It is conservative
c) Magnetic flux lines are always closed
d) It has no sinks or sources

12) The magnetic boundary condition is that the normal component of magnetic flux density across the boundary should be
a) Zero b) Unity c) Non continuous d) Continuous

13) The force on a charge moving with velocity v under the influence of electric and magnetic fields is given by which one of the following ?
a) $q(E + B \times V)$ b) $q(E + V \times B)$ c) $q(H + V \times E)$ d) $q(E + V \times H)$

14) A 50 cm long and 5 cm diameter solenoid is wound 2000 turns of wire. It carries a current of 10A. The energy stored is
a) 0.987 J b) 1.0 J c) 1.02 J d) 1.56 J

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Seat No.	

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
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SECTION – I

2. Solve **any four** : **(4×4=16)**

a) For what value of α, $A = a_x + 2a_y - a_z$ and $B = \alpha a_x + a_y + 3a_z$ are perpendicular ?

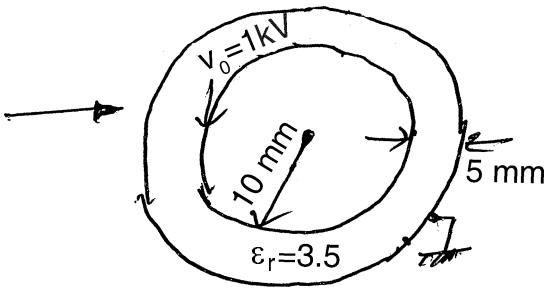
b) Find E at (0, 0, 5) m due to $Q_1 = .35\,\mu C$ at (0, 4, 0) m and $Q_2 = -.55\,\mu C$ at (3, 0, 0) m ?

c) Find electric flux density D at $\left(2, \frac{\pi}{2}, 0\right)$, given potential $V = \frac{10}{r^2}\sin\theta\cos\varphi$.

d) Evaluate the current crossing the spherical shell r = .02 m, when current density $J = 10^3 \sin\theta\, a_r$ in spherical coordinate.

e) Derive continuity of current equation.

f) Calculate capacitance for following geometry if cable is 8 km long

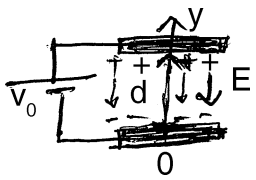


3. Solve **any two** : **(2×6=12)**

   a) For region y < 0 consist of a perfect conductor, while region y > 0 is a dielectric medium $\varepsilon_r = 2$. If there is surface charge of 2n c/m^2 on the conductor, determine E and D at

      a) A (3, – 2, 2) b) B(– 4, 1, 5)

   b) The two plates of parallel plate capacitor are separated by a distance 'd' and maintained at potential 0 and V_0 as shown in fig. Neglect fringing effect at the edge. Determine, the potential at any point between the plate using Laplace equation.



   c) Explain the physical interpretation of divergence of a vector in detail ?

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) A current filament of 5A in $\bar{a}y$ direction is parallel to y-axis at x = 2, z = –2. Find H at the origin.

   b) State and explain the force acting on a wire carrying a current placed in a magnetic field.

   c) Explain different types of magnetic material with suitable example according to the nature of material.

   d) State and prove Ampere's circuital law.

   e) Derive the Maxwell's equation for harmonically varying fields from Faraday's law in integral and point form.

5. Solve **any two** : **(2×6=12)**

   a) Evaluate both sides of Stoke's theorem for the portion of the sphere specified by r = 4m, $0 \le \theta \le 0.1\pi$, $0 \le \phi \le 0.3\pi$. Given $H = 6r \sin\phi \bar{a}_r + 18r \sin\theta \bar{a}\phi$.

   b) What do you mean by displacement current and show how it led to the modification of Ampere's law.

   c) State and derive the Maxwell's equation for time varying fields from Gauss's law in integral and differential form for the electric and magnetic field.

SLR-VB – 316

Seat No.	

Set Q

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ELECTROMAGNETIC ENGINEERING

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data and mention it,* ***if necessary****.*
iii) ***Use*** *of no-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 : 14

1. Choose the correct answer :

1) Which conceptual notion introduced by Maxwell, indicates the generation of magnetic field in an empty free space ?
   a) Displacement current b) Velocity vector current
   c) Acceleration current d) Projectile current

2) Which of the following statement for a divergence of electric and magnetic flux densities ?
   a) Both are zero
   b) It is zero for the electric flux density
   c) These are zero for static densities but non zero for time varying densities
   d) It is zero for the magnetic flux density

3) A magnetic vector potential is given by the expression $A = (-\cos x)(\cos y)u_z$. The flux density at the origin is
   a) 0 b) $-u_y$ c) $-2u_x$ d) $2u_x$

4) Which of the statements is not characteristic of static magnetic field ?
   a) It is solenoid
   b) It is conservative
   c) Magnetic flux lines are always closed
   d) It has no sinks or sources

P.T.O.

5) The magnetic boundary condition is that the normal component of magnetic flux density across the boundary should be
   a) Zero b) Unity c) Non continuous d) Continuous

6) The force on a charge moving with velocity v under the influence of electric and magnetic fields is given by which one of the following ?
   a) $q(E + B \times V)$ b) $q(E + V \times B)$ c) $q(H + V \times E)$ d) $q(E + V \times H)$

7) A 50 cm long and 5 cm diameter solenoid is wound 2000 turns of wire. It carries a current of 10A. The energy stored is
   a) 0.987 J b) 1.0 J c) 1.02 J d) 1.56 J

8) Two concentric hollow spheres of radii R_1 and R_2 ($R_1 > R_2$) have respective charges Q_1 and Q_2 distributed uniformly over their surfaces, the electric flux density D at the gaussian surface of radius r such that ($R_1 > r > R_2$) will be
   _____
   a) $\frac{Q_1}{4\pi R_1^2}$ b) $\frac{Q_1}{4\pi r^2}$ c) $\frac{Q_2}{4\pi R_2^2}$ d) $\frac{Q_2}{4\pi r^2}$

9) Usually a collection of positive charges is considered for constructing gaussian surface. If the gaussian surface encloses a collection of negative charges, then for such a surface
   a) Normal component of D will point inward
   b) Normal component of D will point outward
   c) Normal component of D will become zero
   d) Normal component of D will become infinite

10) Electric flux density D is measured in
   a) c/m b) c/m^2 c) c/m^3 d) c

11) In dot product of unit vector in cylindrical and rectangular coordinate system for $a_n \cdot a_\phi$ is
   a) $\cos\phi$ b) $-\sin\phi$ c) $\sin\phi$ d) $-\cos\phi$

12) A field line and an equipotential surface are
   a) always parallel b) always at 90°
   c) inclined at any angle d) none

13) The unit of capacitance is
   a) Volts/coulomb b) Coulombs/volt
   c) Ohms d) Henry/Wb

14) The unit of dipole moment is
   a) c/m b) c/m^2 c) c/m^3 d) c

SLR-VB – 316

Seat No.	

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTROMAGNETIC ENGINEERING

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data and mention it,* ***if necessary****.*
iii) ***Use*** *of no-programmable calculator is* ***allowed****.*

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) For what value of α, $A = a_x + 2a_y - a_z$ and $B = \alpha a_x + a_y + 3a_z$ are perpendicular ?

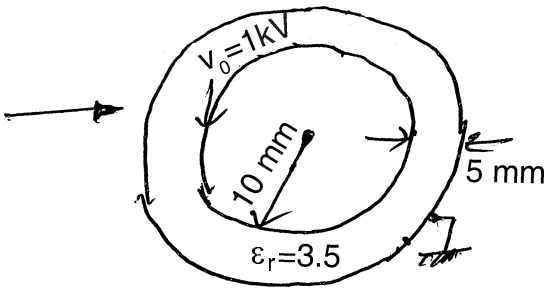
b) Find E at (0, 0, 5) m due to $Q_1 = .35\,\mu C$ at (0, 4, 0) m and $Q_2 = -.55\,\mu C$ at (3, 0, 0) m ?

c) Find electric flux density D at $\left(2, \frac{\pi}{2}, 0\right)$, given potential $V = \frac{10}{r^2}\sin\theta\cos\varphi$.

d) Evaluate the current crossing the spherical shell r = .02 m, when current density $J = 10^3 \sin\theta\, a_r$ in spherical coordinate.

e) Derive continuity of current equation.

f) Calculate capacitance for following geometry if cable is 8 km long

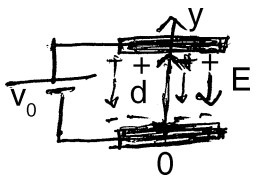


3. Solve **any two** : **(2×6=12)**

   a) For region y < 0 consist of a perfect conductor, while region y > 0 is a dielectric medium $\varepsilon_r = 2$. If there is surface charge of 2n c/m^2 on the conductor, determine E and D at

      a) A (3, – 2, 2) b) B(– 4, 1, 5)

   b) The two plates of parallel plate capacitor are separated by a distance 'd' and maintained at potential 0 and V_0 as shown in fig. Neglect fringing effect at the edge. Determine, the potential at any point between the plate using Laplace equation.



   c) Explain the physical interpretation of divergence of a vector in detail ?

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) A current filament of 5A in $\bar{a}y$ direction is parallel to y-axis at x = 2, z = –2. Find H at the origin.

   b) State and explain the force acting on a wire carrying a current placed in a magnetic field.

   c) Explain different types of magnetic material with suitable example according to the nature of material.

   d) State and prove Ampere's circuital law.

   e) Derive the Maxwell's equation for harmonically varying fields from Faraday's law in integral and point form.

5. Solve **any two** : **(2×6=12)**

   a) Evaluate both sides of Stoke's theorem for the portion of the sphere specified by r = 4m, $0 \le \theta \le 0.1\pi$, $0 \le \phi \le 0.3\pi$. Given $H = 6r \sin\phi \bar{a}_r + 18r \sin\theta \bar{a}\phi$.

   b) What do you mean by displacement current and show how it led to the modification of Ampere's law.

   c) State and derive the Maxwell's equation for time varying fields from Gauss's law in integral and differential form for the electric and magnetic field.

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Seat No.	

Set R

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTROMAGNETIC ENGINEERING

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) ***Assume*** *suitable data and mention it,* ***if necessary****.*
iii) ***Use*** *of no-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 : 14

1. Choose the correct answer :

1) A field line and an equipotential surface are
   a) always parallel b) always at 90°
   c) inclined at any angle d) none

2) The unit of capacitance is
   a) Volts/coulomb b) Coulombs/volt
   c) Ohms d) Henry/Wb

3) The unit of dipole moment is
   a) c/m b) c/m^2 c) c/m^3 d) c

4) Which conceptual notion introduced by Maxwell, indicates the generation of magnetic field in an empty free space ?
   a) Displacement current b) Velocity vector current
   c) Acceleration current d) Projectile current

5) Which of the following statement for a divergence of electric and magnetic flux densities ?
   a) Both are zero
   b) It is zero for the electric flux density
   c) These are zero for static densities but non zero for time varying densities
   d) It is zero for the magnetic flux density

P.T.O.

6) A magnetic vector potential is given by the expression $A = (-\cos x)(\cos y)u_z$. The flux density at the origin is
   a) 0 b) $-u_y$ c) $-2u_x$ d) $2u_x$

7) Which of the statements is not characteristic of static magnetic field ?
   a) It is solenoid
   b) It is conservative
   c) Magnetic flux lines are always closed
   d) It has no sinks or sources

8) The magnetic boundary condition is that the normal component of magnetic flux density across the boundary should be
   a) Zero b) Unity c) Non continuous d) Continuous

9) The force on a charge moving with velocity v under the influence of electric and magnetic fields is given by which one of the following ?
   a) $q(E + B \times V)$ b) $q(E + V \times B)$ c) $q(H + V \times E)$ d) $q(E + V \times H)$

10) A 50 cm long and 5 cm diameter solenoid is wound 2000 turns of wire. It carries a current of 10A. The energy stored is
   a) 0.987 J b) 1.0 J c) 1.02 J d) 1.56 J

11) Two concentric hollow spheres of radii R_1 and R_2 ($R_1 > R_2$) have respective charges Q_1 and Q_2 distributed uniformly over their surfaces, the electric flux density D at the gaussian surface of radius r such that ($R_1 > r > R_2$) will be
   a) $\frac{Q_1}{4\pi R_1^2}$ b) $\frac{Q_1}{4\pi r^2}$ c) $\frac{Q_2}{4\pi R_2^2}$ d) $\frac{Q_2}{4\pi r^2}$

12) Usually a collection of positive charges is considered for constructing gaussian surface. If the gaussian surface encloses a collection of negative charges, then for such a surface
   a) Normal component of D will point inward
   b) Normal component of D will point outward
   c) Normal component of D will become zero
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13) Electric flux density D is measured in
   a) c/m b) c/m^2 c) c/m^3 d) c

14) In dot product of unit vector in cylindrical and rectangular coordinate system for $a_n \cdot a_\phi$ is
   a) $\cos\phi$ b) $-\sin\phi$ c) $\sin\phi$ d) $-\cos\phi$

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Seat No.	

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTROMAGNETIC ENGINEERING

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
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SECTION – I

2. Solve **any four** : **(4×4=16)**

a) For what value of α, $A = a_x + 2a_y - a_z$ and $B = \alpha a_x + a_y + 3a_z$ are perpendicular ?

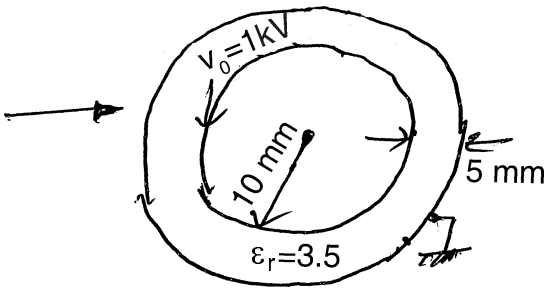
b) Find E at (0, 0, 5) m due to $Q_1 = .35\,\mu C$ at (0, 4, 0) m and $Q_2 = -.55\,\mu C$ at (3, 0, 0) m ?

c) Find electric flux density D at $\left(2, \frac{\pi}{2}, 0\right)$, given potential $V = \frac{10}{r^2}\sin\theta\cos\varphi$.

d) Evaluate the current crossing the spherical shell r = .02 m, when current density $J = 10^3 \sin\theta\, a_r$ in spherical coordinate.

e) Derive continuity of current equation.

f) Calculate capacitance for following geometry if cable is 8 km long



3. Solve **any two** : **(2×6=12)**

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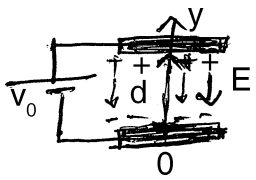

   c) Explain the physical interpretation of divergence of a vector in detail ?

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) A current filament of 5A in $\bar{a}y$ direction is parallel to y-axis at x = 2, z = –2. Find H at the origin.

   b) State and explain the force acting on a wire carrying a current placed in a magnetic field.

   c) Explain different types of magnetic material with suitable example according to the nature of material.

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   e) Derive the Maxwell's equation for harmonically varying fields from Faraday's law in integral and point form.

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   a) Evaluate both sides of Stoke's theorem for the portion of the sphere specified by r = 4m, $0 \le \theta \le 0.1\pi$, $0 \le \phi \le 0.3\pi$. Given $H = 6r \sin\phi \bar{a}_r + 18r \sin\theta \bar{a}\phi$.

   b) What do you mean by displacement current and show how it led to the modification of Ampere's law.

   c) State and derive the Maxwell's equation for time varying fields from Gauss's law in integral and differential form for the electric and magnetic field.

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Seat No.	

Set S

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTROMAGNETIC ENGINEERING

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) A magnetic vector potential is given by the expression $A = (-\cos x)(\cos y)u_z$. The flux density at the origin is
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   a) 0.987 J b) 1.0 J c) 1.02 J d) 1.56 J

P.T.O.

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SLR-VB – 316

Seat No.	

T.E. (Electrical) (Part – I) (CGPA) Examination, 2017
ELECTROMAGNETIC ENGINEERING

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *i)* ***All*** *questions are* ***compulsory****.*
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SECTION – I

2. Solve **any four** : **(4×4=16)**

a) For what value of α, $A = a_x + 2a_y - a_z$ and $B = \alpha a_x + a_y + 3a_z$ are perpendicular ?

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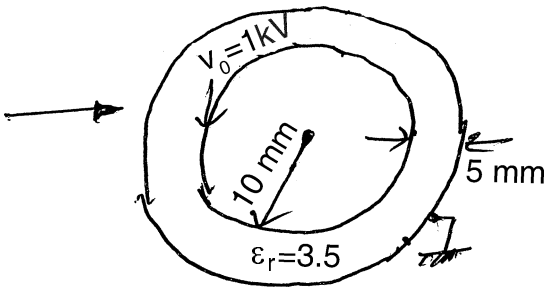

3. Solve **any two** : **(2×6=12)**

   a) For region y < 0 consist of a perfect conductor, while region y > 0 is a dielectric medium $\varepsilon_r = 2$. If there is surface charge of 2n c/m^2 on the conductor, determine E and D at

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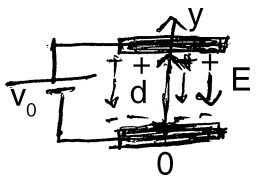

   c) Explain the physical interpretation of divergence of a vector in detail ?

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) A current filament of 5A in $\bar{a}y$ direction is parallel to y-axis at x = 2, z = –2. Find H at the origin.

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   c) Explain different types of magnetic material with suitable example according to the nature of material.

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   e) Derive the Maxwell's equation for harmonically varying fields from Faraday's law in integral and point form.

5. Solve **any two** : **(2×6=12)**

   a) Evaluate both sides of Stoke's theorem for the portion of the sphere specified by r = 4m, $0 \le \theta \le 0.1\pi$, $0 \le \phi \le 0.3\pi$. Given $H = 6r \sin\phi \bar{a}_r + 18r \sin\theta \bar{a}\phi$.

   b) What do you mean by displacement current and show how it led to the modification of Ampere's law.

   c) State and derive the Maxwell's equation for time varying fields from Gauss's law in integral and differential form for the electric and magnetic field.

SLR-VB – 317

Seat No.	

Set P

T.E. (Electrical Engineering) (Part – I) Examination, 2017
(CGPA)
ELECTRICAL MACHINES – III

Day and Date : Monday, 8-5-2017 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 : **(1×14=14)**

1) An alternator is also called as _____ generator.
   a) synchronous b) asynchronous c) rosenberg d) none of these
2) A turbo alternator uses
   a) salient pole filed structure b) non salient pole field structure
   c) rotating a.c. armature winding d) none of these
3) High speed alternators are driven by
   a) diesel engines b) hydraulic turbines
   c) steam turbines d) none of these
4) Turbo alternators have rotors of
   a) small diameter and long axial length
   b) large diameter and long axial length
   c) large diameter and small axial length
   d) same diameter and axial length
5) In the armature winding of an alternator, the coil span falls short of full pitch by 60° (electrical). The pitch factor is
   a) 0.866 b) 0.5 c) 0.25 d) none of these
6) The regulation of an alternator is given as
   a) $\frac{V - Eo}{V} * 100$ b) $\frac{Eo - V}{V} * 100$ c) $\frac{V}{Eo} * 100$ d) none of these

7) The short circuit characteristics of an alternator is
   a) always linear
   b) always nonlinear
   c) either a) or b)
   d) none of these

8) The armature current of the synchronous motor has large values for
   a) low excitation only
   b) high excitation only
   c) both high and low excitation
   d) none

9) What is the ratio of no load speed to full load speed of a 200 kVA, 12 pole, 2200 V, 3 phase, 6Hz Synchronous motor ?
   a) 1 b) 1.1 c) 1.21 d) infinite

10) Under short-circuit conditions, the power factor of an alternator is
   a) unity
   b) almost zero lagging
   c) almost zero leading
   d) none of these

11) The maximum value of torque that a synchronous motor, can develop without losing its synchronism, is known as
   a) breaking torque
   b) synchronizing torque
   c) pull out torque
   d) slip torque

12) In a synchronous motor if the back emf generated in the armature at no load is approximately equal to the applied voltage, then
   a) the torque generated is maximum
   b) the excitation is said to be zero percent
   c) the excitation is said to be 100%
   d) the motor is said to be fully loaded

13) Operation of stepping motors at high speeds is referred to as
   a) fast forward b) slewing c) inching d) jogging

14) Which of the following phase switching sequence represents half-step operation of a VR stepper motor ?
   a) A, B, C, A
   b) A, C, B, A
   c) AB, BC, CA, AB
   d) A, AB, B, BC

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Seat No.	

T.E. (Electrical Engineering) (Part – I) Examination, 2017
(CGPA)
ELECTRICAL MACHINES – III

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data if **necessary**.*

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

1) Explain the MMF method for voltage regulation.
2) Explain necessities and conditions for parallel operation of an alternator.
3) A 3000 kVA, 6 pole alternator runs at 1000 r.p.m. in parallel with other machines on 3300 V busbars. The synchronous reactance is 25%. Calculate the synchronizing power for one mechanical degree of displacement and corresponding synchronizing torque.
4) A 1200 kVA 3300 V 50 Hz three phase star connected alternator has armature resistance of 0.25 Ω per phase. A field current of 40A produces a short circuit current of 200A and an open circuit e.m.f. of 1100 V line to line. Find the voltage regulation at
   a) 0.8 lagging p.f.
   b) 0.8 leading p.f.
5) Explain the methods of synchronization.
6) A three phase, 50Hz, 2-pole star connected alternator has 54 slots with 4 conductors per slot. The pith of the coils 2 slots less than the pole pitch. If the machine gives 3300 V between lines on open circuit with sinusoidal flux distribution, determine the useful flux per pole.

3. Solve **any two**. **12**

1) Derive an expression for power developed in
   a) Salient pole type alternator
   b) Non salient pole type alternator.
2) A 5000 kVA 6600 V 3-phase star connected alternator has a resistance of 0.75 Ω per phase. Estimate the voltage regulation by ZPF method at p.f. of
   a) unity
   b) 0.9 leading

c) 0.71 lagging from following details

Field current	O.C. linevoltage	ZPF voltage
32	3100	0
50	4900	1850
75	6600	4250
100	7500	580
140	8300	7000

3) With neat sketch explain construction, working principle and types of alternator.

4. Solve **any four**. **16**
   1) Explain switched reluctance motor.
   2) Explain hybrid stepper motor.
   3) Explain construction and operation of synchronous motor.
   4) A three phase synchronous motor has 12 poles and operates from 440V 50Hz supply. Calculate its speed. If it takes a line current of 100A at 0.P.f . lead, what torque motor will be developing ? Neglect losses.
   5) With neat sketch explain AC servomotor.
   6) With neat sketch explain PMDC motor.
5. Solve **any two** : **12**
   1) Explain :
      a) Hysteresis motor
      b) Universal motor
   2) Explain single stack and multistack variable reluctance stepper motor.
   3) Why synchronous motor is not self starting ? How unidirectional torque is obtained ? What is the use of damper winding in synchronous motor ?

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SLR-VB – 317

Seat No.	

Set Q

T.E. (Electrical Engineering) (Part – I) Examination, 2017
(CGPA)
ELECTRICAL MACHINES – III

Day and Date : Monday, 8-5-2017 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 : **(1×14=14)**

1) The armature current of the synchronous motor has large values for
   a) low excitation only b) high excitation only
   c) both high and low excitation d) none

2) What is the ratio of no load speed to full load speed of a 200 kVA, 12 pole, 2200 V, 3 phase, 6Hz Synchronous motor ?
   a) 1 b) 1.1 c) 1.21 d) infinite

3) Under short-circuit conditions, the power factor of an alternator is
   a) unity b) almost zero lagging
   c) almost zero leading d) none of these

4) The maximum value of torque that a synchronous motor, can develop without losing its synchronism, is known as
   a) breaking torque b) synchronizing torque
   c) pull out torque d) slip torque

5) In a synchronous motor if the back emf generated in the armature at no load is approximately equal to the applied voltage, then
   a) the torque generated is maximum
   b) the excitation is said to be zero percent
   c) the excitation is said to be 100%
   d) the motor is said to be fully loaded

6) Operation of stepping motors at high speeds is referred to as
   a) fast forward b) slewing c) inching d) jogging

7) Which of the following phase switching sequence represents half-step operation of a VR stepper motor ?
   a) A, B, C, A b) A, C, B, A
   c) AB, BC, CA, AB d) A, AB, B, BC

8) An alternator is also called as _____ generator.
   a) synchronous b) asynchronous c) rosenberg d) none of these

9) A turbo alternator uses
   a) salient pole filed structure b) non salient pole field structure
   c) rotating a.c. armature winding d) none of these

10) High speed alternators are driven by
   a) diesel engines b) hydraulic turbines
   c) steam turbines d) none of these

11) Turbo alternators have rotors of
   a) small diameter and long axial length
   b) large diameter and long axial length
   c) large diameter and small axial length
   d) same diameter and axial length

12) In the armature winding of an alternator, the coil span falls short of full pitch by 60° (electrical). The pitch factor is
   a) 0.866 b) 0.5 c) 0.25 d) none of these

13) The regulation of an alternator is given as
   a) $\frac{V - Eo}{V} * 100$ b) $\frac{Eo - V}{V} * 100$ c) $\frac{V}{Eo} * 100$ d) none of these

14) The short circuit characteristics of an alternator is
   a) always linear b) always nonlinear
   c) either a) or b) d) none of these

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SLR-VB – 317

Seat No.	

T.E. (Electrical Engineering) (Part – I) Examination, 2017
(CGPA)
ELECTRICAL MACHINES – III

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data if necessary.

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

1) Explain the MMF method for voltage regulation.
2) Explain necessities and conditions for parallel operation of an alternator.
3) A 3000 kVA, 6 pole alternator runs at 1000 r.p.m. in parallel with other machines on 3300 V busbars. The synchronous reactance is 25%. Calculate the synchronizing power for one mechanical degree of displacement and corresponding synchronizing torque.
4) A 1200 kVA 3300 V 50 Hz three phase star connected alternator has armature resistance of 0.25 Ω per phase. A field current of 40A produces a short circuit current of 200A and an open circuit e.m.f. of 1100 V line to line. Find the voltage regulation at
   a) 0.8 lagging p.f.
   b) 0.8 leading p.f.
5) Explain the methods of synchronization.
6) A three phase, 50Hz, 2-pole star connected alternator has 54 slots with 4 conductors per slot. The pith of the coils 2 slots less than the pole pitch. If the machine gives 3300 V between lines on open circuit with sinusoidal flux distribution, determine the useful flux per pole.

3. Solve **any two**. **12**

1) Derive an expression for power developed in
   a) Salient pole type alternator
   b) Non salient pole type alternator.
2) A 5000 kVA 6600 V 3-phase star connected alternator has a resistance of 0.75 Ω per phase. Estimate the voltage regulation by ZPF method at p.f. of
   a) unity
   b) 0.9 leading

c) 0.71 lagging from following details

Field current	O.C. linevoltage	ZPF voltage
32	3100	0
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75	6600	4250
100	7500	580
140	8300	7000

3) With neat sketch explain construction, working principle and types of alternator.

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   1) Explain switched reluctance motor.
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   3) Explain construction and operation of synchronous motor.
   4) A three phase synchronous motor has 12 poles and operates from 440V 50Hz supply. Calculate its speed. If it takes a line current of 100A at 0.P.f . lead, what torque motor will be developing ? Neglect losses.
   5) With neat sketch explain AC servomotor.
   6) With neat sketch explain PMDC motor.
5. Solve **any two** : **12**
   1) Explain :
      a) Hysteresis motor
      b) Universal motor
   2) Explain single stack and multistack variable reluctance stepper motor.
   3) Why synchronous motor is not self starting ? How unidirectional torque is obtained ? What is the use of damper winding in synchronous motor ?

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SLR-VB – 317

Seat No.	

Set R

T.E. (Electrical Engineering) (Part – I) Examination, 2017
(CGPA)
ELECTRICAL MACHINES – III

Day and Date : Monday, 8-5-2017 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 : **(1×14=14)**

1) In the armature winding of an alternator, the coil span falls short of full pitch by 60° (electrical). The pitch factor is
   a) 0.866 b) 0.5 c) 0.25 d) none of these

2) The regulation of an alternator is given as
   a) $\frac{V - Eo}{V} * 100$ b) $\frac{Eo - V}{V} * 100$ c) $\frac{V}{Eo} * 100$ d) none of these

3) The short circuit characteristics of an alternator is
   a) always linear b) always nonlinear
   c) either a) or b) d) none of these

4) The armature current of the synchronous motor has large values for
   a) low excitation only b) high excitation only
   c) both high and low excitation d) none

5) What is the ratio of no load speed to full load speed of a 200 kVA, 12 pole, 2200 V, 3 phase, 6Hz Synchronous motor ?
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6) Under short-circuit conditions, the power factor of an alternator is
   a) unity b) almost zero lagging
   c) almost zero leading d) none of these

7) The maximum value of torque that a synchronous motor, can develop without losing its synchronism, is known as
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9) Operation of stepping motors at high speeds is referred to as
   a) fast forward b) slewing c) inching d) jogging

10) Which of the following phase switching sequence represents half-step operation of a VR stepper motor ?
   a) A, B, C, A b) A, C, B, A
   c) AB, BC, CA, AB d) A, AB, B, BC

11) An alternator is also called as _____ generator.
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SLR-VB – 317

Seat No.	

T.E. (Electrical Engineering) (Part – I) Examination, 2017
(CGPA)
ELECTRICAL MACHINES – III

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data if necessary.

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

1) Explain the MMF method for voltage regulation.
2) Explain necessities and conditions for parallel operation of an alternator.
3) A 3000 kVA, 6 pole alternator runs at 1000 r.p.m. in parallel with other machines on 3300 V busbars. The synchronous reactance is 25%. Calculate the synchronizing power for one mechanical degree of displacement and corresponding synchronizing torque.
4) A 1200 kVA 3300 V 50 Hz three phase star connected alternator has armature resistance of 0.25 Ω per phase. A field current of 40A produces a short circuit current of 200A and an open circuit e.m.f. of 1100 V line to line. Find the voltage regulation at
   a) 0.8 lagging p.f.
   b) 0.8 leading p.f.
5) Explain the methods of synchronization.
6) A three phase, 50Hz, 2-pole star connected alternator has 54 slots with 4 conductors per slot. The pith of the coils 2 slots less than the pole pitch. If the machine gives 3300 V between lines on open circuit with sinusoidal flux distribution, determine the useful flux per pole.

3. Solve **any two**. **12**

1) Derive an expression for power developed in
   a) Salient pole type alternator
   b) Non salient pole type alternator.
2) A 5000 kVA 6600 V 3-phase star connected alternator has a resistance of 0.75 Ω per phase. Estimate the voltage regulation by ZPF method at p.f. of
   a) unity
   b) 0.9 leading

c) 0.71 lagging from following details

Field current	O.C. linevoltage	ZPF voltage
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3) With neat sketch explain construction, working principle and types of alternator.

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5. Solve **any two** : **12**
   1) Explain :
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   2) Explain single stack and multistack variable reluctance stepper motor.
   3) Why synchronous motor is not self starting ? How unidirectional torque is obtained ? What is the use of damper winding in synchronous motor ?

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SLR-VB – 317

Seat No.	

Set S

T.E. (Electrical Engineering) (Part – I) Examination, 2017
(CGPA)
ELECTRICAL MACHINES – III

Day and Date : Monday, 8-5-2017 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 : **(1×14=14)**

1) Under short-circuit conditions, the power factor of an alternator is
   a) unity b) almost zero lagging
   c) almost zero leading d) none of these

2) The maximum value of torque that a synchronous motor, can develop without losing its synchronism, is known as
   a) breaking torque b) synchronizing torque
   c) pull out torque d) slip torque

3) In a synchronous motor if the back emf generated in the armature at no load is approximately equal to the applied voltage, then
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   a) fast forward b) slewing c) inching d) jogging

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   a) always linear b) always nonlinear
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   a) 1 b) 1.1 c) 1.21 d) infinite

SLR-VB – 317

Seat No.	

T.E. (Electrical Engineering) (Part – I) Examination, 2017
(CGPA)
ELECTRICAL MACHINES – III

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
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2. Solve **any four**. **16**

1) Explain the MMF method for voltage regulation.
2) Explain necessities and conditions for parallel operation of an alternator.
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3. Solve **any two**. **12**

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c) 0.71 lagging from following details

Field current	O.C. linevoltage	ZPF voltage
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75	6600	4250
100	7500	580
140	8300	7000

3) With neat sketch explain construction, working principle and types of alternator.

4. Solve **any four**. **16**
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   2) Explain hybrid stepper motor.
   3) Explain construction and operation of synchronous motor.
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   5) With neat sketch explain AC servomotor.
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5. Solve **any two** : **12**
   1) Explain :
      a) Hysteresis motor
      b) Universal motor
   2) Explain single stack and multistack variable reluctance stepper motor.
   3) Why synchronous motor is not self starting ? How unidirectional torque is obtained ? What is the use of damper winding in synchronous motor ?

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SLR-VB – 318

Seat No.	

Set **P**

T.E. (Electrical) (CGPA) (Part – I) Examination, 2017
CONTROL SYSTEMS – I

Day and Date : Tuesday, 9-5-2017 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) Open loop control system is one in which the control action
   a) depends on the input signal b) is independent of the desired output
   c) depends on system variable d) depends on system size

2) Feedback control system are
   a) band-pass filters b) low pass filters
   c) high pass filters d) none of the above

3) Sensitivity of a closed loop control system to variations in gain and load disturbances depends upon
   a) loop gain b) frequency c) forward gain d) all of these

4) The transfer function of a system is laplace transform of its
   a) square wave response b) step response
   c) ramp response d) impulse response

5) The transfer function of an AC tachometer is

   a) $Ks = \frac{E(s)}{\theta(s)}$ b) $Ks = \frac{E(s)}{\omega m(s)}$

   c) $K = \frac{E(s)}{\theta(s)}$ d) none of the above

6) In F-V analogy Mass is analogous to
   a) resistance b) inductance
   c) capacitance d) none of the above

7) Zero initial conditions of a system means
   a) system at rest with no energy stored in any of its components
   b) inductance
   c) system at rest with stored energy
   d) system without any storage element

8) The open loop transfer function of a unity feedback system is given by $G(s) = \frac{2(S+\alpha)}{S(S+2)(S+10)}$ Angles of asymptotes are
   a) 60°, 120°, 300° b) 60°, 180°, 300°
   c) 90°, 270°, 360° d) 90°, 180°, 270°

9) _____ increases the steady state accuracy.
   a) Integrator b) Differentiator
   c) Phase lead compensator d) Phase lag compensator

10) By which of the following the system response can be tested better ?
   a) Ramp input signal b) Sinusoidal input signal
   c) Unit impulse input signal d) Exponentially decaying signal

11) Regenerative feedback implies feedback with
   a) oscillations b) step input c) negative sign d) positive sign

12) Which of the following should be done to make an unstable system stable ?
   a) The gain of the system should be decreased
   b) The gain of the system should be increased
   c) The number of poles to the loop transfer function should be increased
   d) The number of zeros to the loop transfer function should be increased

13) The second derivative input signals modify which of the following ?
   a) The time constant of the system
   b) Damping of the system
   c) The gain of the system
   d) The time constant and suppress the oscillations

14) The open-loop transfer function of a unity feedback system is $G(s) = \frac{1+s}{s(1+0.5s)}$ The corner frequencies are
   a) 0 and 2 b) 0 and 1 c) 0 and – 1 d) 1 and 2

SLR-VB – 318

Seat No.	

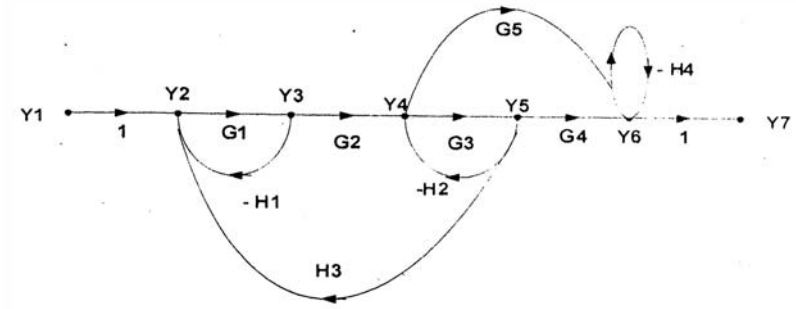
T.E. (Electrical) (CGPA) (Part – I) Examination, 2017
CONTROL SYSTEMS – I

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

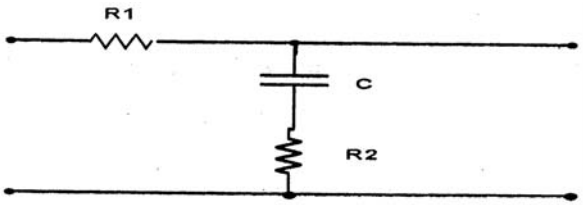
Instruction *:* ***Assume*** *suitable data* ***if*** *necessary.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   a) Explain linear and non-linear control system.
   b) Explain force to voltage analogy.
   c) Calculate Y_7/Y_1 of the system whose signal flow graph is given below.



   d) Explain any four rules of block diagram reduction techniques.
   e) Find the transfer function of below network.

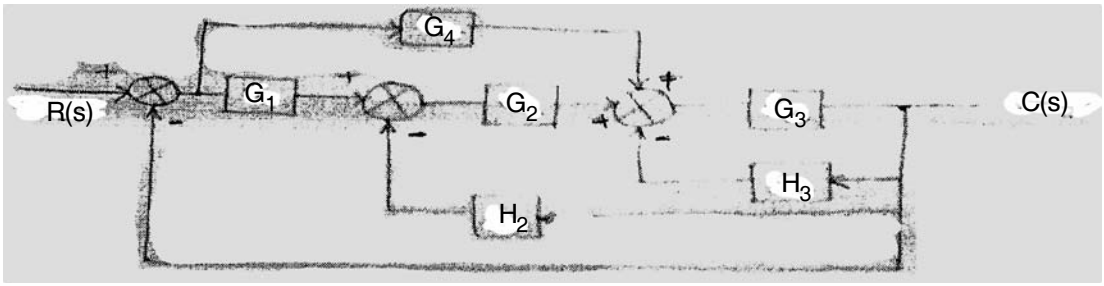


vi

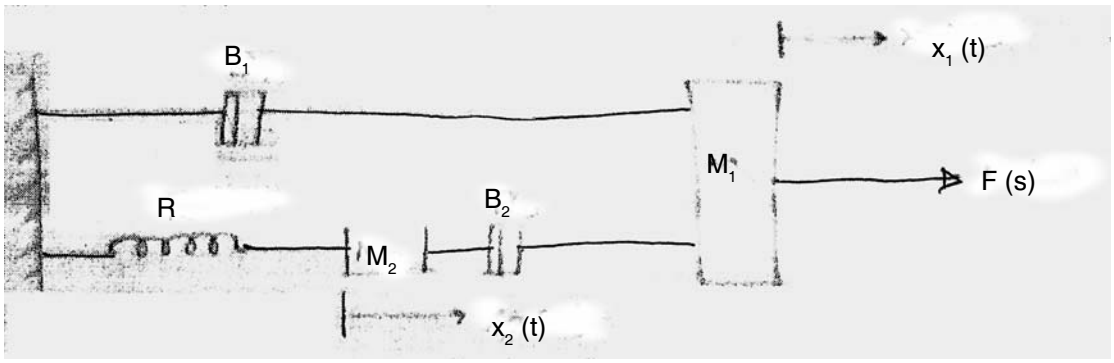
   f) Compare open loop and closed loop control system.

3. Attempt **any two** : **(6×2=12)**

a) Find the transfer function of given block diagram.



b) Find the F-V and F-V analogy of a given mechanical system.



c) Explain the Mason's Gain formula.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) Explain the standard test signals used in control system.

b) The characteristic equation of a feedback control system is $s^4 + 4s^3 + 13s^2 + 36s + k = 0$ determine range of k for system to be stable.

c) Explain the time domain specifications with neat diagram.

d) How stability is related to location of pole ? Explain in detail.

e) Derive the expression for steady state error.

f) The closed loop transfer function of unity feedback system is $C(s)/R(s) = 25/s^2 + 8s + 25$. Determine nature of damping in the system.

5. Sove **any two** : **(2×6=12)**

a) Sketch the root locus for the open loop transfer function of unity feedback control system given below : G(S)H(S) = K/S (S + 4) (S + 5).

b) Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies : G(S) = 1000/S (1+0.1S) (1+ 0.001 S).

c) The open loop T/F of a servo system with unity feedback is given as

G(S) = 10/ (s + 5) (s + 2). Determine the damping ratio, natural frequency of oscillations. What is the percentage overshoot of the response to a unit step input ?

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Set P

SLR-VB – 318

Seat No.	

Set **Q**

T.E. (Electrical) (CGPA) (Part – I) Examination, 2017
CONTROL SYSTEMS – I

Day and Date : Tuesday, 9-5-2017 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 open loop transfer function of a unity feedback system is given by $G(s) = \frac{2(S+\alpha)}{S(S+2)(S+10)}$ Angles of asymptotes are

a) 60°, 120°, 300° b) 60°, 180°, 300°
c) 90°, 270°, 360° d) 90°, 180°, 270°

2) _____ increases the steady state accuracy.

a) Integrator b) Differentiator
c) Phase lead compensator d) Phase lag compensator

3) By which of the following the system response can be tested better ?

a) Ramp input signal b) Sinusoidal input signal
c) Unit impulse input signal d) Exponentially decaying signal

4) Regenerative feedback implies feedback with

a) oscillations b) step input c) negative sign d) positive sign

5) Which of the following should be done to make an unstable system stable ?

a) The gain of the system should be decreased
b) The gain of the system should be increased
c) The number of poles to the loop transfer function should be increased
d) The number of zeros to the loop transfer function should be increased

6) The second derivative input signals modify which of the following ?
   a) The time constant of the system
   b) Damping of the system
   c) The gain of the system
   d) The time constant and suppress the oscillations

7) The open-loop transfer function of a unity feedback system is $G(s) = \frac{1+s}{s(1+0.5s)}$ The corner frequencies are
   a) 0 and 2 b) 0 and 1 c) 0 and – 1 d) 1 and 2

8) Open loop control system is one in which the control action
   a) depends on the input signal b) is independent of the desired output
   c) depends on system variable d) depends on system size

9) Feedback control system are
   a) band-pass filters b) low pass filters
   c) high pass filters d) none of the above

10) Sensitivity of a closed loop control system to variations in gain and load disturbances depends upon
   a) loop gain b) frequency c) forward gain d) all of these

11) The transfer function of a system is laplace transform of its
   a) square wave response b) step response
   c) ramp response d) impulse response

12) The transfer function of an AC tachometer is
   a) $Ks = \frac{E(s)}{\theta(s)}$ b) $Ks = \frac{E(s)}{\omega m(s)}$
   c) $K = \frac{E(s)}{\theta(s)}$ d) none of the above

13) In F-V analogy Mass is analogous to
   a) resistance b) inductance
   c) capacitance d) none of the above

14) Zero initial conditions of a system means
   a) system at rest with no energy stored in any of its components
   b) inductance
   c) system at rest with stored energy
   d) system without any storage element

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SLR-VB – 318

Seat No.	

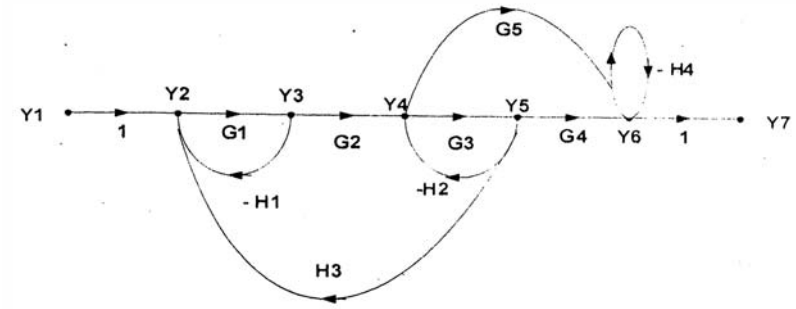
T.E. (Electrical) (CGPA) (Part – I) Examination, 2017
CONTROL SYSTEMS – I

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

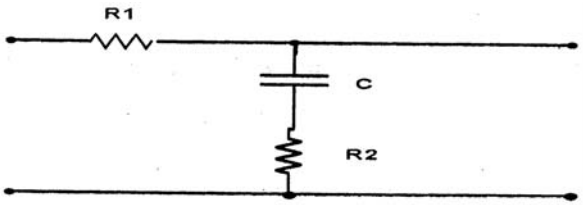
Instruction *:* ***Assume*** *suitable data* ***if*** *necessary.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   a) Explain linear and non-linear control system.
   b) Explain force to voltage analogy.
   c) Calculate Y_7/Y_1 of the system whose signal flow graph is given below.



   d) Explain any four rules of block diagram reduction techniques.
   e) Find the transfer function of below network.



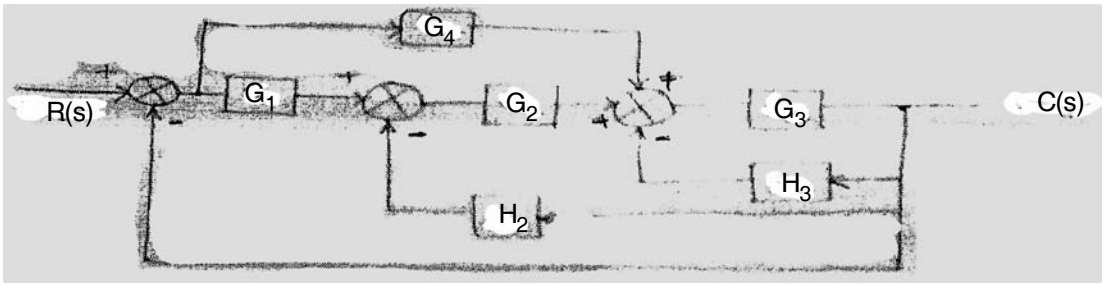
vi

   f) Compare open loop and closed loop control system.

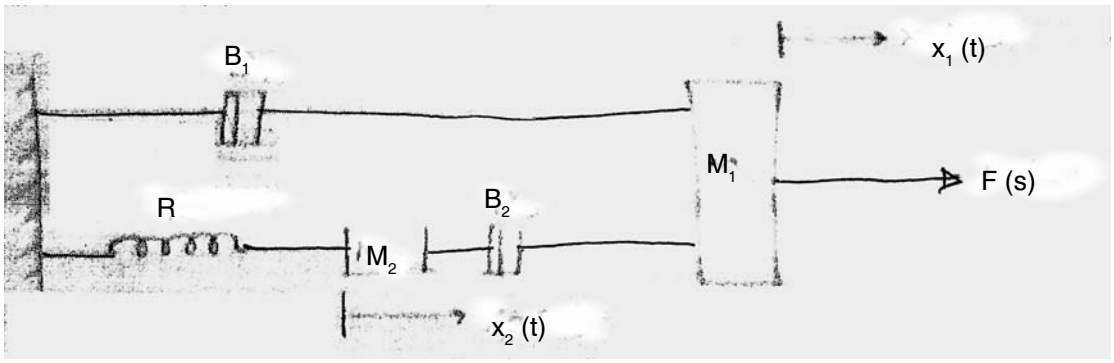
Set Q

3. Attempt **any two** : **(6×2=12)**

a) Find the transfer function of given block diagram.



b) Find the F-V and F-V analogy of a given mechanical system.



c) Explain the Mason's Gain formula.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) Explain the standard test signals used in control system.

b) The characteristic equation of a feedback control system is $s^4 + 4s^3 + 13s^2 + 36s + k = 0$ determine range of k for system to be stable.

c) Explain the time domain specifications with neat diagram.

d) How stability is related to location of pole ? Explain in detail.

e) Derive the expression for steady state error.

f) The closed loop transfer function of unity feedback system is $C(s)/R(s) = 25/s^2 + 8s + 25$. Determine nature of damping in the system.

5. Sove **any two** : **(2×6=12)**

a) Sketch the root locus for the open loop transfer function of unity feedback control system given below : G(S)H(S) = K/S (S + 4) (S + 5).

b) Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies : G(S) = 1000/S (1+0.1S) (1+ 0.001 S).

c) The open loop T/F of a servo system with unity feedback is given as

G(S) = 10/ (s + 5) (s + 2). Determine the damping ratio, natural frequency of oscillations. What is the percentage overshoot of the response to a unit step input ?

———————

Set Q

SLR-VB – 318

Seat No.	

Set **R**

T.E. (Electrical) (CGPA) (Part – I) Examination, 2017
CONTROL SYSTEMS – I

Day and Date : Tuesday, 9-5-2017 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 transfer function of an AC tachometer is

a) $Ks = \frac{E(s)}{\theta(s)}$ b) $Ks = \frac{E(s)}{\omega m(s)}$

c) $K = \frac{E(s)}{\theta(s)}$ d) none of the above

2) In F-V analogy Mass is analogous to
a) resistance b) inductance
c) capacitance d) none of the above

3) Zero initial conditions of a system means
a) system at rest with no energy stored in any of its components
b) inductance
c) system at rest with stored energy
d) system without any storage element

4) The open loop transfer function of a unity feedback system is given by $G(s) = \frac{2(S+\alpha)}{S(S+2)(S+10)}$ Angles of asymptotes are

a) 60°, 120°, 300° b) 60°, 180°, 300°
c) 90°, 270°, 360° d) 90°, 180°, 270°

5) _____ increases the steady state accuracy.
   a) Integrator b) Differentiator
   c) Phase lead compensator d) Phase lag compensator

6) By which of the following the system response can be tested better ?
   a) Ramp input signal b) Sinusoidal input signal
   c) Unit impulse input signal d) Exponentially decaying signal

7) Regenerative feedback implies feedback with
   a) oscillations b) step input c) negative sign d) positive sign

8) Which of the following should be done to make an unstable system stable ?
   a) The gain of the system should be decreased
   b) The gain of the system should be increased
   c) The number of poles to the loop transfer function should be increased
   d) The number of zeros to the loop transfer function should be increased

9) The second derivative input signals modify which of the following ?
   a) The time constant of the system
   b) Damping of the system
   c) The gain of the system
   d) The time constant and suppress the oscillations

10) The open-loop transfer function of a unity feedback system is $G(s) = \frac{1+s}{s(1+0.5s)}$ The corner frequencies are
   a) 0 and 2 b) 0 and 1 c) 0 and – 1 d) 1 and 2

11) Open loop control system is one in which the control action
   a) depends on the input signal b) is independent of the desired output
   c) depends on system variable d) depends on system size

12) Feedback control system are
   a) band-pass filters b) low pass filters
   c) high pass filters d) none of the above

13) Sensitivity of a closed loop control system to variations in gain and load disturbances depends upon
   a) loop gain b) frequency c) forward gain d) all of these

14) The transfer function of a system is laplace transform of its
   a) square wave response b) step response
   c) ramp response d) impulse response

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SLR-VB – 318

Seat No.	

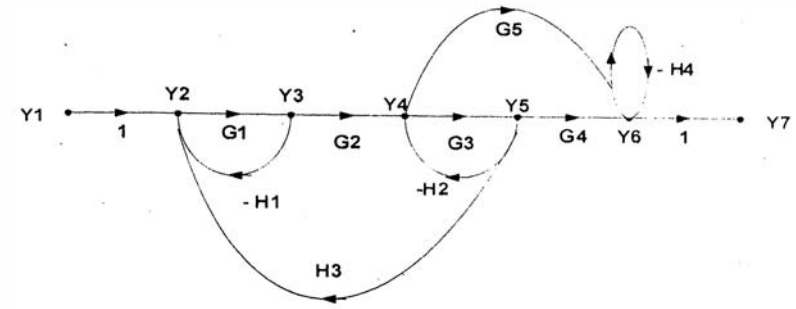
T.E. (Electrical) (CGPA) (Part – I) Examination, 2017
CONTROL SYSTEMS – I

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

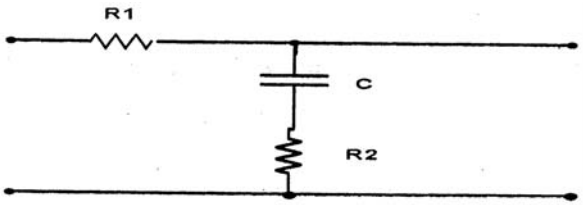
***Instruction** : Assume suitable data **if** necessary.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   a) Explain linear and non-linear control system.
   b) Explain force to voltage analogy.
   c) Calculate Y_7/Y_1 of the system whose signal flow graph is given below.



   d) Explain any four rules of block diagram reduction techniques.
   e) Find the transfer function of below network.



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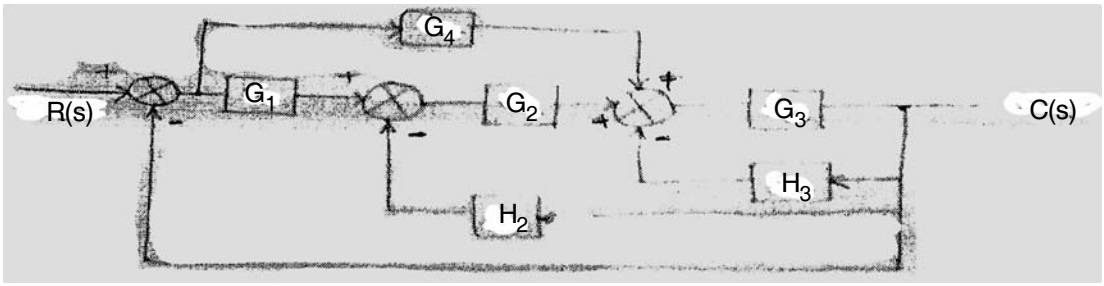
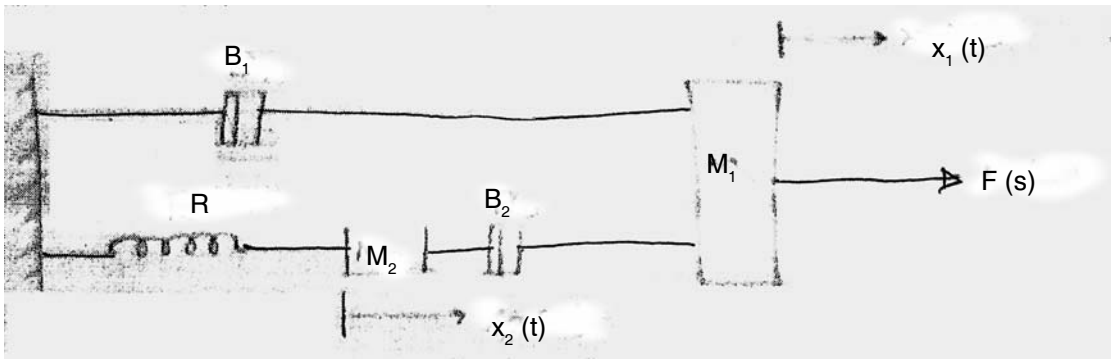
   f) Compare open loop and closed loop control system.

3. Attempt **any two** : **(6×2=12)**

a) Find the transfer function of given block diagram.



b) Find the F-V and F-V analogy of a given mechanical system.



c) Explain the Mason's Gain formula.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) Explain the standard test signals used in control system.

b) The characteristic equation of a feedback control system is $s^4 + 4s^3 + 13s^2 + 36s + k = 0$ determine range of k for system to be stable.

c) Explain the time domain specifications with neat diagram.

d) How stability is related to location of pole ? Explain in detail.

e) Derive the expression for steady state error.

f) The closed loop transfer function of unity feedback system is $C(s)/R(s) = 25/s^2 + 8s + 25$. Determine nature of damping in the system.

5. Sove **any two** : **(2×6=12)**

a) Sketch the root locus for the open loop transfer function of unity feedback control system given below : G(S)H(S) = K/S (S + 4) (S + 5).

b) Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies : G(S) = 1000/S (1+0.1S) (1+ 0.001 S).

c) The open loop T/F of a servo system with unity feedback is given as

G(S) = 10/ (s + 5) (s + 2). Determine the damping ratio, natural frequency of oscillations. What is the percentage overshoot of the response to a unit step input ?

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Set R

SLR-VB – 318

Seat No.	

Set **S**

T.E. (Electrical) (CGPA) (Part – I) Examination, 2017
CONTROL SYSTEMS – I

Day and Date : Tuesday, 9-5-2017 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) By which of the following the system response can be tested better ?
   a) Ramp input signal b) Sinusoidal input signal
   c) Unit impulse input signal d) Exponentially decaying signal

2) Regenerative feedback implies feedback with
   a) oscillations b) step input c) negative sign d) positive sign

3) Which of the following should be done to make an unstable system stable ?
   a) The gain of the system should be decreased
   b) The gain of the system should be increased
   c) The number of poles to the loop transfer function should be increased
   d) The number of zeros to the loop transfer function should be increased

4) The second derivative input signals modify which of the following ?
   a) The time constant of the system
   b) Damping of the system
   c) The gain of the system
   d) The time constant and suppress the oscillations

5) The open-loop transfer function of a unity feedback system is $G(s) = \frac{1+s}{s(1+0.5s)}$ The corner frequencies are
   a) 0 and 2 b) 0 and 1 c) 0 and – 1 d) 1 and 2

P.T.O.

6) Open loop control system is one in which the control action
   a) depends on the input signal
   b) is independent of the desired output
   c) depends on system variable
   d) depends on system size

7) Feedback control system are
   a) band-pass filters
   b) low pass filters
   c) high pass filters
   d) none of the above

8) Sensitivity of a closed loop control system to variations in gain and load disturbances depends upon
   a) loop gain b) frequency c) forward gain d) all of these

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   c) ramp response
   d) impulse response

10) The transfer function of an AC tachometer is

   a) $Ks = \frac{E(s)}{\theta(s)}$
   b) $Ks = \frac{E(s)}{\omega m(s)}$
   c) $K = \frac{E(s)}{\theta(s)}$
   d) none of the above

11) In F-V analogy Mass is analogous to
   a) resistance
   b) inductance
   c) capacitance
   d) none of the above

12) Zero initial conditions of a system means
   a) system at rest with no energy stored in any of its components
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   c) system at rest with stored energy
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13) The open loop transfer function of a unity feedback system is given by

$G(s) = \frac{2(S+\alpha)}{S(S+2)(S+10)}$ Angles of asymptotes are

   a) 60°, 120°, 300°
   b) 60°, 180°, 300°
   c) 90°, 270°, 360°
   d) 90°, 180°, 270°

14) _____ increases the steady state accuracy.
   a) Integrator
   b) Differentiator
   c) Phase lead compensator
   d) Phase lag compensator

SLR-VB – 318

Seat No.	

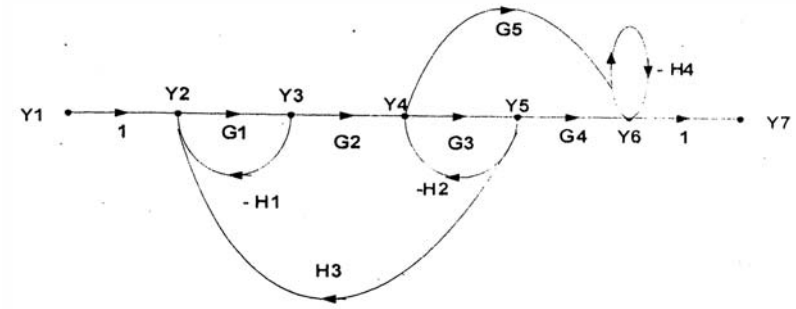
T.E. (Electrical) (CGPA) (Part – I) Examination, 2017
CONTROL SYSTEMS – I

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

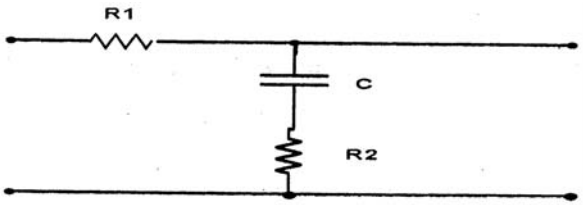
Instruction *:* ***Assume*** *suitable data* ***if*** *necessary.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   a) Explain linear and non-linear control system.
   b) Explain force to voltage analogy.
   c) Calculate Y_7/Y_1 of the system whose signal flow graph is given below.



   d) Explain any four rules of block diagram reduction techniques.
   e) Find the transfer function of below network.

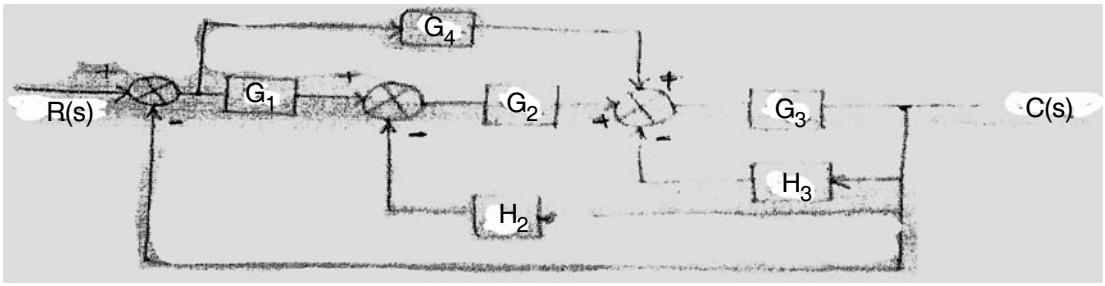


vi

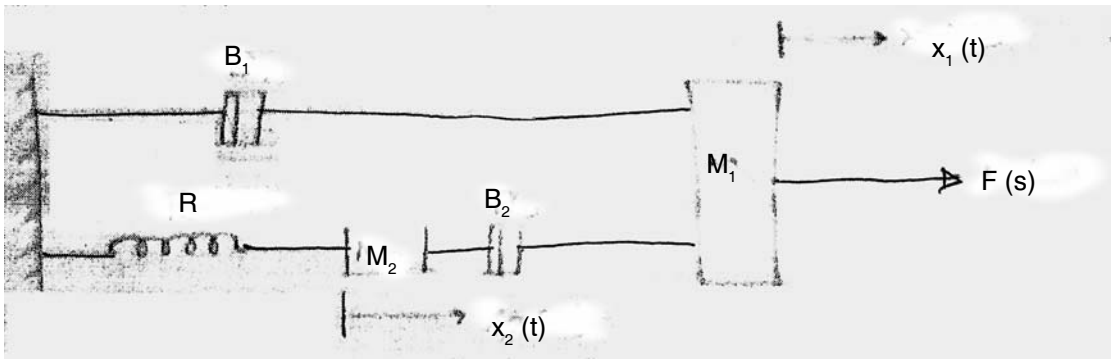
   f) Compare open loop and closed loop control system.

3. Attempt **any two** : **(6×2=12)**

a) Find the transfer function of given block diagram.



b) Find the F-V and F-V analogy of a given mechanical system.



c) Explain the Mason's Gain formula.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) Explain the standard test signals used in control system.

b) The characteristic equation of a feedback control system is $s^4 + 4s^3 + 13s^2 + 36s + k = 0$ determine range of k for system to be stable.

c) Explain the time domain specifications with neat diagram.

d) How stability is related to location of pole ? Explain in detail.

e) Derive the expression for steady state error.

f) The closed loop transfer function of unity feedback system is $C(s)/R(s) = 25/s^2 + 8s + 25$. Determine nature of damping in the system.

5. Sove **any two** : **(2×6=12)**

a) Sketch the root locus for the open loop transfer function of unity feedback control system given below : G(S)H(S) = K/S (S + 4) (S + 5).

b) Plot the Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies : G(S) = 1000/S (1+0.1S) (1+ 0.001 S).

c) The open loop T/F of a servo system with unity feedback is given as

G(S) = 10/ (s + 5) (s + 2). Determine the damping ratio, natural frequency of oscillations. What is the percentage overshoot of the response to a unit step input ?

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Set S

SLR-VB – 320

Seat No.	

Set **P**

T.E. (Electrical) (Part – I) (Old) Examination, 2017
LINEAR INTEGRATED CIRCUITS

Day and Date : Tuesday, 16-5-2017 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.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) An ideal OP-AMP has
a) infinite A_v b) infinite R_i c) zero R_o d) all the above

2) The O/P of the differentiator is proportion to
a) The RC time constant
b) The amplitude of
c) The rate at which the i/p is changing
d) Both a and c

3) For step i/p, o/p of an integrator is
a) triangular b) ramp c) square d) sine

4) In common mode configuration
a) both i/ps are grounded
b) o/p are connected together
c) o/p slgs are in phase
d) identical signal appears on both the i/ps

5) In an integrator, the feedback element is a
a) resistor b) capacitor c) zener diode d) vtg. divider

6) IC 741 is _____ pin IC.
a) 6 b) 12 c) 8 d) 10

7) $\frac{dv_o}{dt}$ is called
a) Voltage ratio b) Voltage rate
c) Slew rate d) Transient response

8) In V-I with floated load, load resistance R_L is
   a) grounded b) connected to NI terminal
   c) floating d) connected to inverting terminal

9) In full wave rectifier ckt., regardless of the polarity of i/p slg, o/p is always
   a) negative going b) positive going
   c) same as i/p d) none

10) The purpose of comparator is to
   a) amplify an i/p vtg.
   b) detect the occurrence of a changing i/p vtg.
   c) maintain a constant o/p when the ac i/p vtg. changes
   d) produce a change in o/p vtg. when an i/p vtg. equals the reference vtg.

11) All pass filter passes
   a) all freq. components b) only particular band of freq.
   c) two band of freq. d) none

12) Square wave generator is also called as
   a) free running multivibrator b) monostable multivibrator
   c) astable multivibrator d) both a and c

13) The freq. oscillation of IC555 astable ckt. is given as
   a) $\frac{1.443}{(R_A+2R_B)C}$ b) $\frac{1.443}{(R_A+R_B)C}$ c) $\frac{1.5}{(R_A+3R_B)C}$ d) $\frac{1.5}{(2R_A+R_B)C}$

14) Which of the following is not an i/p or o/p of the IC 555 timer ?
   a) control vtg. b) threshold c) clock d) trigger

15) The LM7812 produces a regulated o/p vtg. of
   a) 3V b) 4V c) 12V d) 78V

16) The 79XX series are three terminal IC regulator with _____ o/p vtg.
   a) fixed negative b) variable negative
   c) fixed positive d) variable positive

17) The LM337 is a three terminal IC regulator with a _____ o/p vtg.
   a) positive variable b) negative variable
   c) positive fixed d) variable positive

18) Oscillators are ckt.s that generates an o/p vtg. when an i/p slg. is applied
   a) true b) false
   c) partially true d) partially false

19) The wein bridge oscillator's positive feedback is
   a) an RC ckt. b) an LC ckt. c) vtg. divider d) a lead lag ckt.

20) A phase shift oscillator has
   a) 3 RC ckt.s b) 3 LC ckt.s c) A T type ckt. d) An RC-type ckt.

_____

SLR-VB – 320

Seat No.	

T.E. (Electrical) (Part – I) (Old) Examination, 2017
LINEAR INTEGRATED CIRCUITS

Day and Date : Tuesday, 16-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**

   1) Explain differential amplifier with neat diagram.

   2) Explain ideal characteristics of OP–AMP.

   3) Explain V to I convertor with application.

   4) Draw and explain precision full wave rectifier.

   5) Explain differentiator with freq. response.

3. Solve **any two** : **(10×2=20)**

   1) Explain in detail special cases of comparator.

      i) ZCD ii) Window detector

   2) Explain OP-amp as inverting amplifier and derive the gain in closed loop.

   3) The 741IC OP-amp having the following parameters is connected as a non-inverting amplifier with $R_1 = 1\ K\Omega$ and $R_F = 10\ K\Omega$.

      $A = 2,00,000$, $R_i = 2\ M\Omega$, $R_o = 75\Omega$

      $f_o = 5$ Hz

      Supply voltages = $\pm 15V$

      O/P voltage swing = $\pm 13V$

      Compute the values of, A_F, R_{iF}, R_{oF}, F_F and V_{ooT}.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain 1st order high filter with its freq. response.

   2) Explain the +ve voltage regulator with diagram.

   3) Explain the ckt. dia. IC555 as a monostable multivibrator.

   4) What is phase locked loop ? Explain with block diagram.

   5) Draw and explain square wave generator, also sketch the waveform.

5. Attempt **any two** : **(10×2=20)**

   1) Design a 2nd order low-pass filter at a high freq. of 1KHz and also draw freq . response of the network.

   2) Design the phase shift oscillator so that f_o = 200 Hz.

   3) Draw and explain how op-amp is used to produce sawtooth wave and triangular wave with waveforms.

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SLR-VB – 320

Seat No.	

Set **Q**

T.E. (Electrical) (Part – I) (Old) Examination, 2017
LINEAR INTEGRATED CIRCUITS

Day and Date : Tuesday, 16-5-2017 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.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The 79XX series are three terminal IC regulator with _____ o/p vtg.
   a) fixed negative b) variable negative
   c) fixed positive d) variable positive

2) The LM337 is a three terminal IC regulator with a _____ o/p vtg.
   a) positive variable b) negative variable
   c) positive fixed d) variable positive

3) Oscillators are ckt.s that generates an o/p vtg. when an i/p slg. is applied
   a) true b) false
   c) partially true d) partially false

4) The wein bridge oscillator's positive feedback is
   a) an RC ckt. b) an LC ckt. c) vtg. divider d) a lead lag ckt.

5) A phase shift oscillator has
   a) 3 RC ckt.s b) 3 LC ckt.s c) A T type ckt. d) An RC-type ckt.

6) An ideal OP-AMP has
   a) infinite A_v b) infinite R_i c) zero R_o d) all the above

7) The O/P of the differentiator is proportion to
   a) The RC time constant
   b) The amplitude of
   c) The rate at which the i/p is changing
   d) Both a and c

8) For step i/p, o/p of an integrator is
   a) triangular b) ramp c) square d) sine

P.T.O.

9) In common mode configuration
   a) both i/ps are grounded
   b) o/p are connected together
   c) o/p slgs are in phase
   d) identical signal appears on both the i/ps

10) In an integrator, the feedback element is a
   a) resistor b) capacitor c) zener diode d) vtg. divider

11) IC 741 is _____ pin IC.
   a) 6 b) 12 c) 8 d) 10

12) $\frac{dv_o}{dt}$ is called
   a) Voltage ratio b) Voltage rate
   c) Slew rate d) Transient response

13) In V-I with floated load, load resistance R_L is
   a) grounded b) connected to NI terminal
   c) floating d) connected to inverting terminal

14) In full wave rectifier ckt., regardless of the polarity of i/p slg, o/p is always
   a) negative going b) positive going
   c) same as i/p d) none

15) The purpose of comparator is to
   a) amplify an i/p vtg.
   b) detect the occurrence of a changing i/p vtg.
   c) maintain a constant o/p when the ac i/p vtg. changes
   d) produce a change in o/p vtg. when an i/p vtg. equals the reference vtg.

16) All pass filter passes
   a) all freq. components b) only particular band of freq.
   c) two band of freq. d) none

17) Square wave generator is also called as
   a) free running multivibrator b) monostable multivibrator
   c) astable multivibrator d) both a and c

18) The freq. oscillation of IC555 astable ckt. is given as
   a) $\frac{1.443}{(R_A+2R_B)C}$ b) $\frac{1.443}{(R_A+R_B)C}$ c) $\frac{1.5}{(R_A+3R_B)C}$ d) $\frac{1.5}{(2R_A+R_B)C}$

19) Which of the following is not an i/p or o/p of the IC 555 timer ?
   a) control vtg. b) threshold c) clock d) trigger

20) The LM7812 produces a regulated o/p vtg. of
   a) 3V b) 4V c) 12V d) 78V

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SLR-VB – 320

Seat No.	

T.E. (Electrical) (Part – I) (Old) Examination, 2017
LINEAR INTEGRATED CIRCUITS

Day and Date : Tuesday, 16-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**

   1) Explain differential amplifier with neat diagram.

   2) Explain ideal characteristics of OP–AMP.

   3) Explain V to I convertor with application.

   4) Draw and explain precision full wave rectifier.

   5) Explain differentiator with freq. response.

3. Solve **any two** : **(10×2=20)**

   1) Explain in detail special cases of comparator.

      i) ZCD ii) Window detector

   2) Explain OP-amp as inverting amplifier and derive the gain in closed loop.

   3) The 741IC OP-amp having the following parameters is connected as a non-inverting amplifier with $R_1 = 1\ K\Omega$ and $R_F = 10\ K\Omega$.

      $A = 2,00,000$, $R_i = 2\ M\Omega$, $R_o = 75\Omega$

      $f_o = 5$ Hz

      Supply voltages = $\pm 15V$

      O/P voltage swing = $\pm 13V$

      Compute the values of, A_F, R_{iF}, R_{oF}, F_F and V_{ooT}.

Set Q

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain 1st order high filter with its freq. response.

   2) Explain the +ve voltage regulator with diagram.

   3) Explain the ckt. dia. IC555 as a monostable multivibrator.

   4) What is phase locked loop ? Explain with block diagram.

   5) Draw and explain square wave generator, also sketch the waveform.

5. Attempt **any two** : **(10×2=20)**

   1) Design a 2nd order low-pass filter at a high freq. of 1KHz and also draw freq . response of the network.

   2) Design the phase shift oscillator so that f_o = 200 Hz.

   3) Draw and explain how op-amp is used to produce sawtooth wave and triangular wave with waveforms.

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SLR-VB – 320

Seat No.	

Set **R**

T.E. (Electrical) (Part – I) (Old) Examination, 2017
LINEAR INTEGRATED CIRCUITS

Day and Date : Tuesday, 16-5-2017 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.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) All pass filter passes
a) all freq. components b) only particular band of freq.
c) two band of freq. d) none

2) Square wave generator is also called as
a) free running multivibrator b) monostable multivibrator
c) astable multivibrator d) both a and c

3) The freq. oscillation of IC555 astable ckt. is given as
a) $\frac{1.443}{(R_A+2R_B)C}$ b) $\frac{1.443}{(R_A+R_B)C}$ c) $\frac{1.5}{(R_A+3R_B)C}$ d) $\frac{1.5}{(2R_A+R_B)C}$

4) Which of the following is not an i/p or o/p of the IC 555 timer ?
a) control vtg. b) threshold c) clock d) trigger

5) The LM7812 produces a regulated o/p vtg. of
a) 3V b) 4V c) 12V d) 78V

6) The 79XX series are three terminal IC regulator with _____ o/p vtg.
a) fixed negative b) variable negative
c) fixed positive d) variable positive

7) The LM337 is a three terminal IC regulator with a _____ o/p vtg.
a) positive variable b) negative variable
c) positive fixed d) variable positive

8) Oscillators are ckt.s that generates an o/p vtg. when an i/p slg. is applied
a) true b) false
c) partially true d) partially false

9) The wein bridge oscillator's positive feedback is
   a) an RC ckt. b) an LC ckt. c) vtg. divider d) a lead lag ckt.
10) A phase shift oscillator has
   a) 3 RC ckt.s b) 3 LC ckt.s c) A T type ckt. d) An RC-type ckt.
11) An ideal OP-AMP has
   a) infinite A_v b) infinite R_i c) zero R_o d) all the above
12) The O/P of the differentiator is proportion to
   a) The RC time constant
   b) The amplitude of
   c) The rate at which the i/p is changing
   d) Both a and c
13) For step i/p, o/p of an integrator is
   a) triangular b) ramp c) square d) sine
14) In common mode configuration
   a) both i/ps are grounded
   b) o/p are connected together
   c) o/p slgs are in phase
   d) identical signal appears on both the i/ps
15) In an integrator, the feedback element is a
   a) resistor b) capacitor c) zener diode d) vtg. divider
16) IC 741 is _____ pin IC.
   a) 6 b) 12 c) 8 d) 10
17) $\frac{dv_o}{dt}$ is called
   a) Voltage ratio b) Voltage rate
   c) Slew rate d) Transient response
18) In V-I with floated load, load resistance R_L is
   a) grounded b) connected to NI terminal
   c) floating d) connected to inverting terminal
19) In full wave rectifier ckt., regardless of the polarity of i/p slg, o/p is always
   a) negative going b) positive going
   c) same as i/p d) none
20) The purpose of comparator is to
   a) amplify an i/p vtg.
   b) detect the occurrence of a changing i/p vtg.
   c) maintain a constant o/p when the ac i/p vtg. changes
   d) produce a change in o/p vtg. when an i/p vtg. equals the reference vtg.

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SLR-VB – 320

Seat No.	

T.E. (Electrical) (Part – I) (Old) Examination, 2017
LINEAR INTEGRATED CIRCUITS

Day and Date : Tuesday, 16-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**

   1) Explain differential amplifier with neat diagram.

   2) Explain ideal characteristics of OP–AMP.

   3) Explain V to I convertor with application.

   4) Draw and explain precision full wave rectifier.

   5) Explain differentiator with freq. response.

3. Solve **any two** : **(10×2=20)**

   1) Explain in detail special cases of comparator.

      i) ZCD ii) Window detector

   2) Explain OP-amp as inverting amplifier and derive the gain in closed loop.

   3) The 741IC OP-amp having the following parameters is connected as a non-inverting amplifier with $R_1 = 1\ K\Omega$ and $R_F = 10\ K\Omega$.

      $A = 2,00,000$, $R_i = 2\ M\Omega$, $R_o = 75\Omega$

      $f_o = 5$ Hz

      Supply voltages = $\pm 15V$

      O/P voltage swing = $\pm 13V$

      Compute the values of, A_F, R_{iF}, R_{oF}, F_F and V_{ooT}.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain 1st order high filter with its freq. response.

   2) Explain the +ve voltage regulator with diagram.

   3) Explain the ckt. dia. IC555 as a monostable multivibrator.

   4) What is phase locked loop ? Explain with block diagram.

   5) Draw and explain square wave generator, also sketch the waveform.

5. Attempt **any two** : **(10×2=20)**

   1) Design a 2nd order low-pass filter at a high freq. of 1KHz and also draw freq . response of the network.

   2) Design the phase shift oscillator so that f_o = 200 Hz.

   3) Draw and explain how op-amp is used to produce sawtooth wave and triangular wave with waveforms.

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SLR-VB – 320

Seat No.	

Set **S**

T.E. (Electrical) (Part – I) (Old) Examination, 2017
LINEAR INTEGRATED CIRCUITS

Day and Date : Tuesday, 16-5-2017 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.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) IC 741 is _____ pin IC.
a) 6 b) 12 c) 8 d) 10

2) $\frac{dv_o}{dt}$ is called
a) Voltage ratio b) Voltage rate
c) Slew rate d) Transient response

3) In V-I with floated load, load resistance R_L is
a) grounded b) connected to NI terminal
c) floating d) connected to inverting terminal

4) In full wave rectifier ckt., regardless of the polarity of i/p slg, o/p is always
a) negative going b) positive going
c) same as i/p d) none

5) The purpose of comparator is to
a) amplify an i/p vtg.
b) detect the occurrence of a changing i/p vtg.
c) maintain a constant o/p when the ac i/p vtg. changes
d) produce a change in o/p vtg. when an i/p vtg. equals the reference vtg.

6) All pass filter passes
a) all freq. components b) only particular band of freq.
c) two band of freq. d) none

7) Square wave generator is also called as
a) free running multivibrator b) monostable multivibrator
c) astable multivibrator d) both a and c

P.T.O.

8) The freq. oscillation of IC555 astable ckt. is given as
   a) $\frac{1.443}{(R_A+2R_B)C}$ b) $\frac{1.443}{(R_A+R_B)C}$ c) $\frac{1.5}{(R_A+3R_B)C}$ d) $\frac{1.5}{(2R_A+R_B)C}$
9) Which of the following is not an i/p or o/p of the IC 555 timer ?
   a) control vtg. b) threshold c) clock d) trigger
10) The LM7812 produces a regulated o/p vtg. of
   a) 3V b) 4V c) 12V d) 78V
11) The 79XX series are three terminal IC regulator with _____ o/p vtg.
   a) fixed negative b) variable negative
   c) fixed positive d) variable positive
12) The LM337 is a three terminal IC regulator with a _____ o/p vtg.
   a) positive variable b) negative variable
   c) positive fixed d) variable positive
13) Oscillators are ckt.s that generates an o/p vtg. when an i/p slg. is applied
   a) true b) false
   c) partially true d) partially false
14) The wein bridge oscillator's positive feedback is
   a) an RC ckt. b) an LC ckt. c) vtg. divider d) a lead lag ckt.
15) A phase shift oscillator has
   a) 3 RC ckt.s b) 3 LC ckt.s c) A T type ckt. d) An RC-type ckt.
16) An ideal OP-AMP has
   a) infinite A_v b) infinite R_i c) zero R_o d) all the above
17) The O/P of the differentiator is proportion to
   a) The RC time constant
   b) The amplitude of
   c) The rate at which the i/p is changing
   d) Both a and c
18) For step i/p, o/p of an integrator is
   a) triangular b) ramp c) square d) sine
19) In common mode configuration
   a) both i/ps are grounded
   b) o/p are connected together
   c) o/p slgs are in phase
   d) identical signal appears on both the i/ps
20) In an integrator, the feedback element is a
   a) resistor b) capacitor c) zener diode d) vtg. divider

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SLR-VB – 320

Seat No.	

T.E. (Electrical) (Part – I) (Old) Examination, 2017
LINEAR INTEGRATED CIRCUITS

Day and Date : Tuesday, 16-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**

   1) Explain differential amplifier with neat diagram.

   2) Explain ideal characteristics of OP–AMP.

   3) Explain V to I convertor with application.

   4) Draw and explain precision full wave rectifier.

   5) Explain differentiator with freq. response.

3. Solve **any two** : **(10×2=20)**

   1) Explain in detail special cases of comparator.

      i) ZCD ii) Window detector

   2) Explain OP-amp as inverting amplifier and derive the gain in closed loop.

   3) The 741IC OP-amp having the following parameters is connected as a non-inverting amplifier with $R_1 = 1\ K\Omega$ and $R_F = 10\ K\Omega$.

      $A = 2,00,000$, $R_i = 2\ M\Omega$, $R_o = 75\Omega$

      $f_o = 5$ Hz

      Supply voltages = $\pm 15V$

      O/P voltage swing = $\pm 13V$

      Compute the values of, A_F, R_{iF}, R_{oF}, F_F and V_{ooT}.

Set S

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain 1st order high filter with its freq. response.

   2) Explain the +ve voltage regulator with diagram.

   3) Explain the ckt. dia. IC555 as a monostable multivibrator.

   4) What is phase locked loop ? Explain with block diagram.

   5) Draw and explain square wave generator, also sketch the waveform.

5. Attempt **any two** : **(10×2=20)**

   1) Design a 2nd order low-pass filter at a high freq. of 1KHz and also draw freq . response of the network.

   2) Design the phase shift oscillator so that f_o = 200 Hz.

   3) Draw and explain how op-amp is used to produce sawtooth wave and triangular wave with waveforms.

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SLR-VB – 321

Seat No.	

Set **P**

T.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL MACHINE DESIGN (New CGPA)

Day and Date : Monday, 15-5-2017 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 : **(14×1=14)**

1) CRGO has _____ permeability in the direction of grain orientation.
A) Nil B) Maximum C) Minimum D) None of these

2) While punching silicon steel for use in transformer core, burrs produced in laminations are likely to cause
A) Increase in core loss B) Decrease in core loss
C) Decrease in copper loss D) Increase in copper loss

3) Multi stepped core is used in a transformer to
A) Increase output B) Decrease cost of core material
C) Decrease cost of copper D) Increase efficiency

4) The major consideration to evolve a good design is/are
A) Durability
B) Cost
C) Compliance with performance laid down in specification
D) All of the above

5) Power factor impose limitation on _____ motors.
A) Dc B) Synchronous C) Induction D) None of these

6) The action of electromagnetic machines is based on the principle of
A) Induction B) Interaction
C) Alignment D) All of the above

7) In a dc machines "contraction coefficient" is used to take into account the reduction of
A) Air-gap area due to armature slots
B) Iron losses in the teeth due to lower tooth density
C) Armature mmf due to armature slots
D) Torque due to ventilating duct

P.T.O.

8) Specific electric loading is not governed by
   A) Heating or temperature rise B) Speed of machine
   C) Magnetizing current D) Machine size

9) In dc machine increase in field mmf causes
   A) Increase in size and cost of the machines
   B) Decrease in size and cost of the machines
   C) Excessive sparking
   D) None of these

10) If the stator winding of a 3 phase induction motor is delta connected, the rotor winding
   A) Should be delta connected B) Should be star connected
   C) Should not be delta connected D) May be star or delta connected

11) _____ depend on leakage reactance in an induction motor.
   A) Starting current B) Starting torque
   C) Maximum torque D) All of the above

12) A machine with large value of specific magnetic loading has
   A) Poor power factor
   B) Poor efficiency
   C) Poor maximum power output and poor overload capacity
   D) Both A) and B)

13) Synchronous compensator are used for controlling the reactive power (KVAR) of power supply network with rating upto about
   A) 100 MVAR B) 50 MVAR C) 25 MVAR D) 10 MVAR

14) Multiple inlet system of air cooling of turbo-alternator can be employed for machine of rating upto
   A) 250 MW B) 20 MW C) 100 MW D) 60 MW

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SLR-VB – 321

Seat No.	

T.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL MACHINE DESIGN (New CGPA)

Day and Date : Monday, 15-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Explain the principles of design of rotating machines.
   2) For a transformer, show that $E_t = K\sqrt{S}$ where, E_t = emf per turn, S = KVA rating of transformer, what are the factors on which value of K depends.
   3) A 350 Kw, 500 V, 540 r.p.m., 6 pole D.C. generator is built with an armature diameter of 0.87 m and a core length of 0.32 m. The lap wound armature has 660 conductors. Calculate the specific magnetic and electric loadings.
   4) Calculate approximate overall dimension for 200 KVA, 6600/440 V, 50 Hz, 3 phase core type transformer. The following data may be assumed : emf per turn = 10 V, maximum flux density = 1.3 Wb/m^2, current density = 2.5 A/mm^2, window space factor = 0.3, overall height = overall width, stacking factor = 0.9, use 3 stepped cores.
   5) A 5 Kw, 250 V, 4 pole, 1500 r.p.m. shunt generator is designed to have a square pole face. The loadings are : average flux density in the gap = 0.42 Wb/m^2 and ampere conductor per meter = 15000. Find the dimension of the machine. Assume full load efficiency = 0.87 and ratio of pole arc to pole pitch = 0.66.
   6) For square core transformer show that $Ai = 0.45\ d^2$.

3. Solve **any two** : **(6×2=12)**
   1) A 250 KVA 6600/400 V, 3 phase core type transformer has a total loss of 4800 W at full load. The transformer tank is 1.25 m in height and 1 m × 0.5 m in plain. Design a suitable scheme for tubes if the average temp rise is to be limited to 35° C. The diameter of tube is 50 mm and is spaced 75 mm from each other. The average height of tube is 1.05 m. Specific heat dissipation due to radiation and convection is respectively 6 and 6.5 W/m^2-°C. Assume that convection is improved by 35 per cent due to provision of tubes.
   2) Find the main dimensions, number of poles and length of air gap of a 1000 Kw, 500 V, 300 r.p.m. D.C. generator. Assume the specific magnetic loading B_{av} = 0.7 Wb/m^2, ampere conductor per meter = 40000, square pole face, ratio of pole arc to pole pitch is 0.7. Assume efficiency as 92% and gap contraction factor as 1.15.

3) A 250 Kw, 500 V, 600 r.p.m. dc generator is built with an armature diameter of 0.75 m and core length of 0.3 m. The Lap connected armature has 720 conductors. Using the data obtained by this machine, determine the armature diameter, core length, number of armature slots, armature conductors for 350 Kw, 440 V, 720 r.p.m., 6 pole d.c. generator. Assume a square pole face with ratio of pole arc to pole pitch equal to 0.66. The full load efficiency is 0.91 and internal voltage drop is 4% of rated voltage. The voltage between adjacent segments should not exceed 15 V at no load.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) A 11 Kw, 3ϕ, 6 pole, 50 Hz, 220 V, star connected induction motor has 54 stator slots, each containing 9 conductor. Calculate the value of bar and end ring current. The number of rotor bars is 64. The machines has an efficiency of 0.86 and power factor of 0.85. The rotor mmf may assume as 85% of stator mmf. Also find bar and the end ring section if the current density is $5A/mm^2$.
   2) Calculate the length of air gap of a 15 Kw, 400 V, 50 Hz, delta connected 1440 r.p.m. induction motor having both full load efficiency and power factor as 0.88 each. Assume B_{av} = 0.45 Tesla, ac = 23000 amp. Cond. per meter, ratio of pole arc to pole pitch = 0.85.
   3) Design suitable value of diameter and length of a 75 MVA, 11 KV, 50 Hz, 3000 r.p.m., 3Φ, star connected alternator. Also determine the value of flux, conductor per slot, number of turns per phase and size of armature conductor.
   4) Derive the output equation of single phase induction motor.
   5) Discuss the choice of specific electric loading and specific magnetic loading of synchronous generator.

5. Solve **any two** : **(2×6=12)**
   1) Find the main dimensions, no of stator turns, size of conductors and number of stator slots for a 5 H.P., 400 V, 3 phase, 50 Hz, 1500 syn. r.p.m. sq. cage induction motor. Star Delta starting is used. Use the following data : average flux density in air gap = $0.46 Wb/m^2$, amp. Cond. per meter of arm. periphery = 22000, full load efficiency = 83%, full load power factor = 0.84 lagg. Appropriate values for additional data required may be assumed.
   2) Determine the main dimension of 3000 KVA, 6.6 KV, 50 Hz, 187.5 r.p.m., 3ϕ star connected alternator. Also find number of stator slots, conductor per slots and winding details. Assume average gap density = $0.58 Wb/m^2$, ampere conductor per meter = 35000. Assume $L/\tau = 1.5$.
   3) In the design of 30 H.P., 3Φ, 440 V, 960 r.p.m., 50 Hz, delta connected induction motor. Assume the specific electric loading of 25000 A/m, specific magnetic loading of $0.46 Wb/m^2$. Full load efficiency 86%, pf = 0.87 and estimate the following :
      i) Stator core dimensions
      ii) Number of stator slots and winding turns.

Set P

SLR-VB – 321

Seat No.	

Set **Q**

T.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL MACHINE DESIGN (New CGPA)

Day and Date : Monday, 15-5-2017 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 : **(14×1=14)**

1) Specific electric loading is not governed by
   A) Heating or temperature rise B) Speed of machine
   C) Magnetizing current D) Machine size

2) In dc machine increase in field mmf causes
   A) Increase in size and cost of the machines
   B) Decrease in size and cost of the machines
   C) Excessive sparking
   D) None of these

3) If the stator winding of a 3 phase induction motor is delta connected, the rotor winding
   A) Should be delta connected B) Should be star connected
   C) Should not be delta connected D) May be star or delta connected

4) _____ depend on leakage reactance in an induction motor.
   A) Starting current B) Starting torque
   C) Maximum torque D) All of the above

5) A machine with large value of specific magnetic loading has
   A) Poor power factor
   B) Poor efficiency
   C) Poor maximum power output and poor overload capacity
   D) Both A) and B)

6) Synchronous compensator are used for controlling the reactive power (KVAR) of power supply network with rating upto about
   A) 100 MVAR B) 50 MVAR C) 25 MVAR D) 10 MVAR

7) Multiple inlet system of air cooling of turbo-alternator can be employed for machine of rating upto
   A) 250 MW B) 20 MW C) 100 MW D) 60 MW

8) CRGO has _____ permeability in the direction of grain orientation.
   A) Nil B) Maximum C) Minimum D) None of these

9) While punching silicon steel for use in transformer core, burrs produced in laminations are likely to cause
   A) Increase in core loss B) Decrease in core loss
   C) Decrease in copper loss D) Increase in copper loss

10) Multi stepped core is used in a transformer to
   A) Increase output B) Decrease cost of core material
   C) Decrease cost of copper D) Increase efficiency

11) The major consideration to evolve a good design is/are
   A) Durability
   B) Cost
   C) Compliance with performance laid down in specification
   D) All of the above

12) Power factor impose limitation on _____ motors.
   A) Dc B) Synchronous C) Induction D) None of these

13) The action of electromagnetic machines is based on the principle of
   A) Induction B) Interaction
   C) Alignment D) All of the above

14) In a dc machines “contraction coefficient” is used to take into account the reduction of
   A) Air-gap area due to armature slots
   B) Iron losses in the teeth due to lower tooth density
   C) Armature mmf due to armature slots
   D) Torque due to ventilating duct

_____

SLR-VB – 321

Seat No.	

T.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL MACHINE DESIGN (New CGPA)

Day and Date : Monday, 15-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Explain the principles of design of rotating machines.
   2) For a transformer, show that $E_t = K\sqrt{S}$ where, E_t = emf per turn, S = KVA rating of transformer, what are the factors on which value of K depends.
   3) A 350 Kw, 500 V, 540 r.p.m., 6 pole D.C. generator is built with an armature diameter of 0.87 m and a core length of 0.32 m. The lap wound armature has 660 conductors. Calculate the specific magnetic and electric loadings.
   4) Calculate approximate overall dimension for 200 KVA, 6600/440 V, 50 Hz, 3 phase core type transformer. The following data may be assumed : emf per turn = 10 V, maximum flux density = 1.3 Wb/m^2, current density = 2.5 A/mm^2, window space factor = 0.3, overall height = overall width, stacking factor = 0.9, use 3 stepped cores.
   5) A 5 Kw, 250 V, 4 pole, 1500 r.p.m. shunt generator is designed to have a square pole face. The loadings are : average flux density in the gap = 0.42 Wb/m^2 and ampere conductor per meter = 15000. Find the dimension of the machine. Assume full load efficiency = 0.87 and ratio of pole arc to pole pitch = 0.66.
   6) For square core transformer show that $Ai = 0.45\ d^2$.

3. Solve **any two** : **(6×2=12)**
   1) A 250 KVA 6600/400 V, 3 phase core type transformer has a total loss of 4800 W at full load. The transformer tank is 1.25 m in height and 1 m × 0.5 m in plain. Design a suitable scheme for tubes if the average temp rise is to be limited to 35° C. The diameter of tube is 50 mm and is spaced 75 mm from each other. The average height of tube is 1.05 m. Specific heat dissipation due to radiation and convection is respectively 6 and 6.5 W/m^2-°C. Assume that convection is improved by 35 per cent due to provision of tubes.
   2) Find the main dimensions, number of poles and length of air gap of a 1000 Kw, 500 V, 300 r.p.m. D.C. generator. Assume the specific magnetic loading B_{av} = 0.7 Wb/m^2, ampere conductor per meter = 40000, square pole face, ratio of pole arc to pole pitch is 0.7. Assume efficiency as 92% and gap contraction factor as 1.15.

3) A 250 Kw, 500 V, 600 r.p.m. dc generator is built with an armature diameter of 0.75 m and core length of 0.3 m. The Lap connected armature has 720 conductors. Using the data obtained by this machine, determine the armature diameter, core length, number of armature slots, armature conductors for 350 Kw, 440 V, 720 r.p.m., 6 pole d.c. generator. Assume a square pole face with ratio of pole arc to pole pitch equal to 0.66. The full load efficiency is 0.91 and internal voltage drop is 4% of rated voltage. The voltage between adjacent segments should not exceed 15 V at no load.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) A 11 Kw, 3ϕ, 6 pole, 50 Hz, 220 V, star connected induction motor has 54 stator slots, each containing 9 conductor. Calculate the value of bar and end ring current. The number of rotor bars is 64. The machines has an efficiency of 0.86 and power factor of 0.85. The rotor mmf may assume as 85% of stator mmf. Also find bar and the end ring section if the current density is $5A/mm^2$.
   2) Calculate the length of air gap of a 15 Kw, 400 V, 50 Hz, delta connected 1440 r.p.m. induction motor having both full load efficiency and power factor as 0.88 each. Assume B_{av} = 0.45 Tesla, ac = 23000 amp. Cond. per meter, ratio of pole arc to pole pitch = 0.85.
   3) Design suitable value of diameter and length of a 75 MVA, 11 KV, 50 Hz, 3000 r.p.m., 3Φ, star connected alternator. Also determine the value of flux, conductor per slot, number of turns per phase and size of armature conductor.
   4) Derive the output equation of single phase induction motor.
   5) Discuss the choice of specific electric loading and specific magnetic loading of synchronous generator.

5. Solve **any two** : **(2×6=12)**
   1) Find the main dimensions, no of stator turns, size of conductors and number of stator slots for a 5 H.P., 400 V, 3 phase, 50 Hz, 1500 syn. r.p.m. sq. cage induction motor. Star Delta starting is used. Use the following data : average flux density in air gap = $0.46 Wb/m^2$, amp. Cond. per meter of arm. periphery = 22000, full load efficiency = 83%, full load power factor = 0.84 lagg. Appropriate values for additional data required may be assumed.
   2) Determine the main dimension of 3000 KVA, 6.6 KV, 50 Hz, 187.5 r.p.m., 3ϕ star connected alternator. Also find number of stator slots, conductor per slots and winding details. Assume average gap density = $0.58 Wb/m^2$, ampere conductor per meter = 35000. Assume $L/\tau = 1.5$.
   3) In the design of 30 H.P., 3Φ, 440 V, 960 r.p.m., 50 Hz, delta connected induction motor. Assume the specific electric loading of 25000 A/m, specific magnetic loading of $0.46 Wb/m^2$. Full load efficiency 86%, pf = 0.87 and estimate the following :
      i) Stator core dimensions
      ii) Number of stator slots and winding turns.

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Set Q

SLR-VB – 321

Seat No.	

Set **R**

T.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL MACHINE DESIGN (New CGPA)

Day and Date : Monday, 15-5-2017 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 : **(14×1=14)**

1) Power factor impose limitation on _____ motors.
A) Dc B) Synchronous C) Induction D) None of these

2) The action of electromagnetic machines is based on the principle of
A) Induction B) Interaction
C) Alignment D) All of the above

3) In a dc machines "contraction coefficient" is used to take into account the reduction of
A) Air-gap area due to armature slots
B) Iron losses in the teeth due to lower tooth density
C) Armature mmf due to armature slots
D) Torque due to ventilating duct

4) Specific electric loading is not governed by
A) Heating or temperature rise B) Speed of machine
C) Magnetizing current D) Machine size

5) In dc machine increase in field mmf causes
A) Increase in size and cost of the machines
B) Decrease in size and cost of the machines
C) Excessive sparking
D) None of these

6) If the stator winding of a 3 phase induction motor is delta connected, the rotor winding
A) Should be delta connected B) Should be star connected
C) Should not be delta connected D) May be star or delta connected

7) _____ depend on leakage reactance in an induction motor.
A) Starting current B) Starting torque
C) Maximum torque D) All of the above

P.T.O.

8) A machine with large value of specific magnetic loading has
   A) Poor power factor
   B) Poor efficiency
   C) Poor maximum power output and poor overload capacity
   D) Both A) and B)

9) Synchronous compensator are used for controlling the reactive power (KVAR) of power supply network with rating upto about
   A) 100 MVAR B) 50 MVAR C) 25 MVAR D) 10 MVAR

10) Multiple inlet system of air cooling of turbo-alternator can be employed for machine of rating upto
   A) 250 MW B) 20 MW C) 100 MW D) 60 MW

11) CRGO has _____ permeability in the direction of grain orientation.
   A) Nil B) Maximum C) Minimum D) None of these

12) While punching silicon steel for use in transformer core, burrs produced in laminations are likely to cause
   A) Increase in core loss B) Decrease in core loss
   C) Decrease in copper loss D) Increase in copper loss

13) Multi stepped core is used in a transformer to
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_____

SLR-VB – 321

Seat No.	

T.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL MACHINE DESIGN (New CGPA)

Day and Date : Monday, 15-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Explain the principles of design of rotating machines.
   2) For a transformer, show that $E_t = K\sqrt{S}$ where, E_t = emf per turn, S = KVA rating of transformer, what are the factors on which value of K depends.
   3) A 350 Kw, 500 V, 540 r.p.m., 6 pole D.C. generator is built with an armature diameter of 0.87 m and a core length of 0.32 m. The lap wound armature has 660 conductors. Calculate the specific magnetic and electric loadings.
   4) Calculate approximate overall dimension for 200 KVA, 6600/440 V, 50 Hz, 3 phase core type transformer. The following data may be assumed : emf per turn = 10 V, maximum flux density = 1.3 Wb/m^2, current density = 2.5 A/mm^2, window space factor = 0.3, overall height = overall width, stacking factor = 0.9, use 3 stepped cores.
   5) A 5 Kw, 250 V, 4 pole, 1500 r.p.m. shunt generator is designed to have a square pole face. The loadings are : average flux density in the gap = 0.42 Wb/m^2 and ampere conductor per meter = 15000. Find the dimension of the machine. Assume full load efficiency = 0.87 and ratio of pole arc to pole pitch = 0.66.
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3. Solve **any two** : **(6×2=12)**
   1) A 250 KVA 6600/400 V, 3 phase core type transformer has a total loss of 4800 W at full load. The transformer tank is 1.25 m in height and 1 m × 0.5 m in plain. Design a suitable scheme for tubes if the average temp rise is to be limited to 35° C. The diameter of tube is 50 mm and is spaced 75 mm from each other. The average height of tube is 1.05 m. Specific heat dissipation due to radiation and convection is respectively 6 and 6.5 W/m^2-°C. Assume that convection is improved by 35 per cent due to provision of tubes.
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SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) A 11 Kw, 3ϕ, 6 pole, 50 Hz, 220 V, star connected induction motor has 54 stator slots, each containing 9 conductor. Calculate the value of bar and end ring current. The number of rotor bars is 64. The machines has an efficiency of 0.86 and power factor of 0.85. The rotor mmf may assume as 85% of stator mmf. Also find bar and the end ring section if the current density is $5A/mm^2$.
   2) Calculate the length of air gap of a 15 Kw, 400 V, 50 Hz, delta connected 1440 r.p.m. induction motor having both full load efficiency and power factor as 0.88 each. Assume B_{av} = 0.45 Tesla, ac = 23000 amp. Cond. per meter, ratio of pole arc to pole pitch = 0.85.
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   3) In the design of 30 H.P., 3Φ, 440 V, 960 r.p.m., 50 Hz, delta connected induction motor. Assume the specific electric loading of 25000 A/m, specific magnetic loading of $0.46 Wb/m^2$. Full load efficiency 86%, pf = 0.87 and estimate the following :
      i) Stator core dimensions
      ii) Number of stator slots and winding turns.

Set R

SLR-VB – 321

Seat No.	

Set **S**

T.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL MACHINE DESIGN (New CGPA)

Day and Date : Monday, 15-5-2017 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 : **(14×1=14)**

1) If the stator winding of a 3 phase induction motor is delta connected, the rotor winding
A) Should be delta connected B) Should be star connected
C) Should not be delta connected D) May be star or delta connected

2) _____ depend on leakage reactance in an induction motor.
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P.T.O.

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SLR-VB – 321

Seat No.	

T.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL MACHINE DESIGN (New CGPA)

Day and Date : Monday, 15-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Explain the principles of design of rotating machines.
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SECTION – II

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   1) A 11 Kw, 3ϕ, 6 pole, 50 Hz, 220 V, star connected induction motor has 54 stator slots, each containing 9 conductor. Calculate the value of bar and end ring current. The number of rotor bars is 64. The machines has an efficiency of 0.86 and power factor of 0.85. The rotor mmf may assume as 85% of stator mmf. Also find bar and the end ring section if the current density is $5A/mm^2$.
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   1) Find the main dimensions, no of stator turns, size of conductors and number of stator slots for a 5 H.P., 400 V, 3 phase, 50 Hz, 1500 syn. r.p.m. sq. cage induction motor. Star Delta starting is used. Use the following data : average flux density in air gap = $0.46 Wb/m^2$, amp. Cond. per meter of arm. periphery = 22000, full load efficiency = 83%, full load power factor = 0.84 lagg. Appropriate values for additional data required may be assumed.
   2) Determine the main dimension of 3000 KVA, 6.6 KV, 50 Hz, 187.5 r.p.m., 3ϕ star connected alternator. Also find number of stator slots, conductor per slots and winding details. Assume average gap density = $0.58 Wb/m^2$, ampere conductor per meter = 35000. Assume $L/\tau = 1.5$.
   3) In the design of 30 H.P., 3Φ, 440 V, 960 r.p.m., 50 Hz, delta connected induction motor. Assume the specific electric loading of 25000 A/m, specific magnetic loading of $0.46 Wb/m^2$. Full load efficiency 86%, pf = 0.87 and estimate the following :
      i) Stator core dimensions
      ii) Number of stator slots and winding turns.

Set S

SLR-VB – 322

Seat No.	

Set P

T.E. Electrical Engineering (Part – II) (New CGPA) Examination, 2017
CONTROL SYSTEMS – II

Day and Date : Wednesday, 17-5-2017 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) Root locus diagram can be used to determine
   a) Absolute stability b) Relative stability
   c) Conditional stability d) None of these

2) The phase lag produced by transportation relays
   a) is independent of frequency b) is inverse proportional to frequency
   c) increases linearly with frequency d) decreases linearly with frequency

3) The steady state error can be minimized
   a) by increasing damped frequency b) by decreasing damped frequency
   c) by decreasing natural frequency d) by increasing system gain constant

4) The frequency range of control response is specified by
   a) Resonance b) Bandwidth
   c) Modulation index d) Peak value

5) A lead compensator in frequency response form is given by the following

   a) $C(s) = \frac{1+aTs}{1+Ts}\ [a>1]$ b) $C(s) = \frac{1+Ts}{1+aTs}\ [a>1]$

   c) $C(s) = \frac{1-aTs}{1+Ts}\ [a>1]$ d) $C(s) = \frac{1-Ts}{1-aTs}\ [a>1]$

6) For the system $\dot{X} = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$ and $Y = [1\ 1]\ x$ then the
   a) System is controllable but unstable b) System is uncontrollable but unstable
   c) System is controllable but stable d) System is uncontrollable but stable

P.T.O.

7) With the knowledge of state space representation the transfer function of the system
   a) Can be determined partly
   b) Can be determined completely
   c) Cannot be determined
   d) None of these

8) The state model of a linear time invariant system is given by $X(t) = AX(t) + BU(t)$ and $Y(t) = CX(t) + DU(t)$. The expression for transfer function of the system is
   a) $C(sI - A)^{-1} BU(s) + D$
   b) $(sI - A)^{-1} BU(s) + D$
   c) $(sI - A)^{-1} BU(s)$
   d) $C(sI - A)^{-1} B$

9) Which of the following properties are associated with the state transition matrix $\phi(t)$?
   1. $\phi(-t) = \phi^{-1}(t)$
   2. $\phi(t_1/t_2) = \phi(t_1).\phi^{-1}(t_2)$
   3. $\phi(t_1 - t_2) = \phi(-t_2) . \phi(t_1)$

   Select the correct answer using codes given below :

   Codes :

   a) 1, 2 and 3 b) 1 and 2 c) 2 and 3 d) 1 and 3

10) The describing function N of a nonlinear control system is a function of
   a) Amplitude of the input
   b) Frequency of the input
   c) Initial conditions of the output
   d) Both a and b

11) Phase plane method of analyzing the nonlinear control system is a
   a) Time domain method
   b) Frequency domain method
   c) Optimal control method
   d) Digital control method

12) The transfer function of zero order hold is

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

13) If u(t) is the unit step and $\delta(t)$ is the unit impulse function, the inverse z-transform of the $F(z) = \frac{1}{z+1}$ for $k > 0$ is

   a) $(-1)^k \delta(k)$ b) $\delta(k) - (-1)^k$ c) $(-1)^k u(k)$ d) $u(k) - (-1)^k$

14) Small co-efficient of friction
   a) Gives less steady state error
   b) Gives more steady state error
   c) Has no effect on steady state error
   d) None of the above

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SLR-VB – 322

Seat No.	

T.E. Electrical Engineering (Part – II) (New CGPA) Examination, 2017
CONTROL SYSTEMS – II

Day and Date : Wednesday, 17-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) Explain the design procedure for designing the lead compensator by frequency response method.

b) Design suitable compensator for a system whose open loop transfer function is $G(s) = \frac{16}{s(s+4)}$. So that the static error constant Kv is 20 sec –1 without change in original location of poles.

c) For the system shown in Fig. 1 write down the state equations.

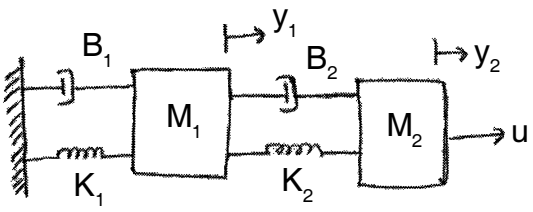

Fig. 1

d) The state equations of a LTI system are as given below $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ u(t); t > 0. Is the system controllable ?

e) Derive the realization of lag compensator using electrical network.

3. a) Design lag-lead compensator for the system whose open loop transfer function is $G(s) = \frac{5}{s(0.5s+1)}$. So that the damping ratio of the dominant closed loop pole is equal to 0.5 and to increase the undamped natural frequency to 5 rad/sec and static velocity error constant to 50 sec^{-1}. **6**

b) Design a phase lag compensator so the system $G(s)H(s) = \frac{100}{s(s+1)}$ will have phase margin of 15°. **6**

OR

b) A linear time invariant system is characterized by the state equation.

$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}1\\ 0\end{bmatrix}$ u where u is a unit step function. Compute the solution of these equations assuming initial condition $X_0=\begin{bmatrix}1\\ 0\end{bmatrix}$. Use inverse Laplace transform technique.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) Obtain the observer error equation by full order state observer.

b) Obtain the inverse z-transform of $X(z)=\dfrac{\frac{1}{4}z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{1}{4}z^{-1}\right)}$; ROC: $|z|>\frac{1}{2}$.

c) Derive the transfer function of zero order hold.

d) Explain the delta method for construction of phase trajectories.

e) Explain in short jump resonance.

5. Solve **any two** : **(2×6=12)**

a) A system defined by $\dot{x}$ = Ax + Bu and y = Cx. Where $A=\begin{bmatrix}0 & 20.6\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}0\\ 1\end{bmatrix}$ and C = [0 1]. It is desired to have eigenvalues of the observer matrix are $\mu 1 = -10$ and $\mu 2 = -10$ by using the observed state feedback control $u = -K\tilde{x}$. Determine the observer gain matrix K_e.

b) Examine the stability of the following characteristic equation.

$P(z) = z^4 - 1.7z^3 + 1.04z^2 - 0.268z + 0.024 = 0$.

c) Derive the describing function of dead zone nonlinearity.

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SLR-VB – 322

Seat No.	

Set Q

T.E. Electrical Engineering (Part – II) (New CGPA) Examination, 2017
CONTROL SYSTEMS – II

Day and Date : Wednesday, 17-5-2017 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 state model of a linear time invariant system is given by $X(t) = AX(t) + BU(t)$ and $Y(t) = CX(t) + DU(t)$. The expression for transfer function of the system is

a) $C(sI - A)^{-1} BU(s) + D$ b) $(sI - A)^{-1} BU(s) + D$

c) $(sI - A)^{-1} BU(s)$ d) $C(sI - A)^{-1} B$

2) Which of the following properties are associated with the state transition matrix $\phi(t)$?

1. $\phi(-t) = \phi^{-1}(t)$
2. $\phi(t_1/t_2) = \phi(t_1).\phi^{-1}(t_2)$
3. $\phi(t_1 - t_2) = \phi(-t_2) . \phi(t_1)$

Select the correct answer using codes given below :

Codes :

a) 1, 2 and 3 b) 1 and 2 c) 2 and 3 d) 1 and 3

3) The describing function N of a nonlinear control system is a function of

a) Amplitude of the input b) Frequency of the input
c) Initial conditions of the output d) Both a and b

4) Phase plane method of analyzing the nonlinear control system is a

a) Time domain method b) Frequency domain method
c) Optimal control method d) Digital control method

5) The transfer function of zero order hold is

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

P.T.O.

6) If u(t) is the unit step and $\delta(t)$ is the unit impulse function, the inverse z-transform of the $F(z) = \frac{1}{z+1}$ for k > 0 is

a) $(-1)^k\ \delta(k)$ b) $\delta(k) - (-1)^k$ c) $(-1)^k\ u(k)$ d) $u(k) - (-1)^k$

7) Small co-efficient of friction

a) Gives less steady state error b) Gives more steady state error
c) Has no effect on steady state error d) None of the above

8) Root locus diagram can be used to determine

a) Absolute stability b) Relative stability
c) Conditional stability d) None of these

9) The phase lag produced by transportation relays

a) is independent of frequency b) is inverse proportional to frequency
c) increases linearly with frequency d) decreases linearly with frequency

10) The steady state error can be minimized

a) by increasing damped frequency b) by decreasing damped frequency
c) by decreasing natural frequency d) by increasing system gain constant

11) The frequency range of control response is specified by

a) Resonance b) Bandwidth
c) Modulation index d) Peak value

12) A lead compensator in frequency response form is given by the following

a) $C(s) = \frac{1+aTs}{1+Ts}\ [a>1]$ b) $C(s) = \frac{1+Ts}{1+aTs}\ [a>1]$

c) $C(s) = \frac{1-aTs}{1+Ts}\ [a>1]$ d) $C(s) = \frac{1-Ts}{1-aTs}\ [a>1]$

13) For the system $\dot{X} = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$ and Y = [1 1] x then the

a) System is controllable but unstable b) System is uncontrollable but unstable
c) System is controllable but stable d) System is uncontrollable but stable

14) With the knowledge of state space representation the transfer function of the system

a) Can be determined partly b) Can be determined completely
c) Cannot be determined d) None of these

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SLR-VB – 322

Seat No.	

T.E. Electrical Engineering (Part – II) (New CGPA) Examination, 2017
CONTROL SYSTEMS – II

Day and Date : Wednesday, 17-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) Explain the design procedure for designing the lead compensator by frequency response method.

b) Design suitable compensator for a system whose open loop transfer function is $G(s) = \frac{16}{s(s+4)}$. So that the static error constant Kv is 20 sec –1 without change in original location of poles.

c) For the system shown in Fig. 1 write down the state equations.

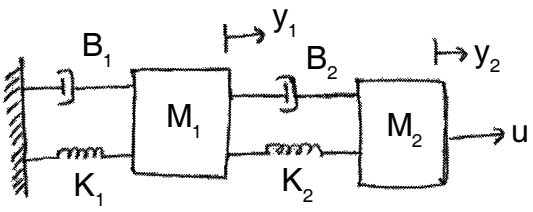

Fig. 1

d) The state equations of a LTI system are as given below $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-2 & 0\\ 1 & -1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}$ u(t); t > 0. Is the system controllable ?

e) Derive the realization of lag compensator using electrical network.

3. a) Design lag-lead compensator for the system whose open loop transfer function is $G(s) = \frac{5}{s(0.5s+1)}$. So that the damping ratio of the dominant closed loop pole is equal to 0.5 and to increase the undamped natural frequency to 5 rad/sec and static velocity error constant to 50 sec^{-1}. **6**

b) Design a phase lag compensator so the system $G(s)H(s) = \frac{100}{s(s+1)}$ will have phase margin of 15°. **6**

OR

Set Q

b) A linear time invariant system is characterized by the state equation.

$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}1\\ 0\end{bmatrix}$ u where u is a unit step function. Compute the solution of these equations assuming initial condition $X_0=\begin{bmatrix}1\\ 0\end{bmatrix}$. Use inverse Laplace transform technique.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) Obtain the observer error equation by full order state observer.

b) Obtain the inverse z-transform of $X(z)=\dfrac{\frac{1}{4}z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{1}{4}z^{-1}\right)}$; ROC: $|z|>\frac{1}{2}$.

c) Derive the transfer function of zero order hold.

d) Explain the delta method for construction of phase trajectories.

e) Explain in short jump resonance.

5. Solve **any two** : **(2×6=12)**

a) A system defined by $\dot{x}$ = Ax + Bu and y = Cx. Where $A=\begin{bmatrix}0 & 20.6\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}0\\ 1\end{bmatrix}$ and C = [0 1]. It is desired to have eigenvalues of the observer matrix are $\mu 1 = -10$ and $\mu 2 = -10$ by using the observed state feedback control $u = -K\tilde{x}$. Determine the observer gain matrix K_e.

b) Examine the stability of the following characteristic equation.

$P(z) = z^4 - 1.7z^3 + 1.04z^2 - 0.268z + 0.024 = 0$.

c) Derive the describing function of dead zone nonlinearity.

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SLR-VB – 322

Seat No.	

Set R

T.E. Electrical Engineering (Part – II) (New CGPA) Examination, 2017
CONTROL SYSTEMS – II

Day and Date : Wednesday, 17-5-2017 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) A lead compensator in frequency response form is given by the following

a) $C(s) = \frac{1+aTs}{1+Ts}\ [a>1]$ b) $C(s) = \frac{1+Ts}{1+aTs}\ [a>1]$

c) $C(s) = \frac{1-aTs}{1+Ts}\ [a>1]$ d) $C(s) = \frac{1-Ts}{1-aTs}\ [a>1]$

2) For the system $\dot{X} = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$ and Y = [1 1] x then the

a) System is controllable but unstable

b) System is uncontrollable but unstable

c) System is controllable but stable

d) System is uncontrollable but stable

3) With the knowledge of state space representation the transfer function of the system

a) Can be determined partly b) Can be determined completely

c) Cannot be determined d) None of these

4) The state model of a linear time invariant system is given by X(t) = AX(t) + BU(t) and Y(t) = CX(t) + DU(t). The expression for transfer function of the system is

a) $C(sI - A)^{-1}\ BU(s) + D$ b) $(sI - A)^{-1}\ BU(s) + D$

c) $(sI - A)^{-1}\ BU(s)$ d) $C(sI - A)^{-1}\ B$

5) Which of the following properties are associated with the state transition matrix $\phi(t)$?

1. $\phi(-t) = \phi^{-1}(t)$
2. $\phi(t_1/t_2) = \phi(t_1).\phi^{-1}(t_2)$
3. $\phi(t_1 - t_2) = \phi(-t_2) \cdot \phi(t_1)$

Select the correct answer using codes given below :

Codes :

a) 1, 2 and 3 b) 1 and 2 c) 2 and 3 d) 1 and 3

6) The describing function N of a nonlinear control system is a function of

a) Amplitude of the input b) Frequency of the input
c) Initial conditions of the output d) Both a and b

7) Phase plane method of analyzing the nonlinear control system is a

a) Time domain method b) Frequency domain method
c) Optimal control method d) Digital control method

8) The transfer function of zero order hold is

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

9) If u(t) is the unit step and $\delta(t)$ is the unit impulse function, the inverse z-transform of the $F(z) = \frac{1}{z+1}$ for $k > 0$ is

a) $(-1)^k \delta(k)$ b) $\delta(k) - (-1)^k$ c) $(-1)^k u(k)$ d) $u(k) - (-1)^k$

10) Small co-efficient of friction

a) Gives less steady state error b) Gives more steady state error
c) Has no effect on steady state error d) None of the above

11) Root locus diagram can be used to determine

a) Absolute stability b) Relative stability
c) Conditional stability d) None of these

12) The phase lag produced by transportation relays

a) is independent of frequency b) is inverse proportional to frequency
c) increases linearly with frequency d) decreases linearly with frequency

13) The steady state error can be minimized

a) by increasing damped frequency b) by decreasing damped frequency
c) by decreasing natural frequency d) by increasing system gain constant

14) The frequency range of control response is specified by

a) Resonance b) Bandwidth
c) Modulation index d) Peak value

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SLR-VB – 322

Seat No.	

T.E. Electrical Engineering (Part – II) (New CGPA) Examination, 2017
CONTROL SYSTEMS – II

Day and Date : Wednesday, 17-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) Explain the design procedure for designing the lead compensator by frequency response method.

b) Design suitable compensator for a system whose open loop transfer function is $G(s) = \frac{16}{s(s+4)}$. So that the static error constant Kv is 20 sec –1 without change in original location of poles.

c) For the system shown in Fig. 1 write down the state equations.

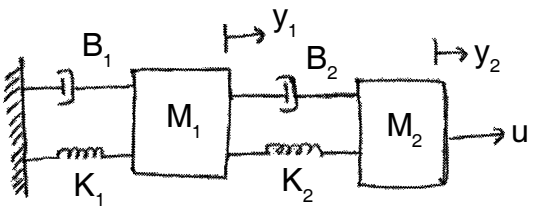

Fig. 1

d) The state equations of a LTI system are as given below $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-2 & 0\\ 1 & -1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}$ u(t); t > 0. Is the system controllable ?

e) Derive the realization of lag compensator using electrical network.

3. a) Design lag-lead compensator for the system whose open loop transfer function is $G(s) = \frac{5}{s(0.5s+1)}$. So that the damping ratio of the dominant closed loop pole is equal to 0.5 and to increase the undamped natural frequency to 5 rad/sec and static velocity error constant to 50 sec^{-1}. **6**

b) Design a phase lag compensator so the system $G(s)H(s) = \frac{100}{s(s+1)}$ will have phase margin of 15°. **6**

OR

Set R

b) A linear time invariant system is characterized by the state equation.

$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}1\\ 0\end{bmatrix}$ u where u is a unit step function. Compute the solution of these equations assuming initial condition $X_0=\begin{bmatrix}1\\ 0\end{bmatrix}$. Use inverse Laplace transform technique.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) Obtain the observer error equation by full order state observer.

b) Obtain the inverse z-transform of $X(z)=\dfrac{\frac{1}{4}z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{1}{4}z^{-1}\right)}$; ROC: $|z|>\frac{1}{2}$.

c) Derive the transfer function of zero order hold.

d) Explain the delta method for construction of phase trajectories.

e) Explain in short jump resonance.

5. Solve **any two** : **(2×6=12)**

a) A system defined by $\dot{x}$ = Ax + Bu and y = Cx. Where $A=\begin{bmatrix}0 & 20.6\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}0\\ 1\end{bmatrix}$ and C = [0 1]. It is desired to have eigenvalues of the observer matrix are $\mu 1 = -10$ and $\mu 2 = -10$ by using the observed state feedback control $u = -K\tilde{x}$. Determine the observer gain matrix K_e.

b) Examine the stability of the following characteristic equation.

$P(z) = z^4 - 1.7z^3 + 1.04z^2 - 0.268z + 0.024 = 0$.

c) Derive the describing function of dead zone nonlinearity.

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SLR-VB – 322

Seat No.	

Set S

T.E. Electrical Engineering (Part – II) (New CGPA) Examination, 2017
CONTROL SYSTEMS – II

Day and Date : Wednesday, 17-5-2017 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 describing function N of a nonlinear control system is a function of
   a) Amplitude of the input b) Frequency of the input
   c) Initial conditions of the output d) Both a and b

2) Phase plane method of analyzing the nonlinear control system is a
   a) Time domain method b) Frequency domain method
   c) Optimal control method d) Digital control method

3) The transfer function of zero order hold is
   a) $1 - e^{Ts}$ b) $1 - e^{-Ts}$ c) $\frac{1-e^{Ts}}{s}$ d) $\frac{1-e^{-Ts}}{s}$

4) If u(t) is the unit step and $\delta(t)$ is the unit impulse function, the inverse z-transform of the $F(z) = \frac{1}{z+1}$ for $k > 0$ is
   a) $(-1)^k \delta(k)$ b) $\delta(k) - (-1)^k$ c) $(-1)^k u(k)$ d) $u(k) - (-1)^k$

5) Small co-efficient of friction
   a) Gives less steady state error b) Gives more steady state error
   c) Has no effect on steady state error d) None of the above

6) Root locus diagram can be used to determine
   a) Absolute stability b) Relative stability
   c) Conditional stability d) None of these

7) The phase lag produced by transportation relays
   a) is independent of frequency b) is inverse proportional to frequency
   c) increases linearly with frequency d) decreases linearly with frequency

P.T.O.

8) The steady state error can be minimized
   a) by increasing damped frequency
   b) by decreasing damped frequency
   c) by decreasing natural frequency
   d) by increasing system gain constant

9) The frequency range of control response is specified by
   a) Resonance
   b) Bandwidth
   c) Modulation index
   d) Peak value

10) A lead compensator in frequency response form is given by the following

   a) $C(s) = \frac{1+aTs}{1+Ts}\ [a>1]$
   b) $C(s) = \frac{1+Ts}{1+aTs}\ [a>1]$
   c) $C(s) = \frac{1-aTs}{1+Ts}\ [a>1]$
   d) $C(s) = \frac{1-Ts}{1-aTs}\ [a>1]$

11) For the system $\dot{X} = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$ and Y = [1 1] x then the
   a) System is controllable but unstable
   b) System is uncontrollable but unstable
   c) System is controllable but stable
   d) System is uncontrollable but stable

12) With the knowledge of state space representation the transfer function of the system
   a) Can be determined partly
   b) Can be determined completely
   c) Cannot be determined
   d) None of these

13) The state model of a linear time invariant system is given by X(t) = AX(t) + BU(t) and Y(t) = CX(t) + DU(t). The expression for transfer function of the system is
   a) $C(sI - A)^{-1}\ BU(s) + D$
   b) $(sI - A)^{-1}\ BU(s) + D$
   c) $(sI - A)^{-1}\ BU(s)$
   d) $C(sI - A)^{-1}\ B$

14) Which of the following properties are associated with the state transition matrix $\phi(t)$?
   1. $\phi(-t) = \phi^{-1}(t)$
   2. $\phi(t_1/t_2) = \phi(t_1).\phi^{-1}(t_2)$
   3. $\phi(t_1 - t_2) = \phi(-t_2)\ .\ \phi(t_1)$

   Select the correct answer using codes given below :

   Codes :

   a) 1, 2 and 3
   b) 1 and 2
   c) 2 and 3
   d) 1 and 3

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SLR-VB – 322

Seat No.	

T.E. Electrical Engineering (Part – II) (New CGPA) Examination, 2017
CONTROL SYSTEMS – II

Day and Date : Wednesday, 17-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**

a) Explain the design procedure for designing the lead compensator by frequency response method.

b) Design suitable compensator for a system whose open loop transfer function is $G(s) = \frac{16}{s(s+4)}$. So that the static error constant Kv is 20 sec –1 without change in original location of poles.

c) For the system shown in Fig. 1 write down the state equations.

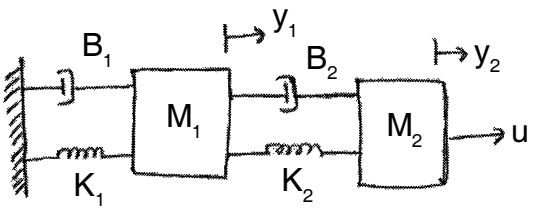

Fig. 1

d) The state equations of a LTI system are as given below $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ u(t); t > 0. Is the system controllable ?

e) Derive the realization of lag compensator using electrical network.

3. a) Design lag-lead compensator for the system whose open loop transfer function is $G(s) = \frac{5}{s(0.5s+1)}$. So that the damping ratio of the dominant closed loop pole is equal to 0.5 and to increase the undamped natural frequency to 5 rad/sec and static velocity error constant to 50 sec^{-1}. **6**

b) Design a phase lag compensator so the system $G(s)H(s) = \frac{100}{s(s+1)}$ will have phase margin of 15°. **6**

OR

b) A linear time invariant system is characterized by the state equation.

$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}1\\ 0\end{bmatrix}$ u where u is a unit step function. Compute the solution of these equations assuming initial condition $X_0=\begin{bmatrix}1\\ 0\end{bmatrix}$. Use inverse Laplace transform technique.

SECTION – II

4. Solve **any four** : **(4×4=16)**

a) Obtain the observer error equation by full order state observer.

b) Obtain the inverse z-transform of $X(z)=\dfrac{\frac{1}{4}z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{1}{4}z^{-1}\right)}$; ROC: $|z|>\frac{1}{2}$.

c) Derive the transfer function of zero order hold.

d) Explain the delta method for construction of phase trajectories.

e) Explain in short jump resonance.

5. Solve **any two** : **(2×6=12)**

a) A system defined by $\dot{x}$ = Ax + Bu and y = Cx. Where $A=\begin{bmatrix}0 & 20.6\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}0\\ 1\end{bmatrix}$ and C = [0 1]. It is desired to have eigenvalues of the observer matrix are $\mu 1 = -10$ and $\mu 2 = -10$ by using the observed state feedback control $u = -K\tilde{x}$. Determine the observer gain matrix K_e.

b) Examine the stability of the following characteristic equation.

$P(z) = z^4 - 1.7z^3 + 1.04z^2 - 0.268z + 0.024 = 0$.

c) Derive the describing function of dead zone nonlinearity.

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SLR-VB – 323

Seat No.	

Set **P**

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Friday, 19-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data ***if necessary****.*
3) Figure to ***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 : 14

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

1) The bits of SIM format required to generate square wave at SOD pins are
a) D7 b) D6 c) D4 and D3 d) Both a) and c)

2) Which causes the microprocessor to immediately terminate its present activity ?
a) RESET signal b) Interrupt signal
c) Both a) and b) d) None of these

3) The act of acquiring an instruction is referred as the _____ instruction.
a) Fetching b) Fetch cycle c) Both a) and b) d) None of these

4) Which bus transfer singles from the CPU to external device and others that carry singles from external device to the CPU ?
a) Address Bus b) Control Bus c) Data Bus d) All of these

5) The internal RAM memory of the 8051 is
a) 32 Bytes b) 64 Bytes c) 128 Bytes d) 256 Bytes

6) The 8051 has _____ 16-bit counter/timers.
a) 1 b) 2 c) 3 d) 4

7) When the 8051 is reset and the $\overline{EA}$ line is HIGH, the program counter points to the first program instruction in the
a) Internal code memory b) External code memory
c) Internal data memory d) External data memory

P.T.O.

8) Lowest priority interrupt in 8051 is
   a) INT1 b) TF0 c) TI d) TF1

9) To change the triggering level of the interrupt, SFR used
   a) IE and TCON b) TCON only c) TMOD d) IE

10) If an 8051 based system is controlled 20 MHz crystal frequency, then timer clock frequency and period respectively are
   a) 1.6 MHz, 1 μs b) 1.6 MHz, 0.6 μs
   c) 1.5 MHz, 0.6 μs d) 1.5 MHz, 1 μs

11) While interfacing 8051 with 16 × 2 LCD, what is status of enable line for read operation
   a) High b) Low c) High to Low d) Low to High

12) Memory size = 8 KB, If starting address is 1000 H, then _____ is the end address.
   a) 1FFFH b) 2FFFH c) 3FFFH d) None

13) The memory which is similar to EEPROM ed erased and programmed in blocks instead of one byte at a time is called as
   a) PROM b) Flash memory c) ROM d) RAM

14) What is direction of EOC pin in ADC 0809 ?
   a) Input b) Output
   c) Both input and output d) None

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SLR-VB – 323

Seat No.	

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Friday, 19-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Assume suitable data ***if necessary****.*

3) Figure to ***right*** *indicates* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×3.5=14)**

1) With the help of a schematic diagram, explain how the bus AD7-AD0 is demultiplexed.

2) Describe the execution of PUSH and POP instructions.

3) What is the purpose of PSW register ?

4) Differentiate between 8085 and 8051.

5) Describe internal memory structure of RAM in 8051.

3. Solve **any two** : **(2×7=14)**

1) Explain Bus architecture of 8085.

2) Explain in brief all the registers used in 8051 microcontroller.

3) Explain the following pins of 8085.

a) ALE.

b) READY.

c) HOLD and HLDA.

SECTION – II

4. Solve **any four** : **(4×4=16)**

   1) Draw and explain the Port 1 structure of 8051.

   2) Draw the interfacing diagram of relay with 8051. Write an ALP to ON/OFF the relay continuously every 1 sec.

   3) Draw and explain interfacing of RTC DS12887 to 8051.

   4) Draw the interfacing diagram of 8051 with 8 KB RAM.

   5) Write an ALP to generate Sine wave using DAC 0808.

5. Solve **any two** : **(2×6=12)**

   1) Draw the interfacing diagram for 16 × 2 LCD display with 8051 and write an ALP to display “INDIA” on LCD display.

   2) Draw and explain IE SFR.

      Assume that the INT1 pin is connected to a switch that is normally high and LED is connected to PI.3 and is normally off. Write an assembly language program for when INT1 pin goes low, then turn on an LED.

   3) Draw temperature indicator and controller system. Write an assembly language program to turn ON Heater when temperature below 20 degree centigrade and turn ON Fan when temperature above 30 degree centigrade.

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SLR-VB – 323

Seat No.	

Set **Q**

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Friday, 19-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data ***if necessary****.*
3) Figure to ***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 : 14

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

1) Lowest priority interrupt in 8051 is
a) INT1 b) TF0 c) TI d) TF1

2) To change the triggering level of the interrupt, SFR used
a) IE and TCON b) TCON only c) TMOD d) IE

3) If an 8051 based system is controlled 20 MHz crystal frequency, then timer clock frequency and period respectively are
a) 1.6 MHz, 1 μs b) 1.6 MHz, 0.6 μs
c) 1.5 MHz, 0.6 μs d) 1.5 MHz, 1 μs

4) While interfacing 8051 with 16 × 2 LCD, what is status of enable line for read operation
a) High b) Low c) High to Low d) Low to High

5) Memory size = 8 KB, If starting address is 1000 H, then _____ is the end address.
a) 1FFFH b) 2FFFH c) 3FFFH d) None

6) The memory which is similar to EEPROM ed erased and programmed in blocks instead of one byte at a time is called as
a) PROM b) Flash memory
c) ROM d) RAM

P.T.O.

7) What is direction of EOC pin in ADC 0809 ?
   a) Input b) Output
   c) Both input and output d) None

8) The bits of SIM format required to generate square wave at SOD pins are
   a) D7 b) D6 c) D4 and D3 d) Both a) and c)

9) Which causes the microprocessor to immediately terminate its present activity ?
   a) RESET signal b) Interrupt signal
   c) Both a) and b) d) None of these

10) The act of acquiring an instruction is referred as the _____ instruction.
   a) Fetching b) Fetch cycle c) Both a) and b) d) None of these

11) Which bus transfer singles from the CPU to external device and others that carry singles from external device to the CPU ?
   a) Address Bus b) Control Bus c) Data Bus d) All of these

12) The internal RAM memory of the 8051 is
   a) 32 Bytes b) 64 Bytes c) 128 Bytes d) 256 Bytes

13) The 8051 has _____ 16-bit counter/timers.
   a) 1 b) 2 c) 3 d) 4

14) When the 8051 is reset and the $\overline{EA}$ line is HIGH, the program counter points to the first program instruction in the
   a) Internal code memory b) External code memory
   c) Internal data memory d) External data memory

_____

SLR-VB – 323

Seat No.	

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Friday, 19-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Assume suitable data ***if necessary****.*

3) Figure to ***right*** *indicates* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×3.5=14)**

1) With the help of a schematic diagram, explain how the bus AD7-AD0 is demultiplexed.

2) Describe the execution of PUSH and POP instructions.

3) What is the purpose of PSW register ?

4) Differentiate between 8085 and 8051.

5) Describe internal memory structure of RAM in 8051.

3. Solve **any two** : **(2×7=14)**

1) Explain Bus architecture of 8085.

2) Explain in brief all the registers used in 8051 microcontroller.

3) Explain the following pins of 8085.

a) ALE.

b) READY.

c) HOLD and HLDA.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Draw and explain the Port 1 structure of 8051.
   2) Draw the interfacing diagram of relay with 8051. Write an ALP to ON/OFF the relay continuously every 1 sec.
   3) Draw and explain interfacing of RTC DS12887 to 8051.
   4) Draw the interfacing diagram of 8051 with 8 KB RAM.
   5) Write an ALP to generate Sine wave using DAC 0808.

5. Solve **any two** : **(2×6=12)**
   1) Draw the interfacing diagram for 16 × 2 LCD display with 8051 and write an ALP to display “INDIA” on LCD display.
   2) Draw and explain IE SFR.

      Assume that the INT1 pin is connected to a switch that is normally high and LED is connected to PI.3 and is normally off. Write an assembly language program for when INT1 pin goes low, then turn on an LED.
   3) Draw temperature indicator and controller system. Write an assembly language program to turn ON Heater when temperature below 20 degree centigrade and turn ON Fan when temperature above 30 degree centigrade.

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SLR-VB – 323

Seat No.	

Set R

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Friday, 19-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Assume suitable data **if necessary**.*
*3) Figure to **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 : 14

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

1) The internal RAM memory of the 8051 is
a) 32 Bytes b) 64 Bytes c) 128 Bytes d) 256 Bytes

2) The 8051 has _____ 16-bit counter/timers.
a) 1 b) 2 c) 3 d) 4

3) When the 8051 is reset and the $\overline{EA}$ line is HIGH, the program counter points to the first program instruction in the
a) Internal code memory b) External code memory
c) Internal data memory d) External data memory

4) Lowest priority interrupt in 8051 is
a) INT1 b) TF0 c) TI d) TF1

5) To change the triggering level of the interrupt, SFR used
a) IE and TCON b) TCON only c) TMOD d) IE

6) If an 8051 based system is controlled 20 MHz crystal frequency, then timer clock frequency and period respectively are
a) 1.6 MHz, 1 μs b) 1.6 MHz, 0.6 μs
c) 1.5 MHz, 0.6 μs d) 1.5 MHz, 1 μs

7) While interfacing 8051 with 16 × 2 LCD, what is status of enable line for read operation
a) High b) Low c) High to Low d) Low to High

P.T.O.

8) Memory size = 8 KB, If starting address is 1000 H, then _____ is the end address.
   a) 1FFFH b) 2FFFH c) 3FFFH d) None

9) The memory which is similar to EEPROM ed erased and programmed in blocks instead of one byte at a time is called as
   a) PROM b) Flash memory c) ROM d) RAM

10) What is direction of EOC pin in ADC 0809 ?
   a) Input b) Output
   c) Both input and output d) None

11) The bits of SIM format required to generate square wave at SOD pins are
   a) D7 b) D6 c) D4 and D3 d) Both a) and c)

12) Which causes the microprocessor to immediately terminate its present activity ?
   a) RESET signal b) Interrupt signal
   c) Both a) and b) d) None of these

13) The act of acquiring an instruction is referred as the _____ instruction.
   a) Fetching b) Fetch cycle c) Both a) and b) d) None of these

14) Which bus transfer singles from the CPU to external device and others that carry singles from external device to the CPU ?
   a) Address Bus b) Control Bus c) Data Bus d) All of these

_____

SLR-VB – 323

Seat No.	

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Friday, 19-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Assume suitable data ***if necessary****.*

3) Figure to ***right*** *indicates* ***full*** *marks.*

SECTION – I

2. Solve **any four** : **(4×3.5=14)**

1) With the help of a schematic diagram, explain how the bus AD7-AD0 is demultiplexed.

2) Describe the execution of PUSH and POP instructions.

3) What is the purpose of PSW register ?

4) Differentiate between 8085 and 8051.

5) Describe internal memory structure of RAM in 8051.

3. Solve **any two** : **(2×7=14)**

1) Explain Bus architecture of 8085.

2) Explain in brief all the registers used in 8051 microcontroller.

3) Explain the following pins of 8085.

a) ALE.

b) READY.

c) HOLD and HLDA.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Draw and explain the Port 1 structure of 8051.
   2) Draw the interfacing diagram of relay with 8051. Write an ALP to ON/OFF the relay continuously every 1 sec.
   3) Draw and explain interfacing of RTC DS12887 to 8051.
   4) Draw the interfacing diagram of 8051 with 8 KB RAM.
   5) Write an ALP to generate Sine wave using DAC 0808.

5. Solve **any two** : **(2×6=12)**
   1) Draw the interfacing diagram for 16 × 2 LCD display with 8051 and write an ALP to display “INDIA” on LCD display.
   2) Draw and explain IE SFR.

      Assume that the INT1 pin is connected to a switch that is normally high and LED is connected to PI.3 and is normally off. Write an assembly language program for when INT1 pin goes low, then turn on an LED.
   3) Draw temperature indicator and controller system. Write an assembly language program to turn ON Heater when temperature below 20 degree centigrade and turn ON Fan when temperature above 30 degree centigrade.

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SLR-VB – 323

Seat No.	

Set **S**

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Friday, 19-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data ***if necessary****.*
3) Figure to ***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 : 14

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

1) If an 8051 based system is controlled 20 MHz crystal frequency, then timer clock frequency and period respectively are
   a) 1.6 MHz, 1 μs b) 1.6 MHz, 0.6 μs
   c) 1.5 MHz, 0.6 μs d) 1.5 MHz, 1 μs

2) While interfacing 8051 with 16 × 2 LCD, what is status of enable line for read operation
   a) High b) Low c) High to Low d) Low to High

3) Memory size = 8 KB, If starting address is 1000 H, then _____ is the end address.
   a) 1FFFH b) 2FFFH c) 3FFFH d) None

4) The memory which is similar to EEPROM ed erased and programmed in blocks instead of one byte at a time is called as
   a) PROM b) Flash memory c) ROM d) RAM

5) What is direction of EOC pin in ADC 0809 ?
   a) Input b) Output
   c) Both input and output d) None

6) The bits of SIM format required to generate square wave at SOD pins are
   a) D7 b) D6 c) D4 and D3 d) Both a) and c)

P.T.O.

7) Which causes the microprocessor to immediately terminate its present activity ?
   a) RESET signal b) Interrupt signal
   c) Both a) and b) d) None of these

8) The act of acquiring an instruction is referred as the _____ instruction.
   a) Fetching b) Fetch cycle c) Both a) and b) d) None of these

9) Which bus transfer singles from the CPU to external device and others that carry singles from external device to the CPU ?
   a) Address Bus b) Control Bus c) Data Bus d) All of these

10) The internal RAM memory of the 8051 is
   a) 32 Bytes b) 64 Bytes c) 128 Bytes d) 256 Bytes

11) The 8051 has _____ 16-bit counter/timers.
   a) 1 b) 2 c) 3 d) 4

12) When the 8051 is reset and the $\overline{EA}$ line is HIGH, the program counter points to the first program instruction in the
   a) Internal code memory b) External code memory
   c) Internal data memory d) External data memory

13) Lowest priority interrupt in 8051 is
   a) INT1 b) TF0 c) TI d) TF1

14) To change the triggering level of the interrupt, SFR used
   a) IE and TCON b) TCON only c) TMOD d) IE

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SLR-VB – 323

Seat No.	

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLERS

Day and Date : Friday, 19-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*

*2) Assume suitable data **if necessary**.*

*3) Figure to **right** indicates **full** marks.*

SECTION – I

2. Solve **any four** : **(4×3.5=14)**

1) With the help of a schematic diagram, explain how the bus AD7-AD0 is demultiplexed.

2) Describe the execution of PUSH and POP instructions.

3) What is the purpose of PSW register ?

4) Differentiate between 8085 and 8051.

5) Describe internal memory structure of RAM in 8051.

3. Solve **any two** : **(2×7=14)**

1) Explain Bus architecture of 8085.

2) Explain in brief all the registers used in 8051 microcontroller.

3) Explain the following pins of 8085.

a) ALE.

b) READY.

c) HOLD and HLDA.

SECTION – II

4. Solve **any four** : **(4×4=16)**

   1) Draw and explain the Port 1 structure of 8051.

   2) Draw the interfacing diagram of relay with 8051. Write an ALP to ON/OFF the relay continuously every 1 sec.

   3) Draw and explain interfacing of RTC DS12887 to 8051.

   4) Draw the interfacing diagram of 8051 with 8 KB RAM.

   5) Write an ALP to generate Sine wave using DAC 0808.

5. Solve **any two** : **(2×6=12)**

   1) Draw the interfacing diagram for 16 × 2 LCD display with 8051 and write an ALP to display “INDIA” on LCD display.

   2) Draw and explain IE SFR.

      Assume that the INT1 pin is connected to a switch that is normally high and LED is connected to PI.3 and is normally off. Write an assembly language program for when INT1 pin goes low, then turn on an LED.

   3) Draw temperature indicator and controller system. Write an assembly language program to turn ON Heater when temperature below 20 degree centigrade and turn ON Fan when temperature above 30 degree centigrade.

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SLR-VB – 324

Seat No.	

Set P

T.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER ELECTRONICS (New CGPA)

Day and Date : Monday, 22-5-2017 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) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Assume data, ***if necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The SCR is turned-off when the anode current falls below
A) Forward current rating B) Breakover voltage
C) Holding current D) Latching current

2) A TRIAC has _____ semiconductor layers.
A) Two B) Three C) Four D) Five

3) For continuous conduction, in a single phase full converter each pair of SCRs conducts for
A) $(\pi - \alpha)$ radians B) π radians
C) α radians D) $(\pi + \alpha)$ radians

4) A TRIAC is effectively
A) Antiparallel connection of two thyristors
B) Antiparallel connection of a thyristor and diode
C) Antiparallel connection of two diodes
D) Two thyristor, in parallel to increase the current capacity of the device

5) The SCR is a _____ switch.
A) Two-directional B) Uni-directional
C) Three-directional D) Four-directional

6) In a single phase full converter, if output voltage has peak and average values of 325 V and 133 V respectively, then the firing angle is
A) 40° B) 50° C) 70° D) 130°

P.T.O.

7) Choose the correct statement.
   A) MOSFET is a uncontrolled device.
   B) MOSFET is a current controlled device.
   C) MOSFET is a voltage controlled device.
   D) MOSFET is a temperature controlled device.

8) A full wave rectifier with resistive load produces
   A) Second harmonic
   B) Third harmonic
   C) Fifth harmonic
   D) Do not produce harmonics

9) Switched mode regulator is a
   A) AC – DC converters
   B) AC – AC converters
   C) DC – AC converters
   D) DC – DC converters

10) Advantages of HVDC transmission over AC system is/are
   A) Reversal of power can be controlled by firing angle
   B) Very good dynamic behavior
   C) They can link two AC system operating unsynchronized
   D) All of these

11) A boost converter has Vs as the source voltage and 'α' as the duty cycle. The output voltage for this converter is given by
   A) $Vs \cdot (1 + \alpha)$
   B) $Vs/(1+\alpha)$
   C) $Vs \cdot (1-\alpha)$
   D) $Vs/(1-\alpha)$

12) Which one of the following is the most suitable device for dc-to-dc converter ?
   A) BJT
   B) GTO
   C) MOSFET
   D) Thyristor

13) The maximum firing angle in the half wave controlled regulator is
   A) 180 degree
   B) 190 degree
   C) 200 degree
   D) 210 degree

14) The dc-dc control for DC motor provides variation in
   A) Input voltage
   B) Frequency
   C) Both A and B
   D) None of the above

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SLR-VB – 324

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER ELECTRONICS (New CGPA)

Day and Date : Monday, 22-5-2017 Marks : 56
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. **(4×4=16)**

a) What is a SCR ? Describe the turn-on and turn-off characteristics of a SCR.

b) Explain Principle of operation, characteristics, rating and applications of power BJT.

c) What is meant by commutation ? Discuss class 'C' commutation with the necessary circuit diagram and waveforms.

d) Explain circuit operation of single phase half wave controlled rectifier with resistive load and draw output waveforms at an firing angle of 0°, 45°and 90°.

e) A single phase 230 V, 1 KW heater is connected across a single phase, 230 V, 50 Hz, supply through an SCR. For firing angle delay of 90°, calculate the power absorbed in the element.

f) i) Explain different modes of operation of TRIAC with neat schematic diagram.

ii) Give few applications of TRIAC.

3. Attempt **any two** of the following. **(2×6=12)**

a) What is free-wheeling diode ? Draw the circuit diagram of an SCR full wave rectifier with and without free-wheeling diode and explain the operation of the circuit with the help of necessary waveforms.

b) A single phase, semiconverter operates with 230 V, 50 Hz ac input and supplies level current of 10 A and operated at firing angle of 60°.
Compute i) RMS supply current ii) output voltage iii) supply power factor.

c) Explain three phase fully controlled bridge rectifier with R-L load and draw output voltage waveforms at an firing angle of 30° and 60°.

SECTION – II

4. Attempt **any four** of the following. **(4×4=16)**

   a) Explain principle of phase control of AC voltage controller with neat sketches.

   b) 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.

   c) Explain the following performance parameters of an inverters :

      i) HF ii) THD iii) DF iv) LOH.

   d) Explain principle of buck-boost converter and derive expression for output voltage in terms of input voltage and duty cycle.

   e) Explain the principle of On-Off control of ac voltage controllers.

   f) Explain role of power electronics converters in speed control of dc motor.

5. Attempt **any two** of the following. **(2×6=12)**

   a) Explain principle of single phase full wave AC voltage controller with the load of R = 10 Ω and L = 1mH and draw the relevant output voltage and current waveforms.

   b) A dc-dc converter has resistive load of R = 10 Ω and the input dc voltage 230 V. When the converter switch remains ON, its voltage drop is 3 Volts and the frequency is 1 KHz. If the duty cycle is 35%, determine :

      i) the average load voltage ii) rms load voltage

      iii) FF iv) RF.

   c) Explain three phase 120 degree mode voltage source inverter with a balanced star connected resistive load and draw the respective output phase and line voltages waveforms.

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SLR-VB – 324

Seat No.	

Set Q

T.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER ELECTRONICS (New CGPA)

Day and Date : Monday, 22-5-2017 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) Figures to the **right** indicate **full** marks.*
*4) Assume data, **if necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) A full wave rectifier with resistive load produces
   A) Second harmonic B) Third harmonic
   C) Fifth harmonic D) Do not produce harmonics

2) Switched mode regulator is a
   A) AC – DC converters B) AC – AC converters
   C) DC – AC converters D) DC – DC converters

3) Advantages of HVDC transmission over AC system is/are
   A) Reversal of power can be controlled by firing angle
   B) Very good dynamic behavior
   C) They can link two AC system operating unsynchronized
   D) All of these

4) A boost converter has Vs as the source voltage and 'α' as the duty cycle. The output voltage for this converter is given by
   A) $Vs \cdot (1 + \alpha)$ B) $Vs/(1+\alpha)$ C) $Vs \cdot (1-\alpha)$ D) $Vs/(1-\alpha)$

5) Which one of the following is the most suitable device for dc-to-dc converter ?
   A) BJT B) GTO C) MOSFET D) Thyristor

P.T.O.

6) The maximum firing angle in the half wave controlled regulator is
A) 180 degree B) 190 degree C) 200 degree D) 210 degree

7) The dc-dc control for DC motor provides variation in
A) Input voltage B) Frequency
C) Both A and B D) None of the above

8) The SCR is turned-off when the anode current falls below
A) Forward current rating B) Breakover voltage
C) Holding current D) Latching current

9) A TRIAC has _____ semiconductor layers.
A) Two B) Three C) Four D) Five

10) For continuous conduction, in a single phase full converter each pair of SCRs conducts for
A) $(\pi - \alpha)$ radians B) π radians
C) α radians D) $(\pi + \alpha)$ radians

11) A TRIAC is effectively
A) Antiparallel connection of two thyristors
B) Antiparallel connection of a thyristor and diode
C) Antiparallel connection of two diodes
D) Two thyristor, in parallel to increase the current capacity of the device

12) The SCR is a _____ switch.
A) Two-directional B) Uni-directional
C) Three-directional D) Four-directional

13) In a single phase full converter, if output voltage has peak and average values of 325 V and 133 V respectively, then the firing angle is
A) 40° B) 50° C) 70° D) 130°

14) Choose the correct statement.
A) MOSFET is a uncontrolled device.
B) MOSFET is a current controlled device.
C) MOSFET is a voltage controlled device.
D) MOSFET is a temperature controlled device.

_____

SLR-VB – 324

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER ELECTRONICS (New CGPA)

Day and Date : Monday, 22-5-2017 Marks : 56
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. **(4×4=16)**

a) What is a SCR ? Describe the turn-on and turn-off characteristics of a SCR.

b) Explain Principle of operation, characteristics, rating and applications of power BJT.

c) What is meant by commutation ? Discuss class 'C' commutation with the necessary circuit diagram and waveforms.

d) Explain circuit operation of single phase half wave controlled rectifier with resistive load and draw output waveforms at an firing angle of 0°, 45°and 90°.

e) A single phase 230 V, 1 KW heater is connected across a single phase, 230 V, 50 Hz, supply through an SCR. For firing angle delay of 90°, calculate the power absorbed in the element.

f) i) Explain different modes of operation of TRIAC with neat schematic diagram.

ii) Give few applications of TRIAC.

3. Attempt **any two** of the following. **(2×6=12)**

a) What is free-wheeling diode ? Draw the circuit diagram of an SCR full wave rectifier with and without free-wheeling diode and explain the operation of the circuit with the help of necessary waveforms.

b) A single phase, semiconverter operates with 230 V, 50 Hz ac input and supplies level current of 10 A and operated at firing angle of 60°.
Compute i) RMS supply current ii) output voltage iii) supply power factor.

c) Explain three phase fully controlled bridge rectifier with R-L load and draw output voltage waveforms at an firing angle of 30° and 60°.

SECTION – II

4. Attempt **any four** of the following. **(4×4=16)**

   a) Explain principle of phase control of AC voltage controller with neat sketches.

   b) 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.

   c) Explain the following performance parameters of an inverters :

      i) HF ii) THD iii) DF iv) LOH.

   d) Explain principle of buck-boost converter and derive expression for output voltage in terms of input voltage and duty cycle.

   e) Explain the principle of On-Off control of ac voltage controllers.

   f) Explain role of power electronics converters in speed control of dc motor.

5. Attempt **any two** of the following. **(2×6=12)**

   a) Explain principle of single phase full wave AC voltage controller with the load of R = 10 Ω and L = 1mH and draw the relevant output voltage and current waveforms.

   b) A dc-dc converter has resistive load of R = 10 Ω and the input dc voltage 230 V. When the converter switch remains ON, its voltage drop is 3 Volts and the frequency is 1 KHz. If the duty cycle is 35%, determine :

      i) the average load voltage ii) rms load voltage

      iii) FF iv) RF.

   c) Explain three phase 120 degree mode voltage source inverter with a balanced star connected resistive load and draw the respective output phase and line voltages waveforms.

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SLR-VB – 324

Seat No.	

Set R

T.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER ELECTRONICS (New CGPA)

Day and Date : Monday, 22-5-2017 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) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Assume data, ***if necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The SCR is a _____ switch.
A) Two-directional B) Uni-directional
C) Three-directional D) Four-directional

2) In a single phase full converter, if output voltage has peak and average values of 325 V and 133 V respectively, then the firing angle is
A) 40° B) 50° C) 70° D) 130°

3) Choose the correct statement.
A) MOSFET is a uncontrolled device.
B) MOSFET is a current controlled device.
C) MOSFET is a voltage controlled device.
D) MOSFET is a temperature controlled device.

4) A full wave rectifier with resistive load produces
A) Second harmonic B) Third harmonic
C) Fifth harmonic D) Do not produce harmonics

5) Switched mode regulator is a
A) AC – DC converters B) AC – AC converters
C) DC – AC converters D) DC – DC converters

6) Advantages of HVDC transmission over AC system is/are
A) Reversal of power can be controlled by firing angle
B) Very good dynamic behavior
C) They can link two AC system operating unsynchronized
D) All of these

P.T.O.

7) A boost converter has Vs as the source voltage and 'α' as the duty cycle. The output voltage for this converter is given by

A) $Vs \cdot (1 + \alpha)$ B) $Vs/(1+\alpha)$ C) $Vs \cdot (1-\alpha)$ D) $Vs/(1-\alpha)$

8) Which one of the following is the most suitable device for dc-to-dc converter ?

A) BJT B) GTO C) MOSFET D) Thyristor

9) The maximum firing angle in the half wave controlled regulator is

A) 180 degree B) 190 degree C) 200 degree D) 210 degree

10) The dc-dc control for DC motor provides variation in

A) Input voltage B) Frequency
C) Both A and B D) None of the above

11) The SCR is turned-off when the anode current falls below

A) Forward current rating B) Breakover voltage
C) Holding current D) Latching current

12) A TRIAC has _____ semiconductor layers.

A) Two B) Three C) Four D) Five

13) For continuous conduction, in a single phase full converter each pair of SCRs conducts for

A) $(\pi - \alpha)$ radians B) π radians
C) α radians D) $(\pi + \alpha)$ radians

14) A TRIAC is effectively

A) Antiparallel connection of two thyristors
B) Antiparallel connection of a thyristor and diode
C) Antiparallel connection of two diodes
D) Two thyristor, in parallel to increase the current capacity of the device

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SLR-VB – 324

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER ELECTRONICS (New CGPA)

Day and Date : Monday, 22-5-2017 Marks : 56
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. **(4×4=16)**

a) What is a SCR ? Describe the turn-on and turn-off characteristics of a SCR.

b) Explain Principle of operation, characteristics, rating and applications of power BJT.

c) What is meant by commutation ? Discuss class 'C' commutation with the necessary circuit diagram and waveforms.

d) Explain circuit operation of single phase half wave controlled rectifier with resistive load and draw output waveforms at an firing angle of 0°, 45°and 90°.

e) A single phase 230 V, 1 KW heater is connected across a single phase, 230 V, 50 Hz, supply through an SCR. For firing angle delay of 90°, calculate the power absorbed in the element.

f) i) Explain different modes of operation of TRIAC with neat schematic diagram.

ii) Give few applications of TRIAC.

3. Attempt **any two** of the following. **(2×6=12)**

a) What is free-wheeling diode ? Draw the circuit diagram of an SCR full wave rectifier with and without free-wheeling diode and explain the operation of the circuit with the help of necessary waveforms.

b) A single phase, semiconverter operates with 230 V, 50 Hz ac input and supplies level current of 10 A and operated at firing angle of 60°.
Compute i) RMS supply current ii) output voltage iii) supply power factor.

c) Explain three phase fully controlled bridge rectifier with R-L load and draw output voltage waveforms at an firing angle of 30° and 60°.

SECTION – II

4. Attempt **any four** of the following. **(4×4=16)**

   a) Explain principle of phase control of AC voltage controller with neat sketches.

   b) 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.

   c) Explain the following performance parameters of an inverters :

      i) HF ii) THD iii) DF iv) LOH.

   d) Explain principle of buck-boost converter and derive expression for output voltage in terms of input voltage and duty cycle.

   e) Explain the principle of On-Off control of ac voltage controllers.

   f) Explain role of power electronics converters in speed control of dc motor.

5. Attempt **any two** of the following. **(2×6=12)**

   a) Explain principle of single phase full wave AC voltage controller with the load of R = 10 Ω and L = 1mH and draw the relevant output voltage and current waveforms.

   b) A dc-dc converter has resistive load of R = 10 Ω and the input dc voltage 230 V. When the converter switch remains ON, its voltage drop is 3 Volts and the frequency is 1 KHz. If the duty cycle is 35%, determine :

      i) the average load voltage ii) rms load voltage

      iii) FF iv) RF.

   c) Explain three phase 120 degree mode voltage source inverter with a balanced star connected resistive load and draw the respective output phase and line voltages waveforms.

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SLR-VB – 324

Seat No.	

Set S

T.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER ELECTRONICS (New CGPA)

Day and Date : Monday, 22-5-2017 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) Figures to the **right** indicate **full** marks.*
*4) Assume data, **if necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Advantages of HVDC transmission over AC system is/are
   A) Reversal of power can be controlled by firing angle
   B) Very good dynamic behavior
   C) They can link two AC system operating unsynchronized
   D) All of these

2) A boost converter has Vs as the source voltage and 'α' as the duty cycle. The output voltage for this converter is given by
   A) $Vs \cdot (1 + \alpha)$ B) $Vs/(1+\alpha)$ C) $Vs \cdot (1-\alpha)$ D) $Vs/(1-\alpha)$

3) Which one of the following is the most suitable device for dc-to-dc converter ?
   A) BJT B) GTO C) MOSFET D) Thyristor

4) The maximum firing angle in the half wave controlled regulator is
   A) 180 degree B) 190 degree C) 200 degree D) 210 degree

5) The dc-dc control for DC motor provides variation in
   A) Input voltage B) Frequency
   C) Both A and B D) None of the above

6) The SCR is turned-off when the anode current falls below
   A) Forward current rating B) Breakover voltage
   C) Holding current D) Latching current

P.T.O.

7) A TRIAC has _____ semiconductor layers.
A) Two B) Three C) Four D) Five

8) For continuous conduction, in a single phase full converter each pair of SCRs conducts for
A) $(\pi - \alpha)$ radians B) π radians
C) α radians D) $(\pi + \alpha)$ radians

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A) Antiparallel connection of two thyristors
B) Antiparallel connection of a thyristor and diode
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A) 40° B) 50° C) 70° D) 130°

12) Choose the correct statement.
A) MOSFET is a uncontrolled device.
B) MOSFET is a current controlled device.
C) MOSFET is a voltage controlled device.
D) MOSFET is a temperature controlled device.

13) A full wave rectifier with resistive load produces
A) Second harmonic B) Third harmonic
C) Fifth harmonic D) Do not produce harmonics

14) Switched mode regulator is a
A) AC – DC converters B) AC – AC converters
C) DC – AC converters D) DC – DC converters

_____

SLR-VB – 324

Seat No.	

T.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER ELECTRONICS (New CGPA)

Day and Date : Monday, 22-5-2017 Marks : 56
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. **(4×4=16)**

a) What is a SCR ? Describe the turn-on and turn-off characteristics of a SCR.

b) Explain Principle of operation, characteristics, rating and applications of power BJT.

c) What is meant by commutation ? Discuss class 'C' commutation with the necessary circuit diagram and waveforms.

d) Explain circuit operation of single phase half wave controlled rectifier with resistive load and draw output waveforms at an firing angle of 0°, 45°and 90°.

e) A single phase 230 V, 1 KW heater is connected across a single phase, 230 V, 50 Hz, supply through an SCR. For firing angle delay of 90°, calculate the power absorbed in the element.

f) i) Explain different modes of operation of TRIAC with neat schematic diagram.

ii) Give few applications of TRIAC.

3. Attempt **any two** of the following. **(2×6=12)**

a) What is free-wheeling diode ? Draw the circuit diagram of an SCR full wave rectifier with and without free-wheeling diode and explain the operation of the circuit with the help of necessary waveforms.

b) A single phase, semiconverter operates with 230 V, 50 Hz ac input and supplies level current of 10 A and operated at firing angle of 60°.
Compute i) RMS supply current ii) output voltage iii) supply power factor.

c) Explain three phase fully controlled bridge rectifier with R-L load and draw output voltage waveforms at an firing angle of 30° and 60°.

SECTION – II

4. Attempt **any four** of the following. **(4×4=16)**

   a) Explain principle of phase control of AC voltage controller with neat sketches.

   b) 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.

   c) Explain the following performance parameters of an inverters :

      i) HF ii) THD iii) DF iv) LOH.

   d) Explain principle of buck-boost converter and derive expression for output voltage in terms of input voltage and duty cycle.

   e) Explain the principle of On-Off control of ac voltage controllers.

   f) Explain role of power electronics converters in speed control of dc motor.

5. Attempt **any two** of the following. **(2×6=12)**

   a) Explain principle of single phase full wave AC voltage controller with the load of R = 10 Ω and L = 1mH and draw the relevant output voltage and current waveforms.

   b) A dc-dc converter has resistive load of R = 10 Ω and the input dc voltage 230 V. When the converter switch remains ON, its voltage drop is 3 Volts and the frequency is 1 KHz. If the duty cycle is 35%, determine :

      i) the average load voltage ii) rms load voltage

      iii) FF iv) RF.

   c) Explain three phase 120 degree mode voltage source inverter with a balanced star connected resistive load and draw the respective output phase and line voltages waveforms.

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SLR-VB – 325

Seat No.	

Set P

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
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 : 14

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

1) $y(t) = x(t-1) + x(t)$ is
a) Linear b) Time-invariant c) Non-linear d) Causal

2) The power signal is one which has _____ energy and _____ average power.
a) finite, infinite b) zero, infinite c) infinite, zero d) infinite, infinite

3) In exponential Fourier series, c_n is given as _____
a) $A_n e^{j\theta n}$ b) $A_n e^{-j\theta n}$ c) $A_{n/2} e^{-j\theta n}$ d) $A_{n/2} e^{j\theta n}$

4) The discrete time system described by $y(n) = x(n^2)$ is
a) causal, linear and time variant
b) causal, linear and time invariant
c) non-causal, linear and time-invariant
d) non-causal, linear and time variant

5) The DT signal $\cos\left(2\pi n/12\right)$ is periodic with period
a) $2\pi/12$ b) 6 c) 12 d) A periodic

P.T.O.

6) The Fourier series expansion of an odd periodic function contains
   a) For cosine terms
   b) Only sine terms
   c) Both cosine and sine
   d) Only sine term with constant

7) Inverse Fourier transform of sgn(ω) is
   a) $-j/\pi t$ b) $j/\pi t$ c) $1/\pi t$ d) $-1/\pi t$

8) In DIF FFT algorithm output sequence is
   a) In natural order
   b) Bit reversed order
   c) In ascending order
   d) Descending order

9) If x(z) = {1, 2, 1, 2, 3 .} ROC is
   ↕
   a) Entire z-plane
   b) Entire z-plane except z = ∞
   c) Entire z-plane except z = 0, z = ∞
   d) Entire z-plane except z = 0

10) In DTFT, if F {x(n)} = $X(e^{j\omega})$ then F(x(n – k)} is =
   a) $e^{-j\omega k}X(e^{j\omega})$
   b) $e^{j\omega k}X(e^{j\omega})$
   c) $e^{-j\omega k}X(e^{-j\omega})$
   d) $X(e^{j\omega})$

11) In DIF FFT algorithm, the number of complex additions is given by
   a) $N\log_2 (N/2)$
   b) $N\log_2(N/3)$
   c) $N\log_2 N$
   d) Any of the above

12) ROC cannot contain any
   a) Zero
   b) Pole
   c) Either a) or b)
   d) Both a) and b)

13) If X(Z) = Z {x(n)} then Z {x(n – m)} is _____. (considering zero initial conditions)
   a) $Z^{-m}X(Z)$
   b) $Z^{m}X(Z)$
   c) ZX(Z)
   d) $Z^{-2m}X(Z)$

14) $Z\{e^{-anT}u(n)\}$ is _____. ('a' is real)
   a) $1/(Z - e^{-aT})$
   b) $1/(Z-e^{aT})$
   c) $Z/(Z - e^{aT})$
   d) $Z/(Z - e^{-aT})$

SLR-VB – 325

Seat No.	

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 24-5-2017 Marks : 56
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

2. Solve **any four** : **(4×4=16)**

a) Find whether following signals are periodic or not :
$x(t) = 2\cos(10t + 1) - \sin(4t - 1)$

b) Determine the energy and power of the following signals :
$x(t) = tu(t)$.

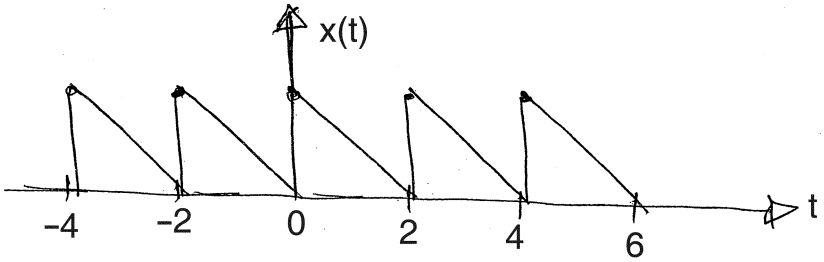
c) Check linearity and causality of the following system :
$y(n) = \sum_{k=-\infty}^{n+1} x(k)$.

d) Find Fourier Transform of $x(t) = e^{-2t}u(t - 1)$.

e) Derive the frequency shifting property of Fourier transform.

3. Solve **any two** : **(6×2=12)**

a) Find the exponential series of the following signal :



b) Find the Fourier transform of the following signal :
$x(t) = A\,\text{rect}\left(t/\tau\right)$ for $|t| \le \tau/2$
$= 0$ otherwise

c) Determine the convolution of the following sequences :
$x(n) = b^n u(n)$ and $h(n) = a^n u(n)$ when $a \neq b$.

Set P

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) Find Z transform and sketch R.O.C. for following sequence :

   $X[n] = -b^n u(-n-1)$

   b) Determine the signal x(n) whose Z transform is given by

   $X(Z) = \log(1 - az^{-1})$; $|Z| > |a|$

   c) Find $X(\infty)$, if i) $X(Z) = (Z + 2)/(Z - 0.8)^2$

   ii) $X(Z) = (Z + 1)/3\ (Z - 1)\ (Z + 0.9)$

   d) Derive the time shifting property of DTFT.

   e) Find the DFT of the following sequences :

   i) $x(n) = \partial(n - n_0)$ ii) $x(n) = a^n$.

5. Solve **any two** : **(6×2=12)**

   a) Find 8 point DFT of following sequence :

   $x(n) = \{1, 1, 1, 1\}$.

   b) Determine the sequence x[n] associated with Z transform given using Partial Fraction Expansion [P.F.E.] method.

   $X[Z] = 2Z^2/(Z + 1)\ (Z + 2)^2$; Right sided sequence.

   c) Compute 8 point IDFT of the sequence using DIT FFT algorithm

   $X(K) = \{7, -0.707 - j0.707, -j, 0.707 - j0.707, 1, 0.707 + j0.707, j, -0.707 + j0.707\}$.

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Seat No.	

Set **Q**

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
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 : 14

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

1) In DIF FFT algorithm output sequence is
   a) In natural order b) Bit reversed order
   c) In ascending order d) Descending order

2) If x(z) = {1, 2, 1, 2, 3 .} ROC is
   ↕
   a) Entire z-plane
   b) Entire z-plane except z = ∞
   c) Entire z-plane except z = 0, z = ∞
   d) Entire z-plane except z = 0

3) In DTFT, if F {x(n)} = $X(e^{j\omega})$ then F(x(n – k)} is =
   a) $e^{-j\omega k}X(e^{j\omega})$ b) $e^{j\omega k}X(e^{j\omega})$
   c) $e^{-j\omega k}X(e^{-j\omega})$ d) $X(e^{j\omega})$

4) In DIF FFT algorithm, the number of complex additions is given by
   a) $N\log_2 (N/2)$ b) $N\log_2(N/3)$ c) $N\log_2 N$ d) Any of the above

P.T.O.

5) ROC cannot contain any
   a) Zero b) Pole
   c) Either a) or b) d) Both a) and b)

6) If $X(Z) = Z\{x(n)\}$ then $Z\{x(n-m)\}$ is _____. (considering zero initial conditions)
   a) $Z^{-m}X(Z)$ b) $Z^{m}X(Z)$
   c) $ZX(Z)$ d) $Z^{-2m}X(Z)$

7) $Z\{e^{-anT}u(n)\}$ is _____. ('a' is real)
   a) $1/(Z - e^{-aT})$ b) $1/(Z-e^{aT})$
   c) $Z/(Z - e^{aT})$ d) $Z/(Z - e^{-aT})$

8) $y(t) = x(t-1) + x(t)$ is
   a) Linear b) Time-invariant c) Non-linear d) Causal

9) The power signal is one which has _____ energy and _____ average power.
   a) finite, infinite b) zero, infinite c) infinite, zero d) infinite, infinite

10) In exponential Fourier series, c_n is given as _____
   a) $A_n e^{j\theta n}$ b) $A_n e^{-j\theta n}$ c) $A_{n/2} e^{-j\theta n}$ d) $A_{n/2} e^{j\theta n}$

11) The discrete time system described by $y(n) = x(n^2)$ is
   a) causal, linear and time variant
   b) causal, linear and time invariant
   c) non-causal, linear and time-invariant
   d) non-causal, linear and time variant

12) The DT signal $\cos\left(2\pi n/12\right)$ is periodic with period
   a) $2\pi/12$ b) 6 c) 12 d) A periodic

13) The Fourier series expansion of an odd periodic function contains
   a) For cosine terms b) Only sine terms
   c) Both cosine and sine d) Only sine term with constant

14) Inverse Fourier transform of $\text{sgn}(\omega)$ is
   a) $-j/\pi t$ b) $j/\pi t$ c) $1/\pi t$ d) $-1/\pi t$

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SLR-VB – 325

Seat No.	

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 24-5-2017 Marks : 56
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

2. Solve **any four** : **(4×4=16)**

a) Find whether following signals are periodic or not :
$x(t) = 2\cos(10t + 1) - \sin(4t - 1)$

b) Determine the energy and power of the following signals :
$x(t) = tu(t)$.

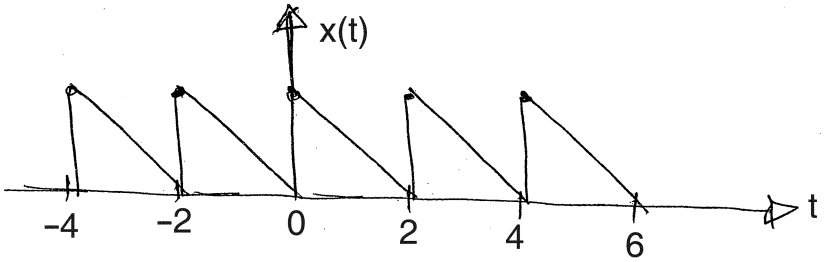
c) Check linearity and causality of the following system :
$y(n) = \sum_{k=-\infty}^{n+1} x(k)$.

d) Find Fourier Transform of $x(t) = e^{-2t}u(t - 1)$.

e) Derive the frequency shifting property of Fourier transform.

3. Solve **any two** : **(6×2=12)**

a) Find the exponential series of the following signal :



b) Find the Fourier transform of the following signal :
$x(t) = A\,\text{rect}\left(t/\tau\right)$ for $|t| \le \tau/2$
$= 0$ otherwise

c) Determine the convolution of the following sequences :
$x(n) = b^n u(n)$ and $h(n) = a^n u(n)$ when $a \neq b$.

Set Q

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) Find Z transform and sketch R.O.C. for following sequence :

   $X[n] = -b^n u(-n-1)$

   b) Determine the signal x(n) whose Z transform is given by

   $X(Z) = \log(1 - az^{-1})$; $|Z| > |a|$

   c) Find $X(\infty)$, if i) $X(Z) = (Z + 2)/(Z - 0.8)^2$

   ii) $X(Z) = (Z + 1)/3\ (Z - 1)\ (Z + 0.9)$

   d) Derive the time shifting property of DTFT.

   e) Find the DFT of the following sequences :

   i) $x(n) = \partial(n - n_0)$ ii) $x(n) = a^n$.

5. Solve **any two** : **(6×2=12)**

   a) Find 8 point DFT of following sequence :

   $x(n) = \{1, 1, 1, 1\}$.

   b) Determine the sequence x[n] associated with Z transform given using Partial Fraction Expansion [P.F.E.] method.

   $X[Z] = 2Z^2/(Z + 1)\ (Z + 2)^2$; Right sided sequence.

   c) Compute 8 point IDFT of the sequence using DIT FFT algorithm

   $X(K) = \{7, -0.707 - j0.707, -j, 0.707 - j0.707, 1, 0.707 + j0.707, j, -0.707 + j0.707\}$.

SLR-VB – 325

Seat No.	

Set R

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
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 : 14

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

1) The DT signal cos $\left(2\pi n/12\right)$ is periodic with period

a) $2\pi/12$ b) 6 c) 12 d) A periodic

2) The Fourier series expansion of an odd periodic function contains

a) For cosine terms b) Only sine terms
c) Both cosine and sine d) Only sine term with constant

3) Inverse Fourier transform of sgn(ω) is

a) $-j/\pi t$ b) $j/\pi t$ c) $1/\pi t$ d) $-1/\pi t$

4) In DIF FFT algorithm output sequence is

a) In natural order
b) Bit reversed order
c) In ascending order
d) Descending order

P.T.O.

5) If x(z) = {1, 2, 1, 2, 3 .} ROC is
   ↕
   a) Entire z-plane
   b) Entire z-plane except z = ∞
   c) Entire z-plane except z = 0, z = ∞
   d) Entire z-plane except z = 0

6) In DTFT, if F {x(n)} = $X(e^{j\omega})$ then F(x(n – k)} is =
   a) $e^{-j\omega k}X(e^{j\omega})$ b) $e^{j\omega k}X(e^{j\omega})$
   c) $e^{-j\omega k}X(e^{-j\omega})$ d) $X(e^{j\omega})$

7) In DIF FFT algorithm, the number of complex additions is given by
   a) $N\log_2 (N/2)$ b) $N\log_2(N/3)$
   c) $N\log_2 N$ d) Any of the above

8) ROC cannot contain any
   a) Zero b) Pole
   c) Either a) or b) d) Both a) and b)

9) If X(Z) = Z {x(n)} then Z {x(n – m)} is _____. (considering zero initial conditions)
   a) $Z^{-m}X(Z)$ b) $Z^{m}X(Z)$
   c) ZX(Z) d) $Z^{-2m}X(Z)$

10) $Z\{e^{-anT}u(n)\}$ is _____. ('a' is real)
   a) $1/(Z - e^{-aT})$ b) $1/(Z-e^{aT})$
   c) $Z/(Z - e^{aT})$ d) $Z/(Z - e^{-aT})$

11) y(t) = x(t – 1) + x(t) is
   a) Linear b) Time-invariant c) Non-linear d) Causal

12) The power signal is one which has _____ energy and _____ average power.
   a) finite, infinite b) zero, infinite c) infinite, zero d) infinite, infinite

13) In exponential Fourier series, c_n is given as _____
   a) $A_n e^{j\theta n}$ b) $A_n e^{-j\theta n}$ c) $A_{n/2} e^{-j\theta n}$ d) $A_{n/2} e^{j\theta n}$

14) The discrete time system described by $y(n) = x(n^2)$ is
   a) causal, linear and time variant
   b) causal, linear and time invariant
   c) non-causal, linear and time-invariant
   d) non-causal, linear and time variant

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SLR-VB – 325

Seat No.	

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 24-5-2017 Marks : 56
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

2. Solve **any four** : **(4×4=16)**

a) Find whether following signals are periodic or not :
$x(t) = 2\cos(10t + 1) - \sin(4t - 1)$

b) Determine the energy and power of the following signals :
$x(t) = tu(t)$.

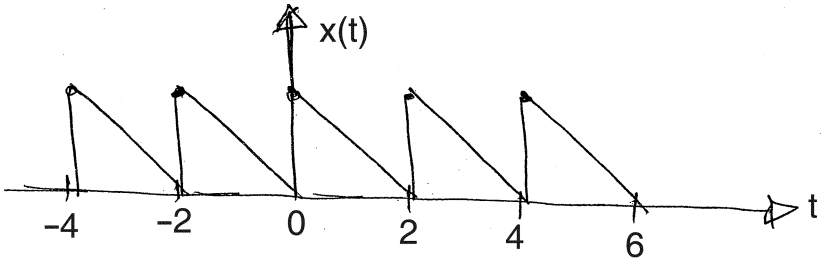
c) Check linearity and causality of the following system :
$y(n) = \sum_{k=-\infty}^{n+1} x(k)$.

d) Find Fourier Transform of $x(t) = e^{-2t}u(t - 1)$.

e) Derive the frequency shifting property of Fourier transform.

3. Solve **any two** : **(6×2=12)**

a) Find the exponential series of the following signal :



b) Find the Fourier transform of the following signal :
$x(t) = A\,\text{rect}\left(t/\tau\right)$ for $|t| \le \tau/2$
$= 0$ otherwise

c) Determine the convolution of the following sequences :
$x(n) = b^n u(n)$ and $h(n) = a^n u(n)$ when $a \neq b$.

Set R

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) Find Z transform and sketch R.O.C. for following sequence :

   $X[n] = -b^n u(-n-1)$

   b) Determine the signal x(n) whose Z transform is given by

   $X(Z) = \log(1 - az^{-1})$; $|Z| > |a|$

   c) Find $X(\infty)$, if i) $X(Z) = (Z + 2)/(Z - 0.8)^2$

   ii) $X(Z) = (Z + 1)/3\ (Z - 1)\ (Z + 0.9)$

   d) Derive the time shifting property of DTFT.

   e) Find the DFT of the following sequences :

   i) $x(n) = \partial(n - n_0)$ ii) $x(n) = a^n$.

5. Solve **any two** : **(6×2=12)**

   a) Find 8 point DFT of following sequence :

   $x(n) = \{1, 1, 1, 1\}$.

   b) Determine the sequence x[n] associated with Z transform given using Partial Fraction Expansion [P.F.E.] method.

   $X[Z] = 2Z^2/(Z + 1)\ (Z + 2)^2$; Right sided sequence.

   c) Compute 8 point IDFT of the sequence using DIT FFT algorithm

   $X(K) = \{7, -0.707 - j0.707, -j, 0.707 - j0.707, 1, 0.707 + j0.707, j, -0.707 + j0.707\}$.

SLR-VB – 325

Seat No.	

Set S

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
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 : 14

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

1) In DTFT, if F {x(n)} = $X(e^{j\omega})$ then F(x(n – k)} is =
   a) $e^{-j\omega k}X(e^{j\omega})$ b) $e^{j\omega k}X(e^{j\omega})$
   c) $e^{-j\omega k}X(e^{-j\omega})$ d) $X(e^{j\omega})$

2) In DIF FFT algorithm, the number of complex additions is given by
   a) $N\log_2 (N/2)$ b) $N\log_2(N/3)$
   c) $N\log_2 N$ d) Any of the above

3) ROC cannot contain any
   a) Zero b) Pole
   c) Either a) or b) d) Both a) and b)

4) If X(Z) = Z {x(n)} then Z {x(n – m)} is _____. (considering zero initial conditions)
   a) $Z^{-m}X(Z)$ b) $Z^{m}X(Z)$
   c) ZX(Z) d) $Z^{-2m}X(Z)$

P.T.O.

5) $Z\{e^{-anT}u(n)\}$ is _____. ('a' is real)
   a) $1/(Z - e^{-aT})$ b) $1/(Z - e^{aT})$ c) $Z/(Z - e^{aT})$ d) $Z/(Z - e^{-aT})$

6) $y(t) = x(t - 1) + x(t)$ is
   a) Linear b) Time-invariant c) Non-linear d) Causal

7) The power signal is one which has _____ energy and _____ average power.
   a) finite, infinite b) zero, infinite c) infinite, zero d) infinite, infinite

8) In exponential Fourier series, c_n is given as _____
   a) $A_n e^{j\theta n}$ b) $A_n e^{-j\theta n}$ c) $A_{n/2} e^{-j\theta n}$ d) $A_{n/2} e^{j\theta n}$

9) The discrete time system described by $y(n) = x(n^2)$ is
   a) causal, linear and time variant
   b) causal, linear and time invariant
   c) non-causal, linear and time-invariant
   d) non-causal, linear and time variant

10) The DT signal $\cos\left(2\pi n/12\right)$ is periodic with period
   a) $2\pi/12$ b) 6 c) 12 d) A periodic

11) The Fourier series expansion of an odd periodic function contains
   a) For cosine terms b) Only sine terms
   c) Both cosine and sine d) Only sine term with constant

12) Inverse Fourier transform of $\text{sgn}(\omega)$ is
   a) $-j/\pi t$ b) $j/\pi t$ c) $1/\pi t$ d) $-1/\pi t$

13) In DIF FFT algorithm output sequence is
   a) In natural order b) Bit reversed order
   c) In ascending order d) Descending order

14) If $x(z) = \{1, 2, 1, 2, 3 .\}$ ROC is
   $\updownarrow$
   a) Entire z-plane
   b) Entire z-plane except $z = \infty$
   c) Entire z-plane except $z = 0$, $z = \infty$
   d) Entire z-plane except $z = 0$

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SLR-VB – 325

Seat No.	

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 24-5-2017 Marks : 56
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

2. Solve **any four** : **(4×4=16)**

a) Find whether following signals are periodic or not :
$x(t) = 2\cos(10t + 1) - \sin(4t - 1)$

b) Determine the energy and power of the following signals :
$x(t) = tu(t)$.

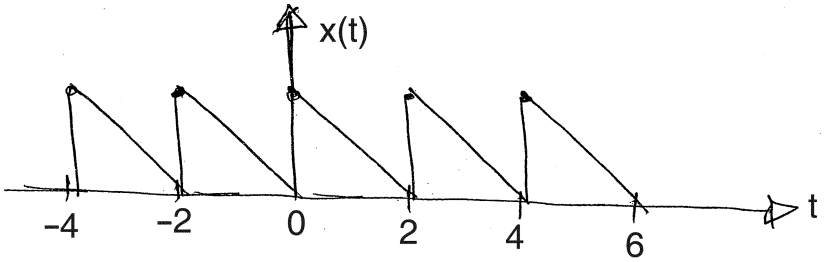
c) Check linearity and causality of the following system :
$y(n) = \sum_{k=-\infty}^{n+1} x(k)$.

d) Find Fourier Transform of $x(t) = e^{-2t}u(t - 1)$.

e) Derive the frequency shifting property of Fourier transform.

3. Solve **any two** : **(6×2=12)**

a) Find the exponential series of the following signal :



b) Find the Fourier transform of the following signal :
$x(t) = A\,\text{rect}\left(t/\tau\right)$ for $|t| \le \tau/2$
$= 0$ otherwise

c) Determine the convolution of the following sequences :
$x(n) = b^n u(n)$ and $h(n) = a^n u(n)$ when $a \neq b$.

SECTION – II

4. Solve **any four** : **(4×4=16)**

   a) Find Z transform and sketch R.O.C. for following sequence :

   $X[n] = -b^n u(-n-1)$

   b) Determine the signal x(n) whose Z transform is given by

   $X(Z) = \log(1 - az^{-1})$; $|Z| > |a|$

   c) Find $X(\infty)$, if i) $X(Z) = (Z + 2)/(Z - 0.8)^2$

   ii) $X(Z) = (Z + 1)/3\ (Z - 1)\ (Z + 0.9)$

   d) Derive the time shifting property of DTFT.

   e) Find the DFT of the following sequences :

   i) $x(n) = \partial(n - n_0)$ ii) $x(n) = a^n$.

5. Solve **any two** : **(6×2=12)**

   a) Find 8 point DFT of following sequence :

   $x(n) = \{1, 1, 1, 1\}$.

   b) Determine the sequence x[n] associated with Z transform given using Partial Fraction Expansion [P.F.E.] method.

   $X[Z] = 2Z^2/(Z + 1)\ (Z + 2)^2$; Right sided sequence.

   c) Compute 8 point IDFT of the sequence using DIT FFT algorithm

   $X(K) = \{7, -0.707 - j0.707, -j, 0.707 - j0.707, 1, 0.707 + j0.707, j, -0.707 + j0.707\}$.

SLR-VB – 326 (C)

Seat No.	

Set **P**

T.E. (Electrical) (Part – II) (New – CGPA) Examination, 2017
VALUE ENGINEERING
Self Learning

Day and Date : Friday, 26-5-2017 Max. Marks : 50
Time : 3.00 p.m. to 5.00 p.m.

***Instructions** : 1) **All** the questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Q. No. **1** is **compulsory**. It should be solved 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

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) Value is equal to
   a) Utility
   b) Cost
   c) Utility/cost
   d) Cost/utility

2) Extension in demand is due to
   a) Extension in price
   b) Extension in supply
   c) Fall on price of commodity
   d) Increase in the price of the commodity

3) Semi variable cost is one which is
   a) Fixed cost
   b) Variable cost
   c) Partly variable and partly fixed cost
   d) Direct cost

4) Strategic planning is primarily carried out by
   a) Top management
   b) Middle management
   c) Knowledge management
   d) Operational management

P.T.O.

5) In value engineering important consideration is given to
   a) Cost control
   b) Customer satisfaction
   c) Function concept
   d) Profit maximization

6) A manager who acts as Crises manager is playing which of the role
   a) Resources allocator
   b) Disturbance handler
   c) Entrepreneur
   d) Negotiator

7) Long term planning means
   a) A period of 5 to 15 years
   b) One to five years
   c) Up to one year
   d) Period of 15 to 25 years

8) Function of staffing includes
   a) Development of persons
   b) Placement
   c) Compensation
   d) All of the above

9) Managing change is an integral part of
   a) Every manager's job
   b) The first line manager job
   c) Middle level managers job
   d) Top level management job

10) The nature of value engineering is
   a) Micro
   b) Macro
   c) Normative and Micro
   d) Only normative

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SLR-VB – 326 (C)

Seat No.	

T.E. (Electrical) (Part – II) (New – CGPA) Examination, 2017
VALUE ENGINEERING
Self Learning

Day and Date : Friday, 26-5-2017 Marks : 40
Time : 3.00 p.m. to 5.00 p.m.

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) Value addition.
   2) Reasons for poor value.
   3) Implementation phase of value engineering.
   4) Value engineering applications in maintenance.
   5) Training for value engineering.

3. Solve **any two** : **(2×10=20)**
   1) Define “Value Engineering”. “How it is useful from engineering economics point of view ?
   2) Explain different techniques of value engineering.
   3) Describe application methodology of value engineering projects.

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Set P

SLR-VB – 326 (C)

Seat No.	

Set **Q**

T.E. (Electrical) (Part – II) (New – CGPA) Examination, 2017
VALUE ENGINEERING
Self Learning

Day and Date : Friday, 26-5-2017 Max. Marks : 50
Time : 3.00 p.m. to 5.00 p.m.

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved 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

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) Managing change is an integral part of
   a) Every manager's job
   b) The first line manager job
   c) Middle level managers job
   d) Top level management job

2) The nature of value engineering is
   a) Micro
   b) Macro
   c) Normative and Micro
   d) Only normative

3) Long term planning means
   a) A period of 5 to 15 years
   b) One to five years
   c) Up to one year
   d) Period of 15 to 25 years

4) Function of staffing includes
   a) Development of persons
   b) Placement
   c) Compensation
   d) All of the above

5) Value is equal to
   a) Utility
   b) Cost
   c) Utility/cost
   d) Cost/utility

6) Extension in demand is due to
   a) Extension in price
   b) Extension in supply
   c) Fall on price of commodity
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7) Semi variable cost is one which is
   a) Fixed cost
   b) Variable cost
   c) Partly variable and partly fixed cost
   d) Direct cost

8) Strategic planning is primarily carried out by
   a) Top management
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   d) Operational management

9) In value engineering important consideration is given to
   a) Cost control
   b) Customer satisfaction
   c) Function concept
   d) Profit maximization

10) A manager who acts as Crises manager is playing which of the role
   a) Resources allocator
   b) Disturbance handler
   c) Entrepreneur
   d) Negotiator

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SLR-VB – 326 (C)

Seat No.	

T.E. (Electrical) (Part – II) (New – CGPA) Examination, 2017
VALUE ENGINEERING
Self Learning

Day and Date : Friday, 26-5-2017 Marks : 40
Time : 3.00 p.m. to 5.00 p.m.

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*
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2. Write short notes on **any four** : **(5×4=20)**
   1) Value addition.
   2) Reasons for poor value.
   3) Implementation phase of value engineering.
   4) Value engineering applications in maintenance.
   5) Training for value engineering.

3. Solve **any two** : **(2×10=20)**
   1) Define “Value Engineering”. “How it is useful from engineering economics point of view ?
   2) Explain different techniques of value engineering.
   3) Describe application methodology of value engineering projects.

———————

Set Q

Set Q

SLR-VB – 326 (C)

Seat No.	

Set **R**

T.E. (Electrical) (Part – II) (New – CGPA) Examination, 2017
VALUE ENGINEERING
Self Learning

Day and Date : Friday, 26-5-2017 Max. Marks : 50
Time : 3.00 p.m. to 5.00 p.m.

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved 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

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) In value engineering important consideration is given to
   a) Cost control b) Customer satisfaction
   c) Function concept d) Profit maximization

2) A manager who acts as Crises manager is playing which of the role
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4) The nature of value engineering is
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   c) Normative and Micro d) Only normative

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   a) Fixed cost
   b) Variable cost
   c) Partly variable and partly fixed cost
   d) Direct cost

P.T.O.

6) Strategic planning is primarily carried out by
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   b) Middle management
   c) Knowledge management
   d) Operational management

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   a) Utility
   b) Cost
   c) Utility/cost
   d) Cost/utility

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   a) Extension in price
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   c) Fall on price of commodity
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   c) Up to one year
   d) Period of 15 to 25 years

10) Function of staffing includes
   a) Development of persons
   b) Placement
   c) Compensation
   d) All of the above

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SLR-VB – 326 (C)

Seat No.	

T.E. (Electrical) (Part – II) (New – CGPA) Examination, 2017
VALUE ENGINEERING
Self Learning

Day and Date : Friday, 26-5-2017 Marks : 40
Time : 3.00 p.m. to 5.00 p.m.

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) Value addition.
   2) Reasons for poor value.
   3) Implementation phase of value engineering.
   4) Value engineering applications in maintenance.
   5) Training for value engineering.

3. Solve **any two** : **(2×10=20)**
   1) Define “Value Engineering”. “How it is useful from engineering economics point of view ?
   2) Explain different techniques of value engineering.
   3) Describe application methodology of value engineering projects.

———————

Set R

SLR-VB – 326 (C)

Seat No.	

Set **S**

T.E. (Electrical) (Part – II) (New – CGPA) Examination, 2017
VALUE ENGINEERING
Self Learning

Day and Date : Friday, 26-5-2017 Max. Marks : 50
Time : 3.00 p.m. to 5.00 p.m.

Instructions *: 1)* ***All*** *the questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved 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

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) Semi variable cost is one which is
   a) Fixed cost
   b) Variable cost
   c) Partly variable and partly fixed cost
   d) Direct cost

2) Strategic planning is primarily carried out by
   a) Top management b) Middle management
   c) Knowledge management d) Operational management

3) In value engineering important consideration is given to
   a) Cost control b) Customer satisfaction
   c) Function concept d) Profit maximization

4) A manager who acts as Crises manager is playing which of the role
   a) Resources allocator b) Disturbance handler
   c) Entrepreneur d) Negotiator

5) Long term planning means
   a) A period of 5 to 15 years b) One to five years
   c) Up to one year d) Period of 15 to 25 years

P.T.O.

6) Function of staffing includes
   a) Development of persons
   b) Placement
   c) Compensation
   d) All of the above

7) Managing change is an integral part of
   a) Every manager's job
   b) The first line manager job
   c) Middle level managers job
   d) Top level management job

8) The nature of value engineering is
   a) Micro
   b) Macro
   c) Normative and Micro
   d) Only normative

9) Value is equal to
   a) Utility
   b) Cost
   c) Utility/cost
   d) Cost/utility

10) Extension in demand is due to
   a) Extension in price
   b) Extension in supply
   c) Fall on price of commodity
   d) Increase in the price of the commodity

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SLR-VB – 326 (C)

Seat No.	

T.E. (Electrical) (Part – II) (New – CGPA) Examination, 2017
VALUE ENGINEERING
Self Learning

Day and Date : Friday, 26-5-2017 Marks : 40
Time : 3.00 p.m. to 5.00 p.m.

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) Value addition.
   2) Reasons for poor value.
   3) Implementation phase of value engineering.
   4) Value engineering applications in maintenance.
   5) Training for value engineering.

3. Solve **any two** : **(2×10=20)**
   1) Define “Value Engineering”. “How it is useful from engineering economics point of view ?
   2) Explain different techniques of value engineering.
   3) Describe application methodology of value engineering projects.

———————

Set S

SLR-VB – 326 (a)

Seat No.	

Set P

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
Self Learning
SAFETY ENGINEERING AND DISASTER MANAGEMENT

Day and Date : Friday, 26-5-2017 Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

***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 : **(10×1=10)**

1) 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

2) 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

3) 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 heath 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

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

6) A workplace emergency evacuation plan is the responsibility of
   a) Company Management
   b) The Government
   c) The Health and Safety Committee
   d) Individual Employees

7) Which is the most effective method of reducing contamination to workers ?
   a) PPE
   b) Administration controls
   c) Fans
   d) Engineering controls

8) 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

9) The work place 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

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SLR-VB – 326 (a)

Seat No.	

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
Self Learning
SAFETY ENGINEERING AND DISASTER MANAGEMENT

Day and Date : Friday, 26-5-2017 Marks : 40

Time : 3.00 p.m. to 5.00 p.m.

2. Solve **any four** : **(4×5=20)**

   a) Discuss in detail about Hazards, their nature.

   b) Discuss various hazard analysis techniques. Also discuss hazard prevention strategies.

   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) What are the impacts of most damaging hazards occurring in the country, on communities, infrastructure, environment etc.

   b) List all of governmental organisations related to disaster management.

   c) Discuss organization structure of safety department along with role and responsibilities of each position.

Set P

SLR-VB – 326 (a)

Seat No.	

Set Q

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
Self Learning
SAFETY ENGINEERING AND DISASTER MANAGEMENT

Day and Date : Friday, 26-5-2017 Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

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 : **(10×1=10)**

1) The work place 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) Which is the most effective method of reducing contamination to workers ?
   a) PPE b) Administration controls
   c) Fans d) Engineering controls

4) 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

5) 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.

6) 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

7) 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 heath 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

8) 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

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) A workplace emergency evacuation plan is the responsibility of
   a) Company Management
   b) The Government
   c) The Health and Safety Committee
   d) Individual Employees

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SLR-VB – 326 (a)

Seat No.	

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
Self Learning
SAFETY ENGINEERING AND DISASTER MANAGEMENT

Day and Date : Friday, 26-5-2017 Marks : 40

Time : 3.00 p.m. to 5.00 p.m.

2. Solve **any four** : **(4×5=20)**

   a) Discuss in detail about Hazards, their nature.

   b) Discuss various hazard analysis techniques. Also discuss hazard prevention strategies.

   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) What are the impacts of most damaging hazards occurring in the country, on communities, infrastructure, environment etc.

   b) List all of governmental organisations related to disaster management.

   c) Discuss organization structure of safety department along with role and responsibilities of each position.

Set Q

SLR-VB – 326 (a)

Seat No.	

Set **R**

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
Self Learning
SAFETY ENGINEERING AND DISASTER MANAGEMENT

Day and Date : Friday, 26-5-2017 Max. Marks : 50
Time : 3.00 p.m. to 5.00 p.m.

***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 : **(10×1=10)**

1) 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

2) A workplace emergency evacuation plan is the responsibility of
   a) Company Management b) The Government
   c) The Health and Safety Committee d) Individual Employees

3) The work place hazard excessive noise may be controlled by
   a) Air conditioning b) Ventilation
   c) Shift work d) PPE

4) 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

5) 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 heath 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

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) 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

8) 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

9) Which is the most effective method of reducing contamination to workers ?
   a) PPE
   b) Administration controls
   c) Fans
   d) Engineering controls

10) 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

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SLR-VB – 326 (a)

Seat No.	

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
Self Learning
SAFETY ENGINEERING AND DISASTER MANAGEMENT

Day and Date : Friday, 26-5-2017 Marks : 40

Time : 3.00 p.m. to 5.00 p.m.

2. Solve **any four** : **(4×5=20)**

   a) Discuss in detail about Hazards, their nature.

   b) Discuss various hazard analysis techniques. Also discuss hazard prevention strategies.

   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) What are the impacts of most damaging hazards occurring in the country, on communities, infrastructure, environment etc.

   b) List all of governmental organisations related to disaster management.

   c) Discuss organization structure of safety department along with role and responsibilities of each position.

Set R

SLR-VB – 326 (a)

Seat No.	

Set S

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
Self Learning
SAFETY ENGINEERING AND DISASTER MANAGEMENT

Day and Date : Friday, 26-5-2017 Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

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 : **(10×1=10)**

1) 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 heath 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

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"
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   d) Social isolation

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   a) Air conditioning
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   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

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   a) A disaster may be domestic or international
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   c) A disaster always receives widespread media coverage
   d) A disaster may have a known and gradual onset

10) 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

———————

SLR-VB – 326 (a)

Seat No.	

T.E. (Electrical) (Part – II) (New-CGPA) Examination, 2017
Self Learning
SAFETY ENGINEERING AND DISASTER MANAGEMENT

Day and Date : Friday, 26-5-2017 Marks : 40

Time : 3.00 p.m. to 5.00 p.m.

2. Solve **any four** : **(4×5=20)**

   a) Discuss in detail about Hazards, their nature.

   b) Discuss various hazard analysis techniques. Also discuss hazard prevention strategies.

   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) What are the impacts of most damaging hazards occurring in the country, on communities, infrastructure, environment etc.

   b) List all of governmental organisations related to disaster management.

   c) Discuss organization structure of safety department along with role and responsibilities of each position.

Set S

SLR-VB – 326 (b)

Seat No.	

Set **P**

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Friday, 26-5-2017 Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

***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) The semiconductor Integrated Circuit Layout Design Act was enacted in year 2000.

2) Any invention concerning with composition, construction or manufacture of a substance, of an article or of an apparatus or an industrial type of process can be patented.

3) A trademark is a special symbol for distinguishing the goods offered for sale.

4) Trademark includes mark, symbol, name, alphabet, numerical, colour or any combination.

5) Solapuri Chadar is not an example of geographical indication.

6) Infringement of a patent consists of the unauthorized making, importing, using, offering for sale or selling any patented invention within the India.

7) The Indian Trademark Act was passed in 1948.

8) Design means the shape, pattern, configuration or ornamentation of an industrial article.

9) Piracy means illegal use of intellectual property.

10) Intellectual Property Rights (IPR) protect the use of information and ideas that are of ethical value.

SLR-VB – 326 (b)

Seat No.	

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Friday, 26-5-2017 Marks : 40

Time : 3.00 p.m. to 5.00 p.m.

2. Attempt following questions **(any two)** : **20**

   1) What are the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement ?

   2) Explain the Procedure for obtaining patents.

   3) Discuss the need to spread awareness regarding piracy, IP Act in India.

3. Short notes **(any four)** : **20**

   1) Overview of Indian Intellectual Property Act.

   2) Law on industrial designs.

   3) Importance of IP Rights and Patents for engineers.

   4) Commercial exploitation and infringement.

   5) Geographical indication of goods.

   6) Trademark.

Set P

SLR-VB – 326 (b)

Seat No.	

Set **Q**

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Friday, 26-5-2017 Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

***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) Piracy means illegal use of intellectual property.

2) Intellectual Property Rights (IPR) protect the use of information and ideas that are of ethical value.

3) The Indian Trademark Act was passed in 1948.

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) Any invention concerning with composition, construction or manufacture of a substance, of an article or of an apparatus or an industrial type of process can be patented.

P.T.O.

7) A trademark is a special symbol for distinguishing the goods offered for sale.

8) Trademark includes mark, symbol, name, alphabet, numerical, colour or any combination.

9) Solapuri Chadar is not an example of geographical indication.

10) Infringement of a patent consists of the unauthorized making, importing, using, offering for sale or selling any patented invention within the India.

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SLR-VB – 326 (b)

Seat No.	

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Friday, 26-5-2017 Marks : 40

Time : 3.00 p.m. to 5.00 p.m.

2. Attempt following questions **(any two)** : **20**

   1) What are the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement ?

   2) Explain the Procedure for obtaining patents.

   3) Discuss the need to spread awareness regarding piracy, IP Act in India.

3. Short notes **(any four)** : **20**

   1) Overview of Indian Intellectual Property Act.

   2) Law on industrial designs.

   3) Importance of IP Rights and Patents for engineers.

   4) Commercial exploitation and infringement.

   5) Geographical indication of goods.

   6) Trademark.

Set Q

SLR-VB – 326 (b)

Seat No.	

Set **R**

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Friday, 26-5-2017 Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

***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) Solapuri Chadar is not an example of geographical indication.

2) Infringement of a patent consists of the unauthorized making, importing, using, offering for sale or selling any patented invention within the India.

3) Piracy means illegal use of intellectual property.

4) Intellectual Property Rights (IPR) protect the use of information and ideas that are of ethical value.

5) A trademark is a special symbol for distinguishing the goods offered for sale.

6) Trademark includes mark, symbol, name, alphabet, numerical, colour or any combination.

P.T.O.

7) The semiconductor Integrated Circuit Layout Design Act was enacted in year 2000.

8) Any invention concerning with composition, construction or manufacture of a substance, of an article or of an apparatus or an industrial type of process can be patented.

9) The Indian Trademark Act was passed in 1948.

10) Design means the shape, pattern, configuration or ornamentation of an industrial article.

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SLR-VB – 326 (b)

Seat No.	

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Friday, 26-5-2017 Marks : 40

Time : 3.00 p.m. to 5.00 p.m.

2. Attempt following questions **(any two)** : **20**

   1) What are the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement ?

   2) Explain the Procedure for obtaining patents.

   3) Discuss the need to spread awareness regarding piracy, IP Act in India.

3. Short notes **(any four)** : **20**

   1) Overview of Indian Intellectual Property Act.

   2) Law on industrial designs.

   3) Importance of IP Rights and Patents for engineers.

   4) Commercial exploitation and infringement.

   5) Geographical indication of goods.

   6) Trademark.

Set R

SLR-VB – 326 (b)

Seat No.	

Set **S**

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Friday, 26-5-2017 Max. Marks : 50

Time : 3.00 p.m. to 5.00 p.m.

***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) A trademark is a special symbol for distinguishing the goods offered for sale.

2) Trademark includes mark, symbol, name, alphabet, numerical, colour or any combination.

3) Solapuri Chadar is not an example of geographical indication.

4) Infringement of a patent consists of the unauthorized making, importing, using, offering for sale or selling any patented invention within the India.

5) The Indian Trademark Act was passed in 1948.

6) Design means the shape, pattern, configuration or ornamentation of an industrial article.

P.T.O.

7) Piracy means illegal use of intellectual property.

8) Intellectual Property Rights (IPR) protect the use of information and ideas that are of ethical value.

9) The semiconductor Integrated Circuit Layout Design Act was enacted in year 2000.

10) Any invention concerning with composition, construction or manufacture of a substance, of an article or of an apparatus or an industrial type of process can be patented.

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SLR-VB – 326 (b)

Seat No.	

T.E. (Electrical Engineering) (Part – II) (New CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS
Self Learning

Day and Date : Friday, 26-5-2017 Marks : 40

Time : 3.00 p.m. to 5.00 p.m.

2. Attempt following questions **(any two)** : **20**

   1) What are the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement ?

   2) Explain the Procedure for obtaining patents.

   3) Discuss the need to spread awareness regarding piracy, IP Act in India.

3. Short notes **(any four)** : **20**

   1) Overview of Indian Intellectual Property Act.

   2) Law on industrial designs.

   3) Importance of IP Rights and Patents for engineers.

   4) Commercial exploitation and infringement.

   5) Geographical indication of goods.

   6) Trademark.

Set S

SLR-VB – 327

Seat No.	

Set P

T.E. (Electrical Engineering) (Old) (Part – II) Examination, 2017
POWER SYSTEM – II

Day and Date : Thursday, 25-5-2017 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.***
3) *Figures to the **right** indicate **full** marks.*
4) *Assume data, **if necessary**.*
5) ***All** questions are **compulsory**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) A 75 MVA, 10KV synchronous generator has reactance of 0.4, the reactance value in p.u to a base of 100 MVA, 11 KV is
   A) 0.578 B) 0.412 C) 0.279 D) 0.44

2) I_{BUS} =
   A) $[Y_{BUS}] \times [V_{BUS}]$ B) $[Z_{BUS}] / [Y_{BUS}]$
   C) $[V_{BUS}] / [Y_{BUS}]$ D) $[Z_{BUS}] \times [V_{BUS}]$

3) 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

4) The positive, negative and zero sequence impedance of a solidly grounded system under steady state condition always follow the relations :
   A) $Z_1 > Z_2 < Z_0$ B) $Z_0 < Z_1 < Z_2$
   C) $Z_1 < Z_2 < Z_0$ D) None of the above

5) The new p.u. impedance if the new base MVA is twice the old base MVA will be
   A) Four times of old p.u. impedance B) Twice the old p.u. impedance
   C) Same as the old p.u. impedance D) Thrice the old p.u. impedance

6) Load flow study carried is out for
   A) Fault calculations B) Stability studies
   C) System planning D) Load frequency control

7) A circuit breaker is
   A) A power factor correcting device
   B) A device to neutralize the effect of transients
   C) A waveform correcting device
   D) A current interrupting device

P.T.O.

8) 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

9) In a balance 3-ph system, negative and zero sequence currents are
   A) Absent B) Equal C) Infinite D) Present

10) Inter connection of sequence networks in case of two conductors open faults is similar to a
   A) L-G fault B) L-L fault C) L-L-G fault D) L-L-L fault

11) The theoretical maximum power occurs when
   A) $\delta = 0°$ B) $\delta = 30°$ C) $\delta = 60°$ D) $\delta = 90°$

12) Equal area criteria gives the information regarding
   A) Stability region B) Relative stability
   C) Absolute stability D) Swing curves

13) The critical clearing time of a fault in a power system is related to
   A) Steady state stability limit B) Short circuit current limit
   C) Transient stability limit D) Reactive power limit

14) The lightning arrestor is located
   A) At the top of the building B) At the bottom of the building
   C) Away from the building to be protected D) In the centre of the building

15) The off-diagonal elements in an Y_{BUS} are called as
   A) Driving point admittance B) Mutual admittance
   C) Self admittance D) All of the above

16) The constant impedance representation of loads is quite often used in
   A) Load flow studies B) Stability studies
   C) Security studies D) None of the above

17) The unidirectional transient component of short circuit current is called
   A) DC Offset current B) DC Onset current
   C) AC Offset current D) None of the above

18) Phase shift of sequence components occurs in
   A) Y-Y transformers B) Y-Δ transformers
   C) Δ - Δ transformers D) None of the above

19) In two synchronous generators are interconnected, loss of synchronism will result in
   A) Stalling of generators B) Wild fluctuations in current
   C) Wild fluctuations in current and voltage D) None of the above

20) Compare with steady state stability limit, transient stability limit is
   A) Always less B) Always more
   C) Sometimes less D) Sometimes more

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SLR-VB – 327

Seat No.	

T.E. (Electrical Engineering) (Old) (Part – II) Examination, 2017
POWER SYSTEM – II

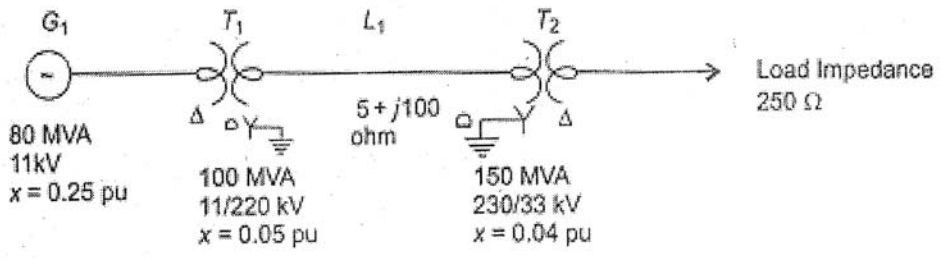
Day and Date : Thursday, 25-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

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) Explain :
      i) Single line diagram and reactance diagram.
      ii) Selection of circuit braker ratings.
   b) Draw equivalent circuit models of following power system components :
      i) Transformer
      ii) Transmission lines.
   c) Discuss formation of Y_{BUS} by method of inspection method with suitable example.
   d) Write short notes on classification of buses in a power system.
   e) Explain transients on a transmission line.

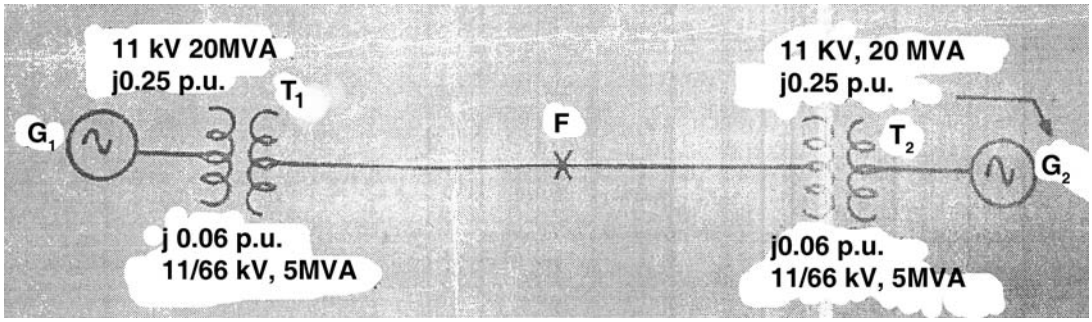
3. Attempt **any two** of the following : **(2×10=20)**
   a) Below figure shows the single line diagram of a simple power system. The transformer ratings, generator rating, line impedance and load impedance are as shown. Draw impedance diagram. Select generator rating as a common base.



   b) Write steps of a computational algorithm of Gauss Seidel method for PQ buses.

Set P

c) Generators G_1 and G_2 are identical and rated 11 KV, 20MVA and have a transient resistance of 0.25 p.u. at own MVA base. The transformer T_1 and T_2 are also identical and are rated 11/66KV, 5MVA and have a reactance of 0.06 p.u. to their own MVA base. The tie line is 50 km long each conductor has a reactance of 0.848 ohm per km. The three phase fault is assumed at F, 20 km from generator as shown in fig. Find short circuit current.



SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**

a) Define a stability of power system. Classify and explain the types of power system stabilities.

b) Derive the expression of power in terms of symmetrical components.

c) Derive the swing equation and discuss its applications in the study of power system stability.

d) Define fault. What are the reasons for the occurrence of fault.

e) Derive the expressions and draw sequence networks of Open conductor faults in power system of :

a) Two conductors open

b) One conductor open.

5. Attempt **any two** of the following : **(2×10=20)**

a) Explain sequence impedances and sequence networks of following PS elements :

i) Transformer ii) Transmission lines.

b) Define an equal area criteria. Discuss the applications of equal area criteria in power systems.

c) Derive the necessary equation to determine the fault current for single line to line fault. Draw a diagram showing the interconnections of sequence networks.

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SLR-VB – 327

Seat No.	

Set **Q**

T.E. (Electrical Engineering) (Old) (Part – II) Examination, 2017
POWER SYSTEM – II

Day and Date : Thursday, 25-5-2017 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.***
3) *Figures to the* ***right*** *indicate* ***full*** *marks.*
4) *Assume data,* ***if necessary****.*
5) ***All*** *questions are* ***compulsory****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) The constant impedance representation of loads is quite often used in
   A) Load flow studies B) Stability studies
   C) Security studies D) None of the above

2) The unidirectional transient component of short circuit current is called
   A) DC Offset current B) DC Onset current
   C) AC Offset current D) None of the above

3) Phase shift of sequence components occurs in
   A) Y-Y transformers B) Y-Δ transformers
   C) Δ - Δ transformers D) None of the above

4) In two synchronous generators are interconnected, loss of synchronism will result in
   A) Stalling of generators B) Wild fluctuations in current
   C) Wild fluctuations in current and voltage D) None of the above

5) Compare with steady state stability limit, transient stability limit is
   A) Always less B) Always more
   C) Sometimes less D) Sometimes more

6) A 75 MVA, 10KV synchronous generator has reactance of 0.4, the reactance value in p.u to a base of 100 MVA, 11 KV is
   A) 0.578 B) 0.412 C) 0.279 D) 0.44

7) I_{BUS} =
   A) $[Y_{BUS}] \times [V_{BUS}]$ B) $[Z_{BUS}] / [Y_{BUS}]$
   C) $[V_{BUS}] / [Y_{BUS}]$ D) $[Z_{BUS}] \times [V_{BUS}]$

P.T.O.

8) 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

9) The positive, negative and zero sequence impedance of a solidly grounded system under steady state condition always follow the relations :
   A) $Z_1 > Z_2 < Z_0$
   B) $Z_0 < Z_1 < Z_2$
   C) $Z_1 < Z_2 < Z_0$
   D) None of the above

10) The new p.u. impedance if the new base MVA is twice the old base MVA will be
   A) Four times of old p.u. impedance
   B) Twice the old p.u. impedance
   C) Same as the old p.u. impedance
   D) Thrice the old p.u. impedance

11) Load flow study carried is out for
   A) Fault calculations
   B) Stability studies
   C) System planning
   D) Load frequency control

12) A circuit breaker is
   A) A power factor correcting device
   B) A device to neutralize the effect of transients
   C) A waveform correcting device
   D) A current interrupting device

13) 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

14) In a balance 3-ph system, negative and zero sequence currents are
   A) Absent B) Equal C) Infinite D) Present

15) Inter connection of sequence networks in case of two conductors open faults is similar to a
   A) L-G fault B) L-L fault C) L-L-G fault D) L-L-L fault

16) The theoretical maximum power occurs when
   A) $\delta = 0°$ B) $\delta = 30°$ C) $\delta = 60°$ D) $\delta = 90°$

17) Equal area criteria gives the information regarding
   A) Stability region
   B) Relative stability
   C) Absolute stability
   D) Swing curves

18) The critical clearing time of a fault in a power system is related to
   A) Steady state stability limit
   B) Short circuit current limit
   C) Transient stability limit
   D) Reactive power limit

19) The lightning arrestor is located
   A) At the top of the building
   B) At the bottom of the building
   C) Away from the building to be protected
   D) In the centre of the building

20) The off-diagonal elements in an Y_{BUS} are called as
   A) Driving point admittance
   B) Mutual admittance
   C) Self admittance
   D) All of the above

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SLR-VB – 327

Seat No.	

T.E. (Electrical Engineering) (Old) (Part – II) Examination, 2017
POWER SYSTEM – II

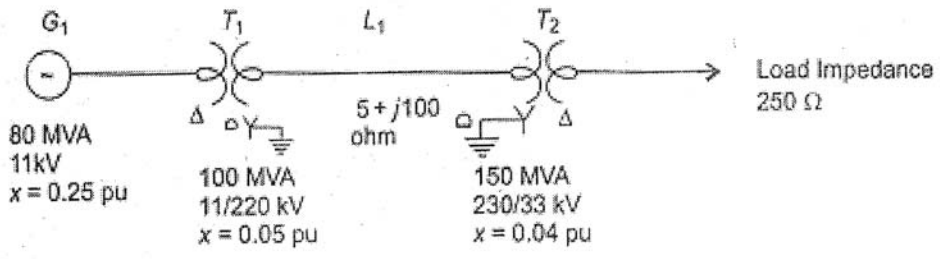
Day and Date : Thursday, 25-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

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) Explain :
      i) Single line diagram and reactance diagram.
      ii) Selection of circuit braker ratings.
   b) Draw equivalent circuit models of following power system components :
      i) Transformer
      ii) Transmission lines.
   c) Discuss formation of Y_{BUS} by method of inspection method with suitable example.
   d) Write short notes on classification of buses in a power system.
   e) Explain transients on a transmission line.

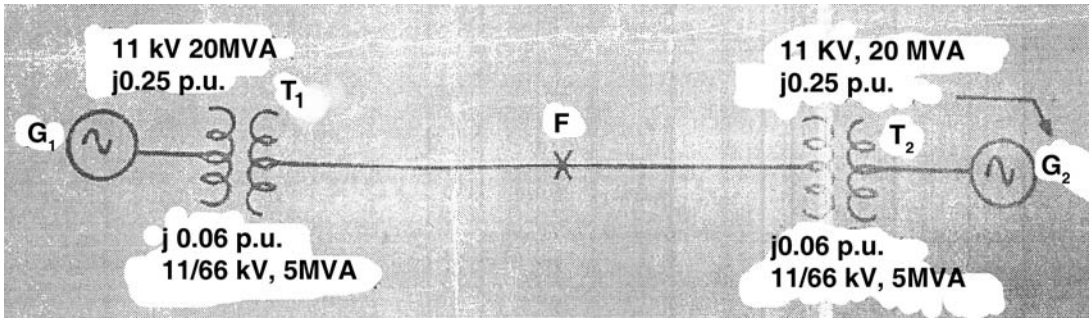
3. Attempt **any two** of the following : **(2×10=20)**
   a) Below figure shows the single line diagram of a simple power system. The transformer ratings, generator rating, line impedance and load impedance are as shown. Draw impedance diagram. Select generator rating as a common base.



   b) Write steps of a computational algorithm of Gauss Seidel method for PQ buses.

Set Q

c) Generators G_1 and G_2 are identical and rated 11 KV, 20MVA and have a transient resistance of 0.25 p.u. at own MVA base. The transformer T_1 and T_2 are also identical and are rated 11/66KV, 5MVA and have a reactance of 0.06 p.u. to their own MVA base. The tie line is 50 km long each conductor has a reactance of 0.848 ohm per km. The three phase fault is assumed at F, 20 km from generator as shown in fig. Find short circuit current.



SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**

a) Define a stability of power system. Classify and explain the types of power system stabilities.

b) Derive the expression of power in terms of symmetrical components.

c) Derive the swing equation and discuss its applications in the study of power system stability.

d) Define fault. What are the reasons for the occurrence of fault.

e) Derive the expressions and draw sequence networks of Open conductor faults in power system of :

a) Two conductors open

b) One conductor open.

5. Attempt **any two** of the following : **(2×10=20)**

a) Explain sequence impedances and sequence networks of following PS elements :

i) Transformer ii) Transmission lines.

b) Define an equal area criteria. Discuss the applications of equal area criteria in power systems.

c) Derive the necessary equation to determine the fault current for single line to line fault. Draw a diagram showing the interconnections of sequence networks.

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SLR-VB – 327

Seat No.	

Set **R**

T.E. (Electrical Engineering) (Old) (Part – II) Examination, 2017
POWER SYSTEM – II

Day and Date : Thursday, 25-5-2017 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.***
3) *Figures to the* ***right*** *indicate* ***full*** *marks.*
4) *Assume data,* ***if necessary****.*
5) ***All*** *questions are* ***compulsory****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) The theoretical maximum power occurs when
A) $\delta = 0°$ B) $\delta = 30°$ C) $\delta = 60°$ D) $\delta = 90°$

2) Equal area criteria gives the information regarding
A) Stability region B) Relative stability
C) Absolute stability D) Swing curves

3) The critical clearing time of a fault in a power system is related to
A) Steady state stability limit B) Short circuit current limit
C) Transient stability limit D) Reactive power limit

4) The lightning arrestor is located
A) At the top of the building B) At the bottom of the building
C) Away from the building to be protected D) In the centre of the building

5) The off-diagonal elements in an Y_{BUS} are called as
A) Driving point admittance B) Mutual admittance
C) Self admittance D) All of the above

6) The constant impedance representation of loads is quite often used in
A) Load flow studies B) Stability studies
C) Security studies D) None of the above

7) The unidirectional transient component of short circuit current is called
A) DC Offset current B) DC Onset current
C) AC Offset current D) None of the above

8) Phase shift of sequence components occurs in
A) Y-Y transformers B) Y-Δ transformers
C) Δ - Δ transformers D) None of the above

P.T.O.

9) In two synchronous generators are interconnected, loss of synchronism will result in
   A) Stalling of generators B) Wild fluctuations in current
   C) Wild fluctuations in current and voltage D) None of the above

10) Compare with steady state stability limit, transient stability limit is
   A) Always less B) Always more
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   A) $[Y_{BUS}] \times [V_{BUS}]$ B) $[Z_{BUS}] / [Y_{BUS}]$
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14) The positive, negative and zero sequence impedance of a solidly grounded system under steady state condition always follow the relations :
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   A) Four times of old p.u. impedance B) Twice the old p.u. impedance
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   C) A waveform correcting device
   D) A current interrupting device

18) 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

19) In a balance 3-ph system, negative and zero sequence currents are
   A) Absent B) Equal C) Infinite D) Present

20) Inter connection of sequence networks in case of two conductors open faults is similar to a
   A) L-G fault B) L-L fault C) L-L-G fault D) L-L-L fault

SLR-VB – 327

Seat No.	

T.E. (Electrical Engineering) (Old) (Part – II) Examination, 2017
POWER SYSTEM – II

Day and Date : Thursday, 25-5-2017 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) Explain :
      i) Single line diagram and reactance diagram.
      ii) Selection of circuit braker ratings.
   b) Draw equivalent circuit models of following power system components :
      i) Transformer
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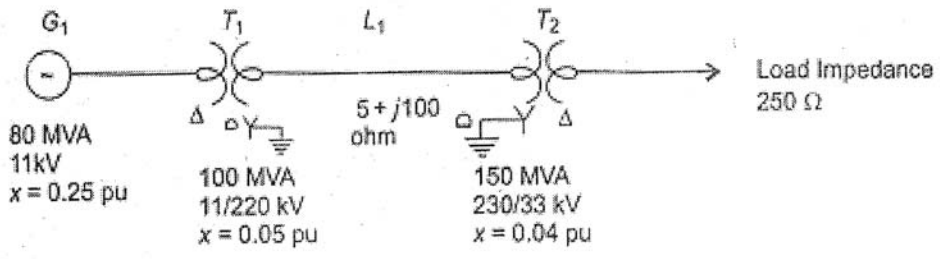
   c) Discuss formation of Y_{BUS} by method of inspection method with suitable example.
   d) Write short notes on classification of buses in a power system.
   e) Explain transients on a transmission line.

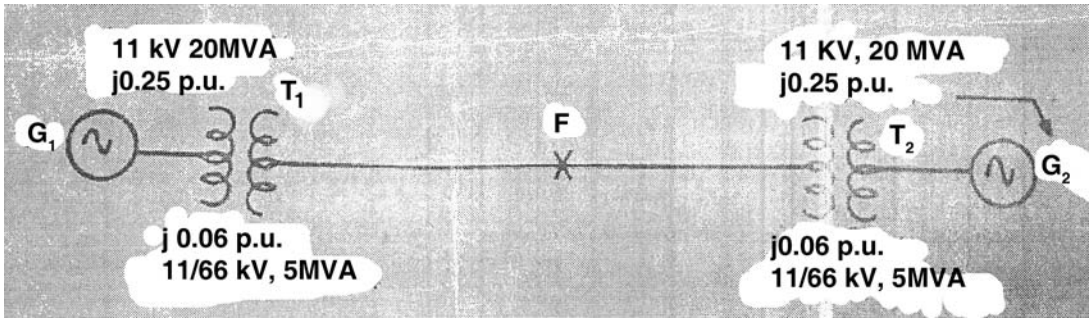
3. Attempt **any two** of the following : **(2×10=20)**
   a) Below figure shows the single line diagram of a simple power system. The transformer ratings, generator rating, line impedance and load impedance are as shown. Draw impedance diagram. Select generator rating as a common base.



   b) Write steps of a computational algorithm of Gauss Seidel method for PQ buses.

Set R

c) Generators G_1 and G_2 are identical and rated 11 KV, 20MVA and have a transient resistance of 0.25 p.u. at own MVA base. The transformer T_1 and T_2 are also identical and are rated 11/66KV, 5MVA and have a reactance of 0.06 p.u. to their own MVA base. The tie line is 50 km long each conductor has a reactance of 0.848 ohm per km. The three phase fault is assumed at F, 20 km from generator as shown in fig. Find short circuit current.



SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**

a) Define a stability of power system. Classify and explain the types of power system stabilities.

b) Derive the expression of power in terms of symmetrical components.

c) Derive the swing equation and discuss its applications in the study of power system stability.

d) Define fault. What are the reasons for the occurrence of fault.

e) Derive the expressions and draw sequence networks of Open conductor faults in power system of :

a) Two conductors open

b) One conductor open.

5. Attempt **any two** of the following : **(2×10=20)**

a) Explain sequence impedances and sequence networks of following PS elements :

i) Transformer ii) Transmission lines.

b) Define an equal area criteria. Discuss the applications of equal area criteria in power systems.

c) Derive the necessary equation to determine the fault current for single line to line fault. Draw a diagram showing the interconnections of sequence networks.

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SLR-VB – 327

Seat No.	

Set **S**

T.E. (Electrical Engineering) (Old) (Part – II) Examination, 2017
POWER SYSTEM – II

Day and Date : Thursday, 25-5-2017 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.***
3) *Figures to the* ***right*** *indicate* ***full*** *marks.*
4) *Assume data,* ***if necessary****.*
5) ***All*** *questions are* ***compulsory****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) Load flow study carried is out for
   A) Fault calculations B) Stability studies
   C) System planning D) Load frequency control

2) A circuit breaker is
   A) A power factor correcting device
   B) A device to neutralize the effect of transients
   C) A waveform correcting device
   D) A current interrupting device

3) Which of the following results in a symmetrical fault ?
   A) Single line to earth B) Phase to phase
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4) In a balance 3-ph system, negative and zero sequence currents are
   A) Absent B) Equal C) Infinite D) Present

5) Inter connection of sequence networks in case of two conductors open faults is similar to a
   A) L-G fault B) L-L fault C) L-L-G fault D) L-L-L fault

6) The theoretical maximum power occurs when
   A) $\delta = 0°$ B) $\delta = 30°$ C) $\delta = 60°$ D) $\delta = 90°$

7) Equal area criteria gives the information regarding
   A) Stability region B) Relative stability
   C) Absolute stability D) Swing curves

8) The critical clearing time of a fault in a power system is related to
   A) Steady state stability limit B) Short circuit current limit
   C) Transient stability limit D) Reactive power limit

P.T.O.

9) The lightning arrestor is located
   A) At the top of the building
   B) At the bottom of the building
   C) Away from the building to be protected
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10) The off-diagonal elements in an Y_{BUS} are called as
   A) Driving point admittance
   B) Mutual admittance
   C) Self admittance
   D) All of the above

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   A) Stalling of generators
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   C) Wild fluctuations in current and voltage
   D) None of the above

15) Compare with steady state stability limit, transient stability limit is
   A) Always less
   B) Always more
   C) Sometimes less
   D) Sometimes more

16) A 75 MVA, 10KV synchronous generator has reactance of 0.4, the reactance value in p.u to a base of 100 MVA, 11 KV is
   A) 0.578 B) 0.412 C) 0.279 D) 0.44

17) I_{BUS} =
   A) $[Y_{BUS}] \times [V_{BUS}]$
   B) $[Z_{BUS}] / [Y_{BUS}]$
   C) $[V_{BUS}] / [Y_{BUS}]$
   D) $[Z_{BUS}] \times [V_{BUS}]$

18) 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

19) The positive, negative and zero sequence impedance of a solidly grounded system under steady state condition always follow the relations :
   A) $Z_1 > Z_2 < Z_0$
   B) $Z_0 < Z_1 < Z_2$
   C) $Z_1 < Z_2 < Z_0$
   D) None of the above

20) The new p.u. impedance if the new base MVA is twice the old base MVA will be
   A) Four times of old p.u. impedance
   B) Twice the old p.u. impedance
   C) Same as the old p.u. impedance
   D) Thrice the old p.u. impedance

SLR-VB – 327

Seat No.	

T.E. (Electrical Engineering) (Old) (Part – II) Examination, 2017
POWER SYSTEM – II

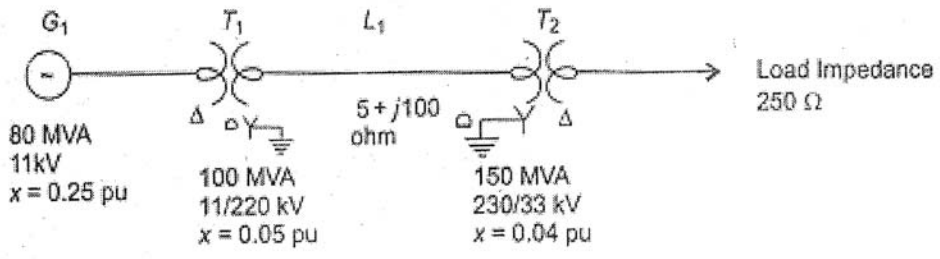
Day and Date : Thursday, 25-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

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) Explain :
      i) Single line diagram and reactance diagram.
      ii) Selection of circuit braker ratings.
   b) Draw equivalent circuit models of following power system components :
      i) Transformer
      ii) Transmission lines.
   c) Discuss formation of Y_{BUS} by method of inspection method with suitable example.
   d) Write short notes on classification of buses in a power system.
   e) Explain transients on a transmission line.

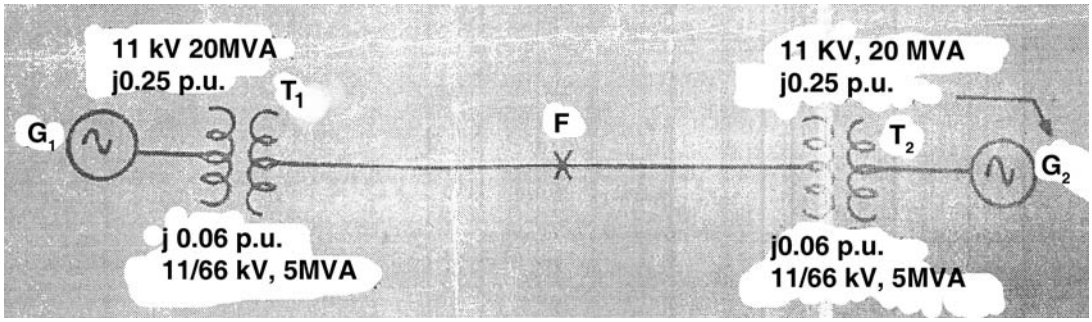
3. Attempt **any two** of the following : **(2×10=20)**
   a) Below figure shows the single line diagram of a simple power system. The transformer ratings, generator rating, line impedance and load impedance are as shown. Draw impedance diagram. Select generator rating as a common base.



   b) Write steps of a computational algorithm of Gauss Seidel method for PQ buses.

Set S

c) Generators G_1 and G_2 are identical and rated 11 KV, 20MVA and have a transient resistance of 0.25 p.u. at own MVA base. The transformer T_1 and T_2 are also identical and are rated 11/66KV, 5MVA and have a reactance of 0.06 p.u. to their own MVA base. The tie line is 50 km long each conductor has a reactance of 0.848 ohm per km. The three phase fault is assumed at F, 20 km from generator as shown in fig. Find short circuit current.



SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**

a) Define a stability of power system. Classify and explain the types of power system stabilities.

b) Derive the expression of power in terms of symmetrical components.

c) Derive the swing equation and discuss its applications in the study of power system stability.

d) Define fault. What are the reasons for the occurrence of fault.

e) Derive the expressions and draw sequence networks of Open conductor faults in power system of :

a) Two conductors open

b) One conductor open.

5. Attempt **any two** of the following : **(2×10=20)**

a) Explain sequence impedances and sequence networks of following PS elements :

i) Transformer ii) Transmission lines.

b) Define an equal area criteria. Discuss the applications of equal area criteria in power systems.

c) Derive the necessary equation to determine the fault current for single line to line fault. Draw a diagram showing the interconnections of sequence networks.

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SLR-VB – 328

Seat No.	

Set **P**

T.E. (Electrical) (Part – II) (Old) Examination, 2017
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Monday, 29-05-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

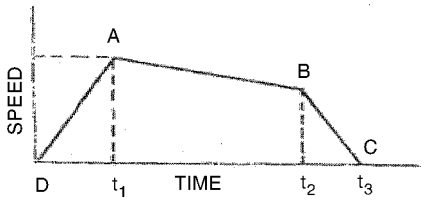
Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(1×20=20)**

1) The speed time curve for a local train is shown in figure. In this AB represents



A) Coasting B) Acceleration C) Braking D) Regeneration

2) The material of the heating element for a furnace should have
A) Lower melting point B) Higher temperature coefficient
C) High specific resistance D) All of the above

3) A zero watt lamp consumes
A) No power B) About 5 to 7 W power
C) About 15 to 20 W power D) About 25 to 30 W power

4) Which of the following will happen if the thickness of refractory wall of furnace is increased ?
A) Heat loss through furnace wall will increase
B) Temperature inside the furnace will fall
C) Energy consumption will increase
D) Temperature on the outer surface of furnace walls will drop

5) When a body reflects entire radiation incident on it, then it is known as
A) White body B) Grey body
C) Transparent body D) Black body

6) Braking retardation on suburban trains is
A) 0.3 to 0.5 kmphps B) 0.5 to 1 kmphps
C) 3 to 5 kmphps D) 30 to 40 kmphps

P.T.O.

7) In a steam locomotive electric power is provided through
   A) Battery system B) Diesel engine generator
   C) Overhead wire D) Small turbo generator

8) The coefficient of adhesion is highest when the
   A) Rails are dry B) Rails are oiled
   C) Rails are wet with dew D) Rails are dusty

9) For tramways the return circuit is through
   A) Cables B) Rails C) Neutral wire D) Common earthling

10) When the speed of the train is estimated taking into account the time of stop at a station in addition to the actual running time between stops is known as
   A) Average speed B) Schedule speed
   C) Notching speed D) Free running speed

11) The unit of luminous flux is
   A) Steradian B) Candela C) Lumen D) Lux

12) The illumination is directly proportional to the cosine of the angle made by the normal to the illuminated surface with the direction of the incident flux. Above statement is associated with
   A) Planck's law B) Macbeth's law of illumination
   C) Bunsen's law of illumination D) Lambert's cosine law

13) Which of the following heating methods has maximum power factor ?
   A) Arc heating B) Dielectric heating
   C) Resistance heating D) None of the above

14) Which of the following lamp gives nearly monochromatic light ?
   A) Sodium vapour lamp B) GLS lamp
   C) Tube light D) Mercury vapour lamp

15) Which of the following will need the highest level of illumination ?
   A) Proof reading B) Bed rooms C) Hospital wards D) Railway platforms

16) A submarine while moving under water, is provided driving power through
   A) Diesel engines B) Steam turbine C) Gas turbine D) Batteries

17) Standard wattage of 3 ft. fluorescent tube is
   A) 10 W B) 40 W C) 65 W D) 100 W

18) Which locomotive has the highest operational availability ?
   A) Diesel B) Electric
   C) Steam D) All have same availability

19) In a resistance furnace the atmosphere is
   A) Oxidizing B) Deoxidizing C) Neutral D) All of the above

20) A perfect white body is one that
   A) Transmits all incident radiations B) Absorbs all incident radiations
   C) Reflects all incident radiations D) Absorbs, reflects all incident radiations

SLR-VB – 328

Seat No.	

T.E. (Electrical) (Part – II) (Old) Examination, 2017
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Monday, 29-05-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

1) Describe the construction and operation of indirect arc furnace.

2) Write a note on motor selection in rolling machines.

3) What are the factors to be considered while designing the lighting scheme ?

4) A 15 kW, 220 V, single phase resistance oven employs nickel-chrome wire for its heating elements. If the wire temperature is not to exceed 1000°C and the temperature of the charge is to be 600°C, calculate the diameter and length of the wire. Assume radiating efficiency to be 0.6 and emissivity as 0.9, for nickel-chrome resistivity is $1.016 \times 10^{-6}\ \Omega$ m.

5) Write short note on integrating sphere.

3. Solve the following : **(10×2=20)**

1) Draw and explain circuit of fluorescent tube lamp.

2) With neat diagram explain seam welding and butt welding.

OR

3) Explain the classification of electric heating. What are the advantages of electric heating ?

SECTION – II

4. Solve **any four** : **(5×4=20)**

1) Explain Quadrilateral speed-time curve.

2) Write a short note on energy conservation planning.

3) An electric train is to have a braking retardation of 3.2 km/h/s. If the ratio of maximum speed to average speed is 1.3, the time for stop is 26 seconds and acceleration is 0.8 km/h/s, find its schedule speed for a run of 1.5 km. Assume trapezoidal speed time curve.

4) How can energy conservation be done in power plant ?

5) Explain suitability of DC series motor for traction work.

Set P

5. Solve **any two** : **(10×2=20)**

   1) Derive specific energy output from speed-time curve.

   2) What is meant by energy conservation ? Explain maximum energy efficiency principle and maximum cost effectiveness in energy use.

   3) An electric train is weighing 100 tonnes has a rotational inertia 10%. Distance between two stop is 2.5 km and trains have an average speed of 50 kmph. The acceleration and retardation are 1 kmphps and 2 kmphps respectively. Track has an up gradient of 1%, train resistance is 40 N/tonne and efficiency of gearing and motor system is 60%. Determine
      i) maximum power at driving axle
      ii) total energy consumption
      iii) specific energy consumption. Assume trapezoidal speed-time curve.

_____

SLR-VB – 328

Seat No.	

Set **Q**

T.E. (Electrical) (Part – II) (Old) Examination, 2017
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Monday, 29-05-2017 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 : **(1×20=20)**

1) A submarine while moving under water, is provided driving power through
A) Diesel engines B) Steam turbine C) Gas turbine D) Batteries

2) Standard wattage of 3 ft. fluorescent tube is
A) 10 W B) 40 W C) 65 W D) 100 W

3) Which locomotive has the highest operational availability ?
A) Diesel B) Electric
C) Steam D) All have same availability

4) In a resistance furnace the atmosphere is
A) Oxidizing B) Deoxidizing C) Neutral D) All of the above

5) A perfect white body is one that
A) Transmits all incident radiations B) Absorbs all incident radiations
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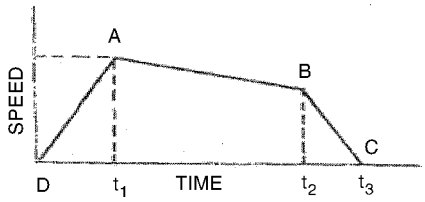
6) The speed time curve for a local train is shown in figure. In this AB represents



A) Coasting B) Acceleration C) Braking D) Regeneration

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P.T.O.

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   A) 0.3 to 0.5 kmphps B) 0.5 to 1 kmphps
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   A) Battery system B) Diesel engine generator
   C) Overhead wire D) Small turbo generator

13) The coefficient of adhesion is highest when the
   A) Rails are dry B) Rails are oiled
   C) Rails are wet with dew D) Rails are dusty

14) For tramways the return circuit is through
   A) Cables B) Rails C) Neutral wire D) Common earthling

15) When the speed of the train is estimated taking into account the time of stop at a station in addition to the actual running time between stops is known as
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19) Which of the following lamp gives nearly monochromatic light ?
   A) Sodium vapour lamp B) GLS lamp
   C) Tube light D) Mercury vapour lamp

20) Which of the following will need the highest level of illumination ?
   A) Proof reading B) Bed rooms C) Hospital wards D) Railway platforms

SLR-VB – 328

Seat No.	

T.E. (Electrical) (Part – II) (Old) Examination, 2017
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Monday, 29-05-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

1) Describe the construction and operation of indirect arc furnace.

2) Write a note on motor selection in rolling machines.

3) What are the factors to be considered while designing the lighting scheme ?

4) A 15 kW, 220 V, single phase resistance oven employs nickel-chrome wire for its heating elements. If the wire temperature is not to exceed 1000°C and the temperature of the charge is to be 600°C, calculate the diameter and length of the wire. Assume radiating efficiency to be 0.6 and emissivity as 0.9, for nickel-chrome resistivity is $1.016 \times 10^{-6}\ \Omega$ m.

5) Write short note on integrating sphere.

3. Solve the following : **(10×2=20)**

1) Draw and explain circuit of fluorescent tube lamp.

2) With neat diagram explain seam welding and butt welding.

OR

3) Explain the classification of electric heating. What are the advantages of electric heating ?

SECTION – II

4. Solve **any four** : **(5×4=20)**

1) Explain Quadrilateral speed-time curve.

2) Write a short note on energy conservation planning.

3) An electric train is to have a braking retardation of 3.2 km/h/s. If the ratio of maximum speed to average speed is 1.3, the time for stop is 26 seconds and acceleration is 0.8 km/h/s, find its schedule speed for a run of 1.5 km. Assume trapezoidal speed time curve.

4) How can energy conservation be done in power plant ?

5) Explain suitability of DC series motor for traction work.

Set Q

5. Solve **any two** : **(10×2=20)**

   1) Derive specific energy output from speed-time curve.

   2) What is meant by energy conservation ? Explain maximum energy efficiency principle and maximum cost effectiveness in energy use.

   3) An electric train is weighing 100 tonnes has a rotational inertia 10%. Distance between two stop is 2.5 km and trains have an average speed of 50 kmph. The acceleration and retardation are 1 kmphps and 2 kmphps respectively. Track has an up gradient of 1%, train resistance is 40 N/tonne and efficiency of gearing and motor system is 60%. Determine
      i) maximum power at driving axle
      ii) total energy consumption
      iii) specific energy consumption. Assume trapezoidal speed-time curve.

_____

SLR-VB – 328

Seat No.	

Set **R**

T.E. (Electrical) (Part – II) (Old) Examination, 2017
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Monday, 29-05-2017 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 : **(1×20=20)**

1) The unit of luminous flux is
A) Steradian B) Candela C) Lumen D) Lux

2) The illumination is directly proportional to the cosine of the angle made by the normal to the illuminated surface with the direction of the incident flux. Above statement is associated with
A) Planck's law B) Macbeth's law of illumination
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C) Tube light D) Mercury vapour lamp

5) Which of the following will need the highest level of illumination ?
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A) Diesel engines B) Steam turbine C) Gas turbine D) Batteries

7) Standard wattage of 3 ft. fluorescent tube is
A) 10 W B) 40 W C) 65 W D) 100 W

8) Which locomotive has the highest operational availability ?
A) Diesel B) Electric
C) Steam D) All have same availability

9) In a resistance furnace the atmosphere is
A) Oxidizing B) Deoxidizing
C) Neutral D) All of the above

P.T.O.

10) A perfect white body is one that
A) Transmits all incident radiations B) Absorbs all incident radiations
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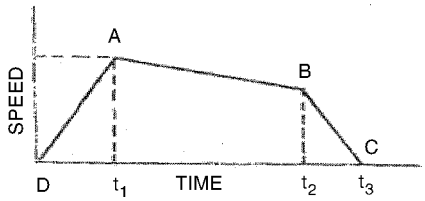
11) The speed time curve for a local train is shown in figure. In this AB represents



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A) Average speed B) Schedule speed
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SLR-VB – 328

Seat No.	

T.E. (Electrical) (Part – II) (Old) Examination, 2017
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Monday, 29-05-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

1) Describe the construction and operation of indirect arc furnace.

2) Write a note on motor selection in rolling machines.

3) What are the factors to be considered while designing the lighting scheme ?

4) A 15 kW, 220 V, single phase resistance oven employs nickel-chrome wire for its heating elements. If the wire temperature is not to exceed 1000°C and the temperature of the charge is to be 600°C, calculate the diameter and length of the wire. Assume radiating efficiency to be 0.6 and emissivity as 0.9, for nickel-chrome resistivity is $1.016 \times 10^{-6}\ \Omega$ m.

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1) Draw and explain circuit of fluorescent tube lamp.

2) With neat diagram explain seam welding and butt welding.

OR

3) Explain the classification of electric heating. What are the advantages of electric heating ?

SECTION – II

4. Solve **any four** : **(5×4=20)**

1) Explain Quadrilateral speed-time curve.

2) Write a short note on energy conservation planning.

3) An electric train is to have a braking retardation of 3.2 km/h/s. If the ratio of maximum speed to average speed is 1.3, the time for stop is 26 seconds and acceleration is 0.8 km/h/s, find its schedule speed for a run of 1.5 km. Assume trapezoidal speed time curve.

4) How can energy conservation be done in power plant ?

5) Explain suitability of DC series motor for traction work.

Set R

5. Solve **any two** : **(10×2=20)**

   1) Derive specific energy output from speed-time curve.

   2) What is meant by energy conservation ? Explain maximum energy efficiency principle and maximum cost effectiveness in energy use.

   3) An electric train is weighing 100 tonnes has a rotational inertia 10%. Distance between two stop is 2.5 km and trains have an average speed of 50 kmph. The acceleration and retardation are 1 kmphps and 2 kmphps respectively. Track has an up gradient of 1%, train resistance is 40 N/tonne and efficiency of gearing and motor system is 60%. Determine
      i) maximum power at driving axle
      ii) total energy consumption
      iii) specific energy consumption. Assume trapezoidal speed-time curve.

_____

SLR-VB – 328

Seat No.	

Set **S**

T.E. (Electrical) (Part – II) (Old) Examination, 2017
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Monday, 29-05-2017 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 : **(1×20=20)**

1) Braking retardation on suburban trains is
A) 0.3 to 0.5 kmphps B) 0.5 to 1 kmphps
C) 3 to 5 kmphps D) 30 to 40 kmphps

2) In a steam locomotive electric power is provided through
A) Battery system B) Diesel engine generator
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3) The coefficient of adhesion is highest when the
A) Rails are dry B) Rails are oiled
C) Rails are wet with dew D) Rails are dusty

4) For tramways the return circuit is through
A) Cables B) Rails C) Neutral wire D) Common earthling

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6) The unit of luminous flux is
A) Steradian B) Candela C) Lumen D) Lux

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C) Resistance heating D) None of the above

P.T.O.

9) Which of the following lamp gives nearly monochromatic light ?
   A) Sodium vapour lamp B) GLS lamp
   C) Tube light D) Mercury vapour lamp

10) Which of the following will need the highest level of illumination ?
   A) Proof reading B) Bed rooms C) Hospital wards D) Railway platforms

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12) Standard wattage of 3 ft. fluorescent tube is
   A) 10 W B) 40 W C) 65 W D) 100 W

13) Which locomotive has the highest operational availability ?
   A) Diesel B) Electric
   C) Steam D) All have same availability

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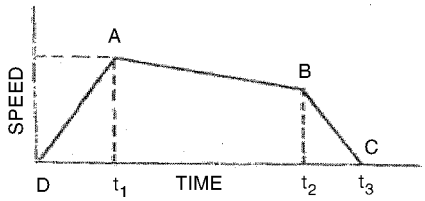
16) The speed time curve for a local train is shown in figure. In this AB represents



   A) Coasting B) Acceleration C) Braking D) Regeneration

17) The material of the heating element for a furnace should have
   A) Lower melting point B) Higher temperature coefficient
   C) High specific resistance D) All of the above

18) A zero watt lamp consumes
   A) No power B) About 5 to 7 W power
   C) About 15 to 20 W power D) About 25 to 30 W power

19) Which of the following will happen if the thickness of refractory wall of furnace is increased ?
   A) Heat loss through furnace wall will increase
   B) Temperature inside the furnace will fall
   C) Energy consumption will increase
   D) Temperature on the outer surface of furnace walls will drop

20) When a body reflects entire radiation incident on it, then it is known as
   A) White body B) Grey body
   C) Transparent body D) Black body

SLR-VB – 328

Seat No.	

T.E. (Electrical) (Part – II) (Old) Examination, 2017
UTILIZATION OF ELECTRICAL ENERGY AND ENERGY CONSERVATION

Day and Date : Monday, 29-05-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

1) Describe the construction and operation of indirect arc furnace.

2) Write a note on motor selection in rolling machines.

3) What are the factors to be considered while designing the lighting scheme ?

4) A 15 kW, 220 V, single phase resistance oven employs nickel-chrome wire for its heating elements. If the wire temperature is not to exceed 1000°C and the temperature of the charge is to be 600°C, calculate the diameter and length of the wire. Assume radiating efficiency to be 0.6 and emissivity as 0.9, for nickel-chrome resistivity is $1.016 \times 10^{-6}\ \Omega$ m.

5) Write short note on integrating sphere.

3. Solve the following : **(10×2=20)**

1) Draw and explain circuit of fluorescent tube lamp.

2) With neat diagram explain seam welding and butt welding.

OR

3) Explain the classification of electric heating. What are the advantages of electric heating ?

SECTION – II

4. Solve **any four** : **(5×4=20)**

1) Explain Quadrilateral speed-time curve.

2) Write a short note on energy conservation planning.

3) An electric train is to have a braking retardation of 3.2 km/h/s. If the ratio of maximum speed to average speed is 1.3, the time for stop is 26 seconds and acceleration is 0.8 km/h/s, find its schedule speed for a run of 1.5 km. Assume trapezoidal speed time curve.

4) How can energy conservation be done in power plant ?

5) Explain suitability of DC series motor for traction work.

Set S

5. Solve **any two** : **(10×2=20)**

   1) Derive specific energy output from speed-time curve.

   2) What is meant by energy conservation ? Explain maximum energy efficiency principle and maximum cost effectiveness in energy use.

   3) An electric train is weighing 100 tonnes has a rotational inertia 10%. Distance between two stop is 2.5 km and trains have an average speed of 50 kmph. The acceleration and retardation are 1 kmphps and 2 kmphps respectively. Track has an up gradient of 1%, train resistance is 40 N/tonne and efficiency of gearing and motor system is 60%. Determine
      i) maximum power at driving axle
      ii) total energy consumption
      iii) specific energy consumption. Assume trapezoidal speed-time curve.

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SLR-VB – 329

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL DRIVES AND CONTROL

Day and Date : Thursday, 4-5-2017 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 alternative : **(1×20=20)**

1) Machine tools are typical example of
   A) Constant power load B) Constant torque load
   C) Variable torque load D) Both A) and B)

2) 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

3) Reduction in supply voltage by 10% will change the torque of motor by
   A) 38% B) 19% C) 9.5% D) No change

4) To get speed below than the base speed of the dc shunt motor
   A) Armature resistance control is used B) Field resistance control is used
   C) Armature voltage control is used D) None of these

5) Effect of friction torque is more pronounced
   A) When the drive is running on full speed B) When the drive is being started
   C) When the drive is being stopped D) When the drive at half of its normal speed

6) Which of the following is preferred for automatic drives ?
   A) Synchronous motors B) Squirrel cage induction motor
   C) Ward Leonard controlled dc motors D) Any of the above

7) A separately excited dc motor fed from 1 phase full converter with firing angle 60 degree runs at 1000 rpm. If this motor is connected to 1 phase semi converter with the same firing angle, the motor would now run at
   A) 2000 rpm B) 1500 rpm C) 1450 rpm D) 1000 rpm

P.T.O.

8) A 6 pulse non reversible thyristorised 415 V ac converter is controlling a 440 V dc motor. If the total drop in the circuit is limited to 10% then the converter must be locked at an angle of
A) 30° B) 60° C) 45° D) 90°

9) 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

10) Slip power control scheme provide a range of speed control of a three phase IM. The range is
A) 0 to Ns B) – Ns to Ns C) 0 to 2Ns D) – 2Ns to 2Ns

11) In a chopper fed dc drive the chopping frequency is approximately equal to
A) 50 Hz B) 300 Hz C) 1000 Hz D) 5000 Hz

12) The no. of thyristors required for single phase midpoint type cyclo-converter are
A) 4 B) 8 C) 12 D) 16

13) 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) 200 V C) 193.3 V D) 241.7 V

14) To save the energy during braking
A) Dynamic braking is used B) Plugging is used
C) Regenerative braking is used D) Mechanical braking is used

15) A three phase induction motor is controlled by keeping ratio V/f constant at 50 Hz, the slip at maximum torque is 0.15 at 25 Hz, the slip at maximum torque would be
A) 0.15 B) 0.30 C) 0.40 D) 0.28

16) Stepper motors are mostly used for
A) High speed operation B) Low speed operation
C) Control system operation D) High power operation

17) Output power requirements of constant torque loads vary with
A) Speed B) Voltage C) Current D) Power factor

18) A stepping motor has four concentric coils on its 4 pole stator. It has an unwound variable reluctance motor with 5 teeths. The step angle for this motor is
A) 36° B) 9° C) 18° D) 72°

19) Regenerative braking can be achieved in BLDC motor
A) By reversing source voltage B) By reversing source current
C) By increasing induced emf D) All of the above

20) 5% increase in supply frequency will change the speed of motor by
A) – 5% B) + 5% C) – 10% D) +10%

SLR-VB – 329

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL DRIVES AND CONTROL

Day and Date : Thursday, 4-5-2017 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) With the help of neat sketch explain operation of closed loop speed control of multi motor drive.

c) A 220 V, 24 A, 100 rpm DC shunt motor has an armature resistance of 2 Ω. 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 $\pm$200 N-m is coupled with motor. Calculate the equilibrium speed of motor in quadrant III.

e) Explain how regenerative braking is employed for DC series motor.

3. Solve following : **(10×2=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 230 V, 960 rpm and 200 A, separately excited dc motor has an armature resistance of 0.02 ohms. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230 V. Assume continuous conduction. Calculate

iv) Duty ratio of chopper for motoring at rated torque and 350 rpm.

v) Duty ratio of chopper for braking at rated torque and 350 rpm.

vi) Duty ratio of chopper for motor speed of 600 rpm and braking torque of twice the rated value if motor is operating in dynamic braking with a braking resistance of 2 ohm.

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 α = 60° and speed = 450 rpm.

b) Motor speed for α = 45° and T = 40 N-m.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) A 400 V, 3 phase, 50 Hz, 4 pole, 1370 rpm star connected induction motor has following parameters referred to stator :

R_s = 2 ohm, R'_r = 3 ohm, X_s = 3.5 ohm, X'_r = 3.5 ohm, motor is controlled by a voltage source inverter at constant v/f ratio. Inverter allows frequency variation from 10 to 50 Hz. Obtain a plot between the breakdown torque and frequency.

b) Explain bipolar drive for permanent magnet and hybrid motors.

c) Explain with block diagram feedback 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) Explain how for the speeds below base speed v/f ratio is maintained constant.

5. Solve **any two** : **(10×2=20)**

a) A 440 V, 2 phase, 50 Hz, 4 pole, 1415 rpm, delta connected induction motor has following parameters referred to stator :

R_s = 0.6 ohm, R'_r = 0.8 ohm, X_s = 0.5 ohm, X'_r = 0.6 ohm and X_m = 15 ohm. Motor is fed from a current source inverter at a constant flux. Determine

i) Motor torque, speed and current when operating at 40 Hz. And rated slip speed.

ii) Inverter frequency and stator current for the rated motor torque and a motor speed of 1000 rpm.

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) Explain with circuit diagram working operation of switched reluctance motor. Also derive its torque equation.

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SLR-VB – 329

Seat No.	

Set Q

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL DRIVES AND CONTROL

Day and Date : Thursday, 4-5-2017 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 alternative : **(1×20=20)**

1) Stepper motors are mostly used for
A) High speed operation B) Low speed operation
C) Control system operation D) High power operation

2) Output power requirements of constant torque loads vary with
A) Speed B) Voltage C) Current D) Power factor

3) A stepping motor has four concentric coils on its 4 pole stator. It has an unwound variable reluctance motor with 5 teeths. The step angle for this motor is
A) 36° B) 9° C) 18° D) 72°

4) Regenerative braking can be achieved in BLDC motor
A) By reversing source voltage B) By reversing source current
C) By increasing induced emf D) All of the above

5) 5% increase in supply frequency will change the speed of motor by
A) – 5% B) + 5% C) – 10% D) +10%

6) Machine tools are typical example of
A) Constant power load B) Constant torque load
C) Variable torque load D) Both A) and B)

7) 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

8) Reduction in supply voltage by 10% will change the torque of motor by
A) 38% B) 19% C) 9.5% D) No change

P.T.O.

9) To get speed below than the base speed of the dc shunt motor
   A) Armature resistance control is used B) Field resistance control is used
   C) Armature voltage control is used D) None of these

10) Effect of friction torque is more pronounced
   A) When the drive is running on full speed B) When the drive is being started
   C) When the drive is being stopped D) When the drive at half of its normal speed

11) Which of the following is preferred for automatic drives ?
   A) Synchronous motors B) Squirrel cage induction motor
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12) A separately excited dc motor fed from 1 phase full converter with firing angle 60 degree runs at 1000 rpm. If this motor is connected to 1 phase semi converter with the same firing angle, the motor would now run at
   A) 2000 rpm B) 1500 rpm C) 1450 rpm D) 1000 rpm

13) A 6 pulse non reversible thyristorised 415 V ac converter is controlling a 440 V dc motor. If the total drop in the circuit is limited to 10% then the converter must be locked at an angle of
   A) 30° B) 60° C) 45° D) 90°

14) 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

15) Slip power control scheme provide a range of speed control of a three phase IM. The range is
   A) 0 to Ns B) – Ns to Ns C) 0 to 2Ns D) – 2Ns to 2Ns

16) In a chopper fed dc drive the chopping frequency is approximately equal to
   A) 50 Hz B) 300 Hz C) 1000 Hz D) 5000 Hz

17) The no. of thyristors required for single phase midpoint type cyclo-converter are
   A) 4 B) 8 C) 12 D) 16

18) 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) 200 V C) 193.3 V D) 241.7 V

19) To save the energy during braking
   A) Dynamic braking is used B) Plugging is used
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20) A three phase induction motor is controlled by keeping ratio V/f constant at 50 Hz, the slip at maximum torque is 0.15 at 25 Hz, the slip at maximum torque would be
   A) 0.15 B) 0.30 C) 0.40 D) 0.28

SLR-VB – 329

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL DRIVES AND CONTROL

Day and Date : Thursday, 4-5-2017 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) With the help of neat sketch explain operation of closed loop speed control of multi motor drive.

c) A 220 V, 24 A, 100 rpm DC shunt motor has an armature resistance of 2 Ω. 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 $\pm$200 N-m is coupled with motor. Calculate the equilibrium speed of motor in quadrant III.

e) Explain how regenerative braking is employed for DC series motor.

3. Solve following : **(10×2=20)**

a) Explain speed torque characteristics for following speed transitions :

i) Increase in speed in same direction

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iii) Speed reversal.

b) A 230 V, 960 rpm and 200 A, separately excited dc motor has an armature resistance of 0.02 ohms. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230 V. Assume continuous conduction. Calculate

iv) Duty ratio of chopper for motoring at rated torque and 350 rpm.

v) Duty ratio of chopper for braking at rated torque and 350 rpm.

vi) Duty ratio of chopper for motor speed of 600 rpm and braking torque of twice the rated value if motor is operating in dynamic braking with a braking resistance of 2 ohm.

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 α = 60° and speed = 450 rpm.

b) Motor speed for α = 45° and T = 40 N-m.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) A 400 V, 3 phase, 50 Hz, 4 pole, 1370 rpm star connected induction motor has following parameters referred to stator :

R_s = 2 ohm, R'_r = 3 ohm, X_s = 3.5 ohm, X'_r = 3.5 ohm, motor is controlled by a voltage source inverter at constant v/f ratio. Inverter allows frequency variation from 10 to 50 Hz. Obtain a plot between the breakdown torque and frequency.

b) Explain bipolar drive for permanent magnet and hybrid motors.

c) Explain with block diagram feedback 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) Explain how for the speeds below base speed v/f ratio is maintained constant.

5. Solve **any two** : **(10×2=20)**

a) A 440 V, 2 phase, 50 Hz, 4 pole, 1415 rpm, delta connected induction motor has following parameters referred to stator :

R_s = 0.6 ohm, R'_r = 0.8 ohm, X_s = 0.5 ohm, X'_r = 0.6 ohm and X_m = 15 ohm. Motor is fed from a current source inverter at a constant flux. Determine

i) Motor torque, speed and current when operating at 40 Hz. And rated slip speed.

ii) Inverter frequency and stator current for the rated motor torque and a motor speed of 1000 rpm.

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) Explain with circuit diagram working operation of switched reluctance motor. Also derive its torque equation.

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SLR-VB – 329

Seat No.	

Set **R**

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL DRIVES AND CONTROL

Day and Date : Thursday, 4-5-2017 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) In a chopper fed dc drive the chopping frequency is approximately equal to
A) 50 Hz B) 300 Hz
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2) The no. of thyristors required for single phase midpoint type cyclo-converter are
A) 4 B) 8 C) 12 D) 16

3) 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) 200 V C) 193.3 V D) 241.7 V

4) To save the energy during braking
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5) A three phase induction motor is controlled by keeping ratio V/f constant at 50 Hz, the slip at maximum torque is 0.15 at 25 Hz, the slip at maximum torque would be
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A) 36° B) 9° C) 18° D) 72°

9) Regenerative braking can be achieved in BLDC motor
   A) By reversing source voltage B) By reversing source current
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10) 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) 0 to Ns B) – Ns to Ns C) 0 to 2Ns D) – 2Ns to 2Ns

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Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL DRIVES AND CONTROL

Day and Date : Thursday, 4-5-2017 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) With the help of neat sketch explain operation of closed loop speed control of multi motor drive.

c) A 220 V, 24 A, 100 rpm DC shunt motor has an armature resistance of 2 Ω. 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 $\pm$200 N-m is coupled with motor. Calculate the equilibrium speed of motor in quadrant III.

e) Explain how regenerative braking is employed for DC series motor.

3. Solve following : **(10×2=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 230 V, 960 rpm and 200 A, separately excited dc motor has an armature resistance of 0.02 ohms. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230 V. Assume continuous conduction. Calculate

iv) Duty ratio of chopper for motoring at rated torque and 350 rpm.

v) Duty ratio of chopper for braking at rated torque and 350 rpm.

vi) Duty ratio of chopper for motor speed of 600 rpm and braking torque of twice the rated value if motor is operating in dynamic braking with a braking resistance of 2 ohm.

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 α = 60° and speed = 450 rpm.

b) Motor speed for α = 45° and T = 40 N-m.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) A 400 V, 3 phase, 50 Hz, 4 pole, 1370 rpm star connected induction motor has following parameters referred to stator :

R_s = 2 ohm, R'_r = 3 ohm, X_s = 3.5 ohm, X'_r = 3.5 ohm, motor is controlled by a voltage source inverter at constant v/f ratio. Inverter allows frequency variation from 10 to 50 Hz. Obtain a plot between the breakdown torque and frequency.

b) Explain bipolar drive for permanent magnet and hybrid motors.

c) Explain with block diagram feedback 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) Explain how for the speeds below base speed v/f ratio is maintained constant.

5. Solve **any two** : **(10×2=20)**

a) A 440 V, 2 phase, 50 Hz, 4 pole, 1415 rpm, delta connected induction motor has following parameters referred to stator :

R_s = 0.6 ohm, R'_r = 0.8 ohm, X_s = 0.5 ohm, X'_r = 0.6 ohm and X_m = 15 ohm. Motor is fed from a current source inverter at a constant flux. Determine

i) Motor torque, speed and current when operating at 40 Hz. And rated slip speed.

ii) Inverter frequency and stator current for the rated motor torque and a motor speed of 1000 rpm.

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) Explain with circuit diagram working operation of switched reluctance motor. Also derive its torque equation.

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SLR-VB – 329

Seat No.	

Set **S**

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL DRIVES AND CONTROL

Day and Date : Thursday, 4-5-2017 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 alternative : **(1×20=20)**

1) Which of the following is preferred for automatic drives ?
A) Synchronous motors B) Squirrel cage induction motor
C) Ward Leonard controlled dc motors D) Any of the above

2) A separately excited dc motor fed from 1 phase full converter with firing angle 60 degree runs at 1000 rpm. If this motor is connected to 1 phase semi converter with the same firing angle, the motor would now run at
A) 2000 rpm B) 1500 rpm C) 1450 rpm D) 1000 rpm

3) A 6 pulse non reversible thyristorised 415 V ac converter is controlling a 440 V dc motor. If the total drop in the circuit is limited to 10% then the converter must be locked at an angle of
A) 30° B) 60° C) 45° D) 90°

4) 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

5) Slip power control scheme provide a range of speed control of a three phase IM. The range is
A) 0 to Ns B) – Ns to Ns C) 0 to 2Ns D) – 2Ns to 2Ns

6) In a chopper fed dc drive the chopping frequency is approximately equal to
A) 50 Hz B) 300 Hz C) 1000 Hz D) 5000 Hz

7) The no. of thyristors required for single phase midpoint type cyclo-converter are
A) 4 B) 8 C) 12 D) 16

P.T.O.

8) 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) 200 V C) 193.3 V D) 241.7 V

9) To save the energy during braking
A) Dynamic braking is used B) Plugging is used
C) Regenerative braking is used D) Mechanical braking is used

10) A three phase induction motor is controlled by keeping ratio V/f constant at 50 Hz, the slip at maximum torque is 0.15 at 25 Hz, the slip at maximum torque would be
A) 0.15 B) 0.30 C) 0.40 D) 0.28

11) Stepper motors are mostly used for
A) High speed operation B) Low speed operation
C) Control system operation D) High power operation

12) Output power requirements of constant torque loads vary with
A) Speed B) Voltage C) Current D) Power factor

13) A stepping motor has four concentric coils on its 4 pole stator. It has an unwound variable reluctance motor with 5 teeths. The step angle for this motor is
A) 36° B) 9° C) 18° D) 72°

14) Regenerative braking can be achieved in BLDC motor
A) By reversing source voltage B) By reversing source current
C) By increasing induced emf D) All of the above

15) 5% increase in supply frequency will change the speed of motor by
A) – 5% B) + 5% C) – 10% D) +10%

16) Machine tools are typical example of
A) Constant power load B) Constant torque load
C) Variable torque load D) Both A) and B)

17) 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

18) Reduction in supply voltage by 10% will change the torque of motor by
A) 38% B) 19% C) 9.5% D) No change

19) To get speed below than the base speed of the dc shunt motor
A) Armature resistance control is used B) Field resistance control is used
C) Armature voltage control is used D) None of these

20) Effect of friction torque is more pronounced
A) When the drive is running on full speed B) When the drive is being started
C) When the drive is being stopped D) When the drive at half of its normal speed

SLR-VB – 329

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL DRIVES AND CONTROL

Day and Date : Thursday, 4-5-2017 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) With the help of neat sketch explain operation of closed loop speed control of multi motor drive.

c) A 220 V, 24 A, 100 rpm DC shunt motor has an armature resistance of 2 Ω. 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 $\pm$200 N-m is coupled with motor. Calculate the equilibrium speed of motor in quadrant III.

e) Explain how regenerative braking is employed for DC series motor.

3. Solve following : **(10×2=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 230 V, 960 rpm and 200 A, separately excited dc motor has an armature resistance of 0.02 ohms. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230 V. Assume continuous conduction. Calculate

iv) Duty ratio of chopper for motoring at rated torque and 350 rpm.

v) Duty ratio of chopper for braking at rated torque and 350 rpm.

vi) Duty ratio of chopper for motor speed of 600 rpm and braking torque of twice the rated value if motor is operating in dynamic braking with a braking resistance of 2 ohm.

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 α = 60° and speed = 450 rpm.

b) Motor speed for α = 45° and T = 40 N-m.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) A 400 V, 3 phase, 50 Hz, 4 pole, 1370 rpm star connected induction motor has following parameters referred to stator :

R_s = 2 ohm, R'_r = 3 ohm, X_s = 3.5 ohm, X'_r = 3.5 ohm, motor is controlled by a voltage source inverter at constant v/f ratio. Inverter allows frequency variation from 10 to 50 Hz. Obtain a plot between the breakdown torque and frequency.

b) Explain bipolar drive for permanent magnet and hybrid motors.

c) Explain with block diagram feedback 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) Explain how for the speeds below base speed v/f ratio is maintained constant.

5. Solve **any two** : **(10×2=20)**

a) A 440 V, 2 phase, 50 Hz, 4 pole, 1415 rpm, delta connected induction motor has following parameters referred to stator :

R_s = 0.6 ohm, R'_r = 0.8 ohm, X_s = 0.5 ohm, X'_r = 0.6 ohm and X_m = 15 ohm. Motor is fed from a current source inverter at a constant flux. Determine

i) Motor torque, speed and current when operating at 40 Hz. And rated slip speed.

ii) Inverter frequency and stator current for the rated motor torque and a motor speed of 1000 rpm.

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) Explain with circuit diagram working operation of switched reluctance motor. Also derive its torque equation.

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SLR-VB – 330

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) Examination, 2017
SWITCHGEAR & PROTECTION

Day and Date : Friday, 5-5-2017 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.***
3) ***All*** *questions* ***compulsory****.*
4) *Assume suitable data if necessary and mention* ***it clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *marks.*
6) ***Assume*** *pick up current* ***equal*** *to rated C.T. secondary current.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) A fuse is a
   a) Protective device b) Current limiting device
   c) Current controlling d) None of the above

2) A circuit breaker is a
   a) current controlling device b) circuit interrupting device
   c) current limiting device d) none of the above

3) If the length of arc in C.B. increases, its resistance
   a) decreases b) increases
   c) remains same d) none of the above

4) Current chopping Phenomenon mainly occurs in
   a) Air-Blast C.B b) Oil C.B c) SF_6 C.B d) Vacuum C.B

5) Capacitive current breaking results in
   a) short circuit b) open circuit c) voltage surge d) none of the above

6) If the fault current is 2000 A, the relay setting is 50%, CT ratio is 400/5 A, the P.S.M. is
   a) 23 b) 50 c) 15 d) 10

7) The current rating of fuse is 5A. The fusing current will be
   a) 5A b) 2.5A c) 1A d) more than 5A

8) The rate of Rise of restriking voltage depends upon
   a) the type of C.B b) the inductance of system only
   c) the capacitance of system only d) both b and c

P.T.O.

9) In low oil C.B., the oils performs the function of
   a) insulation only
   b) arc extinction only
   c) both insulation and arc extinction
   d) none of the above

10) Back-Up protection is
   a) Second line of defence
   b) Operates when primary protection fails
   c) Operation disconnect a large parts of system
   d) All of the above

11) The time current graph for fuse
   a) has linear characteristics
   b) is a circle
   c) has inverse characteristics
   d) none of the above

12) When failure of prime-mover takes place, the alternator
   a) runs as synchronous motor
   b) draws some current from the supply
   c) is in the inverted running mode
   d) all of the above

13) Buchholz relay is
   a) a gas actuated relay
   b) oil actuated relay
   c) either a) or b)
   d) none of the above

14) To protect the power transformer with star-delta connection against earth and phase faults. The current transformer should have
   a) delta-delta connection
   b) delta-star connection
   c) star-star connection
   d) star-delta connection

15) Merz-price protection scheme is employed for
   a) alternator
   b) transformer
   c) both a) and b)
   d) transmission line

16) Location of lightening arrestor is near a
   a) transformer
   b) generator
   c) bus-bar
   d) circuit-breaker

17) By burdent of relay, we generally mean
   a) current rating of relay
   b) volt-ampere rating of relay
   c) voltage rating of relay
   d) none of the above

18) Directional overcurrent relay is for the protection of
   a) ring main distribution system
   b) radial distribution system
   c) long transmission line
   d) power transformer

19) On which relay, the effect of arc is neutral
   a) impedance relay
   b) reactance relay
   c) Mho relay
   d) all of the above

20) For very long H.V. transmission, the system of overcurrent protection used is
   a) time-graded protection
   b) pilot-wire system
   c) distance protection
   d) none of the above

SLR-VB – 330

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
SWITCHGEAR & PROTECTION

Day and Date : Friday, 5-5-2017 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 ***right*** *indicates* ***full*** *marks.*

4) ***Assume*** *pick up current equal to rated C.T. secondary current.*

SECTION – I

II. Solve **any four** : **(4×5=20)**

a) What are the qualities of protective scheme ?

b) Derive torque equation of induction relay. Explain its significance.

c) Write a short note on factors affecting Selection of fuse.

d) Write the advantages and disadvantages of static relay.

e) Current rating of an overcurrent relay is 5 A. relay has plug-setting of 150% and TMS setting of 0.4 CT having ratio 400/5 is connected to relay. Determine operating time of relay for fault current of 6000 A. If Plug setting multiplier is 5 for above fault current. What is the plug-setting for relay ? At TMS = 1, operating time is given,

PSM	2	4	5	8	10	20
Operating time	10	5	4	3	2.8	2.4

III. Solve **any two** : **(2×10=20)**

a) Discuss in detail the overcurrent protective scheme for various distribution feeders.

b) Explain with block diagram and flowchart microprocessor based impedance relay.

c) Derive an expression for a generalized mathematical equations for the operating conditions of Mho, off-set Mho and impedance relays.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain with neat sketch Buchholz relay.

b) Explain backup protection of bus-bars.

c) Explain current chopping phenomenon.

d) Explain with neat sketch Vacuum Circuit Breaker.

e) Explain with neat sketch metal oxide (ZnO) arrestors.

V. Solve **any two** : **(2×10=20)**

a) Explain percentage differential scheme. Write down the need of percentage differential scheme over simple differential scheme.

b) Derive an expression for the Restriking voltage in terms of system voltage, inductance and capacitance across a circuit breaker when a 3-ph fault takes place.

c) In 220 KV system the reactance and capacitance up to the location of C.B. are 8 Ohm and 0.025 μF. a resistance of 600 Ohm is connected across contact of C.B. Determine,

i) Natural frequency of oscillation

ii) Damped frequency of oscillation

iii) Critical value of resistance.

SLR-VB – 330

Seat No.	

Set **Q**

B.E. (Electrical) (Part – I) Examination, 2017
SWITCHGEAR & PROTECTION

Day and Date : Friday, 5-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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3) ***All*** *questions* ***compulsory****.*
4) *Assume suitable data if necessary and mention* ***it clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *marks.*
6) ***Assume*** *pick up current* ***equal*** *to rated C.T. secondary current.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) Location of lightening arrestor is near a
   a) transformer b) generator
   c) bus-bar d) circuit-breaker

2) By burdent of relay, we generally mean
   a) current rating of relay b) volt-ampere rating of relay
   c) voltage rating of relay d) none of the above

3) Directional overcurrent relay is for the protection of
   a) ring main distribution system b) radial distribution system
   c) long transmission line d) power transformer

4) On which relay, the effect of arc is neutral
   a) impedance relay b) reactance relay
   c) Mho relay d) all of the above

5) For very long H.V. transmission, the system of overcurrent protection used is
   a) time-graded protection b) pilot-wire system
   c) distance protection d) none of the above

6) A fuse is a
   a) Protective device b) Current limiting device
   c) Current controlling d) None of the above

7) A circuit breaker is a
   a) current controlling device b) circuit interrupting device
   c) current limiting device d) none of the above

P.T.O.

8) If the length of arc in C.B. increases, its resistance
   a) decreases b) increases
   c) remains same d) none of the above

9) Current chopping Phenomenon mainly occurs in
   a) Air-Blast C.B b) Oil C.B c) SF_6 C.B d) Vacuum C.B

10) Capacitive current breaking results in
   a) short circuit b) open circuit c) voltage surge d) none of the above

11) If the fault current is 2000 A, the relay setting is 50%, CT ratio is 400/5 A, the P.S.M. is
   a) 23 b) 50 c) 15 d) 10

12) The current rating of fuse is 5A. The fusing current will be
   a) 5A b) 2.5A c) 1A d) more than 5A

13) The rate of Rise of restriking voltage depends upon
   a) the type of C.B b) the inductance of system only
   c) the capacitance of system only d) both b and c

14) In low oil C.B., the oils performs the function of
   a) insulation only
   b) arc extinction only
   c) both insulation and arc extinction
   d) none of the above

15) Back-Up protection is
   a) Second line of defence
   b) Operates when primary protection fails
   c) Operation disconnect a large parts of system
   d) All of the above

16) The time current graph for fuse
   a) has linear characteristics b) is a circle
   c) has inverse characteristics d) none of the above

17) When failure of prime-mover takes place, the alternator
   a) runs as synchronous motor b) draws some current from the supply
   c) is in the inverted running mode d) all of the above

18) Buchholz relay is
   a) a gas actuated relay b) oil actuated relay
   c) either a) or b) d) none of the above

19) To protect the power transformer with star-delta connection against earth and phase faults. The current transformer should have
   a) delta-delta connection b) delta-star connection
   c) star-star connection d) star-delta connection

20) Merz-price protection scheme is employed for
   a) alternator b) transformer
   c) both a) and b) d) transmission line

SLR-VB – 330

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
SWITCHGEAR & PROTECTION

Day and Date : Friday, 5-5-2017 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 ***right*** *indicates* ***full*** *marks.*

4) ***Assume*** *pick up current* ***equal*** *to rated C.T. secondary current.*

SECTION – I

II. Solve **any four** : **(4×5=20)**

a) What are the qualities of protective scheme ?

b) Derive torque equation of induction relay. Explain its significance.

c) Write a short note on factors affecting Selection of fuse.

d) Write the advantages and disadvantages of static relay.

e) Current rating of an overcurrent relay is 5 A. relay has plug-setting of 150% and TMS setting of 0.4 CT having ratio 400/5 is connected to relay. Determine operating time of relay for fault current of 6000 A. If Plug setting multiplier is 5 for above fault current. What is the plug-setting for relay ? At TMS = 1, operating time is given,

PSM	2	4	5	8	10	20
Operating time	10	5	4	3	2.8	2.4

III. Solve **any two** : **(2×10=20)**

a) Discuss in detail the overcurrent protective scheme for various distribution feeders.

b) Explain with block diagram and flowchart microprocessor based impedance relay.

c) Derive an expression for a generalized mathematical equations for the operating conditions of Mho, off-set Mho and impedance relays.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain with neat sketch Buchholz relay.

b) Explain backup protection of bus-bars.

c) Explain current chopping phenomenon.

d) Explain with neat sketch Vacuum Circuit Breaker.

e) Explain with neat sketch metal oxide (ZnO) arrestors.

V. Solve **any two** : **(2×10=20)**

a) Explain percentage differential scheme. Write down the need of percentage differential scheme over simple differential scheme.

b) Derive an expression for the Restriking voltage in terms of system voltage, inductance and capacitance across a circuit breaker when a 3-ph fault takes place.

c) In 220 KV system the reactance and capacitance up to the location of C.B. are 8 Ohm and 0.025 μF. a resistance of 600 Ohm is connected across contact of C.B. Determine,

i) Natural frequency of oscillation

ii) Damped frequency of oscillation

iii) Critical value of resistance.

SLR-VB – 330

Seat No.	

Set **R**

B.E. (Electrical) (Part – I) Examination, 2017
SWITCHGEAR & PROTECTION

Day and Date : Friday, 5-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
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6) ***Assume*** *pick up current* ***equal*** *to rated C.T. secondary current.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) The time current graph for fuse
   a) has linear characteristics b) is a circle
   c) has inverse characteristics d) none of the above
2) When failure of prime-mover takes place, the alternator
   a) runs as synchronous motor b) draws some current from the supply
   c) is in the inverted running mode d) all of the above
3) Buchholz relay is
   a) a gas actuated relay b) oil actuated relay
   c) either a) or b) d) none of the above
4) To protect the power transformer with star-delta connection against earth and phase faults. The current transformer should have
   a) delta-delta connection b) delta-star connection
   c) star-star connection d) star-delta connection
5) Merz-price protection scheme is employed for
   a) alternator b) transformer
   c) both a) and b) d) transmission line
6) Location of lightening arrestor is near a
   a) transformer b) generator
   c) bus-bar d) circuit-breaker
7) By burdent of relay, we generally mean
   a) current rating of relay b) volt-ampere rating of relay
   c) voltage rating of relay d) none of the above

P.T.O.

8) Directional overcurrent relay is for the protection of
   a) ring main distribution system
   b) radial distribution system
   c) long transmission line
   d) power transformer

9) On which relay, the effect of arc is neutral
   a) impedance relay
   b) reactance relay
   c) Mho relay
   d) all of the above

10) For very long H.V. transmission, the system of overcurrent protection used is
   a) time-graded protection
   b) pilot-wire system
   c) distance protection
   d) none of the above

11) A fuse is a
   a) Protective device
   b) Current limiting device
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   a) decreases
   b) increases
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   d) none of the above

14) Current chopping Phenomenon mainly occurs in
   a) Air-Blast C.B b) Oil C.B c) SF_6 C.B d) Vacuum C.B

15) Capacitive current breaking results in
   a) short circuit b) open circuit c) voltage surge d) none of the above

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   a) 23 b) 50 c) 15 d) 10

17) The current rating of fuse is 5A. The fusing current will be
   a) 5A b) 2.5A c) 1A d) more than 5A

18) The rate of Rise of restriking voltage depends upon
   a) the type of C.B
   b) the inductance of system only
   c) the capacitance of system only
   d) both b and c

19) In low oil C.B., the oils performs the function of
   a) insulation only
   b) arc extinction only
   c) both insulation and arc extinction
   d) none of the above

20) Back-Up protection is
   a) Second line of defence
   b) Operates when primary protection fails
   c) Operation disconnect a large parts of system
   d) All of the above

SLR-VB – 330

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
SWITCHGEAR & PROTECTION

Day and Date : Friday, 5-5-2017 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 ***right*** *indicates* ***full*** *marks.*

4) ***Assume*** *pick up current equal to rated C.T. secondary current.*

SECTION – I

II. Solve **any four** : **(4×5=20)**

a) What are the qualities of protective scheme ?

b) Derive torque equation of induction relay. Explain its significance.

c) Write a short note on factors affecting Selection of fuse.

d) Write the advantages and disadvantages of static relay.

e) Current rating of an overcurrent relay is 5 A. relay has plug-setting of 150% and TMS setting of 0.4 CT having ratio 400/5 is connected to relay. Determine operating time of relay for fault current of 6000 A. If Plug setting multiplier is 5 for above fault current. What is the plug-setting for relay ? At TMS = 1, operating time is given,

PSM	2	4	5	8	10	20
Operating time	10	5	4	3	2.8	2.4

III. Solve **any two** : **(2×10=20)**

a) Discuss in detail the overcurrent protective scheme for various distribution feeders.

b) Explain with block diagram and flowchart microprocessor based impedance relay.

c) Derive an expression for a generalized mathematical equations for the operating conditions of Mho, off-set Mho and impedance relays.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain with neat sketch Buchholz relay.

b) Explain backup protection of bus-bars.

c) Explain current chopping phenomenon.

d) Explain with neat sketch Vacuum Circuit Breaker.

e) Explain with neat sketch metal oxide (ZnO) arrestors.

V. Solve **any two** : **(2×10=20)**

a) Explain percentage differential scheme. Write down the need of percentage differential scheme over simple differential scheme.

b) Derive an expression for the Restriking voltage in terms of system voltage, inductance and capacitance across a circuit breaker when a 3-ph fault takes place.

c) In 220 KV system the reactance and capacitance up to the location of C.B. are 8 Ohm and 0.025 μF. a resistance of 600 Ohm is connected across contact of C.B. Determine,

i) Natural frequency of oscillation

ii) Damped frequency of oscillation

iii) Critical value of resistance.

SLR-VB – 330

Seat No.	

Set **S**

B.E. (Electrical) (Part – I) Examination, 2017
SWITCHGEAR & PROTECTION

Day and Date : Friday, 5-5-2017 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.***
3) ***All*** *questions* ***compulsory****.*
4) *Assume suitable data* ***if*** *necessary and mention* ***it clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *marks.*
6) ***Assume*** *pick up current* ***equal*** *to rated C.T. secondary current.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) If the fault current is 2000 A, the relay setting is 50%, CT ratio is 400/5 A, the P.S.M. is
   a) 23 b) 50 c) 15 d) 10

2) The current rating of fuse is 5A. The fusing current will be
   a) 5A b) 2.5A c) 1A d) more than 5A

3) The rate of Rise of restriking voltage depends upon
   a) the type of C.B
   b) the inductance of system only
   c) the capacitance of system only
   d) both b and c

4) In low oil C.B., the oils performs the function of
   a) insulation only
   b) arc extinction only
   c) both insulation and arc extinction
   d) none of the above

5) Back-Up protection is
   a) Second line of defence
   b) Operates when primary protection fails
   c) Operation disconnect a large parts of system
   d) All of the above

6) The time current graph for fuse
   a) has linear characteristics
   b) is a circle
   c) has inverse characteristics
   d) none of the above

P.T.O.

7) When failure of prime-mover takes place, the alternator
   a) runs as synchronous motor
   b) draws some current from the supply
   c) is in the inverted running mode
   d) all of the above

8) Buchholz relay is
   a) a gas actuated relay
   b) oil actuated relay
   c) either a) or b)
   d) none of the above

9) To protect the power transformer with star-delta connection against earth and phase faults. The current transformer should have
   a) delta-delta connection
   b) delta-star connection
   c) star-star connection
   d) star-delta connection

10) Merz-price protection scheme is employed for
   a) alternator
   b) transformer
   c) both a) and b)
   d) transmission line

11) Location of lightening arrestor is near a
   a) transformer
   b) generator
   c) bus-bar
   d) circuit-breaker

12) By burdent of relay, we generally mean
   a) current rating of relay
   b) volt-ampere rating of relay
   c) voltage rating of relay
   d) none of the above

13) Directional overcurrent relay is for the protection of
   a) ring main distribution system
   b) radial distribution system
   c) long transmission line
   d) power transformer

14) On which relay, the effect of arc is neutral
   a) impedance relay
   b) reactance relay
   c) Mho relay
   d) all of the above

15) For very long H.V. transmission, the system of overcurrent protection used is
   a) time-graded protection
   b) pilot-wire system
   c) distance protection
   d) none of the above

16) A fuse is a
   a) Protective device
   b) Current limiting device
   c) Current controlling
   d) None of the above

17) A circuit breaker is a
   a) current controlling device
   b) circuit interrupting device
   c) current limiting device
   d) none of the above

18) If the length of arc in C.B. increases, its resistance
   a) decreases
   b) increases
   c) remains same
   d) none of the above

19) Current chopping Phenomenon mainly occurs in
   a) Air-Blast C.B b) Oil C.B c) SF_6 C.B d) Vacuum C.B

20) Capacitive current breaking results in
   a) short circuit b) open circuit c) voltage surge d) none of the above

SLR-VB – 330

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
SWITCHGEAR & PROTECTION

Day and Date : Friday, 5-5-2017 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 ***right*** *indicates* ***full*** *marks.*

4) ***Assume*** *pick up current* ***equal*** *to rated C.T. secondary current.*

SECTION – I

II. Solve **any four** : **(4×5=20)**

a) What are the qualities of protective scheme ?

b) Derive torque equation of induction relay. Explain its significance.

c) Write a short note on factors affecting Selection of fuse.

d) Write the advantages and disadvantages of static relay.

e) Current rating of an overcurrent relay is 5 A. relay has plug-setting of 150% and TMS setting of 0.4 CT having ratio 400/5 is connected to relay. Determine operating time of relay for fault current of 6000 A. If Plug setting multiplier is 5 for above fault current. What is the plug-setting for relay ? At TMS = 1, operating time is given,

PSM	2	4	5	8	10	20
Operating time	10	5	4	3	2.8	2.4

III. Solve **any two** : **(2×10=20)**

a) Discuss in detail the overcurrent protective scheme for various distribution feeders.

b) Explain with block diagram and flowchart microprocessor based impedance relay.

c) Derive an expression for a generalized mathematical equations for the operating conditions of Mho, off-set Mho and impedance relays.

Set S

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain with neat sketch Buchholz relay.

b) Explain backup protection of bus-bars.

c) Explain current chopping phenomenon.

d) Explain with neat sketch Vacuum Circuit Breaker.

e) Explain with neat sketch metal oxide (ZnO) arrestors.

V. Solve **any two** : **(2×10=20)**

a) Explain percentage differential scheme. Write down the need of percentage differential scheme over simple differential scheme.

b) Derive an expression for the Restriking voltage in terms of system voltage, inductance and capacitance across a circuit breaker when a 3-ph fault takes place.

c) In 220 KV system the reactance and capacitance up to the location of C.B. are 8 Ohm and 0.025 μF. a resistance of 600 Ohm is connected across contact of C.B. Determine,

i) Natural frequency of oscillation

ii) Damped frequency of oscillation

iii) Critical value of resistance.

SLR-VB – 331

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL UTILIZATION

Day and Date : Saturday, 6-5-2017 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.***
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

1. Choose the correct answer : **(20×1=20)**

1) The main application of indirect arc furnace is to melt
   a) iron b) steel
   c) non-ferrous metals d) none of these
2) 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
3) Light waves travel with a velocity of
   a) 3×10^{10} cm/s b) 3×10^{12} cm/s c) 3×10^{15} cm/s d) 3×10^{18} cm/s
4) The unit of luminous flux is
   a) steradian b) candela c) lumen d) lux
5) One lumen per square meter is the same as
   a) one lux b) one candela
   c) one foot candle d) one lumen meter
6) The normal value of coefficient of adhesion for wet rails is
   a) 0.25 b) 0.15 c) 0.08 d) 0.14
7) 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
8) Specific energy consumption is minimum in _____ services.
   a) Main-line b) Urban
   c) Sub urban d) Equal for all type of

9) 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

10) When the speed of the train is estimated taking into account the time of stop at a station in addition to the actual running time between stops, is known as
   a) average speed b) schedule speed
   c) notching speed d) free running speed

11) 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

12) Which locomotive has the highest operational availability ?
   a) diesel b) electric
   c) steam d) all have same availability

13) Parallel operation of traction motors is easier with
   a) DC shunt motor b) DC series motor
   c) Induction motor d) None of these

14) 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

15) Overhead lines for power supply to tramcars are at a minimum height of
   a) 2 m b) 5 m c) 10 m d) 15 m

16) The unit of solid angle is
   a) solid angle b) radian c) steradian d) candela

17) The power factor will be leading in case of
   a) Induction heating b) Resistance heating
   c) Dielectric heating d) Electric arc heating

18) The method suitable for heating of conducting medium is
   a) Induction heating b) Indirect arc heating
   c) Radiant heating d) Eddy current heating

19) The tips of the electrodes, for spot welding are made of
   a) carbon b) copper alloy c) mica d) porcelain

20) Power factor is highest in case of
   a) Mercury arc lamp b) Sodium vapour lamps
   c) Tube lights d) GLS lamps

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SLR-VB – 331

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL UTILIZATION

Day and Date : Saturday, 6-5-2017 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. Solve **any four** : **(4×5=20)**
   a) What are the requirements of an ideal traction system ?
   b) An Electric train has an average speed of 42 km/h on a level track between stops 1400 m apart. It is accelerated at 1.7 km/h/s and is braked at 3.3 km/h/s. Draw the speed-time curve for the run.
   c) Explain with neat sketch dynamic braking.
   d) Explain shunt transition in detail.
   e) Explain mechanical regenerative braking.
   f) Explain block diagram of AC Locomotive.

3. Solve **any two** : **(2×10=20)**
   a) An electric train has quadrilateral speed-time curve as follows :
      i) uniform acceleration from rest at 2 kmphps for 30 seconds.
      ii) coasting for 50 seconds.
      iii) braking period of 20 seconds.

      The train is moving a uniform upgradient of 1%, tractive resistance 40 N/tone, rotational inertia effect 10% of dead weight, duration of stop 15 seconds and overall efficiency of transmission gear and motor as 75%. Calculate its schedule speed and specific energy consumption of run.
   b) Explain quadrilateral Speed-Time curve. Derive expression fortotal distance travelled in km.
   c) Explain Series-Parallel Starting.

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Define and explain
      i) Maintenance factor
      ii) Absorption factor.

   b) Explain with neat sketch resistance welding.

   c) Compare tungsten filament lamp and fluorescent tubes.

   d) Explain energy conservation in small scale industries.

   e) Explain with neat sketch indirect resistance heating.

   f) Explain motor selection textile industries.

5. Solve **any two** : **(2×10=20)**

   a) i) Compare resistance welding and Arc welding.
      ii) Compare DC welding and AC welding.

   b) i) Explain energy conservation in legislation.
      ii) Explain motor selection in sugar mills.

   c) Explain laws of illumination.

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SLR-VB – 331

Seat No.	

Set **Q**

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL UTILIZATION

Day and Date : Saturday, 6-5-2017 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.***
*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

1. Choose the correct answer : **(20×1=20)**

1) The main application of indirect arc furnace is to melt
   a) iron b) steel
   c) non-ferrous metals d) none of these
2) 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
3) Light waves travel with a velocity of
   a) 3×10^{10} cm/s b) 3×10^{12} cm/s c) 3×10^{15} cm/s d) 3×10^{18} cm/s
4) The unit of luminous flux is
   a) steradian b) candela c) lumen d) lux
5) One lumen per square meter is the same as
   a) one lux b) one candela
   c) one foot candle d) one lumen meter
6) The normal value of coefficient of adhesion for wet rails is
   a) 0.25 b) 0.15 c) 0.08 d) 0.14
7) 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
8) Specific energy consumption is minimum in _____ services.
   a) Main-line b) Urban
   c) Sub urban d) Equal for all type of

P.T.O.

9) 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

10) When the speed of the train is estimated taking into account the time of stop at a station in addition to the actual running time between stops, is known as
   a) average speed b) schedule speed
   c) notching speed d) free running speed

11) 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

12) Which locomotive has the highest operational availability ?
   a) diesel b) electric
   c) steam d) all have same availability

13) Parallel operation of traction motors is easier with
   a) DC shunt motor b) DC series motor
   c) Induction motor d) None of these

14) 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

15) Overhead lines for power supply to tramcars are at a minimum height of
   a) 2 m b) 5 m c) 10 m d) 15 m

16) The unit of solid angle is
   a) solid angle b) radian c) steradian d) candela

17) The power factor will be leading in case of
   a) Induction heating b) Resistance heating
   c) Dielectric heating d) Electric arc heating

18) The method suitable for heating of conducting medium is
   a) Induction heating b) Indirect arc heating
   c) Radiant heating d) Eddy current heating

19) The tips of the electrodes, for spot welding are made of
   a) carbon b) copper alloy c) mica d) porcelain

20) Power factor is highest in case of
   a) Mercury arc lamp b) Sodium vapour lamps
   c) Tube lights d) GLS lamps

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SLR-VB – 331

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL UTILIZATION

Day and Date : Saturday, 6-5-2017 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. Solve **any four** : **(4×5=20)**
   a) What are the requirements of an ideal traction system ?
   b) An Electric train has an average speed of 42 km/h on a level track between stops 1400 m apart. It is accelerated at 1.7 km/h/s and is braked at 3.3 km/h/s. Draw the speed-time curve for the run.
   c) Explain with neat sketch dynamic braking.
   d) Explain shunt transition in detail.
   e) Explain mechanical regenerative braking.
   f) Explain block diagram of AC Locomotive.

3. Solve **any two** : **(2×10=20)**
   a) An electric train has quadrilateral speed-time curve as follows :
      i) uniform acceleration from rest at 2 kmphps for 30 seconds.
      ii) coasting for 50 seconds.
      iii) braking period of 20 seconds.

      The train is moving a uniform upgradient of 1%, tractive resistance 40 N/tone, rotational inertia effect 10% of dead weight, duration of stop 15 seconds and overall efficiency of transmission gear and motor as 75%. Calculate its schedule speed and specific energy consumption of run.
   b) Explain quadrilateral Speed-Time curve. Derive expression fortotal distance travelled in km.
   c) Explain Series-Parallel Starting.

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Define and explain
      i) Maintenance factor
      ii) Absorption factor.

   b) Explain with neat sketch resistance welding.

   c) Compare tungsten filament lamp and fluorescent tubes.

   d) Explain energy conservation in small scale industries.

   e) Explain with neat sketch indirect resistance heating.

   f) Explain motor selection textile industries.

5. Solve **any two** : **(2×10=20)**

   a) i) Compare resistance welding and Arc welding.
      ii) Compare DC welding and AC welding.

   b) i) Explain energy conservation in legislation.
      ii) Explain motor selection in sugar mills.

   c) Explain laws of illumination.

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Seat No.	

Set **R**

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL UTILIZATION

Day and Date : Saturday, 6-5-2017 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.***
*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

1. Choose the correct answer : **(20×1=20)**

1) The unit of solid angle is
a) solid angle b) radian c) steradian d) candela

2) The power factor will be leading in case of
a) Induction heating b) Resistance heating
c) Dielectric heating d) Electric arc heating

3) The method suitable for heating of conducting medium is
a) Induction heating b) Indirect arc heating
c) Radiant heating d) Eddy current heating

4) The tips of the electrodes, for spot welding are made of
a) carbon b) copper alloy c) mica d) porcelain

5) Power factor is highest in case of
a) Mercury arc lamp b) Sodium vapour lamps
c) Tube lights d) GLS lamps

6) The main application of indirect arc furnace is to melt
a) iron b) steel
c) non-ferrous metals d) none of these

7) 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

8) Light waves travel with a velocity of
a) 3×10^{10} cm/s b) 3×10^{12} cm/s c) 3×10^{15} cm/s d) 3×10^{18} cm/s

9) The unit of luminous flux is
   a) steradian b) candela c) lumen d) lux
10) One lumen per square meter is the same as
   a) one lux b) one candela
   c) one foot candle d) one lumen meter
11) The normal value of coefficient of adhesion for wet rails is
   a) 0.25 b) 0.15 c) 0.08 d) 0.14
12) 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
13) Specific energy consumption is minimum in _____ services.
   a) Main-line b) Urban
   c) Sub urban d) Equal for all type of
14) 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
15) When the speed of the train is estimated taking into account the time of stop at a station in addition to the actual running time between stops, is known as
   a) average speed b) schedule speed
   c) notching speed d) free running speed
16) 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
17) Which locomotive has the highest operational availability ?
   a) diesel b) electric
   c) steam d) all have same availability
18) Parallel operation of traction motors is easier with
   a) DC shunt motor b) DC series motor
   c) Induction motor d) None of these
19) 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
20) Overhead lines for power supply to tramcars are at a minimum height of
   a) 2 m b) 5 m c) 10 m d) 15 m

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SLR-VB – 331

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL UTILIZATION

Day and Date : Saturday, 6-5-2017 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. Solve **any four** : **(4×5=20)**
   a) What are the requirements of an ideal traction system ?
   b) An Electric train has an average speed of 42 km/h on a level track between stops 1400 m apart. It is accelerated at 1.7 km/h/s and is braked at 3.3 km/h/s. Draw the speed-time curve for the run.
   c) Explain with neat sketch dynamic braking.
   d) Explain shunt transition in detail.
   e) Explain mechanical regenerative braking.
   f) Explain block diagram of AC Locomotive.

3. Solve **any two** : **(2×10=20)**
   a) An electric train has quadrilateral speed-time curve as follows :
      i) uniform acceleration from rest at 2 kmphps for 30 seconds.
      ii) coasting for 50 seconds.
      iii) braking period of 20 seconds.

      The train is moving a uniform upgradient of 1%, tractive resistance 40 N/tone, rotational inertia effect 10% of dead weight, duration of stop 15 seconds and overall efficiency of transmission gear and motor as 75%. Calculate its schedule speed and specific energy consumption of run.
   b) Explain quadrilateral Speed-Time curve. Derive expression fortotal distance travelled in km.
   c) Explain Series-Parallel Starting.

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Define and explain
      i) Maintenance factor
      ii) Absorption factor.

   b) Explain with neat sketch resistance welding.

   c) Compare tungsten filament lamp and fluorescent tubes.

   d) Explain energy conservation in small scale industries.

   e) Explain with neat sketch indirect resistance heating.

   f) Explain motor selection textile industries.

5. Solve **any two** : **(2×10=20)**

   a) i) Compare resistance welding and Arc welding.
      ii) Compare DC welding and AC welding.

   b) i) Explain energy conservation in legislation.
      ii) Explain motor selection in sugar mills.

   c) Explain laws of illumination.

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SLR-VB – 331

Seat No.	

Set **S**

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL UTILIZATION

Day and Date : Saturday, 6-5-2017 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.***
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

1. Choose the correct answer : **(20×1=20)**

1) 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
2) Which locomotive has the highest operational availability ?
   a) diesel b) electric
   c) steam d) all have same availability
3) Parallel operation of traction motors is easier with
   a) DC shunt motor b) DC series motor
   c) Induction motor d) None of these
4) 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
5) Overhead lines for power supply to tramcars are at a minimum height of
   a) 2 m b) 5 m c) 10 m d) 15 m
6) The unit of solid angle is
   a) solid angle b) radian c) steradian d) candela
7) The power factor will be leading in case of
   a) Induction heating b) Resistance heating
   c) Dielectric heating d) Electric arc heating

8) The method suitable for heating of conducting medium is
   a) Induction heating b) Indirect arc heating
   c) Radiant heating d) Eddy current heating
9) The tips of the electrodes, for spot welding are made of
   a) carbon b) copper alloy c) mica d) porcelain
10) Power factor is highest in case of
   a) Mercury arc lamp b) Sodium vapour lamps
   c) Tube lights d) GLS lamps
11) The main application of indirect arc furnace is to melt
   a) iron b) steel
   c) non-ferrous metals d) none of these
12) 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
13) Light waves travel with a velocity of
   a) 3×10^{10} cm/s b) 3×10^{12} cm/s c) 3×10^{15} cm/s d) 3×10^{18} cm/s
14) The unit of luminous flux is
   a) steradian b) candela c) lumen d) lux
15) One lumen per square meter is the same as
   a) one lux b) one candela
   c) one foot candle d) one lumen meter
16) The normal value of coefficient of adhesion for wet rails is
   a) 0.25 b) 0.15 c) 0.08 d) 0.14
17) The distance between two stops divided by the actual time of run
   a) Crest speed b) Average speed
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18) Specific energy consumption is minimum in _____ services.
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19) Which motor is used in tramways ?
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   b) ac three phase motor
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   d) dc shunt motor
20) When the speed of the train is estimated taking into account the time of stop at a station in addition to the actual running time between stops, is known as
   a) average speed b) schedule speed
   c) notching speed d) free running speed

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SLR-VB – 331

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ELECTRICAL UTILIZATION

Day and Date : Saturday, 6-5-2017 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. Solve **any four** : **(4×5=20)**
   a) What are the requirements of an ideal traction system ?
   b) An Electric train has an average speed of 42 km/h on a level track between stops 1400 m apart. It is accelerated at 1.7 km/h/s and is braked at 3.3 km/h/s. Draw the speed-time curve for the run.
   c) Explain with neat sketch dynamic braking.
   d) Explain shunt transition in detail.
   e) Explain mechanical regenerative braking.
   f) Explain block diagram of AC Locomotive.

3. Solve **any two** : **(2×10=20)**
   a) An electric train has quadrilateral speed-time curve as follows :
      i) uniform acceleration from rest at 2 kmphps for 30 seconds.
      ii) coasting for 50 seconds.
      iii) braking period of 20 seconds.

      The train is moving a uniform upgradient of 1%, tractive resistance 40 N/tone, rotational inertia effect 10% of dead weight, duration of stop 15 seconds and overall efficiency of transmission gear and motor as 75%. Calculate its schedule speed and specific energy consumption of run.
   b) Explain quadrilateral Speed-Time curve. Derive expression fortotal distance travelled in km.
   c) Explain Series-Parallel Starting.

SECTION – II

4. Solve **any four** : **(4×5=20)**

   a) Define and explain
      i) Maintenance factor
      ii) Absorption factor.

   b) Explain with neat sketch resistance welding.

   c) Compare tungsten filament lamp and fluorescent tubes.

   d) Explain energy conservation in small scale industries.

   e) Explain with neat sketch indirect resistance heating.

   f) Explain motor selection textile industries.

5. Solve **any two** : **(2×10=20)**

   a) i) Compare resistance welding and Arc welding.
      ii) Compare DC welding and AC welding.

   b) i) Explain energy conservation in legislation.
      ii) Explain motor selection in sugar mills.

   c) Explain laws of illumination.

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SLR-VB – 332

Seat No.	

Set **P**

B.E. (Part – I) (Electrical Engineering) Examination, 2017
PLC AND SCADA (Elective – I)

Day and Date : Monday, 8-5-2017 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) ***All*** *questions are* ***compulsory****.*
4) *Make suitable assumptions* ***if necessary****.*

MCQ/Objective Type Questions

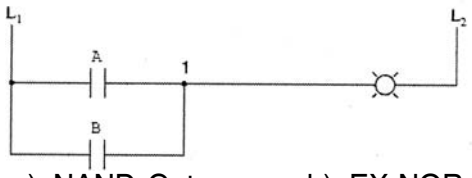
Duration : 30 Minutes Marks : 20

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

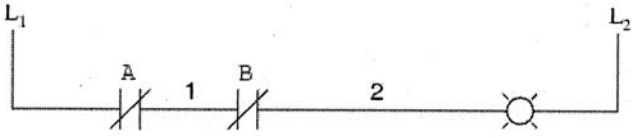
2) The PLC was invented by _____
   a) Bill Gates b) Dick Morley c) Bill Landis d) Tod Cunningham

3) Figure shows the ladder logic for



   a) NAND Gate b) EX-NOR Gate c) EX-OR Gate d) OR GATE

4) Figure shows the ladder logic for



   a) NOR Gate b) EX-NOR Gate c) EX-OR Gate d) NAND Gate

5) Timers and counters use what is known as a _____ and a _____ to hold the target value and the accumulated value.
   a) Holding count_target holder b) EN bit_DN bit
   c) Pre-set register_accumulated register d) None of the above

6) If you want reverse power flow to be present in a rung you must program a
   a) Reverse path that implements the reverse flow
   b) Forward path that implements the reverse flow
   c) Use reverse logic
   d) None of the above

P.T.O.

7) The capability of convention relay systems for complex operations is _____ that of the PLCs.
   a) Poor than b) Excellent than c) As good as d) Unpredictable as

8) PLCs having less than _____ inputs and outputs are called as Small PLC.
   a) 50 b) 200 c) 100 d) 300

9) How do the variations in an average value get affected by PWM period ?
   a) Longer the PWM period, faster will be the variation in an average value
   b) Shorter the PWM period, faster will be the variation in an average value
   c) Shorter the PWM period, slower will be the variation in an average value
   d) Longer the PWM period, slower will be the variation in an average value

10) 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

11) _____ who monitor the SCADA system and perform supervisory control functions for the remote plant.
   a) Operator b) MTU c) RTU d) Communications

12) SCADA system is
   a) Software b) Hardware
   c) Combination of Software and Hardware d) None of the above

13) RPC Protocol is related to _____ Layer in OSI model.
   a) Application b) Presentation c) Session d) Transport

14) Match List – I with List – II and select the correct answer using the code given below the lists :

List – I		List – II	
P	IEC61970	1	Transmission
Q	IEC61968	2	Distribution
R	IEC60870-5	3	Distribution equipment and processes
S	IEC60870-6	4	Power systems and programming interfaces for integrating

   a) P-2, Q-1, R-4, S-3 b) P-3, Q-1, R-4, S-2
   c) P-4, Q-3, R-2, S-1 d) P-3, Q-4, R-1, S-2

15) When planning a SCADA system you should
   a) Have an understanding of the process b) Design a database
   c) Design a secure system d) All of the above

16) The current generation of SCADA uses _____ architecture.
   a) Networked b) Monolithic c) Distributed d) All of the above

17) Second generation SCADA architecture is also called as
   a) Networked b) Monolithic c) Distributed d) All of the above

18) In TCP/IP model layer No. 1 consist of
   a) Application b) Transport c) Internet d) Network Access

19) Which layer is responsible for process to process delivery ?
   a) Network layer b) Transport layer c) Session layer d) Data link layer

20) Where is a hub specified in the OSI model ?
   a) Session layer b) Physical layer c) Data Link layer d) Application layer

SLR-VB – 332

Seat No.	

B.E. (Part – I) (Electrical Engineering) Examination, 2017
PLC AND SCADA (Elective – I)

Day and Date : Monday, 8-5-2017 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) Define Programmable Logic Controller. Write a short note on input and output module.

b) What is ladder diagram ? How it is different than the normal circuit diagram ?

c) What is CPU ? Explain its main Section and also explain important function of each section.

d) Explain Output ON/OFF and analog devices in detail.

e) Explain different types of switches.

f) Explain Variable Speed (Variable Frequency) AC motor drive.

3. Solve **any two** : **(10×2=20)**

a) What is tuning of PID controller ? Explain PID tuning methods in detail.

b) This is an alarm system. There are four hazard inputs to the alarm system A, B, C, D that go on as some operational malfunction occurs.

The system operates as follow :

1) If any one inputs are ON, nothing happen.

2) If any two inputs are ON, a red pilot light goes on.

3) If any three inputs are ON, an alarm siren sounds.

4) If all four are ON, the fire department is notified.

Develop Gate Logic, PLC Ladder logic and Relay Logic for alarm system.

c) Two pulses start at the same time. Pulse output J is to pulse every 12 seconds. Pulse output K is to pulse every 4 seconds.

Develop PLC Ladder Logic, Relay Logic and Timing diagram for above problem.

Set P

SECTION – II

4. Solve **any four** : **(5×4=20)**
   a) Define SCADA. State advantages, disadvantages and applications of SCADA.
   b) Explain SCADA data transfer through PLCC.
   c) Explain :
      1) Human Machine interface
      2) Master Terminal Unit
      3) Remote Terminal Unit
   d) Explain Ethernet layers and their relationship to CIP.
   e) Explain how SCADA system is used in electrical power generation.
   f) Explain first, second, third generation of SCADA architecture.

5. Solve **any two** : **(10×2=20)**
   a) Explain with example how SCADA system is used in conventional electric power generation.
   b) Explain seven layers of OSI model and their functions. Compare OSI Model with TCP/IP Model.
   c) Draw and explain SCADA system in Petroleum Refining Process.

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SLR-VB – 332

Seat No.	

Set **Q**

B.E. (Part – I) (Electrical Engineering) Examination, 2017
PLC AND SCADA (Elective – I)

Day and Date : Monday, 8-5-2017 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) ***All*** *questions are* ***compulsory****.*
4) *Make suitable assumptions* ***if necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) The current generation of SCADA uses _____ architecture.
a) Networked b) Monolithic c) Distributed d) All of the above

2) Second generation SCADA architecture is also called as
a) Networked b) Monolithic c) Distributed d) All of the above

3) In TCP/IP model layer No. 1 consist of
a) Application b) Transport c) Internet d) Network Access

4) Which layer is responsible for process to process delivery ?
a) Network layer b) Transport layer c) Session layer d) Data link layer

5) Where is a hub specified in the OSI model ?
a) Session layer b) Physical layer c) Data Link layer d) Application layer

6) 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
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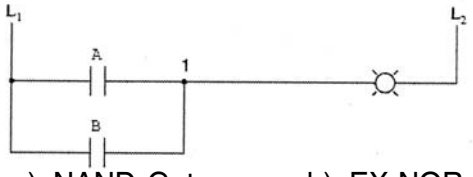
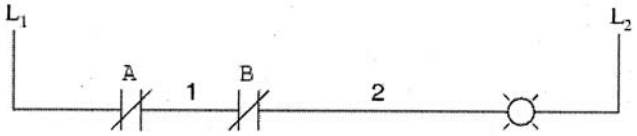
7) The PLC was invented by _____
a) Bill Gates b) Dick Morley c) Bill Landis d) Tod Cunningham

8) Figure shows the ladder logic for



a) NAND Gate b) EX-NOR Gate c) EX-OR Gate d) OR GATE

9) Figure shows the ladder logic for



a) NOR Gate b) EX-NOR Gate c) EX-OR Gate d) NAND Gate

10) Timers and counters use what is known as a _____ and a _____ to hold the target value and the accumulated value.
a) Holding count_target holder b) EN bit_DN bit
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c) Use reverse logic
d) None of the above

12) The capability of convention relay systems for complex operations is _____ that of the PLCs.
a) Poor than b) Excellent than c) As good as d) Unpredictable as

13) PLCs having less than _____ inputs and outputs are called as Small PLC.
a) 50 b) 200 c) 100 d) 300

14) How do the variations in an average value get affected by PWM period ?
a) Longer the PWM period, faster will be the variation in an average value
b) Shorter the PWM period, faster will be the variation in an average value
c) Shorter the PWM period, slower will be the variation in an average value
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15) 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

16) _____ who monitor the SCADA system and perform supervisory control functions for the remote plant.
a) Operator b) MTU c) RTU d) Communications

17) SCADA system is
a) Software b) Hardware
c) Combination of Software and Hardware d) None of the above

18) RPC Protocol is related to _____ Layer in OSI model.
a) Application b) Presentation c) Session d) Transport

19) Match List – I with List – II and select the correct answer using the code given below the lists :

List – I		List – II	
P	IEC61970	1	Transmission
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R	IEC60870-5	3	Distribution equipment and processes
S	IEC60870-6	4	Power systems and programming interfaces for integrating

a) P-2, Q-1, R-4, S-3 b) P-3, Q-1, R-4, S-2
c) P-4, Q-3, R-2, S-1 d) P-3, Q-4, R-1, S-2

20) When planning a SCADA system you should
a) Have an understanding of the process b) Design a database
c) Design a secure system d) All of the above

SLR-VB – 332

Seat No.	

B.E. (Part – I) (Electrical Engineering) Examination, 2017
PLC AND SCADA (Elective – I)

Day and Date : Monday, 8-5-2017 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) Define Programmable Logic Controller. Write a short note on input and output module.

b) What is ladder diagram ? How it is different than the normal circuit diagram ?

c) What is CPU ? Explain its main Section and also explain important function of each section.

d) Explain Output ON/OFF and analog devices in detail.

e) Explain different types of switches.

f) Explain Variable Speed (Variable Frequency) AC motor drive.

3. Solve **any two** : **(10×2=20)**

a) What is tuning of PID controller ? Explain PID tuning methods in detail.

b) This is an alarm system. There are four hazard inputs to the alarm system A, B, C, D that go on as some operational malfunction occurs.

The system operates as follow :

1) If any one inputs are ON, nothing happen.
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4) If all four are ON, the fire department is notified.

Develop Gate Logic, PLC Ladder logic and Relay Logic for alarm system.

c) Two pulses start at the same time. Pulse output J is to pulse every 12 seconds. Pulse output K is to pulse every 4 seconds.

Develop PLC Ladder Logic, Relay Logic and Timing diagram for above problem.

Set Q

SECTION – II

4. Solve **any four** : **(5×4=20)**
   a) Define SCADA. State advantages, disadvantages and applications of SCADA.
   b) Explain SCADA data transfer through PLCC.
   c) Explain :
      1) Human Machine interface
      2) Master Terminal Unit
      3) Remote Terminal Unit
   d) Explain Ethernet layers and their relationship to CIP.
   e) Explain how SCADA system is used in electrical power generation.
   f) Explain first, second, third generation of SCADA architecture.

5. Solve **any two** : **(10×2=20)**
   a) Explain with example how SCADA system is used in conventional electric power generation.
   b) Explain seven layers of OSI model and their functions. Compare OSI Model with TCP/IP Model.
   c) Draw and explain SCADA system in Petroleum Refining Process.

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SLR-VB – 332

Seat No.	

Set **R**

B.E. (Part – I) (Electrical Engineering) Examination, 2017
PLC AND SCADA (Elective – I)

Day and Date : Monday, 8-5-2017 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) ***All** questions are **compulsory**.*
4) *Make suitable assumptions **if necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) _____ who monitor the SCADA system and perform supervisory control functions for the remote plant.
a) Operator b) MTU c) RTU d) Communications

2) SCADA system is
a) Software b) Hardware
c) Combination of Software and Hardware d) None of the above

3) RPC Protocol is related to _____ Layer in OSI model.
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a) Networked b) Monolithic c) Distributed d) All of the above

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P.T.O.

8) In TCP/IP model layer No. 1 consist of
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9) Which layer is responsible for process to process delivery ?
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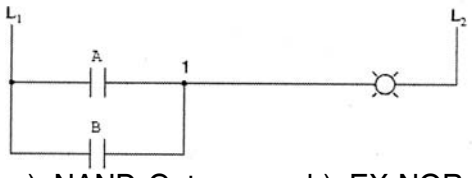

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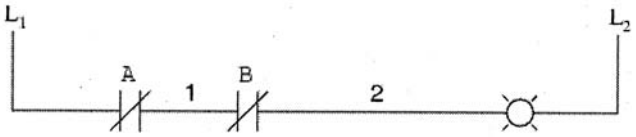

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20) What type of application curve used inside VFD to operate cooling tower fan correctly ?
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_____

SLR-VB – 332

Seat No.	

B.E. (Part – I) (Electrical Engineering) Examination, 2017
PLC AND SCADA (Elective – I)

Day and Date : Monday, 8-5-2017 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) Define Programmable Logic Controller. Write a short note on input and output module.

b) What is ladder diagram ? How it is different than the normal circuit diagram ?

c) What is CPU ? Explain its main Section and also explain important function of each section.

d) Explain Output ON/OFF and analog devices in detail.

e) Explain different types of switches.

f) Explain Variable Speed (Variable Frequency) AC motor drive.

3. Solve **any two** : **(10×2=20)**

a) What is tuning of PID controller ? Explain PID tuning methods in detail.

b) This is an alarm system. There are four hazard inputs to the alarm system A, B, C, D that go on as some operational malfunction occurs.

The system operates as follow :

1) If any one inputs are ON, nothing happen.

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Develop Gate Logic, PLC Ladder logic and Relay Logic for alarm system.

c) Two pulses start at the same time. Pulse output J is to pulse every 12 seconds. Pulse output K is to pulse every 4 seconds.

Develop PLC Ladder Logic, Relay Logic and Timing diagram for above problem.

Set R

SECTION – II

4. Solve **any four** : **(5×4=20)**
   a) Define SCADA. State advantages, disadvantages and applications of SCADA.
   b) Explain SCADA data transfer through PLCC.
   c) Explain :
      1) Human Machine interface
      2) Master Terminal Unit
      3) Remote Terminal Unit
   d) Explain Ethernet layers and their relationship to CIP.
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   f) Explain first, second, third generation of SCADA architecture.

5. Solve **any two** : **(10×2=20)**
   a) Explain with example how SCADA system is used in conventional electric power generation.
   b) Explain seven layers of OSI model and their functions. Compare OSI Model with TCP/IP Model.
   c) Draw and explain SCADA system in Petroleum Refining Process.

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SLR-VB – 332

Seat No.	

Set **S**

B.E. (Part – I) (Electrical Engineering) Examination, 2017
PLC AND SCADA (Elective – I)

Day and Date : Monday, 8-5-2017 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) ***All*** *questions are* ***compulsory****.*
4) *Make suitable assumptions* ***if necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) If you want reverse power flow to be present in a rung you must program a
   a) Reverse path that implements the reverse flow
   b) Forward path that implements the reverse flow
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P.T.O.

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a) Application b) Transport c) Internet d) Network Access

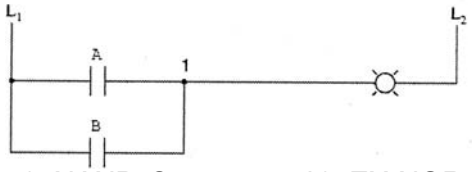
14) Which layer is responsible for process to process delivery ?
a) Network layer b) Transport layer c) Session layer d) Data link layer

15) Where is a hub specified in the OSI model ?
a) Session layer b) Physical layer c) Data Link layer d) Application layer

16) 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

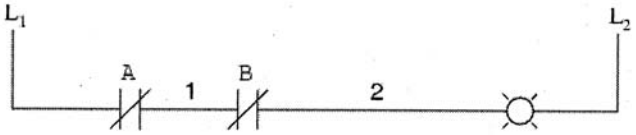
17) The PLC was invented by _____
a) Bill Gates b) Dick Morley c) Bill Landis d) Tod Cunningham

18) Figure shows the ladder logic for



a) NAND Gate b) EX-NOR Gate c) EX-OR Gate d) OR GATE

19) Figure shows the ladder logic for



a) NOR Gate b) EX-NOR Gate c) EX-OR Gate d) NAND Gate

20) Timers and counters use what is known as a _____ and a _____ to hold the target value and the accumulated value.
a) Holding count_target holder b) EN bit_DN bit
c) Pre-set register_accumulated register d) None of the above

SLR-VB – 332

Seat No.	

B.E. (Part – I) (Electrical Engineering) Examination, 2017
PLC AND SCADA (Elective – I)

Day and Date : Monday, 8-5-2017 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) Define Programmable Logic Controller. Write a short note on input and output module.

b) What is ladder diagram ? How it is different than the normal circuit diagram ?

c) What is CPU ? Explain its main Section and also explain important function of each section.

d) Explain Output ON/OFF and analog devices in detail.

e) Explain different types of switches.

f) Explain Variable Speed (Variable Frequency) AC motor drive.

3. Solve **any two** : **(10×2=20)**

a) What is tuning of PID controller ? Explain PID tuning methods in detail.

b) This is an alarm system. There are four hazard inputs to the alarm system A, B, C, D that go on as some operational malfunction occurs.

The system operates as follow :

1) If any one inputs are ON, nothing happen.

2) If any two inputs are ON, a red pilot light goes on.

3) If any three inputs are ON, an alarm siren sounds.

4) If all four are ON, the fire department is notified.

Develop Gate Logic, PLC Ladder logic and Relay Logic for alarm system.

c) Two pulses start at the same time. Pulse output J is to pulse every 12 seconds. Pulse output K is to pulse every 4 seconds.

Develop PLC Ladder Logic, Relay Logic and Timing diagram for above problem.

SECTION – II

4. Solve **any four** : **(5×4=20)**

   a) Define SCADA. State advantages, disadvantages and applications of SCADA.

   b) Explain SCADA data transfer through PLCC.

   c) Explain :

      1) Human Machine interface

      2) Master Terminal Unit

      3) Remote Terminal Unit

   d) Explain Ethernet layers and their relationship to CIP.

   e) Explain how SCADA system is used in electrical power generation.

   f) Explain first, second, third generation of SCADA architecture.

5. Solve **any two** : **(10×2=20)**

   a) Explain with example how SCADA system is used in conventional electric power generation.

   b) Explain seven layers of OSI model and their functions. Compare OSI Model with TCP/IP Model.

   c) Draw and explain SCADA system in Petroleum Refining Process.

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SLR-VB – 333

Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – I) Examination, 2017
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Monday, 8-5-2017 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 number of stages of FFT computations required for the computation of the DFT of a 512 point sequence is
   a) 8 b) 9 c) 6 d) 7

2) Circular time shift of a sequence is equivalent to
   a) Multiplication of the sequence X(k) with complex exponential
   b) Multiplication of the sequence x(n) with complex exponential
   c) Multiplication of the sequence x(n) with exponential factor
   d) None

3) DIT algorithm related to
   a) x(k) shuffled b) x(n) shuffled
   c) x(k) and x(n) shuffled d) none

4) FFT algorithm calculates
   a) DTFT b) DCT c) DFT d) DST

5) Correlation is basically used to
   a) Add two signals b) Subtract two signals
   c) Compare two signals d) None

6) If the system is described by $y(n) = x(n)^2$
   a) Linear b) Non Linear c) Homogeneous d) None of above

7) When aliasing occurs
   a) Low frequency become a high frequency
   b) High frequency become a mid frequency
   c) High frequencies above signal bandwidth becomes low frequencies below signal bandwidth
   d) None

8) Transform domain used as
   a) Enhance the signal b) Compress the signal
   c) Reduce the data points d) Increases the data points

P.T.O.

9) The number of complex multiplications required to calculate N-point DFT using radix-2 DIT-FFT algorithms

a) $N \log_2 N$ b) $\frac{N}{2} \log_{10} N$ c) $N \log_{10} N$ d) $\frac{N}{2} \log_2 N$

10) If we modify the circular sequence by multiplying it with $e^{j8\pi k/N}$ for a k'th frequency sample the DFT coefficients
a) Remain unchanged b) Shift by 4 units
c) Shift by 8 units d) Shift by 2 units

11) The impulse response of ideal filter is
a) Causal b) Non causal
c) Non causal and finite d) None

12) To meet the magnitude response specification for a transition width, one has to
a) Select Proper Window b) To Select Kaiser Window
c) Select Filter Order d) Select Rectangular Window

13) The Transformation function to be used for converting HPF to BRF is obtained by replacing S by

a) $s = \frac{s^2 + \omega_0^2}{Ws}$ b) $s = \frac{s^2 + \omega_0^2}{\omega s}$ c) $S = \frac{s^2 + W^2}{Ws}$ d) $S = \frac{Ws}{s^2 + \omega_0^2}$

14) Specify the correct equation for hanning window

a) $\omega_R(n) = 1$ b) $\omega(n) = 0.5 + 0.5\cos\left(2\pi n/N-1\right)$

c) $\omega(n) = 0.42 + 0.5\cos\left(2\pi n/N-1\right)$ d) $\omega(n) = 0.5 + 0.46\cos\left(2\pi n/N-1\right)$

15) Due to the effect of coefficient quantization change in pole locations
a) False b) True

16) Specify the correct equation for Bilinear Transformation

a) $s = \frac{2}{T}\left[\frac{1 - Z^1}{1 + Z^{-1}}\right]$ b) $s = \frac{T}{2}\left[\frac{1 - Z^1}{1 + Z^{-1}}\right]$ c) $s = \frac{2}{T}\left[\frac{1 - Z^{-1}}{1 + Z^{-1}}\right]$ d) $s = \frac{T}{2}\left[\frac{1 - Z^{-1}}{1 + Z^{-1}}\right]$

17) The binary signed number 0.111011001 when rounded to eight bits will result in number given by
a) 0.11101111 b) 0.11101101 c) 0.10101010 d) 0.11111111

18) Direct Evaluation DFT requires _____ complex multiplications.
a) N(N – 1) b) N^2 c) N(N+1) d) N(N – 1)/2

19) IIR filter is also known as
a) Cascade Structure Filter b) Transversal Filter
c) ARMA Filter d) AR Filter

20) The Number of Multiplications in FIR system can be reduced using
a) Finite Impulse Response b) Infinite Impulse Response
c) Symmetric Nature of Impulse Response d) None of above

_____

SLR-VB – 333

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2017
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   a) Compute Circular convolution
      $x_1(n) = \{1, 3, 1, 1\}$
      $x_2(n) = \{1, 4, 5, 3\}$
   b) Determine the Auto correlation sequence of a sequence
      $x(n) = \{1, 2, 4, 3\}$
   c) Explain the Discrete Cosine Transform (DCT).
   d) Explain the concept of DFT as Linear Transformation.
   e) Find IDFT of Sequence
      $X(k) = \{4, 0, 0, 0\}$
   f) Explain the application of DSP in power systems.

3. Attempt **any two** : **(2×10=20)**
   a) Compare the linear convolution and circular convolution. Find linear convolution using overlap add method for the sequences.
      $x(n) = \{0.5, 2, -1.5, -1, 0, 0.75, 3, 2, 1.5, 1, -0.75, 2\}$ and $h(n) = \{1, 2, -1\}$
   b) Determine the DFT of the given data sequence
      $x(n) = \{1, 0, 1, 0, 1, 0, 1, 0\}$
      By DIT-FFT Algorithm.
   c) Compute 8 – point DFT of following sequence using DIF-FFT Algorithm $x(n) = \{1, 1, 1\}$.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   a) Explain in detail Impulse Invariant Method.
   b) Derive the expression for order of the analog Butterworth filter.
   c) Prove that $\Omega_c = \dfrac{\Omega_p}{(10^{0.1\alpha_p} - 1)^{1/2N}} = \dfrac{\Omega_s}{(10^{0.1\alpha_s} - 1)^{1/2N}}$.

d) Compare the Triangular and hanning windows.
e) Compare FIR and IIR Filter.
f) Explain finite word length effect in IIR filter.

5. Solve **any two** : **(2×10=20)**

a) Design an ideal low pass filter with a frequency response using rectangular window

$Hd(e^{j\omega}) = 1$ for $-\frac{\pi}{2} \le \omega \le \frac{\pi}{2}$

$= 0$ otherwise

Find the values of h(n) for N = 11 and Plot the frequency response.

b) Convert the analog filter into a digital filter whose system function is $H(s) = \frac{s+0.2}{(s+0.2)^2+9}$.

Use impulse invariant method for T=1 sec.

c) Apply Bilinear transformation to $H(s) = \frac{1}{(s+1)(s+3)}$ and T = 0.1 Sec.

SLR-VB – 333

Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – I) Examination, 2017
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Monday, 8-5-2017 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) Specify the correct equation for Bilinear Transformation

a) $s = \frac{2}{T}\left[\frac{1-Z^{1}}{1+Z^{-1}}\right]$ b) $s = \frac{T}{2}\left[\frac{1-Z^{1}}{1+Z^{-1}}\right]$ c) $s = \frac{2}{T}\left[\frac{1-Z^{-1}}{1+Z^{-1}}\right]$ d) $s = \frac{T}{2}\left[\frac{1-Z^{-1}}{1+Z^{-1}}\right]$

2) The binary signed number 0.111011001 when rounded to eight bits will result in number given by
a) 0.11101111 b) 0.11101101 c) 0.10101010 d) 0.11111111

3) Direct Evaluation DFT requires _____ complex multiplications.
a) N(N – 1) b) N^2 c) N(N+1) d) N(N – 1)/2

4) IIR filter is also known as
a) Cascade Structure Filter b) Transversal Filter
c) ARMA Filter d) AR Filter

5) The Number of Multiplications in FIR system can be reduced using
a) Finite Impulse Response b) Infinite Impulse Response
c) Symmetric Nature of Impulse Response d) None of above

6) The number of stages of FFT computations required for the computation of the DFT of a 512 point sequence is
a) 8 b) 9 c) 6 d) 7

7) Circular time shift of a sequence is equivalent to
a) Multiplication of the sequence X(k) with complex exponential
b) Multiplication of the sequence x(n) with complex exponential
c) Multiplication of the sequence x(n) with exponential factor
d) None

8) DIT algorithm related to
a) x(k) shuffled b) x(n) shuffled
c) x(k) and x(n) shuffled d) none

P.T.O.

9) FFT algorithm calculates
   a) DTFT b) DCT c) DFT d) DST

10) Correlation is basically used to
   a) Add two signals b) Subtract two signals
   c) Compare two signals d) None

11) If the system is described by $y(n) = x(n)^2$
   a) Linear b) Non Linear c) Homogeneous d) None of above

12) When aliasing occurs
   a) Low frequency become a high frequency
   b) High frequency become a mid frequency
   c) High frequencies above signal bandwidth becomes low frequencies below signal bandwidth
   d) None

13) Transform domain used as
   a) Enhance the signal b) Compress the signal
   c) Reduce the data points d) Increases the data points

14) The number of complex multiplications required to calculate N-point DFT using radix-2 DIT-FFT algorithms

   a) $N \log_2 N$ b) $\frac{N}{2} \log_{10} N$ c) $N \log_{10} N$ d) $\frac{N}{2} \log_2 N$

15) If we modify the circular sequence by multiplying it with $e^{j8\pi k/N}$ for a k'th frequency sample the DFT coefficients
   a) Remain unchanged b) Shift by 4 units
   c) Shift by 8 units d) Shift by 2 units

16) The impulse response of ideal filter is
   a) Causal b) Non causal
   c) Non causal and finite d) None

17) To meet the magnitude response specification for a transition width, one has to
   a) Select Proper Window b) To Select Kaiser Window
   c) Select Filter Order d) Select Rectangular Window

18) The Transformation function to be used for converting HPF to BRF is obtained by replacing S by

   a) $s = \frac{s^2 + \omega_0^2}{Ws}$ b) $s = \frac{s^2 + \omega_0^2}{\omega s}$ c) $S = \frac{s^2 + W^2}{Ws}$ d) $S = \frac{Ws}{s^2 + \omega_0^2}$

19) Specify the correct equation for hanning window

   a) $\omega_R(n) = 1$ b) $\omega(n) = 0.5 + 0.5\cos\left(2\pi n/N-1\right)$

   c) $\omega(n) = 0.42 + 0.5\cos\left(2\pi n/N-1\right)$ d) $\omega(n) = 0.5 + 0.46\cos\left(2\pi n/N-1\right)$

20) Due to the effect of coefficient quantization change in pole locations
   a) False b) True

SLR-VB – 333

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2017
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   a) Compute Circular convolution
      $x_1(n) = \{1, 3, 1, 1\}$
      $x_2(n) = \{1, 4, 5, 3\}$
   b) Determine the Auto correlation sequence of a sequence
      $x(n) = \{1, 2, 4, 3\}$
   c) Explain the Discrete Cosine Transform (DCT).
   d) Explain the concept of DFT as Linear Transformation.
   e) Find IDFT of Sequence
      $X(k) = \{4, 0, 0, 0\}$
   f) Explain the application of DSP in power systems.

3. Attempt **any two** : **(2×10=20)**
   a) Compare the linear convolution and circular convolution. Find linear convolution using overlap add method for the sequences.
      $x(n) = \{0.5, 2, -1.5, -1, 0, 0.75, 3, 2, 1.5, 1, -0.75, 2\}$ and $h(n) = \{1, 2, -1\}$
   b) Determine the DFT of the given data sequence
      $x(n) = \{1, 0, 1, 0, 1, 0, 1, 0\}$
      By DIT-FFT Algorithm.
   c) Compute 8 – point DFT of following sequence using DIF-FFT Algorithm $x(n) = \{1, 1, 1\}$.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   a) Explain in detail Impulse Invariant Method.
   b) Derive the expression for order of the analog Butterworth filter.
   c) Prove that $\Omega_c = \dfrac{\Omega_p}{(10^{0.1\alpha_p} - 1)^{1/2N}} = \dfrac{\Omega_s}{(10^{0.1\alpha_s} - 1)^{1/2N}}$.

d) Compare the Triangular and hanning windows.
e) Compare FIR and IIR Filter.
f) Explain finite word length effect in IIR filter.

5. Solve **any two** : **(2×10=20)**

a) Design an ideal low pass filter with a frequency response using rectangular window

$Hd(e^{j\omega}) = 1$ for $-\frac{\pi}{2} \le \omega \le \frac{\pi}{2}$

$= 0$ otherwise

Find the values of h(n) for N = 11 and Plot the frequency response.

b) Convert the analog filter into a digital filter whose system function is $H(s) = \frac{s+0.2}{(s+0.2)^2+9}$.

Use impulse invariant method for T=1 sec.

c) Apply Bilinear transformation to $H(s) = \frac{1}{(s+1)(s+3)}$ and T = 0.1 Sec.

SLR-VB – 333

Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – I) Examination, 2017
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Monday, 8-5-2017 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 impulse response of ideal filter is
   a) Causal b) Non causal
   c) Non causal and finite d) None

2) To meet the magnitude response specification for a transition width, one has to
   a) Select Proper Window b) To Select Kaiser Window
   c) Select Filter Order d) Select Rectangular Window

3) The Transformation function to be used for converting HPF to BRF is obtained by replacing S by

   a) $s = \frac{s^2 + \omega_0^2}{Ws}$ b) $s = \frac{s^2 + \omega_0^2}{\omega s}$ c) $S = \frac{s^2 + W^2}{Ws}$ d) $S = \frac{Ws}{s^2 + \omega_0^2}$

4) Specify the correct equation for hanning window

   a) $\omega_R(n) = 1$ b) $\omega(n) = 0.5 + 0.5\cos\left(2\pi n/N-1\right)$

   c) $\omega(n) = 0.42 + 0.5\cos\left(2\pi n/N-1\right)$ d) $\omega(n) = 0.5 + 0.46\cos\left(2\pi n/N-1\right)$

5) Due to the effect of coefficient quantization change in pole locations
   a) False b) True

6) Specify the correct equation for Bilinear Transformation

   a) $s = \frac{2}{T}\left[\frac{1-Z^1}{1+Z^{-1}}\right]$ b) $s = \frac{T}{2}\left[\frac{1-Z^1}{1+Z^{-1}}\right]$ c) $s = \frac{2}{T}\left[\frac{1-Z^{-1}}{1+Z^{-1}}\right]$ d) $s = \frac{T}{2}\left[\frac{1-Z^{-1}}{1+Z^{-1}}\right]$

7) The binary signed number 0.111011001 when rounded to eight bits will result in number given by
   a) 0.11101111 b) 0.11101101 c) 0.10101010 d) 0.11111111

P.T.O.

8) Direct Evaluation DFT requires _____ complex multiplications.
   a) N(N – 1) b) N^2 c) N(N+1) d) N(N – 1)/2

9) IIR filter is also known as
   a) Cascade Structure Filter b) Transversal Filter
   c) ARMA Filter d) AR Filter

10) The Number of Multiplications in FIR system can be reduced using
   a) Finite Impulse Response b) Infinite Impulse Response
   c) Symmetric Nature of Impulse Response d) None of above

11) The number of stages of FFT computations required for the computation of the DFT of a 512 point sequence is
   a) 8 b) 9 c) 6 d) 7

12) Circular time shift of a sequence is equivalent to
   a) Multiplication of the sequence X(k) with complex exponential
   b) Multiplication of the sequence x(n) with complex exponential
   c) Multiplication of the sequence x(n) with exponential factor
   d) None

13) DIT algorithm related to
   a) x(k) shuffled b) x(n) shuffled
   c) x(k) and x(n) shuffled d) none

14) FFT algorithm calculates
   a) DTFT b) DCT c) DFT d) DST

15) Correlation is basically used to
   a) Add two signals b) Subtract two signals
   c) Compare two signals d) None

16) If the system is described by $y(n) = x(n)^2$
   a) Linear b) Non Linear c) Homogeneous d) None of above

17) When aliasing occurs
   a) Low frequency become a high frequency
   b) High frequency become a mid frequency
   c) High frequencies above signal bandwidth becomes low frequencies below signal bandwidth
   d) None

18) Transform domain used as
   a) Enhance the signal b) Compress the signal
   c) Reduce the data points d) Increases the data points

19) The number of complex multiplications required to calculate N-point DFT using radix-2 DIT-FFT algorithms
   a) $N \log_2 N$ b) $\frac{N}{2} \log_{10} N$ c) $N \log_{10} N$ d) $\frac{N}{2} \log_2 N$

20) If we modify the circular sequence by multiplying it with $e^{j8\pi k/N}$ for a k'th frequency sample the DFT coefficients
   a) Remain unchanged b) Shift by 4 units
   c) Shift by 8 units d) Shift by 2 units

_____

SLR-VB – 333

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2017
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   a) Compute Circular convolution
      $x_1(n) = \{1, 3, 1, 1\}$
      $x_2(n) = \{1, 4, 5, 3\}$
   b) Determine the Auto correlation sequence of a sequence
      $x(n) = \{1, 2, 4, 3\}$
   c) Explain the Discrete Cosine Transform (DCT).
   d) Explain the concept of DFT as Linear Transformation.
   e) Find IDFT of Sequence
      $X(k) = \{4, 0, 0, 0\}$
   f) Explain the application of DSP in power systems.

3. Attempt **any two** : **(2×10=20)**
   a) Compare the linear convolution and circular convolution. Find linear convolution using overlap add method for the sequences.
      $x(n) = \{0.5, 2, -1.5, -1, 0, 0.75, 3, 2, 1.5, 1, -0.75, 2\}$ and $h(n) = \{1, 2, -1\}$
   b) Determine the DFT of the given data sequence
      $x(n) = \{1, 0, 1, 0, 1, 0, 1, 0\}$
      By DIT-FFT Algorithm.
   c) Compute 8 – point DFT of following sequence using DIF-FFT Algorithm $x(n) = \{1, 1, 1\}$.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   a) Explain in detail Impulse Invariant Method.
   b) Derive the expression for order of the analog Butterworth filter.
   c) Prove that $\Omega_c = \dfrac{\Omega_p}{(10^{0.1\alpha_p} - 1)^{1/2N}} = \dfrac{\Omega_s}{(10^{0.1\alpha_s} - 1)^{1/2N}}$.

d) Compare the Triangular and hanning windows.
e) Compare FIR and IIR Filter.
f) Explain finite word length effect in IIR filter.

5. Solve **any two** : **(2×10=20)**

a) Design an ideal low pass filter with a frequency response using rectangular window

$Hd(e^{j\omega}) = 1$ for $-\frac{\pi}{2} \le \omega \le \frac{\pi}{2}$

$= 0$ otherwise

Find the values of h(n) for N = 11 and Plot the frequency response.

b) Convert the analog filter into a digital filter whose system function is $H(s) = \frac{s+0.2}{(s+0.2)^2+9}$.

Use impulse invariant method for T=1 sec.

c) Apply Bilinear transformation to $H(s) = \frac{1}{(s+1)(s+3)}$ and T = 0.1 Sec.

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Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – I) Examination, 2017
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Monday, 8-5-2017 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) If the system is described by $y(n) = x(n)^2$
   a) Linear b) Non Linear c) Homogeneous d) None of above

2) When aliasing occurs
   a) Low frequency become a high frequency
   b) High frequency become a mid frequency
   c) High frequencies above signal bandwidth becomes low frequencies below signal bandwidth
   d) None

3) Transform domain used as
   a) Enhance the signal b) Compress the signal
   c) Reduce the data points d) Increases the data points

4) The number of complex multiplications required to calculate N-point DFT using radix-2 DIT-FFT algorithms
   a) $N \log_2 N$ b) $\frac{N}{2} \log_{10} N$ c) $N \log_{10} N$ d) $\frac{N}{2} \log_2 N$

5) If we modify the circular sequence by multiplying it with $e^{j8\pi k/N}$ for a k'th frequency sample the DFT coefficients
   a) Remain unchanged b) Shift by 4 units
   c) Shift by 8 units d) Shift by 2 units

6) The impulse response of ideal filter is
   a) Causal b) Non causal
   c) Non causal and finite d) None

7) To meet the magnitude response specification for a transition width, one has to
   a) Select Proper Window b) To Select Kaiser Window
   c) Select Filter Order d) Select Rectangular Window

P.T.O.

8) The Transformation function to be used for converting HPF to BRF is obtained by replacing S by

a) $s = \frac{s^2 + \omega_0^2}{Ws}$ b) $s = \frac{s^2 + \omega_0^2}{\omega s}$ c) $S = \frac{s^2 + W^2}{Ws}$ d) $S = \frac{Ws}{s^2 + \omega_0^2}$

9) Specify the correct equation for hanning window

a) $\omega_R(n) = 1$ b) $\omega(n) = 0.5 + 0.5\cos\left(2\pi n/N-1\right)$

c) $\omega(n) = 0.42 + 0.5\cos\left(2\pi n/N-1\right)$ d) $\omega(n) = 0.5 + 0.46\cos\left(2\pi n/N-1\right)$

10) Due to the effect of coefficient quantization change in pole locations
a) False b) True

11) Specify the correct equation for Bilinear Transformation

a) $s = \frac{2}{T}\left[\frac{1 - Z^1}{1 + Z^{-1}}\right]$ b) $s = \frac{T}{2}\left[\frac{1 - Z^1}{1 + Z^{-1}}\right]$ c) $s = \frac{2}{T}\left[\frac{1 - Z^{-1}}{1 + Z^{-1}}\right]$ d) $s = \frac{T}{2}\left[\frac{1 - Z^{-1}}{1 + Z^{-1}}\right]$

12) The binary signed number 0.111011001 when rounded to eight bits will result in number given by
a) 0.11101111 b) 0.11101101 c) 0.10101010 d) 0.11111111

13) Direct Evaluation DFT requires _____ complex multiplications.
a) N(N – 1) b) N^2 c) N(N+1) d) N(N – 1)/2

14) IIR filter is also known as
a) Cascade Structure Filter b) Transversal Filter
c) ARMA Filter d) AR Filter

15) The Number of Multiplications in FIR system can be reduced using
a) Finite Impulse Response b) Infinite Impulse Response
c) Symmetric Nature of Impulse Response d) None of above

16) The number of stages of FFT computations required for the computation of the DFT of a 512 point sequence is
a) 8 b) 9 c) 6 d) 7

17) Circular time shift of a sequence is equivalent to
a) Multiplication of the sequence X(k) with complex exponential
b) Multiplication of the sequence x(n) with complex exponential
c) Multiplication of the sequence x(n) with exponential factor
d) None

18) DIT algorithm related to
a) x(k) shuffled b) x(n) shuffled
c) x(k) and x(n) shuffled d) none

19) FFT algorithm calculates
a) DTFT b) DCT c) DFT d) DST

20) Correlation is basically used to
a) Add two signals b) Subtract two signals
c) Compare two signals d) None

SLR-VB – 333

Seat No.	

B.E. (Electrical Engineering) (Part – I) Examination, 2017
DIGITAL SIGNAL PROCESSING (Elective – I)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   a) Compute Circular convolution
      $x_1(n) = \{1, 3, 1, 1\}$
      $x_2(n) = \{1, 4, 5, 3\}$
   b) Determine the Auto correlation sequence of a sequence
      $x(n) = \{1, 2, 4, 3\}$
   c) Explain the Discrete Cosine Transform (DCT).
   d) Explain the concept of DFT as Linear Transformation.
   e) Find IDFT of Sequence
      $X(k) = \{4, 0, 0, 0\}$
   f) Explain the application of DSP in power systems.

3. Attempt **any two** : **(2×10=20)**
   a) Compare the linear convolution and circular convolution. Find linear convolution using overlap add method for the sequences.
      $x(n) = \{0.5, 2, -1.5, -1, 0, 0.75, 3, 2, 1.5, 1, -0.75, 2\}$ and $h(n) = \{1, 2, -1\}$
   b) Determine the DFT of the given data sequence
      $x(n) = \{1, 0, 1, 0, 1, 0, 1, 0\}$
      By DIT-FFT Algorithm.
   c) Compute 8 – point DFT of following sequence using DIF-FFT Algorithm $x(n) = \{1, 1, 1\}$.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   a) Explain in detail Impulse Invariant Method.
   b) Derive the expression for order of the analog Butterworth filter.
   c) Prove that $\Omega_c = \dfrac{\Omega_p}{(10^{0.1\alpha_p} - 1)^{1/2N}} = \dfrac{\Omega_s}{(10^{0.1\alpha_s} - 1)^{1/2N}}$.

d) Compare the Triangular and hanning windows.
e) Compare FIR and IIR Filter.
f) Explain finite word length effect in IIR filter.

5. Solve **any two** : **(2×10=20)**

a) Design an ideal low pass filter with a frequency response using rectangular window

$Hd(e^{j\omega}) = 1$ for $-\frac{\pi}{2} \le \omega \le \frac{\pi}{2}$

$= 0$ otherwise

Find the values of h(n) for N = 11 and Plot the frequency response.

b) Convert the analog filter into a digital filter whose system function is $H(s) = \frac{s+0.2}{(s+0.2)^2+9}$.

Use impulse invariant method for T=1 sec.

c) Apply Bilinear transformation to $H(s) = \frac{1}{(s+1)(s+3)}$ and T = 0.1 Sec.

SLR-VB – 334

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) Examination, 2017
ENERGY AUDIT AND MANAGEMENT (Elective – I)

Day and Date : Monday, 8-5-2017 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 pay period is defined as the ratio of
   A) Net investment to the net annual cash flow
   B) Net investment to the capital cost
   C) Net annual cash flow to the capital cost
   D) Net annual savings to the capital cost

2) Power factor of a load can be improved by using
   A) Static capacitors B) Synchronous condenser
   C) Phase advancer D) All of the above

3) Acid rain is caused by the release of the following components from combustion of fuels
   A) SOx and NOx B) Sox and CO_2 C) CO2 and NOx D) H_2O

4) LNG stands for
   A) Liquefied Natural Gas B) Liquid Natural Gas
   C) Low Nitrogen Content Gas D) Liquid Nitrogen Gas

5) Energy management is a key component of
   A) Environmental management B) Carbon management
   C) Nitrogen management D) Water management

6) Demand Side Management is required to
   A) Reduce overall cost of installed capacity
   B) Reduce needs of peaking station
   C) Ensure quality and equity of supply
   D) All of the above

7) In the balance of process, recycle product is always considered as
   A) Input to process B) Output to process
   C) Both A) and B) D) None of above

8) 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

P.T.O.

9) What do you mean by 'toe' ?
   A) Total oil equivalent B) Tons of effluent
   C) Tons of oil equivalent D) None of the above

10) The main objective of energy management is to
   A) Minimize energy cost
   B) Minimum environmental effect
   C) Maintain optimum energy procurement and utilization
   D) All of the above

11) Explanation of energy conservation in motive power application in
   A) 1936 energy crisis B) 1972 energy crisis
   C) 1973 energy crisis D) 1986 energy crisis

12) EPRI stands for
   A) European Power Research Institute B) Electrical Power Russian Institute
   C) Electrical Power Research Institute D) Electrical Power Research Industries

13) The capital cost of generating equipment, transmission system and distribution system comes under
   A) Fixed capital B) Running capital
   C) Both fixed and running capital D) All of these

14) The sum of money received or paid in annual in one or more installments, for a given period of time is known as
   A) Time value of money B) Annuity
   C) True compounding D) Cash flow

15) The future value of one dollar in "n" periods at interest rate of "I" present is known as
   A) Single payment compound amount B) Single payment present worth
   C) Uniform series compound amount D) Sinking fund payment

16) The watt less component is
   A) I B) $I \cos \phi$ C) $I \sin \phi$ D) None of these

17) Projected temperature increase in degree centigrade 2100 due to climate change is
   A) 2 B) 3 C) 4 D) 5

18) Sankey diagram is an useful tool to represent
   A) Financial strength of the company B) Management philosophy
   C) Input and output energy flow D) Human resource strength

19) Infrared thermometer is used to measure
   A) Surface temperature B) Flame temperature
   C) Flue gas temperature D) Hot water temperature

20) Losses in material and energy balance is considered as
   A) Inputs B) Outputs
   C) Both A) and B) D) None of the above

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SLR-VB – 334

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ENERGY AUDIT AND MANAGEMENT (Elective – I)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Give salient features of energy Conservation Act, 2001.
   2) State the responsibilities and duties of energy manager.
   3) Explain demand side management concept with advantages and disadvantages.
   4) What is energy management ? Discuss the principles of energy management ?
   5) How power factor penalties and incentives in tariff help DSM ?

3. Attempt **any two** : **(10×2=20)**
   1) Discuss United Nations Framework Convention on Climate Change.
   2) Write a note on format of energy policy.
   3) Explain the role of FACTS, VAR compensation in supply side management.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) What is internal and external benchmarking ? What are the benefits of benchmarking energy performance ?
   2) Explain technical means for T and D loss minimization.
   3) Write a note on time value of money.
   4) What is necessity of energy audit ? Explain phases of energy audit.
   5) How cogeneration leads the energy conservation ?

5. Attempt **any two** : **(10×2=20)**
   1) What are the objectives of carrying out sensitivity analysis ? What are the different factors that are considered for the sensitivity analysis ?
   2) Explain the following techniques with their use for energy analysis.
      a) Sankey diagram
      b) CUSUM technique.
   3) Explain the energy conservation in motive power application.

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Set P

Set P

SLR-VB – 334

Seat No.	

Set **Q**

B.E. (Electrical) (Part – I) Examination, 2017
ENERGY AUDIT AND MANAGEMENT (Elective – I)

Day and Date : Monday, 8-5-2017 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 watt less component is
A) I B) I cos ϕ C) I sin ϕ D) None of these

2) Projected temperature increase in degree centigrade 2100 due to climate change is
A) 2 B) 3 C) 4 D) 5

3) Sankey diagram is an useful tool to represent
A) Financial strength of the company B) Management philosophy
C) Input and output energy flow D) Human resource strength

4) Infrared thermometer is used to measure
A) Surface temperature B) Flame temperature
C) Flue gas temperature D) Hot water temperature

5) Losses in material and energy balance is considered as
A) Inputs B) Outputs
C) Both A) and B) D) None of the above

6) The pay period is defined as the ratio of
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8) Acid rain is caused by the release of the following components from combustion of fuels
A) SOx and NOx B) Sox and CO_2 C) CO2 and NOx D) H_2O

9) LNG stands for
A) Liquefied Natural Gas B) Liquid Natural Gas
C) Low Nitrogen Content Gas D) Liquid Nitrogen Gas

P.T.O.

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11) Demand Side Management is required to
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B) Reduce needs of peaking station
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D) All of the above

12) In the balance of 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 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

14) What do you mean by 'toe' ?
A) Total oil equivalent B) Tons of effluent
C) Tons of oil equivalent D) None of the above

15) The main objective of energy management is to
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C) True compounding D) Cash flow

20) The future value of one dollar in "n" periods at interest rate of "I" present is known as
A) Single payment compound amount B) Single payment present worth
C) Uniform series compound amount D) Sinking fund payment

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SLR-VB – 334

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ENERGY AUDIT AND MANAGEMENT (Elective – I)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Give salient features of energy Conservation Act, 2001.
   2) State the responsibilities and duties of energy manager.
   3) Explain demand side management concept with advantages and disadvantages.
   4) What is energy management ? Discuss the principles of energy management ?
   5) How power factor penalties and incentives in tariff help DSM ?

3. Attempt **any two** : **(10×2=20)**
   1) Discuss United Nations Framework Convention on Climate Change.
   2) Write a note on format of energy policy.
   3) Explain the role of FACTS, VAR compensation in supply side management.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) What is internal and external benchmarking ? What are the benefits of benchmarking energy performance ?
   2) Explain technical means for T and D loss minimization.
   3) Write a note on time value of money.
   4) What is necessity of energy audit ? Explain phases of energy audit.
   5) How cogeneration leads the energy conservation ?

5. Attempt **any two** : **(10×2=20)**
   1) What are the objectives of carrying out sensitivity analysis ? What are the different factors that are considered for the sensitivity analysis ?
   2) Explain the following techniques with their use for energy analysis.
      a) Sankey diagram
      b) CUSUM technique.
   3) Explain the energy conservation in motive power application.

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Set Q

Set Q

SLR-VB – 334

Seat No.	

Set **R**

B.E. (Electrical) (Part – I) Examination, 2017
ENERGY AUDIT AND MANAGEMENT (Elective – I)

Day and Date : Monday, 8-5-2017 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) Explanation of energy conservation in motive power application in
A) 1936 energy crisis B) 1972 energy crisis
C) 1973 energy crisis D) 1986 energy crisis

2) EPRI stands for
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3) The capital cost of generating equipment, transmission system and distribution system comes under
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5) The future value of one dollar in "n" periods at interest rate of "I" present is known as
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C) Uniform series compound amount D) Sinking fund payment

6) The watt less component is
A) I B) I cos ϕ C) I sin ϕ D) None of these

7) Projected temperature increase in degree centigrade 2100 due to climate change is
A) 2 B) 3 C) 4 D) 5

8) Sankey diagram is an useful tool to represent
A) Financial strength of the company B) Management philosophy
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P.T.O.

9) Infrared thermometer is used to measure
   A) Surface temperature B) Flame temperature
   C) Flue gas temperature D) Hot water temperature
10) Losses in material and energy balance is considered as
   A) Inputs B) Outputs
   C) Both A) and B) D) None of the above
11) The pay period is defined as the ratio of
   A) Net investment to the net annual cash flow
   B) Net investment to the capital cost
   C) Net annual cash flow to the capital cost
   D) Net annual savings to the capital cost
12) Power factor of a load can be improved by using
   A) Static capacitors B) Synchronous condenser
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13) Acid rain is caused by the release of the following components from combustion of fuels
   A) SOx and NOx B) Sox and CO_2 C) CO2 and NOx D) H_2O
14) LNG stands for
   A) Liquefied Natural Gas B) Liquid Natural Gas
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15) Energy management is a key component of
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16) Demand Side Management is required to
   A) Reduce overall cost of installed capacity
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18) 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
19) What do you mean by 'toe' ?
   A) Total oil equivalent B) Tons of effluent
   C) Tons of oil equivalent D) None of the above
20) The main objective of energy management is to
   A) Minimize energy cost
   B) Minimum environmental effect
   C) Maintain optimum energy procurement and utilization
   D) All of the above

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SLR-VB – 334

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ENERGY AUDIT AND MANAGEMENT (Elective – I)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Give salient features of energy Conservation Act, 2001.
   2) State the responsibilities and duties of energy manager.
   3) Explain demand side management concept with advantages and disadvantages.
   4) What is energy management ? Discuss the principles of energy management ?
   5) How power factor penalties and incentives in tariff help DSM ?

3. Attempt **any two** : **(10×2=20)**
   1) Discuss United Nations Framework Convention on Climate Change.
   2) Write a note on format of energy policy.
   3) Explain the role of FACTS, VAR compensation in supply side management.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) What is internal and external benchmarking ? What are the benefits of benchmarking energy performance ?
   2) Explain technical means for T and D loss minimization.
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5. Attempt **any two** : **(10×2=20)**
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   2) Explain the following techniques with their use for energy analysis.
      a) Sankey diagram
      b) CUSUM technique.
   3) Explain the energy conservation in motive power application.

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Set R

Set R

SLR-VB – 334

Seat No.	

Set **S**

B.E. (Electrical) (Part – I) Examination, 2017
ENERGY AUDIT AND MANAGEMENT (Elective – I)

Day and Date : Monday, 8-5-2017 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) Demand Side Management is required to
   A) Reduce overall cost of installed capacity
   B) Reduce needs of peaking station
   C) Ensure quality and equity of supply
   D) All of the above

2) In the balance of process, recycle product is always considered as
   A) Input to process B) Output to process
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5) The main objective of energy management is to
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6) Explanation of energy conservation in motive power application in
   A) 1936 energy crisis B) 1972 energy crisis
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7) EPRI stands for
   A) European Power Research Institute B) Electrical Power Russian Institute
   C) Electrical Power Research Institute D) Electrical Power Research Industries

P.T.O.

8) The capital cost of generating equipment, transmission system and distribution system comes under
   A) Fixed capital B) Running capital
   C) Both fixed and running capital D) All of these
9) The sum of money received or paid in annual in one or more installments, for a given period of time is known as
   A) Time value of money B) Annuity
   C) True compounding D) Cash flow
10) The future value of one dollar in "n" periods at interest rate of "I" present is known as
   A) Single payment compound amount B) Single payment present worth
   C) Uniform series compound amount D) Sinking fund payment
11) The watt less component is
   A) I B) I $\cos\phi$ C) I $\sin\phi$ D) None of these
12) Projected temperature increase in degree centigrade 2100 due to climate change is
   A) 2 B) 3 C) 4 D) 5
13) Sankey diagram is an useful tool to represent
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   C) Input and output energy flow D) Human resource strength
14) Infrared thermometer is used to measure
   A) Surface temperature B) Flame temperature
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   A) Net investment to the net annual cash flow
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17) Power factor of a load can be improved by using
   A) Static capacitors B) Synchronous condenser
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18) Acid rain is caused by the release of the following components from combustion of fuels
   A) SOx and NOx B) Sox and CO_2 C) CO2 and NOx D) H_2O
19) LNG stands for
   A) Liquefied Natural Gas B) Liquid Natural Gas
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20) Energy management is a key component of
   A) Environmental management B) Carbon management
   C) Nitrogen management D) Water management

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SLR-VB – 334

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
ENERGY AUDIT AND MANAGEMENT (Elective – I)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Give salient features of energy Conservation Act, 2001.
   2) State the responsibilities and duties of energy manager.
   3) Explain demand side management concept with advantages and disadvantages.
   4) What is energy management ? Discuss the principles of energy management ?
   5) How power factor penalties and incentives in tariff help DSM ?

3. Attempt **any two** : **(10×2=20)**
   1) Discuss United Nations Framework Convention on Climate Change.
   2) Write a note on format of energy policy.
   3) Explain the role of FACTS, VAR compensation in supply side management.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) What is internal and external benchmarking ? What are the benefits of benchmarking energy performance ?
   2) Explain technical means for T and D loss minimization.
   3) Write a note on time value of money.
   4) What is necessity of energy audit ? Explain phases of energy audit.
   5) How cogeneration leads the energy conservation ?

5. Attempt **any two** : **(10×2=20)**
   1) What are the objectives of carrying out sensitivity analysis ? What are the different factors that are considered for the sensitivity analysis ?
   2) Explain the following techniques with their use for energy analysis.
      a) Sankey diagram
      b) CUSUM technique.
   3) Explain the energy conservation in motive power application.

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Set S

Set S

SLR-VB – 335

Seat No.	

Set P

B.E. (Electrical) (Part – I) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Monday, 8-5-2017 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

I. Choose the correct answers : **(20×1=20)**

1) Third mode of propagation is called as
   a) Line to ground b) Phase to phase
   c) Homopolar d) Inter-phase

2) Operating 750 KV line gives AN at a level of
   a) 50 dB b) 55.4 dB c) 52 dB d) 58.5 dB

3) 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

4) 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

5) 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) $\frac{zt-zo}{zo+zt}$

6) 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.

7) 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

8) The velocity of travelling wave through a cable of relative permittivity is
   a) 9×10^8 m/sec. b) 3×10^8 m/sec. c) 10^8 m/sec. d) None of these

9) Draining of trapped charge of line is done by
   a) Main breaker b) Auxiliary breaker
   c) Air circuit breaker d) Shunt reactors

10) The crest time of pulse properties for positive cycle is
   a) 20 ns b) 30 ns c) 40 ns d) 50 ns

11) 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

12) The function of steel wire in an ACSR conductor is to
   a) compensate for skin effect b) take care of surges
   c) provide additional mechanical strength d) reduce inductance

13) The high voltage recognised in India are as per
   a) IS 2022 b) IS 2024 c) IS 2026 d) IS 2028

14) 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

15) The measurement of electrostatic field of an e.h.v. line is done by
   a) Dipole b) Spherical Dipole
   c) Parallel plate d) All of the above

16) Which of the following is protective device against lightning over voltages ?
   a) Rod gap b) Surge absorber c) Horn gap d) All above

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) Refraction coefficient of voltage (K_T) for open ended line
   a) + 2 b) 1 c) – 1 d) 0

20) The percentage power loss in 750 kV transmission line is nearly equal to
   a) 3.27 b) 4.76 c) 0.78 d) 2.5

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SLR-VB – 335

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Monday, 8-5-2017 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

II. Solve **any four** : **(4×5=20)**

a) Explain in detail the advantages and disadvantages of high voltages.

b) What are the different mechanical considerations in EHV line performance ?

c) What are the properties of Bundled conductors in EHV-AC lines ?

d) Explain Reflection and refraction of travelling waves.

e) Lightning stroke mechanism.

f) Brief the charge potential relations of the multi conductor lines.

III. Solve **any two** : **(2×10=20)**

a) A tower has 40 ohms footing resistance and two ground wires with Zg = 500 ohms. The lightening stroke surge impedance Zs = 400 ohms. For Is = 50 KA crest, calculate the tower top potential :

i) Considering all impedances

ii) Neglecting the ground wire and stroke surge impedances.

iii) Considering only one ground wire and stroke surge impedance.

b) Explain in detail the sequence inductance and capacitance.

c) Explain the relation between the temperature rise and current carrying capacity of EHV-AC line.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Power circle diagram and its use.

b) Enlist sources of over voltage and explain Ferro resonance voltages.

c) Reduction of switching surge over voltages.

d) Construction and characteristics of ZnO gapless arrester.

e) Explain static reactive compensating system.

f) Expression for generalized constants.

V. Solve **any two** : **(2×10=20)**

a) Explain in brief the sinusoidal excitation-lumped parameter circuits.

b) What are the factors under steady state in design of EHV lines ?

c) Explain sub-synchronous resonance in series capacitors compensated lines.

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SLR-VB – 335

Seat No.	

Set Q

B.E. (Electrical) (Part – I) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Monday, 8-5-2017 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

I. Choose the correct answers : **(20×1=20)**

1) Which of the following is protective device against lightning over voltages ?
a) Rod gap b) Surge absorber c) Horn gap d) All above

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) Refraction coefficient of voltage (K_T) for open ended line
a) + 2 b) 1 c) – 1 d) 0

5) The percentage power loss in 750 kV transmission line is nearly equal to
a) 3.27 b) 4.76 c) 0.78 d) 2.5

6) Third mode of propagation is called as
a) Line to ground b) Phase to phase
c) Homopolar d) Inter-phase

7) Operating 750 KV line gives AN at a level of
a) 50 dB b) 55.4 dB c) 52 dB d) 58.5 dB

8) 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.

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

10) 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) $\frac{zt - zo}{zo + zt}$

11) In lossless transmission line theoretically have

a) $r = l = 0$ b) $l = g = 0$ c) $g = c = 0$ d) $r = g = 0$

12) 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

13) The velocity of travelling wave through a cable of relative permittivity is

a) 9×10^8 m/sec. b) 3×10^8 m/sec. c) 10^8 m/sec. d) None of these

14) Draining of trapped charge of line is done by

a) Main breaker b) Auxiliary breaker
c) Air circuit breaker d) Shunt reactors

15) The crest time of pulse properties for positive cycle is

a) 20 ns b) 30 ns c) 40 ns d) 50 ns

16) 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

17) The function of steel wire in an ACSR conductor is to

a) compensate for skin effect b) take care of surges
c) provide additional mechanical strength d) reduce inductance

18) The high voltage recognised in India are as per

a) IS 2022 b) IS 2024 c) IS 2026 d) IS 2028

19) 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

20) The measurement of electrostatic field of an e.h.v. line is done by

a) Dipole b) Spherical Dipole
c) Parallel plate d) All of the above

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SLR-VB – 335

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Monday, 8-5-2017 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

II. Solve **any four** : **(4×5=20)**

a) Explain in detail the advantages and disadvantages of high voltages.

b) What are the different mechanical considerations in EHV line performance ?

c) What are the properties of Bundled conductors in EHV-AC lines ?

d) Explain Reflection and refraction of travelling waves.

e) Lightning stroke mechanism.

f) Brief the charge potential relations of the multi conductor lines.

III. Solve **any two** : **(2×10=20)**

a) A tower has 40 ohms footing resistance and two ground wires with Zg = 500 ohms. The lightening stroke surge impedance Zs = 400 ohms. For Is = 50 KA crest, calculate the tower top potential :

i) Considering all impedances

ii) Neglecting the ground wire and stroke surge impedances.

iii) Considering only one ground wire and stroke surge impedance.

b) Explain in detail the sequence inductance and capacitance.

c) Explain the relation between the temperature rise and current carrying capacity of EHV-AC line.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Power circle diagram and its use.

b) Enlist sources of over voltage and explain Ferro resonance voltages.

c) Reduction of switching surge over voltages.

d) Construction and characteristics of ZnO gapless arrester.

e) Explain static reactive compensating system.

f) Expression for generalized constants.

V. Solve **any two** : **(2×10=20)**

a) Explain in brief the sinusoidal excitation-lumped parameter circuits.

b) What are the factors under steady state in design of EHV lines ?

c) Explain sub-synchronous resonance in series capacitors compensated lines.

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SLR-VB – 335

Seat No.	

Set R

B.E. (Electrical) (Part – I) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Monday, 8-5-2017 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

I. Choose the correct answers : **(20×1=20)**

1) 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

2) The function of steel wire in an ACSR conductor is to
   a) compensate for skin effect b) take care of surges
   c) provide additional mechanical strength d) reduce inductance

3) The high voltage recognised in India are as per
   a) IS 2022 b) IS 2024 c) IS 2026 d) IS 2028

4) 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

5) The measurement of electrostatic field of an e.h.v. line is done by
   a) Dipole b) Spherical Dipole
   c) Parallel plate d) All of the above

6) Which of the following is protective device against lightning over voltages ?
   a) Rod gap b) Surge absorber c) Horn gap d) All above

7) The dimensions of constants B and C are respectively _____ and _____
   a) Ohm, Siemen b) Mho, Siemen
   c) Both are dimensionless d) Siemen, Ohm

P.T.O.

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) Refraction coefficient of voltage (K_T) for open ended line
   a) + 2 b) 1 c) – 1 d) 0

10) The percentage power loss in 750 kV transmission line is nearly equal to
   a) 3.27 b) 4.76 c) 0.78 d) 2.5

11) Third mode of propagation is called as
   a) Line to ground b) Phase to phase
   c) Homopolar d) Inter-phase

12) Operating 750 KV line gives AN at a level of
   a) 50 dB b) 55.4 dB c) 52 dB d) 58.5 dB

13) 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

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) 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) $\frac{zt-zo}{zo+zt}$

16) In lossless transmission line theoretically have
   a) r = l = 0 b) l = g = 0 c) g = c = 0 d) r = g = 0

17) 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

18) The velocity of travelling wave through a cable of relative permittivity is
   a) 9×10^8 m/sec. b) 3×10^8 m/sec. c) 10^8 m/sec. d) None of these

19) Draining of trapped charge of line is done by
   a) Main breaker b) Auxiliary breaker
   c) Air circuit breaker d) Shunt reactors

20) The crest time of pulse properties for positive cycle is
   a) 20 ns b) 30 ns c) 40 ns d) 50 ns

SLR-VB – 335

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Monday, 8-5-2017 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

II. Solve **any four** : **(4×5=20)**

a) Explain in detail the advantages and disadvantages of high voltages.

b) What are the different mechanical considerations in EHV line performance ?

c) What are the properties of Bundled conductors in EHV-AC lines ?

d) Explain Reflection and refraction of travelling waves.

e) Lightning stroke mechanism.

f) Brief the charge potential relations of the multi conductor lines.

III. Solve **any two** : **(2×10=20)**

a) A tower has 40 ohms footing resistance and two ground wires with Zg = 500 ohms. The lightening stroke surge impedance Zs = 400 ohms. For Is = 50 KA crest, calculate the tower top potential :

i) Considering all impedances

ii) Neglecting the ground wire and stroke surge impedances.

iii) Considering only one ground wire and stroke surge impedance.

b) Explain in detail the sequence inductance and capacitance.

c) Explain the relation between the temperature rise and current carrying capacity of EHV-AC line.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Power circle diagram and its use.

b) Enlist sources of over voltage and explain Ferro resonance voltages.

c) Reduction of switching surge over voltages.

d) Construction and characteristics of ZnO gapless arrester.

e) Explain static reactive compensating system.

f) Expression for generalized constants.

V. Solve **any two** : **(2×10=20)**

a) Explain in brief the sinusoidal excitation-lumped parameter circuits.

b) What are the factors under steady state in design of EHV lines ?

c) Explain sub-synchronous resonance in series capacitors compensated lines.

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SLR-VB – 335

Seat No.	

Set S

B.E. (Electrical) (Part – I) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Monday, 8-5-2017 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

I. Choose the correct answers : **(20×1=20)**

1) In lossless transmission line theoretically have
a) r = *l* = 0 b) *l* = g = 0 c) g = c = 0 d) r = g = 0

2) 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

3) The velocity of travelling wave through a cable of relative permittivity is
a) 9×10^8 m/sec. b) 3×10^8 m/sec. c) 10^8 m/sec. d) None of these

4) Draining of trapped charge of line is done by
a) Main breaker b) Auxiliary breaker
c) Air circuit breaker d) Shunt reactors

5) The crest time of pulse properties for positive cycle is
a) 20 ns b) 30 ns c) 40 ns d) 50 ns

6) 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

7) The function of steel wire in an ACSR conductor is to
a) compensate for skin effect b) take care of surges
c) provide additional mechanical strength d) reduce inductance

8) The high voltage recognised in India are as per
a) IS 2022 b) IS 2024 c) IS 2026 d) IS 2028

9) 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

10) The measurement of electrostatic field of an e.h.v. line is done by
a) Dipole b) Spherical Dipole
c) Parallel plate d) All of the above

11) Which of the following is protective device against lightning over voltages ?
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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) Refraction coefficient of voltage (K_T) for open ended line
a) + 2 b) 1 c) – 1 d) 0

15) The percentage power loss in 750 kV transmission line is nearly equal to
a) 3.27 b) 4.76 c) 0.78 d) 2.5

16) Third mode of propagation is called as
a) Line to ground b) Phase to phase
c) Homopolar d) Inter-phase

17) Operating 750 KV line gives AN at a level of
a) 50 dB b) 55.4 dB c) 52 dB d) 58.5 dB

18) 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

19) Find out the wrong relationship
a) $[Q] = 2\pi\varepsilon [M] [V]$ b) $[V] = [P]\left[\frac{Q}{2\pi\varepsilon}\right]$
c) $\left[\frac{Q}{2\pi\varepsilon}\right] = [P] [V]$ d) All equations are correct

20) 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) $\frac{zt - zo}{zo + zt}$

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Set S

SLR-VB – 335

Seat No.	

B.E. (Electrical) (Part – I) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE AC TRANSMISSION

Day and Date : Monday, 8-5-2017 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

II. Solve **any four** : **(4×5=20)**

a) Explain in detail the advantages and disadvantages of high voltages.

b) What are the different mechanical considerations in EHV line performance ?

c) What are the properties of Bundled conductors in EHV-AC lines ?

d) Explain Reflection and refraction of travelling waves.

e) Lightning stroke mechanism.

f) Brief the charge potential relations of the multi conductor lines.

III. Solve **any two** : **(2×10=20)**

a) A tower has 40 ohms footing resistance and two ground wires with Zg = 500 ohms. The lightening stroke surge impedance Zs = 400 ohms. For Is = 50 KA crest, calculate the tower top potential :

i) Considering all impedances

ii) Neglecting the ground wire and stroke surge impedances.

iii) Considering only one ground wire and stroke surge impedance.

b) Explain in detail the sequence inductance and capacitance.

c) Explain the relation between the temperature rise and current carrying capacity of EHV-AC line.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Power circle diagram and its use.

b) Enlist sources of over voltage and explain Ferro resonance voltages.

c) Reduction of switching surge over voltages.

d) Construction and characteristics of ZnO gapless arrester.

e) Explain static reactive compensating system.

f) Expression for generalized constants.

V. Solve **any two** : **(2×10=20)**

a) Explain in brief the sinusoidal excitation-lumped parameter circuits.

b) What are the factors under steady state in design of EHV lines ?

c) Explain sub-synchronous resonance in series capacitors compensated lines.

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SLR-VB – 336

Seat No.	

Set P

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2017
MICROCONTROLLER AND APPLICATION

Day and Date : Friday, 19-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to right indicate ***full*** *marks.*
3) ***Assume*** *suitable data* ***wherever*** *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. Solve the following :

1) In 8051 which interrupt is having highest priority
a) IE0 b) TF0 c) IE1 d) TF1

2) Which of the following is not bit operated SFR ?
a) IE b) TCON c) P0 d) TMOD

3) MODE0 of timer counter section of 8051 is
a) 8 bit auto reload mode b) 16 bit timer mode
c) 13 bit timer mode d) Split timer mode

4) Serial port vector address is _____ and causes an interrupt when _____
a) 0013H, either TI or RI set b) 0013H, either TI and RI set
c) 0023H, either TI or RI set d) 0023H, either TI and RI set

5) The PORT3 pins used to access memory are
a) P3.0 and P3.1 b) P3.2 and P3.3
c) P3.4 and P3.5 d) P3.6 and P3.7

6) To double the baud rate the bits used are
a) SMOD bit from SCON b) SMOD bit from PCON
c) SM0 and SM1 bit from SCON d) SM2 bit from SCON

P.T.O.

7) To interface external memory capacity of 8K, the addresses are provided by
   a) PORT0 and PORT1 b) PORT0 and PORT2
   c) PORT1 and PORT2 d) PORT2 and PORT3

8) Interfacing LCD with 8051 _____ data lines are used along with the _____ signals.
   a) 6, RS, R/$\overline{W}$ b) 8, RS, EN c) 8, RS, EN, R/$\overline{W}$ d) 8, RS, R/$\overline{W}$

9) The 8051 has _____
   a) 0 KB ROM and 128 bits RAM b) 4 KB ROM and 128 bits RAM
   c) 4 KB ROM and 128 bytes RAM d) 8 KB ROM and 128 bytes RAM

10) When 8051 finishes the transfer of 8 bit character it raises _____
   a) RI flag b) TI flag c) Both RI and TI flags d) None of these

11) In mod2, the counter rolls over when counter goes up to _____ H.
   a) FFFF b) FF c) 7F d) 00

12) To access the data from on chip ROM the instruction used is _____
   a) MOV b) MOVX c) MOVC d) None

13) 8051 timer are _____ bit wide.
   a) 4 b) 8 c) 16 d) 32

14) 8051 has _____ interrupts.
   a) 4 b) 5 c) 7 d) 8

15) What is the address of DPL ?
   a) 82H b) 83H c) 80H d) 90H

16) To transfer the data serially, it must be placed in the register _____
   a) IE b) PCON c) SCON d) SUBF

17) Which bit of register IE is used to enable all interrupts ?
   a) D7 b) D6 c) D5 d) D4

18) The ADC in the PIC16f877 is of _____ bit.
   a) 8 b) 10 c) 12 d) 16

19) CCP means
   a) Compare, Collect and Produce b) Compare, Capture and PWM
   c) Compliment, Compare and Pulse d) Collect, Control and PWM

20) The architecture of PIC16f877 is
   a) Harvard b) CISC c) Von-Numan d) None of these

SLR-VB – 336

Seat No.	

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2017
MICROCONTROLLER AND APPLICATION

Day and Date : Friday, 19-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to right indicate **full** marks.*
*3) **Assume** suitable data **wherever** necessary.*

2. Solve **any four**. **(4×5=20)**
   a) Explain the different addressing modes of 8051 with example.
   b) Draw and explain the timer/counter logic circuit.
   c) Draw and explain the PSW register format of 8051.
   d) Explain the internal memory organization of 8051.
   e) Describe the PORT1 structure of 8051.

3. a) Write a assembly language program to transfer a block of ten numbers from internal memory location 20 H to external memory location 8000 H on wards. **10**
   b) Explain the stack of 8051 and its operation using PUSH and POP instructions. **10**

   OR

   b) Interface DAC0808 to 8051 and write a assembly language program to generate a square wave. **10**

4. Solve **any four**. **(4×5=20)**
   a) Explain the various pins of LCD.
   b) Explain the features of PIC 16f877.
   c) Explain the PORT structure of PIC16f877.
   d) Explain the following instruction of PIC 16f877.
      i) bsf f, b
      ii) addlw k.
   e) Explain the memory organization of PIC 16f877.

5. Solve **any two**. **(2×10=20)**
   a) Interface 8K×8 data RAM to 8051. Determine the initial and final address.
   b) Explain the interrupt structure of PIC16f877.
   c) Interface LCD to 8051 and write a assembly language program to display "INDIA" on it.

_____

Set P

Set P

SLR-VB – 336

Seat No.	

Set Q

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2017
MICROCONTROLLER AND APPLICATION

Day and Date : Friday, 19-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to right indicate ***full*** *marks.*
3) ***Assume*** *suitable data* ***wherever*** *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. Solve the following :

1) To transfer the data serially, it must be placed in the register _____
a) IE b) PCON c) SCON d) SUBF

2) Which bit of register IE is used to enable all interrupts ?
a) D7 b) D6 c) D5 d) D4

3) The ADC in the PIC16f877 is of _____ bit.
a) 8 b) 10 c) 12 d) 16

4) CCP means
a) Compare, Collect and Produce b) Compare, Capture and PWM
c) Compliment, Compare and Pulse d) Collect, Control and PWM

5) The architecture of PIC16f877 is
a) Harvard b) CISC c) Von-Numan d) None of these

6) In 8051 which interrupt is having highest priority
a) IE0 b) TF0 c) IE1 d) TF1

7) Which of the following is not bit operated SFR ?
a) IE b) TCON c) P0 d) TMOD

P.T.O.

8) MODE0 of timer counter section of 8051 is
   a) 8 bit auto reload mode b) 16 bit timer mode
   c) 13 bit timer mode d) Split timer mode

9) Serial port vector address is _____ and causes an interrupt when _____
   a) 0013H, either TI or RI set b) 0013H, either TI and RI set
   c) 0023H, either TI or RI set d) 0023H, either TI and RI set

10) The PORT3 pins used to access memory are
   a) P3.0 and P3.1 b) P3.2 and P3.3
   c) P3.4 and P3.5 d) P3.6 and P3.7

11) To double the baud rate the bits used are
   a) SMOD bit from SCON b) SMOD bit from PCON
   c) SM0 and SM1 bit from SCON d) SM2 bit from SCON

12) To interface external memory capacity of 8K, the addresses are provided by
   a) PORT0 and PORT1 b) PORT0 and PORT2
   c) PORT1 and PORT2 d) PORT2 and PORT3

13) Interfacing LCD with 8051 _____ data lines are used along with the _____ signals.
   a) 6, RS, R/$\overline{W}$ b) 8, RS, EN c) 8, RS, EN, R/$\overline{W}$ d) 8, RS, R/$\overline{W}$

14) The 8051 has _____
   a) 0 KB ROM and 128 bits RAM b) 4 KB ROM and 128 bits RAM
   c) 4 KB ROM and 128 bytes RAM d) 8 KB ROM and 128 bytes RAM

15) When 8051 finishes the transfer of 8 bit character it raises _____
   a) RI flag b) TI flag c) Both RI and TI flags d) None of these

16) In mod2, the counter rolls over when counter goes up to _____ H.
   a) FFFF b) FF c) 7F d) 00

17) To access the data from on chip ROM the instruction used is _____
   a) MOV b) MOVX c) MOVC d) None

18) 8051 timer are _____ bit wide.
   a) 4 b) 8 c) 16 d) 32

19) 8051 has _____ interrupts.
   a) 4 b) 5 c) 7 d) 8

20) What is the address of DPL ?
   a) 82H b) 83H c) 80H d) 90H

_____

SLR-VB – 336

Seat No.	

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2017
MICROCONTROLLER AND APPLICATION

Day and Date : Friday, 19-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to right indicate ***full*** *marks.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*

2. Solve **any four**. **(4×5=20)**
   a) Explain the different addressing modes of 8051 with example.
   b) Draw and explain the timer/counter logic circuit.
   c) Draw and explain the PSW register format of 8051.
   d) Explain the internal memory organization of 8051.
   e) Describe the PORT1 structure of 8051.

3. a) Write a assembly language program to transfer a block of ten numbers from internal memory location 20 H to external memory location 8000 H on wards. **10**
   b) Explain the stack of 8051 and its operation using PUSH and POP instructions. **10**

OR

   b) Interface DAC0808 to 8051 and write a assembly language program to generate a square wave. **10**

4. Solve **any four**. **(4×5=20)**
   a) Explain the various pins of LCD.
   b) Explain the features of PIC 16f877.
   c) Explain the PORT structure of PIC16f877.
   d) Explain the following instruction of PIC 16f877.
      i) bsf f, b
      ii) addlw k.
   e) Explain the memory organization of PIC 16f877.

5. Solve **any two**. **(2×10=20)**
   a) Interface 8K×8 data RAM to 8051. Determine the initial and final address.
   b) Explain the interrupt structure of PIC16f877.
   c) Interface LCD to 8051 and write a assembly language program to display "INDIA" on it.

_____

Set Q

Set Q

SLR-VB – 336

Seat No.	

Set R

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2017
MICROCONTROLLER AND APPLICATION

Day and Date : Friday, 19-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to right indicate ***full*** *marks.*
3) ***Assume*** *suitable data* ***wherever*** *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. Solve the following :

1) In mod2, the counter rolls over when counter goes up to _____ H.
a) FFFF b) FF c) 7F d) 00

2) To access the data from on chip ROM the instruction used is _____
a) MOV b) MOVX c) MOVC d) None

3) 8051 timer are _____ bit wide.
a) 4 b) 8 c) 16 d) 32

4) 8051 has _____ interrupts.
a) 4 b) 5 c) 7 d) 8

5) What is the address of DPL ?
a) 82H b) 83H c) 80H d) 90H

6) To transfer the data serially, it must be placed in the register _____
a) IE b) PCON c) SCON d) SUBF

7) Which bit of register IE is used to enable all interrupts ?
a) D7 b) D6 c) D5 d) D4

8) The ADC in the PIC16f877 is of _____ bit.
a) 8 b) 10 c) 12 d) 16

P.T.O.

9) CCP means
   a) Compare, Collect and Produce b) Compare, Capture and PWM
   c) Compliment, Compare and Pulse d) Collect, Control and PWM

10) The architecture of PIC16f877 is
   a) Harvard b) CISC c) Von-Numan d) None of these

11) In 8051 which interrupt is having highest priority
   a) IE0 b) TF0 c) IE1 d) TF1

12) Which of the following is not bit operated SFR ?
   a) IE b) TCON c) P0 d) TMOD

13) MODE0 of timer counter section of 8051 is
   a) 8 bit auto reload mode b) 16 bit timer mode
   c) 13 bit timer mode d) Split timer mode

14) Serial port vector address is _____ and causes an interrupt when _____
   a) 0013H, either TI or RI set b) 0013H, either TI and RI set
   c) 0023H, either TI or RI set d) 0023H, either TI and RI set

15) The PORT3 pins used to access memory are
   a) P3.0 and P3.1 b) P3.2 and P3.3
   c) P3.4 and P3.5 d) P3.6 and P3.7

16) To double the baud rate the bits used are
   a) SMOD bit from SCON b) SMOD bit from PCON
   c) SM0 and SM1 bit from SCON d) SM2 bit from SCON

17) To interface external memory capacity of 8K, the addresses are provided by
   a) PORT0 and PORT1 b) PORT0 and PORT2
   c) PORT1 and PORT2 d) PORT2 and PORT3

18) Interfacing LCD with 8051 _____ data lines are used along with the _____ signals.
   a) 6, RS, R/$\overline{W}$ b) 8, RS, EN c) 8, RS, EN, R/$\overline{W}$ d) 8, RS, R/$\overline{W}$

19) The 8051 has _____
   a) 0 KB ROM and 128 bits RAM b) 4 KB ROM and 128 bits RAM
   c) 4 KB ROM and 128 bytes RAM d) 8 KB ROM and 128 bytes RAM

20) When 8051 finishes the transfer of 8 bit character it raises _____
   a) RI flag b) TI flag c) Both RI and TI flags d) None of these

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SLR-VB – 336

Seat No.	

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2017
MICROCONTROLLER AND APPLICATION

Day and Date : Friday, 19-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to right indicate **full** marks.*
*3) **Assume** suitable data **wherever** necessary.*

2. Solve **any four**. **(4×5=20)**
   a) Explain the different addressing modes of 8051 with example.
   b) Draw and explain the timer/counter logic circuit.
   c) Draw and explain the PSW register format of 8051.
   d) Explain the internal memory organization of 8051.
   e) Describe the PORT1 structure of 8051.

3. a) Write a assembly language program to transfer a block of ten numbers from internal memory location 20 H to external memory location 8000 H on wards. **10**
   b) Explain the stack of 8051 and its operation using PUSH and POP instructions. **10**

   OR

   b) Interface DAC0808 to 8051 and write a assembly language program to generate a square wave. **10**

4. Solve **any four**. **(4×5=20)**
   a) Explain the various pins of LCD.
   b) Explain the features of PIC 16f877.
   c) Explain the PORT structure of PIC16f877.
   d) Explain the following instruction of PIC 16f877.
      i) bsf f, b
      ii) addlw k.
   e) Explain the memory organization of PIC 16f877.

5. Solve **any two**. **(2×10=20)**
   a) Interface 8K×8 data RAM to 8051. Determine the initial and final address.
   b) Explain the interrupt structure of PIC16f877.
   c) Interface LCD to 8051 and write a assembly language program to display "INDIA" on it.

_____

Set R

SLR-VB – 336

Seat No.	

Set S

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2017
MICROCONTROLLER AND APPLICATION

Day and Date : Friday, 19-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to right indicate ***full*** *marks.*
3) ***Assume*** *suitable data* ***wherever*** *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. Solve the following :

1) To double the baud rate the bits used are
   a) SMOD bit from SCON b) SMOD bit from PCON
   c) SM0 and SM1 bit from SCON d) SM2 bit from SCON

2) To interface external memory capacity of 8K, the addresses are provided by
   a) PORT0 and PORT1 b) PORT0 and PORT2
   c) PORT1 and PORT2 d) PORT2 and PORT3

3) Interfacing LCD with 8051 _____ data lines are used along with the _____ signals.
   a) 6, RS, R/$\overline{W}$ b) 8, RS, EN c) 8, RS, EN, R/$\overline{W}$ d) 8, RS, R/$\overline{W}$

4) The 8051 has _____
   a) 0 KB ROM and 128 bits RAM b) 4 KB ROM and 128 bits RAM
   c) 4 KB ROM and 128 bytes RAM d) 8 KB ROM and 128 bytes RAM

5) When 8051 finishes the transfer of 8 bit character it raises _____
   a) RI flag b) TI flag c) Both RI and TI flags d) None of these

6) In mod2, the counter rolls over when counter goes up to _____ H.
   a) FFFF b) FF c) 7F d) 00

P.T.O.

7) To access the data from on chip ROM the instruction used is _____
   a) MOV b) MOVX c) MOVC d) None

8) 8051 timer are _____ bit wide.
   a) 4 b) 8 c) 16 d) 32

9) 8051 has _____ interrupts.
   a) 4 b) 5 c) 7 d) 8

10) What is the address of DPL ?
   a) 82H b) 83H c) 80H d) 90H

11) To transfer the data serially, it must be placed in the register _____
   a) IE b) PCON c) SCON d) SUBF

12) Which bit of register IE is used to enable all interrupts ?
   a) D7 b) D6 c) D5 d) D4

13) The ADC in the PIC16f877 is of _____ bit.
   a) 8 b) 10 c) 12 d) 16

14) CCP means
   a) Compare, Collect and Produce b) Compare, Capture and PWM
   c) Compliment, Compare and Pulse d) Collect, Control and PWM

15) The architecture of PIC16f877 is
   a) Harvard b) CISC c) Von-Numan d) None of these

16) In 8051 which interrupt is having highest priority
   a) IE0 b) TF0 c) IE1 d) TF1

17) Which of the following is not bit operated SFR ?
   a) IE b) TCON c) P0 d) TMOD

18) MODE0 of timer counter section of 8051 is
   a) 8 bit auto reload mode b) 16 bit timer mode
   c) 13 bit timer mode d) Split timer mode

19) Serial port vector address is _____ and causes an interrupt when _____
   a) 0013H, either TI or RI set b) 0013H, either TI and RI set
   c) 0023H, either TI or RI set d) 0023H, either TI and RI set

20) The PORT3 pins used to access memory are
   a) P3.0 and P3.1 b) P3.2 and P3.3
   c) P3.4 and P3.5 d) P3.6 and P3.7

_____

SLR-VB – 336

Seat No.	

B.E. (Electrical Engineering) (Part – I) (Old) Examination, 2017
MICROCONTROLLER AND APPLICATION

Day and Date : Friday, 19-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to right indicate **full** marks.*
*3) **Assume** suitable data **wherever** necessary.*

2. Solve **any four**. **(4×5=20)**
   a) Explain the different addressing modes of 8051 with example.
   b) Draw and explain the timer/counter logic circuit.
   c) Draw and explain the PSW register format of 8051.
   d) Explain the internal memory organization of 8051.
   e) Describe the PORT1 structure of 8051.

3. a) Write a assembly language program to transfer a block of ten numbers from internal memory location 20 H to external memory location 8000 H on wards. **10**
   b) Explain the stack of 8051 and its operation using PUSH and POP instructions. **10**

   OR

   b) Interface DAC0808 to 8051 and write a assembly language program to generate a square wave. **10**

4. Solve **any four**. **(4×5=20)**
   a) Explain the various pins of LCD.
   b) Explain the features of PIC 16f877.
   c) Explain the PORT structure of PIC16f877.
   d) Explain the following instruction of PIC 16f877.
      i) bsf f, b
      ii) addlw k.
   e) Explain the memory organization of PIC 16f877.

5. Solve **any two**. **(2×10=20)**
   a) Interface 8K×8 data RAM to 8051. Determine the initial and final address.
   b) Explain the interrupt structure of PIC16f877.
   c) Interface LCD to 8051 and write a assembly language program to display "INDIA" on it.

_____

Set S

SLR-VB – 337

Seat No.	

Set **P**

B.E. (Electrical) (Part – I) (Old) Examination, 2017
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 22-5-2017 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 : **(1×20=20)**

1) The percentage of silicon in the core steel is
A) 1 to 2 percent B) 2 to 3 percent C) 4 to 6 percent D) 8 to 10 percent

2) The stacking factor will be least for
A) Square core B) Cruciform core
C) Three stepped core D) Four stepped core

3) In static transformers mechanical forces are produced due to
A) Vibrations
B) Gap between laminations
C) Interaction of current flowing in the conductor and leakage flux around it
D) None of the above

4) The thickness of laminations of the core of a power transformer usually
A) 0.003 to 0.05 mm B) 0.03 to 0.05 mm
C) 0.03 to 0.5 mm D) 3 to 5 mm

5) The heat generated in the transformer is dissipated to the surroundings mainly by
A) Conduction B) Convection C) Radiation D) All of the above

6) Power transformers should be designed to have maximum efficiency at
A) at one fourth load B) at one half load
C) at or near full load D) any of the above

7) In induction motors, small air gap _____ power factor and _____ noise level.
A) increases, reduces B) reduces, increases
C) reduces, also reduces D) increases, also increases

8) For small induction motors, the ratio of length to pole pitch is taken as
A) 0.6 B) 1.5 C) 2.0 D) None of these

9) Which type of slots are generally used in induction motors ?
A) Open type B) Semi-closed type
C) Closed type D) None of the above

10) For avoiding cogging in induction motor the difference between the number of stator and rotor slots should not be
A) P B) 3P C) 5P D) any of the above

11) The slip rings of wound rotor machines are made from
A) Electrolytic copper B) Brass
C) Cast iron D) Mild steel

12) In case of induction motors the ratio of length to pole pitch for minimum cost, is taken as
A) 1.0 B) 2 to 3 C) 1.5 to 2 D) 3 to 5

13) In induction motor if the number of rotor slots is equal to the stator slots then
A) the motor will run smoothly B) the motor will mil at zero slip
C) the noise level will be low D) the motor may refuse to start

14) Which of the following is the most economical method of starting a single phase motor ?
A) Resistance start method B) Inductance start method
C) Capacitance start method D) Split-phase method

15) Out of the following motors, which will give the highest starting torque ?
A) Universal motor B) Capacitor start motor
C) Shaded pole motor D) All have zero starting torque

16) The motor used in household refrigerators is
A) dc series motor B) dc shunt motor
C) universal motor D) single phase induction motor

17) Short circuit ratio for turbo-alternators is usually
A) 0.1 to 0.2 B) 0.2 to 0.4 C) 0.5 to 0.7 D) 0.8 to 0.95

18) A synchronous machine having large length of the air gap will have
A) Higher noise level B) Smaller unbalanced magnetic pull
C) Lower limit of stability D) Higher value of inherent regulation

19) If synchronous motor fails to start, the probable cause could be
A) Single phasing B) Over loading at start
C) Low voltage D) Any of these

20) Turbo generators have
A) Large diameter and large core length
B) Large diameter and small core length
C) Small diameter and small core length
D) Small diameter and large core length

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SLR-VB – 337

Seat No.	

B.E. (Electrical) (Part – I) (Old) Examination, 2017
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 22-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

   a) Distinguish between core type and shell type transformer.

   b) For transformer show that $Et = K\sqrt{S}$.

   c) Explain choice of specific magnetic loading for induction motor.

   d) Derive how dispersion co-efficient affects maximum power factor of induction motor.

   e) Determine the dimensions of core and yoke for a 200 KVA, 50 Hz, single phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage per turn is 14, maximum flux density 1.1 web/m^2, window space factor 0.32, current density 3 A/mm^2 and stacking factor = 0.9.

3. Solve **any two** : **(10×2=20)**

   a) Determine the main dimensions of the core, the number of turns and the cross-section of the conductors for 5 KVA, 11000 V/400 V, 50 Hz, 1-phase core type distribution t/f. 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 of the core, a flux density 1 wb/m^2. A current density 1.4 A/mm^2 and the window space factor 0.2. The height of the window is 3 times its width.

   b) Find the main dimensions of a 15 kW, 3-phase, 400 V, 50 Hz, 2810 rpm squirrel cage I.M. having an efficiency of 0.88 and a full load power factor of 0.9. Specific magnetic loading = 0.5 wb/m^2, specific electric loading = 25000 A/m. Take the peripheral speed as approximately 20 m/s at synchronous speed.

c) Determine the main dimensions of 3 phase, 3 leg core type transformer, the number of turns and the cross-section of the conductors for a 350 KVA, 11000/3300 v, star-delta, 50 Hz transformer. Assume volt per turn = 11, maximum flux density = 1.25 wb/m^2. Net cross-section of core = 0.6 d^2. Window space factor = 0.27, window proportions = 3:1, current density = 250 Amp/cm^2.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) Draw the equivalent circuit diagram of single phase induction motor on the basis of double revolving field theory.

b) Explain capacitor start phase single phase induction motor with circuit and vector diagram.

c) Explain double revolving field theory of single phase induction motor.

d) Derive the output equation of single phase induction motor.

e) Explain salient pole synchronous machine with neat diagram.

5. Solve **any two** : **(10×2=20)**

a) Derive an expression for power in smooth cylindrical synchronous machine.

b) A 500 KVA, 3.3 KV, 50 Hz, 600 rpm, 3 phase salient pole alternator has 180 turns per phase. Estimate the length of air gap if the average flux density is 0.54 wb/m^2. The ratio of pole arc to pole pitch = 0.66, the short circuit ratio = 1.2 and the gap extension coefficient = 1.15. The mmf required for gap is 80% of no load field mmf. Winding factor = 0.955.

c) Find the main dimensions of a 2500 KVA, 187.5 rpm, 50 Hz, 3-phase, 3 kV, salient pole synchronous machine. The alternator is to be vertical, water wheel type. The specific magnetic loading is 0.6 wb/m^2 and the specific electric loading is 34000 A/m. Use circular poles with ratio of core length to pole pitch = 0.65. Specify the type of pole conduction used if the run-away speed is about 2 times the normal speed.

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SLR-VB – 337

Seat No.	

Set **Q**

B.E. (Electrical) (Part – I) (Old) Examination, 2017
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 22-5-2017 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 : **(1×20=20)**

1) The motor used in household refrigerators is
   A) dc series motor B) dc shunt motor
   C) universal motor D) single phase induction motor

2) Short circuit ratio for turbo-alternators is usually
   A) 0.1 to 0.2 B) 0.2 to 0.4 C) 0.5 to 0.7 D) 0.8 to 0.95

3) A synchronous machine having large length of the air gap will have
   A) Higher noise level B) Smaller unbalanced magnetic pull
   C) Lower limit of stability D) Higher value of inherent regulation

4) If synchronous motor fails to start, the probable cause could be
   A) Single phasing B) Over loading at start
   C) Low voltage D) Any of these

5) Turbo generators have
   A) Large diameter and large core length
   B) Large diameter and small core length
   C) Small diameter and small core length
   D) Small diameter and large core length

6) The percentage of silicon in the core steel is
   A) 1 to 2 percent B) 2 to 3 percent C) 4 to 6 percent D) 8 to 10 percent

7) The stacking factor will be least for
   A) Square core B) Cruciform core
   C) Three stepped core D) Four stepped core

8) In static transformers mechanical forces are produced due to
   A) Vibrations
   B) Gap between laminations
   C) Interaction of current flowing in the conductor and leakage flux around it
   D) None of the above

9) The thickness of laminations of the core of a power transformer usually
   A) 0.003 to 0.05 mm B) 0.03 to 0.05 mm
   C) 0.03 to 0.5 mm D) 3 to 5 mm

10) The heat generated in the transformer is dissipated to the surroundings mainly by
   A) Conduction B) Convection C) Radiation D) All of the above

11) Power transformers should be designed to have maximum efficiency at
   A) at one fourth load B) at one half load
   C) at or near full load D) any of the above

12) In induction motors, small air gap _____ power factor and _____ noise level.
   A) increases, reduces B) reduces, increases
   C) reduces, also reduces D) increases, also increases

13) For small induction motors, the ratio of length to pole pitch is taken as
   A) 0.6 B) 1.5 C) 2.0 D) None of these

14) Which type of slots are generally used in induction motors ?
   A) Open type B) Semi-closed type
   C) Closed type D) None of the above

15) For avoiding cogging in induction motor the difference between the number of stator and rotor slots should not be
   A) P B) 3P C) 5P D) any of the above

16) The slip rings of wound rotor machines are made from
   A) Electrolytic copper B) Brass
   C) Cast iron D) Mild steel

17) In case of induction motors the ratio of length to pole pitch for minimum cost, is taken as
   A) 1.0 B) 2 to 3 C) 1.5 to 2 D) 3 to 5

18) In induction motor if the number of rotor slots is equal to the stator slots then
   A) the motor will run smoothly B) the motor will mil at zero slip
   C) the noise level will be low D) the motor may refuse to start

19) Which of the following is the most economical method of starting a single phase motor ?
   A) Resistance start method B) Inductance start method
   C) Capacitance start method D) Split-phase method

20) Out of the following motors, which will give the highest starting torque ?
   A) Universal motor B) Capacitor start motor
   C) Shaded pole motor D) All have zero starting torque

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SLR-VB – 337

Seat No.	

B.E. (Electrical) (Part – I) (Old) Examination, 2017
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 22-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

   a) Distinguish between core type and shell type transformer.

   b) For transformer show that $Et = K\sqrt{S}$.

   c) Explain choice of specific magnetic loading for induction motor.

   d) Derive how dispersion co-efficient affects maximum power factor of induction motor.

   e) Determine the dimensions of core and yoke for a 200 KVA, 50 Hz, single phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage per turn is 14, maximum flux density 1.1 web/m^2, window space factor 0.32, current density 3 A/mm^2 and stacking factor = 0.9.

3. Solve **any two** : **(10×2=20)**

   a) Determine the main dimensions of the core, the number of turns and the cross-section of the conductors for 5 KVA, 11000 V/400 V, 50 Hz, 1-phase core type distribution t/f. 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 of the core, a flux density 1 wb/m^2. A current density 1.4 A/mm^2 and the window space factor 0.2. The height of the window is 3 times its width.

   b) Find the main dimensions of a 15 kW, 3-phase, 400 V, 50 Hz, 2810 rpm squirrel cage I.M. having an efficiency of 0.88 and a full load power factor of 0.9. Specific magnetic loading = 0.5 wb/m^2, specific electric loading = 25000 A/m. Take the peripheral speed as approximately 20 m/s at synchronous speed.

c) Determine the main dimensions of 3 phase, 3 leg core type transformer, the number of turns and the cross-section of the conductors for a 350 KVA, 11000/3300 v, star-delta, 50 Hz transformer. Assume volt per turn = 11, maximum flux density = 1.25 wb/m^2. Net cross-section of core = 0.6 d^2. Window space factor = 0.27, window proportions = 3:1, current density = 250 Amp/cm^2.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) Draw the equivalent circuit diagram of single phase induction motor on the basis of double revolving field theory.

b) Explain capacitor start phase single phase induction motor with circuit and vector diagram.

c) Explain double revolving field theory of single phase induction motor.

d) Derive the output equation of single phase induction motor.

e) Explain salient pole synchronous machine with neat diagram.

5. Solve **any two** : **(10×2=20)**

a) Derive an expression for power in smooth cylindrical synchronous machine.

b) A 500 KVA, 3.3 KV, 50 Hz, 600 rpm, 3 phase salient pole alternator has 180 turns per phase. Estimate the length of air gap if the average flux density is 0.54 wb/m^2. The ratio of pole arc to pole pitch = 0.66, the short circuit ratio = 1.2 and the gap extension coefficient = 1.15. The mmf required for gap is 80% of no load field mmf. Winding factor = 0.955.

c) Find the main dimensions of a 2500 KVA, 187.5 rpm, 50 Hz, 3-phase, 3 kV, salient pole synchronous machine. The alternator is to be vertical, water wheel type. The specific magnetic loading is 0.6 wb/m^2 and the specific electric loading is 34000 A/m. Use circular poles with ratio of core length to pole pitch = 0.65. Specify the type of pole conduction used if the run-away speed is about 2 times the normal speed.

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SLR-VB – 337

Seat No.	

Set **R**

B.E. (Electrical) (Part – I) (Old) Examination, 2017
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 22-5-2017 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 : **(1×20=20)**

1) The slip rings of wound rotor machines are made from
A) Electrolytic copper B) Brass
C) Cast iron D) Mild steel

2) In case of induction motors the ratio of length to pole pitch for minimum cost, is taken as
A) 1.0 B) 2 to 3 C) 1.5 to 2 D) 3 to 5

3) In induction motor if the number of rotor slots is equal to the stator slots then
A) the motor will run smoothly B) the motor will mil at zero slip
C) the noise level will be low D) the motor may refuse to start

4) Which of the following is the most economical method of starting a single phase motor ?
A) Resistance start method B) Inductance start method
C) Capacitance start method D) Split-phase method

5) Out of the following motors, which will give the highest starting torque ?
A) Universal motor B) Capacitor start motor
C) Shaded pole motor D) All have zero starting torque

6) The motor used in household refrigerators is
A) dc series motor B) dc shunt motor
C) universal motor D) single phase induction motor

7) Short circuit ratio for turbo-alternators is usually
A) 0.1 to 0.2 B) 0.2 to 0.4 C) 0.5 to 0.7 D) 0.8 to 0.95

8) A synchronous machine having large length of the air gap will have
A) Higher noise level B) Smaller unbalanced magnetic pull
C) Lower limit of stability D) Higher value of inherent regulation

9) If synchronous motor fails to start, the probable cause could be
   A) Single phasing B) Over loading at start
   C) Low voltage D) Any of these

10) Turbo generators have
   A) Large diameter and large core length
   B) Large diameter and small core length
   C) Small diameter and small core length
   D) Small diameter and large core length

11) The percentage of silicon in the core steel is
   A) 1 to 2 percent B) 2 to 3 percent C) 4 to 6 percent D) 8 to 10 percent

12) The stacking factor will be least for
   A) Square core B) Cruciform core
   C) Three stepped core D) Four stepped core

13) In static transformers mechanical forces are produced due to
   A) Vibrations
   B) Gap between laminations
   C) Interaction of current flowing in the conductor and leakage flux around it
   D) None of the above

14) The thickness of laminations of the core of a power transformer usually
   A) 0.003 to 0.05 mm B) 0.03 to 0.05 mm
   C) 0.03 to 0.5 mm D) 3 to 5 mm

15) The heat generated in the transformer is dissipated to the surroundings mainly by
   A) Conduction B) Convection C) Radiation D) All of the above

16) Power transformers should be designed to have maximum efficiency at
   A) at one fourth load B) at one half load
   C) at or near full load D) any of the above

17) In induction motors, small air gap _____ power factor and _____ noise level.
   A) increases, reduces B) reduces, increases
   C) reduces, also reduces D) increases, also increases

18) For small induction motors, the ratio of length to pole pitch is taken as
   A) 0.6 B) 1.5 C) 2.0 D) None of these

19) Which type of slots are generally used in induction motors ?
   A) Open type B) Semi-closed type
   C) Closed type D) None of the above

20) For avoiding cogging in induction motor the difference between the number of stator and rotor slots should not be
   A) P B) 3P C) 5P D) any of the above

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SLR-VB – 337

Seat No.	

B.E. (Electrical) (Part – I) (Old) Examination, 2017
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 22-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

   a) Distinguish between core type and shell type transformer.

   b) For transformer show that $Et = K\sqrt{S}$.

   c) Explain choice of specific magnetic loading for induction motor.

   d) Derive how dispersion co-efficient affects maximum power factor of induction motor.

   e) Determine the dimensions of core and yoke for a 200 KVA, 50 Hz, single phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage per turn is 14, maximum flux density 1.1 web/m^2, window space factor 0.32, current density 3 A/mm^2 and stacking factor = 0.9.

3. Solve **any two** : **(10×2=20)**

   a) Determine the main dimensions of the core, the number of turns and the cross-section of the conductors for 5 KVA, 11000 V/400 V, 50 Hz, 1-phase core type distribution t/f. 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 of the core, a flux density 1 wb/m^2. A current density 1.4 A/mm^2 and the window space factor 0.2. The height of the window is 3 times its width.

   b) Find the main dimensions of a 15 kW, 3-phase, 400 V, 50 Hz, 2810 rpm squirrel cage I.M. having an efficiency of 0.88 and a full load power factor of 0.9. Specific magnetic loading = 0.5 wb/m^2, specific electric loading = 25000 A/m. Take the peripheral speed as approximately 20 m/s at synchronous speed.

c) Determine the main dimensions of 3 phase, 3 leg core type transformer, the number of turns and the cross-section of the conductors for a 350 KVA, 11000/3300 v, star-delta, 50 Hz transformer. Assume volt per turn = 11, maximum flux density = 1.25 wb/m^2. Net cross-section of core = 0.6 d^2. Window space factor = 0.27, window proportions = 3:1, current density = 250 Amp/cm^2.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) Draw the equivalent circuit diagram of single phase induction motor on the basis of double revolving field theory.

b) Explain capacitor start phase single phase induction motor with circuit and vector diagram.

c) Explain double revolving field theory of single phase induction motor.

d) Derive the output equation of single phase induction motor.

e) Explain salient pole synchronous machine with neat diagram.

5. Solve **any two** : **(10×2=20)**

a) Derive an expression for power in smooth cylindrical synchronous machine.

b) A 500 KVA, 3.3 KV, 50 Hz, 600 rpm, 3 phase salient pole alternator has 180 turns per phase. Estimate the length of air gap if the average flux density is 0.54 wb/m^2. The ratio of pole arc to pole pitch = 0.66, the short circuit ratio = 1.2 and the gap extension coefficient = 1.15. The mmf required for gap is 80% of no load field mmf. Winding factor = 0.955.

c) Find the main dimensions of a 2500 KVA, 187.5 rpm, 50 Hz, 3-phase, 3 kV, salient pole synchronous machine. The alternator is to be vertical, water wheel type. The specific magnetic loading is 0.6 wb/m^2 and the specific electric loading is 34000 A/m. Use circular poles with ratio of core length to pole pitch = 0.65. Specify the type of pole conduction used if the run-away speed is about 2 times the normal speed.

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SLR-VB – 337

Seat No.	

Set S

B.E. (Electrical) (Part – I) (Old) Examination, 2017
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 22-5-2017 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 : **(1×20=20)**

1) Power transformers should be designed to have maximum efficiency at
A) at one fourth load B) at one half load
C) at or near full load D) any of the above

2) In induction motors, small air gap _____ power factor and _____ noise level.
A) increases, reduces B) reduces, increases
C) reduces, also reduces D) increases, also increases

3) For small induction motors, the ratio of length to pole pitch is taken as
A) 0.6 B) 1.5 C) 2.0 D) None of these

4) Which type of slots are generally used in induction motors ?
A) Open type B) Semi-closed type
C) Closed type D) None of the above

5) For avoiding cogging in induction motor the difference between the number of stator and rotor slots should not be
A) P B) 3P C) 5P D) any of the above

6) The slip rings of wound rotor machines are made from
A) Electrolytic copper B) Brass
C) Cast iron D) Mild steel

7) In case of induction motors the ratio of length to pole pitch for minimum cost, is taken as
A) 1.0 B) 2 to 3 C) 1.5 to 2 D) 3 to 5

8) In induction motor if the number of rotor slots is equal to the stator slots then
A) the motor will run smoothly B) the motor will mil at zero slip
C) the noise level will be low D) the motor may refuse to start

P.T.O.

9) Which of the following is the most economical method of starting a single phase motor ?
   A) Resistance start method B) Inductance start method
   C) Capacitance start method D) Split-phase method

10) Out of the following motors, which will give the highest starting torque ?
   A) Universal motor B) Capacitor start motor
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11) The motor used in household refrigerators is
   A) dc series motor B) dc shunt motor
   C) universal motor D) single phase induction motor

12) Short circuit ratio for turbo-alternators is usually
   A) 0.1 to 0.2 B) 0.2 to 0.4 C) 0.5 to 0.7 D) 0.8 to 0.95

13) A synchronous machine having large length of the air gap will have
   A) Higher noise level B) Smaller unbalanced magnetic pull
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14) If synchronous motor fails to start, the probable cause could be
   A) Single phasing B) Over loading at start
   C) Low voltage D) Any of these

15) Turbo generators have
   A) Large diameter and large core length
   B) Large diameter and small core length
   C) Small diameter and small core length
   D) Small diameter and large core length

16) The percentage of silicon in the core steel is
   A) 1 to 2 percent B) 2 to 3 percent C) 4 to 6 percent D) 8 to 10 percent

17) The stacking factor will be least for
   A) Square core B) Cruciform core
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18) In static transformers mechanical forces are produced due to
   A) Vibrations
   B) Gap between laminations
   C) Interaction of current flowing in the conductor and leakage flux around it
   D) None of the above

19) The thickness of laminations of the core of a power transformer usually
   A) 0.003 to 0.05 mm B) 0.03 to 0.05 mm
   C) 0.03 to 0.5 mm D) 3 to 5 mm

20) The heat generated in the transformer is dissipated to the surroundings mainly by
   A) Conduction B) Convection C) Radiation D) All of the above

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SLR-VB – 337

Seat No.	

B.E. (Electrical) (Part – I) (Old) Examination, 2017
ELECTRICAL MACHINE DESIGN

Day and Date : Monday, 22-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **(5×4=20)**

   a) Distinguish between core type and shell type transformer.

   b) For transformer show that $Et = K\sqrt{S}$.

   c) Explain choice of specific magnetic loading for induction motor.

   d) Derive how dispersion co-efficient affects maximum power factor of induction motor.

   e) Determine the dimensions of core and yoke for a 200 KVA, 50 Hz, single phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage per turn is 14, maximum flux density 1.1 web/m^2, window space factor 0.32, current density 3 A/mm^2 and stacking factor = 0.9.

3. Solve **any two** : **(10×2=20)**

   a) Determine the main dimensions of the core, the number of turns and the cross-section of the conductors for 5 KVA, 11000 V/400 V, 50 Hz, 1-phase core type distribution t/f. 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 of the core, a flux density 1 wb/m^2. A current density 1.4 A/mm^2 and the window space factor 0.2. The height of the window is 3 times its width.

   b) Find the main dimensions of a 15 kW, 3-phase, 400 V, 50 Hz, 2810 rpm squirrel cage I.M. having an efficiency of 0.88 and a full load power factor of 0.9. Specific magnetic loading = 0.5 wb/m^2, specific electric loading = 25000 A/m. Take the peripheral speed as approximately 20 m/s at synchronous speed.

c) Determine the main dimensions of 3 phase, 3 leg core type transformer, the number of turns and the cross-section of the conductors for a 350 KVA, 11000/3300 v, star-delta, 50 Hz transformer. Assume volt per turn = 11, maximum flux density = 1.25 wb/m^2. Net cross-section of core = 0.6 d^2. Window space factor = 0.27, window proportions = 3:1, current density = 250 Amp/cm^2.

SECTION – II

4. Solve **any four** : **(5×4=20)**

a) Draw the equivalent circuit diagram of single phase induction motor on the basis of double revolving field theory.

b) Explain capacitor start phase single phase induction motor with circuit and vector diagram.

c) Explain double revolving field theory of single phase induction motor.

d) Derive the output equation of single phase induction motor.

e) Explain salient pole synchronous machine with neat diagram.

5. Solve **any two** : **(10×2=20)**

a) Derive an expression for power in smooth cylindrical synchronous machine.

b) A 500 KVA, 3.3 KV, 50 Hz, 600 rpm, 3 phase salient pole alternator has 180 turns per phase. Estimate the length of air gap if the average flux density is 0.54 wb/m^2. The ratio of pole arc to pole pitch = 0.66, the short circuit ratio = 1.2 and the gap extension coefficient = 1.15. The mmf required for gap is 80% of no load field mmf. Winding factor = 0.955.

c) Find the main dimensions of a 2500 KVA, 187.5 rpm, 50 Hz, 3-phase, 3 kV, salient pole synchronous machine. The alternator is to be vertical, water wheel type. The specific magnetic loading is 0.6 wb/m^2 and the specific electric loading is 34000 A/m. Use circular poles with ratio of core length to pole pitch = 0.65. Specify the type of pole conduction used if the run-away speed is about 2 times the normal speed.

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SLR-VB – 338

Seat No.	

Set **P**

B.E. (Part – I) (Old) (Electrical Engineering) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Wednesday, 24-5-2017 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.***
*3) Assume the suitable data **whenever** necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Boiling water reactor and pressurized water reactors are
A) Nuclear reactor B) Solar reactor C) OTEC D) Biogas reactor

2) In a hydro-electric plant a conduct system for taking water from the intake works to the turbine is known as
A) Dam B) Reservoir C) Penstock D) Surge tank

3) Photovoltaic solar energy conversion system makes use of
A) fuel cell B) solar cell C) solar pond D) none of the above

4) The horse power of a Diesel locomotive is of the order of
A) 100 to 200 B) 500 to 1000 C) 2000 to 2500 D) 10,000 to 12,000

5) Fuel cells are
A) Carbon cell B) Hydrogen battery
C) Nuclear cell D) Chromium cell

6) Which auxiliary of gas turbine consumes most of the power ?
A) Compressor B) Combustion chamber
C) Burner D) Fuel pump

7) In a super-heater
A) pressure rises, temperature drops
B) pressure rises, temperature remains constant
C) pressure remains constant and temperature rises
D) both pressure and temperature remains constant

8) Diesel engines for power plants are usually
A) horizontal B) supercharged C) slow speed D) air cooled

9) Which power plant normally operates at high speeds ?
A) Diesel engine plant B) Petrol engine plant
C) Stem turbine plant D) Hydro-electric power plant

10) Which variety of coal has lowest calorific value ?
A) Steam-coal B) Bituminous coal C) Lignite D) Anthracite

P.T.O.

11) 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

12) In a steam turbine cycle, the lowest pressure pressure occurs in
A) turbine inlet B) condenser C) boiler D) super heater

13) Particles having the same atomic number but different mass numbers are called
A) Positrons
B) Beta particles
C) Isotopes
D) Decayed panicles

14) Maximum efficiency of an open cycle gas turbine is nearly
A) 30% B) 40% C) 50% D) 60%

15) Which among the following is not an adverse environmental impact of tidal power generation
A) Interference with spawing and migration of fish
B) Pollution and health hazard in the estuary due to blockage of flow of polluted water into the sea
C) Navigational hazar
D) None of the above

16) Outward radial flow turbines
A) are impulses turbines
B) are reaction turbines
C) are partly impulse partly reaction turbines
D) may be impulse or reaction turbines

17) Dam: Hydro plant ::
A) Chimney : Gases
B) Coal : Steam plant
C) Reactor : Nuclear plant
D) Gas turbine : Steam turbine

18) In a thermal power plant cooling towers are used to
A) condense low pressure steam
B) cool condensed steam
C) cool the water used in condenser for condensing steam
D) cool feed water of boiler

19) Photovoltaic energy is the conversion of sunlight into
A) Chemical energy
B) Biogas
C) Electricity
D) Geothermal energy

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

SLR-VB – 338

Seat No.	

B.E. (Part – I) (Old) (Electrical Engineering) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Wednesday, 24-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **20**

1) With neat sketch explain working of solar cell.

2) Draw typical layout of nuclear power plant.

3) State different types of boilers and explain any one among them.

4) Define the following.

Diversity factor, Demand factor, Load factor, Utilization factor.

5) What are the factors affecting the power plant design ?

3. Solve **any two** : **20**

1) With neat sketches explain briefly the Tidal power plant and Geo thermal power plant.

2) Explain different methods to calculate the efficiency of boiler.

3) What are the effects of power plant type on cost, tariffs and customer elements ?

SECTION – II

4. Solve **any four** : **20**

1) Explain the following with reference to atomic structure.

Atomic number, mass number, isotopes.

2) Explain super heaters and re-heaters used in boilers.

3) What are the safety measures for operation of nuclear power plant ?

4) Discuss the harmful effect of emission and steps taken for and their impact.

5) With neat diagram explain diesel power plant.

5. Solve **any two** : **20**

1) Draw typical layout of thermal power plant and explain it briefly.

2) With a neat diagram explain CANDU type reactor and gas cooled reactor.

3) Draw and explain different types of Hydro turbines.

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SLR-VB – 338

Seat No.	

Set Q

B.E. (Part – I) (Old) (Electrical Engineering) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Wednesday, 24-5-2017 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.***
*3) Assume the suitable data **whenever** necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Outward radial flow turbines
   A) are impulses turbines
   B) are reaction turbines
   C) are partly impulse partly reaction turbines
   D) may be impulse or reaction turbines

2) Dam: Hydro plant ::
   A) Chimney : Gases B) Coal : Steam plant
   C) Reactor : Nuclear plant D) Gas turbine : Steam turbine

3) In a thermal power plant cooling towers are used to
   A) condense low pressure steam
   B) cool condensed steam
   C) cool the water used in condenser for condensing steam
   D) cool feed water of boiler

4) Photovoltaic energy is the conversion of sunlight into
   A) Chemical energy B) Biogas
   C) Electricity D) Geothermal energy

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) Boiling water reactor and pressurized water reactors are
   A) Nuclear reactor B) Solar reactor C) OTEC D) Biogas reactor

7) In a hydro-electric plant a conduct system for taking water from the intake works to the turbine is known as
   A) Dam B) Reservoir C) Penstock D) Surge tank

P.T.O.

8) Photovoltaic solar energy conversion system makes use of
A) fuel cell B) solar cell C) solar pond D) none of the above

9) The horse power of a Diesel locomotive is of the order of
A) 100 to 200 B) 500 to 1000 C) 2000 to 2500 D) 10,000 to 12,000

10) Fuel cells are
A) Carbon cell B) Hydrogen battery
C) Nuclear cell D) Chromium cell

11) Which auxiliary of gas turbine consumes most of the power ?
A) Compressor B) Combustion chamber
C) Burner D) Fuel pump

12) In a super-heater
A) pressure rises, temperature drops
B) pressure rises, temperature remains constant
C) pressure remains constant and temperature rises
D) both pressure and temperature remains constant

13) Diesel engines for power plants are usually
A) horizontal B) supercharged C) slow speed D) air cooled

14) Which power plant normally operates at high speeds ?
A) Diesel engine plant B) Petrol engine plant
C) Stem turbine plant D) Hydro-electric power plant

15) Which variety of coal has lowest calorific value ?
A) Steam-coal B) Bituminous coal C) Lignite D) Anthracite

16) 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

17) In a steam turbine cycle, the lowest pressure pressure occurs in
A) turbine inlet B) condenser C) boiler D) super heater

18) Particles having the same atomic number but different mass numbers are called
A) Positrons B) Beta particles
C) Isotopes D) Decayed panicles

19) Maximum efficiency of an open cycle gas turbine is nearly
A) 30% B) 40% C) 50% D) 60%

20) Which among the following is not an adverse environmental impact of tidal power generation
A) Interference with spawing and migration of fish
B) Pollution and health hazard in the estuary due to blockage of flow of polluted water into the sea
C) Navigational hazar
D) None of the above

SLR-VB – 338

Seat No.	

B.E. (Part – I) (Old) (Electrical Engineering) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Wednesday, 24-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **20**

1) With neat sketch explain working of solar cell.

2) Draw typical layout of nuclear power plant.

3) State different types of boilers and explain any one among them.

4) Define the following.

Diversity factor, Demand factor, Load factor, Utilization factor.

5) What are the factors affecting the power plant design ?

3. Solve **any two** : **20**

1) With neat sketches explain briefly the Tidal power plant and Geo thermal power plant.

2) Explain different methods to calculate the efficiency of boiler.

3) What are the effects of power plant type on cost, tariffs and customer elements ?

SECTION – II

4. Solve **any four** : **20**

1) Explain the following with reference to atomic structure.

Atomic number, mass number, isotopes.

2) Explain super heaters and re-heaters used in boilers.

3) What are the safety measures for operation of nuclear power plant ?

4) Discuss the harmful effect of emission and steps taken for and their impact.

5) With neat diagram explain diesel power plant.

5. Solve **any two** : **20**

1) Draw typical layout of thermal power plant and explain it briefly.

2) With a neat diagram explain CANDU type reactor and gas cooled reactor.

3) Draw and explain different types of Hydro turbines.

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Seat No.	

Set **R**

B.E. (Part – I) (Old) (Electrical Engineering) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Wednesday, 24-5-2017 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.***
*3) Assume the suitable data **whenever** necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) 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

2) In a steam turbine cycle, the lowest pressure pressure occurs in
A) turbine inlet B) condenser C) boiler D) super heater

3) Particles having the same atomic number but different mass numbers are called
A) Positrons B) Beta particles
C) Isotopes D) Decayed panicles

4) Maximum efficiency of an open cycle gas turbine is nearly
A) 30% B) 40% C) 50% D) 60%

5) Which among the following is not an adverse environmental impact of tidal power generation
A) Interference with spawing and migration of fish
B) Pollution and health hazard in the estuary due to blockage of flow of polluted water into the sea
C) Navigational hazar
D) None of the above

6) Outward radial flow turbines
A) are impulses turbines
B) are reaction turbines
C) are partly impulse partly reaction turbines
D) may be impulse or reaction turbines

7) Dam: Hydro plant ::
   A) Chimney : Gases
   B) Coal : Steam plant
   C) Reactor : Nuclear plant
   D) Gas turbine : Steam turbine

8) In a thermal power plant cooling towers are used to
   A) condense low pressure steam
   B) cool condensed steam
   C) cool the water used in condenser for condensing steam
   D) cool feed water of boiler

9) Photovoltaic energy is the conversion of sunlight into
   A) Chemical energy
   B) Biogas
   C) Electricity
   D) Geothermal energy

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) Boiling water reactor and pressurized water reactors are
   A) Nuclear reactor B) Solar reactor C) OTEC D) Biogas reactor

12) In a hydro-electric plant a conduct system for taking water from the intake works to the turbine is known as
   A) Dam B) Reservoir C) Penstock D) Surge tank

13) Photovoltaic solar energy conversion system makes use of
   A) fuel cell B) solar cell C) solar pond D) none of the above

14) The horse power of a Diesel locomotive is of the order of
   A) 100 to 200 B) 500 to 1000 C) 2000 to 2500 D) 10,000 to 12,000

15) Fuel cells are
   A) Carbon cell
   B) Hydrogen battery
   C) Nuclear cell
   D) Chromium cell

16) Which auxiliary of gas turbine consumes most of the power ?
   A) Compressor
   B) Combustion chamber
   C) Burner
   D) Fuel pump

17) In a super-heater
   A) pressure rises, temperature drops
   B) pressure rises, temperature remains constant
   C) pressure remains constant and temperature rises
   D) both pressure and temperature remains constant

18) Diesel engines for power plants are usually
   A) horizontal B) supercharged C) slow speed D) air cooled

19) Which power plant normally operates at high speeds ?
   A) Diesel engine plant
   B) Petrol engine plant
   C) Stem turbine plant
   D) Hydro-electric power plant

20) Which variety of coal has lowest calorific value ?
   A) Steam-coal B) Bituminous coal C) Lignite D) Anthracite

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Seat No.	

B.E. (Part – I) (Old) (Electrical Engineering) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Wednesday, 24-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **20**

1) With neat sketch explain working of solar cell.

2) Draw typical layout of nuclear power plant.

3) State different types of boilers and explain any one among them.

4) Define the following.

Diversity factor, Demand factor, Load factor, Utilization factor.

5) What are the factors affecting the power plant design ?

3. Solve **any two** : **20**

1) With neat sketches explain briefly the Tidal power plant and Geo thermal power plant.

2) Explain different methods to calculate the efficiency of boiler.

3) What are the effects of power plant type on cost, tariffs and customer elements ?

SECTION – II

4. Solve **any four** : **20**

1) Explain the following with reference to atomic structure.

Atomic number, mass number, isotopes.

2) Explain super heaters and re-heaters used in boilers.

3) What are the safety measures for operation of nuclear power plant ?

4) Discuss the harmful effect of emission and steps taken for and their impact.

5) With neat diagram explain diesel power plant.

5. Solve **any two** : **20**

1) Draw typical layout of thermal power plant and explain it briefly.

2) With a neat diagram explain CANDU type reactor and gas cooled reactor.

3) Draw and explain different types of Hydro turbines.

_____

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Seat No.	

Set **S**

B.E. (Part – I) (Old) (Electrical Engineering) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Wednesday, 24-5-2017 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.***
*3) Assume the suitable data **whenever** necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which auxiliary of gas turbine consumes most of the power ?
A) Compressor B) Combustion chamber
C) Burner D) Fuel pump

2) In a super-heater
A) pressure rises, temperature drops
B) pressure rises, temperature remains constant
C) pressure remains constant and temperature rises
D) both pressure and temperature remains constant

3) Diesel engines for power plants are usually
A) horizontal B) supercharged C) slow speed D) air cooled

4) Which power plant normally operates at high speeds ?
A) Diesel engine plant B) Petrol engine plant
C) Stem turbine plant D) Hydro-electric power plant

5) Which variety of coal has lowest calorific value ?
A) Steam-coal B) Bituminous coal C) Lignite D) Anthracite

6) 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

7) In a steam turbine cycle, the lowest pressure pressure occurs in
A) turbine inlet B) condenser C) boiler D) super heater

8) Particles having the same atomic number but different mass numbers are called
A) Positrons B) Beta particles
C) Isotopes D) Decayed panicles

9) Maximum efficiency of an open cycle gas turbine is nearly
A) 30% B) 40% C) 50% D) 60%

10) Which among the following is not an adverse environmental impact of tidal power generation
A) Interference with spawing and migration of fish
B) Pollution and health hazard in the estuary due to blockage of flow of polluted water into the sea
C) Navigational hazar
D) None of the above

11) Outward radial flow turbines
A) are impulses turbines
B) are reaction turbines
C) are partly impulse partly reaction turbines
D) may be impulse or reaction turbines

12) Dam: Hydro plant ::
A) Chimney : Gases B) Coal : Steam plant
C) Reactor : Nuclear plant D) Gas turbine : Steam turbine

13) In a thermal power plant cooling towers are used to
A) condense low pressure steam
B) cool condensed steam
C) cool the water used in condenser for condensing steam
D) cool feed water of boiler

14) Photovoltaic energy is the conversion of sunlight into
A) Chemical energy B) Biogas
C) Electricity D) Geothermal energy

15) 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

16) Boiling water reactor and pressurized water reactors are
A) Nuclear reactor B) Solar reactor C) OTEC D) Biogas reactor

17) In a hydro-electric plant a conduct system for taking water from the intake works to the turbine is known as
A) Dam B) Reservoir C) Penstock D) Surge tank

18) Photovoltaic solar energy conversion system makes use of
A) fuel cell B) solar cell C) solar pond D) none of the above

19) The horse power of a Diesel locomotive is of the order of
A) 100 to 200 B) 500 to 1000 C) 2000 to 2500 D) 10,000 to 12,000

20) Fuel cells are
A) Carbon cell B) Hydrogen battery
C) Nuclear cell D) Chromium cell

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Seat No.	

B.E. (Part – I) (Old) (Electrical Engineering) Examination, 2017
POWER PLANT ENGINEERING

Day and Date : Wednesday, 24-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **20**

1) With neat sketch explain working of solar cell.

2) Draw typical layout of nuclear power plant.

3) State different types of boilers and explain any one among them.

4) Define the following.

Diversity factor, Demand factor, Load factor, Utilization factor.

5) What are the factors affecting the power plant design ?

3. Solve **any two** : **20**

1) With neat sketches explain briefly the Tidal power plant and Geo thermal power plant.

2) Explain different methods to calculate the efficiency of boiler.

3) What are the effects of power plant type on cost, tariffs and customer elements ?

SECTION – II

4. Solve **any four** : **20**

1) Explain the following with reference to atomic structure.

Atomic number, mass number, isotopes.

2) Explain super heaters and re-heaters used in boilers.

3) What are the safety measures for operation of nuclear power plant ?

4) Discuss the harmful effect of emission and steps taken for and their impact.

5) With neat diagram explain diesel power plant.

5. Solve **any two** : **20**

1) Draw typical layout of thermal power plant and explain it briefly.

2) With a neat diagram explain CANDU type reactor and gas cooled reactor.

3) Draw and explain different types of Hydro turbines.

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Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Tuesday, 16-5-2017 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) Following controller is used for power transmission management in a multi-machine substraction.
a) IPFC b) UPFC c) SVC d) TCSC

2) In SVC the Ism and Isr are
a) Same b) Different c) Unity d) None

3) _____ is operated without an external electric energy source.
a) SSSC b) TCBR c) SVS d) IPFC

4) 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

5) _____ are used to provide compensation at the receiving end of a transmission line so as to improve its voltage profile.
a) Condensor b) Resistor
c) Reactors d) Condensor, Resistor or Reactors

6) The power flow increased with increased in
a) α b) X (transmission line reactance)
c) δ d) All the above

7) At high degree of compensation and degree subsynchronous resonance present, the _____ compensation method is out used.
a) TSSC b) GCSC c) TCSC d) All the above

8) As the degree of series compensation increases, the _____ increase.
   a) Voltage stability b) Power factor
   c) Transmission line reactance d) All of these

9) Sustained oscillations below the fundamental frequency is called as
   a) Subsynchronous oscillations b) Damped oscillations
   c) Power oscillations d) None

10) The SSSC injects the compensating _____ in _____ with the line.
   a) Current, series b) Impedance, series
   c) Voltage, series d) Voltage, shunt

11) 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)

12) 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)

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 AC system is said to week if SCR is
   a) Equal to 3 b) Less than 3 c) Greater than 3 d) None of the above

15) CCC stands for
   a) Capacitor Compressed Converter b) Capacitor Commutator Converter
   c) Capacitor Commutated Converter d) None of the above

16) 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

17) 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

18) For damped filter, the quality factor (Q) is

   a) $\frac{X_0}{R}$ b) $\frac{1}{GX_0}$ c) $\frac{X_0}{X}$ d) $\frac{X_0}{Z}$

19) During switching in, the filter currents can have magnitudes ranging _____ times the harmonics current in normal operation.
   a) 10 to 20 b) 20 to 40 c) 20 to 100 d) 20 to 1000

20) For slow variations in the load, _____ provide control.
   a) Switched capacitors b) Inverters
   c) TCR d) All of the above

_____

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Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Tuesday, 16-5-2017 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) Compare TCR, TSC and TSC.

   2) Explain static VAR SYSTEM.

   3) Explain TCSC.

   4) Explain switching converter based voltage and phase angle regulator.

   5) Explain direct voltage control STATCOM.

3. Solve **any two** : **20**

   1) Compare V-I and V-Q characteristics of statcom and SVC compensating devices.

   2) Describe how to improve the transient stability with static series compensation.

   3) Write short notes on the following :

      i) Benefits from FACTS Controllers.

      ii) Objectives of static series compensation.

SECTION – II

4. Solve **any four** of the following : **20**
   1) Explain planning for HVDC transmission system.
   2) Explain the special feature of converter transformers.
   3) Write basic operating principles and characteristics for IPFC.
   4) Explain Phase Angle Regulator.
   5) Explain the function BI-polar DC link.

5. Solve **any two** : **20**
   1) Give detailed comparison between HVDC and AC transmission.
   2) Explain the significance of commutation margin angle and extinction angle.
   3) Draw the basic converter control hierarchy and explain firing angle control in detail.

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Seat No.	

Set Q

B.E. (Electrical Engineering) (Part – II) Examination, 2017
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Tuesday, 16-5-2017 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) 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) 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

3) For damped filter, the quality factor (Q) is
   a) $\frac{X_0}{R}$ b) $\frac{1}{GX_0}$ c) $\frac{X_0}{X}$ d) $\frac{X_0}{Z}$

4) During switching in, the filter currents can have magnitudes ranging _____ times the harmonics current in normal operation.
   a) 10 to 20 b) 20 to 40 c) 20 to 100 d) 20 to 1000

5) For slow variations in the load, _____ provide control.
   a) Switched capacitors b) Inverters
   c) TCR d) All of the above

6) Following controller is used for power transmission management in a multi-machine substraction.
   a) IPFC b) UPFC c) SVC d) TCSC

7) In SVC the Ism and Isr are
   a) Same b) Different c) Unity d) None

8) _____ is operated without an external electric energy source.
   a) SSSC b) TCBR c) SVS d) IPFC

P.T.O.

9) 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

10) _____ are used to provide compensation at the receiving end of a transmission line so as to improve its voltage profile.
   a) Condensor b) Resistor
   c) Reactors d) Condensor, Resistor or Reactors

11) The power flow increased with increased in
   a) α b) X (transmission line reactance)
   c) δ d) All the above

12) At high degree of compensation and degree subsynchronous resonance present, the _____ compensation method is out used.
   a) TSSC b) GCSC c) TCSC d) All the above

13) As the degree of series compensation increases, the _____ increase.
   a) Voltage stability b) Power factor
   c) Transmission line reactance d) All of these

14) Sustained oscillations below the fundamental frequency is called as
   a) Subsynchronous oscillations b) Damped oscillations
   c) Power oscillations d) None

15) The SSSC injects the compensating _____ in _____ with the line.
   a) Current, series b) Impedance, series
   c) Voltage, series d) Voltage, shunt

16) 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)

17) 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)

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 AC system is said to week if SCR is
   a) Equal to 3 b) Less than 3 c) Greater than 3 d) None of the above

20) CCC stands for
   a) Capacitor Compressed Converter b) Capacitor Commutator Converter
   c) Capacitor Commutated Converter d) None of the above

_____

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Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Tuesday, 16-5-2017 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) Compare TCR, TSC and TSC.

   2) Explain static VAR SYSTEM.

   3) Explain TCSC.

   4) Explain switching converter based voltage and phase angle regulator.

   5) Explain direct voltage control STATCOM.

3. Solve **any two** : **20**

   1) Compare V-I and V-Q characteristics of statcom and SVC compensating devices.

   2) Describe how to improve the transient stability with static series compensation.

   3) Write short notes on the following :

      i) Benefits from FACTS Controllers.

      ii) Objectives of static series compensation.

SECTION – II

4. Solve **any four** of the following : **20**
   1) Explain planning for HVDC transmission system.
   2) Explain the special feature of converter transformers.
   3) Write basic operating principles and characteristics for IPFC.
   4) Explain Phase Angle Regulator.
   5) Explain the function BI-polar DC link.

5. Solve **any two** : **20**
   1) Give detailed comparison between HVDC and AC transmission.
   2) Explain the significance of commutation margin angle and extinction angle.
   3) Draw the basic converter control hierarchy and explain firing angle control in detail.

_____

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Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Tuesday, 16-5-2017 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) 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)

2) 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)

3) 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

4) The AC system is said to week if SCR is
   a) Equal to 3 b) Less than 3 c) Greater than 3 d) None of the above

5) CCC stands for
   a) Capacitor Compressed Converter b) Capacitor Commutator Converter
   c) Capacitor Commutated Converter d) None of the above

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) 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

P.T.O.

8) For damped filter, the quality factor (Q) is

a) $\frac{X_0}{R}$ b) $\frac{1}{GX_0}$ c) $\frac{X_0}{X}$ d) $\frac{X_0}{Z}$

9) During switching in, the filter currents can have magnitudes ranging _____ times the harmonics current in normal operation.
a) 10 to 20 b) 20 to 40 c) 20 to 100 d) 20 to 1000

10) For slow variations in the load, _____ provide control.
a) Switched capacitors b) Inverters
c) TCR d) All of the above

11) Following controller is used for power transmission management in a multi-machine substraction.
a) IPFC b) UPFC c) SVC d) TCSC

12) In SVC the Ism and Isr are
a) Same b) Different c) Unity d) None

13) _____ is operated without an external electric energy source.
a) SSSC b) TCBR c) SVS d) IPFC

14) 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

15) _____ are used to provide compensation at the receiving end of a transmission line so as to improve its voltage profile.
a) Condensor b) Resistor
c) Reactors d) Condensor, Resistor or Reactors

16) The power flow increased with increased in
a) α b) X (transmission line reactance)
c) δ d) All the above

17) At high degree of compensation and degree subsynchronous resonance present, the _____ compensation method is out used.
a) TSSC b) GCSC c) TCSC d) All the above

18) As the degree of series compensation increases, the _____ increase.
a) Voltage stability b) Power factor
c) Transmission line reactance d) All of these

19) Sustained oscillations below the fundamental frequency is called as
a) Subsynchronous oscillations b) Damped oscillations
c) Power oscillations d) None

20) The SSSC injects the compensating _____ in _____ with the line.
a) Current, series b) Impedance, series
c) Voltage, series d) Voltage, shunt

_____

SLR-VB – 339

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Tuesday, 16-5-2017 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) Compare TCR, TSC and TSC.

   2) Explain static VAR SYSTEM.

   3) Explain TCSC.

   4) Explain switching converter based voltage and phase angle regulator.

   5) Explain direct voltage control STATCOM.

3. Solve **any two** : **20**

   1) Compare V-I and V-Q characteristics of statcom and SVC compensating devices.

   2) Describe how to improve the transient stability with static series compensation.

   3) Write short notes on the following :

      i) Benefits from FACTS Controllers.

      ii) Objectives of static series compensation.

SECTION – II

4. Solve **any four** of the following : **20**
   1) Explain planning for HVDC transmission system.
   2) Explain the special feature of converter transformers.
   3) Write basic operating principles and characteristics for IPFC.
   4) Explain Phase Angle Regulator.
   5) Explain the function BI-polar DC link.

5. Solve **any two** : **20**
   1) Give detailed comparison between HVDC and AC transmission.
   2) Explain the significance of commutation margin angle and extinction angle.
   3) Draw the basic converter control hierarchy and explain firing angle control in detail.

SLR-VB – 339

Seat No.	

Set S

B.E. (Electrical Engineering) (Part – II) Examination, 2017
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Tuesday, 16-5-2017 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) The power flow increased with increased in
   a) α b) X (transmission line reactance)
   c) δ d) All the above

2) At high degree of compensation and degree subsynchronous resonance present, the _____ compensation method is out used.
   a) TSSC b) GCSC c) TCSC d) All the above

3) As the degree of series compensation increases, the _____ increase.
   a) Voltage stability b) Power factor
   c) Transmission line reactance d) All of these

4) Sustained oscillations below the fundamental frequency is called as
   a) Subsynchronous oscillations b) Damped oscillations
   c) Power oscillations d) None

5) The SSSC injects the compensating _____ in _____ with the line.
   a) Current, series b) Impedance, series
   c) Voltage, series d) Voltage, shunt

6) 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)

7) 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)

P.T.O.

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 AC system is said to week if SCR is
   a) Equal to 3 b) Less than 3 c) Greater than 3 d) None of the above

10) CCC stands for
   a) Capacitor Compressed Converter b) Capacitor Commutator Converter
   c) Capacitor Commutated Converter d) None of the above

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) 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

13) For damped filter, the quality factor (Q) is

   a) $\frac{X_0}{R}$ b) $\frac{1}{GX_0}$ c) $\frac{X_0}{X}$ d) $\frac{X_0}{Z}$

14) During switching in, the filter currents can have magnitudes ranging _____ times the harmonics current in normal operation.
   a) 10 to 20 b) 20 to 40 c) 20 to 100 d) 20 to 1000

15) For slow variations in the load, _____ provide control.
   a) Switched capacitors b) Inverters
   c) TCR d) All of the above

16) Following controller is used for power transmission management in a multi-machine substraction.
   a) IPFC b) UPFC c) SVC d) TCSC

17) In SVC the Ism and Isr are
   a) Same b) Different c) Unity d) None

18) _____ is operated without an external electric energy source.
   a) SSSC b) TCBR c) SVS d) IPFC

19) 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

20) _____ are used to provide compensation at the receiving end of a transmission line so as to improve its voltage profile.
   a) Condensor b) Resistor
   c) Reactors d) Condensor, Resistor or Reactors

_____

SLR-VB – 339

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
FLEXIBLE AC TRANSMISSION SYSTEM AND HVDC TRANSMISSION

Day and Date : Tuesday, 16-5-2017 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) Compare TCR, TSC and TSC.

   2) Explain static VAR SYSTEM.

   3) Explain TCSC.

   4) Explain switching converter based voltage and phase angle regulator.

   5) Explain direct voltage control STATCOM.

3. Solve **any two** : **20**

   1) Compare V-I and V-Q characteristics of statcom and SVC compensating devices.

   2) Describe how to improve the transient stability with static series compensation.

   3) Write short notes on the following :

      i) Benefits from FACTS Controllers.

      ii) Objectives of static series compensation.

SECTION – II

4. Solve **any four** of the following : **20**
   1) Explain planning for HVDC transmission system.
   2) Explain the special feature of converter transformers.
   3) Write basic operating principles and characteristics for IPFC.
   4) Explain Phase Angle Regulator.
   5) Explain the function BI-polar DC link.

5. Solve **any two** : **20**
   1) Give detailed comparison between HVDC and AC transmission.
   2) Explain the significance of commutation margin angle and extinction angle.
   3) Draw the basic converter control hierarchy and explain firing angle control in detail.

SLR-VB – 340

Seat No.	

Set **P**

B.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Thursday, 18-5-2017 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 :

1) Brake test is _____ method of testing machine.
a) Regenerative b) Direct c) Indirect d) All of these

2) Swinburne test is also called as
a) Load test b) Brake test c) No load test d) Full load test

3) In fire extinguisher we use
a) CO_2 b) SO_2 c) O_2 d) H_2O

4) Do's and Don'ts are observed carefully in safety precautions as per
a) IS 5216-1962 b) IS 5216-1964 c) IS 5216-1966 d) IS 5216-1969

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 50 H.P. motor is
a) 2 sec. b) 5 sec. c) 8 sec. d) 9.5 sec.

7) In moisture proofness test, humidity is maintained to
a) 70% b) 80% c) 90% d) 110%

8) In insulation resistance test of 11 kv transformer, minimum insulation resistance is
a) 25 MΩ b) 50 MΩ c) 75 MΩ d) 100 MΩ

9) The impulse test level is determined by operating level is _____ times normal operating value
a) 1 to 2 b) 2 to 2.5 c) 4 to 5 d) 7 to 9

10) As per I.E.C. for 66 kv system voltage, the impulse with stand voltage is
a) 100 kv b) 150 kv c) 220 kv d) 325 kv

11) In dielectric absorption test by using megger, insulation resistance is measured at regular interval of _____ and recorded.
a) 24 hours b) 12 hours 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) The type of ELCB are
a) Voltage operated b) Current operated
c) Both a) and b) d) Frequency operated

17) While installing electrical machines, checking of foundation for correct level is to be carried out then, we use
a) Spirit level b) Dial indicator c) Bearing puller d) Filler gauge

18) For rotating machinery, the concrete foundation should be about _____ larger in length and breadth.
a) 5 cms b) 15 cms c) 25 cms d) None of the above

19) For 75 H.P. to 100 H.P. rating machine, depth of foundation is
a) 1 cm to 10 cms b) 5 cms to 20 cms
c) 20 cms to 35 cms d) 35 cms to 60 cms

20) When motor arranged in the same line as that of driven machine this coupling is also called as
a) Direct coupling b) Indirect coupling
c) Both a)and b) d) None of these

SLR-VB – 340

Seat No.	

B.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

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) Safety
   ii) Hazard
   iii) Accident
   iv) Major accident hazard
   v) Responsibility.

b) Compare preventive maintenance and breakdown maintenance.

c) What is the need of parallel operation of alternator ? What are the conditions for satisfactory parallel operation of alternator ?

d) Explain with neat sketch open delta method in case of transformer.

e) 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)
250V	2A	1500	3	0.2

The radius of break pulley = 7.5 cm. Calculate :
i) Input
ii) Torque
iii) Output
iv) Efficiency

f) Two single phase transformers with equal voltage ratio have impedance of $(0.819 + j\ 2.503)\Omega$ and $(0.8 + j\ 2.31)\Omega$ with respect to secondary. If they operate in parallel, how they will share a total load of 2000 kw at 0.8 power factor lagging ?

III. Attempt **any two** : **(10×2=20)**

a) Explain in detail temperature rise test by loading the induction motor with generator and by direct application of mechanical load in case of induction motor.

b) Explain any two method of measurement of winding resistance in case of transformer.

c) A.D.C. machine is tested for Swinburne's test. The machine is rated for 230V, 50A. The observations during test were as follows :
No load current = 5A
Armature resistance = 1 Ω
Shunt field resistance = 200 Ω
Find full load efficiency, if the machine was tested as D.C. motor.

SECTION – II

IV. Attempt **any four** : **(4×5=20)**

a) Classify insulating materials as per I.S. 8504 (Part III) 1994.

b) Explain the procedure for drying electrical insulation by using external heat and internal heat.

c) Explain with neat sketch dial indicator.

d) Write a short note on internal and external causes of failure of equipment.

e) State factors involved in designing machine foundation.

f) Explain with neat sketch requirement of different dimensions of foundations for static machines.

V. Attempt **any two** : **(10×2=20)**

a) Explain any two methods of measuring temperature of internal parts of windings/ machines and apply the correction factor when the machine is hot.

b) Discuss in detail electrical fault and mechanical fault on the basis of reasons for development of faults and remedial measures.

c) Explain with neat sketch procedure for levelling and alignment of two shafts of directly and indirectly coupled drives.

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Seat No.

Set Q

B.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Thursday, 18-5-2017 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 :

1) The type of ELCB are
   a) Voltage operated b) Current operated
   c) Both a) and b) d) Frequency operated

2) While installing electrical machines, checking of foundation for correct level is to be carried out then, we use
   a) Spirit level b) Dial indicator c) Bearing puller d) Filler gauge

3) For rotating machinery, the concrete foundation should be about _____ larger in length and breadth.
   a) 5 cms b) 15 cms c) 25 cms d) None of the above

4) For 75 H.P. to 100 H.P. rating machine, depth of foundation is
   a) 1 cm to 10 cms b) 5 cms to 20 cms
   c) 20 cms to 35 cms d) 35 cms to 60 cms

5) When motor arranged in the same line as that of driven machine this coupling is also called as
   a) Direct coupling b) Indirect coupling
   c) Both a)and b) d) None of these

6) Brake test is _____ method of testing machine.
   a) Regenerative b) Direct c) Indirect d) All of these

P.T.O

7) Swinburne test is also called as
a) Load test b) Brake test c) No load test d) Full load test

8) In fire extinguisher we use
a) CO_2 b) SO_2 c) O_2 d) H_2O

9) Do's and Don'ts are observed carefully in safety precautions as per
a) IS 5216-1962 b) IS 5216-1964 c) IS 5216-1966 d) IS 5216-1969

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 50 H.P. motor is
a) 2 sec. b) 5 sec. c) 8 sec. d) 9.5 sec.

12) In moisture proofness test, humidity is maintained to
a) 70% b) 80% c) 90% d) 110%

13) In insulation resistance test of 11 kv transformer, minimum insulation resistance is
a) 25 MΩ b) 50 MΩ c) 75 MΩ d) 100 MΩ

14) The impulse test level is determined by operating level is _____ times normal operating value
a) 1 to 2 b) 2 to 2.5 c) 4 to 5 d) 7 to 9

15) As per I.E.C. for 66 kv system voltage, the impulse with stand voltage is
a) 100 kv b) 150 kv c) 220 kv d) 325 kv

16) In dielectric absorption test by using megger, insulation resistance is measured at regular interval of _____ and recorded.
a) 24 hours b) 12 hours 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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Seat No.	

B.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Thursday, 18-5-2017 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) Safety
   ii) Hazard
   iii) Accident
   iv) Major accident hazard
   v) Responsibility.

b) Compare preventive maintenance and breakdown maintenance.

c) What is the need of parallel operation of alternator ? What are the conditions for satisfactory parallel operation of alternator ?

d) Explain with neat sketch open delta method in case of transformer.

e) 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)
250V	2A	1500	3	0.2

The radius of break pulley = 7.5 cm. Calculate :
i) Input ii) Torque
iii) Output iv) Efficiency

f) Two single phase transformers with equal voltage ratio have impedance of $(0.819 + j\ 2.503)\Omega$ and $(0.8 + j\ 2.31)\Omega$ with respect to secondary. If they operate in parallel, how they will share a total load of 2000 kw at 0.8 power factor lagging ?

III. Attempt **any two** : **(10×2=20)**

a) Explain in detail temperature rise test by loading the induction motor with generator and by direct application of mechanical load in case of induction motor.

b) Explain any two method of measurement of winding resistance in case of transformer.

c) A.D.C. machine is tested for Swinburne's test. The machine is rated for 230V, 50A. The observations during test were as follows :
No load current = 5A
Armature resistance = 1 Ω
Shunt field resistance = 200 Ω
Find full load efficiency, if the machine was tested as D.C. motor.

SECTION – II

IV. Attempt **any four** : **(4×5=20)**

a) Classify insulating materials as per I.S. 8504 (Part III) 1994.

b) Explain the procedure for drying electrical insulation by using external heat and internal heat.

c) Explain with neat sketch dial indicator.

d) Write a short note on internal and external causes of failure of equipment.

e) State factors involved in designing machine foundation.

f) Explain with neat sketch requirement of different dimensions of foundations for static machines.

V. Attempt **any two** : **(10×2=20)**

a) Explain any two methods of measuring temperature of internal parts of windings/ machines and apply the correction factor when the machine is hot.

b) Discuss in detail electrical fault and mechanical fault on the basis of reasons for development of faults and remedial measures.

c) Explain with neat sketch procedure for levelling and alignment of two shafts of directly and indirectly coupled drives.

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Seat No.	

Set **R**

B.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Thursday, 18-5-2017 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 :

1) In dielectric absorption test by using megger, insulation resistance is measured at regular interval of _____ and recorded.
a) 24 hours b) 12 hours 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) The type of ELCB are
a) Voltage operated b) Current operated
c) Both a) and b) d) Frequency operated

7) While installing electrical machines, checking of foundation for correct level is to be carried out then, we use
a) Spirit level b) Dial indicator c) Bearing puller d) Filler gauge

P.T.O.

8) For rotating machinery, the concrete foundation should be about _____ larger in length and breadth.
a) 5 cms b) 15 cms c) 25 cms d) None of the above

9) For 75 H.P. to 100 H.P. rating machine, depth of foundation is
a) 1 cm to 10 cms b) 5 cms to 20 cms
c) 20 cms to 35 cms d) 35 cms to 60 cms

10) When motor arranged in the same line as that of driven machine this coupling is also called as
a) Direct coupling b) Indirect coupling
c) Both a)and b) d) None of these

11) Brake test is _____ method of testing machine.
a) Regenerative b) Direct c) Indirect d) All of these

12) Swinburne test is also called as
a) Load test b) Brake test c) No load test d) Full load test

13) In fire extinguisher we use
a) CO_2 b) SO_2 c) O_2 d) H_2O

14) Do's and Don'ts are observed carefully in safety precautions as per
a) IS 5216-1962 b) IS 5216-1964 c) IS 5216-1966 d) IS 5216-1969

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 50 H.P. motor is
a) 2 sec. b) 5 sec. c) 8 sec. d) 9.5 sec.

17) In moisture proofness test, humidity is maintained to
a) 70% b) 80% c) 90% d) 110%

18) In insulation resistance test of 11 kv transformer, minimum insulation resistance is
a) 25 MΩ b) 50 MΩ c) 75 MΩ d) 100 MΩ

19) The impulse test level is determined by operating level is _____ times normal operating value
a) 1 to 2 b) 2 to 2.5 c) 4 to 5 d) 7 to 9

20) As per I.E.C. for 66 kv system voltage, the impulse with stand voltage is
a) 100 kv b) 150 kv c) 220 kv d) 325 kv

SLR-VB – 340

Seat No.	

B.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Thursday, 18-5-2017 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) Safety
   ii) Hazard
   iii) Accident
   iv) Major accident hazard
   v) Responsibility.

b) Compare preventive maintenance and breakdown maintenance.

c) What is the need of parallel operation of alternator ? What are the conditions for satisfactory parallel operation of alternator ?

d) Explain with neat sketch open delta method in case of transformer.

e) 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)
250V	2A	1500	3	0.2

The radius of break pulley = 7.5 cm. Calculate :
   i) Input ii) Torque
   iii) Output iv) Efficiency

f) Two single phase transformers with equal voltage ratio have impedance of $(0.819 + j\ 2.503)\ \Omega$ and $(0.8 + j\ 2.31)\ \Omega$ with respect to secondary. If they operate in parallel, how they will share a total load of 2000 kw at 0.8 power factor lagging ?

III. Attempt **any two** : **(10×2=20)**

a) Explain in detail temperature rise test by loading the induction motor with generator and by direct application of mechanical load in case of induction motor.

b) Explain any two method of measurement of winding resistance in case of transformer.

c) A.D.C. machine is tested for Swinburne's test. The machine is rated for 230V, 50A. The observations during test were as follows :
No load current = 5A
Armature resistance = 1 Ω
Shunt field resistance = 200 Ω
Find full load efficiency, if the machine was tested as D.C. motor.

SECTION – II

IV. Attempt **any four** : **(4×5=20)**

a) Classify insulating materials as per I.S. 8504 (Part III) 1994.

b) Explain the procedure for drying electrical insulation by using external heat and internal heat.

c) Explain with neat sketch dial indicator.

d) Write a short note on internal and external causes of failure of equipment.

e) State factors involved in designing machine foundation.

f) Explain with neat sketch requirement of different dimensions of foundations for static machines.

V. Attempt **any two** : **(10×2=20)**

a) Explain any two methods of measuring temperature of internal parts of windings/ machines and apply the correction factor when the machine is hot.

b) Discuss in detail electrical fault and mechanical fault on the basis of reasons for development of faults and remedial measures.

c) Explain with neat sketch procedure for levelling and alignment of two shafts of directly and indirectly coupled drives.

SLR-VB – 340

Seat No.	

Set **S**

B.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Thursday, 18-5-2017 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 :

1) While conducting momentary overload test on induction motor, the duration of excess load 50 H.P. motor is
a) 2 sec. b) 5 sec. c) 8 sec. d) 9.5 sec.

2) In moisture proofness test, humidity is maintained to
a) 70% b) 80% c) 90% d) 110%

3) In insulation resistance test of 11 kv transformer, minimum insulation resistance is
a) 25 MΩ b) 50 MΩ c) 75 MΩ d) 100 MΩ

4) The impulse test level is determined by operating level is _____ times normal operating value
a) 1 to 2 b) 2 to 2.5 c) 4 to 5 d) 7 to 9

5) As per I.E.C. for 66 kv system voltage, the impulse with stand voltage is
a) 100 kv b) 150 kv c) 220 kv d) 325 kv

6) In dielectric absorption test by using megger, insulation resistance is measured at regular interval of _____ and recorded.
a) 24 hours b) 12 hours 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) The type of ELCB are
a) Voltage operated b) Current operated
c) Both a) and b) d) Frequency operated

12) While installing electrical machines, checking of foundation for correct level is to be carried out then, we use
a) Spirit level b) Dial indicator c) Bearing puller d) Filler gauge

13) For rotating machinery, the concrete foundation should be about _____ larger in length and breadth.
a) 5 cms b) 15 cms c) 25 cms d) None of the above

14) For 75 H.P. to 100 H.P. rating machine, depth of foundation is
a) 1 cm to 10 cms b) 5 cms to 20 cms
c) 20 cms to 35 cms d) 35 cms to 60 cms

15) When motor arranged in the same line as that of driven machine this coupling is also called as
a) Direct coupling b) Indirect coupling
c) Both a)and b) d) None of these

16) Brake test is _____ method of testing machine.
a) Regenerative b) Direct c) Indirect d) All of these

17) Swinburne test is also called as
a) Load test b) Brake test c) No load test d) Full load test

18) In fire extinguisher we use
a) CO_2 b) SO_2 c) O_2 d) H_2O

19) Do's and Don'ts are observed carefully in safety precautions as per
a) IS 5216-1962 b) IS 5216-1964 c) IS 5216-1966 d) IS 5216-1969

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

SLR-VB – 340

Seat No.	

B.E. (Part – II) (Electrical) Examination, 2017
ELECTRICAL INSTALLATION, TESTING AND MAINTENANCE

Day and Date : Thursday, 18-5-2017 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) Safety
   ii) Hazard
   iii) Accident
   iv) Major accident hazard
   v) Responsibility.

b) Compare preventive maintenance and breakdown maintenance.

c) What is the need of parallel operation of alternator ? What are the conditions for satisfactory parallel operation of alternator ?

d) Explain with neat sketch open delta method in case of transformer.

e) 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)
250V	2A	1500	3	0.2

The radius of break pulley = 7.5 cm. Calculate :
i) Input ii) Torque
iii) Output iv) Efficiency

f) Two single phase transformers with equal voltage ratio have impedance of $(0.819 + j\ 2.503)\ \Omega$ and $(0.8 + j\ 2.31)\ \Omega$ with respect to secondary. If they operate in parallel, how they will share a total load of 2000 kw at 0.8 power factor lagging ?

III. Attempt **any two** : **(10×2=20)**

a) Explain in detail temperature rise test by loading the induction motor with generator and by direct application of mechanical load in case of induction motor.

b) Explain any two method of measurement of winding resistance in case of transformer.

c) A.D.C. machine is tested for Swinburne's test. The machine is rated for 230V, 50A. The observations during test were as follows :
No load current = 5A
Armature resistance = 1 Ω
Shunt field resistance = 200 Ω
Find full load efficiency, if the machine was tested as D.C. motor.

SECTION – II

IV. Attempt **any four** : **(4×5=20)**

a) Classify insulating materials as per I.S. 8504 (Part III) 1994.

b) Explain the procedure for drying electrical insulation by using external heat and internal heat.

c) Explain with neat sketch dial indicator.

d) Write a short note on internal and external causes of failure of equipment.

e) State factors involved in designing machine foundation.

f) Explain with neat sketch requirement of different dimensions of foundations for static machines.

V. Attempt **any two** : **(10×2=20)**

a) Explain any two methods of measuring temperature of internal parts of windings/ machines and apply the correction factor when the machine is hot.

b) Discuss in detail electrical fault and mechanical fault on the basis of reasons for development of faults and remedial measures.

c) Explain with neat sketch procedure for levelling and alignment of two shafts of directly and indirectly coupled drives.

SLR-VB – 341

Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Saturday, 20-5-2017 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.***
3) Figures to ***right*** *indicate* ***full*** *marks.*
4) Assume suitable data ***if necessary****.*

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) The fuel cost is included in
   a) annual fixed cost b) annual operating cost
   c) both the annual fixed cost and operating cost d) either fixed cost or operating cost

3) Two generating plants feed a load centre through a transmission network. For maximum economy
   a) the incremental fuel cost should be the same for the two stations
   b) the two stations should share the load in the ratio of their installed capacities
   c) the more efficient plant should supply more load
   d) the incremental cost of power delivered at the load centre should be the same for both the plants

4) A system has two sources having plant loadings P_1 and P_2. The transmission loss P_L is
   a) $P_1^2 B_{11} + P_1P_2B_{12} + P_2^2 B_{22}$ b) $2P_1^2 B_{11} + P_1P_2B_{12} + 2P_2^2 B_{22}$
   c) $P_1^2 B_{11} + 2P_1P_2B_{12} + P_2^2 B_{22}$ d) None of the above

5) The units for heat rate are
   a) k cal/k Wh b) k Wh/k cal c) k cal/hour d) kW

6) The successful parallel operation of alternator is due to the presence of
   a) resistance b) reactance
   c) reluctance d) armature reaction

7) Modern alternators use
   a) electromechanical voltage regulators b) magnetic amplifier regulators
   c) electronic regulators d) none of the above

8) The units for speed regulation of governor are
   a) Hz b) Hz per MVA c) Hz per MW d) None of above

P.T.O.

9) Which of the following plants takes least time in starting from cold conditions to full load condition ?
   a) nuclear plant
   b) steam plant
   c) hydro electric plant
   d) gas turbine plant

10) A synchronous condenser is a
   a) dc generator
   b) induction motor
   c) over excited synchronous motor
   d) under excited synchronous motor

11) An alternator is connected to infinite bus. If excitation of alternator is increased
   a) real power output of generator increases
   b) power factor of alternator decreases
   c) power factor of alternator increases
   d) both (a) and (c)

12) For stable operation of interconnected system, the passive element which can be used as interconnecting element is
   a) reactor b) resistor c) capacitor d) none of these

13) Phase shift occurs between the sending and receiving ends of ac transmission lines as a result of
   a) reactance of lines
   b) resistance of lines
   c) voltage at which the lines operate
   d) conductor size

14) Var flows in a circuit
   a) from a point of higher voltage to that of lower voltage
   b) from a point of lower voltage to that of higher voltage
   c) without any effect on the voltage of terminals
   d) none of these

15) In economic dispatch including transmission losses, the effect of increased penalty factor is to
   a) increase load on that generator
   b) decrease load on that generator
   c) keep the load on that generator constant
   d) either (a) or (b)

16) Two synchronous generators are operating in parallel. One of them has a 5% governor drop and the other has 8% drop. The generator with higher droop will
   a) tend to take less load
   b) tend to take more load
   c) take the same load as the other generator
   d) either (b) or (c)

17) Automatic Generation Control (AGC)
   a) always requires a special an separate computer
   b) can be provided by a special program in the SCADA master unit computer
   c) cannot include transmission losses
   d) cannot be relied in some cases

18) The voltage drop across a series capacitor bank is proportional to
   a) line current
   b) line voltage
   c) size of conductor
   d) both line current and voltage

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-VB – 341

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Saturday, 20-5-2017 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 4** of the following : **(5×4=20)**

a) What are the constraints of Unit Commitment ?

b) Why is it necessary to consider transmission loss in optimum scheduling ?

c) Why is it necessary to operate hydro and steam plants in combination ? Discuss.

d) Write a short note on 'Automatic Load Dispatching'.

e) Explain the merits of the interconnection of power system network.

3. Solve **any 2** of the following : **(10×2=20)**

a) 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.

b) Discuss the dynamic programming method to solar unit commitment program.

c) Explain the necessity of maintaining a constant frequency in a power system operation.

SECTION – II

4. Solve **any 4** of the following : **(5×4=20)**

   a) Draw a block diagram, with illustrative transfer functions, of a single area load frequency control system.

   b) Write a short note on 'Automatic Load Dispatching.

   c) Explain the mechanism of load frequency control.

   d) What is voltage collapse ?

   e) Explain the effect of rotor angle on voltage stability.

5. Solve **any 2** of the following : **(10×2=20)**

   a) Describe the effect of thyristor-controlled static shunt compensation to meet the reactive power requirement in the power system.

   b) Explain security analysis and sensitivity factors.

   c) Explain the mathematical formulation of voltage stability problem.

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SLR-VB – 341

Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Saturday, 20-5-2017 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.***
3) *Figures to* ***right*** *indicate* ***full*** *marks.*
4) *Assume suitable data* ***if necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Two synchronous generators are operating in parallel. One of them has a 5% governor drop and the other has 8% drop. The generator with higher droop will
   a) tend to take less load
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   a) line current
   b) line voltage
   c) size of conductor
   d) both line current and voltage

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
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   c) may be less or more than 1
   d) may be as high as 100

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   a) annual fixed cost
   b) annual operating cost
   c) both the annual fixed cost and operating cost
   d) either fixed cost or operating cost

P.T.O.

8) Two generating plants feed a load centre through a transmission network. For maximum economy
   a) the incremental fuel cost should be the same for the two stations
   b) the two stations should share the load in the ratio of their installed capacities
   c) the more efficient plant should supply more load
   d) the incremental cost of power delivered at the load centre should be the same for both the plants

9) A system has two sources having plant loadings P_1 and P_2. The transmission loss P_L is
   a) $P_1^2 B_{11} + P_1P_2B_{12} + P_2^2 B_{22}$ b) $2P_1^2 B_{11} + P_1P_2B_{12} + 2P_2^2 B_{22}$
   c) $P_1^2 B_{11} + 2P_1P_2B_{12} + P_2^2 B_{22}$ d) None of the above

10) The units for heat rate are
   a) k cal/k Wh b) k Wh/k cal c) k cal/hour d) kW

11) The successful parallel operation of alternator is due to the presence of
   a) resistance b) reactance
   c) reluctance d) armature reaction

12) Modern alternators use
   a) electromechanical voltage regulators b) magnetic amplifier regulators
   c) electronic regulators d) none of the above

13) The units for speed regulation of governor are
   a) Hz b) Hz per MVA c) Hz per MW d) None of above

14) Which of the following plants takes least time in starting from cold conditions to full load condition ?
   a) nuclear plant b) steam plant
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   c) voltage at which the lines operate d) conductor size

19) Var flows in a circuit
   a) from a point of higher voltage to that of lower voltage
   b) from a point of lower voltage to that of higher voltage
   c) without any effect on the voltage of terminals
   d) none of these

20) In economic dispatch including transmission losses, the effect of increased penalty factor is to
   a) increase load on that generator b) decrease load on that generator
   c) keep the load on that generator constant d) either (a) or (b)

SLR-VB – 341

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Saturday, 20-5-2017 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 4** of the following : **(5×4=20)**

a) What are the constraints of Unit Commitment ?

b) Why is it necessary to consider transmission loss in optimum scheduling ?

c) Why is it necessary to operate hydro and steam plants in combination ? Discuss.

d) Write a short note on 'Automatic Load Dispatching'.

e) Explain the merits of the interconnection of power system network.

3. Solve **any 2** of the following : **(10×2=20)**

a) 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.

b) Discuss the dynamic programming method to solar unit commitment program.

c) Explain the necessity of maintaining a constant frequency in a power system operation.

SECTION – II

4. Solve **any 4** of the following : **(5×4=20)**

   a) Draw a block diagram, with illustrative transfer functions, of a single area load frequency control system.

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   e) Explain the effect of rotor angle on voltage stability.

5. Solve **any 2** of the following : **(10×2=20)**

   a) Describe the effect of thyristor-controlled static shunt compensation to meet the reactive power requirement in the power system.

   b) Explain security analysis and sensitivity factors.

   c) Explain the mathematical formulation of voltage stability problem.

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SLR-VB – 341

Seat No.	

Set **R**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Saturday, 20-5-2017 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.***
3) Figures to ***right*** *indicate* ***full*** *marks.*
4) Assume suitable data ***if necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) An alternator is connected to infinite bus. If excitation of alternator is increased
   a) real power output of generator increases
   b) power factor of alternator decreases
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   d) both (a) and (c)

2) For stable operation of interconnected system, the passive element which can be used as interconnecting element is
   a) reactor b) resistor c) capacitor d) none of these

3) Phase shift occurs between the sending and receiving ends of ac transmission lines as a result of
   a) reactance of lines b) resistance of lines
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4) Var flows in a circuit
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5) In economic dispatch including transmission losses, the effect of increased penalty factor is to
   a) increase load on that generator b) decrease load on that generator
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6) Two synchronous generators are operating in parallel. One of them has a 5% governor drop and the other has 8% drop. The generator with higher droop will
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   a) Voltage at receiving end
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12) The fuel cost is included in
   a) annual fixed cost
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14) A system has two sources having plant loadings P_1 and P_2. The transmission loss P_L is
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   b) $2P_1^2 B_{11} + P_1P_2B_{12} + 2P_2^2 B_{22}$
   c) $P_1^2 B_{11} + 2P_1P_2B_{12} + P_2^2 B_{22}$
   d) None of the above

15) The units for heat rate are
   a) k cal/k Wh
   b) k Wh/k cal
   c) k cal/hour
   d) kW

16) The successful parallel operation of alternator is due to the presence of
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17) Modern alternators use
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   a) Hz
   b) Hz per MVA
   c) Hz per MW
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   c) over excited synchronous motor
   d) under excited synchronous motor

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Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Saturday, 20-5-2017 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 4** of the following : **(5×4=20)**

a) What are the constraints of Unit Commitment ?

b) Why is it necessary to consider transmission loss in optimum scheduling ?

c) Why is it necessary to operate hydro and steam plants in combination ? Discuss.

d) Write a short note on 'Automatic Load Dispatching'.

e) Explain the merits of the interconnection of power system network.

3. Solve **any 2** of the following : **(10×2=20)**

a) 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.

b) Discuss the dynamic programming method to solar unit commitment program.

c) Explain the necessity of maintaining a constant frequency in a power system operation.

SECTION – II

4. Solve **any 4** of the following : **(5×4=20)**

   a) Draw a block diagram, with illustrative transfer functions, of a single area load frequency control system.

   b) Write a short note on 'Automatic Load Dispatching.

   c) Explain the mechanism of load frequency control.

   d) What is voltage collapse ?

   e) Explain the effect of rotor angle on voltage stability.

5. Solve **any 2** of the following : **(10×2=20)**

   a) Describe the effect of thyristor-controlled static shunt compensation to meet the reactive power requirement in the power system.

   b) Explain security analysis and sensitivity factors.

   c) Explain the mathematical formulation of voltage stability problem.

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SLR-VB – 341

Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Saturday, 20-5-2017 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.***
3) Figures to ***right*** *indicate* ***full*** *marks.*
4) Assume suitable data ***if necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The successful parallel operation of alternator is due to the presence of
   a) resistance b) reactance
   c) reluctance d) armature reaction

2) Modern alternators use
   a) electromechanical voltage regulators b) magnetic amplifier regulators
   c) electronic regulators d) none of the above

3) The units for speed regulation of governor are
   a) Hz b) Hz per MVA c) Hz per MW d) None of above

4) Which of the following plants takes least time in starting from cold conditions to full load condition ?
   a) nuclear plant b) steam plant
   c) hydro electric plant d) gas turbine plant

5) A synchronous condenser is a
   a) dc generator b) induction motor
   c) over excited synchronous motor d) under excited synchronous motor

6) An alternator is connected to infinite bus. If excitation of alternator is increased
   a) real power output of generator increases
   b) power factor of alternator decreases
   c) power factor of alternator increases
   d) both (a) and (c)

7) For stable operation of interconnected system, the passive element which can be used as interconnecting element is
   a) reactor b) resistor c) capacitor d) none of these

8) Phase shift occurs between the sending and receiving ends of ac transmission lines as a result of
   a) reactance of lines b) resistance of lines
   c) voltage at which the lines operate d) conductor size

P.T.O.

9) Var flows in a circuit
   a) from a point of higher voltage to that of lower voltage
   b) from a point of lower voltage to that of higher voltage
   c) without any effect on the voltage of terminals
   d) none of these

10) In economic dispatch including transmission losses, the effect of increased penalty factor is to
   a) increase load on that generator
   b) decrease load on that generator
   c) keep the load on that generator constant
   d) either (a) or (b)

11) Two synchronous generators are operating in parallel. One of them has a 5% governor drop and the other has 8% drop. The generator with higher droop will
   a) tend to take less load
   b) tend to take more load
   c) take the same load as the other generator
   d) either (b) or (c)

12) Automatic Generation Control (AGC)
   a) always requires a special an separate computer
   b) can be provided by a special program in the SCADA master unit computer
   c) cannot include transmission losses
   d) cannot be relied in some cases

13) The voltage drop across a series capacitor bank is proportional to
   a) line current
   b) line voltage
   c) size of conductor
   d) both line current and voltage

14) Security analysis is executed
   a) real time analysis
   b) pre contingency analysis
   c) post contingency analysis
   d) none of them

15) Real power is affected due to
   a) Voltage at receiving end
   b) Power factor
   c) Rotor angle
   d) Resistance of transmission line

16) 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

17) The fuel cost is included in
   a) annual fixed cost
   b) annual operating cost
   c) both the annual fixed cost and operating cost
   d) either fixed cost or operating cost

18) Two generating plants feed a load centre through a transmission network. For maximum economy
   a) the incremental fuel cost should be the same for the two stations
   b) the two stations should share the load in the ratio of their installed capacities
   c) the more efficient plant should supply more load
   d) the incremental cost of power delivered at the load centre should be the same for both the plants

19) A system has two sources having plant loadings P_1 and P_2. The transmission loss P_L is
   a) $P_1^2 B_{11} + P_1P_2B_{12} + P_2^2 B_{22}$
   b) $2P_1^2 B_{11} + P_1P_2B_{12} + 2P_2^2 B_{22}$
   c) $P_1^2 B_{11} + 2P_1P_2B_{12} + P_2^2 B_{22}$
   d) None of the above

20) The units for heat rate are
   a) k cal/k Wh
   b) k Wh/k cal
   c) k cal/hour
   d) kW

SLR-VB – 341

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER SYSTEM OPERATION AND CONTROL

Day and Date : Saturday, 20-5-2017 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 4** of the following : **(5×4=20)**

a) What are the constraints of Unit Commitment ?

b) Why is it necessary to consider transmission loss in optimum scheduling ?

c) Why is it necessary to operate hydro and steam plants in combination ? Discuss.

d) Write a short note on 'Automatic Load Dispatching'.

e) Explain the merits of the interconnection of power system network.

3. Solve **any 2** of the following : **(10×2=20)**

a) 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.

b) Discuss the dynamic programming method to solar unit commitment program.

c) Explain the necessity of maintaining a constant frequency in a power system operation.

SECTION – II

4. Solve **any 4** of the following : **(5×4=20)**

   a) Draw a block diagram, with illustrative transfer functions, of a single area load frequency control system.

   b) Write a short note on 'Automatic Load Dispatching.

   c) Explain the mechanism of load frequency control.

   d) What is voltage collapse ?

   e) Explain the effect of rotor angle on voltage stability.

5. Solve **any 2** of the following : **(10×2=20)**

   a) Describe the effect of thyristor-controlled static shunt compensation to meet the reactive power requirement in the power system.

   b) Explain security analysis and sensitivity factors.

   c) Explain the mathematical formulation of voltage stability problem.

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SLR-VB – 342

Seat No.	

Set P

B.E. (Electrical Engineering) (Part – II) Examination, 2017
Elective – II : POWER SYSTEM DYNAMICS

Day and Date : Tuesday, 23-5-2017 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) Figures to the **right** indicate **full** marks.*
*4) Assume data, if **necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Governors of controlling the speed of electric generating units normally provide
   A) A flat-speed load characteristic
   B) An increase in speed with an increasing load
   C) A decrease in speed with an increasing load
   D) None

2) In a power system stability
   A) Steady state stability limit is equal to transient stability limit
   B) Steady state stability limit is less than transient stability limit
   C) Steady state stability limit is greater than transient stability limit
   D) Transient stability limit with governor control mechanism will be more than steady state stability limit

3) The linearity of the electro-hydraulic controlled type speed governing system can be improved by means of
   A) Providing speed relay and hydraulic servomotor
   B) Providing excitation control signals
   C) Providing feedback loops of steam flow and servomotors
   D) Providing linear components

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 critical clearing time of a fault in a power system is related to
   A) Steady state stability limit B) Short circuit current limit
   C) Transient stability limit D) Reactive power limit

6) Linkage mechanism provides
   A) The moment of control valve is proportional to the inlet steam
   B) The feedback from the control valve moment
   C) Both A) and B)
   D) None of these

7) The relation between mechanical angle (δ_m) and electrical angle (δ_e) is _____ where P is the number of poles.
A) $\delta_e = (P/2)\ \delta_m$ B) $\delta_m = (P/2)\ \delta_e$ C) $\delta_e = P\delta_m$ D) $\delta_m = P\delta_e$

8) Swing equation is a
A) linear equation B) non linear equation
C) geometric D) both A) and B)

9) Park's transformation matrix is
A) Linear B) Time dependent C) Power varient D) All of these

10) Reactive-power balance will control the variation in
A) Voltage B) Frequency C) Both D) None

11) For stability and economic reasons, we operate the transmission line with power angle in the range
A) 10° to 25° B) 30° to 45° C) 60° to 75° D) 65° to 80°

12) A synchronous generator connected to an infinite bus delivers power at a lag p.f. If its excitation is increased
A) The terminal voltage increases B) Voltage angle increases
C) Current delivered increases D) Both B) and C)

13) When a system is dynamically unstable ?
A) Oscillations may increase until generating units go out of step or tie lines relay
B) Governor action has no effect
C) Energy input to the system always exceeds the electrical load of the system
D) All of these

14) The speed relay in mechanical hydraulic speed governing system provides
A) An indirect feedback B) A direct feedback
C) No feedback D) None of these

15) The value of the steam turbine time constant is bout
A) 0.05 sec B) 1.5 sec C) 5.2 sec D) none

16) The excitation system consists of
A) An exciter B) An AVR C) Both A) and B) D) None of these

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 synchronous machine has
A) Three windings on stator carrying AC B) One winding on rotor carrying DC excitation
C) Either A) or B) D) Both A) and B)

19) The self inductance of any stator phase of a synchronous machine always _____, but varies the position of _____
A) Positive, rotor B) Negative, rotor C) Positive, stator D) Negative, stator

20) The unit of inertia constant H is
A) MJ/MW. B) MJ/MVA. C) MJ/s. D) MW-s.

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Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
Elective – II : POWER SYSTEM DYNAMICS

Day and Date : Tuesday, 23-5-2017 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) Why Park's transformation is required ? Apply it to transform electrical and mechanical equations of synchronous machine.

b) Draw the block diagram of IEEE type-1 model for excitation control and explain the same.

c) Write comparison between transient and dynamic stability.

d) What is meant by steady stability ? Write steady state equations with the help of phasor diagrams.

e) Explain the operation of AC excitation system for an alternator with the help block diagram.

f) Derive the steady state equations by using phasor diagrams.

3. Attempt **any two** of the following : **(2×10=20)**

a) Explain the function of an excitation system and develop the block diagram for voltage regulation scheme. Develop the transfer function.

b) Draw the stator and rotor circuits of a synchronous machine and formulate the various basic equations governing synchronous machine and also write the basic assumptions necessary to develop basic equations.

c) Write notes on :

i) Importance of stability in power system operation and design.

ii) Stability problem in large interconnected system.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**

   a) Derive swing equation and discuss its application in the study of power system stability.

   b) Compare : coherent and non-coherent machines.

   c) Explain mechanical-hydraulic governor for a hydro turbine with schematic diagram.

   d) Explain how to improve stability by series capacitor compensation lines.

   e) Compare mechanical-hydraulic governor with electrical-hydraulic governor for a hydro and steam turbines.

   f) Explain auto-reclosing circuit breaker.

5. Attempt **any two** of the following : **(2×10=20)**

   a) Explain state stability of single machine connected to an infinite bus system with relevant diagrams and equations.

   b) What are the major components of speed governing mechanism and explain with the help of linkage mechanism diagram.

   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-VB – 342

Seat No.	

Set Q

B.E. (Electrical Engineering) (Part – II) Examination, 2017
Elective – II : POWER SYSTEM DYNAMICS

Day and Date : Tuesday, 23-5-2017 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) Figures to the **right** indicate **full** marks.*
*4) Assume data, if **necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The excitation system consists of
A) An exciter B) An AVR C) Both A) and B) D) None of these

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 synchronous machine has
A) Three windings on stator carrying AC B) One winding on rotor carrying DC excitation
C) Either A) or B) D) Both A) and B)

4) The self inductance of any stator phase of a synchronous machine always _____, but varies the position of _____
A) Positive, rotor B) Negative, rotor C) Positive, stator D) Negative, stator

5) The unit of inertia constant H is
A) MJ/MW. B) MJ/MVA. C) MJ/s. D) MW-s.

6) Governors of controlling the speed of electric generating units normally provide
A) A flat-speed load characteristic
B) An increase in speed with an increasing load
C) A decrease in speed with an increasing load
D) None

7) In a power system stability
A) Steady state stability limit is equal to transient stability limit
B) Steady state stability limit is less than transient stability limit
C) Steady state stability limit is greater than transient stability limit
D) Transient stability limit with governor control mechanism will be more than steady state stability limit

P.T.O.

8) The linearity of the electro-hydraulic controlled type speed governing system can be improved by means of
   A) Providing speed relay and hydraulic servomotor
   B) Providing excitation control signals
   C) Providing feedback loops of steam flow and servomotors
   D) Providing linear components

9) 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

10) The critical clearing time of a fault in a power system is related to
   A) Steady state stability limit B) Short circuit current limit
   C) Transient stability limit D) Reactive power limit

11) Linkage mechanism provides
   A) The moment of control valve is proportional to the inlet steam
   B) The feedback from the control valve moment
   C) Both A) and B)
   D) None of these

12) The relation between mechanical angle (δ_m) and electrical angle (δ_e) is _____ where P is the number of poles.
   A) $\delta_e = (P/2)\ \delta_m$ B) $\delta_m = (P/2)\ \delta_e$ C) $\delta_e = P\delta_m$ D) $\delta_m = P\delta_e$

13) Swing equation is a
   A) linear equation B) non linear equation
   C) geometric D) both A) and B)

14) Park's transformation matrix is
   A) Linear B) Time dependent C) Power varient D) All of these

15) Reactive-power balance will control the variation in
   A) Voltage B) Frequency C) Both D) None

16) For stability and economic reasons, we operate the transmission line with power angle in the range
   A) 10° to 25° B) 30° to 45° C) 60° to 75° D) 65° to 80°

17) A synchronous generator connected to an infinite bus delivers power at a lag p.f. If its excitation is increased
   A) The terminal voltage increases B) Voltage angle increases
   C) Current delivered increases D) Both B) and C)

18) When a system is dynamically unstable ?
   A) Oscillations may increase until generating units go out of step or tie lines relay
   B) Governor action has no effect
   C) Energy input to the system always exceeds the electrical load of the system
   D) All of these

19) The speed relay in mechanical hydraulic speed governing system provides
   A) An indirect feedback B) A direct feedback
   C) No feedback D) None of these

20) The value of the steam turbine time constant is bout
   A) 0.05 sec B) 1.5 sec C) 5.2 sec D) none

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Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
Elective – II : POWER SYSTEM DYNAMICS

Day and Date : Tuesday, 23-5-2017 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) Why Park's transformation is required ? Apply it to transform electrical and mechanical equations of synchronous machine.

b) Draw the block diagram of IEEE type-1 model for excitation control and explain the same.

c) Write comparison between transient and dynamic stability.

d) What is meant by steady stability ? Write steady state equations with the help of phasor diagrams.

e) Explain the operation of AC excitation system for an alternator with the help block diagram.

f) Derive the steady state equations by using phasor diagrams.

3. Attempt **any two** of the following : **(2×10=20)**

a) Explain the function of an excitation system and develop the block diagram for voltage regulation scheme. Develop the transfer function.

b) Draw the stator and rotor circuits of a synchronous machine and formulate the various basic equations governing synchronous machine and also write the basic assumptions necessary to develop basic equations.

c) Write notes on :

i) Importance of stability in power system operation and design.

ii) Stability problem in large interconnected system.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**

   a) Derive swing equation and discuss its application in the study of power system stability.

   b) Compare : coherent and non-coherent machines.

   c) Explain mechanical-hydraulic governor for a hydro turbine with schematic diagram.

   d) Explain how to improve stability by series capacitor compensation lines.

   e) Compare mechanical-hydraulic governor with electrical-hydraulic governor for a hydro and steam turbines.

   f) Explain auto-reclosing circuit breaker.

5. Attempt **any two** of the following : **(2×10=20)**

   a) Explain state stability of single machine connected to an infinite bus system with relevant diagrams and equations.

   b) What are the major components of speed governing mechanism and explain with the help of linkage mechanism diagram.

   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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Seat No.	

Set R

B.E. (Electrical Engineering) (Part – II) Examination, 2017
Elective – II : POWER SYSTEM DYNAMICS

Day and Date : Tuesday, 23-5-2017 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) Figures to the **right** indicate **full** marks.*
*4) Assume data, if **necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) For stability and economic reasons, we operate the transmission line with power angle in the range
A) 10° to 25° B) 30° to 45° C) 60° to 75° D) 65° to 80°

2) A synchronous generator connected to an infinite bus delivers power at a lag p.f. If its excitation is increased
A) The terminal voltage increases B) Voltage angle increases
C) Current delivered increases D) Both B) and C)

3) When a system is dynamically unstable ?
A) Oscillations may increase until generating units go out of step or tie lines relay
B) Governor action has no effect
C) Energy input to the system always exceeds the electrical load of the system
D) All of these

4) The speed relay in mechanical hydraulic speed governing system provides
A) An indirect feedback B) A direct feedback
C) No feedback D) None of these

5) The value of the steam turbine time constant is bout
A) 0.05 sec B) 1.5 sec C) 5.2 sec D) none

6) The excitation system consists of
A) An exciter B) An AVR C) Both A) and B) D) None of these

7) 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

8) The synchronous machine has
A) Three windings on stator carrying AC B) One winding on rotor carrying DC excitation
C) Either A) or B) D) Both A) and B)

P.T.O.

9) The self inductance of any stator phase of a synchronous machine always _____, but varies the position of _____
A) Positive, rotor B) Negative, rotor C) Positive, stator D) Negative, stator

10) The unit of inertia constant H is
A) MJ/MW. B) MJ/MVA. C) MJ/s. D) MW-s.

11) Governors of controlling the speed of electric generating units normally provide
A) A flat-speed load characteristic
B) An increase in speed with an increasing load
C) A decrease in speed with an increasing load
D) None

12) In a power system stability
A) Steady state stability limit is equal to transient stability limit
B) Steady state stability limit is less than transient stability limit
C) Steady state stability limit is greater than transient stability limit
D) Transient stability limit with governor control mechanism will be more than steady state stability limit

13) The linearity of the electro-hydraulic controlled type speed governing system can be improved by means of
A) Providing speed relay and hydraulic servomotor
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C) Providing feedback loops of steam flow and servomotors
D) Providing linear components

14) 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

15) The critical clearing time of a fault in a power system is related to
A) Steady state stability limit B) Short circuit current limit
C) Transient stability limit D) Reactive power limit

16) Linkage mechanism provides
A) The moment of control valve is proportional to the inlet steam
B) The feedback from the control valve moment
C) Both A) and B)
D) None of these

17) The relation between mechanical angle (δ_m) and electrical angle (δ_e) is _____ where P is the number of poles.
A) $\delta_e = (P/2)\ \delta_m$ B) $\delta_m = (P/2)\ \delta_e$ C) $\delta_e = P\delta_m$ D) $\delta_m = P\delta_e$

18) Swing equation is a
A) linear equation B) non linear equation
C) geometric D) both A) and B)

19) Park's transformation matrix is
A) Linear B) Time dependent C) Power varient D) All of these

20) Reactive-power balance will control the variation in
A) Voltage B) Frequency C) Both D) None

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Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
Elective – II : POWER SYSTEM DYNAMICS

Day and Date : Tuesday, 23-5-2017 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) Why Park's transformation is required ? Apply it to transform electrical and mechanical equations of synchronous machine.

b) Draw the block diagram of IEEE type-1 model for excitation control and explain the same.

c) Write comparison between transient and dynamic stability.

d) What is meant by steady stability ? Write steady state equations with the help of phasor diagrams.

e) Explain the operation of AC excitation system for an alternator with the help block diagram.

f) Derive the steady state equations by using phasor diagrams.

3. Attempt **any two** of the following : **(2×10=20)**

a) Explain the function of an excitation system and develop the block diagram for voltage regulation scheme. Develop the transfer function.

b) Draw the stator and rotor circuits of a synchronous machine and formulate the various basic equations governing synchronous machine and also write the basic assumptions necessary to develop basic equations.

c) Write notes on :

i) Importance of stability in power system operation and design.

ii) Stability problem in large interconnected system.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**

   a) Derive swing equation and discuss its application in the study of power system stability.

   b) Compare : coherent and non-coherent machines.

   c) Explain mechanical-hydraulic governor for a hydro turbine with schematic diagram.

   d) Explain how to improve stability by series capacitor compensation lines.

   e) Compare mechanical-hydraulic governor with electrical-hydraulic governor for a hydro and steam turbines.

   f) Explain auto-reclosing circuit breaker.

5. Attempt **any two** of the following : **(2×10=20)**

   a) Explain state stability of single machine connected to an infinite bus system with relevant diagrams and equations.

   b) What are the major components of speed governing mechanism and explain with the help of linkage mechanism diagram.

   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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Seat No.	

Set S

B.E. (Electrical Engineering) (Part – II) Examination, 2017
Elective – II : POWER SYSTEM DYNAMICS

Day and Date : Tuesday, 23-5-2017 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) Figures to the **right** indicate **full** marks.*
*4) Assume data, if **necessary**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Linkage mechanism provides
A) The moment of control valve is proportional to the inlet steam
B) The feedback from the control valve moment
C) Both A) and B)
D) None of these

2) The relation between mechanical angle (δ_m) and electrical angle (δ_e) is _____ where P is the number of poles.
A) $\delta_e = (P/2)\ \delta_m$ B) $\delta_m = (P/2)\ \delta_e$ C) $\delta_e = P\delta_m$ D) $\delta_m = P\delta_e$

3) Swing equation is a
A) linear equation B) non linear equation
C) geometric D) both A) and B)

4) Park's transformation matrix is
A) Linear B) Time dependent C) Power varient D) All of these

5) Reactive-power balance will control the variation in
A) Voltage B) Frequency C) Both D) None

6) For stability and economic reasons, we operate the transmission line with power angle in the range
A) 10° to 25° B) 30° to 45° C) 60° to 75° D) 65° to 80°

7) A synchronous generator connected to an infinite bus delivers power at a lag p.f. If its excitation is increased
A) The terminal voltage increases B) Voltage angle increases
C) Current delivered increases D) Both B) and C)

8) When a system is dynamically unstable ?
A) Oscillations may increase until generating units go out of step or tie lines relay
B) Governor action has no effect
C) Energy input to the system always exceeds the electrical load of the system
D) All of these

P.T.O.

9) The speed relay in mechanical hydraulic speed governing system provides
   A) An indirect feedback B) A direct feedback
   C) No feedback D) None of these

10) The value of the steam turbine time constant is bout
   A) 0.05 sec B) 1.5 sec C) 5.2 sec D) none

11) The excitation system consists of
   A) An exciter B) An AVR C) Both A) and B) D) None of these

12) 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

13) The synchronous machine has
   A) Three windings on stator carrying AC B) One winding on rotor carrying DC excitation
   C) Either A) or B) D) Both A) and B)

14) The self inductance of any stator phase of a synchronous machine always _____, but varies the position of _____
   A) Positive, rotor B) Negative, rotor C) Positive, stator D) Negative, stator

15) The unit of inertia constant H is
   A) MJ/MW. B) MJ/MVA. C) MJ/s. D) MW-s.

16) Governors of controlling the speed of electric generating units normally provide
   A) A flat-speed load characteristic
   B) An increase in speed with an increasing load
   C) A decrease in speed with an increasing load
   D) None

17) In a power system stability
   A) Steady state stability limit is equal to transient stability limit
   B) Steady state stability limit is less than transient stability limit
   C) Steady state stability limit is greater than transient stability limit
   D) Transient stability limit with governor control mechanism will be more than steady state stability limit

18) The linearity of the electro-hydraulic controlled type speed governing system can be improved by means of
   A) Providing speed relay and hydraulic servomotor
   B) Providing excitation control signals
   C) Providing feedback loops of steam flow and servomotors
   D) Providing linear components

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 critical clearing time of a fault in a power system is related to
   A) Steady state stability limit B) Short circuit current limit
   C) Transient stability limit D) Reactive power limit

_____

SLR-VB – 342

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
Elective – II : POWER SYSTEM DYNAMICS

Day and Date : Tuesday, 23-5-2017 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) Why Park's transformation is required ? Apply it to transform electrical and mechanical equations of synchronous machine.

b) Draw the block diagram of IEEE type-1 model for excitation control and explain the same.

c) Write comparison between transient and dynamic stability.

d) What is meant by steady stability ? Write steady state equations with the help of phasor diagrams.

e) Explain the operation of AC excitation system for an alternator with the help block diagram.

f) Derive the steady state equations by using phasor diagrams.

3. Attempt **any two** of the following : **(2×10=20)**

a) Explain the function of an excitation system and develop the block diagram for voltage regulation scheme. Develop the transfer function.

b) Draw the stator and rotor circuits of a synchronous machine and formulate the various basic equations governing synchronous machine and also write the basic assumptions necessary to develop basic equations.

c) Write notes on :

i) Importance of stability in power system operation and design.

ii) Stability problem in large interconnected system.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**

   a) Derive swing equation and discuss its application in the study of power system stability.

   b) Compare : coherent and non-coherent machines.

   c) Explain mechanical-hydraulic governor for a hydro turbine with schematic diagram.

   d) Explain how to improve stability by series capacitor compensation lines.

   e) Compare mechanical-hydraulic governor with electrical-hydraulic governor for a hydro and steam turbines.

   f) Explain auto-reclosing circuit breaker.

5. Attempt **any two** of the following : **(2×10=20)**

   a) Explain state stability of single machine connected to an infinite bus system with relevant diagrams and equations.

   b) What are the major components of speed governing mechanism and explain with the help of linkage mechanism diagram.

   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-VB – 343

Seat No.	

Set **P**

B.E. (Electrical) (Part – II) Examination, 2017
Elective – II : HIGH VOLTAGE ENGINEERING

Day and Date : Tuesday, 23-5-2017 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

I. Choose correct alternatives : **(20×1=20)**

1) The process of ionisation is brought about by
   a) Positive ions only b) Photons only c) Metastables only d) All of the above
2) The value of Townsends second ionization coefficient has
   a) High value for low *E/p* ratio b) Low value for low *E/p* ratio
   c) No relation with *E/p* ratio d) No application if the gas pressure is low
3) If p is the pressure of gas and d the distance of separation between the electrodes, the discharge voltage according to Paschen's law is directly proportional to
   a) p b) d c) pd d) None of the above
4) The breakdown voltage of a specimen is 65 kV at STP. The breakdown voltage at 73 cm Hg pressure and 35° C is
   a) 69 kV b) 63.25 kV c) 64.33 kV d) 60.39 kV
5) All parameters remaining same, the breakdown voltage is
   a) Higher with negative polarity at all pressures b) Lower with negative polarity at all pressures
   c) Higher with negative polarity at low pressures d) None of the above
6) Liquids with solid impurities
   a) Have higher dielectric strength
   b) Of large size have higher dielectric strength
   c) Has lower dielectric strength as compared to pure liquids
   d) None of the above
7) The electric field in a gas bubble which is immersed in a liquid of permittivity ε_z is
   a) Higher than that of the field in the liquid b) Lower than that of the field in the liquid
   c) Same as that in the liquid d) None of the above is always true
8) In order to prevent an excessive evaporation of the aromatics during reconditioning of transformer oil using filtrations under vacuum, the vapour pressure should be
   a) Less than 10^{-4} torr b) Less than 10^{-2} torr
   c) Less than 10^{-1} torr d) None of the above

P.T.O.

9) During reconditioning of transformer oil it is economical to use electrostatic filters if the water content of oil is
   a) Greater than 4 ppm
   b) Greater than 2 ppm
   c) Less than 2 ppm
   d) Electrostatic filters are never used

10) The breakdown of solid materials is roughly given by
   a) $V_b t_b$ = constant
   b) $V_b \ln t_b$ = constant
   c) $t_b \ln V_b$ = constant
   d) None of the above

11) While conducting intrinsic dielectric strength on a specimen, its shape should be so prepared that
   a) The electric stress is high at its centre
   b) The electric stress is high at its corner
   c) The electric stress is same all along the sample
   d) No definite consideration

12) In case of impulse thermal breakdown of solid insulating materials, the critical electric filed is
   a) Proportional to critical absolute temperature
   b) Proportional to square of critical absolute temperature
   c) Proportional to square of T_0
   d) None of the above is true

13) The insulation of the modern EHV lines is designed based on
   a) The lightening voltage
   b) The switching voltage
   c) Corona
   d) RI

14) High voltage d.c. testing for HV machines is resorted because
   a) Certain conclusions regarding the continuous ageing of an insulation can be drawn
   b) The stress distribution is a representation of the service condition
   c) Standardisation on the magnitude of voltage to be applied is available
   d) The stresses do not damage the coil and insulation

15) The velocity of a travelling wave through a cable of relative permittivity 9 is
   a) 9×10^8 m/sec b) 3×10^8 m/sec c) 10^8 m/sec d) 2×10^8 m/sec

16) Partial discharge can be detected by
   a) Listening to hissing sound
   b) A high tan δ
   c) Optical methods
   d) All of the above

17) Non-destructive testing methods require measurement of
   a) dielectric strength
   b) insulation resistance
   c) tan δ
   d) a) and b)
   e) b) and c)

18) The mechanism responsible for dielectric loss in a dielectric are
   a) Conduction
   b) Polarisation
   c) Ionisation
   d) a) and b)
   e) b) and c)

19) Protective resistance to be connected between the sphere gap and the test equipment is required while measuring
   a) Power frequency and higher frequency a.c. voltage
   b) Power frequency and impulse voltage
   c) Higher frequency a.c. voltages and impulse voltage
   d) All kinds of voltages

20) High frequency and impulse currents are measured using
   a) Resistive shunts
   b) Inductive elements
   c) Hall and Farady effect devices
   d) All of the above

SLR-VB – 343

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2017
Elective – II : HIGH VOLTAGE ENGINEERING

Day and Date : Tuesday, 23-5-2017 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

II. Solve **any four** : **(4×5=20)**

a) Explain surge voltages and their distribution.

b) Explain practical considerations in using gases for insulation purposes.

c) Write a short note on conduction and breakdown in commercial liquids.

d) Write a short note on break-down of composite insulation.

e) A steady current of 600 μ A flows through the plane electrode separated by a distance of 0.5 cm when a voltage of 10 kV is applied. Determine the Townsend's first ionization coefficient if a current of 60 μ A flows when the distance of separation is reduced to 0.1 cm and the field is kept constant at the previous value.

III. Solve **any two** : **(2×10=20)**

a) Derive the following expression by using townsend second ionisation coefficient $n = \frac{n_0 \, e^{\alpha d}}{1 - \nu \, (e^{\alpha d} - 1)}$.

b) i) Write a short note on liquids as insulators.
ii) Write a short note on conduction and break-down in pure liquids.

c) Explain electromechanical break-down and break-downs of solid dielectrics in practice.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain in short generation of HVDC/HVAC.

b) Explain sphere gap.

c) Explain briefly various tests to be carried out on a bushing.

d) Write a short note on grounding of impulse testing laboratories.

e) Write a short note on CRO for impulse voltage and current.

V. Solve **any two** : **(2×10=20)**

a) Explain tripping and control of impulse generators.

b) Discuss various methods of measuring high d.c. and a.c. voltages.

c) Discuss the test facilities, activity and studies in high voltage laboratories.

Set P

Set P

SLR-VB – 343

Seat No.	

Set **Q**

B.E. (Electrical) (Part – II) Examination, 2017
Elective – II : HIGH VOLTAGE ENGINEERING

Day and Date : Tuesday, 23-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose correct alternatives : **(20×1=20)**

1) Partial discharge can be detected by
   a) Listening to hissing sound b) A high tan δ
   c) Optical methods d) All of the above
2) Non-destructive testing methods require measurement of
   a) dielectric strength b) insulation resistance
   c) tan δ d) a) and b)
   e) b) and c)
3) The mechanism responsible for dielectric loss in a dielectric are
   a) Conduction b) Polarisation
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8) If p is the pressure of gas and d the distance of separation between the electrodes, the discharge voltage according to Paschen's law is directly proportional to
   a) p b) d c) pd d) None of the above

P.T.O.

9) The breakdown voltage of a specimen is 65 kV at STP. The breakdown voltage at 73 cm Hg pressure and 35° C is
   a) 69 kV b) 63.25 kV c) 64.33 kV d) 60.39 kV
10) All parameters remaining same, the breakdown voltage is
   a) Higher with negative polarity at all pressures b) Lower with negative polarity at all pressures
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   a) Less than 10^{-4} torr b) Less than 10^{-2} torr
   c) Less than 10^{-1} torr d) None of the above
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   a) $V_b t_b$ = constant b) V_b *l*n t_b = constant
   c) t_b *l*n V_b = constant d) None of the above
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   a) Proportional to critical absolute temperature
   b) Proportional to square of critical absolute temperature
   c) Proportional to square of T_0
   d) None of the above is true
18) The insulation of the modern EHV lines is designed based on
   a) The lightening voltage b) The switching voltage
   c) Corona d) RI
19) High voltage d.c. testing for HV machines is resorted because
   a) Certain conclusions regarding the continuous ageing of an insulation can be drawn
   b) The stress distribution is a representation of the service condition
   c) Standardisation on the magnitude of voltage to be applied is available
   d) The stresses do not damage the coil and insulation
20) The velocity of a travelling wave through a cable of relative permittivity 9 is
   a) 9×10^8 m/sec b) 3×10^8 m/sec c) 10^8 m/sec d) 2×10^8 m/sec

SLR-VB – 343

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2017
Elective – II : HIGH VOLTAGE ENGINEERING

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m to 6.00 p.m.

Instructions *: 1)* ***All*** *questions* ***compulsory****.*
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SECTION – I

II. Solve **any four** : **(4×5=20)**

a) Explain surge voltages and their distribution.

b) Explain practical considerations in using gases for insulation purposes.

c) Write a short note on conduction and breakdown in commercial liquids.

d) Write a short note on break-down of composite insulation.

e) A steady current of 600 μ A flows through the plane electrode separated by a distance of 0.5 cm when a voltage of 10 kV is applied. Determine the Townsend's first ionization coefficient if a current of 60 μ A flows when the distance of separation is reduced to 0.1 cm and the field is kept constant at the previous value.

III. Solve **any two** : **(2×10=20)**

a) Derive the following expression by using townsend second ionisation coefficient $n = \frac{n_0 \, e^{\alpha d}}{1 - \nu \, (e^{\alpha d} - 1)}$.

b) i) Write a short note on liquids as insulators.
ii) Write a short note on conduction and break-down in pure liquids.

c) Explain electromechanical break-down and break-downs of solid dielectrics in practice.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain in short generation of HVDC/HVAC.

b) Explain sphere gap.

c) Explain briefly various tests to be carried out on a bushing.

d) Write a short note on grounding of impulse testing laboratories.

e) Write a short note on CRO for impulse voltage and current.

V. Solve **any two** : **(2×10=20)**

a) Explain tripping and control of impulse generators.

b) Discuss various methods of measuring high d.c. and a.c. voltages.

c) Discuss the test facilities, activity and studies in high voltage laboratories.

Set Q

Set Q

SLR-VB – 343

Seat No.	

Set **R**

B.E. (Electrical) (Part – II) Examination, 2017
Elective – II : HIGH VOLTAGE ENGINEERING

Day and Date : Tuesday, 23-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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1) While conducting intrinsic dielectric strength on a specimen, its shape should be so prepared that
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6) Partial discharge can be detected by
   a) Listening to hissing sound b) A high tan δ
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7) Non-destructive testing methods require measurement of
   a) dielectric strength b) insulation resistance
   c) tan δ d) a) and b)
   e) b) and c)

P.T.O.

8) The mechanism responsible for dielectric loss in a dielectric are
   a) Conduction b) Polarisation
   c) Ionisation d) a) and b)
   e) b) and c)

9) Protective resistance to be connected between the sphere gap and the test equipment is required while measuring
   a) Power frequency and higher frequency a.c. voltage
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   c) Higher frequency a.c. voltages and impulse voltage
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10) High frequency and impulse currents are measured using
   a) Resistive shunts b) Inductive elements
   c) Hall and Farady effect devices d) All of the above

11) The process of ionisation is brought about by
   a) Positive ions only b) Photons only c) Metastables only d) All of the above

12) The value of Townsends second ionization coefficient has
   a) High value for low *E/p* ratio b) Low value for low *E/p* ratio
   c) No relation with *E/p* ratio d) No application if the gas pressure is low

13) If p is the pressure of gas and d the distance of separation between the electrodes, the discharge voltage according to Paschen's law is directly proportional to
   a) p b) d c) pd d) None of the above

14) The breakdown voltage of a specimen is 65 kV at STP. The breakdown voltage at 73 cm Hg pressure and 35° C is
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15) All parameters remaining same, the breakdown voltage is
   a) Higher with negative polarity at all pressures b) Lower with negative polarity at all pressures
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16) Liquids with solid impurities
   a) Have higher dielectric strength
   b) Of large size have higher dielectric strength
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   d) None of the above

17) The electric field in a gas bubble which is immersed in a liquid of permittivity ε_z is
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18) In order to prevent an excessive evaporation of the aromatics during reconditioning of transformer oil using filtrations under vacuum, the vapour pressure should be
   a) Less than 10^{-4} torr b) Less than 10^{-2} torr
   c) Less than 10^{-1} torr d) None of the above

19) During reconditioning of transformer oil it is economical to use electrostatic filters if the water content of oil is
   a) Greater than 4 ppm b) Greater than 2 ppm
   c) Less than 2 ppm d) Electrostatic filters are never used

20) The breakdown of solid materials is roughly given by
   a) $V_b t_b$ = constant b) V_b *l*n t_b = constant
   c) t_b *l*n V_b = constant d) None of the above

SLR-VB – 343

Seat No.	

B.E. (Electrical) (Part – II) Examination, 2017
Elective – II : HIGH VOLTAGE ENGINEERING

Day and Date : Tuesday, 23-5-2017 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

II. Solve **any four** : **(4×5=20)**

a) Explain surge voltages and their distribution.

b) Explain practical considerations in using gases for insulation purposes.

c) Write a short note on conduction and breakdown in commercial liquids.

d) Write a short note on break-down of composite insulation.

e) A steady current of 600 μ A flows through the plane electrode separated by a distance of 0.5 cm when a voltage of 10 kV is applied. Determine the Townsend's first ionization coefficient if a current of 60 μ A flows when the distance of separation is reduced to 0.1 cm and the field is kept constant at the previous value.

III. Solve **any two** : **(2×10=20)**

a) Derive the following expression by using townsend second ionisation coefficient $n = \frac{n_0 \, e^{\alpha d}}{1 - \nu \, (e^{\alpha d} - 1)}$.

b) i) Write a short note on liquids as insulators.
ii) Write a short note on conduction and break-down in pure liquids.

c) Explain electromechanical break-down and break-downs of solid dielectrics in practice.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain in short generation of HVDC/HVAC.

b) Explain sphere gap.

c) Explain briefly various tests to be carried out on a bushing.

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e) Write a short note on CRO for impulse voltage and current.

V. Solve **any two** : **(2×10=20)**

a) Explain tripping and control of impulse generators.

b) Discuss various methods of measuring high d.c. and a.c. voltages.

c) Discuss the test facilities, activity and studies in high voltage laboratories.

Set R

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Seat No.	

Set **S**

B.E. (Electrical) (Part – II) Examination, 2017
Elective – II : HIGH VOLTAGE ENGINEERING

Day and Date : Tuesday, 23-5-2017 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

I. Choose correct alternatives : **(20×1=20)**

1) Liquids with solid impurities
   a) Have higher dielectric strength
   b) Of large size have higher dielectric strength
   c) Has lower dielectric strength as compared to pure liquids
   d) None of the above

2) The electric field in a gas bubble which is immersed in a liquid of permittivity ε_z is
   a) Higher than that of the field in the liquid
   b) Lower than that of the field in the liquid
   c) Same as that in the liquid
   d) None of the above is always true

3) In order to prevent an excessive evaporation of the aromatics during reconditioning of transformer oil using filtrations under vacuum, the vapour pressure should be
   a) Less than 10^{-4} torr
   b) Less than 10^{-2} torr
   c) Less than 10^{-1} torr
   d) None of the above

4) During reconditioning of transformer oil it is economical to use electrostatic filters if the water content of oil is
   a) Greater than 4 ppm
   b) Greater than 2 ppm
   c) Less than 2 ppm
   d) Electrostatic filters are never used

5) The breakdown of solid materials is roughly given by
   a) $V_b t_b$ = constant
   b) V_b *l*n t_b = constant
   c) t_b *l*n V_b = constant
   d) None of the above

6) While conducting intrinsic dielectric strength on a specimen, its shape should be so prepared that
   a) The electric stress is high at its centre
   b) The electric stress is high at its corner
   c) The electric stress is same all along the sample
   d) No definite consideration

7) In case of impulse thermal breakdown of solid insulating materials, the critical electric filed is
   a) Proportional to critical absolute temperature
   b) Proportional to square of critical absolute temperature
   c) Proportional to square of T_0
   d) None of the above is true

P.T.O.

8) The insulation of the modern EHV lines is designed based on
   a) The lightening voltage b) The switching voltage
   c) Corona d) RI
9) High voltage d.c. testing for HV machines is resorted because
   a) Certain conclusions regarding the continuous ageing of an insulation can be drawn
   b) The stress distribution is a representation of the service condition
   c) Standardisation on the magnitude of voltage to be applied is available
   d) The stresses do not damage the coil and insulation
10) The velocity of a travelling wave through a cable of relative permittivity 9 is
   a) 9×10^8 m/sec b) 3×10^8 m/sec c) 10^8 m/sec d) 2×10^8 m/sec
11) Partial discharge can be detected by
   a) Listening to hissing sound b) A high tan δ
   c) Optical methods d) All of the above
12) Non-destructive testing methods require measurement of
   a) dielectric strength b) insulation resistance
   c) tan δ d) a) and b)
   e) b) and c)
13) The mechanism responsible for dielectric loss in a dielectric are
   a) Conduction b) Polarisation
   c) Ionisation d) a) and b)
   e) b) and c)
14) Protective resistance to be connected between the sphere gap and the test equipment is required while measuring
   a) Power frequency and higher frequency a.c. voltage
   b) Power frequency and impulse voltage
   c) Higher frequency a.c. voltages and impulse voltage
   d) All kinds of voltages
15) High frequency and impulse currents are measured using
   a) Resistive shunts b) Inductive elements
   c) Hall and Farady effect devices d) All of the above
16) The process of ionisation is brought about by
   a) Positive ions only b) Photons only c) Metastables only d) All of the above
17) The value of Townsends second ionization coefficient has
   a) High value for low *E/p* ratio b) Low value for low *E/p* ratio
   c) No relation with *E/p* ratio d) No application if the gas pressure is low
18) If p is the pressure of gas and d the distance of separation between the electrodes, the discharge voltage according to Paschen's law is directly proportional to
   a) p b) d c) pd d) None of the above
19) The breakdown voltage of a specimen is 65 kV at STP. The breakdown voltage at 73 cm Hg pressure and 35° C is
   a) 69 kV b) 63.25 kV c) 64.33 kV d) 60.39 kV
20) All parameters remaining same, the breakdown voltage is
   a) Higher with negative polarity at all pressures b) Lower with negative polarity at all pressures
   c) Higher with negative polarity at low pressures d) None of the above

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Seat No.	

B.E. (Electrical) (Part – II) Examination, 2017
Elective – II : HIGH VOLTAGE ENGINEERING

Day and Date : Tuesday, 23-5-2017 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

II. Solve **any four** : **(4×5=20)**

a) Explain surge voltages and their distribution.

b) Explain practical considerations in using gases for insulation purposes.

c) Write a short note on conduction and breakdown in commercial liquids.

d) Write a short note on break-down of composite insulation.

e) A steady current of 600 μ A flows through the plane electrode separated by a distance of 0.5 cm when a voltage of 10 kV is applied. Determine the Townsend's first ionization coefficient if a current of 60 μ A flows when the distance of separation is reduced to 0.1 cm and the field is kept constant at the previous value.

III. Solve **any two** : **(2×10=20)**

a) Derive the following expression by using townsend second ionisation coefficient $n = \frac{n_0 \, e^{\alpha d}}{1 - \nu \, (e^{\alpha d} - 1)}$.

b) i) Write a short note on liquids as insulators.
ii) Write a short note on conduction and break-down in pure liquids.

c) Explain electromechanical break-down and break-downs of solid dielectrics in practice.

SECTION – II

IV. Solve **any four** : **(4×5=20)**

a) Explain in short generation of HVDC/HVAC.

b) Explain sphere gap.

c) Explain briefly various tests to be carried out on a bushing.

d) Write a short note on grounding of impulse testing laboratories.

e) Write a short note on CRO for impulse voltage and current.

V. Solve **any two** : **(2×10=20)**

a) Explain tripping and control of impulse generators.

b) Discuss various methods of measuring high d.c. and a.c. voltages.

c) Discuss the test facilities, activity and studies in high voltage laboratories.

Set S

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Seat No.	

Set **P**

B.E. (Electrical) (Part – II) Examination, 2017
RENEWABLE ENERGY SOURCES (Elective – II)

Day and Date : Tuesday, 23-5-2017 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) 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 into thermal energy and delivers it to the next stage of the system

2) Which process is responsible for production of energy in the sun ?
   a) Nuclear fission reaction b) Nuclear fusion reaction
   c) Exothermal chemical reaction d) All of the above

3) The temperature at the inner core of the earth is about
   a) 1000° C b) 4000° C c) 40000° C d) 500° C

4) Increasing the pressure inside a biogas plant
   a) Increases the gas production b) Decreases the gas production
   c) Has no effect on gas production d) Causes explosion

5) Two-basin tidal schemes
   a) Are more economical than single basin schemes
   b) Operate on ebb cycles in both basins
   c) Produce less uniform power
   d) Produce more uniform power

6) At solar noon, the hour angle is
   a) + 90° b) – 90° c) zero d) 180°

7) The value of concentration ratio of a flat-plate collector is
   a) 1 b) 10 c) 100 d) 1000

P.T.O.

8) 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

9) Use of booster mirrors with a flat plate collector
   a) Increases the reflection to the atmosphere
   b) Decreases the reflection to the atmosphere
   c) Increases the diffused radiation component on the absorber
   d) Increases the beam radiation component on the absorber

10) A two-blade wind turbine produces maximum power when the tip speed ratio is equal to
   a) π b) 2π c) 3π d) 0.593

11) The minimum tidal range required for power generation is about
   a) 1 m b) 5 m c) 10 m d) 20 m

12) 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

13) The percentage of the incoming radiation reflected back to space by the earth is
   a) 10% b) 20% c) 30% d) 40%

14) 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

15) A geothermal resource tapped for electricity generation could provide energy for about
   a) 50 years b) 1000 years c) 5 years d) 1 year

16) A device which is used to produce potable water by utilizing solar heat energy is called
   a) Solar water still b) Solar constant
   c) Solar cooling system d) Solar ponds

17) In flat-plate collector the temperatures of the working fluid can be raised upto
   a) 500° C b) 100° C c) 300° C d) 50° C

18) Which region of sun constitutes main mass of the sun ?
   a) Solar interior b) Photosphere
   c) Solar atmosphere d) Chromosphere

19) It is estimated that 90% of the energy is generated in the region
   a) 0 – 0.7 R b) 0.23 R – 0.7 R c) 0 – 0.23 R d) 0.23 R – R

20) The radiation received on the earth's surface directly without change in direction is called
   a) Terrestrial b) Extra-terrestrial c) Diffuse d) Beam

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Seat No.	

B.E. (Electrical) (Part – II) Examination, 2017
RENEWABLE ENERGY SOURCES (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

2. Solve **any four** : **(5×4=20)**
   1) Define solar constant and find out its value from fundamental.
   2) Draw the configuration of pyranometer and explain how it is used to measure global and diffuse radiation.
   3) Draw and explain Flat-plate collector. What are the advantages and disadvantages of Flat-plate collector ?
   4) Draw and explain solar water heater with natural circulation.
   5) With neat diagram explain solar crop drying.
   6) Draw and describe the different types of horizontal axis wind mills.

3. Solve **any two** : **(10×2=20)**
   1) With the help of neat diagram explain terrestrial and extra-terrestrial solar radiation.
   2) Draw and explain the performance characteristics of wind mill.
   3) Draw and explain different zones of solar ponds. What are the applications of solar ponds ? What are the required properties of salt used in solar ponds ?

4. Solve **any four** : **(5×4=20)**
   1) With the help of block diagram explain utilization of biogas for cooking.
   2) Draw and explain the double chamber types biogas plant.
   3) Draw and describe the dry steam geothermal power plant.
   4) Write short note on potential of geothermal resources in India.
   5) Draw and explain the floating drum type biogas plant.
   6) Draw and describe the working of open cycle OTEC system.

5. Solve **any two** : **(10×2=20)**
   1) What is Biomass ? Explain the resources of biomass. With the help of bacterial reactions explain principle of biogas generation.
   2) Draw and describe the general layout of small hydro plant. What are the advantages and limitations of SHP ?
   3) With neat diagram explain tidal energy conversion techniques.

Set P

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Seat No.	

Set **Q**

B.E. (Electrical) (Part – II) Examination, 2017
RENEWABLE ENERGY SOURCES (Elective – II)

Day and Date : Tuesday, 23-5-2017 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) A device which is used to produce potable water by utilizing solar heat energy is called
   a) Solar water still b) Solar constant
   c) Solar cooling system d) Solar ponds

2) In flat-plate collector the temperatures of the working fluid can be raised upto
   a) 500° C b) 100° C c) 300° C d) 50° C

3) Which region of sun constitutes main mass of the sun ?
   a) Solar interior b) Photosphere
   c) Solar atmosphere d) Chromosphere

4) It is estimated that 90% of the energy is generated in the region
   a) 0 – 0.7 R b) 0.23 R – 0.7 R c) 0 – 0.23 R d) 0.23 R – R

5) The radiation received on the earth's surface directly without change in direction is called
   a) Terrestrial b) Extra-terrestrial c) Diffuse d) Beam

6) 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 into thermal energy and delivers it to the next stage of the system

7) Which process is responsible for production of energy in the sun ?
   a) Nuclear fission reaction b) Nuclear fusion reaction
   c) Exothermal chemical reaction d) All of the above

P.T.O.

8) The temperature at the inner core of the earth is about
   a) 1000° C b) 4000° C c) 40000° C d) 500° C

9) Increasing the pressure inside a biogas plant
   a) Increases the gas production b) Decreases the gas production
   c) Has no effect on gas production d) Causes explosion

10) Two-basin tidal schemes
   a) Are more economical than single basin schemes
   b) Operate on ebb cycles in both basins
   c) Produce less uniform power
   d) Produce more uniform power

11) At solar noon, the hour angle is
   a) + 90° b) – 90° c) zero d) 180°

12) The value of concentration ratio of a flat-plate collector is
   a) 1 b) 10 c) 100 d) 1000

13) 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

14) Use of booster mirrors with a flat plate collector
   a) Increases the reflection to the atmosphere
   b) Decreases the reflection to the atmosphere
   c) Increases the diffused radiation component on the absorber
   d) Increases the beam radiation component on the absorber

15) A two-blade wind turbine produces maximum power when the tip speed ratio is equal to
   a) π b) 2π c) 3π d) 0.593

16) The minimum tidal range required for power generation is about
   a) 1 m b) 5 m c) 10 m d) 20 m

17) 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

18) The percentage of the incoming radiation reflected back to space by the earth is
   a) 10% b) 20% c) 30% d) 40%

19) 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

20) A geothermal resource tapped for electricity generation could provide energy for about
   a) 50 years b) 1000 years c) 5 years d) 1 year

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B.E. (Electrical) (Part – II) Examination, 2017
RENEWABLE ENERGY SOURCES (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

2. Solve **any four** : **(5×4=20)**
   1) Define solar constant and find out its value from fundamental.
   2) Draw the configuration of pyranometer and explain how it is used to measure global and diffuse radiation.
   3) Draw and explain Flat-plate collector. What are the advantages and disadvantages of Flat-plate collector ?
   4) Draw and explain solar water heater with natural circulation.
   5) With neat diagram explain solar crop drying.
   6) Draw and describe the different types of horizontal axis wind mills.

3. Solve **any two** : **(10×2=20)**
   1) With the help of neat diagram explain terrestrial and extra-terrestrial solar radiation.
   2) Draw and explain the performance characteristics of wind mill.
   3) Draw and explain different zones of solar ponds. What are the applications of solar ponds ? What are the required properties of salt used in solar ponds ?

4. Solve **any four** : **(5×4=20)**
   1) With the help of block diagram explain utilization of biogas for cooking.
   2) Draw and explain the double chamber types biogas plant.
   3) Draw and describe the dry steam geothermal power plant.
   4) Write short note on potential of geothermal resources in India.
   5) Draw and explain the floating drum type biogas plant.
   6) Draw and describe the working of open cycle OTEC system.

5. Solve **any two** : **(10×2=20)**
   1) What is Biomass ? Explain the resources of biomass. With the help of bacterial reactions explain principle of biogas generation.
   2) Draw and describe the general layout of small hydro plant. What are the advantages and limitations of SHP ?
   3) With neat diagram explain tidal energy conversion techniques.

Set Q

Set Q

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Seat No.	

Set **R**

B.E. (Electrical) (Part – II) Examination, 2017
RENEWABLE ENERGY SOURCES (Elective – II)

Day and Date : Tuesday, 23-5-2017 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 minimum tidal range required for power generation is about
a) 1 m b) 5 m c) 10 m d) 20 m

2) 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

3) The percentage of the incoming radiation reflected back to space by the earth is
a) 10% b) 20% c) 30% d) 40%

4) 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

5) A geothermal resource tapped for electricity generation could provide energy for about
a) 50 years b) 1000 years c) 5 years d) 1 year

6) A device which is used to produce potable water by utilizing solar heat energy is called
a) Solar water still b) Solar constant
c) Solar cooling system d) Solar ponds

7) In flat-plate collector the temperatures of the working fluid can be raised upto
a) 500° C b) 100° C c) 300° C d) 50° C

8) Which region of sun constitutes main mass of the sun ?
a) Solar interior b) Photosphere
c) Solar atmosphere d) Chromosphere

P.T.O.

9) It is estimated that 90% of the energy is generated in the region
   a) 0 – 0.7 R b) 0.23 R – 0.7 R c) 0 – 0.23 R d) 0.23 R – R

10) The radiation received on the earth's surface directly without change in direction is called
   a) Terrestrial b) Extra-terrestrial c) Diffuse d) Beam

11) 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 into thermal energy and delivers it to the next stage of the system

12) Which process is responsible for production of energy in the sun ?
   a) Nuclear fission reaction b) Nuclear fusion reaction
   c) Exothermal chemical reaction d) All of the above

13) The temperature at the inner core of the earth is about
   a) 1000° C b) 4000° C c) 40000° C d) 500° C

14) Increasing the pressure inside a biogas plant
   a) Increases the gas production b) Decreases the gas production
   c) Has no effect on gas production d) Causes explosion

15) Two-basin tidal schemes
   a) Are more economical than single basin schemes
   b) Operate on ebb cycles in both basins
   c) Produce less uniform power
   d) Produce more uniform power

16) At solar noon, the hour angle is
   a) + 90° b) – 90° c) zero d) 180°

17) The value of concentration ratio of a flat-plate collector is
   a) 1 b) 10 c) 100 d) 1000

18) 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

19) Use of booster mirrors with a flat plate collector
   a) Increases the reflection to the atmosphere
   b) Decreases the reflection to the atmosphere
   c) Increases the diffused radiation component on the absorber
   d) Increases the beam radiation component on the absorber

20) A two-blade wind turbine produces maximum power when the tip speed ratio is equal to
   a) π b) 2π c) 3π d) 0.593

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Seat No.	

B.E. (Electrical) (Part – II) Examination, 2017
RENEWABLE ENERGY SOURCES (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

2. Solve **any four** : **(5×4=20)**
   1) Define solar constant and find out its value from fundamental.
   2) Draw the configuration of pyranometer and explain how it is used to measure global and diffuse radiation.
   3) Draw and explain Flat-plate collector. What are the advantages and disadvantages of Flat-plate collector ?
   4) Draw and explain solar water heater with natural circulation.
   5) With neat diagram explain solar crop drying.
   6) Draw and describe the different types of horizontal axis wind mills.

3. Solve **any two** : **(10×2=20)**
   1) With the help of neat diagram explain terrestrial and extra-terrestrial solar radiation.
   2) Draw and explain the performance characteristics of wind mill.
   3) Draw and explain different zones of solar ponds. What are the applications of solar ponds ? What are the required properties of salt used in solar ponds ?

4. Solve **any four** : **(5×4=20)**
   1) With the help of block diagram explain utilization of biogas for cooking.
   2) Draw and explain the double chamber types biogas plant.
   3) Draw and describe the dry steam geothermal power plant.
   4) Write short note on potential of geothermal resources in India.
   5) Draw and explain the floating drum type biogas plant.
   6) Draw and describe the working of open cycle OTEC system.

5. Solve **any two** : **(10×2=20)**
   1) What is Biomass ? Explain the resources of biomass. With the help of bacterial reactions explain principle of biogas generation.
   2) Draw and describe the general layout of small hydro plant. What are the advantages and limitations of SHP ?
   3) With neat diagram explain tidal energy conversion techniques.

Set R

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Set **S**

B.E. (Electrical) (Part – II) Examination, 2017
RENEWABLE ENERGY SOURCES (Elective – II)

Day and Date : Tuesday, 23-5-2017 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) At solar noon, the hour angle is
a) + 90° b) – 90° c) zero d) 180°

2) The value of concentration ratio of a flat-plate collector is
a) 1 b) 10 c) 100 d) 1000

3) 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

4) Use of booster mirrors with a flat plate collector
a) Increases the reflection to the atmosphere
b) Decreases the reflection to the atmosphere
c) Increases the diffused radiation component on the absorber
d) Increases the beam radiation component on the absorber

5) A two-blade wind turbine produces maximum power when the tip speed ratio is equal to
a) π b) 2π c) 3π d) 0.593

6) The minimum tidal range required for power generation is about
a) 1 m b) 5 m c) 10 m d) 20 m

7) 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

8) The percentage of the incoming radiation reflected back to space by the earth is
a) 10% b) 20% c) 30% d) 40%

9) 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

P.T.O.

10) A geothermal resource tapped for electricity generation could provide energy for about
a) 50 years b) 1000 years c) 5 years d) 1 year

11) A device which is used to produce potable water by utilizing solar heat energy is called
a) Solar water still b) Solar constant
c) Solar cooling system d) Solar ponds

12) In flat-plate collector the temperatures of the working fluid can be raised upto
a) 500° C b) 100° C c) 300° C d) 50° C

13) Which region of sun constitutes main mass of the sun ?
a) Solar interior b) Photosphere
c) Solar atmosphere d) Chromosphere

14) It is estimated that 90% of the energy is generated in the region
a) 0 – 0.7 R b) 0.23 R – 0.7 R c) 0 – 0.23 R d) 0.23 R – R

15) The radiation received on the earth's surface directly without change in direction is called
a) Terrestrial b) Extra-terrestrial c) Diffuse d) Beam

16) 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 into thermal energy and delivers it to the next stage of the system

17) Which process is responsible for production of energy in the sun ?
a) Nuclear fission reaction b) Nuclear fusion reaction
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18) The temperature at the inner core of the earth is about
a) 1000° C b) 4000° C c) 40000° C d) 500° C

19) Increasing the pressure inside a biogas plant
a) Increases the gas production b) Decreases the gas production
c) Has no effect on gas production d) Causes explosion

20) Two-basin tidal schemes
a) Are more economical than single basin schemes
b) Operate on ebb cycles in both basins
c) Produce less uniform power
d) Produce more uniform power

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Seat No.	

B.E. (Electrical) (Part – II) Examination, 2017
RENEWABLE ENERGY SOURCES (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

2. Solve **any four** : **(5×4=20)**
   1) Define solar constant and find out its value from fundamental.
   2) Draw the configuration of pyranometer and explain how it is used to measure global and diffuse radiation.
   3) Draw and explain Flat-plate collector. What are the advantages and disadvantages of Flat-plate collector ?
   4) Draw and explain solar water heater with natural circulation.
   5) With neat diagram explain solar crop drying.
   6) Draw and describe the different types of horizontal axis wind mills.

3. Solve **any two** : **(10×2=20)**
   1) With the help of neat diagram explain terrestrial and extra-terrestrial solar radiation.
   2) Draw and explain the performance characteristics of wind mill.
   3) Draw and explain different zones of solar ponds. What are the applications of solar ponds ? What are the required properties of salt used in solar ponds ?

4. Solve **any four** : **(5×4=20)**
   1) With the help of block diagram explain utilization of biogas for cooking.
   2) Draw and explain the double chamber types biogas plant.
   3) Draw and describe the dry steam geothermal power plant.
   4) Write short note on potential of geothermal resources in India.
   5) Draw and explain the floating drum type biogas plant.
   6) Draw and describe the working of open cycle OTEC system.

5. Solve **any two** : **(10×2=20)**
   1) What is Biomass ? Explain the resources of biomass. With the help of bacterial reactions explain principle of biogas generation.
   2) Draw and describe the general layout of small hydro plant. What are the advantages and limitations of SHP ?
   3) With neat diagram explain tidal energy conversion techniques.

Set S

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Seat No.	

Set **P**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER QUALITY (Elective – II)

Day and Date : Tuesday, 23-5-2017 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) Sag is also known as
a) Glitch b) Brownout c) Outage d) Dip

2) IEEE standard 1100 is related to
a) Power Quality monitoring b) Flicker
c) Harmonics d) Grounding

3) Time duration for instantaneous short duration variations is
a) 30 cycles to 3 sec b) 0.5 to 30 cycles
c) 3 sec to 1 min d) 1 min to 3 min

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) Minimum voltage sag ride through capability of equipment A and B are 80% and 50% respectively. Which device will be more immune to voltage sag ?
a) Equipment A
b) Equipment B
c) Both equipments will have same sensitivity to voltage sag
d) None of above

6) Main sources of transient overvoltage in power system are
a) Capacitor switching b) Lighting
c) Arc furnace d) Both a and b

7) As we move from load to source the cost of power quality protection device
a) Goes on increasing b) Goes on decreasing
c) Remains same d) None of above

8) Ferroresonant transformer is _____ transformer.
a) Step up b) Step down c) One to one d) None of above

P.T.O.

9) 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 above

10) Duration of transients produced by capacitor switching depends on value of
   a) Capacitance b) System inductance
   c) Resistance d) None of above

11) According to IEC definition, Individual Harmonic Distortion of fundamental is
   a) 100% b) Less than 100%
   c) More than 100% d) None of above

12) Which of the following is not a source of harmonics in a power system ?
   a) DC drives b) PWM drives
   c) Incandescent lamp d) Printers

13) Triplen harmonics have _____ phase sequence.
   a) Positive b) Negative c) Zero d) None of these

14) The dominant harmonics in a 6 pulse converter is
   a) Third b) Fifth c) Seventh d) Ninth

15) Controlling harmonic current distortion is the responsibility of
   a) End-user b) Utility c) Both a and b d) None of these

16) Single tuned shunt passive filter will act _____ at fundamental frequency.
   a) Inductive b) Resistive c) Capacitive d) None of these

17) 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

18) Reactive power to be injected by capacitor to improve the power factor of load from $\cos\phi_1$ to $\cos\phi_2$ is given by
   a) KW($\tan\phi_1 - \tan\phi_2$) b) KW($\cos\phi_1 - \cos\phi_2$)
   c) KVA($\tan\phi_1 - \tan\phi_2$) d) KVA($\cos\phi_1 - \cos\phi_2$)

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) In windowed FFT technique; to detect low frequency event; the width of window will be
   a) Increased b) Decreased
   c) Remains same d) None of above

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SLR-VB – 345

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER QUALITY (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×5=20)**
   1) Explain power quality susceptibility criteria.
   2) With neat diagram, define; explain the causes and effects of undervoltage.
   3) With neat diagram explain CBEMA curve.
   4) Define power quality. What are the responsibilities of utility, consumer and equipment manufacturer's regarding power quality.
   5) Explain with neat diagram working of rotary UPS.
   6) Explain with neat diagram fundamental principle of protection of equipment against voltage sag.

3. Solve **any two** questions : **(2×10=20)**
   1) Explain with neat diagram working of following equipments.
      a) Online UPS b) Voltage regulator
   2) With neat waveform define, explain the causes and effects of the following power quality problems :
      a) Noise b) Flicker
   3) Explain with neat diagram transients produced by
      a) Single capacitor switching
      b) Back-to-back capacitor switching.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**
   1) Explain with equation how following electric parameters get affected in presence of harmonics :
      a) RMS voltage b) Active Power c) Reactive Power.
   2) Define following terms :
      a) Triplen harmonics b) Interharmonics c) K-factor of transformer.

Set P

3) Explain different drawbacks of poor power factor. Enlist different methods of improving power factor.
4) Define grounding. Explain reasons of grounding.
5) Define power quality monitoring. What is the cost of poor power quality ?
6) 12 pulse PWM variable speed drive has following specifications :

   Output : 0 to 250 V, 0 – 150 Hz, 10A, 6KVA Harmonic spectrum for the drive is as given in the table :

Order	1	3	11	13	15	17	23	25	35	37
Angle (Degree)	0^0	25^0	32^0	-34^0	123^0	45^0	27^0	-56^0	15^0	67^0
Magnitude r.m.s. % of fundamental	100	4	40	30	5	3	20	15	5	4

   Calculate total harmonic distortion in current.

5. Solve **any two** questions : **(2×10=20)**

1) Voltage and currents are analyzed at the load center and are established as follows :

$$v(t) = \sqrt{2}\{220 \sin \omega t + 10 \sin(3\omega t + 60°) + 20 \sin(5\omega t + 160°) + 24 \sin(7\omega t - 84°) + 30 \sin(11\omega t + 55°) + 14 \sin(13\omega t - 65°)\}$$

$$i(t) = \sqrt{2}\{22 \sin(\omega t - 10°) + 3 \sin(3\omega t - 90°) + 5 \sin(5\omega t + 65°) + 4 \sin(7\omega t - 49°) + 4.5 \sin(11\omega t - 99°) + 3.5 \sin(13\omega t - 65°)\}$$

   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) Total Harmonic Distortion in current.

2) Explain with neat diagram following grounding systems :
   a) Properly grounded electrical system.
   b) Isolated grounded electrical system.
3) Define power quality monitoring. Enlist different power quality measurement equipments. Explain the windowed FFT technique for power quality monitoring and analysis.

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Set P

SLR-VB – 345

Seat No.	

Set **Q**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER QUALITY (Elective – II)

Day and Date : Tuesday, 23-5-2017 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) Single tuned shunt passive filter will act _____ at fundamental frequency.
a) Inductive b) Resistive c) Capacitive d) None of these

2) 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

3) Reactive power to be injected by capacitor to improve the power factor of load from $\cos\phi_1$ to $\cos\phi_2$ is given by
a) KW(tan ϕ_1 – tan ϕ_2) b) KW(cos ϕ_1 – cos ϕ_2)
c) KVA(tan ϕ_1 – tan ϕ_2) d) KVA(cos ϕ_1 – cos ϕ_2)

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) In windowed FFT technique; to detect low frequency event; the width of window will be
a) Increased b) Decreased
c) Remains same d) None of above

6) Sag is also known as
a) Glitch b) Brownout c) Outage d) Dip

7) IEEE standard 1100 is related to
a) Power Quality monitoring b) Flicker
c) Harmonics d) Grounding

8) Time duration for instantaneous short duration variations is
a) 30 cycles to 3 sec b) 0.5 to 30 cycles
c) 3 sec to 1 min d) 1 min to 3 min

P.T.O.

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) Minimum voltage sag ride through capability of equipment A and B are 80% and 50% respectively. Which device will be more immune to voltage sag ?
   a) Equipment A
   b) Equipment B
   c) Both equipments will have same sensitivity to voltage sag
   d) None of above

11) Main sources of transient overvoltage in power system are
   a) Capacitor switching b) Lighting
   c) Arc furnace d) Both a and b

12) As we move from load to source the cost of power quality protection device
   a) Goes on increasing b) Goes on decreasing
   c) Remains same d) None of above

13) Ferroresonant transformer is _____ transformer.
   a) Step up b) Step down c) One to one d) None of above

14) To have minimum transients due to capacitor switching; capacitor must be switched ON at the instant when
   a) Voltage across capacitor is zero
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15) Duration of transients produced by capacitor switching depends on value of
   a) Capacitance b) System inductance
   c) Resistance d) None of above

16) According to IEC definition, Individual Harmonic Distortion of fundamental is
   a) 100% b) Less than 100%
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17) Which of the following is not a source of harmonics in a power system ?
   a) DC drives b) PWM drives
   c) Incandescent lamp d) Printers

18) Triplen harmonics have _____ phase sequence.
   a) Positive b) Negative c) Zero d) None of these

19) The dominant harmonics in a 6 pulse converter is
   a) Third b) Fifth c) Seventh d) Ninth

20) Controlling harmonic current distortion is the responsibility of
   a) End-user b) Utility c) Both a and b d) None of these

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SLR-VB – 345

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER QUALITY (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×5=20)**
   1) Explain power quality susceptibility criteria.
   2) With neat diagram, define; explain the causes and effects of undervoltage.
   3) With neat diagram explain CBEMA curve.
   4) Define power quality. What are the responsibilities of utility, consumer and equipment manufacturer's regarding power quality.
   5) Explain with neat diagram working of rotary UPS.
   6) Explain with neat diagram fundamental principle of protection of equipment against voltage sag.

3. Solve **any two** questions : **(2×10=20)**
   1) Explain with neat diagram working of following equipments.
      a) Online UPS b) Voltage regulator
   2) With neat waveform define, explain the causes and effects of the following power quality problems :
      a) Noise b) Flicker
   3) Explain with neat diagram transients produced by
      a) Single capacitor switching
      b) Back-to-back capacitor switching.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**
   1) Explain with equation how following electric parameters get affected in presence of harmonics :
      a) RMS voltage b) Active Power c) Reactive Power.
   2) Define following terms :
      a) Triplen harmonics b) Interharmonics c) K-factor of transformer.

Set Q

3) Explain different drawbacks of poor power factor. Enlist different methods of improving power factor.
4) Define grounding. Explain reasons of grounding.
5) Define power quality monitoring. What is the cost of poor power quality ?
6) 12 pulse PWM variable speed drive has following specifications :

   Output : 0 to 250 V, 0 – 150 Hz, 10A, 6KVA Harmonic spectrum for the drive is as given in the table :

Order	1	3	11	13	15	17	23	25	35	37
Angle (Degree)	0^0	25^0	32^0	-34^0	123^0	45^0	27^0	-56^0	15^0	67^0
Magnitude r.m.s. % of fundamental	100	4	40	30	5	3	20	15	5	4

   Calculate total harmonic distortion in current.

5. Solve **any two** questions : **(2×10=20)**

1) Voltage and currents are analyzed at the load center and are established as follows :

$$v(t) = \sqrt{2}\{220 \sin \omega t + 10 \sin(3\omega t + 60^\circ) + 20 \sin(5\omega t + 160^\circ) + 24 \sin(7\omega t - 84^\circ) + 30 \sin(11\omega t + 55^\circ) + 14 \sin(13\omega t - 65^\circ)\}$$

$$i(t) = \sqrt{2}\{22 \sin(\omega t - 10^\circ) + 3 \sin(3\omega t - 90^\circ) + 5 \sin(5\omega t + 65^\circ) + 4 \sin(7\omega t - 49^\circ) + 4.5 \sin(11\omega t - 99^\circ) + 3.5 \sin(13\omega t - 65^\circ)\}$$

   Calculate the following :
   a) RMS voltage due to harmonic components
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2) Explain with neat diagram following grounding systems :
   a) Properly grounded electrical system.
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3) Define power quality monitoring. Enlist different power quality measurement equipments. Explain the windowed FFT technique for power quality monitoring and analysis.

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Set Q

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Seat No.	

Set R

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER QUALITY (Elective – II)

Day and Date : Tuesday, 23-5-2017 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) According to IEC definition, Individual Harmonic Distortion of fundamental is
   a) 100% b) Less than 100%
   c) More than 100% d) None of above

2) Which of the following is not a source of harmonics in a power system ?
   a) DC drives b) PWM drives
   c) Incandescent lamp d) Printers

3) Triplen harmonics have _____ phase sequence.
   a) Positive b) Negative c) Zero d) None of these

4) The dominant harmonics in a 6 pulse converter is
   a) Third b) Fifth c) Seventh d) Ninth

5) Controlling harmonic current distortion is the responsibility of
   a) End-user b) Utility c) Both a and b d) None of these

6) Single tuned shunt passive filter will act _____ at fundamental frequency.
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9) Power quality monitoring instrument should be located as close as possible to
   a) Service entrance
   b) Primary side of distribution transformer
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   d) None of these

P.T.O.

10) In windowed FFT technique; to detect low frequency event; the width of window will be
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17) As we move from load to source the cost of power quality protection device
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18) Ferroresonant transformer is _____ transformer.
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   a) Capacitance b) System inductance
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SLR-VB – 345

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER QUALITY (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×5=20)**
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   2) With neat diagram, define; explain the causes and effects of undervoltage.
   3) With neat diagram explain CBEMA curve.
   4) Define power quality. What are the responsibilities of utility, consumer and equipment manufacturer's regarding power quality.
   5) Explain with neat diagram working of rotary UPS.
   6) Explain with neat diagram fundamental principle of protection of equipment against voltage sag.

3. Solve **any two** questions : **(2×10=20)**
   1) Explain with neat diagram working of following equipments.
      a) Online UPS b) Voltage regulator
   2) With neat waveform define, explain the causes and effects of the following power quality problems :
      a) Noise b) Flicker
   3) Explain with neat diagram transients produced by
      a) Single capacitor switching
      b) Back-to-back capacitor switching.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**
   1) Explain with equation how following electric parameters get affected in presence of harmonics :
      a) RMS voltage b) Active Power c) Reactive Power.
   2) Define following terms :
      a) Triplen harmonics b) Interharmonics c) K-factor of transformer.

Set R

3) Explain different drawbacks of poor power factor. Enlist different methods of improving power factor.
4) Define grounding. Explain reasons of grounding.
5) Define power quality monitoring. What is the cost of poor power quality ?
6) 12 pulse PWM variable speed drive has following specifications :

   Output : 0 to 250 V, 0 – 150 Hz, 10A, 6KVA Harmonic spectrum for the drive is as given in the table :

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   Calculate total harmonic distortion in current.

5. Solve **any two** questions : **(2×10=20)**

1) Voltage and currents are analyzed at the load center and are established as follows :

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2) Explain with neat diagram following grounding systems :
   a) Properly grounded electrical system.
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Set R

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Seat No.	

Set **S**

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER QUALITY (Elective – II)

Day and Date : Tuesday, 23-5-2017 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) Main sources of transient overvoltage in power system are
   a) Capacitor switching b) Lighting
   c) Arc furnace d) Both a and b

2) As we move from load to source the cost of power quality protection device
   a) Goes on increasing b) Goes on decreasing
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3) Ferroresonant transformer is _____ transformer.
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P.T.O.

10) Controlling harmonic current distortion is the responsibility of
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11) Single tuned shunt passive filter will act _____ at fundamental frequency.
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c) 3 sec to 1 min d) 1 min to 3 min

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) Minimum voltage sag ride through capability of equipment A and B are 80% and 50% respectively. Which device will be more immune to voltage sag ?
a) Equipment A
b) Equipment B
c) Both equipments will have same sensitivity to voltage sag
d) None of above

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SLR-VB – 345

Seat No.	

B.E. (Electrical Engineering) (Part – II) Examination, 2017
POWER QUALITY (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** questions : **(4×5=20)**
   1) Explain power quality susceptibility criteria.
   2) With neat diagram, define; explain the causes and effects of undervoltage.
   3) With neat diagram explain CBEMA curve.
   4) Define power quality. What are the responsibilities of utility, consumer and equipment manufacturer's regarding power quality.
   5) Explain with neat diagram working of rotary UPS.
   6) Explain with neat diagram fundamental principle of protection of equipment against voltage sag.

3. Solve **any two** questions : **(2×10=20)**
   1) Explain with neat diagram working of following equipments.
      a) Online UPS b) Voltage regulator
   2) With neat waveform define, explain the causes and effects of the following power quality problems :
      a) Noise b) Flicker
   3) Explain with neat diagram transients produced by
      a) Single capacitor switching
      b) Back-to-back capacitor switching.

SECTION – II

4. Solve **any four** questions : **(4×5=20)**
   1) Explain with equation how following electric parameters get affected in presence of harmonics :
      a) RMS voltage b) Active Power c) Reactive Power.
   2) Define following terms :
      a) Triplen harmonics b) Interharmonics c) K-factor of transformer.

Set S

3) Explain different drawbacks of poor power factor. Enlist different methods of improving power factor.
4) Define grounding. Explain reasons of grounding.
5) Define power quality monitoring. What is the cost of poor power quality ?
6) 12 pulse PWM variable speed drive has following specifications :

   Output : 0 to 250 V, 0 – 150 Hz, 10A, 6KVA Harmonic spectrum for the drive is as given in the table :

Order	1	3	11	13	15	17	23	25	35	37
Angle (Degree)	0^0	25^0	32^0	-34^0	123^0	45^0	27^0	-56^0	15^0	67^0
Magnitude r.m.s. % of fundamental	100	4	40	30	5	3	20	15	5	4

   Calculate total harmonic distortion in current.

5. Solve **any two** questions : **(2×10=20)**

1) Voltage and currents are analyzed at the load center and are established as follows :

$$v(t) = \sqrt{2}\{220 \sin \omega t + 10 \sin(3\omega t + 60°) + 20 \sin(5\omega t + 160°) + 24 \sin(7\omega t - 84°) + 30 \sin(11\omega t + 55°) + 14 \sin(13\omega t - 65°)\}$$

$$i(t) = \sqrt{2}\{22 \sin(\omega t - 10°) + 3 \sin(3\omega t - 90°) + 5 \sin(5\omega t + 65°) + 4 \sin(7\omega t - 49°) + 4.5 \sin(11\omega t - 99°) + 3.5 \sin(13\omega t - 65°)\}$$

   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) Total Harmonic Distortion in current.

2) Explain with neat diagram following grounding systems :
   a) Properly grounded electrical system.
   b) Isolated grounded electrical system.
3) Define power quality monitoring. Enlist different power quality measurement equipments. Explain the windowed FFT technique for power quality monitoring and analysis.

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Seat No.	

Set P

B.E. (Electrical) (Part – II) (Old) Examination, 2017
HVDC TRANSMISSION

Day and Date : Monday, 29-5-2017 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) 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 above

2) 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) None of above

3) In HVDC transmission system, rectifier firing angle a is kept near
   a) 0° b) 15° c) 30° d) 90°

4) Passive filters acts as source of _____
   a) Active power b) Reactive power
   c) Apparent power d) Only (a) and (c)

5) 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

6) UHV DC transmission is being considered more than _____
   a) ± 500 KV b) ±800 KV c) ± 800 MV d) ± 800 V

7) Individual operation of firing pulses for each valve is the feature of _____
   a) IPC b) EPC c) CCC d) VGC

8) The first commercially used HVDC link was built in
   a) 2006 b) 1954 c) 1986 d) yet to be built

P.T.O.

9) Reactive power to HVDC system may be supplied from
   a) AC filters b) Shunt capacitors
   c) SVS d) All of the above

10) Tuned filters are used to filter out _____
   a) Characteristic harmonics b) Non-characteristic harmonics
   c) Both a) and b) d) Transients only

11) Arc-back is a _____ fault and results in severe stress on transformer winding.
   a) Self clearing b) Non-self clearing
   c) Communication failure d) Both a) and b)

12) 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)

13) HVDC transmission lines are more economical for
   a) short distance transmission b) interconnected system
   c) long distance transmission d) both a) and b)

14) 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

15) The characteristics of DC breakers can be determined by _____
   a) Voltage capability b) Current capability
   c) Energy capability d) All of the above

16) 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) Sub synchronous damping control
   d) Reactive power control

17) Normal value of breakeven distance in dc transmission is around
   a) 70 km b) 700 km c) 7000 km d) any distance

18) As compared to HVAC line, the corona and radio interference on a HVDC line are
   a) lower b) more c) the same d) all of the above

19) 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

20) 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 above

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Seat No.	

B.E. (Electrical) (Part – II) (Old) Examination, 2017
HVDC TRANSMISSION

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **Five marks each**
   a) Define pulse number and explain valve utilization factor.
   b) Draw and explain the basic power controller of HVDC system.
   c) Give advantage and disadvantage of HVDC over EHVAC transmission systems.
   d) State necessity of higher level controllers in HVDC systems.
   e) Explain the analysis of bridge converter with overlap less than 60 degree.

3. Solve **any two** : **Ten marks each**
   a) Explain with neat diagram the different types of DC links.
   b) Draw the basic converter control hierarchy and explain firing angle control in detail.
   c) Give detailed comparison between HVDC and AC transmission.

SECTION – II

4. Solve **any four** : **Five marks each**
   a) Explain harmonic instability problem.
   b) Explain the potential application of MTDC system.
   c) Explain protection against overcurrent in HVDC system.
   d) Explain the basic faults that occur in converters.
   e) Explain DC filters.

5. Solve **any two** : **Ten marks each**
   a) Explain the following current control methods of MTDC system.
      i) Current margin method ii) Two ACR method.
   b) Define the Non-characteristic harmonics and explain
      i) Harmonic distortion ii) IT product
      iii) Telephone influence factor iv) THFF
   c) Explain the significance of commutation margin angle and extinction angle.

Set P

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Seat No.	

Set **Q**

B.E. (Electrical) (Part – II) (Old) Examination, 2017
HVDC TRANSMISSION

Day and Date : Monday, 29-5-2017 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) 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) Sub synchronous damping control
   d) Reactive power control

2) Normal value of breakeven distance in dc transmission is around
   a) 70 km b) 700 km c) 7000 km d) any distance

3) As compared to HVAC line, the corona and radio interference on a HVDC line are
   a) lower b) more c) the same d) all of the above

4) 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

5) 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 above

6) 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 above

7) 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) None of above

P.T.O.

8) In HVDC transmission system, rectifier firing angle a is kept near
   a) 0° b) 15° c) 30° d) 90°

9) Passive filters acts as source of _____
   a) Active power b) Reactive power
   c) Apparent power d) Only (a) and (c)

10) 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

11) UHV DC transmission is being considered more than _____
   a) ± 500 KV b) ±800 KV c) ± 800 MV d) ± 800 V

12) Individual operation of firing pulses for each valve is the feature of _____
   a) IPC b) EPC c) CCC d) VGC

13) The first commercially used HVDC link was built in
   a) 2006 b) 1954 c) 1986 d) yet to be built

14) Reactive power to HVDC system may be supplied from
   a) AC filters b) Shunt capacitors
   c) SVS d) All of the above

15) Tuned filters are used to filter out _____
   a) Characteristic harmonics b) Non-characteristic harmonics
   c) Both a) and b) d) Transients only

16) Arc-back is a _____ fault and results in severe stress on transformer winding.
   a) Self clearing b) Non-self clearing
   c) Communication failure d) Both a) and b)

17) 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)

18) HVDC transmission lines are more economical for
   a) short distance transmission b) interconnected system
   c) long distance transmission d) both a) and b)

19) 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

20) The characteristics of DC breakers can be determined by _____
   a) Voltage capability b) Current capability
   c) Energy capability d) All of the above

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Seat No.	

B.E. (Electrical) (Part – II) (Old) Examination, 2017
HVDC TRANSMISSION

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **Five marks each**
   a) Define pulse number and explain valve utilization factor.
   b) Draw and explain the basic power controller of HVDC system.
   c) Give advantage and disadvantage of HVDC over EHVAC transmission systems.
   d) State necessity of higher level controllers in HVDC systems.
   e) Explain the analysis of bridge converter with overlap less than 60 degree.

3. Solve **any two** : **Ten marks each**
   a) Explain with neat diagram the different types of DC links.
   b) Draw the basic converter control hierarchy and explain firing angle control in detail.
   c) Give detailed comparison between HVDC and AC transmission.

SECTION – II

4. Solve **any four** : **Five marks each**
   a) Explain harmonic instability problem.
   b) Explain the potential application of MTDC system.
   c) Explain protection against overcurrent in HVDC system.
   d) Explain the basic faults that occur in converters.
   e) Explain DC filters.

5. Solve **any two** : **Ten marks each**
   a) Explain the following current control methods of MTDC system.
      i) Current margin method ii) Two ACR method.
   b) Define the Non-characteristic harmonics and explain
      i) Harmonic distortion ii) IT product
      iii) Telephone influence factor iv) THFF
   c) Explain the significance of commutation margin angle and extinction angle.

Set Q

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Seat No.	

Set **R**

B.E. (Electrical) (Part – II) (Old) Examination, 2017
HVDC TRANSMISSION

Day and Date : Monday, 29-5-2017 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) Arc-back is a _____ fault and results in severe stress on transformer winding.
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   c) Communication failure d) Both a) and b)

2) 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)

3) HVDC transmission lines are more economical for
   a) short distance transmission b) interconnected system
   c) long distance transmission d) both a) and b)

4) Short gate pulse or long gate pulse used for _____
   a) To start AC link b) To stop AC link
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5) The characteristics of DC breakers can be determined by _____
   a) Voltage capability b) Current capability
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6) A DC tie used in parallel with an AC tie to damp the low frequency oscillations, for the controllers _____
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   b) Stabilization of AC ties control
   c) Sub synchronous damping control
   d) Reactive power control

7) Normal value of breakeven distance in dc transmission is around
   a) 70 km b) 700 km c) 7000 km d) any distance

8) As compared to HVAC line, the corona and radio interference on a HVDC line are
   a) lower b) more c) the same d) all of the above
9) 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
10) 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 above
11) 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 above
12) 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) None of above
13) In HVDC transmission system, rectifier firing angle a is kept near
   a) 0° b) 15° c) 30° d) 90°
14) Passive filters acts as source of _____
   a) Active power b) Reactive power
   c) Apparent power d) Only (a) and (c)
15) 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
16) UHV DC transmission is being considered more than _____
   a) ± 500 KV b) ±800 KV c) ± 800 MV d) ± 800 V
17) Individual operation of firing pulses for each valve is the feature of _____
   a) IPC b) EPC c) CCC d) VGC
18) The first commercially used HVDC link was built in
   a) 2006 b) 1954 c) 1986 d) yet to be built
19) Reactive power to HVDC system may be supplied from
   a) AC filters b) Shunt capacitors
   c) SVS d) All of the above
20) Tuned filters are used to filter out _____
   a) Characteristic harmonics b) Non-characteristic harmonics
   c) Both a) and b) d) Transients only

_____

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Seat No.	

B.E. (Electrical) (Part – II) (Old) Examination, 2017
HVDC TRANSMISSION

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **Five marks each**
   a) Define pulse number and explain valve utilization factor.
   b) Draw and explain the basic power controller of HVDC system.
   c) Give advantage and disadvantage of HVDC over EHVAC transmission systems.
   d) State necessity of higher level controllers in HVDC systems.
   e) Explain the analysis of bridge converter with overlap less than 60 degree.

3. Solve **any two** : **Ten marks each**
   a) Explain with neat diagram the different types of DC links.
   b) Draw the basic converter control hierarchy and explain firing angle control in detail.
   c) Give detailed comparison between HVDC and AC transmission.

SECTION – II

4. Solve **any four** : **Five marks each**
   a) Explain harmonic instability problem.
   b) Explain the potential application of MTDC system.
   c) Explain protection against overcurrent in HVDC system.
   d) Explain the basic faults that occur in converters.
   e) Explain DC filters.

5. Solve **any two** : **Ten marks each**
   a) Explain the following current control methods of MTDC system.
      i) Current margin method ii) Two ACR method.
   b) Define the Non-characteristic harmonics and explain
      i) Harmonic distortion ii) IT product
      iii) Telephone influence factor iv) THFF
   c) Explain the significance of commutation margin angle and extinction angle.

Set R

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Seat No.	

Set **S**

B.E. (Electrical) (Part – II) (Old) Examination, 2017
HVDC TRANSMISSION

Day and Date : Monday, 29-5-2017 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) UHV DC transmission is being considered more than _____
   a) ± 500 KV b) ±800 KV c) ± 800 MV d) ± 800 V
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   a) 2006 b) 1954 c) 1986 d) yet to be built
4) Reactive power to HVDC system may be supplied from
   a) AC filters b) Shunt capacitors
   c) SVS d) All of the above
5) Tuned filters are used to filter out _____
   a) Characteristic harmonics b) Non-characteristic harmonics
   c) Both a) and b) d) Transients only
6) Arc-back is a _____ fault and results in severe stress on transformer winding.
   a) Self clearing b) Non-self clearing
   c) Communication failure d) Both a) and b)
7) 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)
8) HVDC transmission lines are more economical for
   a) short distance transmission b) interconnected system
   c) long distance transmission d) both a) and b)

P.T.O.

9) Short gate pulse or long gate pulse used for _____
   a) To start AC link b) To stop AC link
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10) The characteristics of DC breakers can be determined by _____
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13) As compared to HVAC line, the corona and radio interference on a HVDC line are
   a) lower b) more c) the same d) all of the above

14) In _____ pulse frequency control, gain K1 of integrator is given by
   a) $K1 = Pf_0V3/V1$ b) $K1 = Pf_0V3$
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15) 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 above

16) 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 above

17) A 12-pulse bridge is preferred in HVDC because
   a) It eliminates certain harmonics
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18) In HVDC transmission system, rectifier firing angle a is kept near
   a) 0° b) 15° c) 30° d) 90°

19) Passive filters acts as source of _____
   a) Active power b) Reactive power
   c) Apparent power d) Only (a) and (c)

20) 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

_____

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Seat No.	

B.E. (Electrical) (Part – II) (Old) Examination, 2017
HVDC TRANSMISSION

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Solve **any four** : **Five marks each**
   a) Define pulse number and explain valve utilization factor.
   b) Draw and explain the basic power controller of HVDC system.
   c) Give advantage and disadvantage of HVDC over EHVAC transmission systems.
   d) State necessity of higher level controllers in HVDC systems.
   e) Explain the analysis of bridge converter with overlap less than 60 degree.

3. Solve **any two** : **Ten marks each**
   a) Explain with neat diagram the different types of DC links.
   b) Draw the basic converter control hierarchy and explain firing angle control in detail.
   c) Give detailed comparison between HVDC and AC transmission.

SECTION – II

4. Solve **any four** : **Five marks each**
   a) Explain harmonic instability problem.
   b) Explain the potential application of MTDC system.
   c) Explain protection against overcurrent in HVDC system.
   d) Explain the basic faults that occur in converters.
   e) Explain DC filters.

5. Solve **any two** : **Ten marks each**
   a) Explain the following current control methods of MTDC system.
      i) Current margin method ii) Two ACR method.
   b) Define the Non-characteristic harmonics and explain
      i) Harmonic distortion ii) IT product
      iii) Telephone influence factor iv) THFF
   c) Explain the significance of commutation margin angle and extinction angle.

Set S

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