SLR-EP – 285

Seat No.	

Set P

S.E. (Part – I) (CGPA) (Bio-Medical Engg.) Examination, 2016
ENGINEERING MATHEMATICS – III

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternative (**each one mark**) : **(14×1=14)**

1) The Laplace transform of tcost is

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

2) The value of the integral $\int_0^\infty e^{-st}\cos 3t\,dt$ is

a) $\frac{s}{s^2-9}$ b) $\frac{s}{s^2+9}$ c) $\frac{1}{s^2-9}$ d) $\frac{1}{s^2+9}$

3) If L[f(t)] = Q(s) then $L[e^{-at} f(t)]$ =

a) Q (s + a) b) Q(s – a) c) e^{-at} Q(s) d) e^{at} Q(s)

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

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

5) $L^{-1}\left(\frac{s+3}{s^2+9}\right)$ =

a) cos3t b) sin3t c) 3t + cos3t d) cos3t + sin3t

P.T.O.

6) $L^{-1}\left(\frac{s+s^2}{s^3}\right) =$

a) $t + t^2$ b) $t + 1$ c) $t^2 + 1$ d) t

7) The mapping $w = z + c$ preserves

a) the shape but not size b) the size but not shape

c) both shape and size d) neither the size nor the shape

8) The mapping $w = f(z)$ is conformal if

a) $f(z)$ is analytic and $f'(z) = 0$ b) $f(z)$ is analytic and $f'(z) \neq 0$

c) $f(z)$ is not analytic and $f'(z) \neq 0$ d) none of these

9) Cauchy-Riemann equation for $f(z)$ to be analytic are

a) $u_x = v_x$, $u_y = -v_y$ b) $u_x = -v_x$ & $u_y = v_y$

c) $u_x = -v_x$, $u_y = v_x$ d) $u_x = v_y$ & $u_y = -v_x$

10) The function $f(z) = \frac{1}{z}$ is analytic

a) everywhere b) at (0, 0) c) nowhere d) except at (0, 0)

11) In the interval $(0, \pi)$ the constant term in the cosine series of $f(x) = x$ is

a) π b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{8}$

12) Fourier expansion of $f(x) = x + x^2$ in $(-1, 1)$ has

a) sine terms only b) cosine terms only

c) both sine and cosine terms d) neither sine nor cosine term

13) The Fourier series expansion of $f(x) = \sin^2 x$ is

a) $\sin x + \cos x$ b) $1 - \cos 2x$ c) $\sin 2x + \cos zx$ d) $\frac{1}{2}(1 - \cos 2x)$

14) Fourier expansion $f(x) = x \sin x$, in $(-\pi, \pi)$, the value of $b_n =$

a) 0 b) 1 c) $\frac{1}{\pi}$ d) $\frac{2}{\pi}$

SLR-EP – 285

Seat No.	

S.E. (Part – I) (CGPA) (Bio-Medical Engg.) Examination, 2016
ENGINEERING MATHEMATICS – III

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

***Instructions**: 1) Solve **any three** questions from **each** Section.*
2) **Use** of non-programming calculator is **allowed**.

SECTION – I

2. a) Find Laplace transform of f(t) **3**
where $f(t) = (t-2)^2$, $t > 1$

$= 0$, $0 < t < 1$

b) Find Laplace transform of $\frac{1}{t}(e^{-3t}\sin 2t)$. **3**

c) Find Laplace transform of $t^2 - 3t + 5 + e^{2t}t^2$. **3**

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

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

c) Find Laplace transform of $t^2 H(t-3) + t^3 \delta(t-3)$. **3**

4. a) Determine whether the function $f(z) = \frac{1}{2}\log(x^2+y^2) + i\tan^{-1}\left(\frac{y}{x}\right)$ is analytic function or not. **3**

b) Construct an analytic function whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$. **3**

c) Prove that $u = e^x \cos y$ is harmonic function and determine its harmonic conjugate. **3**

5. a) Use Laplace transform to solve **5**

$$\frac{dy}{dt} + 2y + \int_0^t y\,dt = \sin t \text{, given that } y(0) = 1$$

b) Find the analytic function f(z) = u + iv in terms of z if $u - v = \frac{\sin x + \sinh y}{\cosh y - \cos x}$. **5**

SECTION – II

6. a) Find the image of $|z - 2i| = 2$ under transformation $w = \frac{1}{z}$. **4**

b) Find the bilinear transformation which maps $z = \infty,\ i,\ 0$ on to $w = 0, i, \infty$. **5**

7. a) Find a Fourier series of

$$f(x) = \begin{cases} x, & 0 < x < \pi \\ 2\pi - x, & \pi < x < 2\pi \end{cases}$$ **5**

b) Find the Fourier expansion of $f(x) = \begin{cases} x + \frac{\pi}{2}, & -\pi < x < 0 \\ \frac{\pi}{2} - x, & 0 < x < \pi \end{cases}$ **5**

8. a) Find half range cosine series for $f(x) = x - x^2$ in (0, 1). **5**

b) Find half range sine series for $f(x) = \begin{cases} 1, & 0 < x < \frac{1}{2} \\ 0, & \frac{1}{2} < x < 1 \end{cases}$. **4**

9. a) Evaluate $\int_0^{1+i} z^2 dz$ along a

i) the line y = x ii) the parabola $x = y^2$ **6**

b) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)}$ where C is the circle $|z| = 3$. **3**

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Set P

SLR-EP – 285

Seat No.	

Set **Q**

S.E. (Part – I) (CGPA) (Bio-Medical Engg.) Examination, 2016
ENGINEERING MATHEMATICS – III

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternative (**each one mark**) : **(14×1=14)**

1) The mapping w = f(z) is conformal if
   a) f(z) is analytic and $f'(z) = 0$ b) f(z) is analytic and $f'(z) \neq 0$
   c) f(z) is not analytic and $f'(z) \neq 0$ d) none of these

2) Cauchy-Riemann equation for f(z) to be analytic are
   a) $u_x = v_x, \quad u_y = -v_y$ b) $u_x = -v_x$ & $u_y = v_y$
   c) $u_x = -v_x, \quad u_y = v_x$ d) $u_x = v_y$ & $u_y = -v_x$

3) The function $f(z) = \frac{1}{z}$ is analytic
   a) everywhere b) at (0, 0) c) nowhere d) except at (0, 0)

4) In the interval $(0, \pi)$ the constant term in the cosine series of f(x) = x is
   a) π b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{8}$

5) Fourier expansion of $f(x) = x + x^2$ in (–1, 1) has
   a) sine terms only b) cosine terms only
   c) both sine and cosine terms d) neither sine nor cosine term

6) The Fourier series expansion of $f(x) = \sin^2 x$ is
   a) sinx + cosx b) 1 – cos2x c) sin2x + coszx d) $\frac{1}{2}(1 - \cos 2x)$

P.T.O.

7) Fourier expansion f(x) = x sinx, in $(-\pi, \pi)$, the value of b_n =

a) 0 b) 1 c) $\frac{1}{\pi}$ d) $\frac{2}{\pi}$

8) The Laplace transform of tcost is

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

9) The value of the integral $\int_0^\infty e^{-st} \cos 3t \, dt$ is

a) $\frac{s}{s^2-9}$ b) $\frac{s}{s^2+9}$ c) $\frac{1}{s^2-9}$ d) $\frac{1}{s^2+9}$

10) If L[f(t)] = Q(s) then $L[e^{-at} f(t)]$ =

a) Q (s + a) b) Q(s – a) c) e^{-at} Q(s) d) e^{at} Q(s)

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

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

12) $L^{-1}\left(\frac{s+3}{s^2+9}\right)$ =

a) cos3t b) sin3t c) 3t + cos3t d) cos3t + sin3t

13) $L^{-1}\left(\frac{s+s^2}{s^3}\right)$ =

a) $t + t^2$ b) t + 1 c) $t^2 + 1$ d) t

14) The mapping w = z + c preserves

a) the shape but not size b) the size but not shape
c) both shape and size d) neither the size nor the shape

SLR-EP – 285

Seat No.	

S.E. (Part – I) (CGPA) (Bio-Medical Engg.) Examination, 2016
ENGINEERING MATHEMATICS – III

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

***Instructions**: 1) Solve **any three** questions from **each** Section.*
2) **Use** of non-programming calculator is **allowed**.

SECTION – I

2. a) Find Laplace transform of f(t) **3**
where $f(t) = (t-2)^2$, $t > 1$

$= 0$, $0 < t < 1$

b) Find Laplace transform of $\frac{1}{t}(e^{-3t}\sin 2t)$. **3**

c) Find Laplace transform of $t^2 - 3t + 5 + e^{2t}t^2$. **3**

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

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

c) Find Laplace transform of $t^2 H(t-3) + t^3 \delta(t-3)$. **3**

4. a) Determine whether the function $f(z) = \frac{1}{2}\log(x^2+y^2) + i\tan^{-1}\left(\frac{y}{x}\right)$ is analytic function or not. **3**

b) Construct an analytic function whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$. **3**

c) Prove that $u = e^x \cos y$ is harmonic function and determine its harmonic conjugate. **3**

Set Q

5. a) Use Laplace transform to solve **5**

$$\frac{dy}{dt} + 2y + \int_0^t y\,dt = \sin t \text{, given that } y(0) = 1$$

b) Find the analytic function f(z) = u + iv in terms of z if $u - v = \frac{\sin x + \sinh y}{\cosh y - \cos x}$. **5**

SECTION – II

6. a) Find the image of $|z - 2i| = 2$ under transformation $w = \frac{1}{z}$. **4**

b) Find the bilinear transformation which maps $z = \infty,\ i,\ 0$ on to $w = 0, i, \infty$. **5**

7. a) Find a Fourier series of

$$f(x) = \begin{cases} x, & 0 < x < \pi \\ 2\pi - x, & \pi < x < 2\pi \end{cases}$$ **5**

b) Find the Fourier expansion of $f(x) = \begin{cases} x + \frac{\pi}{2}, & -\pi < x < 0 \\ \frac{\pi}{2} - x, & 0 < x < \pi \end{cases}$. **5**

8. a) Find half range cosine series for $f(x) = x - x^2$ in (0, 1). **5**

b) Find half range sine series for $f(x) = \begin{cases} 1, & 0 < x < \frac{1}{2} \\ 0, & \frac{1}{2} < x < 1 \end{cases}$. **4**

9. a) Evaluate $\int_0^{1+i} z^2 dz$ along a

i) the line y = x ii) the parabola $x = y^2$ **6**

b) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)}$ where C is the circle $|z| = 3$. **3**

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Set Q

SLR-EP – 285

Seat No.	

Set **R**

S.E. (Part – I) (CGPA) (Bio-Medical Engg.) Examination, 2016
ENGINEERING MATHEMATICS – III

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

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

Duration : 30 Minutes Marks : 14

1. Choose the correct alternative (**each one mark**) : **(14×1=14)**

1) $L^{-1}\left(\frac{s+3}{s^2+9}\right)=$

a) cos3t b) sin3t c) 3t + cos3t d) cos3t + sin3t

2) $L^{-1}\left(\frac{s+s^2}{s^3}\right)=$

a) $t + t^2$ b) t + 1 c) $t^2 + 1$ d) t

3) The mapping w = z + c preserves
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a) f(z) is analytic and $f'(z) = 0$ b) f(z) is analytic and $f'(z) \neq 0$
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a) $u_x = v_x,\ u_y = -v_y$ b) $u_x = -v_x$ & $u_y = v_y$
c) $u_x = -v_x,\ u_y = v_x$ d) $u_x = v_y$ & $u_y = -v_x$

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7) In the interval $(0, \pi)$ the constant term in the cosine series of f(x) = x is

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10) Fourier expansion f(x) = x sinx, in $(-\pi, \pi)$, the value of b_n =

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11) The Laplace transform of tcost is

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

12) The value of the integral $\int_0^{\infty} e^{-st} \cos 3t \, dt$ is

a) $\frac{s}{s^2-9}$ b) $\frac{s}{s^2+9}$ c) $\frac{1}{s^2-9}$ d) $\frac{1}{s^2+9}$

13) If L[f(t)] = Q(s) then $L[e^{-at} f(t)]$ =
a) Q (s + a) b) Q(s – a) c) e^{-at} Q(s) d) e^{at} Q(s)

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

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

SLR-EP – 285

Seat No.	

S.E. (Part – I) (CGPA) (Bio-Medical Engg.) Examination, 2016
ENGINEERING MATHEMATICS – III

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

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

2. a) Find Laplace transform of f(t) **3**
where $f(t) = (t-2)^2$, $t > 1$

$= 0$, $0 < t < 1$

b) Find Laplace transform of $\frac{1}{t}(e^{-3t}\sin 2t)$. **3**

c) Find Laplace transform of $t^2 - 3t + 5 + e^{2t}t^2$. **3**

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

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

c) Find Laplace transform of $t^2 H(t-3) + t^3 \delta(t-3)$. **3**

4. a) Determine whether the function $f(z) = \frac{1}{2}\log(x^2+y^2) + i\tan^{-1}\left(\frac{y}{x}\right)$ is analytic function or not. **3**

b) Construct an analytic function whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$. **3**

c) Prove that $u = e^x \cos y$ is harmonic function and determine its harmonic conjugate. **3**

Set R

5. a) Use Laplace transform to solve **5**

$$\frac{dy}{dt} + 2y + \int_0^t y\,dt = \sin t \text{, given that } y(0) = 1$$

b) Find the analytic function f(z) = u + iv in terms of z if $u - v = \frac{\sin x + \sinh y}{\cosh y - \cos x}$. **5**

SECTION – II

6. a) Find the image of $|z - 2i| = 2$ under transformation $w = \frac{1}{z}$. **4**

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9. a) Evaluate $\int_0^{1+i} z^2 dz$ along a

i) the line y = x ii) the parabola $x = y^2$ **6**

b) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)}$ where C is the circle $|z| = 3$. **3**

———————

Set R

SLR-EP – 285

Seat No.	

Set S

S.E. (Part – I) (CGPA) (Bio-Medical Engg.) Examination, 2016
ENGINEERING MATHEMATICS – III

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

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

Duration : 30 Minutes Marks : 14

1. Choose the correct alternative (**each one mark**) : **(14×1=14)**

1) The function $f(z) = \frac{1}{z}$ is analytic

a) everywhere b) at (0, 0) c) nowhere d) except at (0, 0)

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a) 0 b) 1 c) $\frac{1}{\pi}$ d) $\frac{2}{\pi}$

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

P.T.O.

7) The value of the integral $\int_0^{\infty} e^{-st} \cos 3t \, dt$ is

a) $\frac{s}{s^2-9}$ b) $\frac{s}{s^2+9}$ c) $\frac{1}{s^2-9}$ d) $\frac{1}{s^2+9}$

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c) $u_x = -v_x$, $u_y = v_x$ d) $u_x = v_y$ & $u_y = -v_x$

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SLR-EP – 285

Seat No.	

S.E. (Part – I) (CGPA) (Bio-Medical Engg.) Examination, 2016
ENGINEERING MATHEMATICS – III

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

***Instructions**: 1) Solve **any three** questions from **each** Section.*
2) **Use** of non-programming calculator is **allowed**.

SECTION – I

2. a) Find Laplace transform of f(t) **3**
where $f(t) = (t-2)^2$, $t > 1$

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b) Find Laplace transform of $\frac{1}{t}(e^{-3t}\sin 2t)$. **3**

c) Find Laplace transform of $t^2 - 3t + 5 + e^{2t}t^2$. **3**

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

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

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c) Prove that $u = e^x \cos y$ is harmonic function and determine its harmonic conjugate. **3**

Set S

5. a) Use Laplace transform to solve **5**

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b) Find the analytic function f(z) = u + iv in terms of z if $u - v = \frac{\sin x + \sinh y}{\cosh y - \cos x}$. **5**

SECTION – II

6. a) Find the image of $|z - 2i| = 2$ under transformation $w = \frac{1}{z}$. **4**

b) Find the bilinear transformation which maps $z = \infty,\ i,\ 0$ on to $w = 0, i, \infty$. **5**

7. a) Find a Fourier series of

$$f(x) = \begin{cases} x, & 0 < x < \pi \\ 2\pi - x, & \pi < x < 2\pi \end{cases}$$ **5**

b) Find the Fourier expansion of $f(x) = \begin{cases} x + \frac{\pi}{2}, & -\pi < x < 0 \\ \frac{\pi}{2} - x, & 0 < x < \pi \end{cases}$. **5**

8. a) Find half range cosine series for $f(x) = x - x^2$ in (0, 1). **5**

b) Find half range sine series for $f(x) = \begin{cases} 1, & 0 < x < \frac{1}{2} \\ 0, & \frac{1}{2} < x < 1 \end{cases}$. **4**

9. a) Evaluate $\int_0^{1+i} z^2 dz$ along a

i) the line y = x ii) the parabola $x = y^2$ **6**

b) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)}$ where C is the circle $|z| = 3$. **3**

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Set S

SLR-EP – 286

Seat No.	

Set P

S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2016
HUMAN ANATOMY AND PHYSIOLOGY

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

***Instructions** : 1) Figures to the **right** indicate **full** marks.*
*2) **Assume** suitable data **wherever** required.*
*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) Oxygenated blood is carried to the heart by the
   a) Aorta b) Carotid arteries
   c) Inferior vena cava d) Pulmonary veins

2) _____ is a substance that aids the transmission of nerve impulses.
   a) Acetylcholine b) Cholecystokinin
   c) Deoxyribose d) Oxytocin

3) _____ controls body temperature, sleep and appetite.
   a) Adrenal glands b) Hypothalamus c) Pancreas d) Thalamus

4) _____ is a structural, fibrous protein found in the dermis.
   a) Collagen b) Heparin c) Lipocyte d) Melanin

5) The anatomic location of the spinal canal is
   a) Caudal b) Dorsal c) Frontal d) Transverse

6) _____ is an accessory organ of the gastrointestinal system that is responsible for secreting insulin.
   a) Adrenal gland b) Gall bladder c) Liver d) Pancreas

7) Each of the following is a segment of the large intestine except the
   a) Ascending colon b) Cecum
   c) Ileum d) Sigmoid colon

8) Bile enters the gastrointestinal tract at the
   a) Gastro esophageal sphincter b) Duodenum
   c) Ileocecum d) Jejunum

9) In the lungs, gas exchange occurs in tiny one-celled air sacs called
   a) Alveoli b) Bronchi c) Bronchioles d) Capillaries

10) The thoracic cage is a structural unit important for
   a) Alimentation b) Menstruation c) Mentation d) Respiration

11) The _____ is the outer layer of the heart that keeps the outer surface moist.
   a) Myocardium b) Endocardium c) Pericardium d) Tricuspid

12) The blood is carried to the various parts of the body through _____ having hollow tubes.
   a) Blood vessels b) Blood plasma c) Heart pumping d) Aorta

13) The outer layer of brain is called as
   a) Cerebrum b) Cerebellum c) Cerebral cortex d) Frontal lobe

14) The _____ controls subjective feelings and emotions.
   a) Mid brain b) Hypothalamus c) Spinal cord d) Cortex

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SLR-EP – 286

Seat No.	

S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2016
HUMAN ANATOMY AND PHYSIOLOGY

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Draw microscopic structure of cell and explain any 3 components of it.
   2) Explain types and functions of heart valves with necessary figure.
   3) Draw standard ECG waveform and explain Einthoven's triangle concept.
   4) Discuss all lungs volume and capacities with neat diagram.
   5) Define deglutition and defecation process in detail.

3. Attempt **any two** : **(6×2=12)**
   1) Draw and explain conduction system.
   2) Explain the cardiac cycle. Define stroke volume and cardiac output.
   3) Explain the process of digestion with necessary secretions by digestive system.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw and explain the structure of nephron.
   2) Draw and explain structure of eye and image formation with neat figures.
   3) Define reflex action with an example.
   4) Explain in detail the various actions carried out by Androgens and Progesterone.
   5) Differentiate between types of axons in neuron structure.

5. Attempt **any two** : **(6×2=12)**
   1) Explain the process of urine formation with neat figures.
   2) Draw and explain the function of male reproductive stem in detail.
   3) Draw and explain the structure and function of any two types of endocrine glands.

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Set P

Set P

SLR-EP – 286

Seat No.	

Set Q

S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2016
HUMAN ANATOMY AND PHYSIOLOGY

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***wherever*** *required.*
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) Bile enters the gastrointestinal tract at the
   a) Gastro esophageal sphincter b) Duodenum
   c) Ileocecum d) Jejunum

2) In the lungs, gas exchange occurs in tiny one-celled air sacs called
   a) Alveoli b) Bronchi c) Bronchioles d) Capillaries

3) The thoracic cage is a structural unit important for
   a) Alimentation b) Menstruation c) Mentation d) Respiration

4) The _____ is the outer layer of the heart that keeps the outer surface moist.
   a) Myocardium b) Endocardium c) Pericardium d) Tricuspid

5) The blood is carried to the various parts of the body through _____ having hollow tubes.
   a) Blood vessels b) Blood plasma c) Heart pumping d) Aorta

6) The outer layer of brain is called as
   a) Cerebrum b) Cerebellum c) Cerebral cortex d) Frontal lobe

P.T.O.

7) The _____ controls subjective feelings and emotions.
   a) Mid brain b) Hypothalamus c) Spinal cord d) Cortex

8) Oxygenated blood is carried to the heart by the
   a) Aorta b) Carotid arteries
   c) Inferior vena cava d) Pulmonary veins

9) _____ is a substance that aids the transmission of nerve impulses.
   a) Acetylcholine b) Cholecystokinin
   c) Deoxyribose d) Oxytocin

10) _____ controls body temperature, sleep and appetite.
   a) Adrenal glands b) Hypothalamus c) Pancreas d) Thalamus

11) _____ is a structural, fibrous protein found in the dermis.
   a) Collagen b) Heparin c) Lipocyte d) Melanin

12) The anatomic location of the spinal canal is
   a) Caudal b) Dorsal c) Frontal d) Transverse

13) _____ is an accessory organ of the gastrointestinal system that is responsible for secreting insulin.
   a) Adrenal gland b) Gall bladder c) Liver d) Pancreas

14) Each of the following is a segment of the large intestine except the
   a) Ascending colon b) Cecum
   c) Ileum d) Sigmoid colon

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SLR-EP – 286

Seat No.	

S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2016
HUMAN ANATOMY AND PHYSIOLOGY

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Draw microscopic structure of cell and explain any 3 components of it.
   2) Explain types and functions of heart valves with necessary figure.
   3) Draw standard ECG waveform and explain Einthoven's triangle concept.
   4) Discuss all lungs volume and capacities with neat diagram.
   5) Define deglutition and defecation process in detail.

3. Attempt **any two** : **(6×2=12)**
   1) Draw and explain conduction system.
   2) Explain the cardiac cycle. Define stroke volume and cardiac output.
   3) Explain the process of digestion with necessary secretions by digestive system.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw and explain the structure of nephron.
   2) Draw and explain structure of eye and image formation with neat figures.
   3) Define reflex action with an example.
   4) Explain in detail the various actions carried out by Androgens and Progesterone.
   5) Differentiate between types of axons in neuron structure.

5. Attempt **any two** : **(6×2=12)**
   1) Explain the process of urine formation with neat figures.
   2) Draw and explain the function of male reproductive stem in detail.
   3) Draw and explain the structure and function of any two types of endocrine glands.

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Set Q

Set Q

SLR-EP – 286

Seat No.	

Set R

S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2016
HUMAN ANATOMY AND PHYSIOLOGY

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***wherever*** *required.*
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 anatomic location of the spinal canal is
a) Caudal b) Dorsal c) Frontal d) Transverse

2) _____ is an accessory organ of the gastrointestinal system that is responsible for secreting insulin.
a) Adrenal gland b) Gall bladder c) Liver d) Pancreas

3) Each of the following is a segment of the large intestine except the
a) Ascending colon b) Cecum
c) Ileum d) Sigmoid colon

4) Bile enters the gastrointestinal tract at the
a) Gastro esophageal sphincter b) Duodenum
c) Ileocecum d) Jejunum

5) In the lungs, gas exchange occurs in tiny one-celled air sacs called
a) Alveoli b) Bronchi c) Bronchioles d) Capillaries

6) The thoracic cage is a structural unit important for
a) Alimentation b) Menstruation c) Mentation d) Respiration

P.T.O.

7) The _____ is the outer layer of the heart that keeps the outer surface moist.
   a) Myocardium b) Endocardium c) Pericardium d) Tricuspid

8) The blood is carried to the various parts of the body through _____ having hollow tubes.
   a) Blood vessels b) Blood plasma c) Heart pumping d) Aorta

9) The outer layer of brain is called as
   a) Cerebrum b) Cerebellum c) Cerebral cortex d) Frontal lobe

10) The _____ controls subjective feelings and emotions.
   a) Mid brain b) Hypothalamus c) Spinal cord d) Cortex

11) Oxygenated blood is carried to the heart by the
   a) Aorta b) Carotid arteries
   c) Inferior vena cava d) Pulmonary veins

12) _____ is a substance that aids the transmission of nerve impulses.
   a) Acetylcholine b) Cholecystokinin
   c) Deoxyribose d) Oxytocin

13) _____ controls body temperature, sleep and appetite.
   a) Adrenal glands b) Hypothalamus c) Pancreas d) Thalamus

14) _____ is a structural, fibrous protein found in the dermis.
   a) Collagen b) Heparin c) Lipocyte d) Melanin

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SLR-EP – 286

Seat No.	

S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2016
HUMAN ANATOMY AND PHYSIOLOGY

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Draw microscopic structure of cell and explain any 3 components of it.
   2) Explain types and functions of heart valves with necessary figure.
   3) Draw standard ECG waveform and explain Einthoven's triangle concept.
   4) Discuss all lungs volume and capacities with neat diagram.
   5) Define deglutition and defecation process in detail.

3. Attempt **any two** : **(6×2=12)**
   1) Draw and explain conduction system.
   2) Explain the cardiac cycle. Define stroke volume and cardiac output.
   3) Explain the process of digestion with necessary secretions by digestive system.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw and explain the structure of nephron.
   2) Draw and explain structure of eye and image formation with neat figures.
   3) Define reflex action with an example.
   4) Explain in detail the various actions carried out by Androgens and Progesterone.
   5) Differentiate between types of axons in neuron structure.

5. Attempt **any two** : **(6×2=12)**
   1) Explain the process of urine formation with neat figures.
   2) Draw and explain the function of male reproductive stem in detail.
   3) Draw and explain the structure and function of any two types of endocrine glands.

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Set R

Set R

SLR-EP – 286

Seat No.	

Set **S**

S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2016
HUMAN ANATOMY AND PHYSIOLOGY

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***wherever*** *required.*
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 thoracic cage is a structural unit important for
a) Alimentation b) Menstruation c) Mentation d) Respiration

2) The _____ is the outer layer of the heart that keeps the outer surface moist.
a) Myocardium b) Endocardium c) Pericardium d) Tricuspid

3) The blood is carried to the various parts of the body through _____ having hollow tubes.
a) Blood vessels b) Blood plasma c) Heart pumping d) Aorta

4) The outer layer of brain is called as
a) Cerebrum b) Cerebellum c) Cerebral cortex d) Frontal lobe

5) The _____ controls subjective feelings and emotions.
a) Mid brain b) Hypothalamus c) Spinal cord d) Cortex

6) Oxygenated blood is carried to the heart by the
a) Aorta b) Carotid arteries
c) Inferior vena cava d) Pulmonary veins

7) _____ is a substance that aids the transmission of nerve impulses.
   a) Acetylcholine b) Cholecystokinin
   c) Deoxyribose d) Oxytocin

8) _____ controls body temperature, sleep and appetite.
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9) _____ is a structural, fibrous protein found in the dermis.
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10) The anatomic location of the spinal canal is
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11) _____ is an accessory organ of the gastrointestinal system that is responsible for secreting insulin.
   a) Adrenal gland b) Gall bladder c) Liver d) Pancreas

12) Each of the following is a segment of the large intestine except the
   a) Ascending colon b) Cecum
   c) Ileum d) Sigmoid colon

13) Bile enters the gastrointestinal tract at the
   a) Gastro esophageal sphincter b) Duodenum
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14) In the lungs, gas exchange occurs in tiny one-celled air sacs called
   a) Alveoli b) Bronchi c) Bronchioles d) Capillaries

_____

SLR-EP – 286

Seat No.	

S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2016
HUMAN ANATOMY AND PHYSIOLOGY

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Draw microscopic structure of cell and explain any 3 components of it.
   2) Explain types and functions of heart valves with necessary figure.
   3) Draw standard ECG waveform and explain Einthoven's triangle concept.
   4) Discuss all lungs volume and capacities with neat diagram.
   5) Define deglutition and defecation process in detail.

3. Attempt **any two** : **(6×2=12)**
   1) Draw and explain conduction system.
   2) Explain the cardiac cycle. Define stroke volume and cardiac output.
   3) Explain the process of digestion with necessary secretions by digestive system.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw and explain the structure of nephron.
   2) Draw and explain structure of eye and image formation with neat figures.
   3) Define reflex action with an example.
   4) Explain in detail the various actions carried out by Androgens and Progesterone.
   5) Differentiate between types of axons in neuron structure.

5. Attempt **any two** : **(6×2=12)**
   1) Explain the process of urine formation with neat figures.
   2) Draw and explain the function of male reproductive stem in detail.
   3) Draw and explain the structure and function of any two types of endocrine glands.

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Set S

Set S

SLR-EP – 287

Seat No.	

Set **P**

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
BIOMATERIALS

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The word 'ceramic' meant for
a) soft material b) hard material c) burnt material d) dry material

2) One of the characteristic property of polymer material
a) High temperature stability b) High mechanical strength
c) High elongation d) Low hardness

3) Polymers are _____ in nature.
a) organic b) inorganic c) both a) and b) d) none

4) What is the effect of high temperature on material properties ?
a) loss of cohesive strength b) increase in stiffness
c) increase in hardness d) all above

5) The monomer of polyvinyl chloride is
a) ethyl chloride b) chloroethane
c) ethylene dichloride d) chloroform

6) Cellulose is the main constituent of most _____ fibers.
a) acrylic b) synthetic c) spandex d) natural

7) Out of all the elastomers, natural rubber has the longest elongation range and flexibility of the order of _____ percent.
a) 1500 – 2000 b) 1 – 1000 c) 1000 – 1500 d) 2000 – 2500

8) PMMA is known as
a) bakelite b) nylon-6 c) teflon d) perspex

9) _____ types of materials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) Carbon

10) What is meant by ductility ?
a) metals drawn into sheets
b) metals undergo elastic deformation under load
c) metals undergo plastic deformation under load
d) all above

P.T.O.

11) Corrosion of metals involves _____ reaction.
a) physical b) chemical c) acidic d) both a) and b)

12) Stiffness refers to
a) resistance to elastic deformation b) degree of elastic deformation
c) expendability on heating d) expansion on cooling

13) _____ must be added to steel in order to render it strainless.
a) Chromium 12 – 30% b) Carbon < 1.2%
c) Chromium oxide 3 – 20% d) Flouride 2%

14) _____ cements are mostly used to fix prosthese due to its strong mechanical fixation.
a) PTFE b) Sirubber c) PHEMA d) PMMA

_____

SLR-EP – 287

Seat No.	

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
BIOMATERIALS

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Discuss classification of polymers and also mention application of each.
   2) Define PMMA and list various bioimplant applications of PMMA.
   3) Explain structure and applications of a bioglass.
   4) What is the difference between ceramic and bioceramic ? Classify bioceramics broadly.
   5) What are biomaterials ? Classify biomaterial.

3. Attempt **any two** questions : **(6×2=12)**
   1) Explain the properties and applications of stainless steel.
   2) Explain biocompatibility test performed on Ti alloy.
   3) Explain the following :
      a) Structure and applications of hydrogels.
      b) Biomedical applications of any 2 composite biomaterial.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
   1) Describe composition of materials used as bone substitute.
   2) Explain processing steps of leathers in detail.
   3) Explain how materials can be protected from corrosion and mention definition of corrosion.
   4) Define and explain thermoplastic and thermosetting resin. Also mention one example of each.
   5) Discuss the properties of materials used for breast implants.

5. Attempt **any two** : **(6×2=12)**
   1) List various experiments carried for biocompatibility testing and explain any one in detail.
   2) Mention various surface properties of biomaterials and explain any two in detail.
   3) Write short note on :
      a) Wood and binding materials-structure and application
      b) Types of rubbers and their application.

Set P

_____

Set P

SLR-EP – 287

Seat No.	

Set **Q**

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
BIOMATERIALS

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) PMMA is known as
a) bakelite b) nylon-6 c) teflon d) perspex

2) _____ types of materials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) Carbon

3) What is meant by ductility ?
a) metals drawn into sheets
b) metals undergo elastic deformation under load
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4) Corrosion of metals involves _____ reaction.
a) physical b) chemical c) acidic d) both a) and b)

5) Stiffness refers to
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6) _____ must be added to steel in order to render it strainless.
a) Chromium 12 – 30% b) Carbon < 1.2%
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7) _____ cements are mostly used to fix prosthese due to its strong mechanical fixation.
a) PTFE b) Sirubber c) PHEMA d) PMMA

8) The word 'ceramic' meant for
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P.T.O.

10) Polymers are _____ in nature.
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11) What is the effect of high temperature on material properties ?
a) loss of cohesive strength b) increase in stiffness
c) increase in hardness d) all above

12) The monomer of polyvinyl chloride is
a) ethyl chloride b) chloroethane
c) ethylene dichloride d) chloroform

13) Cellulose is the main constituent of most _____ fibers.
a) acrylic b) synthetic c) spandex d) natural

14) Out of all the elastomers, natural rubber has the longest elongation range and flexibility of the order of _____ percent.
a) 1500 – 2000 b) 1 – 1000 c) 1000 – 1500 d) 2000 – 2500

_____

SLR-EP – 287

Seat No.	

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
BIOMATERIALS

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Discuss classification of polymers and also mention application of each.
   2) Define PMMA and list various bioimplant applications of PMMA.
   3) Explain structure and applications of a bioglass.
   4) What is the difference between ceramic and bioceramic ? Classify bioceramics broadly.
   5) What are biomaterials ? Classify biomaterial.

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   1) Explain the properties and applications of stainless steel.
   2) Explain biocompatibility test performed on Ti alloy.
   3) Explain the following :
      a) Structure and applications of hydrogels.
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SECTION – II

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   1) Describe composition of materials used as bone substitute.
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   1) List various experiments carried for biocompatibility testing and explain any one in detail.
   2) Mention various surface properties of biomaterials and explain any two in detail.
   3) Write short note on :
      a) Wood and binding materials-structure and application
      b) Types of rubbers and their application.

Set Q

_____

Set Q

SLR-EP – 287

Seat No.	

Set R

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
BIOMATERIALS

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The monomer of polyvinyl chloride is
   a) ethyl chloride b) chloroethane
   c) ethylene dichloride d) chloroform

2) Cellulose is the main constituent of most _____ fibers.
   a) acrylic b) synthetic c) spandex d) natural

3) Out of all the elastomers, natural rubber has the longest elongation range and flexibility of the order of _____ percent.
   a) 1500 – 2000 b) 1 – 1000 c) 1000 – 1500 d) 2000 – 2500

4) PMMA is known as
   a) bakelite b) nylon-6 c) teflon d) perspex

5) _____ types of materials are used as bridges between human tissues and metals.
   a) Polymeric b) Ceramic c) Metallic d) Carbon

6) What is meant by ductility ?
   a) metals drawn into sheets
   b) metals undergo elastic deformation under load
   c) metals undergo plastic deformation under load
   d) all above

7) Corrosion of metals involves _____ reaction.
   a) physical b) chemical c) acidic d) both a) and b)

8) Stiffness refers to
   a) resistance to elastic deformation b) degree of elastic deformation
   c) expendability on heating d) expansion on cooling

9) _____ must be added to steel in order to render it strainless.
   a) Chromium 12 – 30% b) Carbon < 1.2%
   c) Chromium oxide 3 – 20% d) Flouride 2%

10) _____ cements are mostly used to fix prosthese due to its strong mechanical fixation.
   a) PTFE b) Sirubber c) PHEMA d) PMMA

P.T.O.

11) The word 'ceramic' meant for
a) soft material b) hard material c) burnt material d) dry material

12) One of the characteristic property of polymer material
a) High temperature stability b) High mechanical strength
c) High elongation d) Low hardness

13) Polymers are _____ in nature.
a) organic b) inorganic c) both a) and b) d) none

14) What is the effect of high temperature on material properties ?
a) loss of cohesive strength b) increase in stiffness
c) increase in hardness d) all above

_____

SLR-EP – 287

Seat No.	

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
BIOMATERIALS

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Discuss classification of polymers and also mention application of each.
   2) Define PMMA and list various bioimplant applications of PMMA.
   3) Explain structure and applications of a bioglass.
   4) What is the difference between ceramic and bioceramic ? Classify bioceramics broadly.
   5) What are biomaterials ? Classify biomaterial.

3. Attempt **any two** questions : **(6×2=12)**
   1) Explain the properties and applications of stainless steel.
   2) Explain biocompatibility test performed on Ti alloy.
   3) Explain the following :
      a) Structure and applications of hydrogels.
      b) Biomedical applications of any 2 composite biomaterial.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
   1) Describe composition of materials used as bone substitute.
   2) Explain processing steps of leathers in detail.
   3) Explain how materials can be protected from corrosion and mention definition of corrosion.
   4) Define and explain thermoplastic and thermosetting resin. Also mention one example of each.
   5) Discuss the properties of materials used for breast implants.

5. Attempt **any two** : **(6×2=12)**
   1) List various experiments carried for biocompatibility testing and explain any one in detail.
   2) Mention various surface properties of biomaterials and explain any two in detail.
   3) Write short note on :
      a) Wood and binding materials-structure and application
      b) Types of rubbers and their application.

Set R

_____

Set R

SLR-EP – 287

Seat No.	

Set S

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
BIOMATERIALS

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) What is meant by ductility ?
   a) metals drawn into sheets
   b) metals undergo elastic deformation under load
   c) metals undergo plastic deformation under load
   d) all above

2) Corrosion of metals involves _____ reaction.
   a) physical b) chemical c) acidic d) both a) and b)

3) Stiffness refers to
   a) resistance to elastic deformation b) degree of elastic deformation
   c) expendability on heating d) expansion on cooling

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5) _____ cements are mostly used to fix prosthese due to its strong mechanical fixation.
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   a) soft material b) hard material c) burnt material d) dry material

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   a) High temperature stability b) High mechanical strength
   c) High elongation d) Low hardness

8) Polymers are _____ in nature.
   a) organic b) inorganic c) both a) and b) d) none

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   a) loss of cohesive strength b) increase in stiffness
   c) increase in hardness d) all above

10) The monomer of polyvinyl chloride is
   a) ethyl chloride b) chloroethane
   c) ethylene dichloride d) chloroform

P.T.O.

11) Cellulose is the main constituent of most _____ fibers.
a) acrylic b) synthetic c) spandex d) natural

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13) PMMA is known as
a) bakelite b) nylon-6 c) teflon d) perspex

14) _____ types of materials are used as bridges between human tissues and metals.
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_____

SLR-EP – 287

Seat No.	

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
BIOMATERIALS

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Discuss classification of polymers and also mention application of each.
   2) Define PMMA and list various bioimplant applications of PMMA.
   3) Explain structure and applications of a bioglass.
   4) What is the difference between ceramic and bioceramic ? Classify bioceramics broadly.
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3. Attempt **any two** questions : **(6×2=12)**
   1) Explain the properties and applications of stainless steel.
   2) Explain biocompatibility test performed on Ti alloy.
   3) Explain the following :
      a) Structure and applications of hydrogels.
      b) Biomedical applications of any 2 composite biomaterial.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
   1) Describe composition of materials used as bone substitute.
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   3) Explain how materials can be protected from corrosion and mention definition of corrosion.
   4) Define and explain thermoplastic and thermosetting resin. Also mention one example of each.
   5) Discuss the properties of materials used for breast implants.

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   1) List various experiments carried for biocompatibility testing and explain any one in detail.
   2) Mention various surface properties of biomaterials and explain any two in detail.
   3) Write short note on :
      a) Wood and binding materials-structure and application
      b) Types of rubbers and their application.

Set S

_____

Set S

SLR-EP – 288

Seat No.	

Set **P**

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) For the RC coupled amplifier, the drop in gain at low frequencies is due to the increasing resistance of
a) C_C b) C_S c) C_E d) All the above

2) The gate of FET controls
a) Width of the channel b) Drain current
c) Gate voltage d) Source voltage

3) Transconductance is measured in
a) Mhos or Siemens b) Ohms
c) Volts d) Amperes

4) A unipolar device uses only
a) Only free electrons b) Only holes
c) Both a and b d) Not both

5) During operation of N-channel depletion type MOSFET, the gate voltage has to be
a) Negative b) Zero c) Low positive d) High positive

6) A FET is better chopper than a BJT because it has
a) Low offset voltage b) High i/p current
c) High i/p resistance d) High series ON resistance

7) The i/p impedance of a JFET is
a) About zero b) About infinity
c) About 100 Ω d) About 10 kΩ

8) A silicon controlled rectifier is a _____ layer solid state device.
   a) 3 b) 2 c) 5 d) 4

9) Astable multivibrator using IC 555 gives _____ states.
   a) one b) two c) more d) zero

10) Diac is made up of two _____ diodes connected back to back.
   a) pnp b) npn c) FET d) zener

11) Triac is a type of thyristors that can conduct in _____ direction.
   a) one b) both c) upper d) down

12) _____ are used as static devices in power electronic converters.
   a) Power FET b) Power BJT
   c) Power regulator d) Power JFET

13) A power diode is a _____ type three layer device.
   a) $p^+n^-n^+$ b) $p^+n^+n^-$
   c) $n^+p^-p^+$ d) $n^+p^+n^-$

14) The high frequency operation of a power semiconductor circuit is limited by
   a) ON state loss b) OFF state loss
   c) Switching loss d) All of these

_____

SLR-EP – 288

Seat No.	

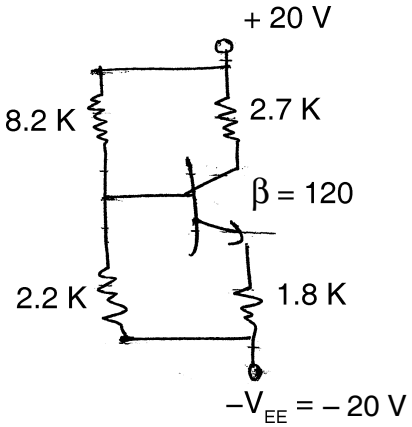
S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I

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

SECTION – I

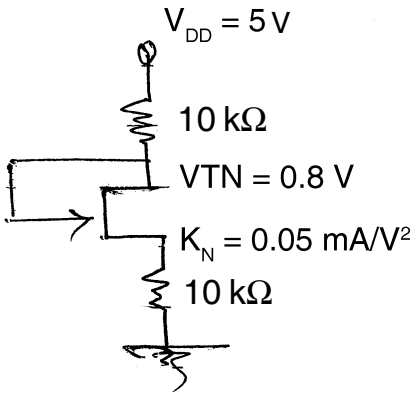
2. Attempt **any four** questions : **(4×4=16)**
   1) Draw and explain working of positive clipper and negative clipper circuit with respective waveforms.
   2) Define following specifications of zener diode
      a) Break down current.
      b) Maximum power dissipation.
   3) If the reverse saturation current in zener diode changes from 25 mA to 50 mA corresponding to the change in reverse voltage from 4.7 V to 4.75 V, determine the dynamic resistance of zener diode.
   4) List various biasing modes of BJT and explain any two with neat diagram.
   5) Draw and explain working of center tap and bridge full wave rectifier.

3. Attempt **any two** : **(6×2=12)**
   1) Explain working of emitter follower regulator and shunt regulator with neat diagram.
   2) Explain working of common emitter and common collector configuration with necessary diagrams.
   3) Determine the co-ordinates of Q point for given circuit.



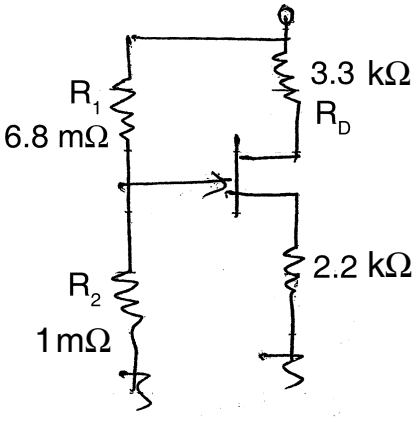
SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain the structure and working of DIAC with diagram.
   2) Draw and explain working of monostable multivibrator circuit using IC 555 with neat waveforms.
   3) For following circuit find I_D and V_{GS}.



   4) Draw and explain working of JFET in detail.
   5) Differentiate between BJT and FET.

5. Attempt **any two** : **(6×2=12)**
   1) Explain how BJT is used as switch and as an amplifier with necessary figure.
   2) For shown figure determine I_D, V_{GS} for JFET.



Given

$V_D \cong 7$ V

   3) Explain followings :
      a) Power transistors
      b) IGBT structure.

Set P

SLR-EP – 288

Seat No.	

Set Q

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) A silicon controlled rectifier is a _____ layer solid state device.
a) 3 b) 2 c) 5 d) 4

2) A stable multivibrator using IC 555 gives _____ states.
a) one b) two c) more d) zero

3) Diac is made up of two _____ diodes connected back to back.
a) pnp b) npn c) FET d) zener

4) Triac is a type of thyristors that can conduct in _____ direction.
a) one b) both c) upper d) down

5) _____ are used as static devices in power electronic converters.
a) Power FET b) Power BJT
c) Power regulator d) Power JFET

6) A power diode is a _____ type three layer device.
a) $p^+n^-n^+$ b) $p^+n^+n^-$
c) $n^+p^-p^+$ d) $n^+p^+n^-$

7) The high frequency operation of a power semiconductor circuit is limited by
a) ON state loss b) OFF state loss
c) Switching loss d) All of these

8) For the RC coupled amplifier, the drop in gain at low frequencies is due to the increasing resistance of
a) C_C b) C_S c) C_E d) All the above

P.T.O.

9) The gate of FET controls
   a) Width of the channel b) Drain current
   c) Gate voltage d) Source voltage

10) Transconductance is measured in
   a) Mhos or Siemens b) Ohms
   c) Volts d) Amperes

11) A unipolar device uses only
   a) Only free electrons b) Only holes
   c) Both a and b d) Not both

12) During operation of N-channel depletion type MOSFET, the gate voltage has to be
   a) Negative b) Zero c) Low positive d) High positive

13) A FET is better chopper than a BJT because it has
   a) Low offset voltage b) High i/p current
   c) High i/p resistance d) High series ON resistance

14) The i/p impedance of a JFET is
   a) About zero b) About infinity
   c) About 100 Ω d) About 10 kΩ

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SLR-EP – 288

Seat No.	

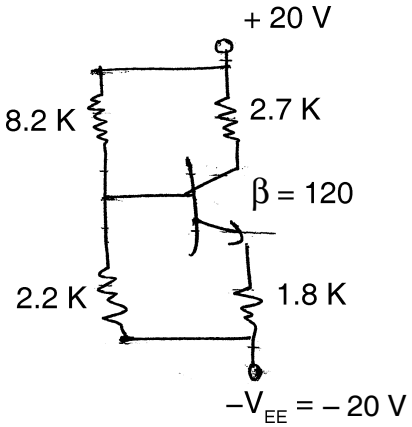
S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I

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

SECTION – I

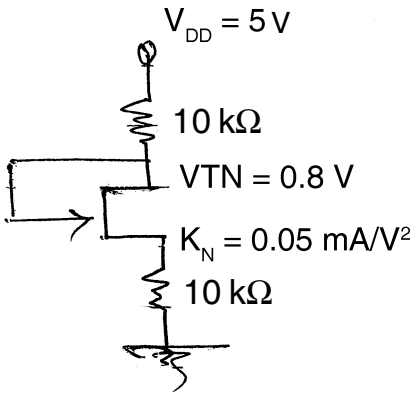
2. Attempt **any four** questions : **(4×4=16)**
   1) Draw and explain working of positive clipper and negative clipper circuit with respective waveforms.
   2) Define following specifications of zener diode
      a) Break down current.
      b) Maximum power dissipation.
   3) If the reverse saturation current in zener diode changes from 25 mA to 50 mA corresponding to the change in reverse voltage from 4.7 V to 4.75 V, determine the dynamic resistance of zener diode.
   4) List various biasing modes of BJT and explain any two with neat diagram.
   5) Draw and explain working of center tap and bridge full wave rectifier.

3. Attempt **any two** : **(6×2=12)**
   1) Explain working of emitter follower regulator and shunt regulator with neat diagram.
   2) Explain working of common emitter and common collector configuration with necessary diagrams.
   3) Determine the co-ordinates of Q point for given circuit.



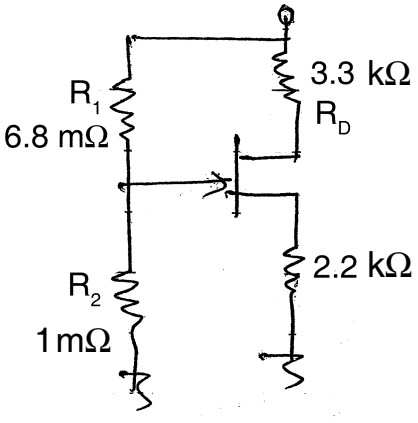
SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain the structure and working of DIAC with diagram.
   2) Draw and explain working of monostable multivibrator circuit using IC 555 with neat waveforms.
   3) For following circuit find I_D and V_{GS}.



   4) Draw and explain working of JFET in detail.
   5) Differentiate between BJT and FET.

5. Attempt **any two** : **(6×2=12)**
   1) Explain how BJT is used as switch and as an amplifier with necessary figure.
   2) For shown figure determine I_D, V_{GS} for JFET.



Given

$V_D \cong 7$ V

   3) Explain followings :
      a) Power transistors
      b) IGBT structure.

Set Q

SLR-EP – 288

Seat No.	

Set **R**

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) During operation of N-channel depletion type MOSFET, the gate voltage has to be
a) Negative b) Zero c) Low positive d) High positive

2) A FET is better chopper than a BJT because it has
a) Low offset voltage b) High i/p current
c) High i/p resistance d) High series ON resistance

3) The i/p impedance of a JFET is
a) About zero b) About infinity
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4) A silicon controlled rectifier is a _____ layer solid state device.
a) 3 b) 2 c) 5 d) 4

5) Astable multivibrator using IC 555 gives _____ states.
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6) Diac is made up of two _____ diodes connected back to back.
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7) Triac is a type of thyristors that can conduct in _____ direction.
a) one b) both c) upper d) down

8) _____ are used as static devices in power electronic converters.
a) Power FET b) Power BJT
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   a) Only free electrons b) Only holes
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_____

SLR-EP – 288

Seat No.	

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Draw and explain working of positive clipper and negative clipper circuit with respective waveforms.
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3. Attempt **any two** : **(6×2=12)**
   1) Explain working of emitter follower regulator and shunt regulator with neat diagram.
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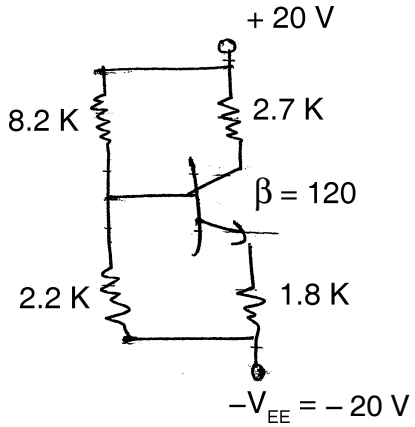

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain the structure and working of DIAC with diagram.
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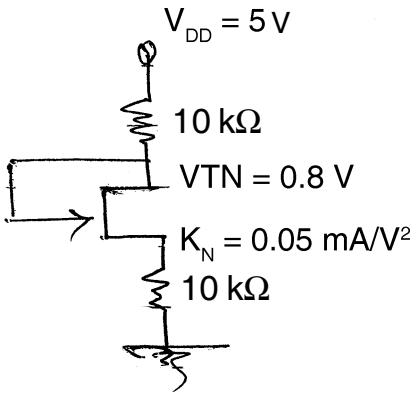

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   1) Explain how BJT is used as switch and as an amplifier with necessary figure.
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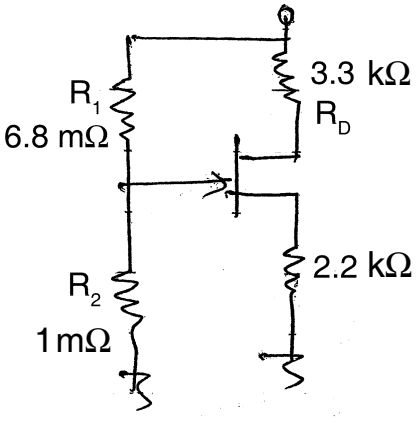

Given

$V_D \cong 7$ V

   3) Explain followings :
      a) Power transistors
      b) IGBT structure.

Set R

SLR-EP – 288

Seat No.	

Set **S**

S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I

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

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

Duration : 30 Minutes Marks : 14

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

1) Diac is made up of two _____ diodes connected back to back.
a) pnp b) npn c) FET d) zener

2) Triac is a type of thyristors that can conduct in _____ direction.
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3) _____ are used as static devices in power electronic converters.
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c) Power regulator d) Power JFET

4) A power diode is a _____ type three layer device.
a) $p^+n^-n^+$ b) $p^+n^+n^-$
c) $n^+p^-p^+$ d) $n^+p^+n^-$

5) The high frequency operation of a power semiconductor circuit is limited by
a) ON state loss b) OFF state loss
c) Switching loss d) All of these

6) For the RC coupled amplifier, the drop in gain at low frequencies is due to the increasing resistance of
a) C_C b) C_S c) C_E d) All the above

7) The gate of FET controls
a) Width of the channel b) Drain current
c) Gate voltage d) Source voltage

8) Transconductance is measured in
a) Mhos or Siemens b) Ohms
c) Volts d) Amperes

P.T.O.

9) A unipolar device uses only
   a) Only free electrons b) Only holes
   c) Both a and b d) Not both

10) During operation of N-channel depletion type MOSFET, the gate voltage has to be
   a) Negative b) Zero c) Low positive d) High positive

11) A FET is better chopper than a BJT because it has
   a) Low offset voltage b) High i/p current
   c) High i/p resistance d) High series ON resistance

12) The i/p impedance of a JFET is
   a) About zero b) About infinity
   c) About 100 Ω d) About 10 kΩ

13) A silicon controlled rectifier is a _____ layer solid state device.
   a) 3 b) 2 c) 5 d) 4

14) Astable multivibrator using IC 555 gives _____ states.
   a) one b) two c) more d) zero

_____

SLR-EP – 288

Seat No.	

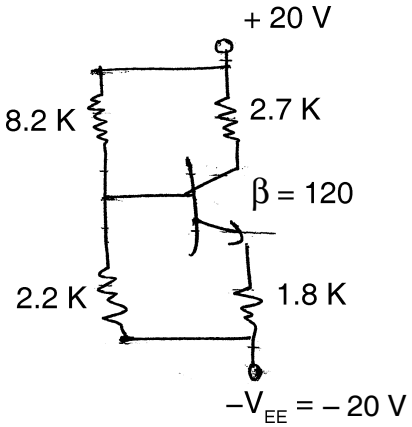
S.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I

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

SECTION – I

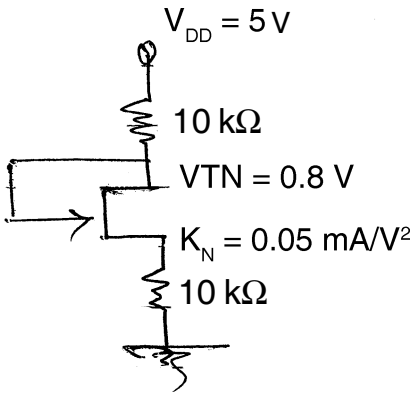
2. Attempt **any four** questions : **(4×4=16)**
   1) Draw and explain working of positive clipper and negative clipper circuit with respective waveforms.
   2) Define following specifications of zener diode
      a) Break down current.
      b) Maximum power dissipation.
   3) If the reverse saturation current in zener diode changes from 25 mA to 50 mA corresponding to the change in reverse voltage from 4.7 V to 4.75 V, determine the dynamic resistance of zener diode.
   4) List various biasing modes of BJT and explain any two with neat diagram.
   5) Draw and explain working of center tap and bridge full wave rectifier.

3. Attempt **any two** : **(6×2=12)**
   1) Explain working of emitter follower regulator and shunt regulator with neat diagram.
   2) Explain working of common emitter and common collector configuration with necessary diagrams.
   3) Determine the co-ordinates of Q point for given circuit.



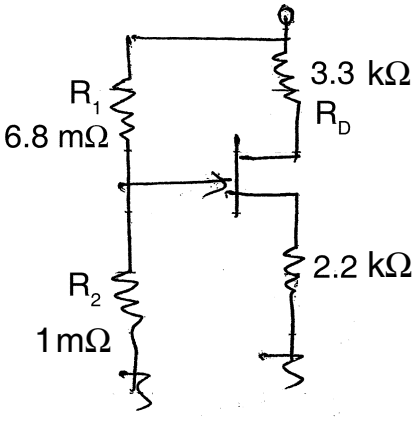
SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain the structure and working of DIAC with diagram.
   2) Draw and explain working of monostable multivibrator circuit using IC 555 with neat waveforms.
   3) For following circuit find I_D and V_{GS}.



   4) Draw and explain working of JFET in detail.
   5) Differentiate between BJT and FET.

5. Attempt **any two** : **(6×2=12)**
   1) Explain how BJT is used as switch and as an amplifier with necessary figure.
   2) For shown figure determine I_D, V_{GS} for JFET.



Given

$V_D \cong 7$ V

   3) Explain followings :
      a) Power transistors
      b) IGBT structure.

SLR-EP – 289

Seat No.	

Set **P**

S.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2016
LINEAR CIRCUIT ANALYSIS

Day and Date : Thursday, 22-12-2016 Total Marks : 70

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

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

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

3) ***All*** *questions are* ***compulsory****.*

4) Neat diagrams must be drawn ***whenever*** *necessary.*

5) Figures to the right indicate ***full*** *marks.*

6) Make suitable assumptions ***if necessary*** *and mention them clearly.*

7) ***Use*** *of log tables and nonprogrammable single memory calculator is* ***allowed****.*

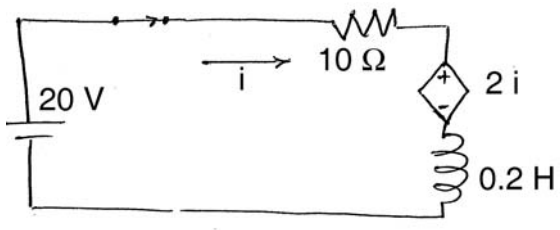
MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The initial current in the circuit shown in fig as when the switch is opened for t > 0 is

a) 1.67 A b) 3 A c) 0 A d) 2 A



2) Which parameters are widely used in transmission line theory ?

a) Z parameters b) Y parameters

c) ABCD parameters d) h parameters

3) If $Z_{11} = 2\,\Omega$; $Z_{12} = 1\,\Omega$; $Z_{21} = 1\,\Omega$; $Z_{22} = 3\,\Omega$, what is the determinant of admittance matrix.

a) 5 b) 1/5 c) 1 d) None of these

4) What is phase angle of a series RLC circuit at resonance ?

a) Zero b) 90° c) 45° d) 30°

P.T.O.

5) A circuit consist of two resistances , R_1 and R_2 in parallel the total current passing through the circuit is I_T. The passing through R_1 is

a) $I_T\ R_1/(R_1+R_2)$ b) $I_T(R_1+R_2)/R_1$ c) $I_TR_2/(R_1+R_2)$ d) $(I_TR_1+R_2)/R_2$

6) 100 ohm resistor is connected across the terminals of a 2.5 V battery. What is the power dissipation in the resistor ?

a) 25 W b) 100 W c) 0.4 W d) 6.25 W

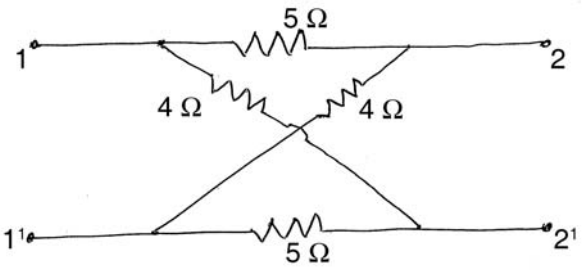
7) In order to tune a parallel resonant circuit to a lower frequency, the capacitance must

a) Be increased b) Be decreased

c) Be zero d) Remain the same

8) What is the transfer admittance of the two networks shown in figure ?

a) $-1\,\Omega$ b) $2\,\Omega$ c) $3\,\Omega$ d) $4\,\Omega$



9) An ideal filter should have

a) Zero attenuation in the pass band b) Infinite attenuation in the pass band

c) Zero attenuation in attenuation band d) None of these

10) Which of the following is an Ideal Voltage Source ?

a) Voltage independent of Current b) Current independent of Voltage

c) Both a) and b) d) None of the above

11) The propagation constant of a symmetrical T-section and π-section are the same

a) True b) False c) Zero d) None of these

12) Nodal method of Circuit analysis is based on

a) KVL and Ohm's Law b) KCL and Ohm's Law

c) KVL and KCL d) KVL, KCL and Ohm's Law

13) The time constant of RC circuit is

a) 1/RC b) R/C c) RC d) e^{-RC}

14) Identify the passive element among the following

a) Voltage source b) Current source c) Inductor d) Transistor

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SLR-EP – 289

Seat No.	

S.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2016
LINEAR CIRCUIT ANALYSIS

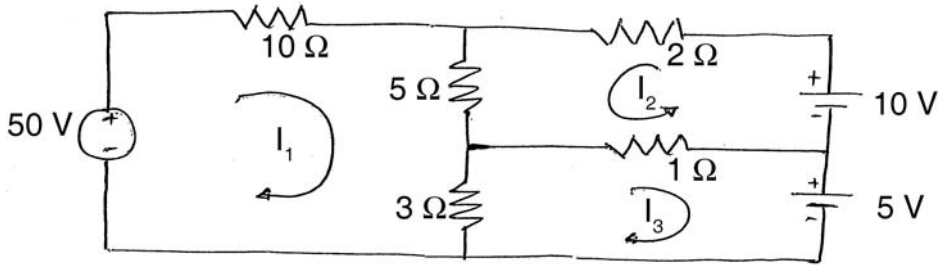
Day and Date : Thursday, 22-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **2** and Q. **4** are Short Answer Type questions.*
*3) Q. **3** and Q. **5** are Long Answer Type questions.*
*4) Neat diagrams must be drawn **whenever** necessary.*
*5) Figures to the right indicate **full** marks.*
*6) Make suitable assumptions **if necessary** and mention them clearly.*
*7) **Use** of log tables and nonprogrammable single memory calculator is **allowed**.*

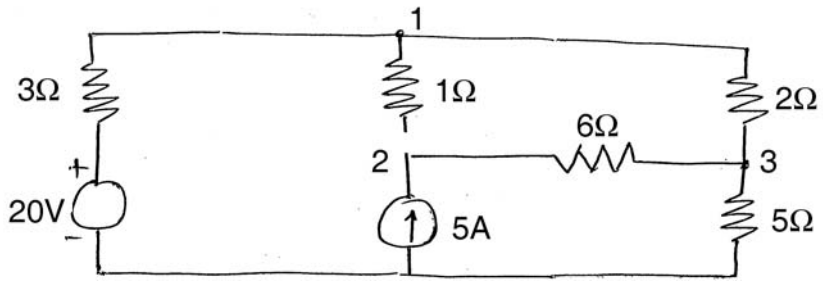
SECTION – I

2. Answer **any five** of the following questions : **15**

a) Determine the mesh current I_1, I_2 and I_3 shown in the circuit and determine the currents. **3**

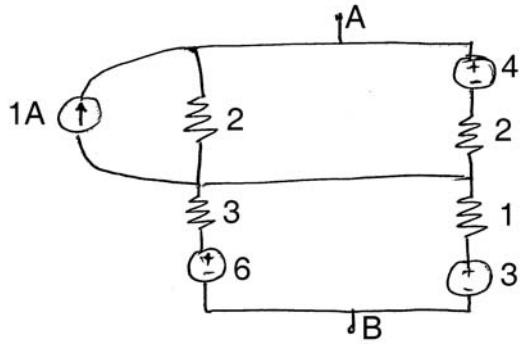


b) Find the power dissipated in the 6 Ω resistor for the circuit shown using nodal analysis. **3**



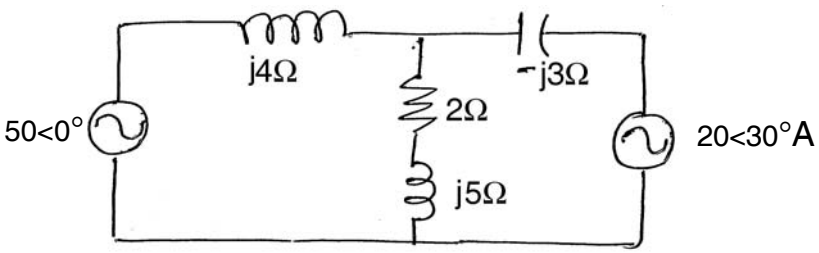
Set P

c) Reduce the network shown in figure into a single source and resistor between terminal A and B using source transformation. **3**



d) State thevenin's theorem and write the procedure to solve problems using thevenin's theorem. **3**

e) Determine the voltage across (2+j5) Ω impedance as shown in figure by using superposition theorem. **3**



f) State maximum power transfer theorem and write the procedure to solve problems using maximum power transfer theorem. **3**

g) Derive the expression for DC response of an RC circuit. **3**

3. Answer **any three** of the following questions : **13**

a) Derive Q factor for parallel RLC circuit of parallel resistance. **4**

b) Derive expression for solving resonant frequency for series resonance for RLC circuit. **5**

c) Derive the expression of resonant frequency for the parallel resonance. **4**

d) Determine the Quality factor of a coil for the series circuit consisting of R = 10 Ω , L = 0.1H and C =10 μ F. **4**

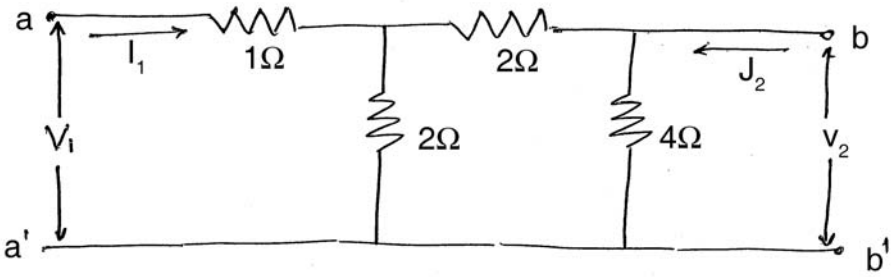
e) Derive and explain resonant frequency for a Tank circuit with circuit diagram. **4**

SECTION – II

4. Answer **any five** of the following questions : **15**

a) Derive transmission (ABCD) parameters of two port networks. **3**

b) Find the Y parameters for the networks. **3**



c) Derive expression of Z parameters in terms of Y parameters and vise-versa. **3**

d) Derive T-network for filter network. **3**

e) Design a high pass filter having a cut-off frequency of 1KHZ with load resistance of 600 ohm. **3**

f) Explain design procedure of bridge-T attenuator with necessary equation and diagram. **3**

g) Write the auxiliary equation and Test for stability for the following equation by using Hurwitz or Routh's method.

$S^4 + 6S^3 + 26S^2 + 56S + 80 = 0$. **3**

5. Answer **any three** of the following questions : **13**

a) Design a symmetrical Lattice attenuator to have characteristics impedance of 800 ohm and attenuation of 20 dB. **4**

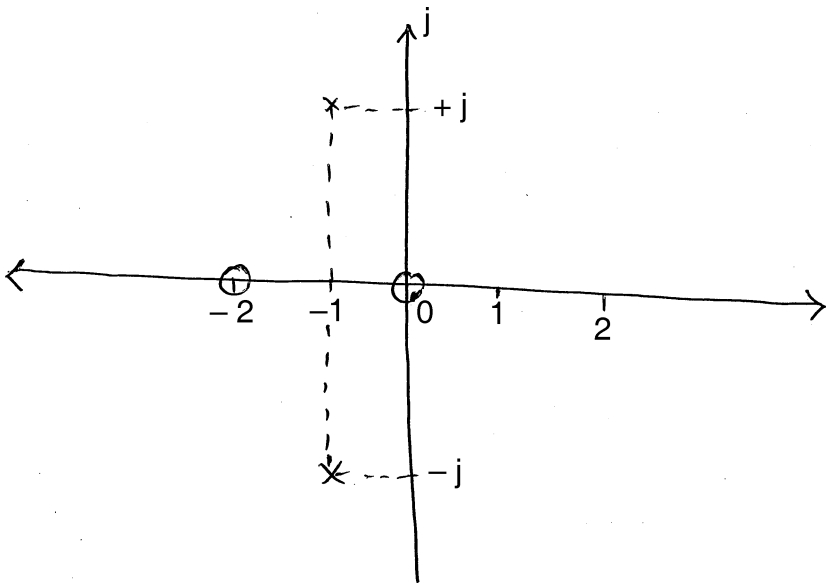
b) Obtain pole-zero plot for the following function. **5**

1) $f(s) = \dfrac{S(S+1)}{S^2+6S+8}$

2) $f(s) = \dfrac{S-5}{S^2+8S+16}$

c) Design a T-pad attenuator to give 60 dB attenuation and to work in a line of 500 ohm impedance. **4**

d) Obtain the admittance function Y(s) for which pole-zero plot is given below. **4**



SLR-EP – 289

Seat No.	

Set **Q**

S.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2016
LINEAR CIRCUIT ANALYSIS

Day and Date : Thursday, 22-12-2016 Total Marks : 70

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

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

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7) ***Use*** *of log tables and nonprogrammable single memory calculator is* ***allowed****.*

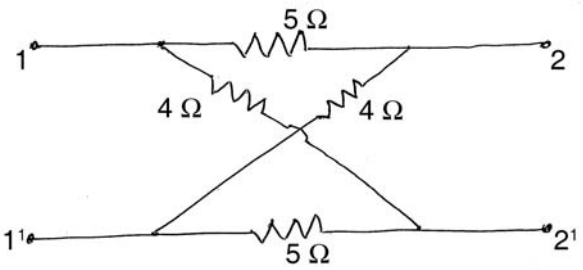
MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) What is the transfer admittance of the two networks shown in figure ?

a) $-1\,\Omega$ b) $2\,\Omega$ c) $3\,\Omega$ d) $4\,\Omega$



2) An ideal filter should have

a) Zero attenuation in the pass band b) Infinite attenuation in the pass band

c) Zero attenuation in attenuation band d) None of these

3) Which of the following is an Ideal Voltage Source ?

a) Voltage independent of Current b) Current independent of Voltage

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P.T.O.

4) The propagation constant of a symmetrical T-section and π-section are the same
   a) True b) False c) Zero d) None of these
5) Nodal method of Circuit analysis is based on
   a) KVL and Ohm's Law b) KCL and Ohm's Law
   c) KVL and KCL d) KVL, KCL and Ohm's Law
6) The time constant of RC circuit is
   a) 1/RC b) R/C c) RC d) e^{-RC}
7) Identify the passive element among the following
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8) The initial current in the circuit shown in fig as when the switch is opened for t > 0 is
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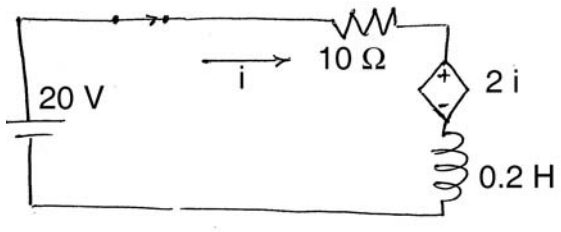

9) Which parameters are widely used in transmission line theory ?
   a) Z parameters b) Y parameters
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10) If $Z_{11} = 2\,\Omega$; $Z_{12} = 1\,\Omega$; $Z_{21} = 1\,\Omega$; $Z_{22} = 3\,\Omega$, what is the determinant of admittance matrix.
   a) 5 b) 1/5 c) 1 d) None of these
11) What is phase angle of a series RLC circuit at resonance ?
   a) Zero b) 90° c) 45° d) 30°
12) A circuit consist of two resistances , R_1 and R_2 in parallel the total current passing through the circuit is I_T. The passing through R_1 is
   a) $I_T\ R_1/(R_1+R_2)$ b) $I_T(R_1+R_2)/R_1$ c) $I_TR_2/(R_1+R_2)$ d) $(I_TR_1+R_2)/R_2$
13) 100 ohm resistor is connected across the terminals of a 2.5 V battery. What is the power dissipation in the resistor ?
   a) 25 W b) 100 W c) 0.4 W d) 6.25 W
14) In order to tune a parallel resonant circuit to a lower frequency, the capacitance must
   a) Be increased b) Be decreased
   c) Be zero d) Remain the same

SLR-EP – 289

Seat No.	

S.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2016
LINEAR CIRCUIT ANALYSIS

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

***Instructions** : 1) **All** questions are **compulsory**.*
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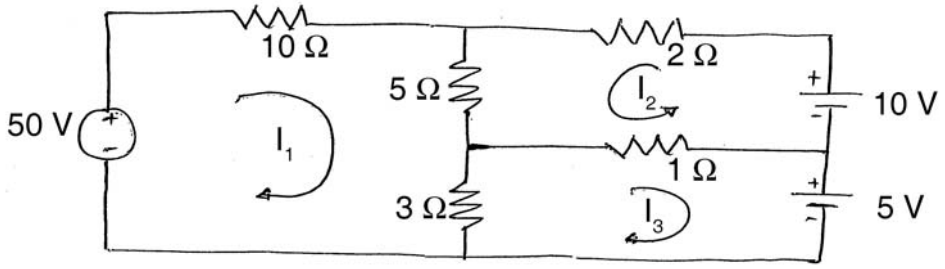
*7) **Use** of log tables and nonprogrammable single memory calculator is **allowed**.*

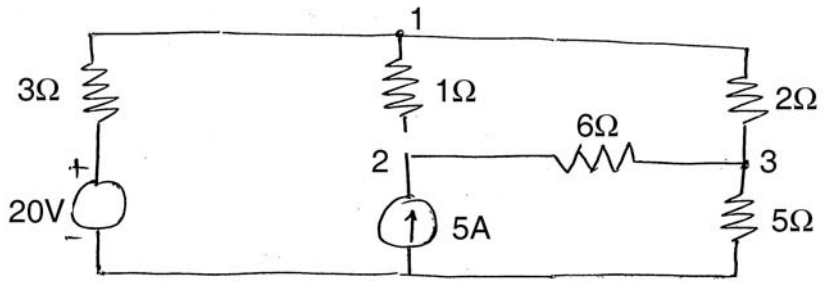
SECTION – I

2. Answer **any five** of the following questions : **15**

a) Determine the mesh current I_1, I_2 and I_3 shown in the circuit and determine the currents. **3**

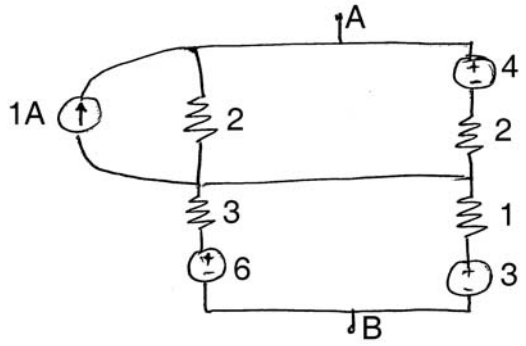


b) Find the power dissipated in the 6 Ω resistor for the circuit shown using nodal analysis. **3**



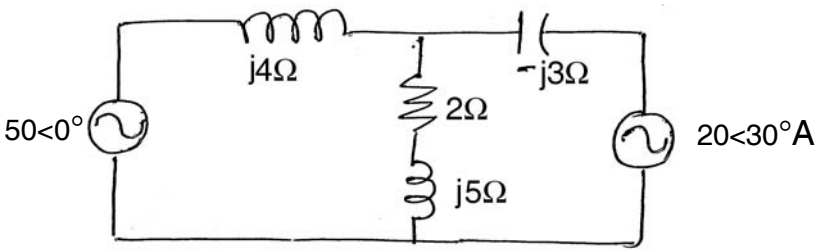
Set Q

c) Reduce the network shown in figure into a single source and resistor between terminal A and B using source transformation. **3**



d) State thevenin's theorem and write the procedure to solve problems using thevenin's theorem. **3**

e) Determine the voltage across (2+j5) Ω impedance as shown in figure by using superposition theorem. **3**



f) State maximum power transfer theorem and write the procedure to solve problems using maximum power transfer theorem. **3**

g) Derive the expression for DC response of an RC circuit. **3**

3. Answer **any three** of the following questions : **13**

a) Derive Q factor for parallel RLC circuit of parallel resistance. **4**

b) Derive expression for solving resonant frequency for series resonance for RLC circuit. **5**

c) Derive the expression of resonant frequency for the parallel resonance. **4**

d) Determine the Quality factor of a coil for the series circuit consisting of R = 10 Ω, L = 0.1H and C =10 μF. **4**

e) Derive and explain resonant frequency for a Tank circuit with circuit diagram. **4**

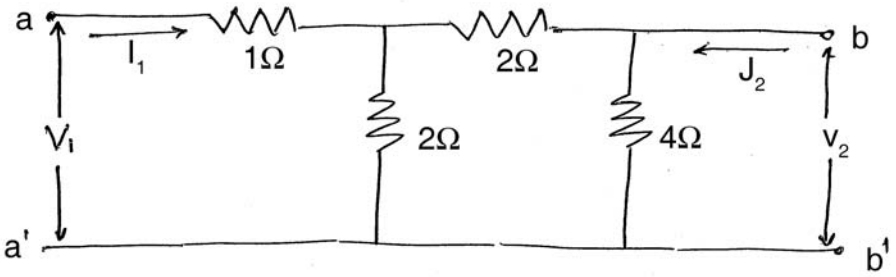
Set Q

SECTION – II

4. Answer **any five** of the following questions : **15**

a) Derive transmission (ABCD) parameters of two port networks. **3**

b) Find the Y parameters for the networks. **3**



c) Derive expression of Z parameters in terms of Y parameters and vise-versa. **3**

d) Derive T-network for filter network. **3**

e) Design a high pass filter having a cut-off frequency of 1KHZ with load resistance of 600 ohm. **3**

f) Explain design procedure of bridge-T attenuator with necessary equation and diagram. **3**

g) Write the auxiliary equation and Test for stability for the following equation by using Hurwitz or Routh's method.

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5. Answer **any three** of the following questions : **13**

a) Design a symmetrical Lattice attenuator to have characteristics impedance of 800 ohm and attenuation of 20 dB. **4**

b) Obtain pole-zero plot for the following function. **5**

1) $f(s) = \dfrac{S(S+1)}{S^2+6S+8}$

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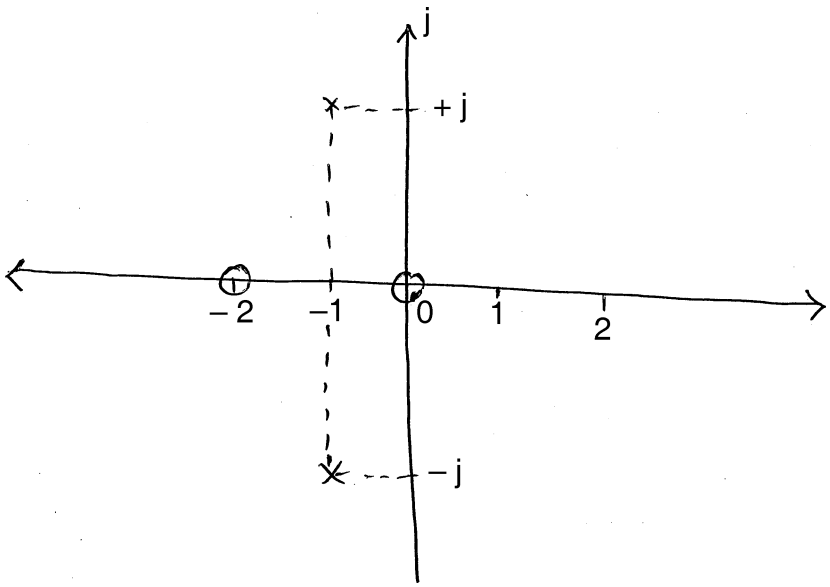

SLR-EP – 289

Seat No.	

Set **R**

S.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2016
LINEAR CIRCUIT ANALYSIS

Day and Date : Thursday, 22-12-2016 Total Marks : 70

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

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

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5) Figures to the right indicate ***full*** *marks.*

6) Make suitable assumptions ***if necessary*** *and mention them clearly.*

7) ***Use*** *of log tables and nonprogrammable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) A circuit consist of two resistances , R_1 and R_2 in parallel the total current passing through the circuit is I_T. The passing through R_1 is

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2) 100 ohm resistor is connected across the terminals of a 2.5 V battery. What is the power dissipation in the resistor ?

a) 25 W b) 100 W c) 0.4 W d) 6.25 W

3) In order to tune a parallel resonant circuit to a lower frequency, the capacitance must

a) Be increased b) Be decreased

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P.T.O.

4) What is the transfer admittance of the two networks shown in figure ?

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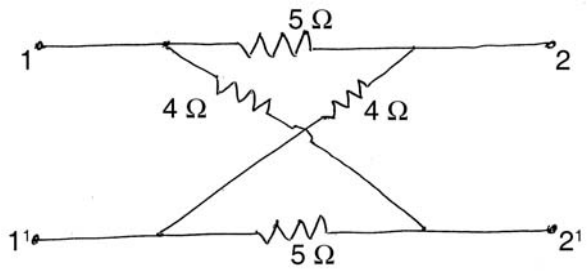


5) An ideal filter should have

a) Zero attenuation in the pass band b) Infinite attenuation in the pass band
c) Zero attenuation in attenuation band d) None of these

6) Which of the following is an Ideal Voltage Source ?

a) Voltage independent of Current b) Current independent of Voltage
c) Both a) and b) d) None of the above

7) The propagation constant of a symmetrical T-section and π-section are the same

a) True b) False c) Zero d) None of these

8) Nodal method of Circuit analysis is based on

a) KVL and Ohm's Law b) KCL and Ohm's Law
c) KVL and KCL d) KVL, KCL and Ohm's Law

9) The time constant of RC circuit is

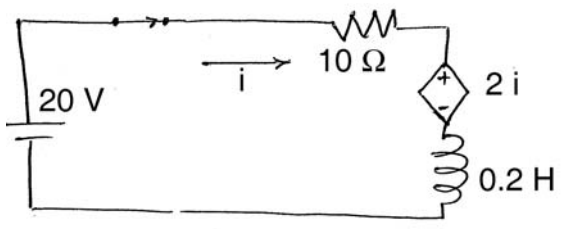
a) 1/RC b) R/C c) RC d) e^{-RC}

10) Identify the passive element among the following

a) Voltage source b) Current source c) Inductor d) Transistor

11) The initial current in the circuit shown in fig as when the switch is opened for t > 0 is

a) 1.67 A b) 3 A c) 0 A d) 2 A



12) Which parameters are widely used in transmission line theory ?

a) Z parameters b) Y parameters
c) ABCD parameters d) h parameters

13) If $Z_{11} = 2\,\Omega$; $Z_{12} = 1\,\Omega$; $Z_{21} = 1\,\Omega$; $Z_{22} = 3\,\Omega$, what is the determinant of admittance matrix.

a) 5 b) 1/5 c) 1 d) None of these

14) What is phase angle of a series RLC circuit at resonance ?

a) Zero b) 90° c) 45° d) 30°

Set R

SLR-EP – 289

Seat No.	

S.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2016
LINEAR CIRCUIT ANALYSIS

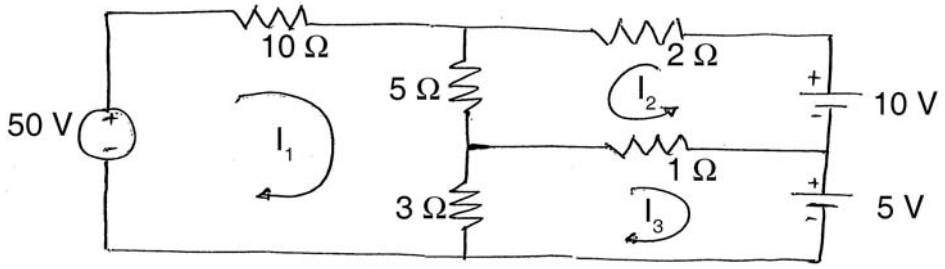
Day and Date : Thursday, 22-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **2** and Q. **4** are Short Answer Type questions.*
*3) Q. **3** and Q. **5** are Long Answer Type questions.*
*4) Neat diagrams must be drawn **whenever** necessary.*
*5) Figures to the right indicate **full** marks.*
*6) Make suitable assumptions **if necessary** and mention them clearly.*
*7) **Use** of log tables and nonprogrammable single memory calculator is **allowed**.*

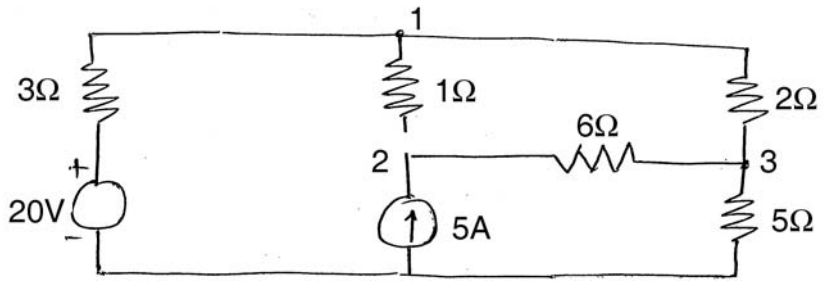
SECTION – I

2. Answer **any five** of the following questions : **15**

a) Determine the mesh current I_1, I_2 and I_3 shown in the circuit and determine the currents. **3**

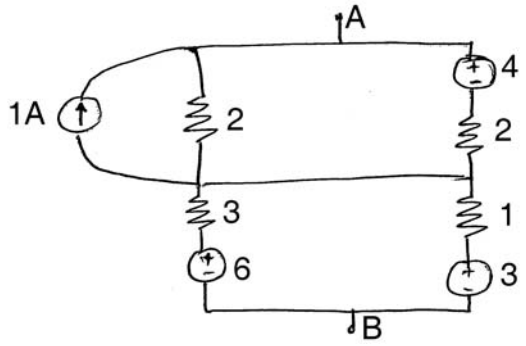


b) Find the power dissipated in the 6 Ω resistor for the circuit shown using nodal analysis. **3**



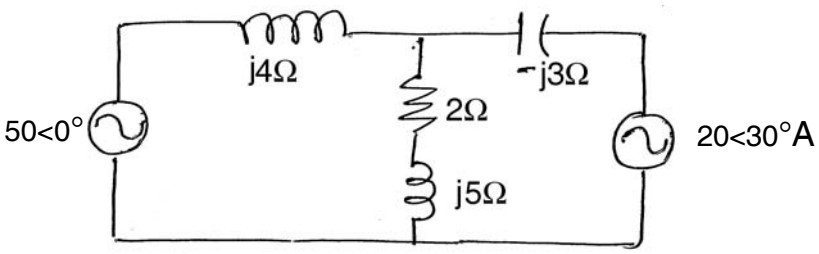
Set R

c) Reduce the network shown in figure into a single source and resistor between terminal A and B using source transformation. **3**



d) State thevenin's theorem and write the procedure to solve problems using thevenin's theorem. **3**

e) Determine the voltage across (2+j5) Ω impedance as shown in figure by using superposition theorem. **3**



f) State maximum power transfer theorem and write the procedure to solve problems using maximum power transfer theorem. **3**

g) Derive the expression for DC response of an RC circuit. **3**

3. Answer **any three** of the following questions : **13**

a) Derive Q factor for parallel RLC circuit of parallel resistance. **4**

b) Derive expression for solving resonant frequency for series resonance for RLC circuit. **5**

c) Derive the expression of resonant frequency for the parallel resonance. **4**

d) Determine the Quality factor of a coil for the series circuit consisting of R = 10 Ω, L = 0.1H and C =10 μF. **4**

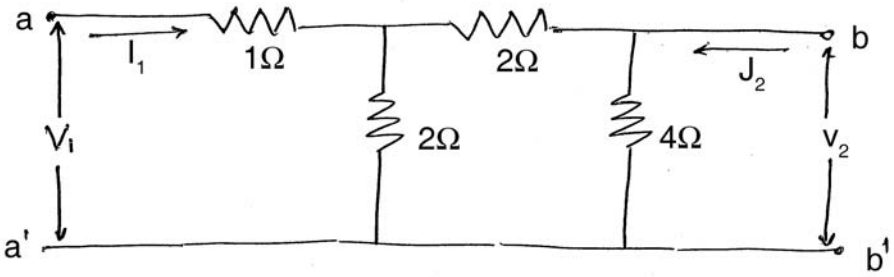
e) Derive and explain resonant frequency for a Tank circuit with circuit diagram. **4**

SECTION – II

4. Answer **any five** of the following questions : **15**

a) Derive transmission (ABCD) parameters of two port networks. **3**

b) Find the Y parameters for the networks. **3**



c) Derive expression of Z parameters in terms of Y parameters and vise-versa. **3**

d) Derive T-network for filter network. **3**

e) Design a high pass filter having a cut-off frequency of 1KHZ with load resistance of 600 ohm. **3**

f) Explain design procedure of bridge-T attenuator with necessary equation and diagram. **3**

g) Write the auxiliary equation and Test for stability for the following equation by using Hurwitz or Routh's method.

$S^4 + 6S^3 + 26S^2 + 56S + 80 = 0$. **3**

5. Answer **any three** of the following questions : **13**

a) Design a symmetrical Lattice attenuator to have characteristics impedance of 800 ohm and attenuation of 20 dB. **4**

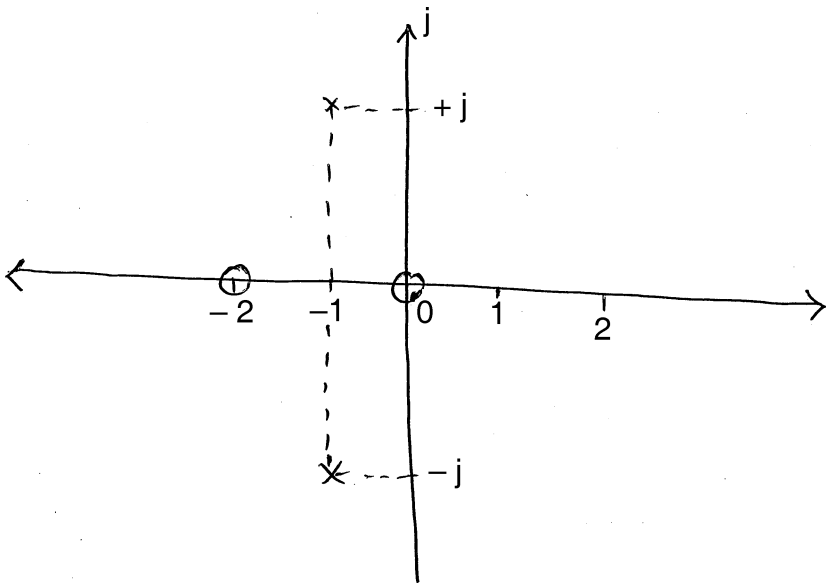
b) Obtain pole-zero plot for the following function. **5**

1) $f(s) = \dfrac{S(S+1)}{S^2+6S+8}$

2) $f(s) = \dfrac{S-5}{S^2+8S+16}$

c) Design a T-pad attenuator to give 60 dB attenuation and to work in a line of 500 ohm impedance. **4**

d) Obtain the admittance function Y(s) for which pole-zero plot is given below. **4**



SLR-EP – 289

Seat No.	

Set **S**

S.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2016
LINEAR CIRCUIT ANALYSIS

Day and Date : Thursday, 22-12-2016 Total Marks : 70

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

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

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

3) ***All*** *questions are* ***compulsory****.*

4) Neat diagrams must be drawn ***whenever*** *necessary.*

5) Figures to the right indicate ***full*** *marks.*

6) Make suitable assumptions ***if necessary*** *and mention them clearly.*

7) ***Use*** *of log tables and nonprogrammable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Which of the following is an Ideal Voltage Source ?

a) Voltage independent of Current b) Current independent of Voltage

c) Both a) and b) d) None of the above

2) The propagation constant of a symmetrical T-section and π-section are the same

a) True b) False c) Zero d) None of these

3) Nodal method of Circuit analysis is based on

a) KVL and Ohm's Law b) KCL and Ohm's Law

c) KVL and KCL d) KVL, KCL and Ohm's Law

4) The time constant of RC circuit is

a) 1/RC b) R/C c) RC d) e^{-RC}

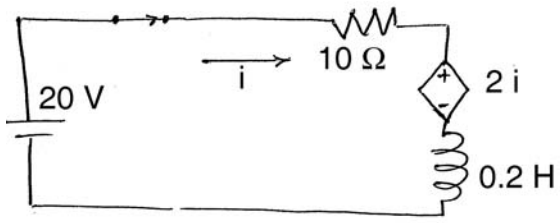
5) Identify the passive element among the following

a) Voltage source b) Current source c) Inductor d) Transistor

P.T.O.

6) The initial current in the circuit shown in fig as when the switch is opened for t > 0 is

a) 1.67 A b) 3 A c) 0 A d) 2 A



7) Which parameters are widely used in transmission line theory ?

a) Z parameters b) Y parameters

c) ABCD parameters d) h parameters

8) If $Z_{11} = 2\,\Omega$; $Z_{12} = 1\,\Omega$; $Z_{21} = 1\,\Omega$; $Z_{22} = 3\,\Omega$, what is the determinant of admittance matrix.

a) 5 b) 1/5 c) 1 d) None of these

9) What is phase angle of a series RLC circuit at resonance ?

a) Zero b) 90° c) 45° d) 30°

10) A circuit consist of two resistances , R_1 and R_2 in parallel the total current passing through the circuit is I_T. The passing through R_1 is

a) $I_T\ R_1/(R_1+R_2)$ b) $I_T(R_1+R_2)/R_1$ c) $I_TR_2/(R_1+R_2)$ d) $(I_TR_1+R_2)/R_2$

11) 100 ohm resistor is connected across the terminals of a 2.5 V battery. What is the power dissipation in the resistor ?

a) 25 W b) 100 W c) 0.4 W d) 6.25 W

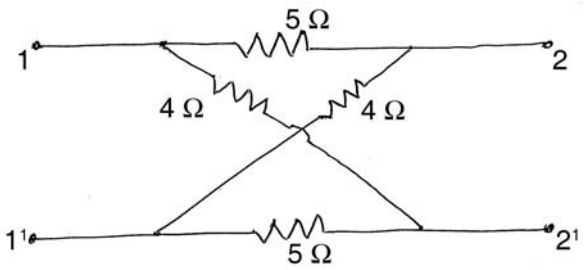
12) In order to tune a parallel resonant circuit to a lower frequency, the capacitance must

a) Be increased b) Be decreased

c) Be zero d) Remain the same

13) What is the transfer admittance of the two networks shown in figure ?

a) $-1\,\Omega$ b) $2\,\Omega$ c) $3\,\Omega$ d) $4\,\Omega$



14) An ideal filter should have

a) Zero attenuation in the pass band b) Infinite attenuation in the pass band

c) Zero attenuation in attenuation band d) None of these

SLR-EP – 289

Seat No.	

S.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2016
LINEAR CIRCUIT ANALYSIS

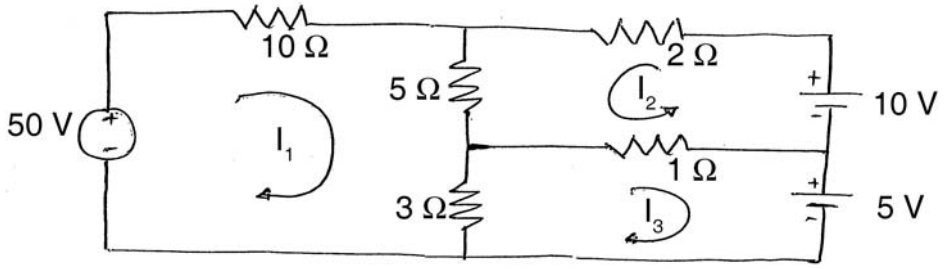
Day and Date : Thursday, 22-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **2** and Q. **4** are Short Answer Type questions.*
*3) Q. **3** and Q. **5** are Long Answer Type questions.*
*4) Neat diagrams must be drawn **whenever** necessary.*
*5) Figures to the right indicate **full** marks.*
*6) Make suitable assumptions **if necessary** and mention them clearly.*
*7) **Use** of log tables and nonprogrammable single memory calculator is **allowed**.*

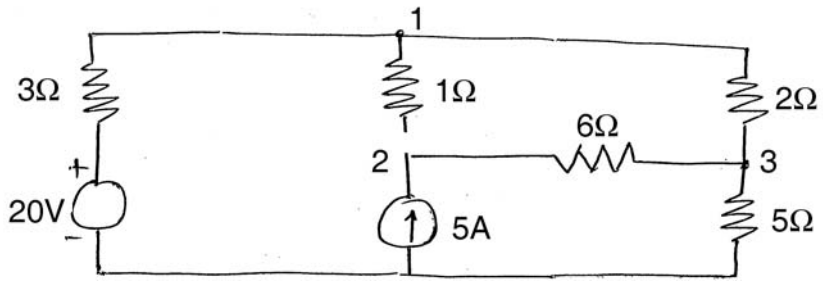
SECTION – I

2. Answer **any five** of the following questions : **15**

a) Determine the mesh current I_1, I_2 and I_3 shown in the circuit and determine the currents. **3**

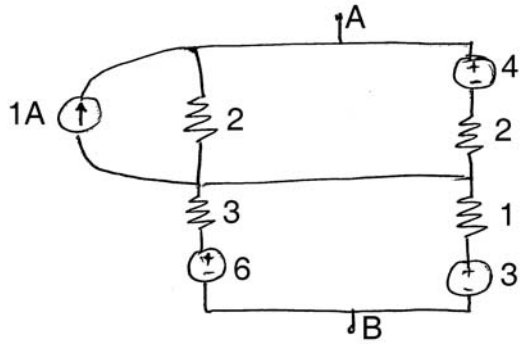


b) Find the power dissipated in the 6 Ω resistor for the circuit shown using nodal analysis. **3**



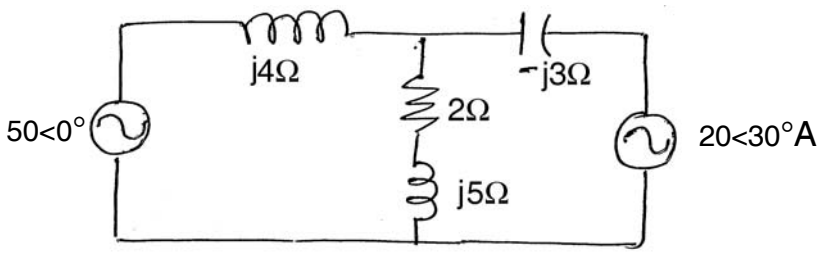
Set S

c) Reduce the network shown in figure into a single source and resistor between terminal A and B using source transformation. **3**



d) State thevenin's theorem and write the procedure to solve problems using thevenin's theorem. **3**

e) Determine the voltage across (2+j5) Ω impedance as shown in figure by using superposition theorem. **3**



f) State maximum power transfer theorem and write the procedure to solve problems using maximum power transfer theorem. **3**

g) Derive the expression for DC response of an RC circuit. **3**

3. Answer **any three** of the following questions : **13**

a) Derive Q factor for parallel RLC circuit of parallel resistance. **4**

b) Derive expression for solving resonant frequency for series resonance for RLC circuit. **5**

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d) Determine the Quality factor of a coil for the series circuit consisting of R = 10 Ω , L = 0.1H and C =10 μ F. **4**

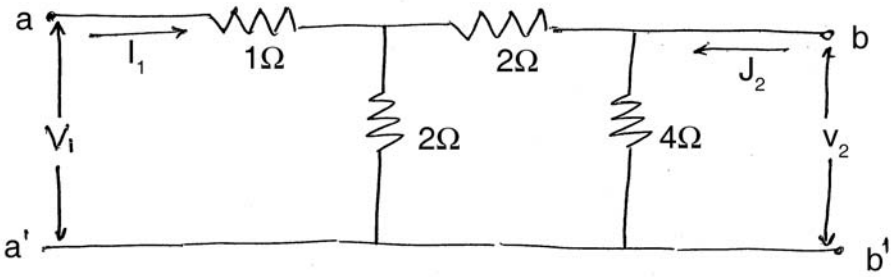
e) Derive and explain resonant frequency for a Tank circuit with circuit diagram. **4**

SECTION – II

4. Answer **any five** of the following questions : **15**

a) Derive transmission (ABCD) parameters of two port networks. **3**

b) Find the Y parameters for the networks. **3**



c) Derive expression of Z parameters in terms of Y parameters and vise-versa. **3**

d) Derive T-network for filter network. **3**

e) Design a high pass filter having a cut-off frequency of 1KHZ with load resistance of 600 ohm. **3**

f) Explain design procedure of bridge-T attenuator with necessary equation and diagram. **3**

g) Write the auxiliary equation and Test for stability for the following equation by using Hurwitz or Routh's method.

$S^4 + 6S^3 + 26S^2 + 56S + 80 = 0$. **3**

5. Answer **any three** of the following questions : **13**

a) Design a symmetrical Lattice attenuator to have characteristics impedance of 800 ohm and attenuation of 20 dB. **4**

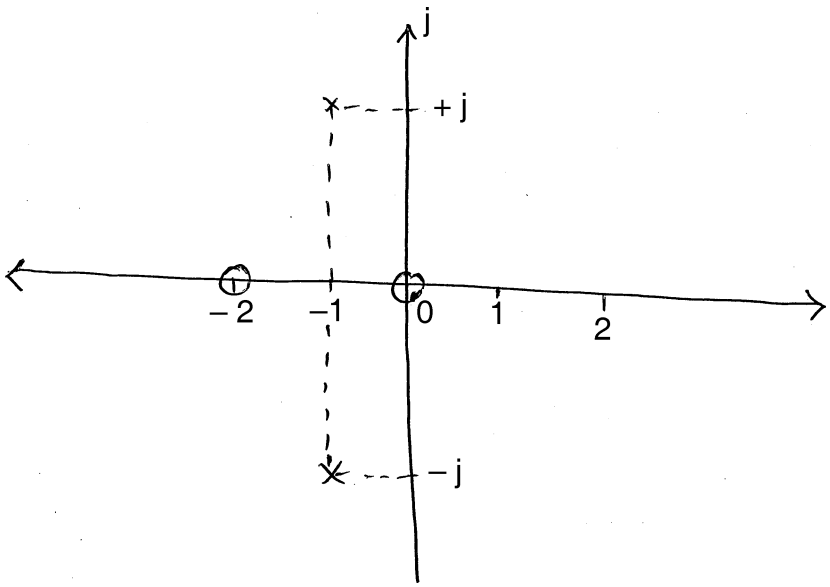
b) Obtain pole-zero plot for the following function. **5**

1) $f(s) = \dfrac{S(S+1)}{S^2+6S+8}$

2) $f(s) = \dfrac{S-5}{S^2+8S+16}$

c) Design a T-pad attenuator to give 60 dB attenuation and to work in a line of 500 ohm impedance. **4**

d) Obtain the admittance function Y(s) for which pole-zero plot is given below. **4**



SLR-EP – 290

Seat No.	

Set P

S.E. (Part – I) (Biomedical Engineering) (Old) Examination, 2016
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Subgraph is a subset of branches and _____ of a graph.
a) Nodes b) Planers c) Meshes d) Loop

2) A graph drawn on a _____ plane is said to be planer if two branches do not intersect.
a) One dimension b) 3 dimensional
c) 2 dimensional d) None of above

3) A sinusoidal alternating current and can be represented _____ by phasors.
a) Voltages b) Power c) Energy d) Watts

4) _____ analysis is based on Kirchoff's law.
a) Nodal b) Mesh c) Star delta d) None of above

5) A voltage source with a series resistance can be converted into an equivalent _____ source with a parallel resistance.
a) Voltage b) Power c) Current d) Watt

6) _____ is the property of a substance due to which it opposes the flow of electric current through it.
a) Capacitance b) Resistance
c) Inductance d) Impedance

7) Inductance is the property of a coil that opposes any change in the amount of _____ flowing through it.
a) Voltage b) Current c) Power d) Energy

8) An element which is a source of electrical signal of signal energy is termed as _____ element.
   a) Passive b) Active c) Series d) Parallel

9) A loop is any _____ part of the circuit.
   a) Closed b) Open c) Series d) Inductive

10) A _____ is a junction where two or more circuits elements are connected together.
   a) Node b) Mesh c) Branch d) Loop

11) For a graph with 'n' nodes and 'b' branches, the complete incidence matrix is of order
   a) n + b b) n / b c) n × b d) n – b

12) The nodal method of circuit analysis is based on
   a) KVL and Ohm's law b) KCL and Ohm's law
   c) KCL and KVL d) KCL, KVL and Ohm's law

13) The number of roots of $s^3 + 5s^2 + 7s + 3 = 0$ in the left half of s-plane is
   a) Zero b) One c) Two d) Three

14) For a 2 port network to be reciprocal
   a) $z_{11} = z_{22}$ b) $y_{12} = y_{21}$ c) $h_{21} = -h_{12}$ d) AD = BC

15) For a 2 port symmetrical bilateral network, if A = 3 and B = 1, the value of parameter C will be
   a) 4 b) 6 c) 8 d) 16

16) The transfer function of a low pass RC network is
   a) $\frac{1}{1+RCs}$ b) $\frac{RCs}{1+RCs}$ c) $\frac{s}{1+RCs}$ d) None

17) As the poles of a network shift away from the x-axis, the response
   a) Remains constant b) Becomes less oscillating
   c) More oscillating d) Variable

18) The transfer function is used to describe networks which have atleast _____ ports.
   a) 3 b) 4 c) 1 d) 2

19) When a unit impulse voltage is applied to an inductor of 1 H, the energy supplied by the source is _____
   a) ∞ b) 1 J c) $\frac{1}{2}$ J d) 0

20) If excitation and response are measured at same ports the network function is known as _____ point function.
   a) Transfer b) Fourier c) Laplace d) Driving

_____

SLR-EP – 290

Seat No.	

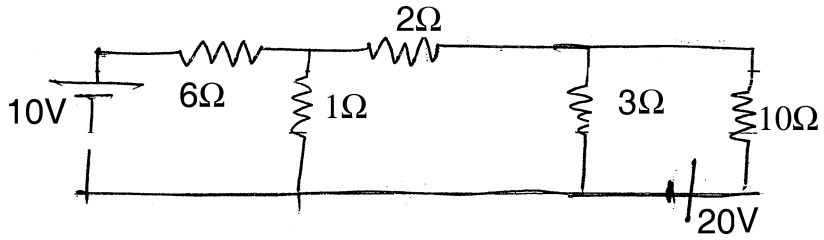
S.E. (Part – I) (Biomedical Engineering) (Old) Examination, 2016
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**

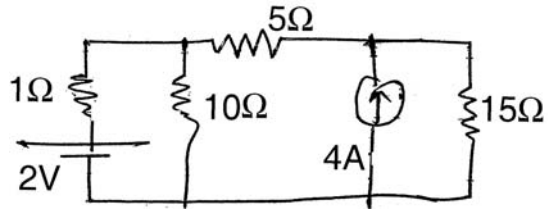
1) Find the current though 2 Ω resistor.



2) State and explain supernode and supermesh analysis with one example.

3) State and explain Thevenin's theorem.

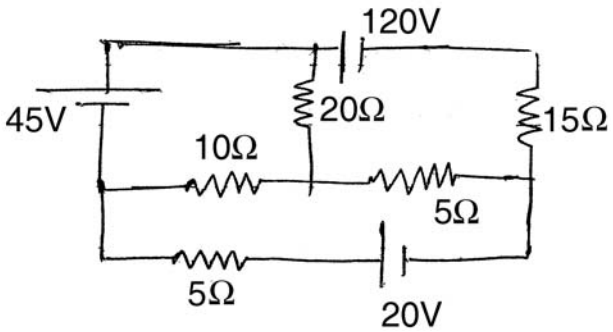
4) Find the current through 10 Ω resistor using mesh analysis.



5) Define and differentiate between nodal and mesh analysis.

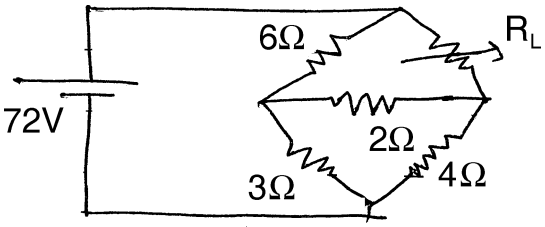
3. Attempt **any two** : **(10×2=20)**

1) Find the current through the 20 Ω resistor using Thevenin's theorem.

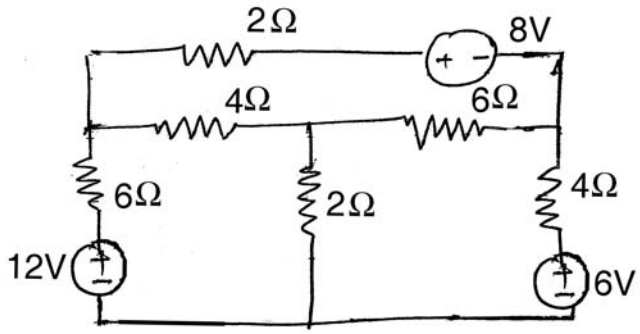


Set P

2) For circuit shown, find the value of resistance R_L for maximum power and calculate maximum power.



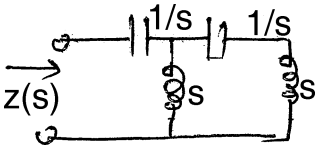
3) For the network shown write down the tieset matrix and obtain the network equilibrium equation in matrix form using KVL. Calculate loop currents.



SECTION – II

4. Attempt **any four** : **(4×5=20)**

1) Determine the driving point impedance of given network.



2) Explain current transfer and transfer impedance function.

3) Mention any 4 properties of positive real function and its necessary and also state sufficient condition.

4) Derive and explain condition of reciprocity for hybrid parameter.

5) State whether following polynomial is Hurwitz or not

a) $s^6 + 5s^5 + 4s^4 + 3s^3 + 2s^2 + s + 3$

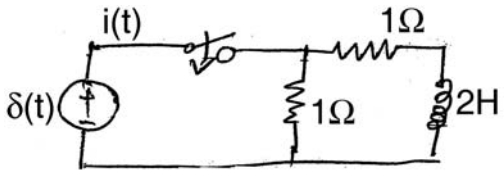
b) $s^4 + 4s^3 + 3s + 2$.

5. Attempt **any two** : **(10×2=20)**

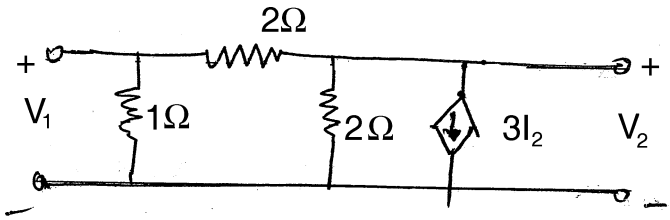
1) Realize Foster forms of a given LC impedance function

$$z(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}.$$

2) Find impulse response of the current i(t) in the network shown



3) For the network shown, find Z and Y parameter.



Set P

SLR-EP – 290

Seat No.	

Set **Q**

S.E. (Part – I) (Biomedical Engineering) (Old) Examination, 2016
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The transfer function of a low pass RC network is
a) $\frac{1}{1+RCs}$ b) $\frac{RCs}{1+RCs}$ c) $\frac{s}{1+RCs}$ d) None

2) As the poles of a network shift away from the x-axis, the response
a) Remains constant b) Becomes less oscillating
c) More oscillating d) Variable

3) The transfer function is used to describe networks which have atleast _____ ports.
a) 3 b) 4 c) 1 d) 2

4) When a unit impulse voltage is applied to an inductor of 1 H, the energy supplied by the source is _____
a) ∞ b) 1 J c) $\frac{1}{2}$ J d) 0

5) If excitation and response are measured at same ports the network function is known as _____ point function.
a) Transfer b) Fourier c) Laplace d) Driving

6) Subgraph is a subset of branches and _____ of a graph.
a) Nodes b) Planers c) Meshes d) Loop

7) A graph drawn on a _____ plane is said to be planer if two branches do not intersect.
a) One dimension b) 3 dimensional
c) 2 dimensional d) None of above

P.T.O.

8) A sinusoidal alternating current and can be represented _____ by phasors.
a) Voltages b) Power c) Energy d) Watts

9) _____ analysis is based on Kirchoff's law.
a) Nodal b) Mesh c) Star delta d) None of above

10) A voltage source with a series resistance can be converted into an equivalent _____ source with a parallel resistance.
a) Voltage b) Power c) Current d) Watt

11) _____ is the property of a substance due to which it opposes the flow of electric current through it.
a) Capacitance b) Resistance
c) Inductance d) Impedance

12) Inductance is the property of a coil that opposes any change in the amount of _____ flowing through it.
a) Voltage b) Current c) Power d) Energy

13) An element which is a source of electrical signal of signal energy is termed as _____ element.
a) Passive b) Active c) Series d) Parallel

14) A loop is any _____ part of the circuit.
a) Closed b) Open c) Series d) Inductive

15) A _____ is a junction where two or more circuits elements are connected together.
a) Node b) Mesh c) Branch d) Loop

16) For a graph with 'n' nodes and 'b' branches, the complete incidence matrix is of order
a) n + b b) n / b c) n × b d) n – b

17) The nodal method of circuit analysis is based on
a) KVL and Ohm's law b) KCL and Ohm's law
c) KCL and KVL d) KCL, KVL and Ohm's law

18) The number of roots of $s^3 + 5s^2 + 7s + 3 = 0$ in the left half of s-plane is
a) Zero b) One c) Two d) Three

19) For a 2 port network to be reciprocal
a) $z_{11} = z_{22}$ b) $y_{12} = y_{21}$ c) $h_{21} = -h_{12}$ d) AD = BC

20) For a 2 port symmetrical bilateral network, if A = 3 and B = 1, the value of parameter C will be
a) 4 b) 6 c) 8 d) 16

_____

SLR-EP – 290

Seat No.	

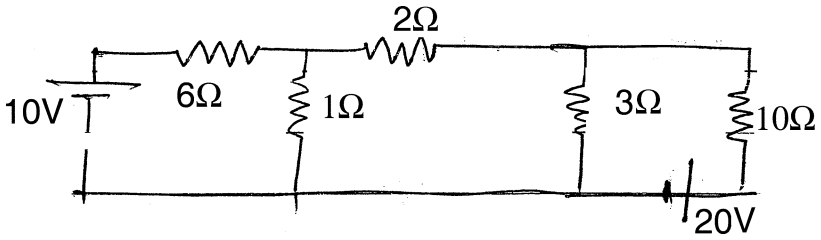
S.E. (Part – I) (Biomedical Engineering) (Old) Examination, 2016
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**

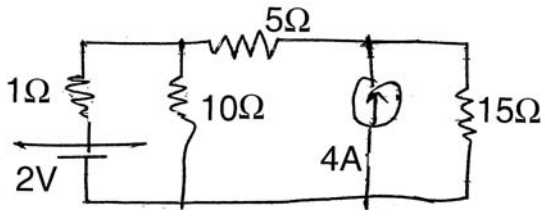
1) Find the current though 2 Ω resistor.



2) State and explain supernode and supermesh analysis with one example.

3) State and explain Thevenin's theorem.

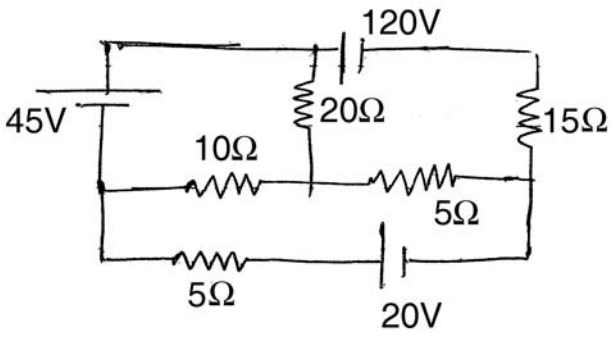
4) Find the current through 10 Ω resistor using mesh analysis.



5) Define and differentiate between nodal and mesh analysis.

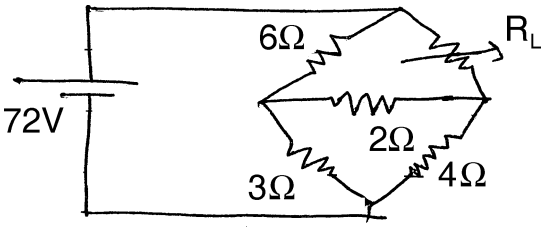
3. Attempt **any two** : **(10×2=20)**

1) Find the current through the 20 Ω resistor using Thevenin's theorem.

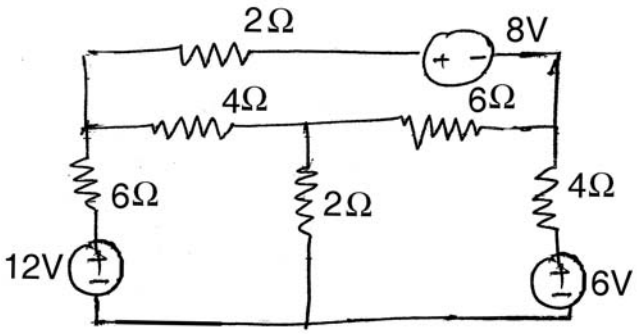


Set Q

2) For circuit shown, find the value of resistance R_L for maximum power and calculate maximum power.



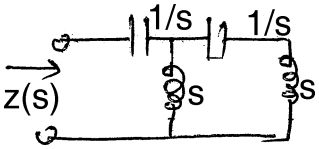
3) For the network shown write down the tieset matrix and obtain the network equilibrium equation in matrix form using KVL. Calculate loop currents.



SECTION – II

4. Attempt **any four** : **(4×5=20)**

1) Determine the driving point impedance of given network.



2) Explain current transfer and transfer impedance function.

3) Mention any 4 properties of positive real function and its necessary and also state sufficient condition.

4) Derive and explain condition of reciprocity for hybrid parameter.

5) State whether following polynomial is Hurwitz or not

a) $s^6 + 5s^5 + 4s^4 + 3s^3 + 2s^2 + s + 3$

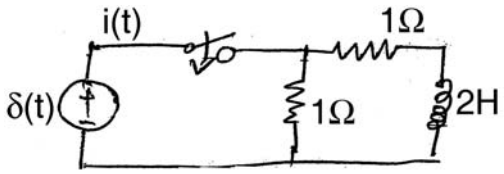
b) $s^4 + 4s^3 + 3s + 2$.

5. Attempt **any two** : **(10×2=20)**

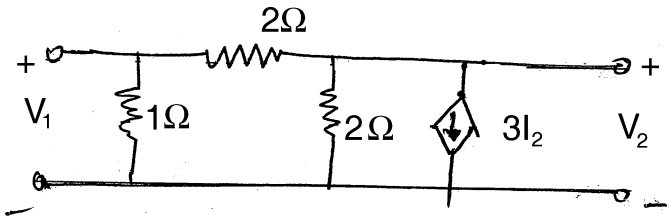
1) Realize Foster forms of a given LC impedance function

$$z(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}.$$

2) Find impulse response of the current i(t) in the network shown



3) For the network shown, find Z and Y parameter.



Set Q

SLR-EP – 290

Seat No.	

Set R

S.E. (Part – I) (Biomedical Engineering) (Old) Examination, 2016
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) For a graph with 'n' nodes and 'b' branches, the complete incidence matrix is of order
a) n + b b) n / b c) n × b d) n – b

2) The nodal method of circuit analysis is based on
a) KVL and Ohm's law b) KCL and Ohm's law
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3) The number of roots of $s^3 + 5s^2 + 7s + 3 = 0$ in the left half of s-plane is
a) Zero b) One c) Two d) Three

4) For a 2 port network to be reciprocal
a) $z_{11} = z_{22}$ b) $y_{12} = y_{21}$ c) $h_{21} = -h_{12}$ d) AD = BC

5) For a 2 port symmetrical bilateral network, if A = 3 and B = 1, the value of parameter C will be
a) 4 b) 6 c) 8 d) 16

6) The transfer function of a low pass RC network is
a) $\frac{1}{1+RCs}$ b) $\frac{RCs}{1+RCs}$ c) $\frac{s}{1+RCs}$ d) None

7) As the poles of a network shift away from the x-axis, the response
a) Remains constant b) Becomes less oscillating
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8) The transfer function is used to describe networks which have atleast _____ ports.
a) 3 b) 4 c) 1 d) 2

P.T.O.

9) When a unit impulse voltage is applied to an inductor of 1 H, the energy supplied by the source is _____
   a) ∞ b) 1 J c) $\frac{1}{2}$ J d) 0
10) If excitation and response are measured at same ports the network function is known as _____ point function.
   a) Transfer b) Fourier c) Laplace d) Driving
11) Subgraph is a subset of branches and _____ of a graph.
   a) Nodes b) Planers c) Meshes d) Loop
12) A graph drawn on a _____ plane is said to be planer if two branches do not intersect.
   a) One dimension b) 3 dimensional
   c) 2 dimensional d) None of above
13) A sinusoidal alternating current and can be represented _____ by phasors.
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14) _____ analysis is based on Kirchoff's law.
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15) A voltage source with a series resistance can be converted into an equivalent _____ source with a parallel resistance.
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_____

SLR-EP – 290

Seat No.	

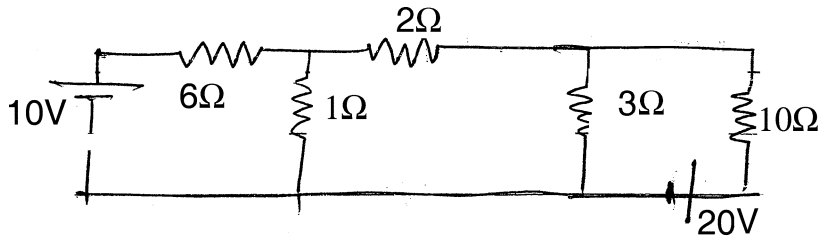
S.E. (Part – I) (Biomedical Engineering) (Old) Examination, 2016
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**

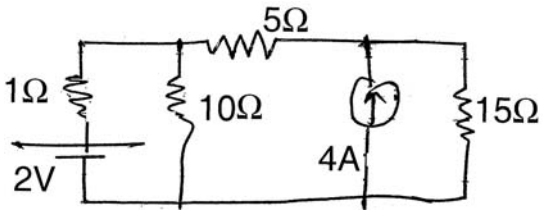
1) Find the current though 2 Ω resistor.



2) State and explain supernode and supermesh analysis with one example.

3) State and explain Thevenin's theorem.

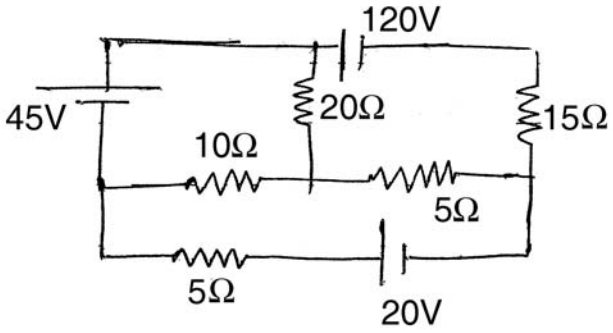
4) Find the current through 10 Ω resistor using mesh analysis.



5) Define and differentiate between nodal and mesh analysis.

3. Attempt **any two** : **(10×2=20)**

1) Find the current through the 20 Ω resistor using Thevenin's theorem.



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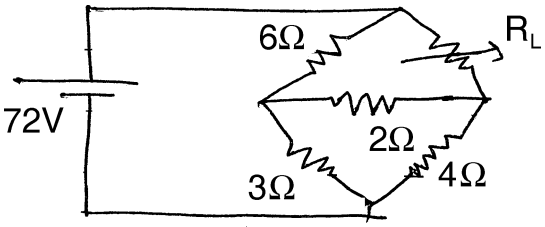

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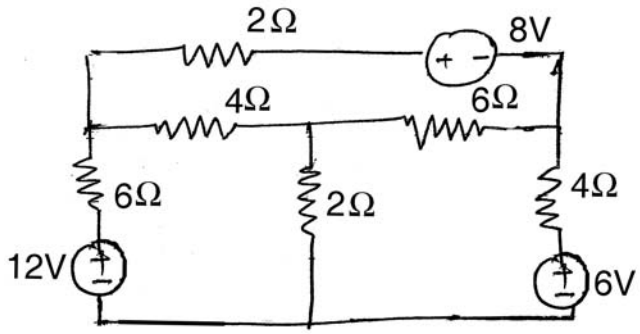
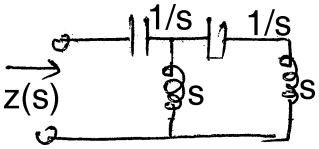


SECTION – II

4. Attempt **any four** : **(4×5=20)**

1) Determine the driving point impedance of given network.



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5) State whether following polynomial is Hurwitz or not

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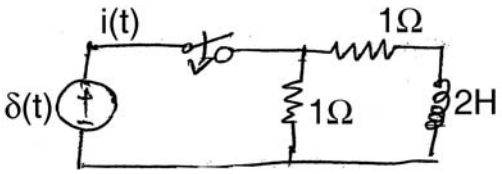
1) Realize Foster forms of a given LC impedance function

$$z(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}.$$

2) Find impulse response of the current i(t) in the network shown



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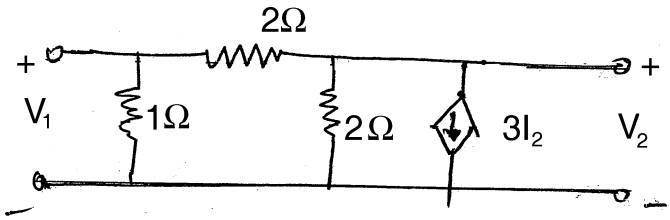

Set R

SLR-EP – 290

Seat No.	

Set S

S.E. (Part – I) (Biomedical Engineering) (Old) Examination, 2016
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) _____ is the property of a substance due to which it opposes the flow of electric current through it.
a) Capacitance b) Resistance
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6) For a graph with 'n' nodes and 'b' branches, the complete incidence matrix is of order
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7) The nodal method of circuit analysis is based on
a) KVL and Ohm's law b) KCL and Ohm's law
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P.T.O.

8) The number of roots of $s^3 + 5s^2 + 7s + 3 = 0$ in the left half of s-plane is
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20) A voltage source with a series resistance can be converted into an equivalent _____ source with a parallel resistance.
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_____

SLR-EP – 290

Seat No.	

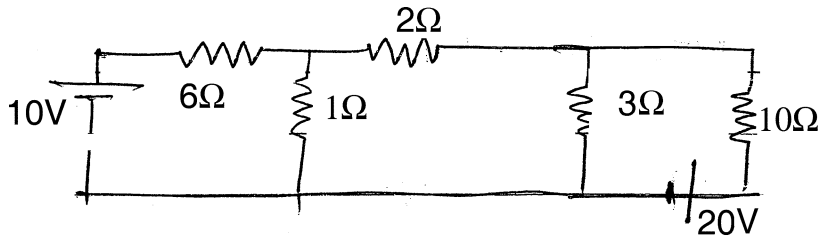
S.E. (Part – I) (Biomedical Engineering) (Old) Examination, 2016
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Find the current though 2 Ω resistor.



2) State and explain supernode and supermesh analysis with one example.

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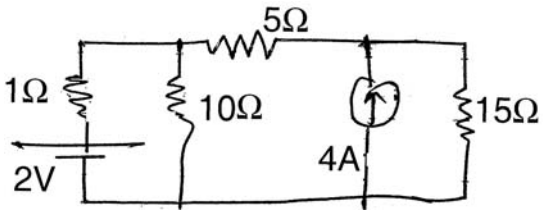

5) Define and differentiate between nodal and mesh analysis.

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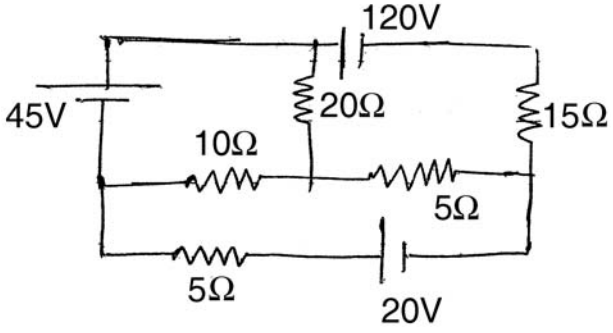
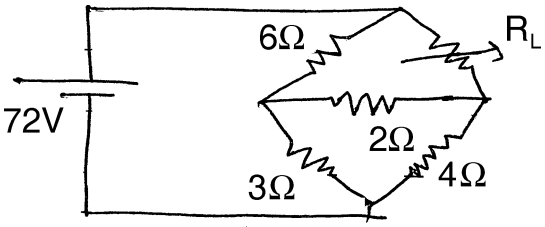


Set S

2) For circuit shown, find the value of resistance R_L for maximum power and calculate maximum power.



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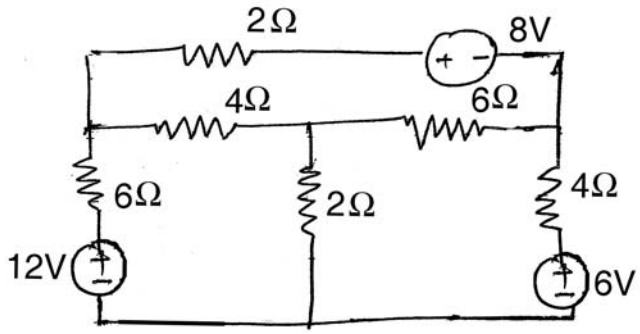
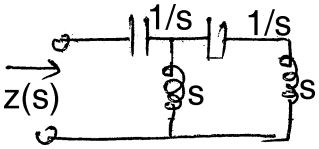


SECTION – II

4. Attempt **any four** : **(4×5=20)**

1) Determine the driving point impedance of given network.



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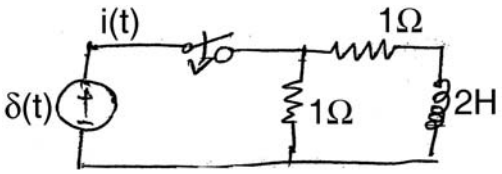

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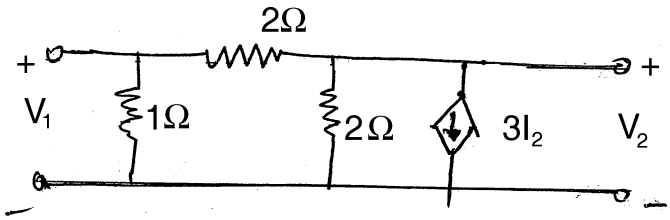

Set S

SLR-EP – 291

Seat No.	

Set P

S.E. (Biomedical Engg.) Part – II (CGPA) Examination, 2016
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATIONS

Day and Date : Monday, 21-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*
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) The figure of merit that describes the behaviour of wire under stress is determined from
   a) gauge factor b) change in length
   c) change in resistance d) sensitivity

2) All temperature sensors are nonlinear transfer characteristics except
   a) thermistor b) optical
   c) semiconductor IC d) RTD

3) $SO_2(\%) = \frac{----O_2}{\text{total Hb}} \times 100$.
   a) Hb b) O_2
   c) Po_2 d) Ca

4) RTD is _____ tansducer.
   a) active b) passive c) linear d) nonlinear

5) Thermistors are _____ of certain metals.
   a) Alloy b) Oxides
   c) Purified form d) Doped part

P.T.O.

6) Any material placed above zero temperature emits _____ radiation from its surface.
   a) electric b) magnetic
   c) inductive d) electromagnetic

7) The basic concept chemical sensors are based upon
   a) fiber optics b) strain gauge
   c) RTD d) photo diodes

8) _____ produces an electrical signal that is proportional to the concentration of the specific analyte.
   a) chemical sensor b) biosensor
   c) ISFET d) thermistor

9) _____ tip of the electrode of metal microelectrode remains uninsulated.
   a) Surface b) Lower
   c) Middle d) Extreme

10) _____ is the smallest incremental quantity that can be measured with certainty.
   a) Resolution b) Linearization
   c) Accuracy d) Hysteresis

11) A linear potentiometer is a example of a _____ instrument.
   a) first order b) second order
   c) third order d) zero order

12) The Wheatstone bridge circuit is ideal for measuring _____ changes in resistance.
   a) small b) large
   c) moderate d) minute

13) The _____ sensors absorbs radiation and transforms it into heat.
   a) thermal b) u v rays
   c) infrared rays d) light

14) Percutaneous electrodes are used to detect _____ within the body.
   a) resistance b) radiation
   c) biopotential d) heat

_____

SLR-EP – 291

Seat No.	

S.E. (Biomedical Engg.) Part – II (CGPA) Examination, 2016
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATIONS

Day and Date : Monday, 21-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

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

1) Explain structure and working of Resistive Temperature Detector (RTD) with neat diagram.

2) Explain structure and applications of needle and wire electrodes for measurement of biopotential.

3) List various types of temperature measurement transducers and explain types and properties of thermistor.

4) Explain the construction and working of unbounded strain gauge.

5) Explain the concept of skin electrode interface with neat figures.

3. Attempt **any 2** : **(6×2=12)**

1) Draw and explain concept of half-cell potential and polarization concept of any electrode.

2) Explain with suitable diagram construction and working of LVDT and mention its application.

3) Define accuracy, precision, resolution, sensitivity, linearity and hysteresis terms for a generalized instrumentation system.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain the working and application of ISFET with necessary diagram.
   2) Explain construction and working of pCo2 electrode in detail.
   3) Explain capacitance microphone sensor with necessary diagram.
   4) Explain working of fiber optic sensor used for temperature measurement.
   5) Explain transcutaneous measurement of arterial oxygen tension.

5. Attempt **any 2** : **(6×2=12)**
   1) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
   2) Classify various Biosensors and explain working of catalytic biosensor in detail with any one application.
   3) Define radiation sensor and explain it with any one example and application.

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SLR-EP – 291

Seat No.	

Set Q

S.E. (Biomedical Engg.) Part – II (CGPA) Examination, 2016
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATIONS

Day and Date : Monday, 21-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*
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) _____ produces an electrical signal that is proportional to the concentration of the specific analyte.
   a) chemical sensor b) biosensor
   c) ISFET d) thermistor

2) _____ tip of the electrode of metal microelectrode remains uninsulated.
   a) Surface b) Lower
   c) Middle d) Extreme

3) _____ is the smallest incremental quantity that can be measured with certainty.
   a) Resolution b) Linearization
   c) Accuracy d) Hysteresis

4) A linear potentiometer is a example of a _____ instrument.
   a) first order b) second order
   c) third order d) zero order

P.T.O.

5) The Wheatstone bridge circuit is ideal for measuring _____ changes in resistance.
   a) small b) large c) moderate d) minute

6) The _____ sensors absorbs radiation and transforms it into heat.
   a) thermal b) u v rays
   c) infrared rays d) light

7) Percutaneous electrodes are used to detect _____ within the body.
   a) resistance b) radiation
   c) biopotential d) heat

8) The figure of merit that describes the behaviour of wire under stress is determined from
   a) gauge factor b) change in length
   c) change in resistance d) sensitivity

9) All temperature sensors are nonlinear transfer characteristics except
   a) thermistor b) optical
   c) semiconductor IC d) RTD

10) $SO_2(\%) = \frac{----O_2}{\text{total Hb}} \times 100$.
   a) Hb b) O_2 c) Po_2 d) Ca

11) RTD is _____ tansducer.
   a) active b) passive c) linear d) nonlinear

12) Thermistors are _____ of certain metals.
   a) Alloy b) Oxides
   c) Purified form d) Doped part

13) Any material placed above zero temperature emits _____ radiation from its surface.
   a) electric b) magnetic
   c) inductive d) electromagnetic

14) The basic concept chemical sensors are based upon
   a) fiber optics b) strain gauge
   c) RTD d) photo diodes

_____

SLR-EP – 291

Seat No.	

S.E. (Biomedical Engg.) Part – II (CGPA) Examination, 2016
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATIONS

Day and Date : Monday, 21-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

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

1) Explain structure and working of Resistive Temperature Detector (RTD) with neat diagram.

2) Explain structure and applications of needle and wire electrodes for measurement of biopotential.

3) List various types of temperature measurement transducers and explain types and properties of thermistor.

4) Explain the construction and working of unbounded strain gauge.

5) Explain the concept of skin electrode interface with neat figures.

3. Attempt **any 2** : **(6×2=12)**

1) Draw and explain concept of half-cell potential and polarization concept of any electrode.

2) Explain with suitable diagram construction and working of LVDT and mention its application.

3) Define accuracy, precision, resolution, sensitivity, linearity and hysteresis terms for a generalized instrumentation system.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain the working and application of ISFET with necessary diagram.
   2) Explain construction and working of pCo2 electrode in detail.
   3) Explain capacitance microphone sensor with necessary diagram.
   4) Explain working of fiber optic sensor used for temperature measurement.
   5) Explain transcutaneous measurement of arterial oxygen tension.

5. Attempt **any 2** : **(6×2=12)**
   1) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
   2) Classify various Biosensors and explain working of catalytic biosensor in detail with any one application.
   3) Define radiation sensor and explain it with any one example and application.

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SLR-EP – 291

Seat No.	

Set R

S.E. (Biomedical Engg.) Part – II (CGPA) Examination, 2016
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATIONS

Day and Date : Monday, 21-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figures to the **right** indicate **full** marks.*
*2) Assume suitable data **wherever** required.*
*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) Thermistors are _____ of certain metals.
   a) Alloy b) Oxides
   c) Purified form d) Doped part

2) Any material placed above zero temperature emits _____ radiation from its surface.
   a) electric b) magnetic
   c) inductive d) electromagnetic

3) The basic concept chemical sensors are based upon
   a) fiber optics b) strain gauge
   c) RTD d) photo diodes

4) _____ produces an electrical signal that is proportional to the concentration of the specific analyte.
   a) chemical sensor b) biosensor
   c) ISFET d) thermistor

5) _____ tip of the electrode of metal microelectrode remains uninsulated.
   a) Surface b) Lower c) Middle d) Extreme

P.T.O.

6) _____ is the smallest incremental quantity that can be measured with certainty.
   a) Resolution b) Linearization
   c) Accuracy d) Hysteresis

7) A linear potentiometer is a example of a _____ instrument.
   a) first order b) second order
   c) third order d) zero order

8) The Wheatstone bridge circuit is ideal for measuring _____ changes in resistance.
   a) small b) large
   c) moderate d) minute

9) The _____ sensors absorbs radiation and transforms it into heat.
   a) thermal b) u v rays
   c) infrared rays d) light

10) Percutaneous electrodes are used to detect _____ within the body.
   a) resistance b) radiation
   c) biopotential d) heat

11) The figure of merit that describes the behaviour of wire under stress is determined from
   a) gauge factor b) change in length
   c) change in resistance d) sensitivity

12) All temperature sensors are nonlinear transfer characteristics except
   a) thermistor b) optical
   c) semiconductor IC d) RTD

13) $SO_2(\%) = \frac{----O_2}{\text{total Hb}} \times 100$.
   a) Hb b) O_2
   c) Po_2 d) Ca

14) RTD is _____ tansducer.
   a) active b) passive c) linear d) nonlinear

_____

SLR-EP – 291

Seat No.	

S.E. (Biomedical Engg.) Part – II (CGPA) Examination, 2016
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATIONS

Day and Date : Monday, 21-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

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

1) Explain structure and working of Resistive Temperature Detector (RTD) with neat diagram.

2) Explain structure and applications of needle and wire electrodes for measurement of biopotential.

3) List various types of temperature measurement transducers and explain types and properties of thermistor.

4) Explain the construction and working of unbounded strain gauge.

5) Explain the concept of skin electrode interface with neat figures.

3. Attempt **any 2** : **(6×2=12)**

1) Draw and explain concept of half-cell potential and polarization concept of any electrode.

2) Explain with suitable diagram construction and working of LVDT and mention its application.

3) Define accuracy, precision, resolution, sensitivity, linearity and hysteresis terms for a generalized instrumentation system.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain the working and application of ISFET with necessary diagram.
   2) Explain construction and working of pCo2 electrode in detail.
   3) Explain capacitance microphone sensor with necessary diagram.
   4) Explain working of fiber optic sensor used for temperature measurement.
   5) Explain transcutaneous measurement of arterial oxygen tension.

5. Attempt **any 2** : **(6×2=12)**
   1) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
   2) Classify various Biosensors and explain working of catalytic biosensor in detail with any one application.
   3) Define radiation sensor and explain it with any one example and application.

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SLR-EP – 291

Seat No.	

Set S

S.E. (Biomedical Engg.) Part – II (CGPA) Examination, 2016
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATIONS

Day and Date : Monday, 21-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*
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) _____ is the smallest incremental quantity that can be measured with certainty.
   a) Resolution b) Linearization
   c) Accuracy d) Hysteresis

2) A linear potentiometer is a example of a _____ instrument.
   a) first order b) second order
   c) third order d) zero order

3) The Wheatstone bridge circuit is ideal for measuring _____ changes in resistance.
   a) small b) large c) moderate d) minute

4) The _____ sensors absorbs radiation and transforms it into heat.
   a) thermal b) u v rays
   c) infrared rays d) light

5) Percutaneous electrodes are used to detect _____ within the body.
   a) resistance b) radiation c) biopotential d) heat

P.T.O.

6) The figure of merit that describes the behaviour of wire under stress is determined from
   a) gauge factor b) change in length
   c) change in resistance d) sensitivity

7) All temperature sensors are nonlinear transfer characteristics except
   a) thermistor b) optical
   c) semiconductor IC d) RTD

8) $SO_2(\%) = \frac{----O_2}{\text{total Hb}} \times 100$.
   a) Hb b) O_2
   c) Po_2 d) Ca

9) RTD is _____ tansducer.
   a) active b) passive c) linear d) nonlinear

10) Thermistors are _____ of certain metals.
   a) Alloy b) Oxides
   c) Purified form d) Doped part

11) Any material placed above zero temperature emits _____ radiation from its surface.
   a) electric b) magnetic
   c) inductive d) electromagnetic

12) The basic concept chemical sensors are based upon
   a) fiber optics b) strain gauge
   c) RTD d) photo diodes

13) _____ produces an electrical signal that is proportional to the concentration of the specific analyte.
   a) chemical sensor b) biosensor
   c) ISFET d) thermistor

14) _____ tip of the electrode of metal microelectrode remains uninsulated.
   a) Surface b) Lower
   c) Middle d) Extreme

_____

SLR-EP – 291

Seat No.	

S.E. (Biomedical Engg.) Part – II (CGPA) Examination, 2016
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATIONS

Day and Date : Monday, 21-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

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

1) Explain structure and working of Resistive Temperature Detector (RTD) with neat diagram.

2) Explain structure and applications of needle and wire electrodes for measurement of biopotential.

3) List various types of temperature measurement transducers and explain types and properties of thermistor.

4) Explain the construction and working of unbounded strain gauge.

5) Explain the concept of skin electrode interface with neat figures.

3. Attempt **any 2** : **(6×2=12)**

1) Draw and explain concept of half-cell potential and polarization concept of any electrode.

2) Explain with suitable diagram construction and working of LVDT and mention its application.

3) Define accuracy, precision, resolution, sensitivity, linearity and hysteresis terms for a generalized instrumentation system.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Explain the working and application of ISFET with necessary diagram.
   2) Explain construction and working of pCo2 electrode in detail.
   3) Explain capacitance microphone sensor with necessary diagram.
   4) Explain working of fiber optic sensor used for temperature measurement.
   5) Explain transcutaneous measurement of arterial oxygen tension.

5. Attempt **any 2** : **(6×2=12)**
   1) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
   2) Classify various Biosensors and explain working of catalytic biosensor in detail with any one application.
   3) Define radiation sensor and explain it with any one example and application.

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SLR-EP – 292

Seat No.	

Set P

S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2016
BIOMEDICAL PROSTHETICS AND ORTHOTICS

Day and Date : Tuesday, 22-11-2016 Total 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) Proximal refers to _____ in proximity to the trunk.
a) closer b) away c) insight d) within

2) In midstance _____ does not contact ground.
a) toe b) heel c) finger d) tibia

3) Stance phase covers_____ of Gait cycle.
a) 70% b) 20% c) 10% d) 50%

4) Young's modulus is defined as
a) $\frac{\text{strain}}{\text{stress}}$ b) $\frac{\text{stress}}{\text{strain}}$
c) $\frac{\text{force}}{\text{area}}$ d) $\frac{\text{change in length}}{\text{original length}}$

5) Bone consists of _____ ions in large amount.
a) sodium b) chlorine
c) calcium d) iron

6) Formation of blood clot is called as
a) coagulation b) precession
c) diffusion d) drift

P.T.O.

7) _____ joint is a type of synovial joints.
   a) socket b) ball and socket
   c) hinge d) tendon

8) 3 point force systems helps in reduction in unwanted _____ rotation.
   a) angular b) vertical
   c) horizontal d) linear

9) _____ is used to measure contact angle of various human joints.
   a) Goniometer b) Selspot c) EMG d) EEG

10) _____ is surrounded by many muscles and ligaments that gives it great strength.
   a) spine b) leg bone
   c) cardiac muscle d) joint

11) VICON instruments are used to measure _____
   a) joint angle b) muscle pain
   c) muscle stress d) Gait analysis

12) Newton's law of _____ called as law of action and reaction.
   a) motion b) energy c) force d) speed

13) In _____ length of muscle remains constant.
   a) isometric contraction b) isometric transition
   c) isometric relaxation d) isometric efforts

14) _____ plane divides the body or an organ into left and right side.
   a) proximal b) lateral c) posterior d) sagittal

_____

SLR-EP – 292

Seat No.	

S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2016
BIOMEDICAL PROSTHETICS AND ORTHOTICS

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Explain various types of levers.
   2) Explain process and positions of stance phases and its subphases.
   3) Draw and explain working of foot switches.
   4) Draw and explain working of interrupted light photography.
   5) Classify force system and mention examples of it.
3. Attempt **any two** : **(6×2=12)**
   1) Explain biomechanics of tendons and ligaments with necessary diagram.
   2) Explain biomechanics of bone and its significance.
   3) Define and explain motion analysis in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw and explain working of Jaipur foot.
   2) Explain concept of various spinal orthosis.
   3) Explain the working of terminal devices in detail.
   4) Explain the working and applications of Goniometer.
   5) Draw and explain construction and applications of Millwaukee brace.
5. Attempt **any two** : **(6×2=12)**
   1) Explain lamination procedure of PTB socket with necessary diagram.
   2) What are the principles that are utilized to design functional orthosis ?
   3) Explain types of Knee Ankle Foot Orthosis (KAFO) used in various conditions.

Set P

Set P

SLR-EP – 292

Seat No.	

Set Q

S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2016
BIOMEDICAL PROSTHETICS AND ORTHOTICS

Day and Date : Tuesday, 22-11-2016 Total 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) 3 point force systems helps in reduction in unwanted _____ rotation.
   a) angular b) vertical
   c) horizontal d) linear

2) _____ is used to measure contact angle of various human joints.
   a) Goniometer b) Selspot c) EMG d) EEG

3) _____ is surrounded by many muscles and ligaments that gives it great strength.
   a) spine b) leg bone
   c) cardiac muscle d) joint

4) VICON instruments are used to measure _____
   a) joint angle b) muscle pain
   c) muscle stress d) Gait analysis

5) Newton's law of _____ called as law of action and reaction.
   a) motion b) energy c) force d) speed

6) In _____ length of muscle remains constant.
   a) isometric contraction b) isometric transition
   c) isometric relaxation d) isometric efforts

P.T.O.

7) _____ plane divides the body or an organ into left and right side.
   a) proximal b) lateral c) posterior d) sagittal

8) Proximal refers to _____ in proximity to the trunk.
   a) closer b) away c) insight d) within

9) In midstance _____ does not contact ground.
   a) toe b) heel c) finger d) tibia

10) Stance phase covers_____ of Gait cycle.
   a) 70% b) 20% c) 10% d) 50%

11) Young's modulus is defined as
   a) $\frac{\text{strain}}{\text{stress}}$ b) $\frac{\text{stress}}{\text{strain}}$
   c) $\frac{\text{force}}{\text{area}}$ d) $\frac{\text{change in length}}{\text{original length}}$

12) Bone consists of _____ ions in large amount.
   a) sodium b) chlorine
   c) calcium d) iron

13) Formation of blood clot is called as
   a) coagulation b) precession
   c) diffusion d) drift

14) _____ joint is a type of synovial joints.
   a) socket b) ball and socket
   c) hinge d) tendon

_____

SLR-EP – 292

Seat No.	

S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2016
BIOMEDICAL PROSTHETICS AND ORTHOTICS

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Explain various types of levers.
   2) Explain process and positions of stance phases and its subphases.
   3) Draw and explain working of foot switches.
   4) Draw and explain working of interrupted light photography.
   5) Classify force system and mention examples of it.
3. Attempt **any two** : **(6×2=12)**
   1) Explain biomechanics of tendons and ligaments with necessary diagram.
   2) Explain biomechanics of bone and its significance.
   3) Define and explain motion analysis in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw and explain working of Jaipur foot.
   2) Explain concept of various spinal orthosis.
   3) Explain the working of terminal devices in detail.
   4) Explain the working and applications of Goniometer.
   5) Draw and explain construction and applications of Millwaukee brace.
5. Attempt **any two** : **(6×2=12)**
   1) Explain lamination procedure of PTB socket with necessary diagram.
   2) What are the principles that are utilized to design functional orthosis ?
   3) Explain types of Knee Ankle Foot Orthosis (KAFO) used in various conditions.

Set Q

Set Q

SLR-EP – 292

Seat No.	

Set **R**

S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2016
BIOMEDICAL PROSTHETICS AND ORTHOTICS

Day and Date : Tuesday, 22-11-2016 Total 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) Bone consists of _____ ions in large amount.
   a) sodium b) chlorine
   c) calcium d) iron

2) Formation of blood clot is called as
   a) coagulation b) precession
   c) diffusion d) drift

3) _____ joint is a type of synovial joints.
   a) socket b) ball and socket
   c) hinge d) tendon

4) 3 point force systems helps in reduction in unwanted _____ rotation.
   a) angular b) vertical
   c) horizontal d) linear

5) _____ is used to measure contact angle of various human joints.
   a) Goniometer b) Selspot c) EMG d) EEG

6) _____ is surrounded by many muscles and ligaments that gives it great strength.
   a) spine b) leg bone
   c) cardiac muscle d) joint

P.T.O.

7) VICON instruments are used to measure _____
   a) joint angle b) muscle pain
   c) muscle stress d) Gait analysis

8) Newton's law of _____ called as law of action and reaction.
   a) motion b) energy c) force d) speed

9) In _____ length of muscle remains constant.
   a) isometric contraction b) isometric transition
   c) isometric relaxation d) isometric efforts

10) _____ plane divides the body or an organ into left and right side.
   a) proximal b) lateral c) posterior d) sagittal

11) Proximal refers to _____ in proximity to the trunk.
   a) closer b) away c) insight d) within

12) In midstance _____ does not contact ground.
   a) toe b) heel c) finger d) tibia

13) Stance phase covers_____ of Gait cycle.
   a) 70% b) 20% c) 10% d) 50%

14) Young's modulus is defined as
   a) $\frac{\text{strain}}{\text{stress}}$ b) $\frac{\text{stress}}{\text{strain}}$
   c) $\frac{\text{force}}{\text{area}}$ d) $\frac{\text{change in length}}{\text{original length}}$

_____

SLR-EP – 292

Seat No.	

S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2016
BIOMEDICAL PROSTHETICS AND ORTHOTICS

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Explain various types of levers.
   2) Explain process and positions of stance phases and its subphases.
   3) Draw and explain working of foot switches.
   4) Draw and explain working of interrupted light photography.
   5) Classify force system and mention examples of it.
3. Attempt **any two** : **(6×2=12)**
   1) Explain biomechanics of tendons and ligaments with necessary diagram.
   2) Explain biomechanics of bone and its significance.
   3) Define and explain motion analysis in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw and explain working of Jaipur foot.
   2) Explain concept of various spinal orthosis.
   3) Explain the working of terminal devices in detail.
   4) Explain the working and applications of Goniometer.
   5) Draw and explain construction and applications of Millwaukee brace.
5. Attempt **any two** : **(6×2=12)**
   1) Explain lamination procedure of PTB socket with necessary diagram.
   2) What are the principles that are utilized to design functional orthosis ?
   3) Explain types of Knee Ankle Foot Orthosis (KAFO) used in various conditions.

Set R

Set R

SLR-EP – 292

Seat No.	

Set **S**

S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2016
BIOMEDICAL PROSTHETICS AND ORTHOTICS

Day and Date : Tuesday, 22-11-2016 Total 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) _____ is surrounded by many muscles and ligaments that gives it great strength.
   a) spine b) leg bone
   c) cardiac muscle d) joint

2) VICON instruments are used to measure _____
   a) joint angle b) muscle pain
   c) muscle stress d) Gait analysis

3) Newton's law of _____ called as law of action and reaction.
   a) motion b) energy c) force d) speed

4) In _____ length of muscle remains constant.
   a) isometric contraction b) isometric transition
   c) isometric relaxation d) isometric efforts

5) _____ plane divides the body or an organ into left and right side.
   a) proximal b) lateral c) posterior d) sagittal

6) Proximal refers to _____ in proximity to the trunk.
   a) closer b) away c) insight d) within

7) In midstance _____ does not contact ground.
   a) toe b) heel c) finger d) tibia

8) Stance phase covers_____ of Gait cycle.
   a) 70% b) 20% c) 10% d) 50%

9) Young's modulus is defined as
   a) $\frac{\text{strain}}{\text{stress}}$ b) $\frac{\text{stress}}{\text{strain}}$
   c) $\frac{\text{force}}{\text{area}}$ d) $\frac{\text{change in length}}{\text{original length}}$

10) Bone consists of _____ ions in large amount.
   a) sodium b) chlorine
   c) calcium d) iron

11) Formation of blood clot is called as
   a) coagulation b) precession
   c) diffusion d) drift

12) _____ joint is a type of synovial joints.
   a) socket b) ball and socket
   c) hinge d) tendon

13) 3 point force systems helps in reduction in unwanted _____ rotation.
   a) angular b) vertical
   c) horizontal d) linear

14) _____ is used to measure contact angle of various human joints.
   a) Goniometer b) Selspot c) EMG d) EEG

_____

SLR-EP – 292

Seat No.	

S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2016
BIOMEDICAL PROSTHETICS AND ORTHOTICS

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Explain various types of levers.
   2) Explain process and positions of stance phases and its subphases.
   3) Draw and explain working of foot switches.
   4) Draw and explain working of interrupted light photography.
   5) Classify force system and mention examples of it.
3. Attempt **any two** : **(6×2=12)**
   1) Explain biomechanics of tendons and ligaments with necessary diagram.
   2) Explain biomechanics of bone and its significance.
   3) Define and explain motion analysis in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw and explain working of Jaipur foot.
   2) Explain concept of various spinal orthosis.
   3) Explain the working of terminal devices in detail.
   4) Explain the working and applications of Goniometer.
   5) Draw and explain construction and applications of Millwaukee brace.
5. Attempt **any two** : **(6×2=12)**
   1) Explain lamination procedure of PTB socket with necessary diagram.
   2) What are the principles that are utilized to design functional orthosis ?
   3) Explain types of Knee Ankle Foot Orthosis (KAFO) used in various conditions.

Set S

Set S

SLR-EP – 293

Seat No.	

Set **P**

S.E. Biomedical Engg. Part – II (CGPA) Examination, 2016
ELECTRONIC INSTRUMENTATIONS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ is the ratio of the change in output to change in the input.
   a) Error b) Resolution
   c) Accuracy d) Sensitivity

2) In common anode types display all _____ terminals of 7 segments are connected together.
   a) Ground b) Cathode
   c) Neutral d) Anode

3) $? = \frac{1}{I_{fsd}}$
   a) Current b) Voltage
   c) Sensitivity d) Linearity

4) _____ waveform is most widely accurately measured with r.m.s. voltmeter.
   a) Complex b) Continuous
   c) Dual d) Single

5) _____ axis modulation is also called as intensity modulation.
   a) Z b) X
   c) Y d) 2D

P.T.O.

6) Multimeter consumes _____1 watt of power.
   a) Less than b) More than
   c) Less and equal d) More and equal

7) In magnetic type of recorder data is replaced for _____ times.
   a) Infinity b) Triple
   c) Multiple d) Dual

8) A _____ converts physical and biological quantity into electrical quantity.
   a) Sensor b) Transducer
   c) Biosensor d) None of the above

9) Piezoelectric sensor is a example of _____ transducer.
   a) Active b) Passive
   c) Primary d) Secondary

10) _____ metal is used to measure temperature.
   a) Aluminium b) Platinum
   c) Stainless steel d) Copper

11) _____ errors are inherent in measuring instruments because of their mechanical structure.
   a) Instrumental b) Environmental
   c) Random d) Human

12) A multimeter is a _____
   a) PMMC b) Digital
   c) Electronic d) Phase

13) Ink jet recorder gives a frequency response up to _____Hz.
   a) 1000 b) 10
   c) 500 d) 2000

14) The _____ depends on the movement of an electron beam.
   a) CRO b) Anode plate
   c) Cathode plate d) Deflection plates

_____

SLR-EP – 293

Seat No.	

S.E. Biomedical Engg. Part – II (CGPA) Examination, 2016
ELECTRONIC INSTRUMENTATIONS

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume ***suitable*** *data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Explain principle and operation of multimeter with its standard specifications.
   2) List the factors involved in selection of voltmeter.
   3) Explain zero order and first order system with each of example.
   4) Explain the working of average responding type voltmeter with necessary diagram.
   5) Explain the working of digital frequency meter.

3. Attempt **any 2** : **(6×2=12)**
   1) Draw and explain the working of successive approximation type digital voltmeter.
   2) Explain each block of a generalized measurement system in detail with one example.
   3) List various techniques of analog to digital conversion and explain any one it in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw panel layout diagram of CRO and mention the function of each control.
   2) Mention various types of writing techniques and explain any two types in detail.
   3) Define and differentiate between dual beam and dual trace oscilloscope.
   4) List various requirements of good laboratory type signal generator.
   5) Define and explain intensity modulation and velocity modulation of CRO.

5. Attempt **any 2** : **(6×2=12)**
   1) Explain ink jet writing system and touch screen display system.
   2) Draw and explain function of single channel and multichannel DAS system.
   3) What is Lissajous pattern ? Explain how it can be used for measurement of frequency and phase using suitable diagram.

Set P

Set P

SLR-EP – 293

Seat No.	

Set **Q**

S.E. Biomedical Engg. Part – II (CGPA) Examination, 2016
ELECTRONIC INSTRUMENTATIONS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) A _____ converts physical and biological quantity into electrical quantity.
   a) Sensor b) Transducer
   c) Biosensor d) None of the above

2) Piezoelectric sensor is a example of _____ transducer.
   a) Active b) Passive
   c) Primary d) Secondary

3) _____ metal is used to measure temperature.
   a) Aluminium b) Platinum
   c) Stainless steel d) Copper

4) _____ errors are inherent in measuring instruments because of their mechanical structure.
   a) Instrumental b) Environmental
   c) Random d) Human

5) A multimeter is a _____
   a) PMMC b) Digital
   c) Electronic d) Phase

P.T.O.

6) Ink jet recorder gives a frequency response up to _____Hz.
   a) 1000 b) 10
   c) 500 d) 2000

7) The _____ depends on the movement of an electron beam.
   a) CRO b) Anode plate
   c) Cathode plate d) Deflection plates

8) _____ is the ratio of the change in output to change in the input.
   a) Error b) Resolution
   c) Accuracy d) Sensitivity

9) In common anode types display all _____ terminals of 7 segments are connected together.
   a) Ground b) Cathode
   c) Neutral d) Anode

10) $? = \frac{1}{I_{fsd}}$
   a) Current b) Voltage
   c) Sensitivity d) Linearity

11) _____ waveform is most widely accurately measured with r.m.s. voltmeter.
   a) Complex b) Continuous
   c) Dual d) Single

12) _____ axis modulation is also called as intensity modulation.
   a) Z b) X
   c) Y d) 2D

13) Multimeter consumes _____1 watt of power.
   a) Less than b) More than
   c) Less and equal d) More and equal

14) In magnetic type of recorder data is replaced for _____ times.
   a) Infinity b) Triple
   c) Multiple d) Dual

_____

SLR-EP – 293

Seat No.	

S.E. Biomedical Engg. Part – II (CGPA) Examination, 2016
ELECTRONIC INSTRUMENTATIONS

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume ***suitable*** *data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Explain principle and operation of multimeter with its standard specifications.
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   1) Draw and explain the working of successive approximation type digital voltmeter.
   2) Explain each block of a generalized measurement system in detail with one example.
   3) List various techniques of analog to digital conversion and explain any one it in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw panel layout diagram of CRO and mention the function of each control.
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   3) Define and differentiate between dual beam and dual trace oscilloscope.
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   5) Define and explain intensity modulation and velocity modulation of CRO.

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   1) Explain ink jet writing system and touch screen display system.
   2) Draw and explain function of single channel and multichannel DAS system.
   3) What is Lissajous pattern ? Explain how it can be used for measurement of frequency and phase using suitable diagram.

Set Q

Set Q

SLR-EP – 293

Seat No.	

Set **R**

S.E. Biomedical Engg. Part – II (CGPA) Examination, 2016
ELECTRONIC INSTRUMENTATIONS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ axis modulation is also called as intensity modulation.
   a) Z b) X
   c) Y d) 2D

2) Multimeter consumes _____1 watt of power.
   a) Less than b) More than
   c) Less and equal d) More and equal

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P.T.O.

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_____

SLR-EP – 293

Seat No.	

S.E. Biomedical Engg. Part – II (CGPA) Examination, 2016
ELECTRONIC INSTRUMENTATIONS

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume ***suitable*** *data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Explain principle and operation of multimeter with its standard specifications.
   2) List the factors involved in selection of voltmeter.
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   1) Draw and explain the working of successive approximation type digital voltmeter.
   2) Explain each block of a generalized measurement system in detail with one example.
   3) List various techniques of analog to digital conversion and explain any one it in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw panel layout diagram of CRO and mention the function of each control.
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   1) Explain ink jet writing system and touch screen display system.
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   3) What is Lissajous pattern ? Explain how it can be used for measurement of frequency and phase using suitable diagram.

Set R

Set R

SLR-EP – 293

Seat No.	

Set **S**

S.E. Biomedical Engg. Part – II (CGPA) Examination, 2016
ELECTRONIC INSTRUMENTATIONS

Day and Date : Wednesday, 23-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ metal is used to measure temperature.
   a) Aluminium b) Platinum
   c) Stainless steel d) Copper

2) _____ errors are inherent in measuring instruments because of their mechanical structure.
   a) Instrumental b) Environmental
   c) Random d) Human

3) A multimeter is a _____
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P.T.O.

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13) A _____ converts physical and biological quantity into electrical quantity.
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14) Piezoelectric sensor is a example of _____ transducer.
   a) Active b) Passive
   c) Primary d) Secondary

_____

SLR-EP – 293

Seat No.	

S.E. Biomedical Engg. Part – II (CGPA) Examination, 2016
ELECTRONIC INSTRUMENTATIONS

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume ***suitable*** *data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×4=16)**
   1) Explain principle and operation of multimeter with its standard specifications.
   2) List the factors involved in selection of voltmeter.
   3) Explain zero order and first order system with each of example.
   4) Explain the working of average responding type voltmeter with necessary diagram.
   5) Explain the working of digital frequency meter.

3. Attempt **any 2** : **(6×2=12)**
   1) Draw and explain the working of successive approximation type digital voltmeter.
   2) Explain each block of a generalized measurement system in detail with one example.
   3) List various techniques of analog to digital conversion and explain any one it in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Draw panel layout diagram of CRO and mention the function of each control.
   2) Mention various types of writing techniques and explain any two types in detail.
   3) Define and differentiate between dual beam and dual trace oscilloscope.
   4) List various requirements of good laboratory type signal generator.
   5) Define and explain intensity modulation and velocity modulation of CRO.

5. Attempt **any 2** : **(6×2=12)**
   1) Explain ink jet writing system and touch screen display system.
   2) Draw and explain function of single channel and multichannel DAS system.
   3) What is Lissajous pattern ? Explain how it can be used for measurement of frequency and phase using suitable diagram.

Set S

Set S

SLR-EP – 294

Seat No.	

Set P

S.E. (Biomedical Engg.) (Part – II) Examination, 2016
DIGITAL DESIGN (CGPA)

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) A master slave J-K flip flop is a cascade of two _____ flip flops.
a) S-R b) T c) D d) Clock

2) Counters are composed of
a) Registers b) NAND gate c) NOR gate d) Counters

3) A circuit which generates a prescribed sequence of bits in synchronism with a clock is called as
a) Sequence generator b) Flip flop
c) Register d) Counter

4) The figure of merit of a digital IC is defined as the product of speed and
a) time b) power c) delay time d) distance

5) _____ is the number of similar gates which can be driven by a gate.
a) Fan out b) Fan in c) Speed d) Power

6) _____ is the fastest of all logic families in speed.
a) Wired OR logic b) TTL c) ECL d) DTL

7) Each individual term in canonical SOP form is called as
a) minterm b) maxterm c) combinational d) sequential

8) Convert $(95.5)_{10}$ = ($)_{16}$
a) $(5\ F)_{16}$ b) $(5\ E)_{16}$ c) $(6\ F)_{16}$ d) $(5\ C)_{16}$

9) AND gate using NOR gates needs _____ NOR gates.
a) 2 b) 3 c) 4 d) 5

P.T.O.

10) OR gate using NAND gates needs _____ NAND gates.

a) 2 b) 3 c) 4 d) 5

11) A binary digit is referred as a

a) signal b) flip flop c) clock d) bit

12) Causing an flip flop to change its state is called as

a) toggling b) setting c) resetting d) triggering

13) A temporary storage device consisting of D type flip flops is called as

a) T flip flop b) Latch c) Triggering d) None of above

14) A shift register in which data can be shifted in both the direction is called as

a) ring counter b) twisted counter

c) bidirectional d) down counter

_____

SLR-EP – 294

Seat No.	

S.E. (Biomedical Engg.) (Part – II) Examination, 2016
DIGITAL DESIGN (CGPA)

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Derive characteristic equation of J-K flip flop.
   2) State and prove Demorgan's theorem.
   3) Explain with aspect to 'T' flip flop the following terms with the help of waveform
      a) level triggering
      b) positive triggering
      c) negative triggering.
   4) Show that :

      $AB + \bar{A}C = AB + \bar{A}C + BC$

   5) Perform following operation :
      a) $(5\ C)_{16} - (3\ F)_{16}$
      b) $(7\ F)_{16} + (BA)_{16}$.

3. Solve **any two** : **(2×6=12)**
   1) What is the necessity of master slave flip flop ? Draw its circuit, waveform diagram using NAND gates and explain its working.
   2) Draw and explain 2 i/p TTL NAND gate. What are the salient features of TTL family ?
   3) Implement F (A, B, C, D) = π M(1, 2, 3, 5, 6, 7, 8, 12, 13) using :
      1) 16 : 1 MUX
      2) 8 : 1 MUX and NOT gate
      3) 4 : 1 MUX and gate.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Explain half adder and full adder using gates.
   2) Differentiate between PROM, EPROM and EEPROM.

Set P

3) Show that $A\bar{B}C + B + B\bar{D} + AB\bar{D} + \bar{A}C = B + C$.

4) Subtract :
   1) $(23)_8 - (67)_8$
   2) $(37)_8 - (53)_8$.

5) Explain Excess – 3 code concept with one example.

5. Attempt **any 2** : **(2×6=12)**

1) With the help of R – 2R binary network explain the working of 4 bit D/A converter.

2) Explain twisted ring counter using 4 bit D and J-K flip flop.

3) What is the difference between synchronous and asynchronous counter ? Draw 4 bit asynchronous up down counter using T flip flop with waveforms.

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SLR-EP – 294

Seat No.	

Set **Q**

S.E. (Biomedical Engg.) (Part – II) Examination, 2016
DIGITAL DESIGN (CGPA)

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Convert $(95.5)_{10}$ = ($)_{16}$

a) $(5\ F)_{16}$ b) $(5\ E)_{16}$ c) $(6\ F)_{16}$ d) $(5\ C)_{16}$

2) AND gate using NOR gates needs _____ NOR gates.

a) 2 b) 3 c) 4 d) 5

3) OR gate using NAND gates needs _____ NAND gates.

a) 2 b) 3 c) 4 d) 5

4) A binary digit is referred as a

a) signal b) flip flop c) clock d) bit

5) Causing an flip flop to change its state is called as

a) toggling b) setting c) resetting d) triggering

6) A temporary storage device consisting of D type flip flops is called as

a) T flip flop b) Latch c) Triggering d) None of above

7) A shift register in which data can be shifted in both the direction is called as

a) ring counter b) twisted counter
c) bidirectional d) down counter

8) A master slave J-K flip flop is a cascade of two _____ flip flops.

a) S-R b) T c) D d) Clock

9) Counters are composed of

a) Registers b) NAND gate c) NOR gate d) Counters

P.T.O.

10) A circuit which generates a prescribed sequence of bits in synchronism with a clock is called as
   a) Sequence generator b) Flip flop
   c) Register d) Counter

11) The figure of merit of a digital IC is defined as the product of speed and
   a) time b) power c) delay time d) distance

12) _____ is the number of similar gates which can be driven by a gate.
   a) Fan out b) Fan in c) Speed d) Power

13) _____ is the fastest of all logic families in speed.
   a) Wired OR logic b) TTL c) ECL d) DTL

14) Each individual term in canonical SOP form is called as
   a) minterm b) maxterm c) combinational d) sequential

SLR-EP – 294

Seat No.	

S.E. (Biomedical Engg.) (Part – II) Examination, 2016
DIGITAL DESIGN (CGPA)

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Derive characteristic equation of J-K flip flop.
   2) State and prove Demorgan's theorem.
   3) Explain with aspect to 'T' flip flop the following terms with the help of waveform
      a) level triggering
      b) positive triggering
      c) negative triggering.
   4) Show that :

      $AB + \bar{A}C = AB + \bar{A}C + BC$

   5) Perform following operation :
      a) $(5\ C)_{16} - (3\ F)_{16}$
      b) $(7\ F)_{16} + (BA)_{16}$.

3. Solve **any two** : **(2×6=12)**
   1) What is the necessity of master slave flip flop ? Draw its circuit, waveform diagram using NAND gates and explain its working.
   2) Draw and explain 2 i/p TTL NAND gate. What are the salient features of TTL family ?
   3) Implement F (A, B, C, D) = π M(1, 2, 3, 5, 6, 7, 8, 12, 13) using :
      1) 16 : 1 MUX
      2) 8 : 1 MUX and NOT gate
      3) 4 : 1 MUX and gate.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Explain half adder and full adder using gates.
   2) Differentiate between PROM, EPROM and EEPROM.

3) Show that $A\bar{B}C + B + B\bar{D} + AB\bar{D} + \bar{A}C = B + C$.

4) Subtract :
   1) $(23)_8 - (67)_8$
   2) $(37)_8 - (53)_8$.

5) Explain Excess – 3 code concept with one example.

5. Attempt **any 2** : **(2×6=12)**

1) With the help of R – 2R binary network explain the working of 4 bit D/A converter.

2) Explain twisted ring counter using 4 bit D and J-K flip flop.

3) What is the difference between synchronous and asynchronous counter ? Draw 4 bit asynchronous up down counter using T flip flop with waveforms.

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SLR-EP – 294

Seat No.	

Set **R**

S.E. (Biomedical Engg.) (Part – II) Examination, 2016
DIGITAL DESIGN (CGPA)

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ is the number of similar gates which can be driven by a gate.
a) Fan out b) Fan in c) Speed d) Power

2) _____ is the fastest of all logic families in speed.
a) Wired OR logic b) TTL c) ECL d) DTL

3) Each individual term in canonical SOP form is called as
a) minterm b) maxterm c) combinational d) sequential

4) Convert $(95.5)_{10}$ = ($)_{16}$
a) $(5\ F)_{16}$ b) $(5\ E)_{16}$ c) $(6\ F)_{16}$ d) $(5\ C)_{16}$

5) AND gate using NOR gates needs _____ NOR gates.
a) 2 b) 3 c) 4 d) 5

6) OR gate using NAND gates needs _____ NAND gates.
a) 2 b) 3 c) 4 d) 5

7) A binary digit is referred as a
a) signal b) flip flop c) clock d) bit

8) Causing an flip flop to change its state is called as
a) toggling b) setting c) resetting d) triggering

9) A temporary storage device consisting of D type flip flops is called as
a) T flip flop b) Latch c) Triggering d) None of above

P.T.O.

10) A shift register in which data can be shifted in both the direction is called as
   a) ring counter b) twisted counter
   c) bidirectional d) down counter

11) A master slave J-K flip flop is a cascade of two _____ flip flops.
   a) S-R b) T c) D d) Clock

12) Counters are composed of
   a) Registers b) NAND gate c) NOR gate d) Counters

13) A circuit which generates a prescribed sequence of bits in synchronism with a clock is called as
   a) Sequence generator b) Flip flop
   c) Register d) Counter

14) The figure of merit of a digital IC is defined as the product of speed and
   a) time b) power c) delay time d) distance

SLR-EP – 294

Seat No.	

S.E. (Biomedical Engg.) (Part – II) Examination, 2016
DIGITAL DESIGN (CGPA)

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Derive characteristic equation of J-K flip flop.
   2) State and prove Demorgan's theorem.
   3) Explain with aspect to 'T' flip flop the following terms with the help of waveform
      a) level triggering
      b) positive triggering
      c) negative triggering.
   4) Show that :

      $AB + \bar{A}C = AB + \bar{A}C + BC$

   5) Perform following operation :
      a) $(5\ C)_{16} - (3\ F)_{16}$
      b) $(7\ F)_{16} + (BA)_{16}$.

3. Solve **any two** : **(2×6=12)**
   1) What is the necessity of master slave flip flop ? Draw its circuit, waveform diagram using NAND gates and explain its working.
   2) Draw and explain 2 i/p TTL NAND gate. What are the salient features of TTL family ?
   3) Implement F (A, B, C, D) = π M(1, 2, 3, 5, 6, 7, 8, 12, 13) using :
      1) 16 : 1 MUX
      2) 8 : 1 MUX and NOT gate
      3) 4 : 1 MUX and gate.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Explain half adder and full adder using gates.
   2) Differentiate between PROM, EPROM and EEPROM.

Set R

3) Show that $A\bar{B}C + B + B\bar{D} + AB\bar{D} + \bar{A}C = B + C$.

4) Subtract :
   1) $(23)_8 - (67)_8$
   2) $(37)_8 - (53)_8$.

5) Explain Excess – 3 code concept with one example.

5. Attempt **any 2** : **(2×6=12)**

1) With the help of R – 2R binary network explain the working of 4 bit D/A converter.

2) Explain twisted ring counter using 4 bit D and J-K flip flop.

3) What is the difference between synchronous and asynchronous counter ? Draw 4 bit asynchronous up down counter using T flip flop with waveforms.

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SLR-EP – 294

Seat No.	

Set **S**

S.E. (Biomedical Engg.) (Part – II) Examination, 2016
DIGITAL DESIGN (CGPA)

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) OR gate using NAND gates needs _____ NAND gates.
a) 2 b) 3 c) 4 d) 5

2) A binary digit is referred as a
a) signal b) flip flop c) clock d) bit

3) Causing an flip flop to change its state is called as
a) toggling b) setting c) resetting d) triggering

4) A temporary storage device consisting of D type flip flops is called as
a) T flip flop b) Latch c) Triggering d) None of above

5) A shift register in which data can be shifted in both the direction is called as
a) ring counter b) twisted counter
c) bidirectional d) down counter

6) A master slave J-K flip flop is a cascade of two _____ flip flops.
a) S-R b) T c) D d) Clock

7) Counters are composed of
a) Registers b) NAND gate c) NOR gate d) Counters

8) A circuit which generates a prescribed sequence of bits in synchronism with a clock is called as
a) Sequence generator b) Flip flop
c) Register d) Counter

P.T.O.

9) The figure of merit of a digital IC is defined as the product of speed and

a) time b) power c) delay time d) distance

10) _____ is the number of similar gates which can be driven by a gate.

a) Fan out b) Fan in c) Speed d) Power

11) _____ is the fastest of all logic families in speed.

a) Wired OR logic b) TTL c) ECL d) DTL

12) Each individual term in canonical SOP form is called as

a) minterm b) maxterm c) combinational d) sequential

13) Convert $(95.5)_{10}$ = ($)_{16}$

a) $(5\ F)_{16}$ b) $(5\ E)_{16}$ c) $(6\ F)_{16}$ d) $(5\ C)_{16}$

14) AND gate using NOR gates needs _____ NOR gates.

a) 2 b) 3 c) 4 d) 5

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SLR-EP – 294

Seat No.	

S.E. (Biomedical Engg.) (Part – II) Examination, 2016
DIGITAL DESIGN (CGPA)

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×4=16)**
   1) Derive characteristic equation of J-K flip flop.
   2) State and prove Demorgan's theorem.
   3) Explain with aspect to 'T' flip flop the following terms with the help of waveform
      a) level triggering
      b) positive triggering
      c) negative triggering.
   4) Show that :

      $AB + \bar{A}C = AB + \bar{A}C + BC$

   5) Perform following operation :
      a) $(5\ C)_{16} - (3\ F)_{16}$
      b) $(7\ F)_{16} + (BA)_{16}$.

3. Solve **any two** : **(2×6=12)**
   1) What is the necessity of master slave flip flop ? Draw its circuit, waveform diagram using NAND gates and explain its working.
   2) Draw and explain 2 i/p TTL NAND gate. What are the salient features of TTL family ?
   3) Implement F (A, B, C, D) = π M(1, 2, 3, 5, 6, 7, 8, 12, 13) using :
      1) 16 : 1 MUX
      2) 8 : 1 MUX and NOT gate
      3) 4 : 1 MUX and gate.

SECTION – II

4. Solve **any four** : **(4×4=16)**
   1) Explain half adder and full adder using gates.
   2) Differentiate between PROM, EPROM and EEPROM.

Set S

3) Show that $A\bar{B}C + B + B\bar{D} + AB\bar{D} + \bar{A}C = B + C$.

4) Subtract :
   1) $(23)_8 - (67)_8$
   2) $(37)_8 - (53)_8$.

5) Explain Excess – 3 code concept with one example.

5. Attempt **any 2** : **(2×6=12)**

1) With the help of R – 2R binary network explain the working of 4 bit D/A converter.

2) Explain twisted ring counter using 4 bit D and J-K flip flop.

3) What is the difference between synchronous and asynchronous counter ? Draw 4 bit asynchronous up down counter using T flip flop with waveforms.

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SLR-EP – 295

Seat No.	

Set P

S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II

Day and Date : Friday, 25-11-2016 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) In h-parameter for CE amplifier output resistance (R0) is _____ (When RE bypassed).

a) $\frac{1}{h_{oe}} + R_E$ b) $\frac{1}{h_{ie}} + R_E$ c) both a) and b) d) none

2) A gain of 1000000 times is power is expressed by _____ dB.

a) 30 dB b) 60 dB c) 10 dB d) 600 dB

3) The emitter follower circuit is also known as _____ circuit.

a) Voltage series feedback
b) Current series feedback
c) Both voltage and current feedback
d) None of above

4) In a current series feedback amplifier, the input resistance

a) Zero b) Increases
c) Decreases d) Remains unchanged

5) Stability of _____ oscillator is best.

a) Crystal b) Hartley c) Colpitt's d) None of these

P.T.O.

6) To sustained oscillation, the condition known as Barkhausen criterion to be satisfied are _____

   a) $|\beta A| \geq 1$

   b) Total loop phase shift must be 0° or 360°

   c) Both a) and b)

   d) None of above

7) Two stages of multistage amplifier have gains of 60 and 30. The dB voltage gain is

   a) 1800 b) 90 c) 30 d) None of these

8) The unit of CMRR is

   a) $\mu V / V$ b) dB c) Ω d) Volts

9) The ideal OPAMP have _____ Bandwidth.

   a) Zero b) Low c) Not defined d) Infinite

10) R_{OM} =

   a) $-\frac{R_F}{R_1}$ b) $1+\frac{R_F}{R_1}$ c) $\frac{R_1 R_F}{R_1 + R_F}$ d) None of above

11) CMRR of IC μA 741 OPAMP is

   a) 60 dB b) 90 dB c) 120 dB d) 180 dB

12) A subtractor is application of

   a) Differential amplifier b) Inverting amplifier

   c) Non-inverting amplifier d) None of above

13) Schmitt trigger is also known as _____

   a) Squaring circuit b) Cubing circuit

   c) Both a) and b) d) None of above

14) The instrumentation amplifier is used in _____ application.

   a) ECG b) EMG c) EGG d) All of above

_____

SLR-EP – 295

Seat No.	

S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II

Day and Date : Friday, 25-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(4×4=16)**

1) What are advantages offered by direct coupled method ?
2) Describe with necessary derivations, the effect of negative feedback on the bandwidth and gain in amplifier.
3) Explain phase shift oscillator.
4) Explain the design steps of complementary symmetry power amplifier.
5) Compare class A and B.

III. Solve **any two** questions : **(2×6=12)**

1) Design RC phase shift oscillator for the output frequency of oscillations of 10 kHz with load impedance of 10 $k\Omega$ and peak to peak output voltage $\geq$ 5V. Use V_{CC} = 12 V.
2) Sketch the circuit of a two stage RC coupled BJT amplifier that uses series voltage negative feedback. Briefly explain how the feedback operators and derive equation for voltage gain.
3) Draw circuit diagram and VI characteristics of class A amplifier. Show the maximum collector efficiency of transformer coupled Class A amplifier is 50%.

SECTION – II

IV. Solve **any four** questions : **(4×4=16)**

1) Explain open loop differential amplifier configuration of OPAMP.
2) Explain the effect of variation in power supply voltages on offset voltage.
3) Derive the expression for the total offset voltage for the closed looped practical OPAMP.
4) Explain OPAMP as Schmitt trigger.
5) Draw the practical circuit diagram of integrator with waveforms.

V. Solve **any two** questions : **(2×6=12)**

1) Write a short note on thermal drift.
2) Explain OPAMP as differentiator.
3) Design a first order high pass Butterworth filter at a cutoff frequency of 1 kHz with a pass band gain of 2.

SLR-EP – 295

Seat No.	

Set Q

S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II

Day and Date : Friday, 25-11-2016 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The unit of CMRR is
   a) $\mu V / V$ b) dB c) Ω d) Volts

2) The ideal OPAMP have _____ Bandwidth.
   a) Zero b) Low c) Not defined d) Infinite

3) R_{OM} =
   a) $-\frac{R_F}{R_1}$ b) $1+\frac{R_F}{R_1}$ c) $\frac{R_1 R_F}{R_1 + R_F}$ d) None of above

4) CMRR of IC μ A 741 OPAMP is
   a) 60 dB b) 90 dB c) 120 dB d) 180 dB

5) A subtractor is application of
   a) Differential amplifier b) Inverting amplifier
   c) Non-inverting amplifier d) None of above

6) Schmitt trigger is also known as _____
   a) Squaring circuit b) Cubing circuit
   c) Both a) and b) d) None of above

7) The instrumentation amplifier is used in _____ application.
   a) ECG b) EMG c) EGG d) All of above

P.T.O.

8) In h-parameter for CE amplifier output resistance (R0) is _____ (When RE bypassed).

a) $\frac{1}{h_{oe}} + R_E$ b) $\frac{1}{h_{ie}} + R_E$ c) both a) and b) d) none

9) A gain of 1000000 times is power is expressed by _____ dB.

a) 30 dB b) 60 dB c) 10 dB d) 600 dB

10) The emitter follower circuit is also known as _____ circuit.

a) Voltage series feedback
b) Current series feedback
c) Both voltage and current feedback
d) None of above

11) In a current series feedback amplifier, the input resistance

a) Zero b) Increases
c) Decreases d) Remains unchanged

12) Stability of _____ oscillator is best.

a) Crystal b) Hartley c) Colpitt's d) None of these

13) To sustained oscillation, the condition known as Barkhausen criterion to be satisfied are _____

a) $|\beta A| \geq 1$
b) Total loop phase shift must be 0° or 360°
c) Both a) and b)
d) None of above

14) Two stages of multistage amplifier have gains of 60 and 30. The dB voltage gain is

a) 1800 b) 90 c) 30 d) None of these

_____

SLR-EP – 295

Seat No.	

S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II

Day and Date : Friday, 25-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(4×4=16)**

1) What are advantages offered by direct coupled method ?
2) Describe with necessary derivations, the effect of negative feedback on the bandwidth and gain in amplifier.
3) Explain phase shift oscillator.
4) Explain the design steps of complementary symmetry power amplifier.
5) Compare class A and B.

III. Solve **any two** questions : **(2×6=12)**

1) Design RC phase shift oscillator for the output frequency of oscillations of 10 kHz with load impedance of 10 $k\Omega$ and peak to peak output voltage $\geq$ 5V. Use V_{CC} = 12 V.
2) Sketch the circuit of a two stage RC coupled BJT amplifier that uses series voltage negative feedback. Briefly explain how the feedback operators and derive equation for voltage gain.
3) Draw circuit diagram and VI characteristics of class A amplifier. Show the maximum collector efficiency of transformer coupled Class A amplifier is 50%.

SECTION – II

IV. Solve **any four** questions : **(4×4=16)**

1) Explain open loop differential amplifier configuration of OPAMP.
2) Explain the effect of variation in power supply voltages on offset voltage.
3) Derive the expression for the total offset voltage for the closed looped practical OPAMP.
4) Explain OPAMP as Schmitt trigger.
5) Draw the practical circuit diagram of integrator with waveforms.

V. Solve **any two** questions : **(2×6=12)**

1) Write a short note on thermal drift.
2) Explain OPAMP as differentiator.
3) Design a first order high pass Butterworth filter at a cutoff frequency of 1 kHz with a pass band gain of 2.

SLR-EP – 295

Seat No.	

Set **R**

S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II

Day and Date : Friday, 25-11-2016 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Stability of _____ oscillator is best.
   a) Crystal b) Hartley c) Colpitt's d) None of these

2) To sustained oscillation, the condition known as Barkhausen criterion to be satisfied are _____
   a) $|\beta A| \geq 1$
   b) Total loop phase shift must be 0° or 360°
   c) Both a) and b)
   d) None of above

3) Two stages of multistage amplifier have gains of 60 and 30. The dB voltage gain is
   a) 1800 b) 90 c) 30 d) None of these

4) The unit of CMRR is
   a) $\mu V / V$ b) dB c) Ω d) Volts

5) The ideal OPAMP have _____ Bandwidth.
   a) Zero b) Low c) Not defined d) Infinite

6) R_{OM} =
   a) $-\frac{R_F}{R_1}$ b) $1+\frac{R_F}{R_1}$ c) $\frac{R_1 R_F}{R_1 + R_F}$ d) None of above

P.T.O.

7) CMRR of IC μ A 741 OPAMP is
   a) 60 dB b) 90 dB c) 120 dB d) 180 dB

8) A subtractor is application of
   a) Differential amplifier b) Inverting amplifier
   c) Non-inverting amplifier d) None of above

9) Schmitt trigger is also known as _____
   a) Squaring circuit b) Cubing circuit
   c) Both a) and b) d) None of above

10) The instrumentation amplifier is used in _____ application.
   a) ECG b) EMG c) EGG d) All of above

11) In h-parameter for CE amplifier output resistance (R0) is _____ (When RE bypassed).
   a) $\frac{1}{h_{oe}} + R_E$ b) $\frac{1}{h_{ie}} + R_E$ c) both a) and b) d) none

12) A gain of 1000000 times is power is expressed by _____ dB.
   a) 30 dB b) 60 dB c) 10 dB d) 600 dB

13) The emitter follower circuit is also known as _____ circuit.
   a) Voltage series feedback
   b) Current series feedback
   c) Both voltage and current feedback
   d) None of above

14) In a current series feedback amplifier, the input resistance
   a) Zero b) Increases
   c) Decreases d) Remains unchanged

_____

SLR-EP – 295

Seat No.	

S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II

Day and Date : Friday, 25-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(4×4=16)**

1) What are advantages offered by direct coupled method ?
2) Describe with necessary derivations, the effect of negative feedback on the bandwidth and gain in amplifier.
3) Explain phase shift oscillator.
4) Explain the design steps of complementary symmetry power amplifier.
5) Compare class A and B.

III. Solve **any two** questions : **(2×6=12)**

1) Design RC phase shift oscillator for the output frequency of oscillations of 10 kHz with load impedance of 10 $k\Omega$ and peak to peak output voltage $\geq$ 5V. Use V_{CC} = 12 V.
2) Sketch the circuit of a two stage RC coupled BJT amplifier that uses series voltage negative feedback. Briefly explain how the feedback operators and derive equation for voltage gain.
3) Draw circuit diagram and VI characteristics of class A amplifier. Show the maximum collector efficiency of transformer coupled Class A amplifier is 50%.

SECTION – II

IV. Solve **any four** questions : **(4×4=16)**

1) Explain open loop differential amplifier configuration of OPAMP.
2) Explain the effect of variation in power supply voltages on offset voltage.
3) Derive the expression for the total offset voltage for the closed looped practical OPAMP.
4) Explain OPAMP as Schmitt trigger.
5) Draw the practical circuit diagram of integrator with waveforms.

V. Solve **any two** questions : **(2×6=12)**

1) Write a short note on thermal drift.
2) Explain OPAMP as differentiator.
3) Design a first order high pass Butterworth filter at a cutoff frequency of 1 kHz with a pass band gain of 2.

SLR-EP – 295

Seat No.	

Set **S**

S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II

Day and Date : Friday, 25-11-2016 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) R_{OM} =

a) $-\frac{R_F}{R_1}$ b) $1+\frac{R_F}{R_1}$ c) $\frac{R_1 R_F}{R_1 + R_F}$ d) None of above

2) CMRR of IC μ A 741 OPAMP is
a) 60 dB b) 90 dB c) 120 dB d) 180 dB

3) A subtractor is application of
a) Differential amplifier b) Inverting amplifier
c) Non-inverting amplifier d) None of above

4) Schmitt trigger is also known as _____
a) Squaring circuit b) Cubing circuit
c) Both a) and b) d) None of above

5) The instrumentation amplifier is used in _____ application.
a) ECG b) EMG c) EGG d) All of above

6) In h-parameter for CE amplifier output resistance (R0) is _____ (When RE bypassed).

a) $\frac{1}{h_{oe}} + R_E$ b) $\frac{1}{h_{ie}} + R_E$ c) both a) and b) d) none

7) A gain of 1000000 times is power is expressed by _____ dB.
   a) 30 dB b) 60 dB c) 10 dB d) 600 dB

8) The emitter follower circuit is also known as _____ circuit.
   a) Voltage series feedback
   b) Current series feedback
   c) Both voltage and current feedback
   d) None of above

9) In a current series feedback amplifier, the input resistance
   a) Zero b) Increases
   c) Decreases d) Remains unchanged

10) Stability of _____ oscillator is best.
   a) Crystal b) Hartley c) Colpitt's d) None of these

11) To sustained oscillation, the condition known as Barkhausen criterion to be satisfied are _____
   a) $|\beta A| \geq 1$
   b) Total loop phase shift must be 0° or 360°
   c) Both a) and b)
   d) None of above

12) Two stages of multistage amplifier have gains of 60 and 30. The dB voltage gain is
   a) 1800 b) 90 c) 30 d) None of these

13) The unit of CMRR is
   a) $\mu V / V$ b) dB c) Ω d) Volts

14) The ideal OPAMP have _____ Bandwidth.
   a) Zero b) Low c) Not defined d) Infinite

_____

SLR-EP – 295

Seat No.	

S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2016
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II

Day and Date : Friday, 25-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(4×4=16)**

1) What are advantages offered by direct coupled method ?
2) Describe with necessary derivations, the effect of negative feedback on the bandwidth and gain in amplifier.
3) Explain phase shift oscillator.
4) Explain the design steps of complementary symmetry power amplifier.
5) Compare class A and B.

III. Solve **any two** questions : **(2×6=12)**

1) Design RC phase shift oscillator for the output frequency of oscillations of 10 kHz with load impedance of 10 $k\Omega$ and peak to peak output voltage $\geq$ 5V. Use V_{CC} = 12 V.
2) Sketch the circuit of a two stage RC coupled BJT amplifier that uses series voltage negative feedback. Briefly explain how the feedback operators and derive equation for voltage gain.
3) Draw circuit diagram and VI characteristics of class A amplifier. Show the maximum collector efficiency of transformer coupled Class A amplifier is 50%.

SECTION – II

IV. Solve **any four** questions : **(4×4=16)**

1) Explain open loop differential amplifier configuration of OPAMP.
2) Explain the effect of variation in power supply voltages on offset voltage.
3) Derive the expression for the total offset voltage for the closed looped practical OPAMP.
4) Explain OPAMP as Schmitt trigger.
5) Draw the practical circuit diagram of integrator with waveforms.

V. Solve **any two** questions : **(2×6=12)**

1) Write a short note on thermal drift.
2) Explain OPAMP as differentiator.
3) Design a first order high pass Butterworth filter at a cutoff frequency of 1 kHz with a pass band gain of 2.

SLR-EP – 296

Seat No.	

Set P

T.E. (Biomedical Engineering) Part – I (New CGPA) Examination, 2016
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Dry gas supplied by anaesthesia machine using cause clinically desiccation of
a) Saliva b) Bilirubin c) Mucus d) Blood

2) The relationship between log PCO_2 and pH is linear over the range of _____ mm Hg.
a) 100 – 900 b) 50 – 500 c) 10 – 90 d) 100 – 150

3) The peak and peak volume changes during a quick breath is called as
a) Absolute volume b) Tidal volume
c) Vital capacity d) Closing of valves

4) The electromagnetic flow meter measures instantaneous _____ flow of blood.
a) Pulsatile b) Pulsed c) Continuous d) Real

5) _____ is defined as the movement of a solid phase with respect to a liquid.
a) Diffusion b) Drift
c) Osmosis d) Electrophoresis

6) The inert gas is the _____ phase of the chromatograph.
a) Mobile b) Real c) Stationary d) Continuous

7) _____ are devices that utilizes prism as diffraction grating.
a) Lens b) Monochromatous
c) Filter d) Quartz

P.T.O.

8) _____ pressure ventilators operate either in mandatory or spontaneous mode.
   a) Negative b) Positive c) Both a) and b) d) Air

9) The _____ provides a positive force for transporting respiratory and anaesthesia gas into apneic patient.
   a) Spirometer b) Oxygenerator c) Audiometer d) Ventilator

10) Nebulizers are used to supply moisture in the form of
   a) Droplets b) Vapour c) Water d) Gas

11) Lung _____ is the ability of the alveoli and lung tissue to expand on inspiration.
   a) Volume b) Capacity c) Discharge d) Compliance

12) White noise is a noise containing all frequencies in audible spectrum at _____ intensities.
   a) Different b) Same c) Equal d) Approximates

13) An audiometer is a equipment which is used for the identification of
   a) Evoked potential b) Masking
   c) Hone condition d) Hearing loss

14) _____ volume is the depth of breathing inspired or expired during each respiratory cycle.
   a) Tidal b) Minute c) Sigh d) Lung

_____

SLR-EP – 296

Seat No.	

T.E. (Biomedical Engineering) Part – I (New CGPA) Examination, 2016
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Draw and explain schematic diagram and function of mass spectroscopy.
   2) Explain working of ELISA reader machine and mention its application.
   3) Discuss working of any one type of blood cell counter.
   4) List various blood flow measurement techniques and explain electromagnetic blood flow meter.
   5) Define electrophoresis process and mention its application in medicine.

3. Attempt **any two** : **(6×2=12)**
   1) Explain working of PO_2^- and PCO_2 electrode with neat diagram.
   2) Draw and explain working of ultrasonic blood flowmeter.
   3) Explain working of complete blood gas analyzer with neat diagram.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
   1) Define and differentiate between pure tone and speech audiometry.
   2) Explain working of spirometer and mention its clinical significance.
   3) Discuss various modes of ventilator.
   4) Explain principle of pulse oximeter with necessary diagram.
   5) Draw and explain various lung volume and capacities.

5. Attempt **any two** questions : **(6×2=12)**
   1) Explain working of anaesthesia equipment with neat diagram.
   2) Draw and explain working of evoked response audiometry.
   3) List various parts of heart lung machines and explain working of any two of it.

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Set P

Set P

SLR-EP – 296

Seat No.	

Set Q

T.E. (Biomedical Engineering) Part – I (New CGPA) Examination, 2016
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ pressure ventilators operate either in mandatory or spontaneous mode.
a) Negative b) Positive c) Both a) and b) d) Air

2) The _____ provides a positive force for transporting respiratory and anaesthesia gas into apneic patient.
a) Spirometer b) Oxygenerator c) Audiometer d) Ventilator

3) Nebulizers are used to supply moisture in the form of
a) Droplets b) Vapour c) Water d) Gas

4) Lung _____ is the ability of the alveoli and lung tissue to expand on inspiration.
a) Volume b) Capacity c) Discharge d) Compliance

5) White noise is a noise containing all frequencies in audible spectrum at _____ intensities.
a) Different b) Same c) Equal d) Approximates

6) An audiometer is a equipment which is used for the identification of
a) Evoked potential b) Masking
c) Hone condition d) Hearing loss

7) _____ volume is the depth of breathing inspired or expired during each respiratory cycle.
a) Tidal b) Minute c) Sigh d) Lung

P.T.O.

8) Dry gas supplied by anaesthesia machine using cause clinically desiccation of
   a) Saliva b) Bilirubin c) Mucus d) Blood

9) The relationship between log PCO_2 and pH is linear over the range of _____ mm Hg.
   a) 100 – 900 b) 50 – 500 c) 10 – 90 d) 100 – 150

10) The peak and peak volume changes during a quick breath is called as
   a) Absolute volume b) Tidal volume
   c) Vital capacity d) Closing of valves

11) The electromagnetic flow meter measures instantaneous _____ flow of blood.
   a) Pulsatile b) Pulsed c) Continuous d) Real

12) _____ is defined as the movement of a solid phase with respect to a liquid.
   a) Diffusion b) Drift
   c) Osmosis d) Electrophoresis

13) The inert gas is the _____ phase of the chromatograph.
   a) Mobile b) Real c) Stationary d) Continuous

14) _____ are devices that utilizes prism as diffraction grating.
   a) Lens b) Monochromatous
   c) Filter d) Quartz

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SLR-EP – 296

Seat No.	

T.E. (Biomedical Engineering) Part – I (New CGPA) Examination, 2016
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Draw and explain schematic diagram and function of mass spectroscopy.
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   3) Discuss working of any one type of blood cell counter.
   4) List various blood flow measurement techniques and explain electromagnetic blood flow meter.
   5) Define electrophoresis process and mention its application in medicine.

3. Attempt **any two** : **(6×2=12)**
   1) Explain working of PO_2^- and PCO_2 electrode with neat diagram.
   2) Draw and explain working of ultrasonic blood flowmeter.
   3) Explain working of complete blood gas analyzer with neat diagram.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
   1) Define and differentiate between pure tone and speech audiometry.
   2) Explain working of spirometer and mention its clinical significance.
   3) Discuss various modes of ventilator.
   4) Explain principle of pulse oximeter with necessary diagram.
   5) Draw and explain various lung volume and capacities.

5. Attempt **any two** questions : **(6×2=12)**
   1) Explain working of anaesthesia equipment with neat diagram.
   2) Draw and explain working of evoked response audiometry.
   3) List various parts of heart lung machines and explain working of any two of it.

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Set Q

Set Q

SLR-EP – 296

Seat No.	

Set R

T.E. (Biomedical Engineering) Part – I (New CGPA) Examination, 2016
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ is defined as the movement of a solid phase with respect to a liquid.
a) Diffusion b) Drift
c) Osmosis d) Electrophoresis

2) The inert gas is the _____ phase of the chromatograph.
a) Mobile b) Real c) Stationary d) Continuous

3) _____ are devices that utilizes prism as diffraction grating.
a) Lens b) Monochromatous
c) Filter d) Quartz

4) _____ pressure ventilators operate either in mandatory or spontaneous mode.
a) Negative b) Positive c) Both a) and b) d) Air

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7) Lung _____ is the ability of the alveoli and lung tissue to expand on inspiration.
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P.T.O.

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9) An audiometer is a equipment which is used for the identification of
   a) Evoked potential b) Masking
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10) _____ volume is the depth of breathing inspired or expired during each respiratory cycle.
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12) The relationship between log PCO_2 and pH is linear over the range of _____ mm Hg.
   a) 100 – 900 b) 50 – 500 c) 10 – 90 d) 100 – 150

13) The peak and peak volume changes during a quick breath is called as
   a) Absolute volume b) Tidal volume
   c) Vital capacity d) Closing of valves

14) The electromagnetic flow meter measures instantaneous _____ flow of blood.
   a) Pulsatile b) Pulsed c) Continuous d) Real

_____

SLR-EP – 296

Seat No.	

T.E. (Biomedical Engineering) Part – I (New CGPA) Examination, 2016
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Draw and explain schematic diagram and function of mass spectroscopy.
   2) Explain working of ELISA reader machine and mention its application.
   3) Discuss working of any one type of blood cell counter.
   4) List various blood flow measurement techniques and explain electromagnetic blood flow meter.
   5) Define electrophoresis process and mention its application in medicine.

3. Attempt **any two** : **(6×2=12)**
   1) Explain working of PO_2^- and PCO_2 electrode with neat diagram.
   2) Draw and explain working of ultrasonic blood flowmeter.
   3) Explain working of complete blood gas analyzer with neat diagram.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
   1) Define and differentiate between pure tone and speech audiometry.
   2) Explain working of spirometer and mention its clinical significance.
   3) Discuss various modes of ventilator.
   4) Explain principle of pulse oximeter with necessary diagram.
   5) Draw and explain various lung volume and capacities.

5. Attempt **any two** questions : **(6×2=12)**
   1) Explain working of anaesthesia equipment with neat diagram.
   2) Draw and explain working of evoked response audiometry.
   3) List various parts of heart lung machines and explain working of any two of it.

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Set R

Set R

SLR-EP – 296

Seat No.	

Set S

T.E. (Biomedical Engineering) Part – I (New CGPA) Examination, 2016
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Nebulizers are used to supply moisture in the form of
a) Droplets b) Vapour c) Water d) Gas

2) Lung _____ is the ability of the alveoli and lung tissue to expand on inspiration.
a) Volume b) Capacity c) Discharge d) Compliance

3) White noise is a noise containing all frequencies in audible spectrum at _____ intensities.
a) Different b) Same c) Equal d) Approximates

4) An audiometer is a equipment which is used for the identification of
a) Evoked potential b) Masking
c) Hone condition d) Hearing loss

5) _____ volume is the depth of breathing inspired or expired during each respiratory cycle.
a) Tidal b) Minute c) Sigh d) Lung

6) Dry gas supplied by anaesthesia machine using cause clinically desiccation of
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7) The relationship between log PCO_2 and pH is linear over the range of _____ mm Hg.
a) 100 – 900 b) 50 – 500 c) 10 – 90 d) 100 – 150

8) The peak and peak volume changes during a quick breath is called as
   a) Absolute volume b) Tidal volume
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9) The electromagnetic flow meter measures instantaneous _____ flow of blood.
   a) Pulsatile b) Pulsed c) Continuous d) Real

10) _____ is defined as the movement of a solid phase with respect to a liquid.
   a) Diffusion b) Drift
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11) The inert gas is the _____ phase of the chromatograph.
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12) _____ are devices that utilizes prism as diffraction grating.
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13) _____ pressure ventilators operate either in mandatory or spontaneous mode.
   a) Negative b) Positive c) Both a) and b) d) Air

14) The _____ provides a positive force for transporting respiratory and anaesthesia gas into apneic patient.
   a) Spirometer b) Oxygenerator c) Audiometer d) Ventilator

_____

SLR-EP – 296

Seat No.	

T.E. (Biomedical Engineering) Part – I (New CGPA) Examination, 2016
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Draw and explain schematic diagram and function of mass spectroscopy.
   2) Explain working of ELISA reader machine and mention its application.
   3) Discuss working of any one type of blood cell counter.
   4) List various blood flow measurement techniques and explain electromagnetic blood flow meter.
   5) Define electrophoresis process and mention its application in medicine.

3. Attempt **any two** : **(6×2=12)**
   1) Explain working of PO_2^- and PCO_2 electrode with neat diagram.
   2) Draw and explain working of ultrasonic blood flowmeter.
   3) Explain working of complete blood gas analyzer with neat diagram.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
   1) Define and differentiate between pure tone and speech audiometry.
   2) Explain working of spirometer and mention its clinical significance.
   3) Discuss various modes of ventilator.
   4) Explain principle of pulse oximeter with necessary diagram.
   5) Draw and explain various lung volume and capacities.

5. Attempt **any two** questions : **(6×2=12)**
   1) Explain working of anaesthesia equipment with neat diagram.
   2) Draw and explain working of evoked response audiometry.
   3) List various parts of heart lung machines and explain working of any two of it.

_____

Set S

Set S

SLR-EP – 297

Seat No.	

Set P

T.E. (Biomedical Engineering) (Part – I) (CGPA) (New) Examination, 2016
BIOLOGICAL MODELING AND SIMULATION

Day and Date : Wednesday, 30-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Excited nerve muscle cells action potential state reaches to
a) +20 mV b) +35 mV c) –90 mV d) –35 mV

2) Smooth pursuit eye movement tracks _____ objects.
a) Moving b) Stable c) Fixed d) None of the above

3) Saccadic eye movement are very _____ that jumps from one eye position to another.
a) Slow b) Linear c) Variable d) Fast

4) _____ equation defines membrane current.
a) Nernst b) Donnan
c) Cable d) Goldman

5) Donnan's equation is called as _____ ion equation.
a) One b) Three c) Four d) Two

6) Goldman's equation is called as _____ equation.
a) Variable field b) Complex field
c) Constant field d) Electric field

7) Parkinson's occurrence syndrome is related to _____ system.
a) Respiratory b) Nervous c) Digestive d) Urinary

8) _____ law defines diffusion process.
a) Ohm's b) Fick's
c) Donnan's d) Goldman's

P.T.O.

9) _____ law defines drift process.
   a) Ohm's b) Fick's
   c) Donnan's d) Goldman's

10) Models are simplified representation of
   a) Objects b) Images
   c) Projects d) Documents

11) _____ is defined as a controlling of load dynamics of muscles.
   a) Control system b) Drift
   c) Stretch reflex d) Diffusion

12) _____ neutrality is representation of anions and cations.
   a) Space charge b) Diffusion
   c) Drift d) Reflex

13) Resting state of nerve muscle action potential starts from
   a) –20 mV b) 35 mV c) 90 mV d) –90 mV

14) In thermoregulatory plant model short resistor represents
   a) Conduction b) Convention
   c) Radiation d) Insulation

_____

SLR-EP – 297

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (CGPA) (New) Examination, 2016
BIOLOGICAL MODELING AND SIMULATION

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any 4** : **(4×4=16)**
   1) Define and differentiate between Nernst equation and Donnan's equation.
   2) Explain the concept of compartmental modeling.
   3) Write Goldman's equation and mention why it is called constant field equation.
   4) Discuss the concept of lumped and distributed parameter models.
   5) Define modeling and state its steps for modeling.

3. Attempt **any two** : **(6×2=12)**
   1) Draw and explain electrical equivalent model of biological membrane.
   2) Asquid Giant axon has following ratio of permeabilities and concentration :

Ion	Cytoplasm (mm)	ECF (mm)	Ratio of Permeabilities
Na^+	50	440	0.04
K^+	400	20	1
Cl^-	52	560	0.45

   Considering KTI q = 25.3 mV, calculate, Nernst potential for Na^+ and K^+ ions.
   3) Discuss active transport mechanism and mention its significance.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
   1) Discuss drug delivery systems control model.
   2) Explain insulin glucose feedback system in short.
   3) Differentiate between one control and two control mechanism for neuromuscular system.
   4) Discuss the role of spindle receptor and golgi tendon organ in controlling neuromuscular system.
   5) Discuss any two industrial applications of thermoregulatory system.

5. Attempt **any 2** questions : **(6×2=12)**
   1) Define and explain various eye movements and name type of muscles responsible for it.
   2) Draw and explain thermoregulatory plant model in detail.
   3) Discuss reciprocal innervation model of neuromuscular system with neat diagram.

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SLR-EP – 297

Seat No.	

Set Q

T.E. (Biomedical Engineering) (Part – I) (CGPA) (New) Examination, 2016
BIOLOGICAL MODELING AND SIMULATION

Day and Date : Wednesday, 30-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ law defines diffusion process.
   a) Ohm's b) Fick's
   c) Donnan's d) Goldman's

2) _____ law defines drift process.
   a) Ohm's b) Fick's c) Donnan's d) Goldman's

3) Models are simplified representation of
   a) Objects b) Images
   c) Projects d) Documents

4) _____ is defined as a controlling of load dynamics of muscles.
   a) Control system b) Drift
   c) Stretch reflex d) Diffusion

5) _____ neutrality is representation of anions and cations.
   a) Space charge b) Diffusion c) Drift d) Reflex

6) Resting state of nerve muscle action potential starts from
   a) –20 mV b) 35 mV c) 90 mV d) –90 mV

7) In thermoregulatory plant model short resistor represents
   a) Conduction b) Convention
   c) Radiation d) Insulation

P.T.O.

8) Excited nerve muscle cells action potential state reaches to
   a) +20 mV b) +35 mV c) –90 mV d) –35 mV

9) Smooth pursuit eye movement tracks _____ objects.
   a) Moving b) Stable c) Fixed d) None of the above

10) Saccadic eye movement are very _____ that jumps from one eye position to another.
   a) Slow b) Linear c) Variable d) Fast

11) _____ equation defines membrane current.
   a) Nernst b) Donnan
   c) Cable d) Goldman

12) Donnan's equation is called as _____ ion equation.
   a) One b) Three c) Four d) Two

13) Goldman's equation is called as _____ equation.
   a) Variable field b) Complex field
   c) Constant field d) Electric field

14) Parkinson's occurrence syndrome is related to _____ system.
   a) Respiratory b) Nervous c) Digestive d) Urinary

_____

SLR-EP – 297

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (CGPA) (New) Examination, 2016
BIOLOGICAL MODELING AND SIMULATION

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any 4** : **(4×4=16)**
   1) Define and differentiate between Nernst equation and Donnan's equation.
   2) Explain the concept of compartmental modeling.
   3) Write Goldman's equation and mention why it is called constant field equation.
   4) Discuss the concept of lumped and distributed parameter models.
   5) Define modeling and state its steps for modeling.

3. Attempt **any two** : **(6×2=12)**
   1) Draw and explain electrical equivalent model of biological membrane.
   2) Asquid Giant axon has following ratio of permeabilities and concentration :

Ion	Cytoplasm (mm)	ECF (mm)	Ratio of Permeabilities
Na^+	50	440	0.04
K^+	400	20	1
Cl^-	52	560	0.45

   Considering KTI q = 25.3 mV, calculate, Nernst potential for Na^+ and K^+ ions.
   3) Discuss active transport mechanism and mention its significance.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
   1) Discuss drug delivery systems control model.
   2) Explain insulin glucose feedback system in short.
   3) Differentiate between one control and two control mechanism for neuromuscular system.
   4) Discuss the role of spindle receptor and golgi tendon organ in controlling neuromuscular system.
   5) Discuss any two industrial applications of thermoregulatory system.

5. Attempt **any 2** questions : **(6×2=12)**
   1) Define and explain various eye movements and name type of muscles responsible for it.
   2) Draw and explain thermoregulatory plant model in detail.
   3) Discuss reciprocal innervation model of neuromuscular system with neat diagram.

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SLR-EP – 297

Seat No.	

Set **R**

T.E. (Biomedical Engineering) (Part – I) (CGPA) (New) Examination, 2016
BIOLOGICAL MODELING AND SIMULATION

Day and Date : Wednesday, 30-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Donnan's equation is called as _____ ion equation.
a) One b) Three c) Four d) Two

2) Goldman's equation is called as _____ equation.
a) Variable field b) Complex field
c) Constant field d) Electric field

3) Parkinson's occurrence syndrome is related to _____ system.
a) Respiratory b) Nervous c) Digestive d) Urinary

4) _____ law defines diffusion process.
a) Ohm's b) Fick's
c) Donnan's d) Goldman's

5) _____ law defines drift process.
a) Ohm's b) Fick's
c) Donnan's d) Goldman's

6) Models are simplified representation of
a) Objects b) Images
c) Projects d) Documents

7) _____ is defined as a controlling of load dynamics of muscles.
a) Control system b) Drift
c) Stretch reflex d) Diffusion

P.T.O.

8) _____ neutrality is representation of anions and cations.
   a) Space charge b) Diffusion c) Drift d) Reflex

9) Resting state of nerve muscle action potential starts from
   a) –20 mV b) 35 mV c) 90 mV d) –90 mV

10) In thermoregulatory plant model short resistor represents
   a) Conduction b) Convention
   c) Radiation d) Insulation

11) Excited nerve muscle cells action potential state reaches to
   a) +20 mV b) +35 mV c) –90 mV d) –35 mV

12) Smooth pursuit eye movement tracks _____ objects.
   a) Moving b) Stable
   c) Fixed d) None of the above

13) Saccadic eye movement are very _____ that jumps from one eye position to another.
   a) Slow b) Linear c) Variable d) Fast

14) _____ equation defines membrane current.
   a) Nernst b) Donnan
   c) Cable d) Goldman

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SLR-EP – 297

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (CGPA) (New) Examination, 2016
BIOLOGICAL MODELING AND SIMULATION

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any 4** : **(4×4=16)**
   1) Define and differentiate between Nernst equation and Donnan's equation.
   2) Explain the concept of compartmental modeling.
   3) Write Goldman's equation and mention why it is called constant field equation.
   4) Discuss the concept of lumped and distributed parameter models.
   5) Define modeling and state its steps for modeling.

3. Attempt **any two** : **(6×2=12)**
   1) Draw and explain electrical equivalent model of biological membrane.
   2) Asquid Giant axon has following ratio of permeabilities and concentration :

Ion	Cytoplasm (mm)	ECF (mm)	Ratio of Permeabilities
Na^+	50	440	0.04
K^+	400	20	1
Cl^-	52	560	0.45

   Considering KTI q = 25.3 mV, calculate, Nernst potential for Na^+ and K^+ ions.
   3) Discuss active transport mechanism and mention its significance.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
   1) Discuss drug delivery systems control model.
   2) Explain insulin glucose feedback system in short.
   3) Differentiate between one control and two control mechanism for neuromuscular system.
   4) Discuss the role of spindle receptor and golgi tendon organ in controlling neuromuscular system.
   5) Discuss any two industrial applications of thermoregulatory system.

5. Attempt **any 2** questions : **(6×2=12)**
   1) Define and explain various eye movements and name type of muscles responsible for it.
   2) Draw and explain thermoregulatory plant model in detail.
   3) Discuss reciprocal innervation model of neuromuscular system with neat diagram.

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SLR-EP – 297

Seat No.	

Set S

T.E. (Biomedical Engineering) (Part – I) (CGPA) (New) Examination, 2016
BIOLOGICAL MODELING AND SIMULATION

Day and Date : Wednesday, 30-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Models are simplified representation of
a) Objects b) Images c) Projects d) Documents

2) _____ is defined as a controlling of load dynamics of muscles.
a) Control system b) Drift
c) Stretch reflex d) Diffusion

3) _____ neutrality is representation of anions and cations.
a) Space charge b) Diffusion
c) Drift d) Reflex

4) Resting state of nerve muscle action potential starts from
a) –20 mV b) 35 mV c) 90 mV d) –90 mV

5) In thermoregulatory plant model short resistor represents
a) Conduction b) Convention
c) Radiation d) Insulation

6) Excited nerve muscle cells action potential state reaches to
a) +20 mV b) +35 mV c) –90 mV d) –35 mV

7) Smooth pursuit eye movement tracks _____ objects.
a) Moving b) Stable
c) Fixed d) None of the above

P.T.O.

8) Saccadic eye movement are very _____ that jumps from one eye position to another.
   a) Slow b) Linear c) Variable d) Fast

9) _____ equation defines membrane current.
   a) Nernst b) Donnan
   c) Cable d) Goldman

10) Donnan's equation is called as _____ ion equation.
   a) One b) Three c) Four d) Two

11) Goldman's equation is called as _____ equation.
   a) Variable field b) Complex field
   c) Constant field d) Electric field

12) Parkinson's occurrence syndrome is related to _____ system.
   a) Respiratory b) Nervous c) Digestive d) Urinary

13) _____ law defines diffusion process.
   a) Ohm's b) Fick's
   c) Donnan's d) Goldman's

14) _____ law defines drift process.
   a) Ohm's b) Fick's c) Donnan's d) Goldman's

_____

SLR-EP – 297

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (CGPA) (New) Examination, 2016
BIOLOGICAL MODELING AND SIMULATION

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any 4** : **(4×4=16)**
   1) Define and differentiate between Nernst equation and Donnan's equation.
   2) Explain the concept of compartmental modeling.
   3) Write Goldman's equation and mention why it is called constant field equation.
   4) Discuss the concept of lumped and distributed parameter models.
   5) Define modeling and state its steps for modeling.

3. Attempt **any two** : **(6×2=12)**
   1) Draw and explain electrical equivalent model of biological membrane.
   2) Asquid Giant axon has following ratio of permeabilities and concentration :

Ion	Cytoplasm (mm)	ECF (mm)	Ratio of Permeabilities
Na^+	50	440	0.04
K^+	400	20	1
Cl^-	52	560	0.45

   Considering KTI q = 25.3 mV, calculate, Nernst potential for Na^+ and K^+ ions.
   3) Discuss active transport mechanism and mention its significance.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
   1) Discuss drug delivery systems control model.
   2) Explain insulin glucose feedback system in short.
   3) Differentiate between one control and two control mechanism for neuromuscular system.
   4) Discuss the role of spindle receptor and golgi tendon organ in controlling neuromuscular system.
   5) Discuss any two industrial applications of thermoregulatory system.

5. Attempt **any 2** questions : **(6×2=12)**
   1) Define and explain various eye movements and name type of muscles responsible for it.
   2) Draw and explain thermoregulatory plant model in detail.
   3) Discuss reciprocal innervation model of neuromuscular system with neat diagram.

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SLR-EP – 298

Seat No.	

Set P

T.E. (Biomedical Engineering) (Part – I) (New) (CGPA) Examination, 2016
MICROPROCESSOR AND MICROCONTROLLER

Day and Date : Friday, 2-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Q. ***1*** *and Q.* ***3*** *are Short Answer Type Questions.*
3) Q. ***2*** *and Q.* ***4*** *are Long Answer Type Questions.*
4) Neat diagrams must be drawn ***whenever*** *necessary.*
5) Figures to the ***right*** *indicate* ***full*** *marks.*
6) Make ***suitable*** *assumptions if necessary and mention them* ***clearly****.*
7) ***Use*** *of log tables and non-programmable single memory calculator is* ***allowed****.*
8) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
9) ***Answer MCQ/Objective type questions on Page No. 3 only. 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

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

1) Mnemonics in assembly language are translated into binary language by
   a) Loader b) Linker
   c) Compiler d) Assembler

2) The bus
   a) Carries bits between the microprocessor and memory & I/Os
   b) Carries bits between the microprocessor and memory
   c) Carries bits between the microprocessor & I/Os
   d) Carries bits between the memory & I/Os

3) Which is the non-volatile memory ?
   a) ROM b) RAM
   c) SRAM d) None

4) In assembly language MOV C, A 4F here opcode is
   a) C b) C, A c) 4F d) MOV

P.T.O.

5) DCR M indicates
   a) Decrement the contents of register
   b) Decrement the contents of register pair
   c) Decrement the contents of register and memory
   d) Decrement the contents of memory

6) The address/data bus in 8085 is
   a) Multiplexed b) Demultiplexed
   c) Decoded d) Loaded

7) Which is the non-maskable interrupt ?
   a) RST 7.5 b) RST 7 c) INTR d) TRAP

8) RST 7.5 interrupt is
   a) Negative edge triggered
   b) Positive edge triggered
   c) Level triggered
   d) Both (a) and (c)

9) Mention the memory capacity for using 12 address lines
   a) 1 K b) 2 K c) 4 K d) 8 K

10) Memory-mapped I/O has the
   a) Save the memory space for ROM
   b) It does not limit the RAM address space loss
   c) It is not using any of the 8051 ports
   d) All above

11) The 8051 has _____ bit of stack pointer.
   a) 8 b) 16 c) 4 d) 0

12) All SFRs may be addressed at _____ level by using the direct address assigned to it.
   a) Low b) High c) Bit d) Byte

13) After reset, SP register is initialized to address
   a) 08H b) 09H c) 06H d) 07H

14) The size of the internal RAM of 8051 is
   a) 64 Kb b) 128 bytes c) 128 Kb d) 4 Kb

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SLR-EP – 298

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (New) (CGPA) Examination, 2016
MICROPROCESSOR AND MICROCONTROLLER

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **1** and Q. **3** are Short Answer Type Questions.*
*3) Q. **2** and Q. **4** are Long Answer Type Questions.*
*4) Neat diagrams must be drawn **whenever** necessary.*
*5) Figures to the **right** indicate **full** marks.*
*6) Make **suitable** assumptions if necessary and mention them **clearly**.*
*7) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

SECTION – I

1. Answer **any five** of the following questions : **15**
   a) Draw and explain static RAM cell and its operation. **3**
   b) Describe the flag register (PSW) of 8085. **3**
   c) Discuss the concept of RESET and HALT states in microprocessor. **3**
   d) Define addressing mode. Explain different addressing modes with example. **3**
   e) Explain following : **3**
      i) LXI
      ii) LHL address
   f) Compare hardware and software interrupts. **3**
   g) Draw the Op code fetch machine cycle. **3**

2. Answer **any three** of the following questions : **13**
   a) Draw architecture of 8085 and explain its various functional blocks. **5**
   b) Write an assembly language program to arrange array of numbers in ascending order. **4**
   c) Draw and explain RIM and SIM instruction format. **4**
   d) Draw and explain the interrupt structure of 8085 microprocessor. **4**

SECTION – II

3. Answer **any five** of the following : **15**
   a) List all SFRs of MCS 51 and explain TMOD. **3**
   b) Compare memory mapped I/O and I/O mapped I/O. **3**
   c) Compare microprocessor and microcontroller. **3**
   d) Explain following :
      i) DA A
      ii) MUL AB **3**
   e) Explain different types of serial data input output. **3**
   f) Explain the features and operator of I/O port of 8051. Sketch the internal circuit of port I and explain its operation. **3**

4. Answer **any three** of the following questions : **13**
   a) Draw and explain architecture of 8051. **4**
   b) List and explain in detail different data transfer techniques. **4**
   c) Interface keyboard and explain in detail. **4**
   d) How do you differentiate between timer/counter operation in 8051 and also different modes of operator of timer/counter ? **5**

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SLR-EP – 298

Seat No.	

Set Q

T.E. (Biomedical Engineering) (Part – I) (New) (CGPA) Examination, 2016
MICROPROCESSOR AND MICROCONTROLLER

Day and Date : Friday, 2-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Q. ***1*** *and Q.* ***3*** *are Short Answer Type Questions.*
3) Q. ***2*** *and Q.* ***4*** *are Long Answer Type Questions.*
4) Neat diagrams must be drawn ***whenever*** *necessary.*
5) Figures to the ***right*** *indicate* ***full*** *marks.*
6) Make ***suitable*** *assumptions if necessary and mention them* ***clearly****.*
7) ***Use*** *of log tables and non-programmable single memory calculator is* ***allowed****.*
8) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
9) ***Answer MCQ/Objective type questions on Page No. 3 only. 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

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

1) RST 7.5 interrupt is
   a) Negative edge triggered
   b) Positive edge triggered
   c) Level triggered
   d) Both (a) and (c)

2) Mention the memory capacity for using 12 address lines
   a) 1 K b) 2 K
   c) 4 K d) 8 K

3) Memory-mapped I/O has the
   a) Save the memory space for ROM
   b) It does not limit the RAM address space loss
   c) It is not using any of the 8051 ports
   d) All above

P.T.O.

4) The 8051 has _____ bit of stack pointer.
   a) 8 b) 16 c) 4 d) 0

5) All SFRs may be addressed at _____ level by using the direct address assigned to it.
   a) Low b) High c) Bit d) Byte

6) After reset, SP register is initialized to address
   a) 08H b) 09H c) 06H d) 07H

7) The size of the internal RAM of 8051 is
   a) 64 Kb b) 128 bytes c) 128 Kb d) 4 Kb

8) Mnemonics in assembly language are translated into binary language by
   a) Loader b) Linker
   c) Compiler d) Assembler

9) The bus
   a) Carries bits between the microprocessor and memory & I/Os
   b) Carries bits between the microprocessor and memory
   c) Carries bits between the microprocessor & I/Os
   d) Carries bits between the memory & I/Os

10) Which is the non-volatile memory ?
   a) ROM b) RAM
   c) SRAM d) None

11) In assembly language MOV C, A 4F here opcode is
   a) C b) C, A c) 4F d) MOV

12) DCR M indicates
   a) Decrement the contents of register
   b) Decrement the contents of register pair
   c) Decrement the contents of register and memory
   d) Decrement the contents of memory

13) The address/data bus in 8085 is
   a) Multiplexed b) Demultiplexed
   c) Decoded d) Loaded

14) Which is the non-maskable interrupt ?
   a) RST 7.5 b) RST 7 c) INTR d) TRAP

_____

SLR-EP – 298

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (New) (CGPA) Examination, 2016
MICROPROCESSOR AND MICROCONTROLLER

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **1** and Q. **3** are Short Answer Type Questions.*
*3) Q. **2** and Q. **4** are Long Answer Type Questions.*
*4) Neat diagrams must be drawn **whenever** necessary.*
*5) Figures to the **right** indicate **full** marks.*
*6) Make **suitable** assumptions if necessary and mention them **clearly**.*
*7) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

SECTION – I

1. Answer **any five** of the following questions : **15**
   a) Draw and explain static RAM cell and its operation. **3**
   b) Describe the flag register (PSW) of 8085. **3**
   c) Discuss the concept of RESET and HALT states in microprocessor. **3**
   d) Define addressing mode. Explain different addressing modes with example. **3**
   e) Explain following : **3**
      i) LXI
      ii) LHL address
   f) Compare hardware and software interrupts. **3**
   g) Draw the Op code fetch machine cycle. **3**

2. Answer **any three** of the following questions : **13**
   a) Draw architecture of 8085 and explain its various functional blocks. **5**
   b) Write an assembly language program to arrange array of numbers in ascending order. **4**
   c) Draw and explain RIM and SIM instruction format. **4**
   d) Draw and explain the interrupt structure of 8085 microprocessor. **4**

Set Q

SECTION – II

3. Answer **any five** of the following : **15**
   a) List all SFRs of MCS 51 and explain TMOD. **3**
   b) Compare memory mapped I/O and I/O mapped I/O. **3**
   c) Compare microprocessor and microcontroller. **3**
   d) Explain following :
      i) DA A
      ii) MUL AB **3**
   e) Explain different types of serial data input output. **3**
   f) Explain the features and operator of I/O port of 8051. Sketch the internal circuit of port I and explain its operation. **3**

4. Answer **any three** of the following questions : **13**
   a) Draw and explain architecture of 8051. **4**
   b) List and explain in detail different data transfer techniques. **4**
   c) Interface keyboard and explain in detail. **4**
   d) How do you differentiate between timer/counter operation in 8051 and also different modes of operator of timer/counter ? **5**

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SLR-EP – 298

Seat No.	

Set R

T.E. (Biomedical Engineering) (Part – I) (New) (CGPA) Examination, 2016
MICROPROCESSOR AND MICROCONTROLLER

Day and Date : Friday, 2-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Q. ***1*** *and Q.* ***3*** *are Short Answer Type Questions.*
3) Q. ***2*** *and Q.* ***4*** *are Long Answer Type Questions.*
4) Neat diagrams must be drawn ***whenever*** *necessary.*
5) Figures to the ***right*** *indicate* ***full*** *marks.*
6) Make ***suitable*** *assumptions if necessary and mention them* ***clearly****.*
7) ***Use*** *of log tables and non-programmable single memory calculator is* ***allowed****.*
8) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
9) ***Answer MCQ/Objective type questions on Page No. 3 only. 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

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

1) DCR M indicates
   a) Decrement the contents of register
   b) Decrement the contents of register pair
   c) Decrement the contents of register and memory
   d) Decrement the contents of memory

2) The address/data bus in 8085 is
   a) Multiplexed b) Demultiplexed
   c) Decoded d) Loaded

3) Which is the non-maskable interrupt ?
   a) RST 7.5 b) RST 7 c) INTR d) TRAP

4) RST 7.5 interrupt is
   a) Negative edge triggered b) Positive edge triggered
   c) Level triggered d) Both (a) and (c)

P.T.O.

5) Mention the memory capacity for using 12 address lines
   a) 1 K b) 2 K c) 4 K d) 8 K

6) Memory-mapped I/O has the
   a) Save the memory space for ROM
   b) It does not limit the RAM address space loss
   c) It is not using any of the 8051 ports
   d) All above

7) The 8051 has _____ bit of stack pointer.
   a) 8 b) 16 c) 4 d) 0

8) All SFRs may be addressed at _____ level by using the direct address assigned to it.
   a) Low b) High c) Bit d) Byte

9) After reset, SP register is initialized to address
   a) 08H b) 09H c) 06H d) 07H

10) The size of the internal RAM of 8051 is
   a) 64 Kb b) 128 bytes c) 128 Kb d) 4 Kb

11) Mnemonics in assembly language are translated into binary language by
   a) Loader b) Linker
   c) Compiler d) Assembler

12) The bus
   a) Carries bits between the microprocessor and memory & I/Os
   b) Carries bits between the microprocessor and memory
   c) Carries bits between the microprocessor & I/Os
   d) Carries bits between the memory & I/Os

13) Which is the non-volatile memory ?
   a) ROM b) RAM
   c) SRAM d) None

14) In assembly language MOV C, A 4F here opcode is
   a) C b) C, A c) 4F d) MOV

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SLR-EP – 298

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (New) (CGPA) Examination, 2016
MICROPROCESSOR AND MICROCONTROLLER

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **1** and Q. **3** are Short Answer Type Questions.*
*3) Q. **2** and Q. **4** are Long Answer Type Questions.*
*4) Neat diagrams must be drawn **whenever** necessary.*
*5) Figures to the **right** indicate **full** marks.*
*6) Make **suitable** assumptions if necessary and mention them **clearly**.*
*7) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

SECTION – I

1. Answer **any five** of the following questions : **15**
   a) Draw and explain static RAM cell and its operation. **3**
   b) Describe the flag register (PSW) of 8085. **3**
   c) Discuss the concept of RESET and HALT states in microprocessor. **3**
   d) Define addressing mode. Explain different addressing modes with example. **3**
   e) Explain following : **3**
      i) LXI
      ii) LHL address
   f) Compare hardware and software interrupts. **3**
   g) Draw the Op code fetch machine cycle. **3**

2. Answer **any three** of the following questions : **13**
   a) Draw architecture of 8085 and explain its various functional blocks. **5**
   b) Write an assembly language program to arrange array of numbers in ascending order. **4**
   c) Draw and explain RIM and SIM instruction format. **4**
   d) Draw and explain the interrupt structure of 8085 microprocessor. **4**

SECTION – II

3. Answer **any five** of the following : **15**
   a) List all SFRs of MCS 51 and explain TMOD. **3**
   b) Compare memory mapped I/O and I/O mapped I/O. **3**
   c) Compare microprocessor and microcontroller. **3**
   d) Explain following :
      i) DA A
      ii) MUL AB **3**
   e) Explain different types of serial data input output. **3**
   f) Explain the features and operator of I/O port of 8051. Sketch the internal circuit of port I and explain its operation. **3**

4. Answer **any three** of the following questions : **13**
   a) Draw and explain architecture of 8051. **4**
   b) List and explain in detail different data transfer techniques. **4**
   c) Interface keyboard and explain in detail. **4**
   d) How do you differentiate between timer/counter operation in 8051 and also different modes of operator of timer/counter ? **5**

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SLR-EP – 298

Seat No.	

Set S

T.E. (Biomedical Engineering) (Part – I) (New) (CGPA) Examination, 2016
MICROPROCESSOR AND MICROCONTROLLER

Day and Date : Friday, 2-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Q. ***1*** *and Q.* ***3*** *are Short Answer Type Questions.*
3) Q. ***2*** *and Q.* ***4*** *are Long Answer Type Questions.*
4) Neat diagrams must be drawn ***whenever*** *necessary.*
5) Figures to the ***right*** *indicate* ***full*** *marks.*
6) Make ***suitable*** *assumptions if necessary and mention them* ***clearly****.*
7) ***Use*** *of log tables and non-programmable single memory calculator is* ***allowed****.*
8) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
9) ***Answer MCQ/Objective type questions on Page No. 3 only. 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

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

1) Memory-mapped I/O has the
   a) Save the memory space for ROM
   b) It does not limit the RAM address space loss
   c) It is not using any of the 8051 ports
   d) All above

2) The 8051 has _____ bit of stack pointer.
   a) 8 b) 16 c) 4 d) 0

3) All SFRs may be addressed at _____ level by using the direct address assigned to it.
   a) Low b) High c) Bit d) Byte

4) After reset, SP register is initialized to address
   a) 08H b) 09H c) 06H d) 07H

P.T.O.

5) The size of the internal RAM of 8051 is
   a) 64 Kb b) 128 bytes c) 128 Kb d) 4 Kb

6) Mnemonics in assembly language are translated into binary language by
   a) Loader b) Linker
   c) Compiler d) Assembler

7) The bus
   a) Carries bits between the microprocessor and memory & I/Os
   b) Carries bits between the microprocessor and memory
   c) Carries bits between the microprocessor & I/Os
   d) Carries bits between the memory & I/Os

8) Which is the non-volatile memory ?
   a) ROM b) RAM
   c) SRAM d) None

9) In assembly language MOV C, A 4F here opcode is
   a) C b) C, A c) 4F d) MOV

10) DCR M indicates
   a) Decrement the contents of register
   b) Decrement the contents of register pair
   c) Decrement the contents of register and memory
   d) Decrement the contents of memory

11) The address/data bus in 8085 is
   a) Multiplexed b) Demultiplexed
   c) Decoded d) Loaded

12) Which is the non-maskable interrupt ?
   a) RST 7.5 b) RST 7 c) INTR d) TRAP

13) RST 7.5 interrupt is
   a) Negative edge triggered
   b) Positive edge triggered
   c) Level triggered
   d) Both (a) and (c)

14) Mention the memory capacity for using 12 address lines
   a) 1 K b) 2 K c) 4 K d) 8 K

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SLR-EP – 298

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (New) (CGPA) Examination, 2016
MICROPROCESSOR AND MICROCONTROLLER

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **1** and Q. **3** are Short Answer Type Questions.*
*3) Q. **2** and Q. **4** are Long Answer Type Questions.*
*4) Neat diagrams must be drawn **whenever** necessary.*
*5) Figures to the **right** indicate **full** marks.*
*6) Make **suitable** assumptions if necessary and mention them **clearly**.*
*7) **Use** of log tables and non-programmable single memory calculator is **allowed**.*

SECTION – I

1. Answer **any five** of the following questions : **15**
   a) Draw and explain static RAM cell and its operation. **3**
   b) Describe the flag register (PSW) of 8085. **3**
   c) Discuss the concept of RESET and HALT states in microprocessor. **3**
   d) Define addressing mode. Explain different addressing modes with example. **3**
   e) Explain following : **3**
      i) LXI
      ii) LHL address
   f) Compare hardware and software interrupts. **3**
   g) Draw the Op code fetch machine cycle. **3**

2. Answer **any three** of the following questions : **13**
   a) Draw architecture of 8085 and explain its various functional blocks. **5**
   b) Write an assembly language program to arrange array of numbers in ascending order. **4**
   c) Draw and explain RIM and SIM instruction format. **4**
   d) Draw and explain the interrupt structure of 8085 microprocessor. **4**

Set S

SECTION – II

3. Answer **any five** of the following : **15**
   a) List all SFRs of MCS 51 and explain TMOD. **3**
   b) Compare memory mapped I/O and I/O mapped I/O. **3**
   c) Compare microprocessor and microcontroller. **3**
   d) Explain following :
      i) DA A
      ii) MUL AB **3**
   e) Explain different types of serial data input output. **3**
   f) Explain the features and operator of I/O port of 8051. Sketch the internal circuit of port I and explain its operation. **3**

4. Answer **any three** of the following questions : **13**
   a) Draw and explain architecture of 8051. **4**
   b) List and explain in detail different data transfer techniques. **4**
   c) Interface keyboard and explain in detail. **4**
   d) How do you differentiate between timer/counter operation in 8051 and also different modes of operator of timer/counter ? **5**

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SLR-EP – 299

Seat No.	

Set P

T.E. (Part – I) (Biomedical Engineering) (New) (CGPA) Examination, 2016
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 5-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Frequency of frequency modulated wave is given by

$f = f_c + K_{\Delta} V_m \sin$ _____ t.

a) ω_c b) ω_m c) ω_f d) ω_d

2) _____ is defined as the ratio of signal power to noise power at same point.
a) Noise figure
b) Noise merit
c) Noise frequency
d) Noise amplitude

3) In amplitude modulation, the modulated wave contains extra energy in _____ components.
a) 1 side band b) 3 side bands
c) 2 side bands d) None of the above

4) A varactor diode is a semiconductor diode whose junction _____ varies linearly with applied voltage.
a) resistance b) e.m.f. c) capacitance d) induction

5) _____ is the range of frequencies required for transmission of modulated signal.
a) Time b) Frequency c) Wavelength d) Bandwidth

P.T.O.

6) Maximum power in amplitude modulation is given by PAM = _____ Pc when m = 1.
   a) 2 b) 1.5 c) 2.5 d) 5

7) Probability of error is the function of a carrier to noise power ratio and number of possible _____ conditions used.
   a) Encoding b) Decoding
   c) Multiplexing d) Demultiplexing

8) _____ division multiplexing is an analog type multiplexing system.
   a) Time b) Pulse c) Frequency d) Amplitude

9) _____ efficiency is used to compare the performance of one digital modulation technique to an other.
   a) Wavelength b) Modulation c) Probability d) Bandwidth

10) Shot noise is caused by _____ variation in the arrival of electrons at output electrode of an amplifying device.
   a) Random b) Linear c) Proportional d) Simultaneous

11) Modulation index in amplitude modulation is given by m =
   a) V_m/V_c b) V_c/V_m c) $2V_m/V_c$ d) $V_m/2V_c$

12) Delta modulation is obtained by _____ the quantization and encoding process of PCM.
   a) Integrating b) Dividing c) Simplifying d) Adding

13) FSK is a _____ modulation technique.
   a) Analog b) Digital c) Frequency d) Pulsed

14) _____ estimates the predictable part from signal and then codes unpredictable signal.
   a) PCM b) DM c) DPCM d) PSK

_____

SLR-EP – 299

Seat No.	

T.E. (Part – I) (Biomedical Engineering) (New) (CGPA) Examination, 2016
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Differentiate between amplitude modulation and frequency modulation.
   2) Define and explain various types of noises with example.
   3) On an AM signal the $V_{max(p-p)}$ value read from the gratitude on oscilloscope screen is 5.9 divisions and $V_{min(p-p)}$ is 1.2 divisions.
      Calculate :
      1) Modulation index
      2) V_c and V_m
   4) Explain block diagram of showing elements of analog communication.
   5) Derive power relations in frequency modulated wave.

3. Attempt **any two** : **(6×2=12)**
   1) Define and explain pre-emphasis and de-emphasis concept with its significance.
   2) Define SSB and DSBSC techniques and mention their power relations.
   3) List various methods of frequency modulate and explain any two with necessary figure.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Differentiate between TDM and FDM technique.
   2) Draw and explain working of PAM demodulation circuit.

Set P

3) Define and differentiate between uniform and non-uniform quantization types of source coding.

4) Explain Frequency Division Multiplexing (FDM) with neat diagram.

5) Define and explain sampling and quantization.

5. Attempt **any two** : **(6×2=12)**

1) Explain following techniques :

a) PCM b) ADPCM

2) List direct and indirect techniques of PTM generating signals and explain any one from each technique.

3) Draw and explain working of M Array FSK system.

SLR-EP – 299

Seat No.	

Set Q

T.E. (Part – I) (Biomedical Engineering) (New) (CGPA) Examination, 2016
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 5-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ division multiplexing is an analog type multiplexing system.
a) Time b) Pulse c) Frequency d) Amplitude

2) _____ efficiency is used to compare the performance of one digital modulation technique to an other.
a) Wavelength b) Modulation c) Probability d) Bandwidth

3) Shot noise is caused by _____ variation in the arrival of electrons at output electrode of an amplifying device.
a) Random b) Linear c) Proportional d) Simultaneous

4) Modulation index in amplitude modulation is given by m =
a) V_m/V_c b) V_c/V_m c) $2V_m/V_c$ d) $V_m/2V_c$

5) Delta modulation is obtained by _____ the quantization and encoding process of PCM.
a) Integrating b) Dividing c) Simplifying d) Adding

6) FSK is a _____ modulation technique.
a) Analog b) Digital c) Frequency d) Pulsed

7) _____ estimates the predictable part from signal and then codes unpredictable signal.
a) PCM b) DM c) DPCM d) PSK

P.T.O.

8) Frequency of frequency modulated wave is given by

$f = f_c + K_\Delta V_m \sin$ _____ t.

a) ω_c b) ω_m c) ω_f d) ω_d

9) _____ is defined as the ratio of signal power to noise power at same point.
   a) Noise figure
   b) Noise merit
   c) Noise frequency
   d) Noise amplitude

10) In amplitude modulation, the modulated wave contains extra energy in _____ components.
   a) 1 side band b) 3 side bands
   c) 2 side bands d) None of the above

11) A varactor diode is a semiconductor diode whose junction _____ varies linearly with applied voltage.
   a) resistance b) e.m.f. c) capacitance d) induction

12) _____ is the range of frequencies required for transmission of modulated signal.
   a) Time b) Frequency c) Wavelength d) Bandwidth

13) Maximum power in amplitude modulation is given by PAM = _____ Pc when m = 1.
   a) 2 b) 1.5 c) 2.5 d) 5

14) Probability of error is the function of a carrier to noise power ratio and number of possible _____ conditions used.
   a) Encoding b) Decoding
   c) Multiplexing d) Demultiplexing

_____

SLR-EP – 299

Seat No.	

T.E. (Part – I) (Biomedical Engineering) (New) (CGPA) Examination, 2016
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Differentiate between amplitude modulation and frequency modulation.
   2) Define and explain various types of noises with example.
   3) On an AM signal the $V_{max(p-p)}$ value read from the gratitude on oscilloscope screen is 5.9 divisions and $V_{min(p-p)}$ is 1.2 divisions.
      Calculate :
      1) Modulation index
      2) V_c and V_m
   4) Explain block diagram of showing elements of analog communication.
   5) Derive power relations in frequency modulated wave.

3. Attempt **any two** : **(6×2=12)**
   1) Define and explain pre-emphasis and de-emphasis concept with its significance.
   2) Define SSB and DSBSC techniques and mention their power relations.
   3) List various methods of frequency modulate and explain any two with necessary figure.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Differentiate between TDM and FDM technique.
   2) Draw and explain working of PAM demodulation circuit.

Set Q

3) Define and differentiate between uniform and non-uniform quantization types of source coding.

4) Explain Frequency Division Multiplexing (FDM) with neat diagram.

5) Define and explain sampling and quantization.

5. Attempt **any two** : **(6×2=12)**

1) Explain following techniques :

a) PCM b) ADPCM

2) List direct and indirect techniques of PTM generating signals and explain any one from each technique.

3) Draw and explain working of M Array FSK system.

SLR-EP – 299

Seat No.	

Set R

T.E. (Part – I) (Biomedical Engineering) (New) (CGPA) Examination, 2016
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 5-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) _____ is the range of frequencies required for transmission of modulated signal.
a) Time b) Frequency c) Wavelength d) Bandwidth

2) Maximum power in amplitude modulation is given by PAM = _____ Pc when m = 1.
a) 2 b) 1.5 c) 2.5 d) 5

3) Probability of error is the function of a carrier to noise power ratio and number of possible _____ conditions used.
a) Encoding b) Decoding
c) Multiplexing d) Demultiplexing

4) _____ division multiplexing is an analog type multiplexing system.
a) Time b) Pulse c) Frequency d) Amplitude

5) _____ efficiency is used to compare the performance of one digital modulation technique to an other.
a) Wavelength b) Modulation c) Probability d) Bandwidth

6) Shot noise is caused by _____ variation in the arrival of electrons at output electrode of an amplifying device.
a) Random b) Linear
c) Proportional d) Simultaneous

P.T.O.

7) Modulation index in amplitude modulation is given by m =
   a) V_m/V_c b) V_c/V_m c) $2V_m/V_c$ d) $V_m/2V_c$

8) Delta modulation is obtained by _____ the quantization and encoding process of PCM.
   a) Integrating b) Dividing c) Simplifying d) Adding

9) FSK is a _____ modulation technique.
   a) Analog b) Digital c) Frequency d) Pulsed

10) _____ estimates the predictable part from signal and then codes unpredictable signal.
   a) PCM b) DM c) DPCM d) PSK

11) Frequency of frequency modulated wave is given by

   $f = f_c + K_\Delta V_m \sin$ _____ t.
   a) ω_c b) ω_m c) ω_f d) ω_d

12) _____ is defined as the ratio of signal power to noise power at same point.
   a) Noise figure
   b) Noise merit
   c) Noise frequency
   d) Noise amplitude

13) In amplitude modulation, the modulated wave contains extra energy in _____ components.
   a) 1 side band b) 3 side bands
   c) 2 side bands d) None of the above

14) A varactor diode is a semiconductor diode whose junction _____ varies linearly with applied voltage.
   a) resistance b) e.m.f. c) capacitance d) induction

_____

SLR-EP – 299

Seat No.	

T.E. (Part – I) (Biomedical Engineering) (New) (CGPA) Examination, 2016
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Differentiate between amplitude modulation and frequency modulation.
   2) Define and explain various types of noises with example.
   3) On an AM signal the $V_{max(p-p)}$ value read from the gratitude on oscilloscope screen is 5.9 divisions and $V_{min(p-p)}$ is 1.2 divisions.
      Calculate :
      1) Modulation index
      2) V_c and V_m
   4) Explain block diagram of showing elements of analog communication.
   5) Derive power relations in frequency modulated wave.

3. Attempt **any two** : **(6×2=12)**
   1) Define and explain pre-emphasis and de-emphasis concept with its significance.
   2) Define SSB and DSBSC techniques and mention their power relations.
   3) List various methods of frequency modulate and explain any two with necessary figure.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Differentiate between TDM and FDM technique.
   2) Draw and explain working of PAM demodulation circuit.

Set R

3) Define and differentiate between uniform and non-uniform quantization types of source coding.

4) Explain Frequency Division Multiplexing (FDM) with neat diagram.

5) Define and explain sampling and quantization.

5. Attempt **any two** : **(6×2=12)**

1) Explain following techniques :

a) PCM b) ADPCM

2) List direct and indirect techniques of PTM generating signals and explain any one from each technique.

3) Draw and explain working of M Array FSK system.

SLR-EP – 299

Seat No.	

Set S

T.E. (Part – I) (Biomedical Engineering) (New) (CGPA) Examination, 2016
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 5-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Shot noise is caused by _____ variation in the arrival of electrons at output electrode of an amplifying device.
a) Random b) Linear c) Proportional d) Simultaneous

2) Modulation index in amplitude modulation is given by m =
a) V_m/V_c b) V_c/V_m c) $2V_m/V_c$ d) $V_m/2V_c$

3) Delta modulation is obtained by _____ the quantization and encoding process of PCM.
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c) Simplifying d) Adding

4) FSK is a _____ modulation technique.
a) Analog b) Digital
c) Frequency d) Pulsed

5) _____ estimates the predictable part from signal and then codes unpredictable signal.
a) PCM b) DM c) DPCM d) PSK

6) Frequency of frequency modulated wave is given by

$f = f_c + K_\Delta V_m \sin$ _____ t.

a) ω_c b) ω_m c) ω_f d) ω_d

P.T.O.

7) _____ is defined as the ratio of signal power to noise power at same point.
   a) Noise figure
   b) Noise merit
   c) Noise frequency
   d) Noise amplitude

8) In amplitude modulation, the modulated wave contains extra energy in _____ components.
   a) 1 side band b) 3 side bands
   c) 2 side bands d) None of the above

9) A varactor diode is a semiconductor diode whose junction _____ varies linearly with applied voltage.
   a) resistance b) e.m.f. c) capacitance d) induction

10) _____ is the range of frequencies required for transmission of modulated signal.
   a) Time b) Frequency c) Wavelength d) Bandwidth

11) Maximum power in amplitude modulation is given by PAM = _____ Pc when m = 1.
   a) 2 b) 1.5 c) 2.5 d) 5

12) Probability of error is the function of a carrier to noise power ratio and number of possible _____ conditions used.
   a) Encoding b) Decoding
   c) Multiplexing d) Demultiplexing

13) _____ division multiplexing is an analog type multiplexing system.
   a) Time b) Pulse c) Frequency d) Amplitude

14) _____ efficiency is used to compare the performance of one digital modulation technique to an other.
   a) Wavelength b) Modulation c) Probability d) Bandwidth

_____

SLR-EP – 299

Seat No.	

T.E. (Part – I) (Biomedical Engineering) (New) (CGPA) Examination, 2016
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
   1) Differentiate between amplitude modulation and frequency modulation.
   2) Define and explain various types of noises with example.
   3) On an AM signal the $V_{max(p-p)}$ value read from the gratitude on oscilloscope screen is 5.9 divisions and $V_{min(p-p)}$ is 1.2 divisions.
      Calculate :
      1) Modulation index
      2) V_c and V_m
   4) Explain block diagram of showing elements of analog communication.
   5) Derive power relations in frequency modulated wave.

3. Attempt **any two** : **(6×2=12)**
   1) Define and explain pre-emphasis and de-emphasis concept with its significance.
   2) Define SSB and DSBSC techniques and mention their power relations.
   3) List various methods of frequency modulate and explain any two with necessary figure.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
   1) Differentiate between TDM and FDM technique.
   2) Draw and explain working of PAM demodulation circuit.

Set S

3) Define and differentiate between uniform and non-uniform quantization types of source coding.

4) Explain Frequency Division Multiplexing (FDM) with neat diagram.

5) Define and explain sampling and quantization.

5. Attempt **any two** : **(6×2=12)**

1) Explain following techniques :

a) PCM b) ADPCM

2) List direct and indirect techniques of PTM generating signals and explain any one from each technique.

3) Draw and explain working of M Array FSK system.

SLR-EP – 300

Seat No.	

Set P

T.E. (Biomedical Engineering) (Part – I) (New CGPA) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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

1) The autocorrelation of a sinusoid is
   a) Sine pulse b) Another sinusoid
   c) Regular pulse d) Triangular pulse

2) Which of the following is true for the system represented by y(n) = x (– n) ?
   a) Linear b) Time invariant c) Causal d) Nonlinear

3) The Fourier transform of impulse function is
   a) $\delta(\omega)$ b) $2\pi\omega$ c) 1 d) sine f

4) Discrete time signal system is stable if the poles are
   a) Within unit circle b) Outside unit circle
   c) On unit circle d) None

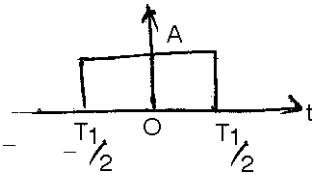
5) The z transform of –u(–n –1) is
   a) $1/1-z$ b) z/1 – z c) $1/1-z^{-1}$ d) z/1-z^{-1}

6) For a stable system
   a) |z|< 1 b) |z| = 1 c) |z| >1 d) $|z| \neq 1$

7) The period of the signal x(t) = 10 sin πt + 4cos 18 πt is
   a) $\pi/4$ b) $1/6$ c) $1/9$ d) $1/3$

P.T.O.

8) The average power of given signal is



a) $\frac{A^2}{2}$ b) A^2 c) AT_1^2 d) A^2T_1

9) A continuous time periodic signal x(t), having a period T_1 is convolved with itself. The resulting signal is
   a) not periodic b) periodic with period T
   c) periodic with period 2T d) none of above

10) The region of convergence of z transform of the signal $x(n) = \underset{\uparrow}{\{2, 1, 1, 2\}}$ is
   $n=0$
   a) All z except z = 0 and z = ∞ b) All z except z = 0
   c) All z except z = ∞ d) All z

11) The unit step response of a system with impulse response $h(n) = \delta(n) - \delta(n-1)$ is
   a) $\delta(n-1)$ b) $\delta(n)$ c) u(n –1) d) u(n)

12) The system having input x(n) related to output $y(n) = \log_{10}|x(n)|$ is
   a) Nonlinear, causal, stable b) Linear, noncausal, stable
   c) Nonlinear, causal, not stable d) Linear, causal, not stable

13) The DFT of a signal x(n) of length N is x(K.) When x(K) is given and x(n) is computed from it, the length of x(n) is
   a) increased to ∞ b) remains N c) become 2N – 1 d) become N^2

14) The Fourier transform of u(t) is

   a) $\frac{1}{2j\pi f}$ b) $2j\pi f$ c) $\frac{1}{1+2j\pi f}$ d) none of above

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SLR-EP – 300

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (New CGPA) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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

1) Determine the even and odd parts of given signal $x(t) = \begin{cases} Ae^{-\alpha t} & t > 0 \\ 0 & t < 0 \end{cases}$.

2) Define a unit impulse function $\delta(t)$.

3) Find the Laplace function of $t\sin \omega_0 t\, u(t)$.

4) Define causal, non-causal, even and odd signals with example.

5) State and explain sampling theorem in time and frequency domain.

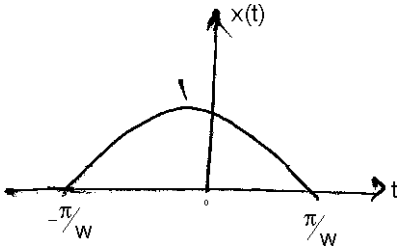
3. Attempt **any two** : **(6×2=12)**

1) Obtain the time function F(t) whose Laplace transform is

$$F(s) = \frac{s^2 + 3s + 1}{(s+1)^3 (s+2)^2}.$$

2) Determine the total energy of the raised cosine pulse x(t), defined by

$$x(t) = \begin{cases} \frac{1}{2}(\cos \omega + 1) & \frac{-\pi}{\omega} \le t \le \frac{\pi}{\omega} \\ 0 & \text{otherwise} \end{cases}.$$



3) State the initial and final value theorem of a Laplace transform. Compute it for given below $x(s) = \frac{3s + 4}{s(s+1)(s+2)^2}$.

Set P

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

   1) Let the z-transform of x(n) be x(z). Show that the z-transform of x(–n) is $x\left(\frac{1}{z}\right)$.

   2) Explain time differentiation and time integration properties of Fourier series.

   3) State and prove Parseval's theorem for continuous time periodic signal.

   4) Calculate the fundamental frequency of given signal

   $$x(n) = e^{\frac{-4j\pi n}{3}} + e^{-3j\pi n}.$$

   5) Determine the Fourier transform of unit step x(t) = u(t).

5. Attempt **any two** : **(6×2=12)**

   1) Find the Fourier transform of (i) $x_1[n] = \sin n\ \omega_0$ (ii) $x_2[n] = (\sin n\omega_o)\ u(n)$.

   2) Determine autocorrelation of the sequence {1, 1, 2, 3}.

   3) Determine the z-transform of $x_1(n) = \alpha^n u(n)$ and $x_2(n) = -\alpha^n u(-n-1)$ and indicate their regions of convergence.

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SLR-EP – 300

Seat No.	

Set Q

T.E. (Biomedical Engineering) (Part – I) (New CGPA) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

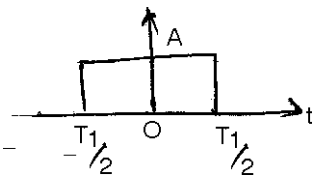
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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

1) The average power of given signal is



a) $\frac{A^2}{2}$ b) A^2 c) AT_1^2 d) A^2T_1

2) A continuous time periodic signal x(t), having a period T_1 is convolved with itself. The resulting signal is
   a) not periodic b) periodic with period T
   c) periodic with period 2T d) none of above

3) The region of convergence of z transform of the signal $x(n) = \underset{\uparrow}{\{2, 1, 1, 2\}}$ is
   $n=0$
   a) All z except z = 0 and z = ∞ b) All z except z = 0
   c) All z except z = ∞ d) All z

4) The unit step response of a system with impulse response $h(n) = \delta(n) - \delta(n-1)$ is
   a) $\delta(n-1)$ b) $\delta(n)$ c) u(n –1) d) u(n)

P.T.O.

5) The system having input x(n) related to output $y(n) = \log_{10}|x(n)|$ is
   a) Nonlinear, causal, stable b) Linear, noncausal, stable
   c) Nonlinear, causal, not stable d) Linear, causal, not stable

6) The DFT of a signal x(n) of length N is x(K.) When x(K) is given and x(n) is computed from it, the length of x(n) is
   a) increased to ∞ b) remains N c) become 2N – 1 d) become N^2

7) The Fourier transform of u(t) is
   a) $\frac{1}{2j\pi f}$ b) $2j\pi f$ c) $\frac{1}{1+2j\pi f}$ d) none of above

8) The autocorrelation of a sinusoid is
   a) Sine pulse b) Another sinusoid
   c) Regular pulse d) Triangular pulse

9) Which of the following is true for the system represented by y(n) = x (– n) ?
   a) Linear b) Time invariant c) Causal d) Nonlinear

10) The Fourier transform of impulse function is
   a) $\delta(\omega)$ b) $2\pi\omega$ c) 1 d) sine f

11) Discrete time signal system is stable if the poles are
   a) Within unit circle b) Outside unit circle
   c) On unit circle d) None

12) The z transform of –u(–n –1) is
   a) $\frac{1}{1-z}$ b) z/1 –z c) $\frac{1}{1-z^{-1}}$ d) $z/1\text{-}z^{-1}$

13) For a stable system
   a) |z|< 1 b) |z| = 1 c) |z| >1 d) $|z| \neq 1$

14) The period of the signal $x(t) = 10 \sin \pi t + 4\cos 18\pi t$ is
   a) $\frac{\pi}{4}$ b) $\frac{1}{6}$ c) $\frac{1}{9}$ d) $\frac{1}{3}$

SLR-EP – 300

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (New CGPA) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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

1) Determine the even and odd parts of given signal $x(t) = \begin{cases} Ae^{-\alpha t} & t > 0 \\ 0 & t < 0 \end{cases}$.

2) Define a unit impulse function $\delta(t)$.

3) Find the Laplace function of $t\sin \omega_0 t\, u(t)$.

4) Define causal, non-causal, even and odd signals with example.

5) State and explain sampling theorem in time and frequency domain.

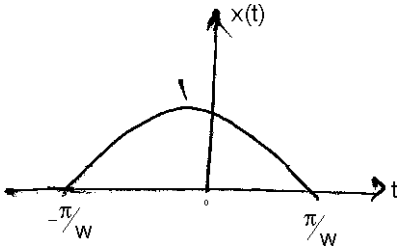
3. Attempt **any two** : **(6×2=12)**

1) Obtain the time function F(t) whose Laplace transform is

$$F(s) = \frac{s^2 + 3s + 1}{(s+1)^3 (s+2)^2}.$$

2) Determine the total energy of the raised cosine pulse x(t), defined by

$$x(t) = \begin{cases} \frac{1}{2}(\cos \omega + 1) & \frac{-\pi}{\omega} \le t \le \frac{\pi}{\omega} \\ 0 & \text{otherwise} \end{cases}.$$



3) State the initial and final value theorem of a Laplace transform. Compute it for given below $x(s) = \frac{3s + 4}{s(s+1)(s+2)^2}$.

Set Q

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

   1) Let the z-transform of x(n) be x(z). Show that the z-transform of x(–n) is $x\left(\frac{1}{z}\right)$.

   2) Explain time differentiation and time integration properties of Fourier series.

   3) State and prove Parseval's theorem for continuous time periodic signal.

   4) Calculate the fundamental frequency of given signal

   $$x(n) = e^{\frac{-4j\pi n}{3}} + e^{-3j\pi n}.$$

   5) Determine the Fourier transform of unit step x(t) = u(t).

5. Attempt **any two** : **(6×2=12)**

   1) Find the Fourier transform of (i) $x_1[n] = \sin n\ \omega_0$ (ii) $x_2[n] = (\sin n\omega_o)\ u(n)$.

   2) Determine autocorrelation of the sequence {1, 1, 2, 3}.

   3) Determine the z-transform of $x_1(n) = \alpha^n u(n)$ and $x_2(n) = -\alpha^n u(-n-1)$ and indicate their regions of convergence.

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SLR-EP – 300

Seat No.	

Set R

T.E. (Biomedical Engineering) (Part – I) (New CGPA) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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

1) The z transform of –u(–n –1) is

a) $\frac{1}{1-z}$ b) z/1 –z c) $\frac{1}{1-z^{-1}}$ d) $z/1-z^{-1}$

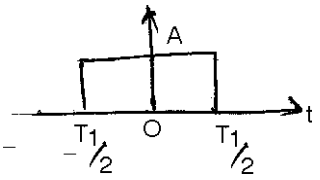
2) For a stable system

a) $|z|<1$ b) $|z|=1$ c) $|z|>1$ d) $|z|\neq 1$

3) The period of the signal $x(t) = 10 \sin \pi t + 4\cos 18 \pi t$ is

a) $\frac{\pi}{4}$ b) $\frac{1}{6}$ c) $\frac{1}{9}$ d) $\frac{1}{3}$

4) The average power of given signal is



a) $\frac{A^2}{2}$ b) A^2 c) AT_1^2 d) A^2T_1

5) A continuous time periodic signal x(t), having a period T_1 is convolved with itself. The resulting signal is

a) not periodic b) periodic with period T
c) periodic with period 2T d) none of above

P.T.O.

6) The region of convergence of z transform of the signal $x(n) = \{2, \underset{\uparrow}{1}, 1, 2\}$ is
n=0

a) All z except z = 0 and z = ∞ b) All z except z = 0
c) All z except z = ∞ d) All z

7) The unit step response of a system with impulse response $h(n) = \delta(n) - \delta(n-1)$ is

a) $\delta(n-1)$ b) $\delta(n)$ c) $u(n-1)$ d) $u(n)$

8) The system having input x(n) related to output $y(n) = \log_{10}|x(n)|$ is
a) Nonlinear, causal, stable b) Linear, noncausal, stable
c) Nonlinear, causal, not stable d) Linear, causal, not stable

9) The DFT of a signal x(n) of length N is x(K.) When x(K) is given and x(n) is computed from it, the length of x(n) is
a) increased to ∞ b) remains N c) become 2N – 1 d) become N^2

10) The Fourier transform of u(t) is

a) $\frac{1}{2j\pi f}$ b) $2j\pi f$ c) $\frac{1}{1+2j\pi f}$ d) none of above

11) The autocorrelation of a sinusoid is
a) Sine pulse b) Another sinusoid
c) Regular pulse d) Triangular pulse

12) Which of the following is true for the system represented by y(n) = x (– n) ?
a) Linear b) Time invariant c) Causal d) Nonlinear

13) The Fourier transform of impulse function is
a) $\delta(\omega)$ b) $2\pi\omega$ c) 1 d) sine f

14) Discrete time signal system is stable if the poles are
a) Within unit circle b) Outside unit circle
c) On unit circle d) None

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SLR-EP – 300

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (New CGPA) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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

1) Determine the even and odd parts of given signal $x(t) = \begin{cases} Ae^{-\alpha t} & t > 0 \\ 0 & t < 0 \end{cases}$.

2) Define a unit impulse function $\delta(t)$.

3) Find the Laplace function of $t\sin \omega_0 t\, u(t)$.

4) Define causal, non-causal, even and odd signals with example.

5) State and explain sampling theorem in time and frequency domain.

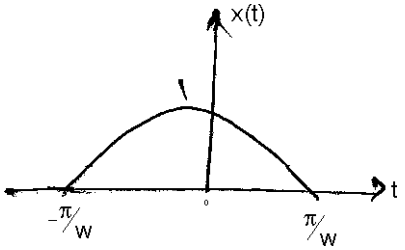
3. Attempt **any two** : **(6×2=12)**

1) Obtain the time function F(t) whose Laplace transform is

$$F(s) = \frac{s^2 + 3s + 1}{(s+1)^3 (s+2)^2}.$$

2) Determine the total energy of the raised cosine pulse x(t), defined by

$$x(t) = \begin{cases} \frac{1}{2}(\cos \omega + 1) & \frac{-\pi}{\omega} \le t \le \frac{\pi}{\omega} \\ 0 & \text{otherwise} \end{cases}.$$



3) State the initial and final value theorem of a Laplace transform. Compute it for given below $x(s) = \frac{3s + 4}{s(s+1)(s+2)^2}$.

Set R

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

   1) Let the z-transform of x(n) be x(z). Show that the z-transform of x(–n) is $x\left(\frac{1}{z}\right)$.

   2) Explain time differentiation and time integration properties of Fourier series.

   3) State and prove Parseval's theorem for continuous time periodic signal.

   4) Calculate the fundamental frequency of given signal

   $$x(n) = e^{\frac{-4j\pi n}{3}} + e^{-3j\pi n}.$$

   5) Determine the Fourier transform of unit step x(t) = u(t).

5. Attempt **any two** : **(6×2=12)**

   1) Find the Fourier transform of (i) $x_1[n] = \sin n\ \omega_0$ (ii) $x_2[n] = (\sin n\omega_o)\ u(n)$.

   2) Determine autocorrelation of the sequence {1, 1, 2, 3}.

   3) Determine the z-transform of $x_1(n) = \alpha^n u(n)$ and $x_2(n) = -\alpha^n u(-n-1)$ and indicate their regions of convergence.

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SLR-EP – 300

Seat No.	

Set **S**

T.E. (Biomedical Engineering) (Part – I) (New CGPA) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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

1) The region of convergence of z transform of the signal $x(n) = \{2, \underset{\uparrow}{1}, 1, 2\}$ is
$_{n=0}$

a) All z except z = 0 and z = ∞ b) All z except z = 0
c) All z except z = ∞ d) All z

2) The unit step response of a system with impulse response $h(n) = \delta(n) - \delta(n-1)$ is
a) $\delta(n-1)$ b) $\delta(n)$ c) u(n –1) d) u(n)

3) The system having input x(n) related to output $y(n) = \log_{10}|x(n)|$ is
a) Nonlinear, causal, stable b) Linear, noncausal, stable
c) Nonlinear, causal, not stable d) Linear, causal, not stable

4) The DFT of a signal x(n) of length N is x(K.) When x(K) is given and x(n) is computed from it, the length of x(n) is
a) increased to ∞ b) remains N c) become 2N – 1 d) become N^2

5) The Fourier transform of u(t) is
a) $\frac{1}{2j\pi f}$ b) $2j\pi f$ c) $\frac{1}{1+2j\pi f}$ d) none of above

6) The autocorrelation of a sinusoid is
a) Sine pulse b) Another sinusoid
c) Regular pulse d) Triangular pulse

P.T.O.

7) Which of the following is true for the system represented by y(n) = x (– n) ?
   a) Linear b) Time invariant c) Causal d) Nonlinear

8) The Fourier transform of impulse function is
   a) $\delta(\omega)$ b) $2\pi\omega$ c) 1 d) sine f

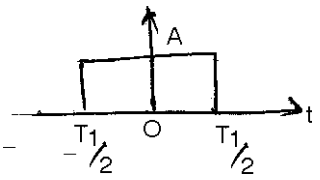
9) Discrete time signal system is stable if the poles are
   a) Within unit circle b) Outside unit circle
   c) On unit circle d) None

10) The z transform of –u(–n –1) is
   a) $\frac{1}{1-z}$ b) z/1 –z c) $\frac{1}{1-z^{-1}}$ d) $z/1\text{-}z^{-1}$

11) For a stable system
   a) $|z|< 1$ b) $|z| = 1$ c) $|z| >1$ d) $|z| \neq 1$

12) The period of the signal x(t) = 10 sin πt + 4cos 18 πt is
   a) $\frac{\pi}{4}$ b) $\frac{1}{6}$ c) $\frac{1}{9}$ d) $\frac{1}{3}$

13) The average power of given signal is



   a) $\frac{A^2}{2}$ b) A^2 c) AT_1^2 d) A^2T_1

14) A continuous time periodic signal x(t), having a period T_1 is convolved with itself. The resulting signal is
   a) not periodic b) periodic with period T
   c) periodic with period 2T d) none of above

SLR-EP – 300

Seat No.	

T.E. (Biomedical Engineering) (Part – I) (New CGPA) Examination, 2016
SIGNALS AND SYSTEMS

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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

1) Determine the even and odd parts of given signal $x(t) = \begin{cases} Ae^{-\alpha t} & t > 0 \\ 0 & t < 0 \end{cases}$.

2) Define a unit impulse function $\delta(t)$.

3) Find the Laplace function of $t\sin \omega_0 t\, u(t)$.

4) Define causal, non-causal, even and odd signals with example.

5) State and explain sampling theorem in time and frequency domain.

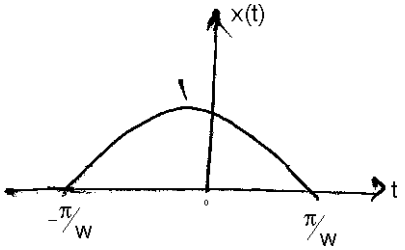
3. Attempt **any two** : **(6×2=12)**

1) Obtain the time function F(t) whose Laplace transform is

$$F(s) = \frac{s^2 + 3s + 1}{(s+1)^3 (s+2)^2}.$$

2) Determine the total energy of the raised cosine pulse x(t), defined by

$$x(t) = \begin{cases} \frac{1}{2}(\cos \omega + 1) & \frac{-\pi}{\omega} \le t \le \frac{\pi}{\omega} \\ 0 & \text{otherwise} \end{cases}.$$



3) State the initial and final value theorem of a Laplace transform. Compute it for given below $x(s) = \frac{3s + 4}{s(s+1)(s+2)^2}$.

Set S

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

   1) Let the z-transform of x(n) be x(z). Show that the z-transform of x(–n) is $x\left(\frac{1}{z}\right)$.

   2) Explain time differentiation and time integration properties of Fourier series.

   3) State and prove Parseval's theorem for continuous time periodic signal.

   4) Calculate the fundamental frequency of given signal

   $$x(n) = e^{\frac{-4j\pi n}{3}} + e^{-3j\pi n}.$$

   5) Determine the Fourier transform of unit step x(t) = u(t).

5. Attempt **any two** : **(6×2=12)**

   1) Find the Fourier transform of (i) $x_1[n] = \sin n\ \omega_0$ (ii) $x_2[n] = (\sin n\omega_o)\ u(n)$.

   2) Determine autocorrelation of the sequence {1, 1, 2, 3}.

   3) Determine the z-transform of $x_1(n) = \alpha^n u(n)$ and $x_2(n) = -\alpha^n u(-n-1)$ and indicate their regions of convergence.

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SLR-EP – 301

Seat No.	

Set P

T.E. (Biomedical Engg.) Part – II Examination, 2016
BIOMEDICAL INSTRUMENTATION – II

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Fill in the blanks : **(20×1=20)**

1) Heart rate measures _____ beats/min.
a) 82 b) 80 c) 72 d) 70

2) Blood pressure measures are _____/_____ mmHg.
a) 120/80 b) 110/20 c) 80/72 d) 72/40

3) EEG measures electrical activity of
a) Muscle b) Cortex c) Heart d) Brain

4) GSR is a measure of _____
a) Body resistance b) Biofeedback
c) Skin d) None of the above

5) _____ measures heart sounds.
a) Hodgkin-Huxley b) Phonocardiography
c) ECG d) Heart rate

6) _____ current is unavoidable current.
a) Leakage b) Macro
c) Micro d) None of the above

7) EEG uses _____ electrode system.
a) 20-30 b) 21 c) 12 d) 10-20

8) EMG measures electrical activity of _____
a) Muscle b) Cell c) Neuron d) CSF

9) Depolarization of nerve cell activity measures _____ mV.
a) +20 b) +75 c) –20 d) +35

10) Resting state membrane potential measures _____ mV.
a) +20 b) +75 c) –20 d) –90

11) Cardiotocograph is a part of _____
a) Pacemaker b) ECG
c) Defibrillator d) Phonocardiograph

12) Ultrasound Doppler works on the principle of _____
a) Doppler shift b) Reciprocal innervation
c) Diffusion d) None of the above

13) Baby incubator maintains _____ of baby.
a) Pressure b) Humidity
c) Temperature d) None of the above

14) _____ period is defined as the period of time during which an excitable cell can't generate another action potential.
a) Refractory b) Resting c) Absolute d) Relative

15) Ultrasound Doppler uses _____ transducer.
a) Piezocrystal b) Sodium c) Na-I d) Active

16) _____ is one of the ion substance used by cells to transmit impulses in basal ganglia.
a) Na b) Ca c) Neuron d) CSF

17) Muscles are more efficient at higher _____
a) Levels b) Viscosity c) Pressure d) Temperature

18) Instrumentation amplifiers provides _____ to amplification.
a) Slew rate b) Drift
c) Gain d) None of the above

19) Standard mean pressure is _____ mmHg.
a) 40 b) 120 c) 80 d) 10

20) Ultrasound Doppler measures _____
a) Heart sound b) Heart rate c) ECG d) Pulse rate

_____

SLR-EP – 301

Seat No.	

T.E. (Biomedical Engg.) Part – II Examination, 2016
BIOMEDICAL INSTRUMENTATION – II

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the right indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Draw nerve action potential and define different components of it.

2) Explain high frequency and low frequency noise in ECG recording.

3) Draw and explain average heart rate monitoring system in detail.

4) Explain different amplifiers design for ECG and EMG recording techniques.

5) Define and mention standard values of blood pressure, mean pressure, heart rate, pulse rate.

3. Attempt **any two** : **(2×10=20)**

1) Explain 10-20 system with the help of neat diagram and also explain the working of EEG machine.

2) Explain the generation of EMG signal and working of it.

3) Mention the significance of measuring skin resistance and explain the technique used for measurement of skin resistance with necessary diagram.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

1) Explain Doppler shift principle with necessary diagram.

2) Define micro shock and macro shock and state their limiting values.

3) List the application of telemedicine.

4) Draw and explain cardiotocograph in detail.

5) Draw and explain working, applications of baby incubator.

5. Attempt **any two** : **(2×10=20)**

1) Define leakage current and explain various patient isolation techniques with necessary diagram.

2) Define biofeedback, explain the clinical significance of EMG biofeedback.

3) Explain using block diagram of ultrasonic Doppler shift based fetal heart rate measuring system.

SLR-EP – 301

Seat No.	

Set Q

T.E. (Biomedical Engg.) Part – II Examination, 2016
BIOMEDICAL INSTRUMENTATION – II

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Fill in the blanks : **(20×1=20)**

1) _____ is one of the ion substance used by cells to transmit impulses in basal ganglia.
a) Na b) Ca c) Neuron d) CSF

2) Muscles are more efficient at higher _____
a) Levels b) Viscosity c) Pressure d) Temperature

3) Instrumentation amplifiers provides _____ to amplification.
a) Slew rate b) Drift
c) Gain d) None of the above

4) Standard mean pressure is _____ mmHg.
a) 40 b) 120 c) 80 d) 10

5) Ultrasound Doppler measures _____
a) Heart sound b) Heart rate c) ECG d) Pulse rate

6) Heart rate measures _____ beats/min.
a) 82 b) 80 c) 72 d) 70

7) Blood pressure measures are _____/_____ mmHg.
a) 120/80 b) 110/20 c) 80/72 d) 72/40

8) EEG measures electrical activity of
a) Muscle b) Cortex c) Heart d) Brain

P.T.O.

9) GSR is a measure of _____
   a) Body resistance b) Biofeedback
   c) Skin d) None of the above

10) _____ measures heart sounds.
   a) Hodgkin-Huxley b) Phonocardiography
   c) ECG d) Heart rate

11) _____ current is unavoidable current.
   a) Leakage b) Macro
   c) Micro d) None of the above

12) EEG uses _____ electrode system.
   a) 20-30 b) 21 c) 12 d) 10-20

13) EMG measures electrical activity of _____
   a) Muscle b) Cell c) Neuron d) CSF

14) Depolarization of nerve cell activity measures _____ mV.
   a) +20 b) +75 c) –20 d) +35

15) Resting state membrane potential measures _____ mV.
   a) +20 b) +75 c) –20 d) –90

16) Cardiotocograph is a part of _____
   a) Pacemaker b) ECG
   c) Defibrillator d) Phonocardiograph

17) Ultrasound Doppler works on the principle of _____
   a) Doppler shift b) Reciprocal innervation
   c) Diffusion d) None of the above

18) Baby incubator maintains _____ of baby.
   a) Pressure b) Humidity
   c) Temperature d) None of the above

19) _____ period is defined as the period of time during which an excitable cell can't generate another action potential.
   a) Refractory b) Resting c) Absolute d) Relative

20) Ultrasound Doppler uses _____ transducer.
   a) Piezocrystal b) Sodium c) Na-I d) Active

_____

SLR-EP – 301

Seat No.	

T.E. (Biomedical Engg.) Part – II Examination, 2016
BIOMEDICAL INSTRUMENTATION – II

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the right indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Draw nerve action potential and define different components of it.

2) Explain high frequency and low frequency noise in ECG recording.

3) Draw and explain average heart rate monitoring system in detail.

4) Explain different amplifiers design for ECG and EMG recording techniques.

5) Define and mention standard values of blood pressure, mean pressure, heart rate, pulse rate.

3. Attempt **any two** : **(2×10=20)**

1) Explain 10-20 system with the help of neat diagram and also explain the working of EEG machine.

2) Explain the generation of EMG signal and working of it.

3) Mention the significance of measuring skin resistance and explain the technique used for measurement of skin resistance with necessary diagram.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

1) Explain Doppler shift principle with necessary diagram.

2) Define micro shock and macro shock and state their limiting values.

3) List the application of telemedicine.

4) Draw and explain cardiotocograph in detail.

5) Draw and explain working, applications of baby incubator.

5. Attempt **any two** : **(2×10=20)**

1) Define leakage current and explain various patient isolation techniques with necessary diagram.

2) Define biofeedback, explain the clinical significance of EMG biofeedback.

3) Explain using block diagram of ultrasonic Doppler shift based fetal heart rate measuring system.

SLR-EP – 301

Seat No.	

Set R

T.E. (Biomedical Engg.) Part – II Examination, 2016
BIOMEDICAL INSTRUMENTATION – II

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Fill in the blanks : **(20×1=20)**

1) Cardiotocograph is a part of _____
   a) Pacemaker b) ECG
   c) Defibrillator d) Phonocardiograph

2) Ultrasound Doppler works on the principle of _____
   a) Doppler shift b) Reciprocal innervation
   c) Diffusion d) None of the above

3) Baby incubator maintains _____ of baby.
   a) Pressure b) Humidity
   c) Temperature d) None of the above

4) _____ period is defined as the period of time during which an excitable cell can't generate another action potential.
   a) Refractory b) Resting c) Absolute d) Relative

5) Ultrasound Doppler uses _____ transducer.
   a) Piezocrystal b) Sodium c) Na-I d) Active

6) _____ is one of the ion substance used by cells to transmit impulses in basal ganglia.
   a) Na b) Ca c) Neuron d) CSF

7) Muscles are more efficient at higher _____
   a) Levels b) Viscosity c) Pressure d) Temperature

P.T.O.

8) Instrumentation amplifiers provides _____ to amplification.
   a) Slew rate b) Drift
   c) Gain d) None of the above

9) Standard mean pressure is _____ mmHg.
   a) 40 b) 120 c) 80 d) 10

10) Ultrasound Doppler measures _____
   a) Heart sound b) Heart rate c) ECG d) Pulse rate

11) Heart rate measures _____ beats/min.
   a) 82 b) 80 c) 72 d) 70

12) Blood pressure measures are _____/_____ mmHg.
   a) 120/80 b) 110/20 c) 80/72 d) 72/40

13) EEG measures electrical activity of
   a) Muscle b) Cortex c) Heart d) Brain

14) GSR is a measure of _____
   a) Body resistance b) Biofeedback
   c) Skin d) None of the above

15) _____ measures heart sounds.
   a) Hodgkin-Huxley b) Phonocardiography
   c) ECG d) Heart rate

16) _____ current is unavoidable current.
   a) Leakage b) Macro
   c) Micro d) None of the above

17) EEG uses _____ electrode system.
   a) 20-30 b) 21 c) 12 d) 10-20

18) EMG measures electrical activity of _____
   a) Muscle b) Cell c) Neuron d) CSF

19) Depolarization of nerve cell activity measures _____ mV.
   a) +20 b) +75 c) –20 d) +35

20) Resting state membrane potential measures _____ mV.
   a) +20 b) +75 c) –20 d) –90

_____

SLR-EP – 301

Seat No.	

T.E. (Biomedical Engg.) Part – II Examination, 2016
BIOMEDICAL INSTRUMENTATION – II

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the right indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Draw nerve action potential and define different components of it.
   2) Explain high frequency and low frequency noise in ECG recording.
   3) Draw and explain average heart rate monitoring system in detail.
   4) Explain different amplifiers design for ECG and EMG recording techniques.
   5) Define and mention standard values of blood pressure, mean pressure, heart rate, pulse rate.
3. Attempt **any two** : **(2×10=20)**
   1) Explain 10-20 system with the help of neat diagram and also explain the working of EEG machine.
   2) Explain the generation of EMG signal and working of it.
   3) Mention the significance of measuring skin resistance and explain the technique used for measurement of skin resistance with necessary diagram.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain Doppler shift principle with necessary diagram.
   2) Define micro shock and macro shock and state their limiting values.

3) List the application of telemedicine.

4) Draw and explain cardiotocograph in detail.

5) Draw and explain working, applications of baby incubator.

5. Attempt **any two** : **(2×10=20)**

1) Define leakage current and explain various patient isolation techniques with necessary diagram.

2) Define biofeedback, explain the clinical significance of EMG biofeedback.

3) Explain using block diagram of ultrasonic Doppler shift based fetal heart rate measuring system.

SLR-EP – 301

Seat No.	

Set S

T.E. (Biomedical Engg.) Part – II Examination, 2016
BIOMEDICAL INSTRUMENTATION – II

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Fill in the blanks : **(20×1=20)**

1) _____ current is unavoidable current.
a) Leakage b) Macro
c) Micro d) None of the above

2) EEG uses _____ electrode system.
a) 20-30 b) 21 c) 12 d) 10-20

3) EMG measures electrical activity of _____
a) Muscle b) Cell c) Neuron d) CSF

4) Depolarization of nerve cell activity measures _____ mV.
a) +20 b) +75 c) –20 d) +35

5) Resting state membrane potential measures _____ mV.
a) +20 b) +75 c) –20 d) –90

6) Cardiotocograph is a part of _____
a) Pacemaker b) ECG
c) Defibrillator d) Phonocardiograph

7) Ultrasound Doppler works on the principle of _____
a) Doppler shift b) Reciprocal innervation
c) Diffusion d) None of the above

8) Baby incubator maintains _____ of baby.
   a) Pressure b) Humidity
   c) Temperature d) None of the above

9) _____ period is defined as the period of time during which an excitable cell can't generate another action potential.
   a) Refractory b) Resting c) Absolute d) Relative

10) Ultrasound Doppler uses _____ transducer.
   a) Piezocrystal b) Sodium c) Na-I d) Active

11) _____ is one of the ion substance used by cells to transmit impulses in basal ganglia.
   a) Na b) Ca c) Neuron d) CSF

12) Muscles are more efficient at higher _____
   a) Levels b) Viscosity c) Pressure d) Temperature

13) Instrumentation amplifiers provides _____ to amplification.
   a) Slew rate b) Drift
   c) Gain d) None of the above

14) Standard mean pressure is _____ mmHg.
   a) 40 b) 120 c) 80 d) 10

15) Ultrasound Doppler measures _____
   a) Heart sound b) Heart rate c) ECG d) Pulse rate

16) Heart rate measures _____ beats/min.
   a) 82 b) 80 c) 72 d) 70

17) Blood pressure measures are _____/_____ mmHg.
   a) 120/80 b) 110/20 c) 80/72 d) 72/40

18) EEG measures electrical activity of
   a) Muscle b) Cortex c) Heart d) Brain

19) GSR is a measure of _____
   a) Body resistance b) Biofeedback
   c) Skin d) None of the above

20) _____ measures heart sounds.
   a) Hodgkin-Huxley b) Phonocardiography
   c) ECG d) Heart rate

_____

SLR-EP – 301

Seat No.	

T.E. (Biomedical Engg.) Part – II Examination, 2016
BIOMEDICAL INSTRUMENTATION – II

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the right indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Draw nerve action potential and define different components of it.

2) Explain high frequency and low frequency noise in ECG recording.

3) Draw and explain average heart rate monitoring system in detail.

4) Explain different amplifiers design for ECG and EMG recording techniques.

5) Define and mention standard values of blood pressure, mean pressure, heart rate, pulse rate.

3. Attempt **any two** : **(2×10=20)**

1) Explain 10-20 system with the help of neat diagram and also explain the working of EEG machine.

2) Explain the generation of EMG signal and working of it.

3) Mention the significance of measuring skin resistance and explain the technique used for measurement of skin resistance with necessary diagram.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

1) Explain Doppler shift principle with necessary diagram.

2) Define micro shock and macro shock and state their limiting values.

3) List the application of telemedicine.

4) Draw and explain cardiotocograph in detail.

5) Draw and explain working, applications of baby incubator.

5. Attempt **any two** : **(2×10=20)**

1) Define leakage current and explain various patient isolation techniques with necessary diagram.

2) Define biofeedback, explain the clinical significance of EMG biofeedback.

3) Explain using block diagram of ultrasonic Doppler shift based fetal heart rate measuring system.

SLR-EP – 302

Seat No.	

Set **P**

T.E. (Biomedical Engg.) (Part – II) Examination, 2016
MEDICAL IMAGING – I

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct objective : **(20×1=20)**

1) An object which absorbs all radiation incident upon it, of all wavelengths is called
   a) Black body b) Absorbed dose
   c) Wavelength d) Attenuation

2) In spiral IT scanning technique X-ray tube rotates continuously _____ the patient.
   a) Around b) With c) Over d) Down

3) All the larger organs of body can be examined by visualizing the associated vessel is called
   a) Scanning b) Intensifying c) Angiography d) Radiography

4) _____ give an indication of how much of this incident energy is absorbed.
   a) Roentegen b) Anger c) Rad d) Rayl

5) _____ are inserted between the X-ray tube and the patient body surface.
   a) Grids b) Collimators
   c) Leads d) Detectors

6) Focused transducer reduces
   a) Wavelength b) Frequency c) Period d) Beam width

P.T.O.

7) _____ mode displays time dependent motion.
a) A b) B c) M d) Frequency

8) The medical thermograph is a sensitive _____ camera.
a) Gamma b) Ultraviolet c) Infrared d) X-ray

9) _____ mode displays a static image of a section of tissue.
a) A b) B c) Frequency d) M

10) The Q factor is related to the _____ response of crystal.
a) Frequency b) Time c) Wavelength d) Period

11) _____ is the change in direction of an ultrasound beam when it passes from one medium to another.
a) Reflection b) Refraction c) Incident d) Scattered

12) The absorbed _____ energy is converted into heat.
a) CT scan b) X-ray c) Ultrasound d) Intensity

13) Unit of acoustic impedance is
a) Rad b) Roentegen c) Rayl d) Rem

14) Velocity = ? $\times \lambda$
a) Time b) Wavelength
c) Velocity d) None of the above

15) _____ is the distance between successive waves crests.
a) Frequency b) Wavelength c) Velocity d) None of the above

16) Exposure is used to measure _____ of a X-ray beam.
a) Intensity b) Roentegen c) Rem d) Rad

17) A X-ray _____ provides power to X-ray film.
a) Generator b) Film c) Grids d) Collimators

18) _____ is the source of electrons that are accelerated towards the anode.
a) Coil b) Magnet c) Filament d) Counter

19) The _____ is the flow of electrons from the filament to the anode.
a) Tube current b) Tube voltage
c) kVp d) Electrons

20) Fourth generation of CT scan worked in _____ mode.
a) Translate-translate b) Rotate-fixed
c) Fixed-fixed d) Translate-fixed

_____

SLR-EP – 302

Seat No.	

T.E. (Biomedical Engg.) (Part – II) Examination, 2016
MEDICAL IMAGING – I

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

2. Attempt **any 4** : **(4×5=20)**
   1) Draw structure of image intensifier tube.
   2) List various interaction techniques of X-ray with matter and explain any one in detail.
   3) Explain type of collimators with neat diagrams.
   4) Explain following terms with reference to X-ray.
      a) Heel effect b) Line focus principle
   5) Explain X-ray film processing techniques in detail.

3. Attempt **any 2** : **(2×10=20)**
   1) Explain continuous and pulsed wave Doppler ultrasound system.
   2) Explain A, B and M modes in ultrasound imaging with each of application.
   3) Draw and explain the complete block diagram of X-ray machine.

4. Attempt **any 4** : **(4×5=20)**
   1) Explain the need and application of endoscopy.
   2) Explain the physics behind thermography technique.
   3) Mention any 5 differences between CT scan and digital radiography.
   4) Explain the need, significance and applications of mammography.
   5) Explain first and second generations of CT scanner with neat figures.

5. Attempt **any 2** : **(2×10=20)**
   1) Calculate the shortest wavelength produced by X-ray tube when potential difference across tube is 130 kV_P.
      Given data :
      $h = 6.6 \times 10^{-34}$ J/s, $c = 3 \times 10^{8}$ m/sec.
      $e = 1.6 \times 10^{-19}$ C.
   2) Explain different parts of thermographic machine with neat diagram.
   3) Explain the need, process and application of angiography technique.

Set P

Set P

SLR-EP – 302

Seat No.	

Set Q

T.E. (Biomedical Engg.) (Part – II) Examination, 2016
MEDICAL IMAGING – I

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct objective : **(20×1=20)**

1) Exposure is used to measure _____ of a X-ray beam.
a) Intensity b) Roentegen c) Rem d) Rad

2) A X-ray _____ provides power to X-ray film.
a) Generator b) Film c) Grids d) Collimators

3) _____ is the source of electrons that are accelerated towards the anode.
a) Coil b) Magnet c) Filament d) Counter

4) The _____ is the flow of electrons from the filament to the anode.
a) Tube current b) Tube voltage
c) kVp d) Electrons

5) Fourth generation of CT scan worked in _____ mode.
a) Translate-translate b) Rotate-fixed
c) Fixed-fixed d) Translate-fixed

6) An object which absorbs all radiation incident upon it, of all wavelengths is called
a) Black body b) Absorbed dose
c) Wavelength d) Attenuation

7) In spiral IT scanning technique X-ray tube rotates continuously _____ the patient.
a) Around b) With c) Over d) Down

P.T.O.

8) All the larger organs of body can be examined by visualizing the associated vessel is called
a) Scanning b) Intensifying c) Angiography d) Radiography

9) _____ give an indication of how much of this incident energy is absorbed.
a) Roentegen b) Anger c) Rad d) Rayl

10) _____ are inserted between the X-ray tube and the patient body surface.
a) Grids b) Collimators
c) Leads d) Detectors

11) Focused transducer reduces
a) Wavelength b) Frequency c) Period d) Beam width

12) _____ mode displays time dependent motion.
a) A b) B c) M d) Frequency

13) The medical thermograph is a sensitive _____ camera.
a) Gamma b) Ultraviolet c) Infrared d) X-ray

14) _____ mode displays a static image of a section of tissue.
a) A b) B c) Frequency d) M

15) The Q factor is related to the _____ response of crystal.
a) Frequency b) Time c) Wavelength d) Period

16) _____ is the change in direction of an ultrasound beam when it passes from one medium to another.
a) Reflection b) Refraction c) Incident d) Scattered

17) The absorbed _____ energy is converted into heat.
a) CT scan b) X-ray c) Ultrasound d) Intensity

18) Unit of acoustic impedance is
a) Rad b) Roentegen c) Rayl d) Rem

19) Velocity = ? $\times \lambda$
a) Time b) Wavelength
c) Velocity d) None of the above

20) _____ is the distance between successive waves crests.
a) Frequency b) Wavelength
c) Velocity d) None of the above

_____

SLR-EP – 302

Seat No.	

T.E. (Biomedical Engg.) (Part – II) Examination, 2016
MEDICAL IMAGING – I

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

2. Attempt **any 4** : **(4×5=20)**
   1) Draw structure of image intensifier tube.
   2) List various interaction techniques of X-ray with matter and explain any one in detail.
   3) Explain type of collimators with neat diagrams.
   4) Explain following terms with reference to X-ray.
      a) Heel effect b) Line focus principle
   5) Explain X-ray film processing techniques in detail.

3. Attempt **any 2** : **(2×10=20)**
   1) Explain continuous and pulsed wave Doppler ultrasound system.
   2) Explain A, B and M modes in ultrasound imaging with each of application.
   3) Draw and explain the complete block diagram of X-ray machine.

4. Attempt **any 4** : **(4×5=20)**
   1) Explain the need and application of endoscopy.
   2) Explain the physics behind thermography technique.
   3) Mention any 5 differences between CT scan and digital radiography.
   4) Explain the need, significance and applications of mammography.
   5) Explain first and second generations of CT scanner with neat figures.

5. Attempt **any 2** : **(2×10=20)**
   1) Calculate the shortest wavelength produced by X-ray tube when potential difference across tube is 130 kV_P.
      Given data :
      $h = 6.6 \times 10^{-34}$ J/s, $c = 3 \times 10^{8}$ m/sec.
      $e = 1.6 \times 10^{-19}$ C.
   2) Explain different parts of thermographic machine with neat diagram.
   3) Explain the need, process and application of angiography technique.

Set Q

Set Q

SLR-EP – 302

Seat No.	

Set R

T.E. (Biomedical Engg.) (Part – II) Examination, 2016
MEDICAL IMAGING – I

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct objective : **(20×1=20)**

1) _____ is the change in direction of an ultrasound beam when it passes from one medium to another.
a) Reflection b) Refraction c) Incident d) Scattered

2) The absorbed _____ energy is converted into heat.
a) CT scan b) X-ray c) Ultrasound d) Intensifier

3) Unit of acoustic impedance is
a) Rad b) Roentegen c) Rayl d) Rem

4) Velocity = ? $\times$ λ
a) Time b) Wavelength c) Velocity d) None of the above

5) _____ is the distance between successive waves crests.
a) Frequency b) Wavelength c) Velocity d) None of the above

6) Exposure is used to measure _____ of a X-ray beam.
a) Intensity b) Roentegen c) Rem d) Rad

7) A X-ray _____ provides power to X-ray film.
a) Generator b) Film c) Grids d) Collimators

8) _____ is the source of electrons that are accelerated towards the anode.
a) Coil b) Magnet c) Filament d) Counter

P.T.O.

9) The _____ is the flow of electrons from the filament to the anode.
   a) Tube current b) Tube voltage
   c) kVp d) Electrons

10) Fourth generation of CT scan worked in _____ mode.
   a) Translate-translate b) Rotate-fixed
   c) Fixed-fixed d) Translate-fixed

11) An object which absorbs all radiation incident upon it, of all wavelengths is called
   a) Black body b) Absorbed dose
   c) Wavelength d) Attenuation

12) In spiral IT scanning technique X-ray tube rotates continuously _____ the patient.
   a) Around b) With c) Over d) Down

13) All the larger organs of body can be examined by visualizing the associated vessel is called
   a) Scanning b) Intensifying c) Angiography d) Radiography

14) _____ give an indication of how much of this incident energy is absorbed.
   a) Roentegen b) Anger c) Rad d) Rayl

15) _____ are inserted between the X-ray tube and the patient body surface.
   a) Grids b) Collimators
   c) Leads d) Detectors

16) Focused transducer reduces
   a) Wavelength b) Frequency c) Period d) Beam width

17) _____ mode displays time dependent motion.
   a) A b) B c) M d) Frequency

18) The medical thermograph is a sensitive _____ camera.
   a) Gamma b) Ultraviolet c) Infrared d) X-ray

19) _____ mode displays a static image of a section of tissue.
   a) A b) B c) Frequency d) M

20) The Q factor is related to the _____ response of crystal.
   a) Frequency b) Time
   c) Wavelength d) Period

_____

SLR-EP – 302

Seat No.	

T.E. (Biomedical Engg.) (Part – II) Examination, 2016
MEDICAL IMAGING – I

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

2. Attempt **any 4** : **(4×5=20)**
   1) Draw structure of image intensifier tube.
   2) List various interaction techniques of X-ray with matter and explain any one in detail.
   3) Explain type of collimators with neat diagrams.
   4) Explain following terms with reference to X-ray.
      a) Heel effect b) Line focus principle
   5) Explain X-ray film processing techniques in detail.

3. Attempt **any 2** : **(2×10=20)**
   1) Explain continuous and pulsed wave Doppler ultrasound system.
   2) Explain A, B and M modes in ultrasound imaging with each of application.
   3) Draw and explain the complete block diagram of X-ray machine.

4. Attempt **any 4** : **(4×5=20)**
   1) Explain the need and application of endoscopy.
   2) Explain the physics behind thermography technique.
   3) Mention any 5 differences between CT scan and digital radiography.
   4) Explain the need, significance and applications of mammography.
   5) Explain first and second generations of CT scanner with neat figures.

5. Attempt **any 2** : **(2×10=20)**
   1) Calculate the shortest wavelength produced by X-ray tube when potential difference across tube is 130 kV_P.
      Given data :
      $h = 6.6 \times 10^{-34}$ J/s, $c = 3 \times 10^{8}$ m/sec.
      $e = 1.6 \times 10^{-19}$ C.
   2) Explain different parts of thermographic machine with neat diagram.
   3) Explain the need, process and application of angiography technique.

Set R

Set R

SLR-EP – 302

Seat No.	

Set S

T.E. (Biomedical Engg.) (Part – II) Examination, 2016
MEDICAL IMAGING – I

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct objective : **(20×1=20)**

1) Focused transducer reduces
a) Wavelength b) Frequency c) Period d) Beam width

2) _____ mode displays time dependent motion.
a) A b) B c) M d) Frequency

3) The medical thermograph is a sensitive _____ camera.
a) Gamma b) Ultraviolet c) Infrared d) X-ray

4) _____ mode displays a static image of a section of tissue.
a) A b) B c) Frequency d) M

5) The Q factor is related to the _____ response of crystal.
a) Frequency b) Time c) Wavelength d) Period

6) _____ is the change in direction of an ultrasound beam when it passes from one medium to another.
a) Reflection b) Refraction c) Incident d) Scattered

7) The absorbed _____ energy is converted into heat.
a) CT scan b) X-ray c) Ultrasound d) Intensity

8) Unit of acoustic impedance is
a) Rad b) Roentegen c) Rayl d) Rem

P.T.O.

9) Velocity = ? $\times$ λ
   a) Time b) Wavelength c) Velocity d) None of the above

10) _____ is the distance between successive waves crests.
   a) Frequency b) Wavelength c) Velocity d) None of the above

11) Exposure is used to measure _____ of a X-ray beam.
   a) Intensity b) Roentegen c) Rem d) Rad

12) A X-ray _____ provides power to X-ray film.
   a) Generator b) Film c) Grids d) Collimators

13) _____ is the source of electrons that are accelerated towards the anode.
   a) Coil b) Magnet c) Filament d) Counter

14) The _____ is the flow of electrons from the filament to the anode.
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   a) Translate-translate b) Rotate-fixed
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   a) Black body b) Absorbed dose
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17) In spiral IT scanning technique X-ray tube rotates continuously _____ the patient.
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   c) Over d) Down

18) All the larger organs of body can be examined by visualizing the associated vessel is called
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19) _____ give an indication of how much of this incident energy is absorbed.
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20) _____ are inserted between the X-ray tube and the patient body surface.
   a) Grids b) Collimators
   c) Leads d) Detectors

_____

SLR-EP – 302

Seat No.	

T.E. (Biomedical Engg.) (Part – II) Examination, 2016
MEDICAL IMAGING – I

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

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   2) Explain A, B and M modes in ultrasound imaging with each of application.
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   1) Calculate the shortest wavelength produced by X-ray tube when potential difference across tube is 130 kV_P.

      Given data :
      $h = 6.6 \times 10^{-34}$ J/s, $c = 3 \times 10^{8}$ m/sec.
      $e = 1.6 \times 10^{-19}$ C.
   2) Explain different parts of thermographic machine with neat diagram.
   3) Explain the need, process and application of angiography technique.

Set S

Set S

SLR-EP – 303

Seat No.	

Set P

T.E. (Part – II) (Biomedical Engineering) Examination, 2016
CONTROL SYSTEM

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) In closed loop control system, with positive value of feedback gain the overall gain of system will
   a) decreases b) increases c) be unaffected d) none of above

2) The initial response when output is not equal to input is called as _____ response.
   a) transient b) error c) dynamic d) steady

3) The transient response with feed back system
   a) rises slowly b) rises quickly c) decays slowly d) decays quickly

4) From _____ transfer function can be obtained.
   a) signal flow graph b) analogous table
   c) output input ratio d) standard block system

5) With feedback _____ increases.
   a) gain b) system stability c) sensitivity d) disturbance

6) Static error co-efficients are used as a measure of the effectiveness of closed loop systems for specified _____ input signal.
   a) acceleration b) velocity c) position d) all of above

7) The type zero system has _____ at the origin.
   a) no pole b) net pole c) simple pole d) 2 poles

8) The type 2 system has _____ at the origin.
   a) no net pole b) net pole c) simple pole d) two poles

P.T.O.

9) _____ is the best method for determining the stability and transient.
   a) Root locus b) Bode plot
   c) Nyquist plot d) Signal flow graph

10) Phase margin of a system is used to specify
   a) frequency response b) absolute stability
   c) relative stability d) time response

11) _____ technique is not applicable to nonlinear system.
   a) Nyquist criterion b) Quasi linearization
   c) Functional analysis d) Steady state

12) _____ techniques gives quick transient and stability response.
   a) Root locus b) Bode plot c) Nyquist d) Nichols

13) If the gain of the critically damped system is increased it will behave as
   a) oscillatory b) critically damped
   c) over damped d) under damped

14) If a step function is applied to the input of a system and output remains below a certain level for all the time, system is
   a) not necessarily stable b) unstable
   c) stable d) always unstable

15) Addition of zero's in transfer function causes
   a) Lead compensation b) Log compensation
   c) Lead log compensation d) None of above

16) Velocity error constant of a system is measured when the input to the system is unit _____ function.
   a) parabolic b) ramp c) impulse d) step

17) In case of type one system study state acceleration is
   a) unity b) infinity c) zero d) 10

18) A controller is essentially is a
   a) sensor b) clipper c) comparator d) amplifier

19) In control system, the output of the controller is given to
   a) final control element b) amplifier
   c) comparator d) sensor

20) Regenerative feedback implies feedback with
   a) oscillations b) step input c) negative sign d) positive sign

_____

SLR-EP – 303

Seat No.	

T.E. (Part – II) (Biomedical Engineering) Examination, 2016
CONTROL SYSTEM

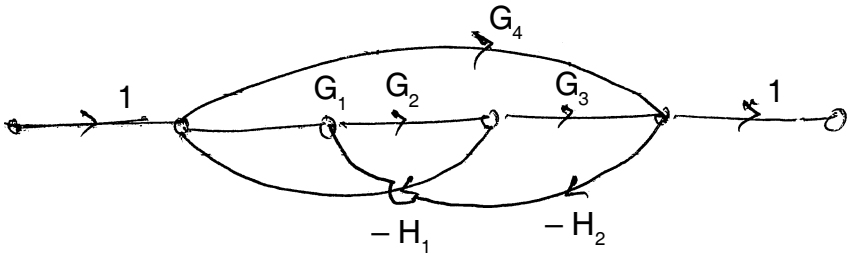
Day and Date : Wednesday, 23-11-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**

1) Find the transfer function of shown system using Mason's gain formula.



2) Explain the working and applications of gear trains with the help of diagram.

3) Define following terms :

a) Routh's stability criteria.

b) Bounded input and bounded output stability.

4) For a unity feedback system with the forward transfer function.

$$G(s) = \frac{K(s+20)}{s(s+2)(s+3)}$$

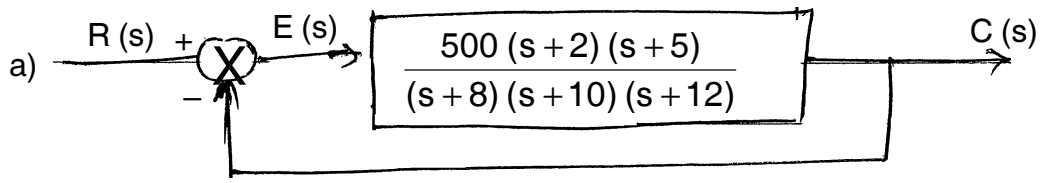
Find the range of 'K' to make the system stable.

5) Differentiate between open loop and close loop system in detail with an example.

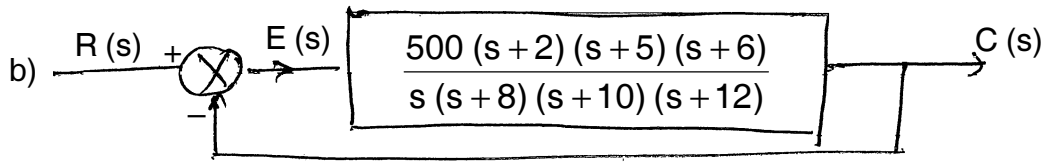
3. Attempt **any two** questions : **(2×10=20)**

1) For each system shown below evaluate static error constants and find expected error for the standard step, ramp and parabolic inputs

a)



b)

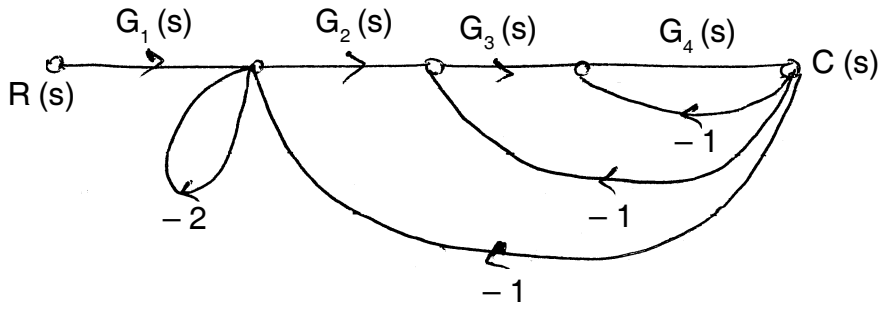


2) Discuss following system with example in detail :

a) Translational system

b) Rotational system

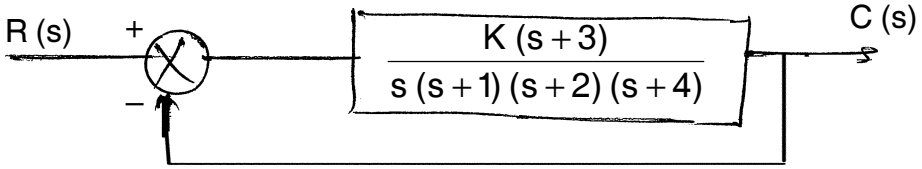
3) Using Mason's rule find the transfer function T (s) = C (s) / R (s), for system shown :



SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

1) Sketch the root locus for given system



2) Define and mention importance of gain margin and phase margin.

3) A unity feedback system with forward transfer function $G(s) = \frac{K}{s(s+7)}$ is operating with a closed loop step response that has 20 % overshoot evaluate,
   a) settling time
   b) steady state error for a unit ramp input.

4) Write an expression for constant M circles and N circles and explain each of terms of it.

5) Discuss Nyquist stability criteria and its condition.

5. Attempt **any 2** : **(10×2=20)**

1) Using Bode plot determine gain crossover and phase crossover frequency gain margin and phase margin of a feedback system with open loop transfer function

$$G(s) = \frac{20(0.2s+1)}{s(0.5s+1)}.$$

2) Explain various types of state variable and state models for electrical systems with neat figures.

3) Sketch opamp circuits capable of realizing
   a) lead compensator
   b) log compensator.

———————

Set P

SLR-EP – 303

Seat No.	

Set Q

T.E. (Part – II) (Biomedical Engineering) Examination, 2016
CONTROL SYSTEM

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Velocity error constant of a system is measured when the input to the system is unit _____ function.
a) parabolic b) ramp c) impulse d) step

2) In case of type one system study state acceleration is
a) unity b) infinity c) zero d) 10

3) A controller is essentially is a
a) sensor b) clipper c) comparator d) amplifier

4) In control system, the output of the controller is given to
a) final control element b) amplifier
c) comparator d) sensor

5) Regenerative feedback implies feedback with
a) oscillations b) step input c) negative sign d) positive sign

6) In closed loop control system, with positive value of feedback gain the overall gain of system will
a) decreases b) increases c) be unaffected d) none of above

7) The initial response when output is not equal to input is called as _____ response.
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8) The transient response with feed back system
a) rises slowly b) rises quickly c) decays slowly d) decays quickly

P.T.O.

9) From _____ transfer function can be obtained.
   a) signal flow graph b) analogous table
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12) The type zero system has _____ at the origin.
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13) The type 2 system has _____ at the origin.
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14) _____ is the best method for determining the stability and transient.
   a) Root locus b) Bode plot
   c) Nyquist plot d) Signal flow graph

15) Phase margin of a system is used to specify
   a) frequency response b) absolute stability
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16) _____ technique is not applicable to nonlinear system.
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   a) Lead compensation b) Log compensation
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_____

SLR-EP – 303

Seat No.	

T.E. (Part – II) (Biomedical Engineering) Examination, 2016
CONTROL SYSTEM

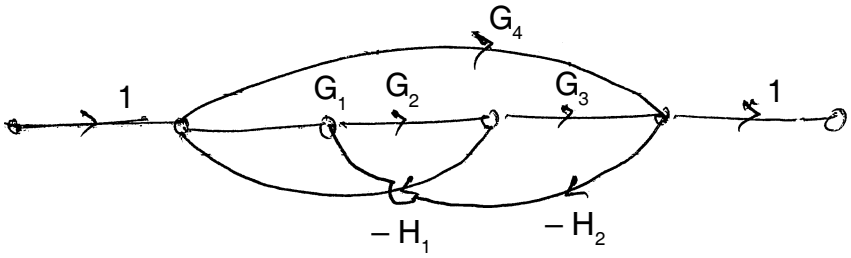
Day and Date : Wednesday, 23-11-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**

1) Find the transfer function of shown system using Mason's gain formula.



2) Explain the working and applications of gear trains with the help of diagram.

3) Define following terms :

a) Routh's stability criteria.

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4) For a unity feedback system with the forward transfer function.

$$G(s) = \frac{K(s+20)}{s(s+2)(s+3)}$$

Find the range of 'K' to make the system stable.

5) Differentiate between open loop and close loop system in detail with an example.

3. Attempt **any two** questions : **(2×10=20)**

1) For each system shown below evaluate static error constants and find expected error for the standard step, ramp and parabolic inputs

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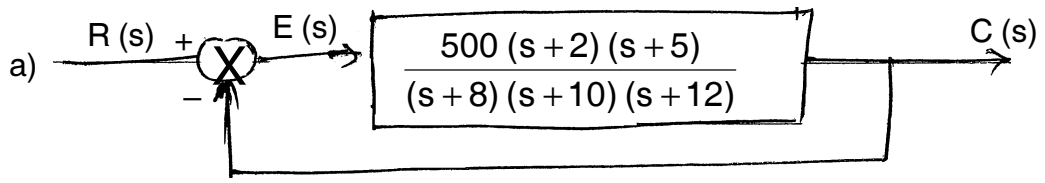
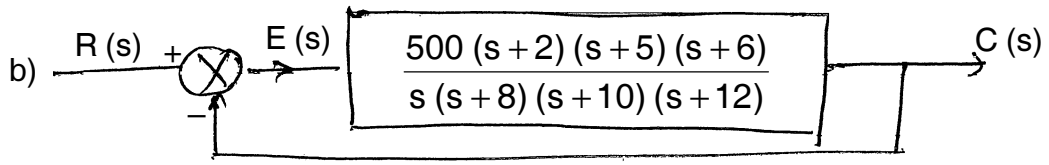


b)



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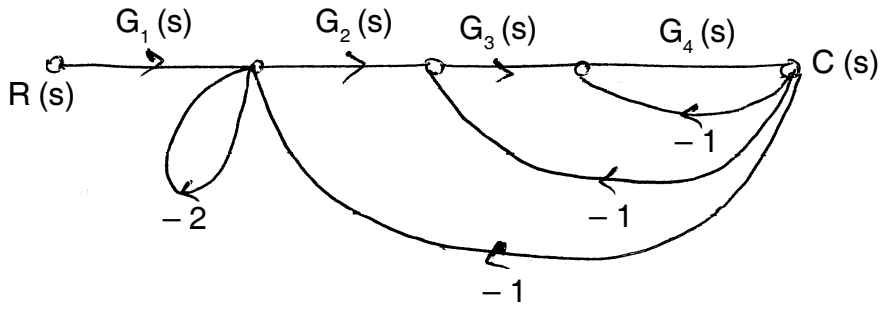
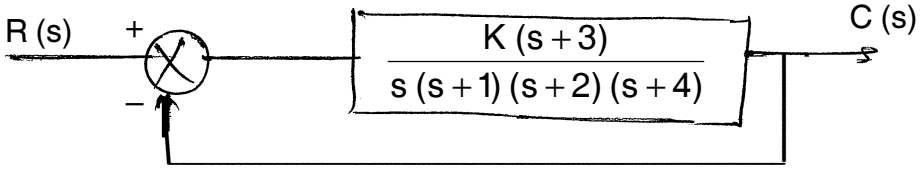


Set Q

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

1) Sketch the root locus for given system



2) Define and mention importance of gain margin and phase margin.

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———————

Set Q

SLR-EP – 303

Seat No.	

Set R

T.E. (Part – II) (Biomedical Engineering) Examination, 2016
CONTROL SYSTEM

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) _____ technique is not applicable to nonlinear system.
   a) Nyquist criterion b) Quasi linearization
   c) Functional analysis d) Steady state

2) _____ techniques gives quick transient and stability response.
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P.T.O.

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   c) relative stability d) time response

_____

SLR-EP – 303

Seat No.	

T.E. (Part – II) (Biomedical Engineering) Examination, 2016
CONTROL SYSTEM

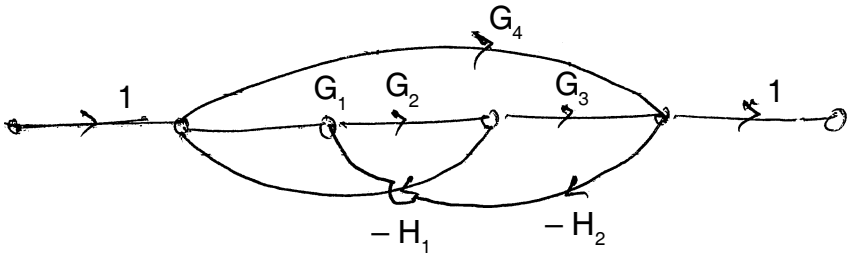
Day and Date : Wednesday, 23-11-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**

1) Find the transfer function of shown system using Mason's gain formula.



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a) Routh's stability criteria.

b) Bounded input and bounded output stability.

4) For a unity feedback system with the forward transfer function.

$$G(s) = \frac{K(s+20)}{s(s+2)(s+3)}$$

Find the range of 'K' to make the system stable.

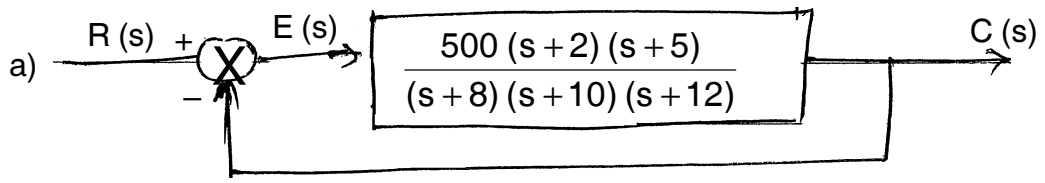
5) Differentiate between open loop and close loop system in detail with an example.

Set R

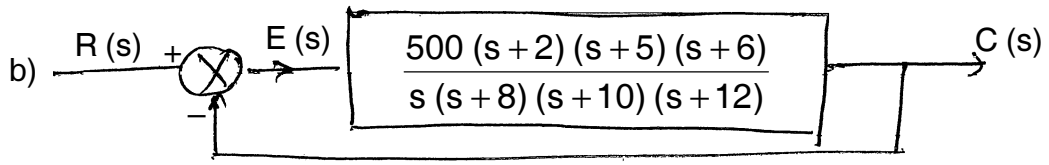
3. Attempt **any two** questions : **(2×10=20)**

1) For each system shown below evaluate static error constants and find expected error for the standard step, ramp and parabolic inputs

a)



b)

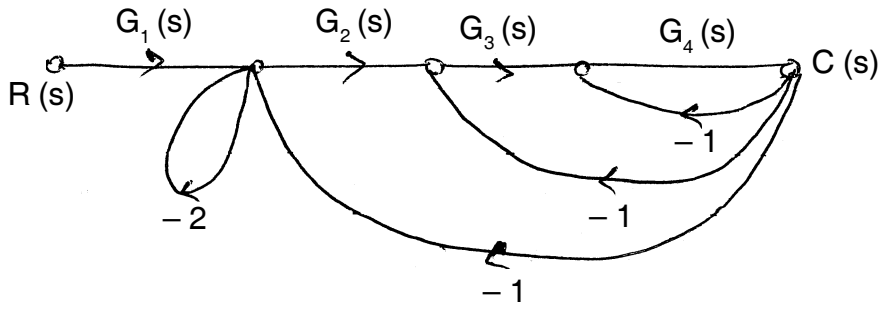


2) Discuss following system with example in detail :

a) Translational system

b) Rotational system

3) Using Mason's rule find the transfer function T (s) = C (s) / R (s), for system shown :

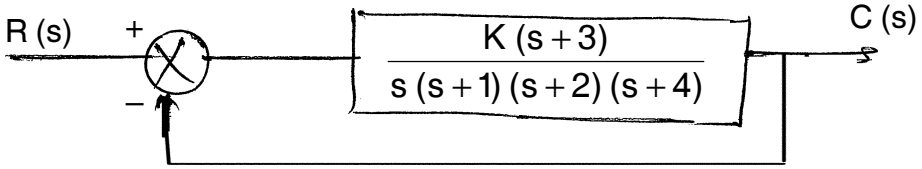


Set R

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

1) Sketch the root locus for given system



2) Define and mention importance of gain margin and phase margin.

3) A unity feedback system with forward transfer function $G(s) = \frac{K}{s(s+7)}$ is operating with a closed loop step response that has 20 % overshoot evaluate,
   a) settling time
   b) steady state error for a unit ramp input.

4) Write an expression for constant M circles and N circles and explain each of terms of it.

5) Discuss Nyquist stability criteria and its condition.

5. Attempt **any 2** : **(10×2=20)**

1) Using Bode plot determine gain crossover and phase crossover frequency gain margin and phase margin of a feedback system with open loop transfer function

$$G(s) = \frac{20(0.2s+1)}{s(0.5s+1)}.$$

2) Explain various types of state variable and state models for electrical systems with neat figures.

3) Sketch opamp circuits capable of realizing
   a) lead compensator
   b) log compensator.

———————

Set R

SLR-EP – 303

Seat No.	

Set S

T.E. (Part – II) (Biomedical Engineering) Examination, 2016
CONTROL SYSTEM

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Static error co-efficients are used as a measure of the effectiveness of closed loop systems for specified _____ input signal.
   a) acceleration b) velocity c) position d) all of above

2) The type zero system has _____ at the origin.
   a) no pole b) net pole c) simple pole d) 2 poles

3) The type 2 system has _____ at the origin.
   a) no net pole b) net pole c) simple pole d) two poles

4) _____ is the best method for determining the stability and transient.
   a) Root locus b) Bode plot
   c) Nyquist plot d) Signal flow graph

5) Phase margin of a system is used to specify
   a) frequency response b) absolute stability
   c) relative stability d) time response

6) _____ technique is not applicable to nonlinear system.
   a) Nyquist criterion b) Quasi linearization
   c) Functional analysis d) Steady state

7) _____ techniques gives quick transient and stability response.
   a) Root locus b) Bode plot c) Nyquist d) Nichols

8) If the gain of the critically damped system is increased it will behave as
   a) oscillatory b) critically damped
   c) over damped d) under damped

P.T.O.

9) If a step function is applied to the input of a system and output remains below a certain level for all the time, system is
   a) not necessarily stable b) unstable
   c) stable d) always unstable

10) Addition of zero's in transfer function causes
   a) Lead compensation b) Log compensation
   c) Lead log compensation d) None of above

11) Velocity error constant of a system is measured when the input to the system is unit _____ function.
   a) parabolic b) ramp c) impulse d) step

12) In case of type one system study state acceleration is
   a) unity b) infinity c) zero d) 10

13) A controller is essentially is a
   a) sensor b) clipper c) comparator d) amplifier

14) In control system, the output of the controller is given to
   a) final control element b) amplifier
   c) comparator d) sensor

15) Regenerative feedback implies feedback with
   a) oscillations b) step input c) negative sign d) positive sign

16) In closed loop control system, with positive value of feedback gain the overall gain of system will
   a) decreases b) increases c) be unaffected d) none of above

17) The initial response when output is not equal to input is called as _____ response.
   a) transient b) error c) dynamic d) steady

18) The transient response with feed back system
   a) rises slowly b) rises quickly c) decays slowly d) decays quickly

19) From _____ transfer function can be obtained.
   a) signal flow graph b) analogous table
   c) output input ratio d) standard block system

20) With feedback _____ increases.
   a) gain b) system stability c) sensitivity d) disturbance

_____

SLR-EP – 303

Seat No.	

T.E. (Part – II) (Biomedical Engineering) Examination, 2016
CONTROL SYSTEM

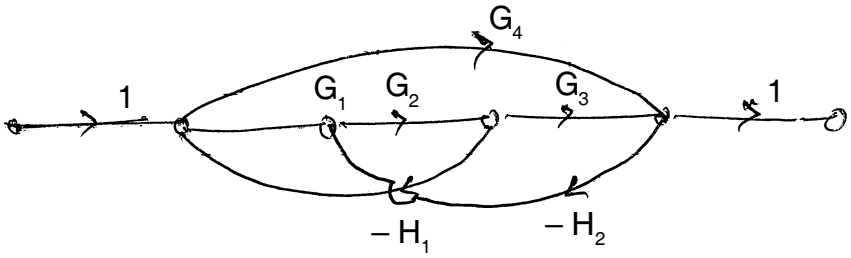
Day and Date : Wednesday, 23-11-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**

1) Find the transfer function of shown system using Mason's gain formula.



2) Explain the working and applications of gear trains with the help of diagram.

3) Define following terms :

a) Routh's stability criteria.

b) Bounded input and bounded output stability.

4) For a unity feedback system with the forward transfer function.

$$G(s) = \frac{K(s+20)}{s(s+2)(s+3)}$$

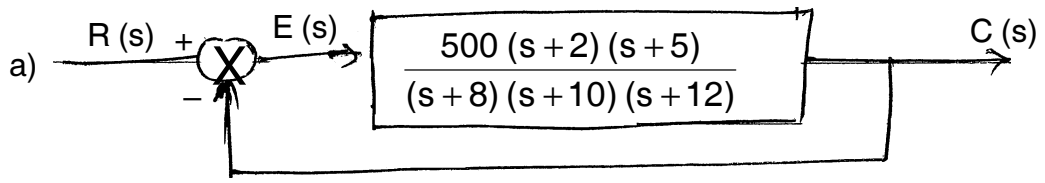
Find the range of 'K' to make the system stable.

5) Differentiate between open loop and close loop system in detail with an example.

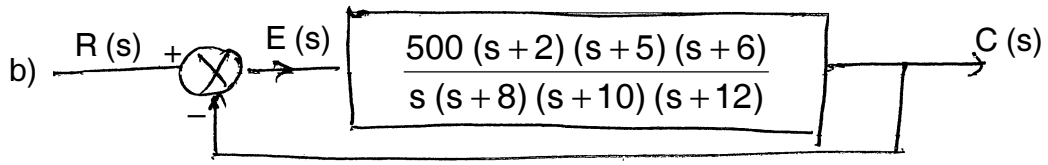
3. Attempt **any two** questions : **(2×10=20)**

1) For each system shown below evaluate static error constants and find expected error for the standard step, ramp and parabolic inputs

a)



b)

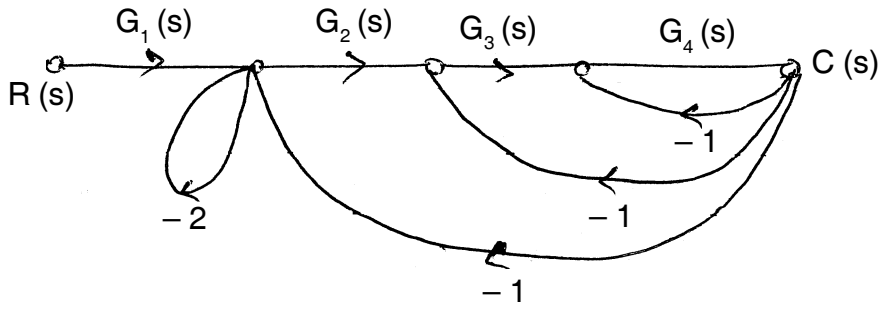


2) Discuss following system with example in detail :

a) Translational system

b) Rotational system

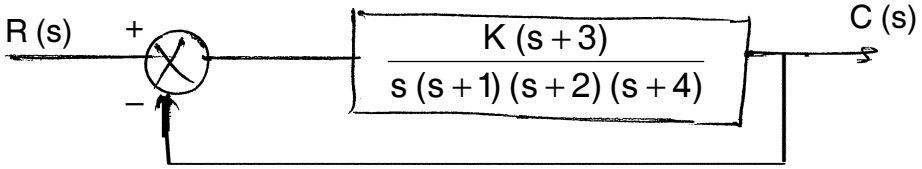
3) Using Mason's rule find the transfer function T (s) = C (s) / R (s), for system shown :



SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

1) Sketch the root locus for given system



2) Define and mention importance of gain margin and phase margin.

3) A unity feedback system with forward transfer function $G(s) = \frac{K}{s(s+7)}$ is operating with a closed loop step response that has 20 % overshoot evaluate,
   a) settling time
   b) steady state error for a unit ramp input.

4) Write an expression for constant M circles and N circles and explain each of terms of it.

5) Discuss Nyquist stability criteria and its condition.

5. Attempt **any 2** : **(10×2=20)**

1) Using Bode plot determine gain crossover and phase crossover frequency gain margin and phase margin of a feedback system with open loop transfer function

$$G(s) = \frac{20(0.2s+1)}{s(0.5s+1)}.$$

2) Explain various types of state variable and state models for electrical systems with neat figures.

3) Sketch opamp circuits capable of realizing
   a) lead compensator
   b) log compensator.

———————

Set S

SLR-EP– 304

Seat No.	

Set **P**

T.E. (Biomedical Engineering) Part – II Examination, 2016
DIGITAL SIGNAL PROCESSING

Day and Date : Thursday, 24-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Figures to the **right** indicate **full** marks.*
*2) Assume data **wherever** necessary.*
*3) Use legible handwriting, use **blue/black** only.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(1×20=20)**

1) Circular convolution of two sequences both of length N in time domain is equivalent to
   a) Convolution of their spectra in frequency domain
   b) Multiplication of their spectra in frequency domain
   c) Circular convolution of their spectra in frequency domain
   d) Exponential product of their spectra in frequency domain

2) DFT of u(n) is given by
   a) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{-j2\pi kn}{N}}$
   b) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{j2\pi kn}{N}}$
   c) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{-j\pi kn}{N}}$
   d) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{j\pi kn}{N}}$

3) Determine the convolution sum of two sequences x(n) = {3, 2, 1, 2} and h(n) = {1, 2, 1, 2}
   a) y(n) = {3, 8, 8, 12, 9, 4, 4}
   b) y(n) = {3, 8, 8, 12, 9, 1, 4}
   c) y(n) = {3, 8, 3, 12, 9, 4, 4}
   d) y(n) = {3, 8, 8, 1, 9, 4, 4}

4) DFT stands for
   a) Discrete Fourier Transform
   b) Digital Function Transform
   c) Digital Frequency Transform
   d) None

5) Twiddle factor
   a) $W=e^{-j\frac{2\pi}{N}}$
   b) $W=e^{-j\frac{\pi}{N}}$
   c) $W=e^{j\frac{2\pi}{N}}$
   d) None

6) Calculate DFT of x(n) = {1, 0, 1, 0}
   a) x(k) = {1, 0, 1, 0}
   b) x(k) = {2, 0, 1, 0}
   c) x(k) = {2, 0, 2, 0}
   d) x(k) = {1, 1, 0, 0}

7) Calculate DFT of x(n) = $\delta(n-n_0)$ where $0 < n_0 < N$
   a) $e^{j\omega n_0}$
   b) $e^{-j\omega n_0}$
   c) 1
   d) None

8) The FFT algorithm
   a) Eliminate the redundant calculation and enable to analyze the spectral properties of a signal
   b) Enable the redundant to analyze the spectral properties of a signal
   c) Both a) and b)
   d) None

P.T.O.

9) What is the advantages of DSP ?
   a) Low cost
   b) Repeatable
   c) Storage of data is very easy
   d) All of the above

10) IIR filters are _____ type.
   a) Non-recursive
   b) Recursive
   c) Causal
   d) None

11) Find the response of a FIR filter with Impulse response h(n) = (1, 2, 4) to the input sequence x(n) = (1, 2)
   a) y(n) = (1, 4, 8, 8)
   b) y(n) = (1, 4, 6, 6)
   c) y(n) = (1, 2, 8, 8)
   d) None of the above

12) Two digital filters can be operated in cascade or, the same effect can be achieved by
   a) Adding their co-efficient
   b) Subtracting their co-efficient
   c) Convolving their co-efficient
   d) Averaging their co-efficient and then using a blackman window

13) FIR filter have _____ and IIR filters have _____
   a) Zeros, poles and zeros
   b) Poles and zeros, zeros
   c) Zeros, zeros
   d) None of these

14) N-point DFT requires _____ Number of multiplications.
   a) N^2 b) N/2 c) N d) N^3

15) Number of multiplications and additions required in FFT algorithm is
   a) N $\log_2$ N and N/2 $\log_2$N
   b) N $\log_2$ N and N $\log_2$N
   c) N/2 $\log_2$ N and N $\log_2$N
   d) N $\log_2$ N and (N +1)$\log_2$N

16) Number of multiplication needed in the calculation of FFT algorithm for 32-point sequence
   a) 80 b) 64 c) 32 d) 160

17) In DIF FFT algorithm
   a) Input is bit reversed and output is in natural order
   b) Input is in natural order and output is bit reversed
   c) Input is bit reversed and output is bit reversed
   d) Input is in natural order and output is natural order

18) In bilinear transformation method relationship between digital transformation and analog transformation is given by
   a) $S=\frac{1}{T_s}\left[\frac{1+z^{-1}}{1-z^{-1}}\right]$
   b) $S=\frac{2}{T_s}\left[\frac{1+z^{-1}}{1-z^{-1}}\right]$
   c) $S=\frac{1}{T_s}\left[\frac{1-z^{-1}}{1+z^{-1}}\right]$
   d) $S=\frac{2}{T_s}\left[\frac{1-z^{-1}}{1+z^{-1}}\right]$

19) Impulse response of an ideal high pass FIR filter when $n=\frac{N-1}{2}$ is given by
   a) $1-\frac{Wc}{\pi}$ b) $1-\frac{\pi}{Wc}$ c) $1+\frac{Wc}{\pi}$ d) $1+\frac{\pi}{Wc}$

20) Chebyshev filter contains
   a) Oscillation in the pass band
   b) Oscillation in the stop band
   c) Oscillation in the pass and stop band
   d) Oscillation in the transition band

Seat No.	

T.E. (Biomedical Engineering) Part – II Examination, 2016
DIGITAL SIGNAL PROCESSING

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Figures to the **right** indicates **full** marks.*
*2) Assume data **wherever** necessary.*
*3) Draw diagrams/sketches **wherever** necessary.*
*4) Use legible handwirting, use **blue/black** only.*

SECTION – I

2. Answer **any four** of following questions : **(4×5=20)**
   1) Derive any two properties of DFT.
   2) Find the circular convolution of sequences X(n) = {0, 1, 2, 3} h(n) = {2, 1, 1, 2}
   3) Derive DIT FFT flow graph for N = 4 hence find DFT of X(n) = {1, 2, 3, 4}.
   4) In which convolution aliasing occurs (overlap save/over add). Explain in detail.
   5) Find the IDFT of sequence X(K) = {2, 1 + j, 0, 1 – j}.

3. Answer **any two** of following questions : **(2×10=20)**
   1) Compute 8 point DFT of the following sequence X(n) = {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using DIT FFT Algorithm.
   2) Given X(n) = n + 1 and N = 8, Determine X(K) using DIFFFT.
   3) Let X(n) be 8 point sequence. Its corresponding IDFT X(k) is X(k) = {(0.5), (2 + j), (3 + j2), (j), (3), (– j), (3 – j 2), (2 – j)}.

SECTION – II

4. Answer **any four** of following questions : **(4×5=20)**
   1) What is FIR filter ? What are advantages of windowing method in FIR filter design ?
   2) Discuss the symmetric and Anti-symmetric FIR filters in details.
   3) Write a short note on bilinear transformation.
   4) What are the advantages and disadvantages of digital filters ?
   5) Derive the filter co-efficient updating equations using LMS algorithm.

5. Answer **any two** of following questions : **(2×10=20)**
   1) Explain the design steps of IIR filter by the Impulse Invariance Method.
   2) Find the magnitude and phase response function of seventh order low pass linear phase FIR filters with cut off frequency 1 rad/sec using Hanning window.
   3) Explain how EMG Noise is cancelled in contaminated EEG signal using adaptive filtering.

_____

Set P

Set P

SLR-EP– 304

Seat No.	

Set **Q**

T.E. (Biomedical Engineering) Part – II Examination, 2016
DIGITAL SIGNAL PROCESSING

Day and Date : Thursday, 24-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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1) Number of multiplication needed in the calculation of FFT algorithm for 32-point sequence
a) 80 b) 64 c) 32 d) 160

2) In DIF FFT algorithm
a) Input is bit reversed and output is in natural order
b) Input is in natural order and output is bit reversed
c) Input is bit reversed and output is bit reversed
d) Input is in natural order and output is natural order

3) In bilinear transformation method relationship between digital transformation and analog transformation is given by

a) $S=\frac{1}{T_s}\left[\frac{1+z^{-1}}{1-z^{-1}}\right]$ b) $S=\frac{2}{T_s}\left[\frac{1+z^{-1}}{1-z^{-1}}\right]$

c) $S=\frac{1}{T_s}\left[\frac{1-z^{-1}}{1+z^{-1}}\right]$ d) $S=\frac{2}{T_s}\left[\frac{1-z^{-1}}{1+z^{-1}}\right]$

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

5) Chebyshev filter contains
a) Oscillation in the pass band b) Oscillation in the stop band
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6) Circular convolution of two sequences both of length N in time domain is equivalent to
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7) DFT of u(n) is given by

a) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{-j2\pi kn}{N}}$ b) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{j2\pi kn}{N}}$

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P.T.O.

8) Determine the convolution sum of two sequences x(n) = {3, 2, 1, 2} and h(n) = {1, 2, 1, 2}
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   c) y(n) = {3, 8, 3, 12, 9, 4, 4}
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9) DFT stands for
   a) Discrete Fourier Transform
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10) Twiddle factor
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   c) x(k) = {2, 0, 2, 0}
   d) x(k) = {1, 1, 0, 0}

12) Calculate DFT of x(n) = $\delta (n - n_0)$ where $0 < n_0 < N$
   a) $e^{j\omega n_0}$
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   d) None

13) The FFT algorithm
   a) Eliminate the redundant calculation and enable to analyze the spectral properties of a signal
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14) What is the advantages of DSP ?
   a) Low cost
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15) IIR filters are _____ type.
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   d) None

16) Find the response of a FIR filter with Impulse response h(n) = (1, 2, 4) to the input sequence x(n) = (1, 2)
   a) y(n) = (1, 4, 8, 8)
   b) y(n) = (1, 4, 6, 6)
   c) y(n) = (1, 2, 8, 8)
   d) None of the above

17) Two digital filters can be operated in cascade or, the same effect can be achieved by
   a) Adding their co-efficient
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18) FIR filter have _____ and IIR filters have _____
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19) N-point DFT requires _____ Number of multiplications.
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   a) N $\log_2$ N and N/2 $\log_2$N
   b) N $\log_2$ N and N $\log_2$N
   c) N/2 $\log_2$ N and N $\log_2$N
   d) N $\log_2$ N and (N +1)$\log_2$N

SLR-EP– 304

Seat No.	

T.E. (Biomedical Engineering) Part – II Examination, 2016
DIGITAL SIGNAL PROCESSING

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Figures to the **right** indicates **full** marks.*
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SECTION – I

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   1) Derive any two properties of DFT.
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   4) In which convolution aliasing occurs (overlap save/over add). Explain in detail.
   5) Find the IDFT of sequence X(K) = {2, 1 + j, 0, 1 – j}.

3. Answer **any two** of following questions : **(2×10=20)**
   1) Compute 8 point DFT of the following sequence X(n) = {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using DIT FFT Algorithm.
   2) Given X(n) = n + 1 and N = 8, Determine X(K) using DIFFFT.
   3) Let X(n) be 8 point sequence. Its corresponding IDFT X(k) is X(k) = {(0.5), (2 + j), (3 + j2), (j), (3), (– j), (3 – j 2), (2 – j)}.

SECTION – II

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   3) Write a short note on bilinear transformation.
   4) What are the advantages and disadvantages of digital filters ?
   5) Derive the filter co-efficient updating equations using LMS algorithm.

5. Answer **any two** of following questions : **(2×10=20)**
   1) Explain the design steps of IIR filter by the Impulse Invariance Method.
   2) Find the magnitude and phase response function of seventh order low pass linear phase FIR filters with cut off frequency 1 rad/sec using Hanning window.
   3) Explain how EMG Noise is cancelled in contaminated EEG signal using adaptive filtering.

_____

Set Q

Set Q

SLR-EP– 304

Seat No.	

Set **R**

T.E. (Biomedical Engineering) Part – II Examination, 2016
DIGITAL SIGNAL PROCESSING

Day and Date : Thursday, 24-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Figures to the **right** indicate **full** marks.*
*2) Assume data **wherever** necessary.*
*3) Use legible handwriting, use **blue/black** only.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(1×20=20)**

1) Find the response of a FIR filter with Impulse response h(n) = (1, 2, 4) to the input sequence x(n) = (1, 2)
   a) y(n) = (1, 4, 8, 8) b) y(n) = (1, 4, 6, 6)
   c) y(n) = (1, 2, 8, 8) d) None of the above

2) Two digital filters can be operated in cascade or, the same effect can be achieved by
   a) Adding their co-efficient
   b) Subtracting their co-efficient
   c) Convolving their co-efficient
   d) Averaging their co-efficient and then using a blackman window

3) FIR filter have _____ and IIR filters have _____
   a) Zeros, poles and zeros b) Poles and zeros, zeros
   c) Zeros, zeros d) None of these

4) N-point DFT requires _____ Number of multiplications.
   a) N^2 b) N/2 c) N d) N^3

5) Number of multiplications and additions required in FFT algorithm is
   a) N $\log_2$ N and N/2 $\log_2$N
   b) N $\log_2$ N and N $\log_2$N
   c) N/2 $\log_2$ N and N $\log_2$N
   d) N $\log_2$ N and (N +1)$\log_2$N

6) Number of multiplication needed in the calculation of FFT algorithm for 32-point sequence
   a) 80 b) 64 c) 32 d) 160

7) In DIF FFT algorithm
   a) Input is bit reversed and output is in natural order
   b) Input is in natural order and output is bit reversed
   c) Input is bit reversed and output is bit reversed
   d) Input is in natural order and output is natural order

8) In bilinear transformation method relationship between digital transformation and analog transformation is given by
   a) $S=\frac{1}{T_s}\left[\frac{1+z^{-1}}{1-z^{-1}}\right]$ b) $S=\frac{2}{T_s}\left[\frac{1+z^{-1}}{1-z^{-1}}\right]$
   c) $S=\frac{1}{T_s}\left[\frac{1-z^{-1}}{1+z^{-1}}\right]$ d) $S=\frac{2}{T_s}\left[\frac{1-z^{-1}}{1+z^{-1}}\right]$

P.T.O.

9) Impulse response of an ideal high pass FIR filter when $n=\frac{N-1}{2}$ is given by

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

10) Chebyshev filter contains
a) Oscillation in the pass band
b) Oscillation in the stop band
c) Oscillation in the pass and stop band
d) Oscillation in the transition band

11) Circular convolution of two sequences both of length N in time domain is equivalent to
a) Convolution of their spectra in frequency domain
b) Multiplication of their spectra in frequency domain
c) Circular convolution of their spectra in frequency domain
d) Exponential product of their spectra in frequency domain

12) DFT of u(n) is given by

a) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{-j2\pi kn}{N}}$ b) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{j2\pi kn}{N}}$

c) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{-j\pi kn}{N}}$ d) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{j\pi kn}{N}}$

13) Determine the convolution sum of two sequences x(n) = {3, 2, 1, 2} and h(n) = {1, 2, 1, 2}
a) y(n) = {3, 8, 8, 12, 9, 4, 4}
b) y(n) = {3, 8, 8, 12, 9, 1, 4}
c) y(n) = {3, 8, 3, 12, 9, 4, 4}
d) y(n) = {3, 8, 8, 1, 9, 4, 4}

14) DFT stands for
a) Discrete Fourier Transform
b) Digital Function Transform
c) Digital Frequency Transform
d) None

15) Twiddle factor

a) $W=e^{-j\frac{2\pi}{N}}$ b) $W=e^{-j\frac{\pi}{N}}$

c) $W=e^{j\frac{2\pi}{N}}$ d) None

16) Calculate DFT of x(n) = {1, 0, 1, 0}
a) x(k) = {1, 0, 1, 0}
b) x(k) = {2, 0, 1, 0}
c) x(k) = {2, 0, 2, 0}
d) x(k) = {1, 1, 0, 0}

17) Calculate DFT of x(n) = $\delta(n-n_0)$ where $0 < n_0 < N$

a) $e^{j\omega n_0}$ b) $e^{-j\omega n_0}$
c) 1 d) None

18) The FFT algorithm
a) Eliminate the redundant calculation and enable to analyze the spectral properties of a signal
b) Enable the redundant to analyze the spectral properties of a signal
c) Both a) and b)
d) None

19) What is the advantages of DSP ?
a) Low cost
b) Repeatable
c) Storage of data is very easy
d) All of the above

20) IIR filters are _____ type.
a) Non-recursive
b) Recursive
c) Causal
d) None

SLR-EP– 304

Seat No.	

T.E. (Biomedical Engineering) Part – II Examination, 2016
DIGITAL SIGNAL PROCESSING

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Figures to the **right** indicates **full** marks.*
*2) Assume data **wherever** necessary.*
*3) Draw diagrams/sketches **wherever** necessary.*
*4) Use legible handwirting, use **blue/black** only.*

SECTION – I

2. Answer **any four** of following questions : **(4×5=20)**
   1) Derive any two properties of DFT.
   2) Find the circular convolution of sequences X(n) = {0, 1, 2, 3} h(n) = {2, 1, 1, 2}
   3) Derive DIT FFT flow graph for N = 4 hence find DFT of X(n) = {1, 2, 3, 4}.
   4) In which convolution aliasing occurs (overlap save/over add). Explain in detail.
   5) Find the IDFT of sequence X(K) = {2, 1 + j, 0, 1 – j}.

3. Answer **any two** of following questions : **(2×10=20)**
   1) Compute 8 point DFT of the following sequence X(n) = {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using DIT FFT Algorithm.
   2) Given X(n) = n + 1 and N = 8, Determine X(K) using DIFFFT.
   3) Let X(n) be 8 point sequence. Its corresponding IDFT X(k) is X(k) = {(0.5), (2 + j), (3 + j2), (j), (3), (– j), (3 – j 2), (2 – j)}.

SECTION – II

4. Answer **any four** of following questions : **(4×5=20)**
   1) What is FIR filter ? What are advantages of windowing method in FIR filter design ?
   2) Discuss the symmetric and Anti-symmetric FIR filters in details.
   3) Write a short note on bilinear transformation.
   4) What are the advantages and disadvantages of digital filters ?
   5) Derive the filter co-efficient updating equations using LMS algorithm.

5. Answer **any two** of following questions : **(2×10=20)**
   1) Explain the design steps of IIR filter by the Impulse Invariance Method.
   2) Find the magnitude and phase response function of seventh order low pass linear phase FIR filters with cut off frequency 1 rad/sec using Hanning window.
   3) Explain how EMG Noise is cancelled in contaminated EEG signal using adaptive filtering.

_____

Set R

Set R

SLR-EP– 304

Seat No.	

Set **S**

T.E. (Biomedical Engineering) Part – II Examination, 2016
DIGITAL SIGNAL PROCESSING

Day and Date : Thursday, 24-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Figures to the **right** indicate **full** marks.*
*2) Assume data **wherever** necessary.*
*3) Use legible handwriting, use **blue/black** only.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(1×20=20)**

1) Calculate DFT of x(n) = {1, 0, 1, 0}
   a) x(k) = {1, 0, 1, 0} b) x(k) = {2, 0, 1, 0}
   c) x(k) = {2, 0, 2, 0} d) x(k) = {1, 1, 0, 0}

2) Calculate DFT of x(n) = $\delta (n - n_0)$ where $0 < n_0 < N$
   a) $e^{j\omega n_0}$ b) $e^{-j\omega n_0}$
   c) 1 d) None

3) The FFT algorithm
   a) Eliminate the redundant calculation and enable to analyze the spectral properties of a signal
   b) Enable the redundant to analyze the spectral properties of a signal
   c) Both a) and b)
   d) None

4) What is the advantages of DSP ?
   a) Low cost b) Repeatable
   c) Storage of data is very easy d) All of the above

5) IIR filters are _____ type.
   a) Non-recursive
   b) Recursive
   c) Causal
   d) None

6) Find the response of a FIR filter with Impulse response h(n) = (1, 2, 4) to the input sequence x(n) = (1, 2)
   a) y(n) = (1, 4, 8, 8) b) y(n) = (1, 4, 6, 6)
   c) y(n) = (1, 2, 8, 8) d) None of the above

7) Two digital filters can be operated in cascade or, the same effect can be achieved by
   a) Adding their co-efficient
   b) Subtracting their co-efficient
   c) Convolving their co-efficient
   d) Averaging their co-efficient and then using a blackman window

8) FIR filter have _____ and IIR filters have _____
   a) Zeros, poles and zeros b) Poles and zeros, zeros
   c) Zeros, zeros d) None of these

9) N-point DFT requires _____ Number of multiplications.
   a) N^2 b) N/2 c) N d) N^3

P.T.O.

10) Number of multiplications and additions required in FFT algorithm is
   a) N $\log_2$ N and N/2 $\log_2$N
   b) N $\log_2$ N and N $\log_2$N
   c) N/2 $\log_2$ N and N $\log_2$N
   d) N $\log_2$ N and (N +1)$\log_2$N

11) Number of multiplication needed in the calculation of FFT algorithm for 32-point sequence
   a) 80 b) 64 c) 32 d) 160

12) In DIF FFT algorithm
   a) Input is bit reversed and output is in natural order
   b) Input is in natural order and output is bit reversed
   c) Input is bit reversed and output is bit reversed
   d) Input is in natural order and output is natural order

13) In bilinear transformation method relationship between digital transformation and analog transformation is given by
   a) $S=\frac{1}{T_s}\left[\frac{1+z^{-1}}{1-z^{-1}}\right]$
   b) $S=\frac{2}{T_s}\left[\frac{1+z^{-1}}{1-z^{-1}}\right]$
   c) $S=\frac{1}{T_s}\left[\frac{1-z^{-1}}{1+z^{-1}}\right]$
   d) $S=\frac{2}{T_s}\left[\frac{1-z^{-1}}{1+z^{-1}}\right]$

14) Impulse response of an ideal high pass FIR filter when $n=\frac{N-1}{2}$ is given by
   a) $1-\frac{Wc}{\pi}$ b) $1-\frac{\pi}{Wc}$ c) $1+\frac{Wc}{\pi}$ d) $1+\frac{\pi}{Wc}$

15) Chebyshev filter contains
   a) Oscillation in the pass band
   b) Oscillation in the stop band
   c) Oscillation in the pass and stop band
   d) Oscillation in the transition band

16) Circular convolution of two sequences both of length N in time domain is equivalent to
   a) Convolution of their spectra in frequency domain
   b) Multiplication of their spectra in frequency domain
   c) Circular convolution of their spectra in frequency domain
   d) Exponential product of their spectra in frequency domain

17) DFT of u(n) is given by
   a) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{-j2\pi kn}{N}}$
   b) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{j2\pi kn}{N}}$
   c) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{-j\pi kn}{N}}$
   d) $X(K)=\sum_{n=0}^{N-1}x(n)e^{\frac{j\pi kn}{N}}$

18) Determine the convolution sum of two sequences x(n) = {3, 2, 1, 2} and h(n) = {1, 2, 1, 2}
   a) y(n) = {3, 8, 8, 12, 9, 4, 4}
   b) y(n) = {3, 8, 8, 12, 9, 1, 4}
   c) y(n) = {3, 8, 3, 12, 9, 4, 4}
   d) y(n) = {3, 8, 8, 1, 9, 4, 4}

19) DFT stands for
   a) Discrete Fourier Transform
   b) Digital Function Transform
   c) Digital Frequency Transform
   d) None

20) Twiddle factor
   a) $W=e^{-j\frac{2\pi}{N}}$
   b) $W=e^{-j\frac{\pi}{N}}$
   c) $W=e^{j\frac{2\pi}{N}}$
   d) None

SLR-EP– 304

Seat No.	

T.E. (Biomedical Engineering) Part – II Examination, 2016
DIGITAL SIGNAL PROCESSING

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Figures to the **right** indicates **full** marks.*
*2) Assume data **wherever** necessary.*
*3) Draw diagrams/sketches **wherever** necessary.*
*4) Use legible handwirting, use **blue/black** only.*

SECTION – I

2. Answer **any four** of following questions : **(4×5=20)**
   1) Derive any two properties of DFT.
   2) Find the circular convolution of sequences X(n) = {0, 1, 2, 3} h(n) = {2, 1, 1, 2}
   3) Derive DIT FFT flow graph for N = 4 hence find DFT of X(n) = {1, 2, 3, 4}.
   4) In which convolution aliasing occurs (overlap save/over add). Explain in detail.
   5) Find the IDFT of sequence X(K) = {2, 1 + j, 0, 1 – j}.

3. Answer **any two** of following questions : **(2×10=20)**
   1) Compute 8 point DFT of the following sequence X(n) = {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using DIT FFT Algorithm.
   2) Given X(n) = n + 1 and N = 8, Determine X(K) using DIFFFT.
   3) Let X(n) be 8 point sequence. Its corresponding IDFT X(k) is X(k) = {(0.5), (2 + j), (3 + j2), (j), (3), (– j), (3 – j 2), (2 – j)}.

SECTION – II

4. Answer **any four** of following questions : **(4×5=20)**
   1) What is FIR filter ? What are advantages of windowing method in FIR filter design ?
   2) Discuss the symmetric and Anti-symmetric FIR filters in details.
   3) Write a short note on bilinear transformation.
   4) What are the advantages and disadvantages of digital filters ?
   5) Derive the filter co-efficient updating equations using LMS algorithm.

5. Answer **any two** of following questions : **(2×10=20)**
   1) Explain the design steps of IIR filter by the Impulse Invariance Method.
   2) Find the magnitude and phase response function of seventh order low pass linear phase FIR filters with cut off frequency 1 rad/sec using Hanning window.
   3) Explain how EMG Noise is cancelled in contaminated EEG signal using adaptive filtering.

_____

Set S

Set S

SLR-EP – 305

Seat No.	

Set **P**

T.E. (Biomedical Engineering) (Part – II) Examination, 2016
EMBEDDED SYSTEMS

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Use legible handwriting, use ***blue/black*** *only.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct option : **(20×1=20)**

1) ARM is _____ processor.
a) 16 bit b) 32 bit c) 64 bit d) 8 bit

2) All ARM peripherals are _____ mapped.
a) I/O b) Memory c) Both a) and b) d) None

3) How many types of interrupt controllers are available for ARM processor ?
a) 2 b) 3 c) 4 d) None

4) General purpose registers are _____ in size.
a) 16 bit b) 32 bit c) 64 bit d) 8 bit

5) How many processor modes we have in total ?
a) 9 b) 6 c) 3 d) 7

6) Among the processors mode given below, select the odd one.
a) User b) Supervisor
c) Abort d) Fast interrupt request

7) ARM7 processor has _____ stag pipeline.
a) Three b) Five c) Seven d) None

8) RISC stands for
a) Remote Interrupt Set Coding b) Reduced Instruction Set Computer
c) Reduced Instruction Set Coding d) None of these

9) USB 2.0 standard supports _____ data rate.
a) 120 Mbps b) 480 Mbps c) 200 Mbps d) None

P.T.O.

10) The lower the value of priority, _____ the priority of the tas.
a) Higher b) Lower c) Same d) None

11) LPC 2148 has _____ DAC.
a) 8 bit b) 10 bit c) 16 bit d) None

12) ARM stands for
a) Advanced Rate Machines b) Advanced RISC Machines
c) Artificial Running Machines d) Aviary Running Machines

13) The address system supported by ARM systems is/are
a) Little Endian b) Big Endian c) X-Little Endian d) Both a) and b)

14) The additional duplicate register used in ARM machines are called as
a) Copied-registers b) Banked registers
c) Extra registers d) Sentential registers

15) ARM processors where basically designed for
a) Main frame systems b) Distributed systems
c) Mobile systems d) Super computers

16) For real time operating systems, interrupt latency should be
a) Minimal b) Maximum
c) Zero d) Dependent on the scheduling

17) In rate monotonic scheduling
a) Shorter duration job has higher priority
b) Longer duration job has higher priority
c) Priority does not depend on the duration of the job
d) None of the mentioned

18) Interrupt latency refers to the period of time
a) From the occurrence of an event to the arrival of an interrupt
b) From the occurrence of an event to the servicing of an interrupt
c) From arrival of an interrupt to the start of the interrupt service routine
d) None of these

19) In real time operating system
a) All processes have the same priority
b) A task must be serviced by its deadline period
c) Process scheduling can be done only once
d) Kernel is not required

20) A semaphore
a) Is a binary mutex
b) Must be accessed from only one process
c) Can be accessed from multiple processes
d) None of these

_____

SLR-EP – 305

Seat No.	

T.E. (Biomedical Engineering) (Part – II) Examination, 2016
EMBEDDED SYSTEMS

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Use legible handwriting, use ***blue/black*** *only.*

SECTION – I

2. Solve **any four** questions : **(5×4=20)**
   1) Explain the concept of thumb instructions in ARM processor.
   2) Describe the features of LPC 2148.
   3) What are recent trends in embedded system, explain in detail.
   4) Explain communication protocol CAN in detail.
   5) Differentiate between CISC and RISC with example.

3. Solve **any two** questions : **(10×2=20)**
   1) Explain in detail timer hardware behind LPC 2148 with various initialization register.
   2) Give the functional block diagram of typical ADC system and explain. Also discuss the need of sample and hold circuit.
   3) Describe the following ARM instructions with example.
      1) MLA
      2) BLX
      3) STM
      4) POP
      5) PUSH

SECTION – II

4. Solve **any four** questions. **(5×4=20)**
   1) Explain Task Control Block.
   2) Explain basic task states in RTOS.
   3) Compare between treads and process.
   4) Explain foreground and background system. What is the difference between foreground and background tasks ?
   5) What is interrupt latency ? Explain the factors affecting it.

5. Solve **any two** questions. **(10×2=20)**
   1) What is context switching ? Describe the sequence of steps that are necessary to occurrence of an interrupt.
   2) Explain in detail encapsulating semaphore and encapsulating queue.
   3) Explain inter task communication in μC/OS II using
      a) Message mailbox
      b) Queue
      c) Pipes.

SLR-EP – 305

Seat No.	

Set **Q**

T.E. (Biomedical Engineering) (Part – II) Examination, 2016
EMBEDDED SYSTEMS

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct option : **(20×1=20)**

1) For real time operating systems, interrupt latency should be
   a) Minimal
   b) Maximum
   c) Zero
   d) Dependent on the scheduling

2) In rate monotonic scheduling
   a) Shorter duration job has higher priority
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   a) Is a binary mutex
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   c) Can be accessed from multiple processes
   d) None of these

6) ARM is _____ processor.
a) 16 bit b) 32 bit c) 64 bit d) 8 bit

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8) How many types of interrupt controllers are available for ARM processor ?
a) 2 b) 3 c) 4 d) None

9) General purpose registers are _____ in size.
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10) How many processor modes we have in total ?
a) 9 b) 6 c) 3 d) 7

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a) User b) Supervisor
c) Abort d) Fast interrupt request

12) ARM7 processor has _____ stag pipeline.
a) Three b) Five c) Seven d) None

13) RISC stands for
a) Remote Interrupt Set Coding b) Reduced Instruction Set Computer
c) Reduced Instruction Set Coding d) None of these

14) USB 2.0 standard supports _____ data rate.
a) 120 Mbps b) 480 Mbps c) 200 Mbps d) None

15) The lower the value of priority, _____ the priority of the tas.
a) Higher b) Lower c) Same d) None

16) LPC 2148 has _____ DAC.
a) 8 bit b) 10 bit c) 16 bit d) None

17) ARM stands for
a) Advanced Rate Machines b) Advanced RISC Machines
c) Artificial Running Machines d) Aviary Running Machines

18) The address system supported by ARM systems is/are
a) Little Endian b) Big Endian c) X-Little Endian d) Both a) and b)

19) The additional duplicate register used in ARM machines are called as
a) Copied-registers b) Banked registers
c) Extra registers d) Sentential registers

20) ARM processors where basically designed for
a) Main frame systems b) Distributed systems
c) Mobile systems d) Super computers

_____

SLR-EP – 305

Seat No.	

T.E. (Biomedical Engineering) (Part – II) Examination, 2016
EMBEDDED SYSTEMS

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
*2) Assume data **wherever** necessary.*
*3) Use legible handwriting, use **blue/black** only.*

SECTION – I

2. Solve **any four** questions : **(5×4=20)**
   1) Explain the concept of thumb instructions in ARM processor.
   2) Describe the features of LPC 2148.
   3) What are recent trends in embedded system, explain in detail.
   4) Explain communication protocol CAN in detail.
   5) Differentiate between CISC and RISC with example.

3. Solve **any two** questions : **(10×2=20)**
   1) Explain in detail timer hardware behind LPC 2148 with various initialization register.
   2) Give the functional block diagram of typical ADC system and explain. Also discuss the need of sample and hold circuit.
   3) Describe the following ARM instructions with example.
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      2) BLX
      3) STM
      4) POP
      5) PUSH

SECTION – II

4. Solve **any four** questions. **(5×4=20)**
   1) Explain Task Control Block.
   2) Explain basic task states in RTOS.
   3) Compare between treads and process.
   4) Explain foreground and background system. What is the difference between foreground and background tasks ?
   5) What is interrupt latency ? Explain the factors affecting it.

5. Solve **any two** questions. **(10×2=20)**
   1) What is context switching ? Describe the sequence of steps that are necessary to occurrence of an interrupt.
   2) Explain in detail encapsulating semaphore and encapsulating queue.
   3) Explain inter task communication in μC/OS II using
      a) Message mailbox
      b) Queue
      c) Pipes.

SLR-EP – 305

Seat No.	

Set **R**

T.E. (Biomedical Engineering) (Part – II) Examination, 2016
EMBEDDED SYSTEMS

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Use legible handwriting, use ***blue/black*** *only.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct option : **(20×1=20)**

1) LPC 2148 has _____ DAC.
a) 8 bit b) 10 bit c) 16 bit d) None

2) ARM stands for
a) Advanced Rate Machines b) Advanced RISC Machines
c) Artificial Running Machines d) Aviary Running Machines

3) The address system supported by ARM systems is/are
a) Little Endian b) Big Endian c) X-Little Endian d) Both a) and b)

4) The additional duplicate register used in ARM machines are called as
a) Copied-registers b) Banked registers
c) Extra registers d) Sentential registers

5) ARM processors where basically designed for
a) Main frame systems b) Distributed systems
c) Mobile systems d) Super computers

6) For real time operating systems, interrupt latency should be
a) Minimal b) Maximum
c) Zero d) Dependent on the scheduling

7) In rate monotonic scheduling
a) Shorter duration job has higher priority
b) Longer duration job has higher priority
c) Priority does not depend on the duration of the job
d) None of the mentioned

P.T.O.

8) Interrupt latency refers to the period of time
   a) From the occurrence of an event to the arrival of an interrupt
   b) From the occurrence of an event to the servicing of an interrupt
   c) From arrival of an interrupt to the start of the interrupt service routine
   d) None of these

9) In real time operating system
   a) All processes have the same priority
   b) A task must be serviced by its deadline period
   c) Process scheduling can be done only once
   d) Kernel is not required

10) A semaphore
   a) Is a binary mutex
   b) Must be accessed from only one process
   c) Can be accessed from multiple processes
   d) None of these

11) ARM is _____ processor.
   a) 16 bit b) 32 bit c) 64 bit d) 8 bit

12) All ARM peripherals are _____ mapped.
   a) I/O b) Memory c) Both a) and b) d) None

13) How many types of interrupt controllers are available for ARM processor ?
   a) 2 b) 3 c) 4 d) None

14) General purpose registers are _____ in size.
   a) 16 bit b) 32 bit c) 64 bit d) 8 bit

15) How many processor modes we have in total ?
   a) 9 b) 6 c) 3 d) 7

16) Among the processors mode given below, select the odd one.
   a) User b) Supervisor
   c) Abort d) Fast interrupt request

17) ARM7 processor has _____ stag pipeline.
   a) Three b) Five c) Seven d) None

18) RISC stands for
   a) Remote Interrupt Set Coding b) Reduced Instruction Set Computer
   c) Reduced Instruction Set Coding d) None of these

19) USB 2.0 standard supports _____ data rate.
   a) 120 Mbps b) 480 Mbps c) 200 Mbps d) None

20) The lower the value of priority, _____ the priority of the tas.
   a) Higher b) Lower c) Same d) None

_____

SLR-EP – 305

Seat No.	

T.E. (Biomedical Engineering) (Part – II) Examination, 2016
EMBEDDED SYSTEMS

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Use legible handwriting, use ***blue/black*** *only.*

SECTION – I

2. Solve **any four** questions : **(5×4=20)**
   1) Explain the concept of thumb instructions in ARM processor.
   2) Describe the features of LPC 2148.
   3) What are recent trends in embedded system, explain in detail.
   4) Explain communication protocol CAN in detail.
   5) Differentiate between CISC and RISC with example.

3. Solve **any two** questions : **(10×2=20)**
   1) Explain in detail timer hardware behind LPC 2148 with various initialization register.
   2) Give the functional block diagram of typical ADC system and explain. Also discuss the need of sample and hold circuit.
   3) Describe the following ARM instructions with example.
      1) MLA
      2) BLX
      3) STM
      4) POP
      5) PUSH

SECTION – II

4. Solve **any four** questions. **(5×4=20)**
   1) Explain Task Control Block.
   2) Explain basic task states in RTOS.
   3) Compare between treads and process.
   4) Explain foreground and background system. What is the difference between foreground and background tasks ?
   5) What is interrupt latency ? Explain the factors affecting it.

5. Solve **any two** questions. **(10×2=20)**
   1) What is context switching ? Describe the sequence of steps that are necessary to occurrence of an interrupt.
   2) Explain in detail encapsulating semaphore and encapsulating queue.
   3) Explain inter task communication in μC/OS II using
      a) Message mailbox
      b) Queue
      c) Pipes.

SLR-EP – 305

Seat No.	

Set **S**

T.E. (Biomedical Engineering) (Part – II) Examination, 2016
EMBEDDED SYSTEMS

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Use legible handwriting, use ***blue/black*** *only.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct option : **(20×1=20)**

1) Among the processors mode given below, select the odd one.
   a) User b) Supervisor
   c) Abort d) Fast interrupt request

2) ARM7 processor has _____ stag pipeline.
   a) Three b) Five c) Seven d) None

3) RISC stands for
   a) Remote Interrupt Set Coding b) Reduced Instruction Set Computer
   c) Reduced Instruction Set Coding d) None of these

4) USB 2.0 standard supports _____ data rate.
   a) 120 Mbps b) 480 Mbps c) 200 Mbps d) None

5) The lower the value of priority, _____ the priority of the tas.
   a) Higher b) Lower c) Same d) None

6) LPC 2148 has _____ DAC.
   a) 8 bit b) 10 bit c) 16 bit d) None

7) ARM stands for
   a) Advanced Rate Machines b) Advanced RISC Machines
   c) Artificial Running Machines d) Aviary Running Machines

8) The address system supported by ARM systems is/are
   a) Little Endian b) Big Endian c) X-Little Endian d) Both a) and b)

P.T.O.

9) The additional duplicate register used in ARM machines are called as
   a) Copied-registers b) Banked registers
   c) Extra registers d) Sentential registers

10) ARM processors where basically designed for
   a) Main frame systems b) Distributed systems
   c) Mobile systems d) Super computers

11) For real time operating systems, interrupt latency should be
   a) Minimal b) Maximum
   c) Zero d) Dependent on the scheduling

12) In rate monotonic scheduling
   a) Shorter duration job has higher priority
   b) Longer duration job has higher priority
   c) Priority does not depend on the duration of the job
   d) None of the mentioned

13) Interrupt latency refers to the period of time
   a) From the occurrence of an event to the arrival of an interrupt
   b) From the occurrence of an event to the servicing of an interrupt
   c) From arrival of an interrupt to the start of the interrupt service routine
   d) None of these

14) In real time operating system
   a) All processes have the same priority
   b) A task must be serviced by its deadline period
   c) Process scheduling can be done only once
   d) Kernel is not required

15) A semaphore
   a) Is a binary mutex
   b) Must be accessed from only one process
   c) Can be accessed from multiple processes
   d) None of these

16) ARM is _____ processor.
   a) 16 bit b) 32 bit c) 64 bit d) 8 bit

17) All ARM peripherals are _____ mapped.
   a) I/O b) Memory c) Both a) and b) d) None

18) How many types of interrupt controllers are available for ARM processor ?
   a) 2 b) 3 c) 4 d) None

19) General purpose registers are _____ in size.
   a) 16 bit b) 32 bit c) 64 bit d) 8 bit

20) How many processor modes we have in total ?
   a) 9 b) 6 c) 3 d) 7

Set S

_____

SLR-EP – 305

Seat No.	

T.E. (Biomedical Engineering) (Part – II) Examination, 2016
EMBEDDED SYSTEMS

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Use legible handwriting, use ***blue/black*** *only.*

SECTION – I

2. Solve **any four** questions : **(5×4=20)**
   1) Explain the concept of thumb instructions in ARM processor.
   2) Describe the features of LPC 2148.
   3) What are recent trends in embedded system, explain in detail.
   4) Explain communication protocol CAN in detail.
   5) Differentiate between CISC and RISC with example.

3. Solve **any two** questions : **(10×2=20)**
   1) Explain in detail timer hardware behind LPC 2148 with various initialization register.
   2) Give the functional block diagram of typical ADC system and explain. Also discuss the need of sample and hold circuit.
   3) Describe the following ARM instructions with example.
      1) MLA
      2) BLX
      3) STM
      4) POP
      5) PUSH

SECTION – II

4. Solve **any four** questions. **(5×4=20)**
   1) Explain Task Control Block.
   2) Explain basic task states in RTOS.
   3) Compare between treads and process.
   4) Explain foreground and background system. What is the difference between foreground and background tasks ?
   5) What is interrupt latency ? Explain the factors affecting it.

5. Solve **any two** questions. **(10×2=20)**
   1) What is context switching ? Describe the sequence of steps that are necessary to occurrence of an interrupt.
   2) Explain in detail encapsulating semaphore and encapsulating queue.
   3) Explain inter task communication in μC/OS II using
      a) Message mailbox
      b) Queue
      c) Pipes.

SLR-EP – 306

Seat No.	

Set P

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
NUCLEAR MEDICINE

Day and Date : Tuesday, 29-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only.***
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) _____ rays are emitted during radioactivity.
a) α-rays b) β-rays c) Gamma rays d) All of above

2) As per radioactive decay law, small amount of disintegration of the isotope in a small portion period is equal to
a) $-\lambda N$ b) λN c) $-2\lambda N$ d) $2\lambda N$

3) The international systems of units (SI) of radioactivity is
a) Becquerel b) Curie c) Fermi d) Roengten

4) The half life of radioactive nuclei is
a) $0.693/\lambda$ b) $0.793/\lambda$ c) 0.693λ d) 0.793λ

5) Compound containing same amount of radioisotope is
a) tracer b) radioactive compound
c) non radioactive d) linear active compound

6) Radioactive decay is a _____ process.
a) random b) spontaneous c) regular d) massive

7) Gamma camera in nuclear medicine is used for
a) Organ imaging b) Radioactivity measurement
c) Surface contamination d) RIA

8) The Full Width at Half Maximum (FWHM) of a photopeak is a measure of
a) PHA window setting b) Camera sensitivity
c) Field of view d) Detector energy resolution

P.T.O.

9) The principle disadvantage in using a high resolution collimator in a gamma camera is that it has
   a) Limited FOV b) More distortion
   c) Lets scatter rejection d) Lower sensitivity

10) _____ is not a in characteristic of PET.
   a) Lead collimatous b) Positron emitters
   c) 511 KeV photons d) Attenuation correction

11) Compared to diverging collimator, a converging collimator will produce
   a) Reduced FOV b) Increased FOV
   c) Moderate FOV d) Smaller image

12) If PHA window on a gamma camera is incorrectly set below the photopeak energy it will produce
   a) decreased FOV b) decreased sensitivity
   c) increased FOV d) increased contrast

13) A flood source can be used to check a gamma cameras
   a) maximum count rate b) collimator focussing
   c) uniformity d) spatial distortion

14) In crystal scintillation detector the size or amplitude of electrical pulse is proportional to
   a) activity b) gamma photon energy
   c) focussing d) contrast

15) _____ would be the most desirable for radionucleide imaging.
   a) 15 KeV Gamma b) 150 KeV Gamma
   c) 150 KeV Beta d) 1500 KeV Gamma

16) Regarding SPECT
   a) Noise limited b) Noise unlimited
   c) Worse resolution d) Good contrast

17) Desirable properties of radionucleide include
   a) low specific activity b) long effective half life
   c) non toxic d) disperse all over the body

18) Tc – 99m is used in
   a) PET scan b) Renal scan c) Spleen scan d) SPECT scan

19) Dose to a patient is reduced by using
   a) goid b) high KV c) transforms d) camera

20) To minimise dose, patients are advised to
   a) drink less water b) empty bladder frequently
   c) wear lead gowns d) wear lead spectacles

_____

SLR-EP – 306

Seat No.	

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
NUCLEAR MEDICINE

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**

   1) Differentiate between alpha, beta and gamma emission in detail.

   2) Explain following :

      a) Isometric transition

      b) Radioactive decay law.

   3) Derive relationship between the decay constant and the half life.

   4) Find the radioactivity of a 1g sample of ^{226}R given that $t_{1/2}$ = 1620 yrs and Avogadro's number = 6.023×10^{23}.

   5) Draw and explain working of multichannel pulse height analyser.

3. Attempt **any two** questions : **(10×2=20)**

   1) Write a note on :

      a) Gas filled detector

      b) Scintillation detector.

   2) Explain working of gamma camera with neat diagram. Mention its performance parameter.

   3) What is the minimum mass of 99mTc that can have a radioactivity of 1MBq ? Assume the half life is 6 hours and that Avogadro's number is 6.023×10^{23}.

      Also mention various units of radioactivity.

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

   1) Discuss various types of collimators with neat figures.

   2) Differentiate between PET and SPECT.

   3) Define RIA techniques and list its clinical applications.

   4) Discuss about prevention of internal exposure of radionucleide.

   5) List and explain various radiotracers used in RIA and also mention their advantage.

5. Attempt **any two** questions : **(10×2=20)**

   1) Explain single and double isotope method in vitro technique with neat figure.

   2) Discuss various biological effects of radiation exposure in detail.

   3) Explain the following :

      a) Principle and applications of SPECT

      b) Disposal of biological waste.

SLR-EP – 306

Seat No.	

Set Q

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
NUCLEAR MEDICINE

Day and Date : Tuesday, 29-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Regarding SPECT
   a) Noise limited b) Noise unlimited
   c) Worse resolution d) Good contrast

2) Desirable properties of radionucleide include
   a) low specific activity b) long effective half life
   c) non toxic d) disperse all over the body

3) Tc – 99m is used in
   a) PET scan b) Renal scan c) Spleen scan d) SPECT scan

4) Dose to a patient is reduced by using
   a) goid b) high KV c) transforms d) camera

5) To minimise dose, patients are advised to
   a) drink less water b) empty bladder frequently
   c) wear lead gowns d) wear lead spectacles

6) _____ rays are emitted during radioactivity.
   a) α-rays b) β-rays c) Gamma rays d) All of above

7) As per radioactive decay law, small amount of disintegration of the isotope in a small portion period is equal to
   a) $-\lambda N$ b) λN c) $-2\lambda N$ d) $2\lambda N$

8) The international systems of units (SI) of radioactivity is
   a) Becquerel b) Curie c) Fermi d) Roengten

9) The half life of radioactive nuclei is
   a) $0.693/\lambda$ b) $0.793/\lambda$ c) 0.693λ d) 0.793λ

P.T.O.

10) Compound containing same amount of radioisotope is
a) tracer b) radioactive compound
c) non radioactive d) linear active compound

11) Radioactive decay is a _____ process.
a) random b) spontaneous c) regular d) massive

12) Gamma camera in nuclear medicine is used for
a) Organ imaging b) Radioactivity measurement
c) Surface contamination d) RIA

13) The Full Width at Half Maximum (FWHM) of a photopeak is a measure of
a) PHA window setting b) Camera sensitivity
c) Field of view d) Detector energy resolution

14) The principle disadvantage in using a high resolution collimator in a gamma camera is that it has
a) Limited FOV b) More distortion
c) Lets scatter rejection d) Lower sensitivity

15) _____ is not a in characteristic of PET.
a) Lead collimatous b) Positron emitters
c) 511 KeV photons d) Attenuation correction

16) Compared to diverging collimator, a converging collimator will produce
a) Reduced FOV b) Increased FOV
c) Moderate FOV d) Smaller image

17) If PHA window on a gamma camera is incorrectly set below the photopeak energy it will produce
a) decreased FOV b) decreased sensitivity
c) increased FOV d) increased contrast

18) A flood source can be used to check a gamma cameras
a) maximum count rate b) collimator focussing
c) uniformity d) spatial distortion

19) In crystal scintillation detector the size or amplitude of electrical pulse is proportional to
a) activity b) gamma photon energy
c) focussing d) contrast

20) _____ would be the most desirable for radionucleide imaging.
a) 15 KeV Gamma b) 150 KeV Gamma
c) 150 KeV Beta d) 1500 KeV Gamma

_____

SLR-EP – 306

Seat No.	

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
NUCLEAR MEDICINE

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**

   1) Differentiate between alpha, beta and gamma emission in detail.

   2) Explain following :

      a) Isometric transition

      b) Radioactive decay law.

   3) Derive relationship between the decay constant and the half life.

   4) Find the radioactivity of a 1g sample of ^{226}R given that $t_{1/2}$ = 1620 yrs and Avogadro's number = 6.023×10^{23}.

   5) Draw and explain working of multichannel pulse height analyser.

3. Attempt **any two** questions : **(10×2=20)**

   1) Write a note on :

      a) Gas filled detector

      b) Scintillation detector.

   2) Explain working of gamma camera with neat diagram. Mention its performance parameter.

   3) What is the minimum mass of 99mTc that can have a radioactivity of 1MBq ? Assume the half life is 6 hours and that Avogadro's number is 6.023×10^{23}.

      Also mention various units of radioactivity.

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

   1) Discuss various types of collimators with neat figures.

   2) Differentiate between PET and SPECT.

   3) Define RIA techniques and list its clinical applications.

   4) Discuss about prevention of internal exposure of radionucleide.

   5) List and explain various radiotracers used in RIA and also mention their advantage.

5. Attempt **any two** questions : **(10×2=20)**

   1) Explain single and double isotope method in vitro technique with neat figure.

   2) Discuss various biological effects of radiation exposure in detail.

   3) Explain the following :

      a) Principle and applications of SPECT

      b) Disposal of biological waste.

———————————

SLR-EP – 306

Seat No.	

Set **R**

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
NUCLEAR MEDICINE

Day and Date : Tuesday, 29-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Compared to diverging collimator, a converging collimator will produce
   a) Reduced FOV b) Increased FOV
   c) Moderate FOV d) Smaller image

2) If PHA window on a gamma camera is incorrectly set below the photopeak energy it will produce
   a) decreased FOV b) decreased sensitivity
   c) increased FOV d) increased contrast

3) A flood source can be used to check a gamma cameras
   a) maximum count rate b) collimator focussing
   c) uniformity d) spatial distortion

4) In crystal scintillation detector the size or amplitude of electrical pulse is proportional to
   a) activity b) gamma photon energy
   c) focussing d) contrast

5) _____ would be the most desirable for radionucleide imaging.
   a) 15 KeV Gamma b) 150 KeV Gamma
   c) 150 KeV Beta d) 1500 KeV Gamma

6) Regarding SPECT
   a) Noise limited b) Noise unlimited
   c) Worse resolution d) Good contrast

7) Desirable properties of radionucleide include
   a) low specific activity b) long effective half life
   c) non toxic d) disperse all over the body

8) Tc – 99m is used in
a) PET scan b) Renal scan c) Spleen scan d) SPECT scan

9) Dose to a patient is reduced by using
a) goid b) high KV c) transforms d) camera

10) To minimise dose, patients are advised to
a) drink less water b) empty bladder frequently
c) wear lead gowns d) wear lead spectacles

11) _____ rays are emitted during radioactivity.
a) α-rays b) β-rays c) Gamma rays d) All of above

12) As per radioactive decay law, small amount of disintegration of the isotope in a small portion period is equal to
a) $-\lambda N$ b) λN c) $-2\lambda N$ d) $2\lambda N$

13) The international systems of units (SI) of radioactivity is
a) Becquerel b) Curie c) Fermi d) Roengten

14) The half life of radioactive nuclei is
a) $0.693/\lambda$ b) $0.793/\lambda$ c) 0.693λ d) 0.793λ

15) Compound containing same amount of radioisotope is
a) tracer b) radioactive compound
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c) Surface contamination d) RIA

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a) PHA window setting b) Camera sensitivity
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19) The principle disadvantage in using a high resolution collimator in a gamma camera is that it has
a) Limited FOV b) More distortion
c) Lets scatter rejection d) Lower sensitivity

20) _____ is not a in characteristic of PET.
a) Lead collimatous b) Positron emitters
c) 511 KeV photons d) Attenuation correction

_____

SLR-EP – 306

Seat No.	

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
NUCLEAR MEDICINE

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**

   1) Differentiate between alpha, beta and gamma emission in detail.

   2) Explain following :

      a) Isometric transition

      b) Radioactive decay law.

   3) Derive relationship between the decay constant and the half life.

   4) Find the radioactivity of a 1g sample of ^{226}R given that $t_{1/2}$ = 1620 yrs and Avogadro's number = 6.023×10^{23}.

   5) Draw and explain working of multichannel pulse height analyser.

3. Attempt **any two** questions : **(10×2=20)**

   1) Write a note on :

      a) Gas filled detector

      b) Scintillation detector.

   2) Explain working of gamma camera with neat diagram. Mention its performance parameter.

   3) What is the minimum mass of 99mTc that can have a radioactivity of 1MBq ? Assume the half life is 6 hours and that Avogadro's number is 6.023×10^{23}.

      Also mention various units of radioactivity.

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

   1) Discuss various types of collimators with neat figures.

   2) Differentiate between PET and SPECT.

   3) Define RIA techniques and list its clinical applications.

   4) Discuss about prevention of internal exposure of radionucleide.

   5) List and explain various radiotracers used in RIA and also mention their advantage.

5. Attempt **any two** questions : **(10×2=20)**

   1) Explain single and double isotope method in vitro technique with neat figure.

   2) Discuss various biological effects of radiation exposure in detail.

   3) Explain the following :

      a) Principle and applications of SPECT

      b) Disposal of biological waste.

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SLR-EP – 306

Seat No.	

Set S

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
NUCLEAR MEDICINE

Day and Date : Tuesday, 29-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Radioactive decay is a _____ process.
a) random b) spontaneous c) regular d) massive

2) Gamma camera in nuclear medicine is used for
a) Organ imaging b) Radioactivity measurement
c) Surface contamination d) RIA

3) The Full Width at Half Maximum (FWHM) of a photopeak is a measure of
a) PHA window setting b) Camera sensitivity
c) Field of view d) Detector energy resolution

4) The principle disadvantage in using a high resolution collimator in a gamma camera is that it has
a) Limited FOV b) More distortion
c) Lets scatter rejection d) Lower sensitivity

5) _____ is not a in characteristic of PET.
a) Lead collimatous b) Positron emitters
c) 511 KeV photons d) Attenuation correction

6) Compared to diverging collimator, a converging collimator will produce
a) Reduced FOV b) Increased FOV
c) Moderate FOV d) Smaller image

7) If PHA window on a gamma camera is incorrectly set below the photopeak energy it will produce
a) decreased FOV b) decreased sensitivity
c) increased FOV d) increased contrast

P.T.O.

8) A flood source can be used to check a gamma cameras
   a) maximum count rate b) collimator focussing
   c) uniformity d) spatial distortion

9) In crystal scintillation detector the size or amplitude of electrical pulse is proportional to
   a) activity b) gamma photon energy
   c) focussing d) contrast

10) _____ would be the most desirable for radionucleide imaging.
   a) 15 KeV Gamma b) 150 KeV Gamma
   c) 150 KeV Beta d) 1500 KeV Gamma

11) Regarding SPECT
   a) Noise limited b) Noise unlimited
   c) Worse resolution d) Good contrast

12) Desirable properties of radionucleide include
   a) low specific activity b) long effective half life
   c) non toxic d) disperse all over the body

13) Tc – 99m is used in
   a) PET scan b) Renal scan c) Spleen scan d) SPECT scan

14) Dose to a patient is reduced by using
   a) goid b) high KV c) transforms d) camera

15) To minimise dose, patients are advised to
   a) drink less water b) empty bladder frequently
   c) wear lead gowns d) wear lead spectacles

16) _____ rays are emitted during radioactivity.
   a) α-rays b) β-rays c) Gamma rays d) All of above

17) As per radioactive decay law, small amount of disintegration of the isotope in a small portion period is equal to
   a) $-\lambda N$ b) λN c) $-2\lambda N$ d) $2\lambda N$

18) The international systems of units (SI) of radioactivity is
   a) Becquerel b) Curie c) Fermi d) Roengten

19) The half life of radioactive nuclei is
   a) $0.693/\lambda$ b) $0.793/\lambda$ c) 0.693λ d) 0.793λ

20) Compound containing same amount of radioisotope is
   a) tracer b) radioactive compound
   c) non radioactive d) linear active compound

_____

SLR-EP – 306

Seat No.	

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
NUCLEAR MEDICINE

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**

   1) Differentiate between alpha, beta and gamma emission in detail.

   2) Explain following :

      a) Isometric transition

      b) Radioactive decay law.

   3) Derive relationship between the decay constant and the half life.

   4) Find the radioactivity of a 1g sample of ^{226}R given that $t_{1/2}$ = 1620 yrs and Avogadro's number = 6.023×10^{23}.

   5) Draw and explain working of multichannel pulse height analyser.

3. Attempt **any two** questions : **(10×2=20)**

   1) Write a note on :

      a) Gas filled detector

      b) Scintillation detector.

   2) Explain working of gamma camera with neat diagram. Mention its performance parameter.

   3) What is the minimum mass of 99mTc that can have a radioactivity of 1MBq ? Assume the half life is 6 hours and that Avogadro's number is 6.023×10^{23}.

      Also mention various units of radioactivity.

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**

   1) Discuss various types of collimators with neat figures.

   2) Differentiate between PET and SPECT.

   3) Define RIA techniques and list its clinical applications.

   4) Discuss about prevention of internal exposure of radionucleide.

   5) List and explain various radiotracers used in RIA and also mention their advantage.

5. Attempt **any two** questions : **(10×2=20)**

   1) Explain single and double isotope method in vitro technique with neat figure.

   2) Discuss various biological effects of radiation exposure in detail.

   3) Explain the following :

      a) Principle and applications of SPECT

      b) Disposal of biological waste.

SLR-EP – 307

Seat No.	

Set P

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
MEDICAL INFORMATICS

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Figures to the* ***right*** *indicate* ***full*** *marks.*
4) ***Assume*** *data* ***wherever*** *necessary.*
5) ***Use*** *legible handwriting, use* ***blue/black pen*** *only.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Following this standard facilitates the electronic interchange of health system data.
a) DICOM b) EDI c) HL7 d) AWG

2) Following this standard defines the message formats and communications standards for diagnostic and therapeutic images.
a) HL7 b) MDDI c) ASTM d) DICOM

3) EDI stands for
a) Electric Data Interchange b) Electric Device Interchange
c) Electronic Data Information d) Electronic Data Interchange

4) CMTs stands for
a) Controlled Medical Terminologies b) Converted Medical Terminations
c) Covered Medical Terminologies d) Compared Medical Terminologies

5) Medical information system deals with _____
a) Only patient related information b) Only doctor related information
c) Only hospital related information d) Only health related information

6) This step is not involved in the development of HMIS
a) Feasibility b) Design c) Coding d) Conversion

7) PHC stands for
a) Programmable Health Centre b) Primary Hospital Centre
c) Primary Health Centre d) Programmable Hospital Centre

8) Which is not related to blood bank module ?
a) Inventory b) Donors c) Storage d) Performance

P.T.O.

9) CAME stands for
   a) Computer Automated Medical Education and Surgery
   b) Computer Assisted Medical Education and Surgery
   c) Computer Approached Medical Education and Surgery
   d) None

10) Prospect of medical informatics includes
   a) Medical informatics
   b) Introduction of healthcare informatics
   c) Introduction of digital knowledge system
   d) All the above

11) Which signals are uses to examine blood flow rather than to image the cardiac anatomy ?
   a) Electric signals
   b) Electronic signals
   c) Electrochemical signals
   d) Ultrasonic signals

12) CAS stands for
   a) Computer Assisted Surgery
   b) Computer Automated Surgery
   c) Central Automated Surgery
   d) None

13) ES and KBS are the branches of _____
   a) Knowledge based system
   b) Planning system
   c) Expert system
   d) Artificial intelligence

14) _____ is the heart of web browser.
   a) HTTP b) WWW c) HTML d) CGI

15) Full form of CMD
   a) Computer Assisted Medical Decision
   b) Computer Approached Medical Decision
   c) Centre Approached Medical Decision
   d) Computer Attended Medical Decision

16) Among these not a type of network topology
   a) Ring b) Bus c) Star d) Hash

17) Among these which is not type of knowledge in expert system ?
   a) Declarative knowledge
   b) Procedural knowledge
   c) Heuristic knowledge
   d) Standard knowledge

18) DICOM stands for
   a) Digital Imaging and Communication in Medicine
   b) Discrete Imaging and Communication in Medicine
   c) Direct Imaging and Communication in Medicine
   d) Dimension Imaging and Communication in Medicine

19) Medical Informatics is deals with
   a) Hospital management
   b) Medical field
   c) Patients data
   d) All of the above

20) CBPR is
   a) Computer Based Patient Record
   b) Central Based Patient Record
   c) Computer Based Parameter Record
   d) None

_____

SLR-EP – 307

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
MEDICAL INFORMATICS

Day and Date : Thursday, 1-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
*2) **Assume** data **wherever** necessary.*
*3) **Draw** diagrams/sketches **wherever** necessary.*
*4) **Use** legible handwriting, use **blue/black pen** only.*

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
   1) Explain blood bank module.
   2) Explain operation theatre module.
   3) Explain diet planning module.
   4) Write in detail of medical records index module.
   5) Discuss about Health and family welfare examination.

3. Answer **any two** of the following questions : **(2×10=20)**
   1) Write silent features of application of VE (Virtual Enviornment).
   2) Explain pathology laboratory module.
   3) Discuss in detail radiology module in hospital.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
   1) Discuss advantages and disadvantages of Telecommunication based systems.
   2) Explain needs for telesurgery.
   3) Write the application and advantages of CAS.
   4) Explain the technology, materials and methods in surgical simulation.
   5) Application and future scopes of surgical simulation.

5. Answer **any two** of the following questions : **(2×10=20)**
   1) Discuss application and future scopes of AI and experts systems.
   2) Explain in details of limitations of conventional surgery.
   3) Write and explain advantages of simulators and after effects of VE (Virtual Environment) Participation.

Set P

Set P

SLR-EP – 307

Seat No.	

Set **Q**

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
MEDICAL INFORMATICS

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Among these not a type of network topology
   a) Ring b) Bus c) Star d) Hash

2) Among these which is not type of knowledge in expert system ?
   a) Declarative knowledge b) Procedural knowledge
   c) Heuristic knowledge d) Standard knowledge

3) DICOM stands for
   a) Digital Imaging and Communication in Medicine
   b) Discrete Imaging and Communication in Medicine
   c) Direct Imaging and Communication in Medicine
   d) Dimension Imaging and Communication in Medicine

4) Medical Informatics is deals with
   a) Hospital management b) Medical field
   c) Patients data d) All of the above

5) CBPR is
   a) Computer Based Patient Record b) Central Based Patient Record
   c) Computer Based Parameter Record d) None

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   b) Primary Hospital Centre
   c) Primary Health Centre
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_____

SLR-EP – 307

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
MEDICAL INFORMATICS

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SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
   1) Explain blood bank module.
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   3) Explain diet planning module.
   4) Write in detail of medical records index module.
   5) Discuss about Health and family welfare examination.

3. Answer **any two** of the following questions : **(2×10=20)**
   1) Write silent features of application of VE (Virtual Enviornment).
   2) Explain pathology laboratory module.
   3) Discuss in detail radiology module in hospital.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
   1) Discuss advantages and disadvantages of Telecommunication based systems.
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   3) Write the application and advantages of CAS.
   4) Explain the technology, materials and methods in surgical simulation.
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Set Q

Set Q

SLR-EP – 307

Seat No.	

Set **R**

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
MEDICAL INFORMATICS

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which signals are uses to examine blood flow rather than to image the cardiac anatomy ?
   a) Electric signals b) Electronic signals
   c) Electrochemical signals d) Ultrasonic signals

2) CAS stands for
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P.T.O.

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_____

SLR-EP – 307

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
MEDICAL INFORMATICS

Day and Date : Thursday, 1-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
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SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
   1) Explain blood bank module.
   2) Explain operation theatre module.
   3) Explain diet planning module.
   4) Write in detail of medical records index module.
   5) Discuss about Health and family welfare examination.

3. Answer **any two** of the following questions : **(2×10=20)**
   1) Write silent features of application of VE (Virtual Enviornment).
   2) Explain pathology laboratory module.
   3) Discuss in detail radiology module in hospital.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
   1) Discuss advantages and disadvantages of Telecommunication based systems.
   2) Explain needs for telesurgery.
   3) Write the application and advantages of CAS.
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Set R

Set R

SLR-EP – 307

Seat No.	

Set **S**

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
MEDICAL INFORMATICS

Day and Date : Thursday, 1-12-2016 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

1. Choose the correct answer : **(20×1=20)**

1) This step is not involved in the development of HMIS
   a) Feasibility b) Design c) Coding d) Conversion

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P.T.O.

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   c) Patients data d) All of the above

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   a) DICOM b) EDI c) HL7 d) AWG

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   a) Only patient related information b) Only doctor related information
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_____

SLR-EP – 307

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
MEDICAL INFORMATICS

Day and Date : Thursday, 1-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
*2) **Assume** data **wherever** necessary.*
*3) **Draw** diagrams/sketches **wherever** necessary.*
*4) **Use** legible handwriting, use **blue/black pen** only.*

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
   1) Explain blood bank module.
   2) Explain operation theatre module.
   3) Explain diet planning module.
   4) Write in detail of medical records index module.
   5) Discuss about Health and family welfare examination.

3. Answer **any two** of the following questions : **(2×10=20)**
   1) Write silent features of application of VE (Virtual Enviornment).
   2) Explain pathology laboratory module.
   3) Discuss in detail radiology module in hospital.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
   1) Discuss advantages and disadvantages of Telecommunication based systems.
   2) Explain needs for telesurgery.
   3) Write the application and advantages of CAS.
   4) Explain the technology, materials and methods in surgical simulation.
   5) Application and future scopes of surgical simulation.

5. Answer **any two** of the following questions : **(2×10=20)**
   1) Discuss application and future scopes of AI and experts systems.
   2) Explain in details of limitations of conventional surgery.
   3) Write and explain advantages of simulators and after effects of VE (Virtual Environment) Participation.

Set S

SLR-EP – 308

Seat No.	

Set **P**

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
BIOMEDICAL INSTRUMENTATION – III

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The energy of muscle contraction is derived from following except.
   a) ATP b) Muscle fiber
   c) Lactic acid d) Phosphate

2) In current pacemaker through out the impulses the current in the circuit is determined by the _____ of the pacemaker.
   a) internal resistance b) external resistance
   c) internal capacitance d) external capacitance

3) In the five letter code of pacemaker the first letter indicates the _____ that are paced.
   a) muscles b) nerves c) chambers d) bones

4) In the capacitor plate method of shortwave diathermy electrodes are called as
   a) PADS b) SACS c) Sutureless d) Contraplaner

5) _____ generators are constructed on the piezoelectric effect.
   a) Function b) Ultrasonic
   c) Nerve and Muscle d) Pulsed

6) Timed _____ produces the electrical oscillations of the required frequency in ultrasonic therapy unit.
   a) amplifier b) power amplifier
   c) rectifier d) oscillator

7) _____ current is a steady flow direct current that is passed through a tissue, affects chemically.
   a) Galvanic b) Faradic c) Surging d) Exponent

8) The frequency of currents used in surgical diathermy units in the range of _____ MHz.
   a) 10 – 20 b) 15 – 20 c) 5 – 10 d) 1 – 3

9) _____ refers to a superficial tissue destruction without affecting deep-seated tissue.
   a) Cutting b) Coagulation
   c) Fulguration d) None of above

10) In _____ needle point electrodes are stuck into tissue and then kept steady.
   a) Cutting b) Coagulation c) Fulguration d) Desiccation

11) Biological tissues are coagulated by thermal means if the requisite temperature is maintained at _____ °C.
   a) 35° b) 55° c) 70° d) 100°

12) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amounts of solutes on the side.
   a) Drift b) Diffusion c) Osmosis d) Filtration

13) The artificial kidney is a membrane _____ device that serves as a mass exchanger during clinical use.
   a) separation b) filter
   c) mixed d) exchanger

14) _____ is the used membrane for haemodialysis.
   a) Polymer b) Cuprophane c) Phosphor d) Sodium

15) The laser action depends upon the phenomenon of stimulated
   a) Current b) Energy c) Emission d) Radiation

16) A ruby laser is operated in _____ bursts.
   a) short b) big c) medium d) large

17) _____ ion laser photo coagulator is suitable for photo coagulation of the retina.
   a) Sodium b) Calcium c) Nitrogen d) Argon

18) The _____ lasers operate primarily in the ultraviolet spectral region.
   a) Excimer b) Ruby c) CO_2 d) Nd-Yag

19) The electrodes for external defibrillation are usually metal discs about _____ in diameter.
   a) 10 – 20 cm b) 10 – 15 cm c) 3 – 5 cm d) 1 – 2 cm

20) A defibrillator analyzer is used to measure the _____ content in the discharge pulse.
   a) energy b) power c) charging d) potential

_____

SLR-EP – 308

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
BIOMEDICAL INSTRUMENTATION – III

Day and Date : Saturday, 3-12-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** questions. **(4×5=20)**
   1) Discuss various power sources used for pacemakers. Also mention code system of it.
   2) Draw and explain cut, coagulation modes with is electrodes.
   3) Draw and explain various output current waveforms of nerve muscle stimulation.
   4) Differentiate between internal and external pacemaker.
   5) Explain application techniques of short wave diathermy with necessary figure.
3. Attempt **any two** questions. **(10×2=20)**
   1) Draw circuit diagram of ultrasonic therapy machine and explain its working.
   2) Discuss unipolar and bipolar modes of ESU. Draw and explain working of coagulation mode circuit.
   3) Draw and explain working of rate generator and pace pulse generator circuit of pacemaker.

SECTION – II

4. Attempt **any four** questions. **(4×5=20)**
   1) Explain working of AC defibrillator and DC defibrillator in detail.
   2) Discuss the principle of dialysis machine.
   3) Explain how capacitor discharges in INST mode of defibrillator.
   4) Explain any two types of dialyzers of dialysis machine.
   5) Mention 3 clinical applications of following.
      a) Heart rate meter
      b) LASER

5. Attempt **any two** questions. **(10×2=20)**

   1) Mention need of heart rate variability meter. Explain its working with necessary diagram.

   2) Explain working of dialysis machine with help of block diagram. Mention the precautions that has to be taken in procedure.

   3) Discuss principle of LASER and list various LASER equipment techniques and explain any two of it in detail.

_____

SLR-EP – 308

Seat No.	

Set **Q**

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
BIOMEDICAL INSTRUMENTATION – III

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) A ruby laser is operated in _____ bursts.
a) short b) big c) medium d) large

2) _____ ion laser photo coagulator is suitable for photo coagulation of the retina.
a) Sodium b) Calcium c) Nitrogen d) Argon

3) The _____ lasers operate primarily in the ultraviolet spectral region.
a) Excimer b) Ruby c) CO_2 d) Nd-Yag

4) The electrodes for external defibrillation are usually metal discs about _____ in diameter.
a) 10 – 20 cm b) 10 – 15 cm c) 3 – 5 cm d) 1 – 2 cm

5) A defibrillator analyzer is used to measure the _____ content in the discharge pulse.
a) energy b) power c) charging d) potential

6) The energy of muscle contraction is derived from following except.
a) ATP b) Muscle fiber
c) Lactic acid d) Phosphate

7) In current pacemaker through out the impulses the current in the circuit is determined by the _____ of the pacemaker.
a) internal resistance b) external resistance
c) internal capacitance d) external capacitance

8) In the five letter code of pacemaker the first letter indicates the _____ that are paced.
a) muscles b) nerves c) chambers d) bones

P.T.O.

9) In the capacitor plate method of shortwave diathermy electrodes are called as
   a) PADS b) SACS c) Sutureless d) Contraplaner

10) _____ generators are constructed on the piezoelectric effect.
   a) Function b) Ultrasonic
   c) Nerve and Muscle d) Pulsed

11) Timed _____ produces the electrical oscillations of the required frequency in ultrasonic therapy unit.
   a) amplifier b) power amplifier
   c) rectifier d) oscillator

12) _____ current is a steady flow direct current that is passed through a tissue, affects chemically.
   a) Galvanic b) Faradic c) Surging d) Exponent

13) The frequency of currents used in surgical diathermy units in the range of _____ MHz.
   a) 10 – 20 b) 15 – 20 c) 5 – 10 d) 1 – 3

14) _____ refers to a superficial tissue destruction without affecting deep-seated tissue.
   a) Cutting b) Coagulation
   c) Fulguration d) None of above

15) In _____ needle point electrodes are stuck into tissue and then kept steady.
   a) Cutting b) Coagulation c) Fulguration d) Desiccation

16) Biological tissues are coagulated by thermal means if the requisite temperature is maintained at _____ °C.
   a) 35° b) 55° c) 70° d) 100°

17) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amounts of solutes on the side.
   a) Drift b) Diffusion c) Osmosis d) Filtration

18) The artificial kidney is a membrane _____ device that serves as a mass exchanger during clinical use.
   a) separation b) filter
   c) mixed d) exchanger

19) _____ is the used membrane for haemodialysis.
   a) Polymer b) Cuprophane c) Phosphor d) Sodium

20) The laser action depends upon the phenomenon of stimulated
   a) Current b) Energy c) Emission d) Radiation

_____

SLR-EP – 308

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
BIOMEDICAL INSTRUMENTATION – III

Day and Date : Saturday, 3-12-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** questions. **(4×5=20)**
   1) Discuss various power sources used for pacemakers. Also mention code system of it.
   2) Draw and explain cut, coagulation modes with is electrodes.
   3) Draw and explain various output current waveforms of nerve muscle stimulation.
   4) Differentiate between internal and external pacemaker.
   5) Explain application techniques of short wave diathermy with necessary figure.
3. Attempt **any two** questions. **(10×2=20)**
   1) Draw circuit diagram of ultrasonic therapy machine and explain its working.
   2) Discuss unipolar and bipolar modes of ESU. Draw and explain working of coagulation mode circuit.
   3) Draw and explain working of rate generator and pace pulse generator circuit of pacemaker.

SECTION – II

4. Attempt **any four** questions. **(4×5=20)**
   1) Explain working of AC defibrillator and DC defibrillator in detail.
   2) Discuss the principle of dialysis machine.
   3) Explain how capacitor discharges in INST mode of defibrillator.
   4) Explain any two types of dialyzers of dialysis machine.
   5) Mention 3 clinical applications of following.
      a) Heart rate meter
      b) LASER

Set Q

5. Attempt **any two** questions. **(10×2=20)**

   1) Mention need of heart rate variability meter. Explain its working with necessary diagram.

   2) Explain working of dialysis machine with help of block diagram. Mention the precautions that has to be taken in procedure.

   3) Discuss principle of LASER and list various LASER equipment techniques and explain any two of it in detail.

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SLR-EP – 308

Seat No.	

Set **R**

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
BIOMEDICAL INSTRUMENTATION – III

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Biological tissues are coagulated by thermal means if the requisite temperature is maintained at _____ °C.
a) 35° b) 55° c) 70° d) 100°

2) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amounts of solutes on the side.
a) Drift b) Diffusion c) Osmosis d) Filtration

3) The artificial kidney is a membrane _____ device that serves as a mass exchanger during clinical use.
a) separation b) filter
c) mixed d) exchanger

4) _____ is the used membrane for haemodialysis.
a) Polymer b) Cuprophane c) Phosphor d) Sodium

5) The laser action depends upon the phenomenon of stimulated
a) Current b) Energy c) Emission d) Radiation

6) A ruby laser is operated in _____ bursts.
a) short b) big c) medium d) large

7) _____ ion laser photo coagulator is suitable for photo coagulation of the retina.
a) Sodium b) Calcium c) Nitrogen d) Argon

8) The _____ lasers operate primarily in the ultraviolet spectral region.
a) Excimer b) Ruby c) CO_2 d) Nd-Yag

9) The electrodes for external defibrillation are usually metal discs about _____ in diameter.
   a) 10 – 20 cm b) 10 – 15 cm c) 3 – 5 cm d) 1 – 2 cm

10) A defibrillator analyzer is used to measure the _____ content in the discharge pulse.
   a) energy b) power c) charging d) potential

11) The energy of muscle contraction is derived from following except.
   a) ATP b) Muscle fiber
   c) Lactic acid d) Phosphate

12) In current pacemaker through out the impulses the current in the circuit is determined by the _____ of the pacemaker.
   a) internal resistance b) external resistance
   c) internal capacitance d) external capacitance

13) In the five letter code of pacemaker the first letter indicates the _____ that are paced.
   a) muscles b) nerves c) chambers d) bones

14) In the capacitor plate method of shortwave diathermy electrodes are called as
   a) PADS b) SACS c) Sutureless d) Contraplaner

15) _____ generators are constructed on the piezoelectric effect.
   a) Function b) Ultrasonic
   c) Nerve and Muscle d) Pulsed

16) Timed _____ produces the electrical oscillations of the required frequency in ultrasonic therapy unit.
   a) amplifier b) power amplifier
   c) rectifier d) oscillator

17) _____ current is a steady flow direct current that is passed through a tissue, affects chemically.
   a) Galvanic b) Faradic c) Surging d) Exponent

18) The frequency of currents used in surgical diathermy units in the range of _____ MHz.
   a) 10 – 20 b) 15 – 20 c) 5 – 10 d) 1 – 3

19) _____ refers to a superficial tissue destruction without affecting deep-seated tissue.
   a) Cutting b) Coagulation
   c) Fulguration d) None of above

20) In _____ needle point electrodes are stuck into tissue and then kept steady.
   a) Cutting b) Coagulation c) Fulguration d) Desiccation

_____

SLR-EP – 308

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
BIOMEDICAL INSTRUMENTATION – III

Day and Date : Saturday, 3-12-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** questions. **(4×5=20)**
   1) Discuss various power sources used for pacemakers. Also mention code system of it.
   2) Draw and explain cut, coagulation modes with is electrodes.
   3) Draw and explain various output current waveforms of nerve muscle stimulation.
   4) Differentiate between internal and external pacemaker.
   5) Explain application techniques of short wave diathermy with necessary figure.
3. Attempt **any two** questions. **(10×2=20)**
   1) Draw circuit diagram of ultrasonic therapy machine and explain its working.
   2) Discuss unipolar and bipolar modes of ESU. Draw and explain working of coagulation mode circuit.
   3) Draw and explain working of rate generator and pace pulse generator circuit of pacemaker.

SECTION – II

4. Attempt **any four** questions. **(4×5=20)**
   1) Explain working of AC defibrillator and DC defibrillator in detail.
   2) Discuss the principle of dialysis machine.
   3) Explain how capacitor discharges in INST mode of defibrillator.
   4) Explain any two types of dialyzers of dialysis machine.
   5) Mention 3 clinical applications of following.
      a) Heart rate meter
      b) LASER

Set R

5. Attempt **any two** questions. **(10×2=20)**

   1) Mention need of heart rate variability meter. Explain its working with necessary diagram.

   2) Explain working of dialysis machine with help of block diagram. Mention the precautions that has to be taken in procedure.

   3) Discuss principle of LASER and list various LASER equipment techniques and explain any two of it in detail.

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SLR-EP – 308

Seat No.	

Set **S**

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
BIOMEDICAL INSTRUMENTATION – III

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Timed _____ produces the electrical oscillations of the required frequency in ultrasonic therapy unit.
   a) amplifier b) power amplifier
   c) rectifier d) oscillator

2) _____ current is a steady flow direct current that is passed through a tissue, affects chemically.
   a) Galvanic b) Faradic c) Surging d) Exponent

3) The frequency of currents used in surgical diathermy units in the range of _____ MHz.
   a) 10 – 20 b) 15 – 20 c) 5 – 10 d) 1 – 3

4) _____ refers to a superficial tissue destruction without affecting deep-seated tissue.
   a) Cutting b) Coagulation
   c) Fulguration d) None of above

5) In _____ needle point electrodes are stuck into tissue and then kept steady.
   a) Cutting b) Coagulation c) Fulguration d) Desiccation

6) Biological tissues are coagulated by thermal means if the requisite temperature is maintained at _____ °C.
   a) 35° b) 55° c) 70° d) 100°

7) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amounts of solutes on the side.
   a) Drift b) Diffusion c) Osmosis d) Filtration

8) The artificial kidney is a membrane _____ device that serves as a mass exchanger during clinical use.
   a) separation b) filter
   c) mixed d) exchanger

9) _____ is the used membrane for haemodialysis.
   a) Polymer b) Cuprophane c) Phosphor d) Sodium

10) The laser action depends upon the phenomenon of stimulated
   a) Current b) Energy c) Emission d) Radiation

11) A ruby laser is operated in _____ bursts.
   a) short b) big c) medium d) large

12) _____ ion laser photo coagulator is suitable for photo coagulation of the retina.
   a) Sodium b) Calcium c) Nitrogen d) Argon

13) The _____ lasers operate primarily in the ultraviolet spectral region.
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14) The electrodes for external defibrillation are usually metal discs about _____ in diameter.
   a) 10 – 20 cm b) 10 – 15 cm c) 3 – 5 cm d) 1 – 2 cm

15) A defibrillator analyzer is used to measure the _____ content in the discharge pulse.
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16) The energy of muscle contraction is derived from following except.
   a) ATP b) Muscle fiber
   c) Lactic acid d) Phosphate

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   a) internal resistance b) external resistance
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   a) PADS b) SACS c) Sutureless d) Contraplaner

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   a) Function b) Ultrasonic
   c) Nerve and Muscle d) Pulsed

_____

SLR-EP – 308

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
BIOMEDICAL INSTRUMENTATION – III

Day and Date : Saturday, 3-12-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** questions. **(4×5=20)**
   1) Discuss various power sources used for pacemakers. Also mention code system of it.
   2) Draw and explain cut, coagulation modes with is electrodes.
   3) Draw and explain various output current waveforms of nerve muscle stimulation.
   4) Differentiate between internal and external pacemaker.
   5) Explain application techniques of short wave diathermy with necessary figure.
3. Attempt **any two** questions. **(10×2=20)**
   1) Draw circuit diagram of ultrasonic therapy machine and explain its working.
   2) Discuss unipolar and bipolar modes of ESU. Draw and explain working of coagulation mode circuit.
   3) Draw and explain working of rate generator and pace pulse generator circuit of pacemaker.

SECTION – II

4. Attempt **any four** questions. **(4×5=20)**
   1) Explain working of AC defibrillator and DC defibrillator in detail.
   2) Discuss the principle of dialysis machine.
   3) Explain how capacitor discharges in INST mode of defibrillator.
   4) Explain any two types of dialyzers of dialysis machine.
   5) Mention 3 clinical applications of following.
      a) Heart rate meter
      b) LASER

5. Attempt **any two** questions. **(10×2=20)**

   1) Mention need of heart rate variability meter. Explain its working with necessary diagram.

   2) Explain working of dialysis machine with help of block diagram. Mention the precautions that has to be taken in procedure.

   3) Discuss principle of LASER and list various LASER equipment techniques and explain any two of it in detail.

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SLR-EP – 309

Seat No.	

Set P

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Gaussian noise is referred to as
   a) red noise b) black noise c) white noise d) normal noise

2) One that is not a type of noise is
   a) Rayleigh noise b) Gamma noise
   c) Block noise d) Exponential noise

3) In bit plane slicing 8 bit image will have
   a) 6 planes b) 7 planes c) 8 planes d) 9 planes

4) Pixels are digital number that are composed of
   a) Color b) Intensity levels c) Dots d) Bits

5) Color of an object is determined by light
   a) Refracted b) Transmitted c) Reflected d) Absorbed

6) Compressed image can be recovered back by image
   a) Enhancement b) Decompression
   c) Contrast d) Equalization

7) Every run length pair introduce new
   a) Pixels b) Matrix c) Frames d) Intensity

8) Replication of pixels is called
   a) Coding redundancy b) Spatial redundancy
   c) Temporal redundancy d) Both (b) and (c)

P.T.O.

9) For point detection we use
   a) First derivative b) Second derivative
   c) Third derivative d) Both (a) and (b)

10) First derivatives in image segmentation produces
   a) Thick edges b) Thin edges
   c) Fine edges d) Rough edges

11) Image having gradient pixels is called
   a) Sharp image b) Blue image
   c) Gradient image d) Binary image

12) Sobel is better than Prewitt in image
   a) Sharpening b) Blurring
   c) Smoothing d) Contrast

13) Digitizing image intensity amplitude is called
   a) Sampling b) Quantization
   c) Framing d) Both (a) and (b)

14) Histogram equalization make image intensity changes
   a) Low b) High
   c) Visible d) Invisible

15) Simple way to compression is removing
   a) Data b) Superfluous data
   c) Information d) Meaningful data

16) Blurring attenuate the
   a) Pixels b) Points
   c) Cross gradient d) Intensity

17) Gradient magnitude images are more useful in
   a) Point detection b) Line detection
   c) Area detection d) Edge detection

18) Sobel gradient is not that good for detecting of
   a) Horizontal lines b) Vertical lines
   c) Diagonal lines d) Edge

19) Smoothness reduced bricks of
   a) Pixels b) Constant intensities
   c) Point pixels d) Edges

20) Restoration cannot be done using
   a) Single projection b) Double projection
   c) Triple projection d) Octa projection

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SLR-EP – 309

Seat No.	

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Define and explain sampling and quantization with each one example.
   2) Discuss the significance of chain coding with its application.
   3) Define and differentiate between point operation and neighbourhood operation.
   4) Define Gaussian noise and salt pepper noise.
   5) Mention various properties of 2D-DFT in detail.

3. Attempt **any two** : **(10×2=20)**
   1) Explain following image enhancement technique and mention their applications.
      a) Contrast stretching b) Log trasformation
   2) Explain region based segmentation methods in detail.
   3) Define and discuss various blurring and ringing effects. How they can be avoided ?

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain opening and closing operation in detail with each of example.
   2) Explain concept of skeletonization and mention its advantages.
   3) Define moments and explain its importance in image processing.
   4) Explain HIT and MISS function and their role in image processing.
   5) Differentiate between DFT and FFT transforms with an example.

5. Attempt **any two** : **(10×2=20)**
   1) Define and explain dilation and erosion operations with their significance.
   2) List various image reconstruction techniques in CT scanning and explain any one in detail.
   3) Explain all image compression techniques in detail with two examples.

Set P

Set P

SLR-EP – 309

Seat No.	

Set **Q**

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Blurring attenuate the
   a) Pixels b) Points
   c) Cross gradient d) Intensity

2) Gradient magnitude images are more useful in
   a) Point detection b) Line detection
   c) Area detection d) Edge detection

3) Sobel gradient is not that good for detecting of
   a) Horizontal lines b) Vertical lines
   c) Diagonal lines d) Edge

4) Smoothness reduced bricks of
   a) Pixels b) Constant intensities
   c) Point pixels d) Edges

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6) Gaussian noise is referred to as
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P.T.O.

8) In bit plane slicing 8 bit image will have
   a) 6 planes b) 7 planes c) 8 planes d) 9 planes

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   a) Color b) Intensity levels c) Dots d) Bits

10) Color of an object is determined by light
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11) Compressed image can be recovered back by image
   a) Enhancement b) Decompression
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12) Every run length pair introduce new
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14) For point detection we use
   a) First derivative b) Second derivative
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15) First derivatives in image segmentation produces
   a) Thick edges b) Thin edges
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16) Image having gradient pixels is called
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19) Histogram equalization make image intensity changes
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SLR-EP – 309

Seat No.	

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Define and explain sampling and quantization with each one example.
   2) Discuss the significance of chain coding with its application.
   3) Define and differentiate between point operation and neighbourhood operation.
   4) Define Gaussian noise and salt pepper noise.
   5) Mention various properties of 2D-DFT in detail.

3. Attempt **any two** : **(10×2=20)**
   1) Explain following image enhancement technique and mention their applications.
      a) Contrast stretching b) Log trasformation
   2) Explain region based segmentation methods in detail.
   3) Define and discuss various blurring and ringing effects. How they can be avoided ?

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain opening and closing operation in detail with each of example.
   2) Explain concept of skeletonization and mention its advantages.
   3) Define moments and explain its importance in image processing.
   4) Explain HIT and MISS function and their role in image processing.
   5) Differentiate between DFT and FFT transforms with an example.

5. Attempt **any two** : **(10×2=20)**
   1) Define and explain dilation and erosion operations with their significance.
   2) List various image reconstruction techniques in CT scanning and explain any one in detail.
   3) Explain all image compression techniques in detail with two examples.

Set Q

Set Q

SLR-EP – 309

Seat No.	

Set **R**

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Image having gradient pixels is called
   a) Sharp image b) Blue image
   c) Gradient image d) Binary image

2) Sobel is better than Prewitt in image
   a) Sharpening b) Blurring
   c) Smoothing d) Contrast

3) Digitizing image intensity amplitude is called
   a) Sampling b) Quantization
   c) Framing d) Both (a) and (b)

4) Histogram equalization make image intensity changes
   a) Low b) High
   c) Visible d) Invisible

5) Simple way to compression is removing
   a) Data b) Superfluous data
   c) Information d) Meaningful data

6) Blurring attenuate the
   a) Pixels b) Points c) Cross gradient d) Intensity

7) Gradient magnitude images are more useful in
   a) Point detection b) Line detection
   c) Area detection d) Edge detection

P.T.O.

8) Sobel gradient is not that good for detecting of
   a) Horizontal lines b) Vertical lines
   c) Diagonal lines d) Edge

9) Smoothness reduced bricks of
   a) Pixels b) Constant intensities
   c) Point pixels d) Edges

10) Restoration cannot be done using
   a) Single projection b) Double projection
   c) Triple projection d) Octa projection

11) Gaussian noise is referred to as
   a) red noise b) black noise c) white noise d) normal noise

12) One that is not a type of noise is
   a) Rayleigh noise b) Gamma noise
   c) Block noise d) Exponential noise

13) In bit plane slicing 8 bit image will have
   a) 6 planes b) 7 planes c) 8 planes d) 9 planes

14) Pixels are digital number that are composed of
   a) Color b) Intensity levels c) Dots d) Bits

15) Color of an object is determined by light
   a) Refracted b) Transmitted c) Reflected d) Absorbed

16) Compressed image can be recovered back by image
   a) Enhancement b) Decompression
   c) Contrast d) Equalization

17) Every run length pair introduce new
   a) Pixels b) Matrix c) Frames d) Intensity

18) Replication of pixels is called
   a) Coding redundancy b) Spatial redundancy
   c) Temporal redundancy d) Both (b) and (c)

19) For point detection we use
   a) First derivative b) Second derivative
   c) Third derivative d) Both (a) and (b)

20) First derivatives in image segmentation produces
   a) Thick edges b) Thin edges
   c) Fine edges d) Rough edges

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SLR-EP – 309

Seat No.	

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Define and explain sampling and quantization with each one example.
   2) Discuss the significance of chain coding with its application.
   3) Define and differentiate between point operation and neighbourhood operation.
   4) Define Gaussian noise and salt pepper noise.
   5) Mention various properties of 2D-DFT in detail.

3. Attempt **any two** : **(10×2=20)**
   1) Explain following image enhancement technique and mention their applications.
      a) Contrast stretching b) Log trasformation
   2) Explain region based segmentation methods in detail.
   3) Define and discuss various blurring and ringing effects. How they can be avoided ?

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain opening and closing operation in detail with each of example.
   2) Explain concept of skeletonization and mention its advantages.
   3) Define moments and explain its importance in image processing.
   4) Explain HIT and MISS function and their role in image processing.
   5) Differentiate between DFT and FFT transforms with an example.

5. Attempt **any two** : **(10×2=20)**
   1) Define and explain dilation and erosion operations with their significance.
   2) List various image reconstruction techniques in CT scanning and explain any one in detail.
   3) Explain all image compression techniques in detail with two examples.

Set R

Set R

SLR-EP – 309

Seat No.	

Set **S**

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Compressed image can be recovered back by image
   a) Enhancement b) Decompression
   c) Contrast d) Equalization

2) Every run length pair introduce new
   a) Pixels b) Matrix c) Frames d) Intensity

3) Replication of pixels is called
   a) Coding redundancy b) Spatial redundancy
   c) Temporal redundancy d) Both (b) and (c)

4) For point detection we use
   a) First derivative b) Second derivative
   c) Third derivative d) Both (a) and (b)

5) First derivatives in image segmentation produces
   a) Thick edges b) Thin edges
   c) Fine edges d) Rough edges

6) Image having gradient pixels is called
   a) Sharp image b) Blue image
   c) Gradient image d) Binary image

7) Sobel is better than Prewitt in image
   a) Sharpening b) Blurring
   c) Smoothing d) Contrast

P.T.O.

8) Digitizing image intensity amplitude is called
   a) Sampling b) Quantization
   c) Framing d) Both (a) and (b)

9) Histogram equalization make image intensity changes
   a) Low b) High
   c) Visible d) Invisible

10) Simple way to compression is removing
   a) Data b) Superfluous data
   c) Information d) Meaningful data

11) Blurring attenuate the
   a) Pixels b) Points
   c) Cross gradient d) Intensity

12) Gradient magnitude images are more useful in
   a) Point detection b) Line detection
   c) Area detection d) Edge detection

13) Sobel gradient is not that good for detecting of
   a) Horizontal lines b) Vertical lines
   c) Diagonal lines d) Edge

14) Smoothness reduced bricks of
   a) Pixels b) Constant intensities
   c) Point pixels d) Edges

15) Restoration cannot be done using
   a) Single projection b) Double projection
   c) Triple projection d) Octa projection

16) Gaussian noise is referred to as
   a) red noise b) black noise c) white noise d) normal noise

17) One that is not a type of noise is
   a) Rayleigh noise b) Gamma noise
   c) Block noise d) Exponential noise

18) In bit plane slicing 8 bit image will have
   a) 6 planes b) 7 planes c) 8 planes d) 9 planes

19) Pixels are digital number that are composed of
   a) Color b) Intensity levels c) Dots d) Bits

20) Color of an object is determined by light
   a) Refracted b) Transmitted c) Reflected d) Absorbed

———————

SLR-EP – 309

Seat No.	

B.E. (Biomedical Engineering) (Part – I) Examination, 2016
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** : **(4×5=20)**
   1) Define and explain sampling and quantization with each one example.
   2) Discuss the significance of chain coding with its application.
   3) Define and differentiate between point operation and neighbourhood operation.
   4) Define Gaussian noise and salt pepper noise.
   5) Mention various properties of 2D-DFT in detail.

3. Attempt **any two** : **(10×2=20)**
   1) Explain following image enhancement technique and mention their applications.
      a) Contrast stretching b) Log trasformation
   2) Explain region based segmentation methods in detail.
   3) Define and discuss various blurring and ringing effects. How they can be avoided ?

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain opening and closing operation in detail with each of example.
   2) Explain concept of skeletonization and mention its advantages.
   3) Define moments and explain its importance in image processing.
   4) Explain HIT and MISS function and their role in image processing.
   5) Differentiate between DFT and FFT transforms with an example.

5. Attempt **any two** : **(10×2=20)**
   1) Define and explain dilation and erosion operations with their significance.
   2) List various image reconstruction techniques in CT scanning and explain any one in detail.
   3) Explain all image compression techniques in detail with two examples.

Set S

Set S

SLR-EP – 310

Seat No.	

Set P

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
HOSPITAL MANAGEMENT

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose correct answer : **(1×20=20)**

1) A good health triad does not include
   a) Physical status b) Social status
   c) Mental status d) Economic status

2) All except one is the output indicator of hospital system
   a) Patient satisfactor b) Public relation
   c) Quality of care d) Machines

3) Supportive services of the hospital includes all except _____ service.
   a) Pharmacy b) Laboratory c) House keeping d) Laundry

4) _____ is not a basis of classification of hospital.
   a) Speciality b) Functional c) Size d) Shape

5) The function of the OPD includes
   a) promotion of health b) training of medical and nursing staff
   c) social search d) all the above

6) "Shopping window" of a hospital is
   a) Operation theater b) ICU
   c) OPD d) Cafeteria

7) _____ is the skeleton of organization.
   a) Organizational function b) Organization structure
   c) Decentralization d) Co-ordination

P.T.O.

8) _____ are not part of hospital services.
   a) Essential services b) Additional services
   c) Utility services d) Administrator services

9) _____ is the best suited for walls end ceiling of OT.
   a) Ceramic tiles b) Terrazo tiles
   c) Glaze tiles d) Situ mosaic finish

10) Air change requirement/hour in OT is _____ %.
   a) 10 – 12 b) 16 – 18 c) 28 – 30 d) 58 – 60

11) Concept behind changing the role of hospital from indoor care to outpatient care includes all EXCEPT
   a) rising cost of hospital care b) shortage of patient bed
   c) economic importance d) increase in patient beds

12) Capability to identify who has the disease is done by measuring
   a) validity b) sensitivity c) specificity d) repeatability

13) Preventive maintenance is carried out to reduce the failure to a absolute
   a) moderate b) minimum c) maximum d) nil

14) _____ of health is a function of OPD.
   a) promotion b) restriction c) supporting d) none of above

15) PICU is related to _____ treatments.
   a) adult b) neonatal c) child d) aged

16) To create a good organization relation is function of _____ department of hospital.
   a) Nursing b) CEO c) HR d) Administrator

17) Functional nursing is method of providing
   a) patient care b) caring of records
   c) care management d) equipment care

18) _____ is the element of directing in hospital.
   a) Evaluation b) Discipline c) Planning d) Delegation

19) _____ is the color code of the bag used in hospitals to dispose off human anatomical wastes such as body parts.
   a) Yellow b) Black c) Red d) Blue

20) Heart lung machine is apart of _____ department.
   a) Cathlab b) CCU c) Cardiac OT d) ICCU

_____

SLR-EP – 310

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
HOSPITAL MANAGEMENT

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** questions. **(4×5=20)**

   1) Explain various roles of hospital administrator while handling hospital in detail.
   2) Discuss the importance of time management and motivation in hospital management.
   3) Explain the role of CEO in hospital administration.
   4) Mention various types of medical gases used in hospital and explain importance of each.
   5) Discuss working of hospital information system in detail with an example.

3. Attempt **any two** questions. **(10×2=20)**

   1) Mention various duties of Biomedical engineer in hospital and also mention its contribution in R & D field.
   2) Draw and explain criteria for location, space requirement for designing OT.
   3) Explain procedure and precautions that needed while installing radiology equipment.

SECTION – II

4. Attempt **any four** questions. **(4×5=20)**

   1) Discuss the uses, procedures and advantages of keeping medical records of hospital.
   2) Explain the various uses of computers in the hospital.
   3) Draw and explain the structure and function of blood bank.
   4) Explain the concept, need and ways of infection control in hospital.
   5) Discuss about waste management in a hospital.

Set P

5. Attempt **any two** questions. **(10×2=20)**

   1) Explain the structure and function of following departments :
      a) Medical social service
      b) CSSD.
   2) Discuss various functions and importance of engineering and maintenance services in hospital.
   3) Draw layout and explain functions of following departments :
      a) Radiology
      b) Operation theater and nursing service.

SLR-EP – 310

Seat No.	

Set Q

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
HOSPITAL MANAGEMENT

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose correct answer : **(1×20=20)**

1) To create a good organization relation is function of _____ department of hospital.
a) Nursing b) CEO c) HR d) Administrator

2) Functional nursing is method of providing
a) patient care b) caring of records
c) care management d) equipment care

3) _____ is the element of directing in hospital.
a) Evaluation b) Discipline c) Planning d) Delegation

4) _____ is the color code of the bag used in hospitals to dispose off human anatomical wastes such as body parts.
a) Yellow b) Black c) Red d) Blue

5) Heart lung machine is apart of _____ department.
a) Cathlab b) CCU c) Cardiac OT d) ICCU

6) A good health triad does not include
a) Physical status b) Social status
c) Mental status d) Economic status

7) All except one is the output indicator of hospital system
a) Patient satisfactor b) Public relation
c) Quality of care d) Machines

P.T.O.

8) Supportive services of the hospital includes all except _____ service.
a) Pharmacy b) Laboratory c) House keeping d) Laundry

9) _____ is not a basis of classification of hospital.
a) Speciality b) Functional c) Size d) Shape

10) The function of the OPD includes
a) promotion of health b) training of medical and nursing staff
c) social search d) all the above

11) "Shopping window" of a hospital is
a) Operation theater b) ICU
c) OPD d) Cafeteria

12) _____ is the skeleton of organization.
a) Organizational function b) Organization structure
c) Decentralization d) Co-ordination

13) _____ are not part of hospital services.
a) Essential services b) Additional services
c) Utility services d) Administrator services

14) _____ is the best suited for walls end ceiling of OT.
a) Ceramic tiles b) Terrazo tiles
c) Glaze tiles d) Situ mosaic finish

15) Air change requirement/hour in OT is _____ %.
a) 10 – 12 b) 16 – 18 c) 28 – 30 d) 58 – 60

16) Concept behind changing the role of hospital from indoor care to outpatient care includes all EXCEPT
a) rising cost of hospital care b) shortage of patient bed
c) economic importance d) increase in patient beds

17) Capability to identify who has the disease is done by measuring
a) validity b) sensitivity c) specificity d) repeatability

18) Preventive maintenance is carried out to reduce the failure to a absolute
a) moderate b) minimum c) maximum d) nil

19) _____ of health is a function of OPD.
a) promotion b) restriction c) supporting d) none of above

20) PICU is related to _____ treatments.
a) adult b) neonatal c) child d) aged

_____

SLR-EP – 310

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
HOSPITAL MANAGEMENT

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** questions. **(4×5=20)**
   1) Explain various roles of hospital administrator while handling hospital in detail.
   2) Discuss the importance of time management and motivation in hospital management.
   3) Explain the role of CEO in hospital administration.
   4) Mention various types of medical gases used in hospital and explain importance of each.
   5) Discuss working of hospital information system in detail with an example.

3. Attempt **any two** questions. **(10×2=20)**
   1) Mention various duties of Biomedical engineer in hospital and also mention its contribution in R & D field.
   2) Draw and explain criteria for location, space requirement for designing OT.
   3) Explain procedure and precautions that needed while installing radiology equipment.

SECTION – II

4. Attempt **any four** questions. **(4×5=20)**
   1) Discuss the uses, procedures and advantages of keeping medical records of hospital.
   2) Explain the various uses of computers in the hospital.
   3) Draw and explain the structure and function of blood bank.
   4) Explain the concept, need and ways of infection control in hospital.
   5) Discuss about waste management in a hospital.

Set Q

5. Attempt **any two** questions. **(10×2=20)**

   1) Explain the structure and function of following departments :
      a) Medical social service
      b) CSSD.
   2) Discuss various functions and importance of engineering and maintenance services in hospital.
   3) Draw layout and explain functions of following departments :
      a) Radiology
      b) Operation theater and nursing service.

_____

SLR-EP – 310

Seat No.	

Set R

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
HOSPITAL MANAGEMENT

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose correct answer : **(1×20=20)**

1) Concept behind changing the role of hospital from indoor care to outpatient care includes all EXCEPT
   a) rising cost of hospital care b) shortage of patient bed
   c) economic importance d) increase in patient beds

2) Capability to identify who has the disease is done by measuring
   a) validity b) sensitivity c) specificity d) repeatability

3) Preventive maintenance is carried out to reduce the failure to a absolute
   a) moderate b) minimum c) maximum d) nil

4) _____ of health is a function of OPD.
   a) promotion b) restriction c) supporting d) none of above

5) PICU is related to _____ treatments.
   a) adult b) neonatal c) child d) aged

6) To create a good organization relation is function of _____ department of hospital.
   a) Nursing b) CEO c) HR d) Administrator

7) Functional nursing is method of providing
   a) patient care b) caring of records
   c) care management d) equipment care

8) _____ is the element of directing in hospital.
   a) Evaluation b) Discipline c) Planning d) Delegation

P.T.O.

9) _____ is the color code of the bag used in hospitals to dispose off human anatomical wastes such as body parts.
a) Yellow b) Black c) Red d) Blue

10) Heart lung machine is apart of _____ department.
a) Cathlab b) CCU c) Cardiac OT d) ICCU

11) A good health triad does not include
a) Physical status b) Social status
c) Mental status d) Economic status

12) All except one is the output indicator of hospital system
a) Patient satisfactor b) Public relation
c) Quality of care d) Machines

13) Supportive services of the hospital includes all except _____ service.
a) Pharmacy b) Laboratory c) House keeping d) Laundry

14) _____ is not a basis of classification of hospital.
a) Speciality b) Functional c) Size d) Shape

15) The function of the OPD includes
a) promotion of health b) training of medical and nursing staff
c) social search d) all the above

16) "Shopping window" of a hospital is
a) Operation theater b) ICU
c) OPD d) Cafeteria

17) _____ is the skeleton of organization.
a) Organizational function b) Organization structure
c) Decentralization d) Co-ordination

18) _____ are not part of hospital services.
a) Essential services b) Additional services
c) Utility services d) Administrator services

19) _____ is the best suited for walls end ceiling of OT.
a) Ceramic tiles b) Terrazo tiles
c) Glaze tiles d) Situ mosaic finish

20) Air change requirement/hour in OT is _____ %.
a) 10 – 12 b) 16 – 18 c) 28 – 30 d) 58 – 60

_____

SLR-EP – 310

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
HOSPITAL MANAGEMENT

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** questions. **(4×5=20)**
   1) Explain various roles of hospital administrator while handling hospital in detail.
   2) Discuss the importance of time management and motivation in hospital management.
   3) Explain the role of CEO in hospital administration.
   4) Mention various types of medical gases used in hospital and explain importance of each.
   5) Discuss working of hospital information system in detail with an example.

3. Attempt **any two** questions. **(10×2=20)**
   1) Mention various duties of Biomedical engineer in hospital and also mention its contribution in R & D field.
   2) Draw and explain criteria for location, space requirement for designing OT.
   3) Explain procedure and precautions that needed while installing radiology equipment.

SECTION – II

4. Attempt **any four** questions. **(4×5=20)**
   1) Discuss the uses, procedures and advantages of keeping medical records of hospital.
   2) Explain the various uses of computers in the hospital.
   3) Draw and explain the structure and function of blood bank.
   4) Explain the concept, need and ways of infection control in hospital.
   5) Discuss about waste management in a hospital.

Set R

5. Attempt **any two** questions. **(10×2=20)**

   1) Explain the structure and function of following departments :
      a) Medical social service
      b) CSSD.
   2) Discuss various functions and importance of engineering and maintenance services in hospital.
   3) Draw layout and explain functions of following departments :
      a) Radiology
      b) Operation theater and nursing service.

_____

SLR-EP – 310

Seat No.	

Set S

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
HOSPITAL MANAGEMENT

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose correct answer : **(1×20=20)**

1) "Shopping window" of a hospital is
   a) Operation theater b) ICU
   c) OPD d) Cafeteria

2) _____ is the skeleton of organization.
   a) Organizational function b) Organization structure
   c) Decentralization d) Co-ordination

3) _____ are not part of hospital services.
   a) Essential services b) Additional services
   c) Utility services d) Administrator services

4) _____ is the best suited for walls end ceiling of OT.
   a) Ceramic tiles b) Terrazo tiles
   c) Glaze tiles d) Situ mosaic finish

5) Air change requirement/hour in OT is _____ %.
   a) 10 – 12 b) 16 – 18 c) 28 – 30 d) 58 – 60

6) Concept behind changing the role of hospital from indoor care to outpatient care includes all EXCEPT
   a) rising cost of hospital care b) shortage of patient bed
   c) economic importance d) increase in patient beds

7) Capability to identify who has the disease is done by measuring
   a) validity b) sensitivity c) specificity d) repeatability

P.T.O.

8) Preventive maintenance is carried out to reduce the failure to a absolute
   a) moderate b) minimum c) maximum d) nil

9) _____ of health is a function of OPD.
   a) promotion b) restriction c) supporting d) none of above

10) PICU is related to _____ treatments.
   a) adult b) neonatal c) child d) aged

11) To create a good organization relation is function of _____ department of hospital.
   a) Nursing b) CEO c) HR d) Administrator

12) Functional nursing is method of providing
   a) patient care b) caring of records
   c) care management d) equipment care

13) _____ is the element of directing in hospital.
   a) Evaluation b) Discipline c) Planning d) Delegation

14) _____ is the color code of the bag used in hospitals to dispose off human anatomical wastes such as body parts.
   a) Yellow b) Black c) Red d) Blue

15) Heart lung machine is apart of _____ department.
   a) Cathlab b) CCU c) Cardiac OT d) ICCU

16) A good health triad does not include
   a) Physical status b) Social status
   c) Mental status d) Economic status

17) All except one is the output indicator of hospital system
   a) Patient satisfactor b) Public relation
   c) Quality of care d) Machines

18) Supportive services of the hospital includes all except _____ service.
   a) Pharmacy b) Laboratory c) House keeping d) Laundry

19) _____ is not a basis of classification of hospital.
   a) Speciality b) Functional c) Size d) Shape

20) The function of the OPD includes
   a) promotion of health b) training of medical and nursing staff
   c) social search d) all the above

_____

SLR-EP – 310

Seat No.	

B.E. (Part – I) (Biomedical Engineering) Examination, 2016
HOSPITAL MANAGEMENT

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four** questions. **(4×5=20)**

   1) Explain various roles of hospital administrator while handling hospital in detail.
   2) Discuss the importance of time management and motivation in hospital management.
   3) Explain the role of CEO in hospital administration.
   4) Mention various types of medical gases used in hospital and explain importance of each.
   5) Discuss working of hospital information system in detail with an example.

3. Attempt **any two** questions. **(10×2=20)**

   1) Mention various duties of Biomedical engineer in hospital and also mention its contribution in R & D field.
   2) Draw and explain criteria for location, space requirement for designing OT.
   3) Explain procedure and precautions that needed while installing radiology equipment.

SECTION – II

4. Attempt **any four** questions. **(4×5=20)**

   1) Discuss the uses, procedures and advantages of keeping medical records of hospital.
   2) Explain the various uses of computers in the hospital.
   3) Draw and explain the structure and function of blood bank.
   4) Explain the concept, need and ways of infection control in hospital.
   5) Discuss about waste management in a hospital.

Set S

5. Attempt **any two** questions. **(10×2=20)**

   1) Explain the structure and function of following departments :
      a) Medical social service
      b) CSSD.
   2) Discuss various functions and importance of engineering and maintenance services in hospital.
   3) Draw layout and explain functions of following departments :
      a) Radiology
      b) Operation theater and nursing service.

_____

SLR-EP – 311

Seat No.	

Set **P**

B.E. (Biomedical Engg.) (Part – II) (Old) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/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 suitable data ***wherever*** *required.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The relative attenuation coefficient is expressed in _____ units.
a) Hounsfield b) Rontgen c) RAD d) REM

2) _____ is the diameter of the body region are being imaged.
a) Field of view b) Field of collimator
c) Field of detector d) Field of imaging

3) Pixel Size = $\frac{?}{\text{Matrix size}}$
a) Field of view b) Field of collimator
c) Field of detector d) Field of imaging

4) Second generation of CT scan called as
a) Translate-rotate b) Translate-translate
c) Rotate-fixed d) Fixed-rotate

5) Fourth generation of CT scan called as
a) Translate-rotate b) Translate-translate
c) Rotate-fixed d) Fixed-rotate

6) The purpose of CT scanning is to _____ a picture for diagnosis.
a) Reconstruct b) Manuplate c) Restore d) View

7) The nuclei have a resonant or _____ frequency determined by their localized magnetic field strength.
a) Rotating b) Double c) Spinning d) Larmor

8) The excited proton returns to decay that in _____ in nature in MRI.
a) Linear b) Nonlinear c) Longitudinal d) Exponential

9) T1 of MRI referred to the _____ relaxation processes.
a) Spin-spin b) Spin-lattice c) Spin-echo d) Lattice echo

10) T2 of MRI refers to the _____ relaxation processes.
a) Spin-spin b) Spin-lattice c) Spin-echo d) Lattice echo

11) A gradient system produces _____ varying magnetic fields of controlled spatial nonuniformity.
a) Frequency b) Spin c) Time d) Signal

12) The CT gantry look like a
a) Round b) Spiral c) Doughnut d) Circular

13) MRI systems provide highly detailed images of _____ in the body.
a) Tissues b) Cells c) CSF d) Bones

14) Unlike CT, NMR imaging requires no _____ part.
a) Stable b) Moving c) Unstable d) Nonmovable

15) NMR imaging parameters are affected by _____ bonding.
a) Chemical b) Physical c) Electrical d) Ions

16) Spatial _____ is the ability to discriminate between adjacent objects.
a) Density b) Intensity c) Resolution d) Sensitivity

17) _____ artifacts are caused by the polychromatic nature of the x-ray beam.
a) Ring b) Beam hardening
c) Motion d) None of above

18) CT number depends upon
a) Beam hardening b) Tissue structure
c) m As d) Tube voltage

19) Multi slice CT improves the utilization of the
a) x ray tube output b) Collimators
c) Bow tie filter d) ADC

20) Image noise is not affected by
a) Section thickness b) Reconstruction algorithm
c) m As d) Display setting

_____

SLR-EP – 311

Seat No.	

B.E. (Biomedical Engg.) (Part – II) (Old) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Discuss any 5 clinical applications of CT.

2) What is the CT number of bone whose attenuation coefficient is 0.38 cm^{-1} and attenuation coefficient of water is 0.195 ? (Magnification constant 1000).

3) Draw and explain first and second generations of CT scan.

4) State applications of MR spectroscopy.

5) Define the term artifact. Explain any 3 artifacts that arise during imaging.

3. Attempt **any two** : **(2×10=20)**

1) Describe the third and fourth generations of CT with suitable diagrams. Discuss the advantages of spiral CT over conventional CT.

2) Explain any 2 parameters with respect to Magnetic Resonance Spectroscopy :

   1) Chemical shift

   2) PRESS sequence

   3) STEAM sequence

3) List various image reconstruction techniques used in CT imaging and explain Fourier reconstruction techniques with one example.

Set P

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain the working principle of magnetic resonance imaging.
   2) Define angiography and explain the role of CT in imaging process.
   3) Explain biological effects of MRI imaging.
   4) Explain working of Electrical Impedance Tomography in short.
   5) How do the magnetic field gradient coils help in the production of MRI image.

5. Attempt **any two** : **(2×10=20)**
   1) Explain the following MRI parameters :
      i) Larmor frequency
      ii) Free induction decay
   2) Define Hybrid Imaging and its applications. Also explain any one hybrid imaging technique in detail.
   3) Discuss the construction and detectors used in MDCET. Explain how MDCT is superior over other generations of CT.

SLR-EP – 311

Seat No.	

Set Q

B.E. (Biomedical Engg.) (Part – II) (Old) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/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 suitable data **wherever** required.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Spatial _____ is the ability to discriminate between adjacent objects.
a) Density b) Intensity c) Resolution d) Sensitivity

2) _____ artifacts are caused by the polychromatic nature of the x-ray beam.
a) Ring b) Beam hardening
c) Motion d) None of above

3) CT number depends upon
a) Beam hardening b) Tissue structure
c) m As d) Tube voltage

4) Multi slice CT improves the utilization of the
a) x ray tube output b) Collimators
c) Bow tie filter d) ADC

5) Image noise is not affected by
a) Section thickness b) Reconstruction algorithm
c) m As d) Display setting

6) The relative attenuation coefficient is expressed in _____ units.
a) Hounsfield b) Rontgen c) RAD d) REM

7) _____ is the diameter of the body region are being imaged.
a) Field of view b) Field of collimator
c) Field of detector d) Field of imaging

P.T.O.

8) Pixel Size = $\frac{?}{\text{Matrix size}}$

a) Field of view b) Field of collimator
c) Field of detector d) Field of imaging

9) Second generation of CT scan called as
a) Translate-rotate b) Translate-translate
c) Rotate-fixed d) Fixed-rotate

10) Fourth generation of CT scan called as
a) Translate-rotate b) Translate-translate
c) Rotate-fixed d) Fixed-rotate

11) The purpose of CT scanning is to _____ a picture for diagnosis.
a) Reconstruct b) Manuplate c) Restore d) View

12) The nuclei have a resonant or _____ frequency determined by their localized magnetic field strength.
a) Rotating b) Double c) Spinning d) Larmor

13) The excited proton returns to decay that in _____ in nature in MRI.
a) Linear b) Nonlinear c) Longitudinal d) Exponential

14) T1 of MRI referred to the _____ relaxation processes.
a) Spin-spin b) Spin-lattice c) Spin-echo d) Lattice echo

15) T2 of MRI refers to the _____ relaxation processes.
a) Spin-spin b) Spin-lattice c) Spin-echo d) Lattice echo

16) A gradient system produces _____ varying magnetic fields of controlled spatial nonuniformity.
a) Frequency b) Spin c) Time d) Signal

17) The CT gantry look like a
a) Round b) Spiral c) Doughnut d) Circular

18) MRI systems provide highly detailed images of _____ in the body.
a) Tissues b) Cells c) CSF d) Bones

19) Unlike CT, NMR imaging requires no _____ part.
a) Stable b) Moving c) Unstable d) Nonmovable

20) NMR imaging parameters are affected by _____ bonding.
a) Chemical b) Physical c) Electrical d) Ions

_____

SLR-EP – 311

Seat No.	

B.E. (Biomedical Engg.) (Part – II) (Old) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Discuss any 5 clinical applications of CT.

2) What is the CT number of bone whose attenuation coefficient is 0.38 cm^{-1} and attenuation coefficient of water is 0.195 ? (Magnification constant 1000).

3) Draw and explain first and second generations of CT scan.

4) State applications of MR spectroscopy.

5) Define the term artifact. Explain any 3 artifacts that arise during imaging.

3. Attempt **any two** : **(2×10=20)**

1) Describe the third and fourth generations of CT with suitable diagrams. Discuss the advantages of spiral CT over conventional CT.

2) Explain any 2 parameters with respect to Magnetic Resonance Spectroscopy :

   1) Chemical shift

   2) PRESS sequence

   3) STEAM sequence

3) List various image reconstruction techniques used in CT imaging and explain Fourier reconstruction techniques with one example.

Set Q

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain the working principle of magnetic resonance imaging.
   2) Define angiography and explain the role of CT in imaging process.
   3) Explain biological effects of MRI imaging.
   4) Explain working of Electrical Impedance Tomography in short.
   5) How do the magnetic field gradient coils help in the production of MRI image.

5. Attempt **any two** : **(2×10=20)**
   1) Explain the following MRI parameters :
      i) Larmor frequency
      ii) Free induction decay
   2) Define Hybrid Imaging and its applications. Also explain any one hybrid imaging technique in detail.
   3) Discuss the construction and detectors used in MDCET. Explain how MDCT is superior over other generations of CT.

SLR-EP – 311

Seat No.	

Set **R**

B.E. (Biomedical Engg.) (Part – II) (Old) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/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 suitable data **wherever** required.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) A gradient system produces _____ varying magnetic fields of controlled spatial nonuniformity.
a) Frequency b) Spin c) Time d) Signal

2) The CT gantry look like a
a) Round b) Spiral c) Doughnut d) Circular

3) MRI systems provide highly detailed images of _____ in the body.
a) Tissues b) Cells c) CSF d) Bones

4) Unlike CT, NMR imaging requires no _____ part.
a) Stable b) Moving c) Unstable d) Nonmovable

5) NMR imaging parameters are affected by _____ bonding.
a) Chemical b) Physical c) Electrical d) Ions

6) Spatial _____ is the ability to discriminate between adjacent objects.
a) Density b) Intensity c) Resolution d) Sensitivity

7) _____ artifacts are caused by the polychromatic nature of the x-ray beam.
a) Ring b) Beam hardening
c) Motion d) None of above

8) CT number depends upon
a) Beam hardening b) Tissue structure
c) m As d) Tube voltage

P.T.O.

9) Multi slice CT improves the utilization of the
   a) x ray tube output b) Collimators
   c) Bow tie filter d) ADC

10) Image noise is not affected by
   a) Section thickness b) Reconstruction algorithm
   c) m As d) Display setting

11) The relative attenuation coefficient is expressed in _____ units.
   a) Hounsfield b) Rontgen c) RAD d) REM

12) _____ is the diameter of the body region are being imaged.
   a) Field of view b) Field of collimator
   c) Field of detector d) Field of imaging

13) Pixel Size = $\frac{?}{\text{Matrix size}}$
   a) Field of view b) Field of collimator
   c) Field of detector d) Field of imaging

14) Second generation of CT scan called as
   a) Translate-rotate b) Translate-translate
   c) Rotate-fixed d) Fixed-rotate

15) Fourth generation of CT scan called as
   a) Translate-rotate b) Translate-translate
   c) Rotate-fixed d) Fixed-rotate

16) The purpose of CT scanning is to _____ a picture for diagnosis.
   a) Reconstruct b) Manuplate c) Restore d) View

17) The nuclei have a resonant or _____ frequency determined by their localized magnetic field strength.
   a) Rotating b) Double c) Spinning d) Larmor

18) The excited proton returns to decay that in _____ in nature in MRI.
   a) Linear b) Nonlinear c) Longitudinal d) Exponential

19) T1 of MRI referred to the _____ relaxation processes.
   a) Spin-spin b) Spin-lattice c) Spin-echo d) Lattice echo

20) T2 of MRI refers to the _____ relaxation processes.
   a) Spin-spin b) Spin-lattice c) Spin-echo d) Lattice echo

_____

SLR-EP – 311

Seat No.	

B.E. (Biomedical Engg.) (Part – II) (Old) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Discuss any 5 clinical applications of CT.

2) What is the CT number of bone whose attenuation coefficient is 0.38 cm^{-1} and attenuation coefficient of water is 0.195 ? (Magnification constant 1000).

3) Draw and explain first and second generations of CT scan.

4) State applications of MR spectroscopy.

5) Define the term artifact. Explain any 3 artifacts that arise during imaging.

3. Attempt **any two** : **(2×10=20)**

1) Describe the third and fourth generations of CT with suitable diagrams. Discuss the advantages of spiral CT over conventional CT.

2) Explain any 2 parameters with respect to Magnetic Resonance Spectroscopy :

   1) Chemical shift

   2) PRESS sequence

   3) STEAM sequence

3) List various image reconstruction techniques used in CT imaging and explain Fourier reconstruction techniques with one example.

Set R

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain the working principle of magnetic resonance imaging.
   2) Define angiography and explain the role of CT in imaging process.
   3) Explain biological effects of MRI imaging.
   4) Explain working of Electrical Impedance Tomography in short.
   5) How do the magnetic field gradient coils help in the production of MRI image.

5. Attempt **any two** : **(2×10=20)**
   1) Explain the following MRI parameters :
      i) Larmor frequency
      ii) Free induction decay
   2) Define Hybrid Imaging and its applications. Also explain any one hybrid imaging technique in detail.
   3) Discuss the construction and detectors used in MDCET. Explain how MDCT is superior over other generations of CT.

SLR-EP – 311

Seat No.	

Set **S**

B.E. (Biomedical Engg.) (Part – II) (Old) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/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 suitable data ***wherever*** *required.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The purpose of CT scanning is to _____ a picture for diagnosis.
a) Reconstruct b) Manuplate c) Restore d) View

2) The nuclei have a resonant or _____ frequency determined by their localized magnetic field strength.
a) Rotating b) Double c) Spinning d) Larmor

3) The excited proton returns to decay that in _____ in nature in MRI.
a) Linear b) Nonlinear c) Longitudinal d) Exponential

4) T1 of MRI referred to the _____ relaxation processes.
a) Spin-spin b) Spin-lattice c) Spin-echo d) Lattice echo

5) T2 of MRI refers to the _____ relaxation processes.
a) Spin-spin b) Spin-lattice c) Spin-echo d) Lattice echo

6) A gradient system produces _____ varying magnetic fields of controlled spatial nonuniformity.
a) Frequency b) Spin c) Time d) Signal

7) The CT gantry look like a
a) Round b) Spiral c) Doughnut d) Circular

8) MRI systems provide highly detailed images of _____ in the body.
a) Tissues b) Cells c) CSF d) Bones

9) Unlike CT, NMR imaging requires no _____ part.
a) Stable b) Moving c) Unstable d) Nonmovable

10) NMR imaging parameters are affected by _____ bonding.
a) Chemical b) Physical c) Electrical d) Ions

11) Spatial _____ is the ability to discriminate between adjacent objects.
a) Density b) Intensity c) Resolution d) Sensitivity

12) _____ artifacts are caused by the polychromatic nature of the x-ray beam.
a) Ring b) Beam hardening
c) Motion d) None of above

13) CT number depends upon
a) Beam hardening b) Tissue structure
c) m As d) Tube voltage

14) Multi slice CT improves the utilization of the
a) x ray tube output b) Collimators
c) Bow tie filter d) ADC

15) Image noise is not affected by
a) Section thickness b) Reconstruction algorithm
c) m As d) Display setting

16) The relative attenuation coefficient is expressed in _____ units.
a) Hounsfield b) Rontgen c) RAD d) REM

17) _____ is the diameter of the body region are being imaged.
a) Field of view b) Field of collimator
c) Field of detector d) Field of imaging

18) Pixel Size = $\frac{?}{\text{Matrix size}}$
a) Field of view b) Field of collimator
c) Field of detector d) Field of imaging

19) Second generation of CT scan called as
a) Translate-rotate b) Translate-translate
c) Rotate-fixed d) Fixed-rotate

20) Fourth generation of CT scan called as
a) Translate-rotate b) Translate-translate
c) Rotate-fixed d) Fixed-rotate

_____

SLR-EP – 311

Seat No.	

B.E. (Biomedical Engg.) (Part – II) (Old) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Discuss any 5 clinical applications of CT.

2) What is the CT number of bone whose attenuation coefficient is 0.38 cm^{-1} and attenuation coefficient of water is 0.195 ? (Magnification constant 1000).

3) Draw and explain first and second generations of CT scan.

4) State applications of MR spectroscopy.

5) Define the term artifact. Explain any 3 artifacts that arise during imaging.

3. Attempt **any two** : **(2×10=20)**

1) Describe the third and fourth generations of CT with suitable diagrams. Discuss the advantages of spiral CT over conventional CT.

2) Explain any 2 parameters with respect to Magnetic Resonance Spectroscopy :

   1) Chemical shift

   2) PRESS sequence

   3) STEAM sequence

3) List various image reconstruction techniques used in CT imaging and explain Fourier reconstruction techniques with one example.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
   1) Explain the working principle of magnetic resonance imaging.
   2) Define angiography and explain the role of CT in imaging process.
   3) Explain biological effects of MRI imaging.
   4) Explain working of Electrical Impedance Tomography in short.
   5) How do the magnetic field gradient coils help in the production of MRI image.

5. Attempt **any two** : **(2×10=20)**
   1) Explain the following MRI parameters :
      i) Larmor frequency
      ii) Free induction decay
   2) Define Hybrid Imaging and its applications. Also explain any one hybrid imaging technique in detail.
   3) Discuss the construction and detectors used in MDCET. Explain how MDCT is superior over other generations of CT.

SLR-EP – 312

Seat No.	

Set **P**

B.E. (Bio-Medical) (Part – II) (Old) Examination, 2016
INSTALLATION, MAINTENANCE & SERVICING

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) The upper inlet in the ventilator is used for _____ pressure gas.
a) Low b) High c) Moderate d) All

2) In the ventilator the gas flows through _____ filter.
a) Bacteria b) Fiber c) Optical d) Liquid

3) The flow transducer on _____ side measures the gas flow to the patient.
a) Expiration b) Inspiration c) a) and b) d) None

4) The clause for ISO 9001-2008 is given as
a) Quality management system b) Quantity management system
c) Product realization d) a) and c)

5) The clause for NABH is given as
a) Information to patient b) Rights of patients and family
c) Quality investigation d) All

6) QCI is the
a) Quality and Certified Implementation b) Quality Control and Implementation
c) Quality Council of India d) None

7) All the sides of an X-ray machine chamber must be
a) 3" Thick b) 6" Thick c) 9" Thick d) 12" Thick

8) NICU stands for
a) Neonatal Intensive Care Unit b) Neuro Intensive Care Unit
c) Nephro Intensive Care Unit d) None

9) Periodic maintenance helps in reducing
a) Operational hazards b) Service cost
c) Equipment down time d) All

10) ALARA is
a) As Large As Recommended and Achievable
b) As Large As Reasonably Achievable
c) As Low As Reasonably Achievable
d) None

P.T.O.

11) In an electrolyte analyzer, each electrode has _____ Membrane, that undergoes a specific reaction with the corresponding ion.
a) Selective b) Ion selective c) Semi permeable d) Permeable

12) The electrolyte analyzer is equipped with a _____ interface and allows data to be exchanged with commercially available computer system.
a) parallel RS-232 b) series RS-232 c) parallel RS-230 d) series RS-230

13) A peristaltic pump of the electrolyte analyzer transports all samples and operating fluids _____ the instrument.
a) Inside b) Outside c) Upside d) Downside

14) In the defibrillator when the internal paddles are used the energy levels are limited to
a) 25J b) 50J c) 75J d) 100J

15) In the synchronized shock mode of the defibrillator the LED blinks during the detection of each
a) P Wave b) R Wave c) T Wave d) All

16) In the defibrillator when the internal paddles are used the default energy level on power up is set to
a) 10J b) 15J c) 20J d) 25J

17) CPAP stands for
a) Coronary Positive Airway Pressure
b) Continuous Pulmonary Airway Pressure
c) Continuous Positive Airway Pressure
d) Cardiac Positive Airway Pressure

18) Which one of the following is not an operational mode of ventilator ?
a) M mode b) CPAP mode c) S mode d) T mode

19) In the synchrony ventilator system the level of pressure support delivered is determined by
a) PS = EPAP – IPAP b) PS = IPAP + EPAP
c) PS = IPAP – EPAP d) PS = IPAP/EPAP

20) The Battery used in patient monitoring system is of
a) 3 Volts b) 6 Volts c) 9 Volts d) 12 Volts

_____

SLR-EP – 312

Seat No.	

B.E. (Bio-Medical) (Part – II) (Old) Examination, 2016
INSTALLATION, MAINTENANCE & SERVICING

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

II. Answer **any four** of the following : **(4×5=20)**

1) Discuss the role of biomedical engineer in a hospital.
2) Explain how a biomedical engineer is involved in R and D sector.
3) What care should be taken before the installation of bio medical equipment ?
4) What are the different medical gases ? Explain the use of these gases in the hospital.
5) What kind of tests and checkups must be performed before the final acceptance of the Instrument ?

III. Answer **any 2** of the following : **(2×10=20)**

1) Give the preinstallation techniques of the auto analyzer in detail.
2) Draw a labeled figure of the ventilator with all its specifications.
3) Explain the following modes of operation of the synchrony ventilator.
   a) CPAP mode b) S-mode c) S / T mode
   d) PC mode e) Timed mode.

IV. Answer **any four** of the following : **(4×5=20)**

1) Draw a labeled figure of the synchrony ventilator control panel.
2) Draw any five pictorial safety instructions of the electrosurgical unit and explain.
3) Explain what kind of location must be selected before the installation of the electrolyte analyzer.
4) What is an incubator ? Explain its significance.
5) Explain the trouble shooting methods.

V. Answer **any 2** of the following : **(2×10=20)**

1) What are the types of maintenance of bio medical equipments ? Explain what do you mean by preventive maintenance in detail.
2) Explain the operation theater with respect to the following :
   a) Location of OT
   b) Space requirement for OT
   c) Design of OT
3) a) Calibration procedure of pH meter.
   b) ISO and NABH certification.

Set P

Set P

SLR-EP – 312

Seat No.	

Set Q

B.E. (Bio-Medical) (Part – II) (Old) Examination, 2016
INSTALLATION, MAINTENANCE & SERVICING

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) In the defibrillator when the internal paddles are used the default energy level on power up is set to
a) 10J b) 15J c) 20J d) 25J

2) CPAP stands for
a) Coronary Positive Airway Pressure
b) Continuous Pulmonary Airway Pressure
c) Continuous Positive Airway Pressure
d) Cardiac Positive Airway Pressure

3) Which one of the following is not an operational mode of ventilator ?
a) M mode b) CPAP mode c) S mode d) T mode

4) In the synchrony ventilator system the level of pressure support delivered is determined by
a) PS = EPAP – IPAP b) PS = IPAP + EPAP
c) PS = IPAP – EPAP d) PS = IPAP/EPAP

5) The Battery used in patient monitoring system is of
a) 3 Volts b) 6 Volts c) 9 Volts d) 12 Volts

6) The upper inlet in the ventilator is used for _____ pressure gas.
a) Low b) High c) Moderate d) All

7) In the ventilator the gas flows through _____ filter.
a) Bacteria b) Fiber c) Optical d) Liquid

8) The flow transducer on _____ side measures the gas flow to the patient.
a) Expiration b) Inspiration c) a) and b) d) None

9) The clause for ISO 9001-2008 is given as
a) Quality management system b) Quantity management system
c) Product realization d) a) and c)

10) The clause for NABH is given as
a) Information to patient b) Rights of patients and family
c) Quality investigation d) All

P.T.O.

11) QCI is the
   a) Quality and Certified Implementation
   b) Quality Control and Implementation
   c) Quality Council of India
   d) None

12) All the sides of an X-ray machine chamber must be
   a) 3'' Thick
   b) 6'' Thick
   c) 9'' Thick
   d) 12'' Thick

13) NICU stands for
   a) Neonatal Intensive Care Unit
   b) Neuro Intensive Care Unit
   c) Nephro Intensive Care Unit
   d) None

14) Periodic maintenance helps in reducing
   a) Operational hazards
   b) Service cost
   c) Equipment down time
   d) All

15) ALARA is
   a) As Large As Recommended and Achievable
   b) As Large As Reasonably Achievable
   c) As Low As Reasonably Achievable
   d) None

16) In an electrolyte analyzer, each electrode has _____ Membrane, that undergoes a specific reaction with the corresponding ion.
   a) Selective
   b) Ion selective
   c) Semi permeable
   d) Permeable

17) The electrolyte analyzer is equipped with a _____ interface and allows data to be exchanged with commercially available computer system.
   a) parallel RS-232
   b) series RS-232
   c) parallel RS-230
   d) series RS-230

18) A peristaltic pump of the electrolyte analyzer transports all samples and operating fluids _____ the instrument.
   a) Inside
   b) Outside
   c) Upside
   d) Downside

19) In the defibrillator when the internal paddles are used the energy levels are limited to
   a) 25J
   b) 50J
   c) 75J
   d) 100J

20) In the synchronized shock mode of the defibrillator the LED blinks during the detection of each
   a) P Wave
   b) R Wave
   c) T Wave
   d) All

_____

SLR-EP – 312

Seat No.	

B.E. (Bio-Medical) (Part – II) (Old) Examination, 2016
INSTALLATION, MAINTENANCE & SERVICING

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

II. Answer **any four** of the following : **(4×5=20)**

1) Discuss the role of biomedical engineer in a hospital.
2) Explain how a biomedical engineer is involved in R and D sector.
3) What care should be taken before the installation of bio medical equipment ?
4) What are the different medical gases ? Explain the use of these gases in the hospital.
5) What kind of tests and checkups must be performed before the final acceptance of the Instrument ?

III. Answer **any 2** of the following : **(2×10=20)**

1) Give the preinstallation techniques of the auto analyzer in detail.
2) Draw a labeled figure of the ventilator with all its specifications.
3) Explain the following modes of operation of the synchrony ventilator.
   a) CPAP mode b) S-mode c) S / T mode
   d) PC mode e) Timed mode.

IV. Answer **any four** of the following : **(4×5=20)**

1) Draw a labeled figure of the synchrony ventilator control panel.
2) Draw any five pictorial safety instructions of the electrosurgical unit and explain.
3) Explain what kind of location must be selected before the installation of the electrolyte analyzer.
4) What is an incubator ? Explain its significance.
5) Explain the trouble shooting methods.

V. Answer **any 2** of the following : **(2×10=20)**

1) What are the types of maintenance of bio medical equipments ? Explain what do you mean by preventive maintenance in detail.
2) Explain the operation theater with respect to the following :
   a) Location of OT
   b) Space requirement for OT
   c) Design of OT
3) a) Calibration procedure of pH meter.
   b) ISO and NABH certification.

Set Q

Set Q

SLR-EP – 312

Seat No.	

Set R

B.E. (Bio-Medical) (Part – II) (Old) Examination, 2016
INSTALLATION, MAINTENANCE & SERVICING

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) In an electrolyte analyzer, each electrode has _____ Membrane, that undergoes a specific reaction with the corresponding ion.
a) Selective b) Ion selective c) Semi permeable d) Permeable

2) The electrolyte analyzer is equipped with a _____ interface and allows data to be exchanged with commercially available computer system.
a) parallel RS-232 b) series RS-232 c) parallel RS-230 d) series RS-230

3) A peristaltic pump of the electrolyte analyzer transports all samples and operating fluids _____ the instrument.
a) Inside b) Outside c) Upside d) Downside

4) In the defibrillator when the internal paddles are used the energy levels are limited to
a) 25J b) 50J c) 75J d) 100J

5) In the synchronized shock mode of the defibrillator the LED blinks during the detection of each
a) P Wave b) R Wave c) T Wave d) All

6) In the defibrillator when the internal paddles are used the default energy level on power up is set to
a) 10J b) 15J c) 20J d) 25J

7) CPAP stands for
a) Coronary Positive Airway Pressure
b) Continuous Pulmonary Airway Pressure
c) Continuous Positive Airway Pressure
d) Cardiac Positive Airway Pressure

8) Which one of the following is not an operational mode of ventilator ?
a) M mode b) CPAP mode c) S mode d) T mode

9) In the synchrony ventilator system the level of pressure support delivered is determined by
a) PS = EPAP – IPAP b) PS = IPAP + EPAP
c) PS = IPAP – EPAP d) PS = IPAP/EPAP

P.T.O.

10) The Battery used in patient monitoring system is of
a) 3 Volts b) 6 Volts c) 9 Volts d) 12 Volts

11) The upper inlet in the ventilator is used for _____ pressure gas.
a) Low b) High c) Moderate d) All

12) In the ventilator the gas flows through _____ filter.
a) Bacteria b) Fiber c) Optical d) Liquid

13) The flow transducer on _____ side measures the gas flow to the patient.
a) Expiration b) Inspiration c) a) and b) d) None

14) The clause for ISO 9001-2008 is given as
a) Quality management system b) Quantity management system
c) Product realization d) a) and c)

15) The clause for NABH is given as
a) Information to patient b) Rights of patients and family
c) Quality investigation d) All

16) QCI is the
a) Quality and Certified Implementation b) Quality Control and Implementation
c) Quality Council of India d) None

17) All the sides of an X-ray machine chamber must be
a) 3" Thick b) 6" Thick c) 9" Thick d) 12" Thick

18) NICU stands for
a) Neonatal Intensive Care Unit b) Neuro Intensive Care Unit
c) Nephro Intensive Care Unit d) None

19) Periodic maintenance helps in reducing
a) Operational hazards b) Service cost
c) Equipment down time d) All

20) ALARA is
a) As Large As Recommended and Achievable
b) As Large As Reasonably Achievable
c) As Low As Reasonably Achievable
d) None

_____

SLR-EP – 312

Seat No.	

B.E. (Bio-Medical) (Part – II) (Old) Examination, 2016
INSTALLATION, MAINTENANCE & SERVICING

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

II. Answer **any four** of the following : **(4×5=20)**

1) Discuss the role of biomedical engineer in a hospital.
2) Explain how a biomedical engineer is involved in R and D sector.
3) What care should be taken before the installation of bio medical equipment ?
4) What are the different medical gases ? Explain the use of these gases in the hospital.
5) What kind of tests and checkups must be performed before the final acceptance of the Instrument ?

III. Answer **any 2** of the following : **(2×10=20)**

1) Give the preinstallation techniques of the auto analyzer in detail.
2) Draw a labeled figure of the ventilator with all its specifications.
3) Explain the following modes of operation of the synchrony ventilator.
   a) CPAP mode b) S-mode c) S / T mode
   d) PC mode e) Timed mode.

IV. Answer **any four** of the following : **(4×5=20)**

1) Draw a labeled figure of the synchrony ventilator control panel.
2) Draw any five pictorial safety instructions of the electrosurgical unit and explain.
3) Explain what kind of location must be selected before the installation of the electrolyte analyzer.
4) What is an incubator ? Explain its significance.
5) Explain the trouble shooting methods.

V. Answer **any 2** of the following : **(2×10=20)**

1) What are the types of maintenance of bio medical equipments ? Explain what do you mean by preventive maintenance in detail.
2) Explain the operation theater with respect to the following :
   a) Location of OT
   b) Space requirement for OT
   c) Design of OT
3) a) Calibration procedure of pH meter.
   b) ISO and NABH certification.

Set R

Set R

SLR-EP – 312

Seat No.	

Set S

B.E. (Bio-Medical) (Part – II) (Old) Examination, 2016
INSTALLATION, MAINTENANCE & SERVICING

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) QCI is the
   a) Quality and Certified Implementation b) Quality Control and Implementation
   c) Quality Council of India d) None

2) All the sides of an X-ray machine chamber must be
   a) 3" Thick b) 6" Thick c) 9" Thick d) 12" Thick

3) NICU stands for
   a) Neonatal Intensive Care Unit b) Neuro Intensive Care Unit
   c) Nephro Intensive Care Unit d) None

4) Periodic maintenance helps in reducing
   a) Operational hazards b) Service cost
   c) Equipment down time d) All

5) ALARA is
   a) As Large As Recommended and Achievable
   b) As Large As Reasonably Achievable
   c) As Low As Reasonably Achievable
   d) None

6) In an electrolyte analyzer, each electrode has _____ Membrane, that undergoes a specific reaction with the corresponding ion.
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7) The electrolyte analyzer is equipped with a _____ interface and allows data to be exchanged with commercially available computer system.
   a) parallel RS-232 b) series RS-232 c) parallel RS-230 d) series RS-230

8) A peristaltic pump of the electrolyte analyzer transports all samples and operating fluids _____ the instrument.
   a) Inside b) Outside c) Upside d) Downside

9) In the defibrillator when the internal paddles are used the energy levels are limited to
   a) 25J b) 50J c) 75J d) 100J

P.T.O.

10) In the synchronized shock mode of the defibrillator the LED blinks during the detection of each
a) P Wave b) R Wave c) T Wave d) All

11) In the defibrillator when the internal paddles are used the default energy level on power up is set to
a) 10J b) 15J c) 20J d) 25J

12) CPAP stands for
a) Coronary Positive Airway Pressure
b) Continuous Pulmonary Airway Pressure
c) Continuous Positive Airway Pressure
d) Cardiac Positive Airway Pressure

13) Which one of the following is not an operational mode of ventilator ?
a) M mode b) CPAP mode c) S mode d) T mode

14) In the synchrony ventilator system the level of pressure support delivered is determined by
a) PS = EPAP – IPAP b) PS = IPAP + EPAP
c) PS = IPAP – EPAP d) PS = IPAP/EPAP

15) The Battery used in patient monitoring system is of
a) 3 Volts b) 6 Volts c) 9 Volts d) 12 Volts

16) The upper inlet in the ventilator is used for _____ pressure gas.
a) Low b) High c) Moderate d) All

17) In the ventilator the gas flows through _____ filter.
a) Bacteria b) Fiber c) Optical d) Liquid

18) The flow transducer on _____ side measures the gas flow to the patient.
a) Expiration b) Inspiration c) a) and b) d) None

19) The clause for ISO 9001-2008 is given as
a) Quality management system b) Quantity management system
c) Product realization d) a) and c)

20) The clause for NABH is given as
a) Information to patient b) Rights of patients and family
c) Quality investigation d) All

_____

SLR-EP – 312

Seat No.	

B.E. (Bio-Medical) (Part – II) (Old) Examination, 2016
INSTALLATION, MAINTENANCE & SERVICING

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

II. Answer **any four** of the following : **(4×5=20)**

1) Discuss the role of biomedical engineer in a hospital.
2) Explain how a biomedical engineer is involved in R and D sector.
3) What care should be taken before the installation of bio medical equipment ?
4) What are the different medical gases ? Explain the use of these gases in the hospital.
5) What kind of tests and checkups must be performed before the final acceptance of the Instrument ?

III. Answer **any 2** of the following : **(2×10=20)**

1) Give the preinstallation techniques of the auto analyzer in detail.
2) Draw a labeled figure of the ventilator with all its specifications.
3) Explain the following modes of operation of the synchrony ventilator.
   a) CPAP mode b) S-mode c) S / T mode
   d) PC mode e) Timed mode.

IV. Answer **any four** of the following : **(4×5=20)**

1) Draw a labeled figure of the synchrony ventilator control panel.
2) Draw any five pictorial safety instructions of the electrosurgical unit and explain.
3) Explain what kind of location must be selected before the installation of the electrolyte analyzer.
4) What is an incubator ? Explain its significance.
5) Explain the trouble shooting methods.

V. Answer **any 2** of the following : **(2×10=20)**

1) What are the types of maintenance of bio medical equipments ? Explain what do you mean by preventive maintenance in detail.
2) Explain the operation theater with respect to the following :
   a) Location of OT
   b) Space requirement for OT
   c) Design of OT
3) a) Calibration procedure of pH meter.
   b) ISO and NABH certification.

Set S

Set S

SLR-EP – 313

Seat No.	

Set P

B.E. (Biomedical Eng.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (Old)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) The _____ has 3-Dimensioned device structures.
   a) Biomedical Microsystems b) Electronics Systems
   c) Embedded Systems d) None of the above

2) Micro-gears are produced by _____ process.
   a) Soft-lithography b) Surface micromachining
   c) LIGA d) Bulk Micromachining

3) The Young's Modulus of silicon is similar as _____
   a) Aluminum b) Copper c) Plastic d) Steel

4) In miller indices the orientation of inclined plane is represented by _____
   a) (100) b) <100> c) (111) d) <111>

5) _____ is defined as change in electrical resistance of solids when subjected to stress fields.
   a) Piezo capacitance b) Piezo resistance
   c) Piezo Crystal d) None of above

6) The light source used in the photolithography process is _____
   a) Mercury vapor lamp b) LASER light
   c) Sun light d) None of above

7) Deposition of polycrystalline silicon is called _____ process.
   a) Annealing b) Curing c) Pyrolysis d) None of above

8) _____ is etch stop technique used for controlling anisotropic etching.
   a) Pyrolysis b) Dopant controlled
   c) Dry d) Electrochemical

P.T.O.

9) DRIE one of the method of _____ etching technic.
a) DRY b) WET c) Both d) None

10) The German meaning of abformung is _____
a) Lithography b) Molding c) Electroforming d) None of the above

11) _____ Sensor is used to measure glucose concentration in blood.
a) Electrochemical b) Diaphragm
c) Metal oxide gas d) Optical

12) In μ TAS M and N indicates No. of _____ and No. of _____ respectively used in a system.
a) Silicon's and Carbides b) Sensors and substrates
c) Sensors and components d) All of the above

13) The elements of μ TAS contains _____
a) Sampling Unit b) Microfluidic Unit
c) A detector System d) All of above

14) METF valve is
a) Micro Electro Thermo Fluidic b) Micro Electrical Temporary Fluidic
c) Micro Electro Temporary Fluidic d) Micro Enable Thermal Flow

15) In _____ sensors the selection of material is principally based on quantum efficiency.
a) Optical b) Chemical c) Pressure d) Bio

16) In μ TAS the micro-pump transfers the liquid by _____ and _____ momentum.
a) Physical and mechanical b) Electrical and mechanical
c) Electrical and physical d) Only physical

17) The nanolithography fabrication process creates _____ scale structured pattern.
a) Centimeter b) Millimeter c) Micrometer d) Nanometer

18) Replica Molding is type of _____
a) Photolithography b) Soft Lithography
c) Etching d) Surface Micromachining

19) In injection compression molding the injection is stopped _____ mm before mold is closed completely.
a) 0.25 b) 0.50 c) 0.75 d) 1

20) Nano particulates drug delivery are used in the application _____
a) Anti-tumor therapy b) Gene therapy
c) AIDS therapy d) All of above

_____

SLR-EP – 313

Seat No.	

B.E. (Biomedical Eng.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (Old)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

1) List the differences between microsystems and microelectronics.
2) Classify silicon compound. Explain any two in detail.
3) What is photoresist ? List the material used as positive and negative photoresist.
4) Explain plasma etching in detail.
5) Draw and explain the design steps of LIGA.

III. Solve **any two** questions : **(10×2=20)**

1) Write a short note on :
   a) Quartz
   b) Polymers.
2) Explain chemical reaction and rate of deposition in CVD.
3) Explain plasma etching and Deep Reactive Ion Etching (DRIE).

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

1) Classify μ TAS. Explain elements of μ TAS with neat diagram.
2) Explain cantilever based biosensors.
3) Explain micro molding in capillaries with schematic diagram.
4) Explain working principal of chemical sensors.
5) Explain thermocouple in detail.

V. Solve **any two** questions : **(10×2=20)**

1) Give classification of micro-pump used in μ TAS. Explain any two.
2) Classify soft lithography. Explain any two.
3) Classify Biosensor and explain each in detail.

Set P

Set P

SLR-EP – 313

Seat No.	

Set Q

B.E. (Biomedical Eng.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (Old)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) In μ TAS the micro-pump transfers the liquid by _____ and _____ momentum.
   a) Physical and mechanical b) Electrical and mechanical
   c) Electrical and physical d) Only physical

2) The nanolithography fabrication process creates _____ scale structured pattern.
   a) Centimeter b) Millimeter c) Micrometer d) Nanometer

3) Replica Molding is type of _____
   a) Photolithography b) Soft Lithography
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5) Nano particulates drug delivery are used in the application _____
   a) Anti-tumor therapy b) Gene therapy
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7) Micro-gears are produced by _____ process.
   a) Soft-lithography b) Surface micromachining
   c) LIGA d) Bulk Micromachining

P.T.O.

8) The Young's Modulus of silicon is similar as _____
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10) _____ is defined as change in electrical resistance of solids when subjected to stress fields.
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   c) Sun light d) None of above

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   a) Pyrolysis b) Dopant controlled
   c) Dry d) Electrochemical

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   c) A detector System d) All of above

19) METF valve is
   a) Micro Electro Thermo Fluidic b) Micro Electrical Temporary Fluidic
   c) Micro Electro Temporary Fluidic d) Micro Enable Thermal Flow

20) In _____ sensors the selection of material is principally based on quantum efficiency.
   a) Optical b) Chemical c) Pressure d) Bio

_____

SLR-EP – 313

Seat No.	

B.E. (Biomedical Eng.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (Old)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

1) List the differences between microsystems and microelectronics.
2) Classify silicon compound. Explain any two in detail.
3) What is photoresist ? List the material used as positive and negative photoresist.
4) Explain plasma etching in detail.
5) Draw and explain the design steps of LIGA.

III. Solve **any two** questions : **(10×2=20)**

1) Write a short note on :
   a) Quartz
   b) Polymers.
2) Explain chemical reaction and rate of deposition in CVD.
3) Explain plasma etching and Deep Reactive Ion Etching (DRIE).

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

1) Classify μ TAS. Explain elements of μ TAS with neat diagram.
2) Explain cantilever based biosensors.
3) Explain micro molding in capillaries with schematic diagram.
4) Explain working principal of chemical sensors.
5) Explain thermocouple in detail.

V. Solve **any two** questions : **(10×2=20)**

1) Give classification of micro-pump used in μ TAS. Explain any two.
2) Classify soft lithography. Explain any two.
3) Classify Biosensor and explain each in detail.

Set Q

Set Q

SLR-EP – 313

Seat No.	

Set R

B.E. (Biomedical Eng.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (Old)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) _____ Sensor is used to measure glucose concentration in blood.
   a) Electrochemical b) Diaphragm
   c) Metal oxide gas d) Optical

2) In μ TAS M and N indicates No. of _____ and No. of _____ respectively used in a system.
   a) Silicon's and Carbides b) Sensors and substrates
   c) Sensors and components d) All of the above

3) The elements of μ TAS contains _____
   a) Sampling Unit b) Microfluidic Unit
   c) A detector System d) All of above

4) METF valve is
   a) Micro Electro Thermo Fluidic b) Micro Electrical Temporary Fluidic
   c) Micro Electro Temporary Fluidic d) Micro Enable Thermal Flow

5) In _____ sensors the selection of material is principally based on quantum efficiency.
   a) Optical b) Chemical c) Pressure d) Bio

6) In μ TAS the micro-pump transfers the liquid by _____ and _____ momentum.
   a) Physical and mechanical b) Electrical and mechanical
   c) Electrical and physical d) Only physical

7) The nanolithography fabrication process creates _____ scale structured pattern.
   a) Centimeter b) Millimeter c) Micrometer d) Nanometer

P.T.O.

8) Replica Molding is type of _____
   a) Photolithography b) Soft Lithography
   c) Etching d) Surface Micromachining

9) In injection compression molding the injection is stopped _____ mm before mold is closed completely.
   a) 0.25 b) 0.50 c) 0.75 d) 1

10) Nano particulates drug delivery are used in the application _____
   a) Anti-tumor therapy b) Gene therapy
   c) AIDS therapy d) All of above

11) The _____ has 3-Dimensioned device structures.
   a) Biomedical Microsystems b) Electronics Systems
   c) Embedded Systems d) None of the above

12) Micro-gears are produced by _____ process.
   a) Soft-lithography b) Surface micromachining
   c) LIGA d) Bulk Micromachining

13) The Young's Modulus of silicon is similar as _____
   a) Aluminum b) Copper c) Plastic d) Steel

14) In miller indices the orientation of inclined plane is represented by _____
   a) (100) b) <100> c) (111) d) <111>

15) _____ is defined as change in electrical resistance of solids when subjected to stress fields.
   a) Piezo capacitance b) Piezo resistance
   c) Piezo Crystal d) None of above

16) The light source used in the photolithography process is _____
   a) Mercury vapor lamp b) LASER light
   c) Sun light d) None of above

17) Deposition of polycrystalline silicon is called _____ process.
   a) Annealing b) Curing c) Pyrolysis d) None of above

18) _____ is etch stop technique used for controlling anisotropic etching.
   a) Pyrolysis b) Dopant controlled
   c) Dry d) Electrochemical

19) DRIE one of the method of _____ etching technic.
   a) DRY b) WET c) Both d) None

20) The German meaning of abformung is _____
   a) Lithography b) Molding c) Electroforming d) None of the above

_____

SLR-EP – 313

Seat No.	

B.E. (Biomedical Eng.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (Old)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

1) List the differences between microsystems and microelectronics.
2) Classify silicon compound. Explain any two in detail.
3) What is photoresist ? List the material used as positive and negative photoresist.
4) Explain plasma etching in detail.
5) Draw and explain the design steps of LIGA.

III. Solve **any two** questions : **(10×2=20)**

1) Write a short note on :
   a) Quartz
   b) Polymers.
2) Explain chemical reaction and rate of deposition in CVD.
3) Explain plasma etching and Deep Reactive Ion Etching (DRIE).

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

1) Classify μ TAS. Explain elements of μ TAS with neat diagram.
2) Explain cantilever based biosensors.
3) Explain micro molding in capillaries with schematic diagram.
4) Explain working principal of chemical sensors.
5) Explain thermocouple in detail.

V. Solve **any two** questions : **(10×2=20)**

1) Give classification of micro-pump used in μ TAS. Explain any two.
2) Classify soft lithography. Explain any two.
3) Classify Biosensor and explain each in detail.

Set R

Set R

SLR-EP – 313

Seat No.	

Set S

B.E. (Biomedical Eng.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (Old)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct answer : **(20×1=20)**

1) The light source used in the photolithography process is _____
   a) Mercury vapor lamp b) LASER light
   c) Sun light d) None of above

2) Deposition of polycrystalline silicon is called _____ process.
   a) Annealing b) Curing c) Pyrolysis d) None of above

3) _____ is etch stop technique used for controlling anisotropic etching.
   a) Pyrolysis b) Dopant controlled
   c) Dry d) Electrochemical

4) DRIE one of the method of _____ etching technic.
   a) DRY b) WET c) Both d) None

5) The German meaning of abformung is _____
   a) Lithography b) Molding c) Electroforming d) None of the above

6) _____ Sensor is used to measure glucose concentration in blood.
   a) Electrochemical b) Diaphragm
   c) Metal oxide gas d) Optical

7) In μ TAS M and N indicates No. of _____ and No. of _____ respectively used in a system.
   a) Silicon's and Carbides b) Sensors and substrates
   c) Sensors and components d) All of the above

8) The elements of μ TAS contains _____
   a) Sampling Unit b) Microfluidic Unit
   c) A detector System d) All of above

P.T.O.

9) METF valve is
   a) Micro Electro Thermo Fluidic b) Micro Electrical Temporary Fluidic
   c) Micro Electro Temporary Fluidic d) Micro Enable Thermal Flow

10) In _____ sensors the selection of material is principally based on quantum efficiency.
   a) Optical b) Chemical c) Pressure d) Bio

11) In μ TAS the micro-pump transfers the liquid by _____ and _____ momentum.
   a) Physical and mechanical b) Electrical and mechanical
   c) Electrical and physical d) Only physical

12) The nanolithography fabrication process creates _____ scale structured pattern.
   a) Centimeter b) Millimeter c) Micrometer d) Nanometer

13) Replica Molding is type of _____
   a) Photolithography b) Soft Lithography
   c) Etching d) Surface Micromachining

14) In injection compression molding the injection is stopped _____ mm before mold is closed completely.
   a) 0.25 b) 0.50 c) 0.75 d) 1

15) Nano particulates drug delivery are used in the application _____
   a) Anti-tumor therapy b) Gene therapy
   c) AIDS therapy d) All of above

16) The _____ has 3-Dimensioned device structures.
   a) Biomedical Microsystems b) Electronics Systems
   c) Embedded Systems d) None of the above

17) Micro-gears are produced by _____ process.
   a) Soft-lithography b) Surface micromachining
   c) LIGA d) Bulk Micromachining

18) The Young's Modulus of silicon is similar as _____
   a) Aluminum b) Copper c) Plastic d) Steel

19) In miller indices the orientation of inclined plane is represented by _____
   a) (100) b) <100> c) (111) d) <111>

20) _____ is defined as change in electrical resistance of solids when subjected to stress fields.
   a) Piezo capacitance b) Piezo resistance
   c) Piezo Crystal d) None of above

_____

SLR-EP – 313

Seat No.	

B.E. (Biomedical Eng.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (Old)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

1) List the differences between microsystems and microelectronics.
2) Classify silicon compound. Explain any two in detail.
3) What is photoresist ? List the material used as positive and negative photoresist.
4) Explain plasma etching in detail.
5) Draw and explain the design steps of LIGA.

III. Solve **any two** questions : **(10×2=20)**

1) Write a short note on :
   a) Quartz
   b) Polymers.
2) Explain chemical reaction and rate of deposition in CVD.
3) Explain plasma etching and Deep Reactive Ion Etching (DRIE).

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

1) Classify μ TAS. Explain elements of μ TAS with neat diagram.
2) Explain cantilever based biosensors.
3) Explain micro molding in capillaries with schematic diagram.
4) Explain working principal of chemical sensors.
5) Explain thermocouple in detail.

V. Solve **any two** questions : **(10×2=20)**

1) Give classification of micro-pump used in μ TAS. Explain any two.
2) Classify soft lithography. Explain any two.
3) Classify Biosensor and explain each in detail.

Set S

Set S

SLR-EP – 314

Seat No.	

Set P

B.E. (Part – II) (Biomedical Engineering) Examination, 2016
TISSUE ENGINEERING (Old)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) ***Use*** *legible handwriting, use* ***blue/black*** *only.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(20×1=20)**

1) Tissue is group of
a) Cells b) Organs c) Mitochondria d) None

2) The implantable device application of tissue engineering
a) Bioartificial skin b) Endothelialized Vascular grafts
c) Both a) and b) d) None

3) Micro patterning technique is based on the utilization of photo reactive cross linking of
a) Hydrophobic b) Hydrophilic c) Both a) and b) d) None

4) To promote the growth and reconnection of damaged nerves, use of which tubes ?
a) Implanted polymeric tubes b) Implanted polyvinyl tubes
c) In-vitro polymeric tubes d) None

5) Which cell system have been used for the production of skin grafts in long term culture of hepatocytes ?
a) Heterotypic cell systems b) Monotypic cell systems
c) Hematotypic cell systems d) None

6) The most simple method to create connective tissue in-vitro to incorporate tissue cells within
a) Extracellular matrix components b) Intracellular matrix components
c) Bioartificial d) None

7) Bioartificial vascular grafts have been produced by seeding
   a) Endothelial cells b) Mesothelium cells
   c) Connective cells d) None
8) Bioreactors have been designed primarily for use as
   a) Bioartificial liver b) Production of blood cells
   c) Both a) and b) d) None
9) Hollow fiber systems of a shell traversed by a large number of
   a) Small diameter tubes b) Large diameter tubes
   c) Medium diameter tubes d) None
10) Microcarrier are small beads usually less than _____ diameters.
   a) 500 μm b) 750 μm c) 600 μm d) 800 μm
11) ATP stands for
   a) Anti-Trans Polymer b) Adenosine triphosphate
   c) Anti Toxic Polymer d) None of the above
12) Shear is expressed in
   a) Cm/s/cm b) s^{-1} c) Both a) and b) d) None
13) Physiological levels of venous shear stress ranges between
   a) 8 – 10 dynes/cm^2 b) 5 – 8 dynes/cm^2
   c) 6 – 9 dynes/cm^2 d) 1 – 5 dynes/cm^2
14) Shear stress is expressed in
   a) s^{-1} b) Cm/s/cm c) Dynes/cm^2 d) None
15) BMT stands for
   a) Brain Mapping Technology b) Bone Marrow Transplantation
   c) Brain Marrow Transplantation d) Bone Matter Transplantation
16) Contractions of which muscles generates the stability and power for all movement
   a) Skeletal muscles b) Cardiac muscles
   c) Nerve muscles d) Smooth muscles
17) Plasma membrane of a muscle fiber is term as
   a) Sarcolema b) Myofilaments
   c) Basal lamina d) Basement membrane
18) Chondrocytes were obtained from the articular cartilage of _____ old bovine calves.
   a) 2 – 3 weeks b) 4 – 5 weeks c) 6 – 9 weeks d) 8 – 10 weeks
19) BMSC stands for
   a) Bone Marrow Stratified Cells b) Bone Marrow Stem Cell
   c) Bone Marrow Stromal Cells d) Bone Marrow Smooth Cells
20) DNA stands for
   a) Dioxide Ribonucleic Acid b) Deoxyribo Nitrous Acid
   c) Deoxyribonucleic Acid d) Dual Oxyribonucleic Acid

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SLR-EP – 314

Seat No.	

B.E. (Part – II) (Biomedical Engineering) Examination, 2016
TISSUE ENGINEERING (Old)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Draw diagrams/sketches ***wherever*** *necessary.*
4) ***Use*** *legible handwriting, use* ***blue/black*** *only.*

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
   1) Explain in detail reconstruction of epithelial tissue with neat diagram.
   2) Explain shear stress effects on gene regulations.
   3) Explain in detail control of stem cell development.
   4) Explain stereotypic culture v/s monolayer culture.
   5) Write a short notes on gene therapy.

3. Answer **any two** of the following questions : **(2×10=20)**
   1) Explain in details mechanism of shear stress induced gene regulation.
   2) Explain basic principles and considerations in tissue engineering.
   3) Explain adult stem cell and ageing of stem cell.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
   1) Mention and explain in detail application of reconstituted ex-vivo hematopoiesis.
   2) Explain Hepatocyte transformation systems.
   3) Write a note on skeletal muscle function.
   4) Describe cell based approaches to cartilage tissue engineering.
   5) Explain fundamentals of kidney function.

5. Answer **any two** of the following questions : **(2×10=20)**
   1) Explain in detail cell polymer bioreactor system with neat diagram.
   2) Explain reconstructive surgery of skeletal muscle.
   3) Explain delivery of neuroactive molecules to the nervous systems.

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Set P

Set P

SLR-EP – 314

Seat No.	

Set Q

B.E. (Part – II) (Biomedical Engineering) Examination, 2016
TISSUE ENGINEERING (Old)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) ***Use*** *legible handwriting, use* ***blue/black*** *only.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(20×1=20)**

1) Contractions of which muscles generates the stability and power for all movement
   a) Skeletal muscles b) Cardiac muscles
   c) Nerve muscles d) Smooth muscles

2) Plasma membrane of a muscle fiber is term as
   a) Sarcolema b) Myofilaments
   c) Basal lamina d) Basement membrane

3) Chondrocytes were obtained from the articular cartilage of _____ old bovine calves.
   a) 2 – 3 weeks b) 4 – 5 weeks c) 6 – 9 weeks d) 8 – 10 weeks

4) BMSC stands for
   a) Bone Marrow Stratified Cells b) Bone Marrow Stem Cell
   c) Bone Marrow Stromal Cells d) Bone Marrow Smooth Cells

5) DNA stands for
   a) Dioxide Ribonucleic Acid b) Deoxyribo Nitrous Acid
   c) Deoxyribonucleic Acid d) Dual Oxyribonucleic Acid

6) Tissue is group of
   a) Cells b) Organs c) Mitochondria d) None

7) The implantable device application of tissue engineering
   a) Bioartificial skin b) Endothelialized Vascular grafts
   c) Both a) and b) d) None

P.T.O.

8) Micro patterning technique is based on the utilization of photo reactive cross linking of
   a) Hydrophobic b) Hydrophilic c) Both a) and b) d) None
9) To promote the growth and reconnection of damaged nerves, use of which tubes ?
   a) Implanted polymeric tubes b) Implanted polyvinyl tubes
   c) In-vitro polymeric tubes d) None
10) Which cell system have been used for the production of skin grafts in long term culture of hepatocytes ?
   a) Heterotypic cell systems b) Monotypic cell systems
   c) Hematotypic cell systems d) None
11) The most simple method to create connective tissue in-vitro to incorporate tissue cells within
   a) Extracellular matrix components b) Intracellular matrix components
   c) Bioartificial d) None
12) Bioartificial vascular grafts have been produced by seeding
   a) Endothelial cells b) Mesothelium cells
   c) Connective cells d) None
13) Bioreactors have been designed primarily for use as
   a) Bioartificial liver b) Production of blood cells
   c) Both a) and b) d) None
14) Hollow fiber systems of a shell traversed by a large number of
   a) Small diameter tubes b) Large diameter tubes
   c) Medium diameter tubes d) None
15) Microcarrier are small beads usually less than _____ diameters.
   a) 500 μm b) 750 μm c) 600 μm d) 800 μm
16) ATP stands for
   a) Anti-Trans Polymer b) Adenosine triphosphate
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17) Shear is expressed in
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19) Shear stress is expressed in
   a) s^{-1} b) Cm/s/cm c) Dynes/cm^2 d) None
20) BMT stands for
   a) Brain Mapping Technology b) Bone Marrow Transplantation
   c) Brain Marrow Transplantation d) Bone Matter Transplantation

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SLR-EP – 314

Seat No.	

B.E. (Part – II) (Biomedical Engineering) Examination, 2016
TISSUE ENGINEERING (Old)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Draw diagrams/sketches ***wherever*** *necessary.*
4) ***Use*** *legible handwriting, use* ***blue/black*** *only.*

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
   1) Explain in detail reconstruction of epithelial tissue with neat diagram.
   2) Explain shear stress effects on gene regulations.
   3) Explain in detail control of stem cell development.
   4) Explain stereotypic culture v/s monolayer culture.
   5) Write a short notes on gene therapy.

3. Answer **any two** of the following questions : **(2×10=20)**
   1) Explain in details mechanism of shear stress induced gene regulation.
   2) Explain basic principles and considerations in tissue engineering.
   3) Explain adult stem cell and ageing of stem cell.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
   1) Mention and explain in detail application of reconstituted ex-vivo hematopoiesis.
   2) Explain Hepatocyte transformation systems.
   3) Write a note on skeletal muscle function.
   4) Describe cell based approaches to cartilage tissue engineering.
   5) Explain fundamentals of kidney function.

5. Answer **any two** of the following questions : **(2×10=20)**
   1) Explain in detail cell polymer bioreactor system with neat diagram.
   2) Explain reconstructive surgery of skeletal muscle.
   3) Explain delivery of neuroactive molecules to the nervous systems.

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Set Q

Set Q

SLR-EP – 314

Seat No.	

Set R

B.E. (Part – II) (Biomedical Engineering) Examination, 2016
TISSUE ENGINEERING (Old)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) ***Use*** *legible handwriting, use* ***blue/black*** *only.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(20×1=20)**

1) ATP stands for
a) Anti-Trans Polymer b) Adenosine triphosphate
c) Anti Toxic Polymer d) None of the above

2) Shear is expressed in
a) Cm/s/cm b) s^{-1} c) Both a) and b) d) None

3) Physiological levels of venous shear stress ranges between
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c) 6 – 9 dynes/cm^2 d) 1 – 5 dynes/cm^2

4) Shear stress is expressed in
a) s^{-1} b) Cm/s/cm c) Dynes/cm^2 d) None

5) BMT stands for
a) Brain Mapping Technology b) Bone Marrow Transplantation
c) Brain Marrow Transplantation d) Bone Matter Transplantation

6) Contractions of which muscles generates the stability and power for all movement
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P.T.O.

8) Chondrocytes were obtained from the articular cartilage of _____ old bovine calves.
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11) Tissue is group of
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12) The implantable device application of tissue engineering
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   a) Hydrophobic b) Hydrophilic c) Both a) and b) d) None
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   a) Small diameter tubes b) Large diameter tubes
   c) Medium diameter tubes d) None
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   a) 500 μm b) 750 μm c) 600 μm d) 800 μm

_____

SLR-EP – 314

Seat No.	

B.E. (Part – II) (Biomedical Engineering) Examination, 2016
TISSUE ENGINEERING (Old)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Draw diagrams/sketches ***wherever*** *necessary.*
4) ***Use*** *legible handwriting, use* ***blue/black*** *only.*

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
   1) Explain in detail reconstruction of epithelial tissue with neat diagram.
   2) Explain shear stress effects on gene regulations.
   3) Explain in detail control of stem cell development.
   4) Explain stereotypic culture v/s monolayer culture.
   5) Write a short notes on gene therapy.

3. Answer **any two** of the following questions : **(2×10=20)**
   1) Explain in details mechanism of shear stress induced gene regulation.
   2) Explain basic principles and considerations in tissue engineering.
   3) Explain adult stem cell and ageing of stem cell.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
   1) Mention and explain in detail application of reconstituted ex-vivo hematopoiesis.
   2) Explain Hepatocyte transformation systems.
   3) Write a note on skeletal muscle function.
   4) Describe cell based approaches to cartilage tissue engineering.
   5) Explain fundamentals of kidney function.

5. Answer **any two** of the following questions : **(2×10=20)**
   1) Explain in detail cell polymer bioreactor system with neat diagram.
   2) Explain reconstructive surgery of skeletal muscle.
   3) Explain delivery of neuroactive molecules to the nervous systems.

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Set R

Set R

SLR-EP – 314

Seat No.	

Set S

B.E. (Part – II) (Biomedical Engineering) Examination, 2016
TISSUE ENGINEERING (Old)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) ***Use*** *legible handwriting, use* ***blue/black*** *only.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(20×1=20)**

1) The most simple method to create connective tissue in-vitro to incorporate tissue cells within
   a) Extracellular matrix components b) Intracellular matrix components
   c) Bioartificial d) None
2) Bioartificial vascular grafts have been produced by seeding
   a) Endothelial cells b) Mesothelium cells
   c) Connective cells d) None
3) Bioreactors have been designed primarily for use as
   a) Bioartificial liver b) Production of blood cells
   c) Both a) and b) d) None
4) Hollow fiber systems of a shell traversed by a large number of
   a) Small diameter tubes b) Large diameter tubes
   c) Medium diameter tubes d) None
5) Microcarrier are small beads usually less than _____ diameters.
   a) 500 μm b) 750 μm c) 600 μm d) 800 μm
6) ATP stands for
   a) Anti-Trans Polymer b) Adenosine triphosphate
   c) Anti Toxic Polymer d) None of the above
7) Shear is expressed in
   a) Cm/s/cm b) s^{-1} c) Both a) and b) d) None

P.T.O.

8) Physiological levels of venous shear stress ranges between
   a) 8 – 10 dynes/cm^2 b) 5 – 8 dynes/cm^2
   c) 6 – 9 dynes/cm^2 d) 1 – 5 dynes/cm^2

9) Shear stress is expressed in
   a) s^{-1} b) Cm/s/cm c) Dynes/cm^2 d) None

10) BMT stands for
   a) Brain Mapping Technology b) Bone Marrow Transplantation
   c) Brain Marrow Transplantation d) Bone Matter Transplantation

11) Contractions of which muscles generates the stability and power for all movement
   a) Skeletal muscles b) Cardiac muscles
   c) Nerve muscles d) Smooth muscles

12) Plasma membrane of a muscle fiber is term as
   a) Sarcolema b) Myofilaments
   c) Basal lamina d) Basement membrane

13) Chondrocytes were obtained from the articular cartilage of _____ old bovine calves.
   a) 2 – 3 weeks b) 4 – 5 weeks c) 6 – 9 weeks d) 8 – 10 weeks

14) BMSC stands for
   a) Bone Marrow Stratified Cells b) Bone Marrow Stem Cell
   c) Bone Marrow Stromal Cells d) Bone Marrow Smooth Cells

15) DNA stands for
   a) Dioxide Ribonucleic Acid b) Deoxyribo Nitrous Acid
   c) Deoxyribonucleic Acid d) Dual Oxyribonucleic Acid

16) Tissue is group of
   a) Cells b) Organs c) Mitochondria d) None

17) The implantable device application of tissue engineering
   a) Bioartificial skin b) Endothelialized Vascular grafts
   c) Both a) and b) d) None

18) Micro patterning technique is based on the utilization of photo reactive cross linking of
   a) Hydrophobic b) Hydrophilic c) Both a) and b) d) None

19) To promote the growth and reconnection of damaged nerves, use of which tubes ?
   a) Implanted polymeric tubes b) Implanted polyvinyl tubes
   c) In-vitro polymeric tubes d) None

20) Which cell system have been used for the production of skin grafts in long term culture of hepatocytes ?
   a) Heterotypic cell systems b) Monotypic cell systems
   c) Hematotypic cell systems d) None

_____

SLR-EP – 314

Seat No.	

B.E. (Part – II) (Biomedical Engineering) Examination, 2016
TISSUE ENGINEERING (Old)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume data ***wherever*** *necessary.*
3) Draw diagrams/sketches ***wherever*** *necessary.*
4) ***Use*** *legible handwriting, use* ***blue/black*** *only.*

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
   1) Explain in detail reconstruction of epithelial tissue with neat diagram.
   2) Explain shear stress effects on gene regulations.
   3) Explain in detail control of stem cell development.
   4) Explain stereotypic culture v/s monolayer culture.
   5) Write a short notes on gene therapy.

3. Answer **any two** of the following questions : **(2×10=20)**
   1) Explain in details mechanism of shear stress induced gene regulation.
   2) Explain basic principles and considerations in tissue engineering.
   3) Explain adult stem cell and ageing of stem cell.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
   1) Mention and explain in detail application of reconstituted ex-vivo hematopoiesis.
   2) Explain Hepatocyte transformation systems.
   3) Write a note on skeletal muscle function.
   4) Describe cell based approaches to cartilage tissue engineering.
   5) Explain fundamentals of kidney function.

5. Answer **any two** of the following questions : **(2×10=20)**
   1) Explain in detail cell polymer bioreactor system with neat diagram.
   2) Explain reconstructive surgery of skeletal muscle.
   3) Explain delivery of neuroactive molecules to the nervous systems.

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Set S

Set S

SLR-EP – 315

Seat No.	

Set **P**

B.E. (Part – II) (New) (Biomedical Engg.) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) MRI system provides detailed images of _____ in the body.
a) Bone b) Water c) Body fluids d) Tissues

2) Hydrogen atoms have inherent magnetic moment called as
a) Nuclear spin b) Spin echo c) Precession d) Resonance

3) The natural exponential NMR decay is called as
a) Spin b) FID
c) Nuclear spin d) Plank's equation

4) Electromagnets makes use of _____ materials for pole faces.
a) Soft magnet b) Hard magnet c) Copper d) Tungsten

5) The degree of blurring depends upon the _____ at which patient is moved.
a) Velocity b) Fidelity c) Temperature d) Speed

6) _____ scanning involves continuous movement of patient table along z-axis.
a) Helical b) CT c) NMR d) MRI

7) Xenon detector of CT modality operates in _____ mode.
a) Proportional b) Ionization c) Scattering d) Absorbing

8) Back projection technique is analogous to a _____ reconstruction.
a) Graphic b) Filtered c) Mathematical d) Algebraic

9) CT scanners employs a _____ filter to remove blurring artefacts.
a) Analog b) Digital c) Spatial d) Logical

10) Unlike CT, MRI requires no any
a) Detectors b) Gantries c) Control console d) Echo technique

11) _____ is developed by G. N. Hounsfield.
a) X-ray b) MRI c) NMR d) CT

12) Complete given expression :

$$H = \frac{\mu - \mu_{water}}{?} \times 1000$$

a) 1000 b) μ c) μ_{water} d) μ_{air}

13) Purpose of scanning system to acquire enough information to _____ a picture or image.
a) View b) Scan c) Reconstruct d) Verify

14) Fourth generation of CT scan constituted _____ detectors.
a) Fixed b) Moving c) Rotating d) Multiple

15) In spiral scanning modality X-ray tube rotates continuously around the
a) Detector b) Gantry c) Collimator d) Patient

16) In CT scanners a tungsten target utilizes with a target angle of about _____ degrees.
a) 20 b) 200 c) 10 d) 15

17) _____ is a techniques used for diagnosis of heart functioning in co-ordination of CT.
a) MRI b) X-ray c) Angiography d) Hybrid imaging

18) Spatial resolution is the ability to _____ between adjacent objects.
a) Disintegrate b) Discriminate c) Integrate d) Merge

19) In CT system with 360° X-ray tube movement skin dose around the patient is
a) Constant b) Variable c) Moderate d) Low

20) Windowing in CT modality shows _____ mathematical nature of the displayed picture.
a) Superficial b) Underlying c) Bottom level d) Moderate level

_____

SLR-EP – 315

Seat No.	

B.E. (Part – II) (New) (Biomedical Engg.) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**

   1) Explain working, construction and application of spiral CT scan.

   2) Explain various artefacts that affects CT imaging.

   3) Draw and explain first and second generation of CT scanning techniques.

   4) Mention advantages and disadvantages of MR spectroscopy.

   5) Calculate CT number of bone whose attenuate coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.195. (Magnification constant = 1000)

3. Attempt **any two** : **(2×10=20)**

   1) Explain various system components of CT scan machine with necessary figure.

   2) Draw and explain principle and working of Magnetic Resonance Spectroscopy.

   3) Apply successive approximation method for given matrix and obtain final algorithm in case of CT image.

4	6
1	8

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain advantages, limitations and two applications of MRI imaging.

   2) Explain various types of magnets that are used for MRI imaging modality.

   3) Explain process of angiography with the help of CT modality.

   4) Define and explain construction of electrical impedance tomography.

   5) Explain spin-lattice and spin-spin techniques of MRI.

5. Attempt **any two** : **(2×10=20)**

   1) Draw and explain working of MRI scanning machine.

   2) What is MDCET ? Explain its construction and working.

   3) Define hybrid imaging. Explain any one of hybrid imaging technique in detail.

SLR-EP – 315

Seat No.	

Set Q

B.E. (Part – II) (New) (Biomedical Engg.) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) In CT scanners a tungsten target utilizes with a target angle of about _____ degrees.
a) 20 b) 200 c) 10 d) 15

2) _____ is a techniques used for diagnosis of heart functioning in co-ordination of CT.
a) MRI b) X-ray c) Angiography d) Hybrid imaging

3) Spatial resolution is the ability to _____ between adjacent objects.
a) Disintegrate b) Discriminate c) Integrate d) Merge

4) In CT system with 360° X-ray tube movement skin dose around the patient is
a) Constant b) Variable c) Moderate d) Low

5) Windowing in CT modality shows _____ mathematical nature of the displayed picture.
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6) MRI system provides detailed images of _____ in the body.
a) Bone b) Water c) Body fluids d) Tissues

7) Hydrogen atoms have inherent magnetic moment called as
a) Nuclear spin b) Spin echo c) Precession d) Resonance

8) The natural exponential NMR decay is called as
a) Spin b) FID
c) Nuclear spin d) Plank's equation

P.T.O.

9) Electromagnets makes use of _____ materials for pole faces.
a) Soft magnet b) Hard magnet c) Copper d) Tungsten

10) The degree of blurring depends upon the _____ at which patient is moved.
a) Velocity b) Fidelity c) Temperature d) Speed

11) _____ scanning involves continuous movement of patient table along z-axis.
a) Helical b) CT c) NMR d) MRI

12) Xenon detector of CT modality operates in _____ mode.
a) Proportional b) Ionization c) Scattering d) Absorbing

13) Back projection technique is analogous to a _____ reconstruction.
a) Graphic b) Filtered c) Mathematical d) Algebraic

14) CT scanners employs a _____ filter to remove blurring artefacts.
a) Analog b) Digital c) Spatial d) Logical

15) Unlike CT, MRI requires no any
a) Detectors b) Gantries c) Control console d) Echo technique

16) _____ is developed by G. N. Hounsfield.
a) X-ray b) MRI c) NMR d) CT

17) Complete given expression :

$$H = \frac{\mu - \mu_{water}}{?} \times 1000$$

a) 1000 b) μ c) μ_{water} d) μ_{air}

18) Purpose of scanning system to acquire enough information to _____ a picture or image.
a) View b) Scan c) Reconstruct d) Verify

19) Fourth generation of CT scan constituted _____ detectors.
a) Fixed b) Moving c) Rotating d) Multiple

20) In spiral scanning modality X-ray tube rotates continuously around the
a) Detector b) Gantry c) Collimator d) Patient

_____

SLR-EP – 315

Seat No.	

B.E. (Part – II) (New) (Biomedical Engg.) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**

   1) Explain working, construction and application of spiral CT scan.

   2) Explain various artefacts that affects CT imaging.

   3) Draw and explain first and second generation of CT scanning techniques.

   4) Mention advantages and disadvantages of MR spectroscopy.

   5) Calculate CT number of bone whose attenuate coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.195. (Magnification constant = 1000)

3. Attempt **any two** : **(2×10=20)**

   1) Explain various system components of CT scan machine with necessary figure.

   2) Draw and explain principle and working of Magnetic Resonance Spectroscopy.

   3) Apply successive approximation method for given matrix and obtain final algorithm in case of CT image.

4	6
1	8

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain advantages, limitations and two applications of MRI imaging.

   2) Explain various types of magnets that are used for MRI imaging modality.

   3) Explain process of angiography with the help of CT modality.

   4) Define and explain construction of electrical impedance tomography.

   5) Explain spin-lattice and spin-spin techniques of MRI.

5. Attempt **any two** : **(2×10=20)**

   1) Draw and explain working of MRI scanning machine.

   2) What is MDCET ? Explain its construction and working.

   3) Define hybrid imaging. Explain any one of hybrid imaging technique in detail.

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SLR-EP – 315

Seat No.	

Set R

B.E. (Part – II) (New) (Biomedical Engg.) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) _____ is developed by G. N. Hounsfield.
a) X-ray b) MRI c) NMR d) CT

2) Complete given expression :

$$H = \frac{\mu - \mu_{water}}{?} \times 1000$$

a) 1000 b) μ c) μ_{water} d) μ_{air}

3) Purpose of scanning system to acquire enough information to _____ a picture or image.
a) View b) Scan c) Reconstruct d) Verify

4) Fourth generation of CT scan constituted _____ detectors.
a) Fixed b) Moving c) Rotating d) Multiple

5) In spiral scanning modality X-ray tube rotates continuously around the
a) Detector b) Gantry c) Collimator d) Patient

6) In CT scanners a tungsten target utilizes with a target angle of about _____ degrees.
a) 20 b) 200 c) 10 d) 15

7) _____ is a techniques used for diagnosis of heart functioning in co-ordination of CT.
a) MRI b) X-ray c) Angiography d) Hybrid imaging

P.T.O.

8) Spatial resolution is the ability to _____ between adjacent objects.
a) Disintegrate b) Discriminate c) Integrate d) Merge

9) In CT system with 360° X-ray tube movement skin dose around the patient is
a) Constant b) Variable c) Moderate d) Low

10) Windowing in CT modality shows _____ mathematical nature of the displayed picture.
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11) MRI system provides detailed images of _____ in the body.
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a) Nuclear spin b) Spin echo c) Precession d) Resonance

13) The natural exponential NMR decay is called as
a) Spin b) FID
c) Nuclear spin d) Plank's equation

14) Electromagnets makes use of _____ materials for pole faces.
a) Soft magnet b) Hard magnet c) Copper d) Tungsten

15) The degree of blurring depends upon the _____ at which patient is moved.
a) Velocity b) Fidelity c) Temperature d) Speed

16) _____ scanning involves continuous movement of patient table along z-axis.
a) Helical b) CT c) NMR d) MRI

17) Xenon detector of CT modality operates in _____ mode.
a) Proportional b) Ionization c) Scattering d) Absorbing

18) Back projection technique is analogous to a _____ reconstruction.
a) Graphic b) Filtered c) Mathematical d) Algebraic

19) CT scanners employs a _____ filter to remove blurring artefacts.
a) Analog b) Digital c) Spatial d) Logical

20) Unlike CT, MRI requires no any
a) Detectors b) Gantries c) Control console d) Echo technique

_____

SLR-EP – 315

Seat No.	

B.E. (Part – II) (New) (Biomedical Engg.) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**

   1) Explain working, construction and application of spiral CT scan.

   2) Explain various artefacts that affects CT imaging.

   3) Draw and explain first and second generation of CT scanning techniques.

   4) Mention advantages and disadvantages of MR spectroscopy.

   5) Calculate CT number of bone whose attenuate coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.195. (Magnification constant = 1000)

3. Attempt **any two** : **(2×10=20)**

   1) Explain various system components of CT scan machine with necessary figure.

   2) Draw and explain principle and working of Magnetic Resonance Spectroscopy.

   3) Apply successive approximation method for given matrix and obtain final algorithm in case of CT image.

4	6
1	8

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain advantages, limitations and two applications of MRI imaging.

   2) Explain various types of magnets that are used for MRI imaging modality.

   3) Explain process of angiography with the help of CT modality.

   4) Define and explain construction of electrical impedance tomography.

   5) Explain spin-lattice and spin-spin techniques of MRI.

5. Attempt **any two** : **(2×10=20)**

   1) Draw and explain working of MRI scanning machine.

   2) What is MDCET ? Explain its construction and working.

   3) Define hybrid imaging. Explain any one of hybrid imaging technique in detail.

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SLR-EP – 315

Seat No.	

Set S

B.E. (Part – II) (New) (Biomedical Engg.) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) _____ scanning involves continuous movement of patient table along z-axis.
a) Helical b) CT c) NMR d) MRI

2) Xenon detector of CT modality operates in _____ mode.
a) Proportional b) Ionization c) Scattering d) Absorbing

3) Back projection technique is analogous to a _____ reconstruction.
a) Graphic b) Filtered c) Mathematical d) Algebraic

4) CT scanners employs a _____ filter to remove blurring artefacts.
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a) Detectors b) Gantries c) Control console d) Echo technique

6) _____ is developed by G. N. Hounsfield.
a) X-ray b) MRI c) NMR d) CT

7) Complete given expression :

$$H = \frac{\mu - \mu_{water}}{?} \times 1000$$

a) 1000 b) μ c) μ_{water} d) μ_{air}

P.T.O.

8) Purpose of scanning system to acquire enough information to _____ a picture or image.
a) View b) Scan c) Reconstruct d) Verify

9) Fourth generation of CT scan constituted _____ detectors.
a) Fixed b) Moving c) Rotating d) Multiple

10) In spiral scanning modality X-ray tube rotates continuously around the
a) Detector b) Gantry c) Collimator d) Patient

11) In CT scanners a tungsten target utilizes with a target angle of about _____ degrees.
a) 20 b) 200 c) 10 d) 15

12) _____ is a techniques used for diagnosis of heart functioning in co-ordination of CT.
a) MRI b) X-ray c) Angiography d) Hybrid imaging

13) Spatial resolution is the ability to _____ between adjacent objects.
a) Disintegrate b) Discriminate c) Integrate d) Merge

14) In CT system with 360° X-ray tube movement skin dose around the patient is
a) Constant b) Variable c) Moderate d) Low

15) Windowing in CT modality shows _____ mathematical nature of the displayed picture.
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16) MRI system provides detailed images of _____ in the body.
a) Bone b) Water c) Body fluids d) Tissues

17) Hydrogen atoms have inherent magnetic moment called as
a) Nuclear spin b) Spin echo c) Precession d) Resonance

18) The natural exponential NMR decay is called as
a) Spin b) FID
c) Nuclear spin d) Plank's equation

19) Electromagnets makes use of _____ materials for pole faces.
a) Soft magnet b) Hard magnet c) Copper d) Tungsten

20) The degree of blurring depends upon the _____ at which patient is moved.
a) Velocity b) Fidelity c) Temperature d) Speed

_____

SLR-EP – 315

Seat No.	

B.E. (Part – II) (New) (Biomedical Engg.) Examination, 2016
MEDICAL IMAGING – II

Day and Date : Monday, 21-11-2016 Marks : 80

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**

   1) Explain working, construction and application of spiral CT scan.

   2) Explain various artefacts that affects CT imaging.

   3) Draw and explain first and second generation of CT scanning techniques.

   4) Mention advantages and disadvantages of MR spectroscopy.

   5) Calculate CT number of bone whose attenuate coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.195. (Magnification constant = 1000)

3. Attempt **any two** : **(2×10=20)**

   1) Explain various system components of CT scan machine with necessary figure.

   2) Draw and explain principle and working of Magnetic Resonance Spectroscopy.

   3) Apply successive approximation method for given matrix and obtain final algorithm in case of CT image.

4	6
1	8

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain advantages, limitations and two applications of MRI imaging.

   2) Explain various types of magnets that are used for MRI imaging modality.

   3) Explain process of angiography with the help of CT modality.

   4) Define and explain construction of electrical impedance tomography.

   5) Explain spin-lattice and spin-spin techniques of MRI.

5. Attempt **any two** : **(2×10=20)**

   1) Draw and explain working of MRI scanning machine.

   2) What is MDCET ? Explain its construction and working.

   3) Define hybrid imaging. Explain any one of hybrid imaging technique in detail.

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SLR-EP – 316

Seat No.	

Set P

B.E. (Biomedical Engg.) (Part – II) (New) Examination, 2016
INSTALLATION, MAINTENANCE AND SERVICING

Day and Date : Tuesday, 22-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) _____ in X-rays is measured in Kilovolt.
a) Voltages b) Power c) kVp d) Energy

2) _____ is part of heart lung machine.
a) Ventilator b) Oxygenator c) Defibrillator d) Humidifier

3) _____ is the examination of certain equipments or their parts to find their state or condition.
a) Inspection b) Calibration c) Maintenance d) None

4) In _____ measurement flow rate "Q=VA" where A stands for area of cross section.
a) Pulse rate b) Heart rate c) Blood flow d) Blood pressure

5) CPAP is a mode of synchrony _____
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

6) In the _____ the air flows through bacteria filter.
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

7) _____ measures analysis in clinical chemistry.
a) Centrifuge b) Gas analyzer
c) Spectrophotometer d) PH meter

8) The _____ inlet in the cardioverter is used for moderate pressure gas.
a) Lower b) Upper c) Moderate d) Ventilator

9) Cardioverter is operated while presence of _____
a) ECG b) Pacemaker c) Defibrillator d) Heart long machine

10) Negative transformer is not used in _____ modality.
a) SPECT b) CT c) X-Ray d) PET

11) UPS systems are essential for clean and stable supply _____ maintenance.
a) During b) Before c) At the time d) For simultaneous

12) X-ray _____ ratings are done in current.
a) Tube b) Gantry c) Frequency d) Collimator

13) Preventive _____ is carried out to reduce the failure to absolute minimum.
a) Installation b) Maintenance c) Care d) Nil

14) _____ record should be maintained for each equipment to indicate entire history of maintenance of the equipment.
a) Installation b) Maintenance c) Care d) Nil

15) _____ equipments must be maintained at a constant temperature around 20°C.
a) Electronic b) Mechanical c) Pneumatics d) Laboratory

16) Dry skin presents a very _____ resistance of several hundred thousand ohms.
a) High b) Low c) Moderate d) Standard

17) QCI stands for _____
a) Quality Council Integrity b) Quality Control and Implementation
c) Quantity Council in India d) Quality Control and Imaging

18) _____ are included in ventilator to remove mucus from airway passage.
a) Aspirators b) ECG machine
c) Defibrillator d) Humidifier

19) _____ is used to measure lung capacity and volume.
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

20) CCU stands for _____
a) Cardiac Care Unit b) Cardiac Center Unit
c) Coronary Center Unit d) Coronary Care Unit

_____

SLR-EP – 316

Seat No.	

B.E. (Biomedical Engg.) (Part – II) (New) Examination, 2016
INSTALLATION, MAINTENANCE AND SERVICING

Day and Date : Tuesday, 22-11-2016 Marks : 80

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*

2) ***Assume*** *suitable data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Explain the use of preventive maintenance for biomedical equipments with any two examples.

2) Explain working criteria's of R and D field in hospital.

3) Explain the need and procedure of drawing insurance of medical equipments in hospital.

4) Explain procedure of installing radiology equipment in radiology department.

5) Draw a labeled figure of a ventilator with all its specifications.

3. Attempt **any two** : **(2×10=20)**

1) Explain installation and maintenance procedure of defibrillator and pacemaker.

2) Explain the criteria for location, space requirement and design of OT.

3) Explain the installation procedure of pathology and radiology equipments with each of 2 examples.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain the importance of ISO and NABH certification.

   2) Explain the need and function of medical gas management.

   3) Explain maintenance procedure of radiology equipments with any one example.

   4) Draw and specify various front panel controls of a standard ventilator.

   5) Explain safety precautions that has to be taken while operating and handling ESU.

5. Attempt **any two** : **(2×10=20)**

   1) Explain various trouble shooting methods of operation theater equipments with any two examples.

   2) List various equipments present in NICU and explain functions of any two of it.

   3) Differentiate between PICU, CCU and AKD in terms of life saving equipments.

SLR-EP – 316

Seat No.	

Set Q

B.E. (Biomedical Engg.) (Part – II) (New) Examination, 2016
INSTALLATION, MAINTENANCE AND SERVICING

Day and Date : Tuesday, 22-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Dry skin presents a very _____ resistance of several hundred thousand ohms.
a) High b) Low c) Moderate d) Standard

2) QCI stands for _____
a) Quality Council Integrity b) Quality Control and Implementation
c) Quantity Council in India d) Quality Control and Imaging

3) _____ are included in ventilator to remove mucus from airway passage.
a) Aspirators b) ECG machine
c) Defibrillator d) Humidifier

4) _____ is used to measure lung capacity and volume.
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

5) CCU stands for _____
a) Cardiac Care Unit b) Cardiac Center Unit
c) Coronary Center Unit d) Coronary Care Unit

6) _____ in X-rays is measured in Kilovolt.
a) Voltages b) Power c) kVp d) Energy

7) _____ is part of heart lung machine.
a) Ventilator b) Oxygenator c) Defibrillator d) Humidifier

P.T.O.

8) _____ is the examination of certain equipments or their parts to find their state or condition.
a) Inspection b) Calibration c) Maintenance d) None

9) In _____ measurement flow rate "Q=VA" where A stands for area of cross section.
a) Pulse rate b) Heart rate c) Blood flow d) Blood pressure

10) CPAP is a mode of synchrony _____
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

11) In the _____ the air flows through bacteria filter.
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

12) _____ measures analysis in clinical chemistry.
a) Centrifuge b) Gas analyzer
c) Spectrophotometer d) PH meter

13) The _____ inlet in the cardioverter is used for moderate pressure gas.
a) Lower b) Upper c) Moderate d) Ventilator

14) Cardioverter is operated while presence of _____
a) ECG b) Pacemaker c) Defibrillator d) Heart long machine

15) Negative transformer is not used in _____ modality.
a) SPECT b) CT c) X-Ray d) PET

16) UPS systems are essential for clean and stable supply _____ maintenance.
a) During b) Before c) At the time d) For simultaneous

17) X-ray _____ ratings are done in current.
a) Tube b) Gantry c) Frequency d) Collimator

18) Preventive _____ is carried out to reduce the failure to absolute minimum.
a) Installation b) Maintenance c) Care d) Nil

19) _____ record should be maintained for each equipment to indicate entire history of maintenance of the equipment.
a) Installation b) Maintenance c) Care d) Nil

20) _____ equipments must be maintained at a constant temperature around 20°C.
a) Electronic b) Mechanical c) Pneumatics d) Laboratory

_____

SLR-EP – 316

Seat No.	

B.E. (Biomedical Engg.) (Part – II) (New) Examination, 2016
INSTALLATION, MAINTENANCE AND SERVICING

Day and Date : Tuesday, 22-11-2016 Marks : 80

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*

2) ***Assume*** *suitable data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Explain the use of preventive maintenance for biomedical equipments with any two examples.

2) Explain working criteria's of R and D field in hospital.

3) Explain the need and procedure of drawing insurance of medical equipments in hospital.

4) Explain procedure of installing radiology equipment in radiology department.

5) Draw a labeled figure of a ventilator with all its specifications.

3. Attempt **any two** : **(2×10=20)**

1) Explain installation and maintenance procedure of defibrillator and pacemaker.

2) Explain the criteria for location, space requirement and design of OT.

3) Explain the installation procedure of pathology and radiology equipments with each of 2 examples.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain the importance of ISO and NABH certification.

   2) Explain the need and function of medical gas management.

   3) Explain maintenance procedure of radiology equipments with any one example.

   4) Draw and specify various front panel controls of a standard ventilator.

   5) Explain safety precautions that has to be taken while operating and handling ESU.

5. Attempt **any two** : **(2×10=20)**

   1) Explain various trouble shooting methods of operation theater equipments with any two examples.

   2) List various equipments present in NICU and explain functions of any two of it.

   3) Differentiate between PICU, CCU and AKD in terms of life saving equipments.

SLR-EP – 316

Seat No.	

Set **R**

B.E. (Biomedical Engg.) (Part – II) (New) Examination, 2016
INSTALLATION, MAINTENANCE AND SERVICING

Day and Date : Tuesday, 22-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) UPS systems are essential for clean and stable supply _____ maintenance.
a) During b) Before c) At the time d) For simultaneous

2) X-ray _____ ratings are done in current.
a) Tube b) Gantry c) Frequency d) Collimator

3) Preventive _____ is carried out to reduce the failure to absolute minimum.
a) Installation b) Maintenance c) Care d) Nil

4) _____ record should be maintained for each equipment to indicate entire history of maintenance of the equipment.
a) Installation b) Maintenance c) Care d) Nil

5) _____ equipments must be maintained at a constant temperature around 20°C.
a) Electronic b) Mechanical c) Pneumatics d) Laboratory

6) Dry skin presents a very _____ resistance of several hundred thousand ohms.
a) High b) Low c) Moderate d) Standard

7) QCI stands for _____
a) Quality Council Integrity b) Quality Control and Implementation
c) Quantity Council in India d) Quality Control and Imaging

P.T.O.

8) _____ are included in ventilator to remove mucus from airway passage.
   a) Aspirators b) ECG machine
   c) Defibrillator d) Humidifier

9) _____ is used to measure lung capacity and volume.
   a) Lung measurement b) Humidifier
   c) Spirometer d) Ventilator

10) CCU stands for _____
   a) Cardiac Care Unit b) Cardiac Center Unit
   c) Coronary Center Unit d) Coronary Care Unit

11) _____ in X-rays is measured in Kilovolt.
   a) Voltages b) Power c) kVp d) Energy

12) _____ is part of heart lung machine.
   a) Ventilator b) Oxygenator c) Defibrillator d) Humidifier

13) _____ is the examination of certain equipments or their parts to find their state or condition.
   a) Inspection b) Calibration c) Maintenance d) None

14) In _____ measurement flow rate “Q=VA” where A stands for area of cross section.
   a) Pulse rate b) Heart rate c) Blood flow d) Blood pressure

15) CPAP is a mode of synchrony _____
   a) Lung measurement b) Humidifier
   c) Spirometer d) Ventilator

16) In the _____ the air flows through bacteria filter.
   a) Lung measurement b) Humidifier
   c) Spirometer d) Ventilator

17) _____ measures analysis in clinical chemistry.
   a) Centrifuge b) Gas analyzer
   c) Spectrophotometer d) PH meter

18) The _____ inlet in the cardioverter is used for moderate pressure gas.
   a) Lower b) Upper c) Moderate d) Ventilator

19) Cardioverter is operated while presence of _____
   a) ECG b) Pacemaker c) Defibrillator d) Heart long machine

20) Negative transformer is not used in _____ modality.
   a) SPECT b) CT c) X-Ray d) PET

_____

SLR-EP – 316

Seat No.	

B.E. (Biomedical Engg.) (Part – II) (New) Examination, 2016
INSTALLATION, MAINTENANCE AND SERVICING

Day and Date : Tuesday, 22-11-2016 Marks : 80

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*

2) ***Assume*** *suitable data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Explain the use of preventive maintenance for biomedical equipments with any two examples.

2) Explain working criteria's of R and D field in hospital.

3) Explain the need and procedure of drawing insurance of medical equipments in hospital.

4) Explain procedure of installing radiology equipment in radiology department.

5) Draw a labeled figure of a ventilator with all its specifications.

3. Attempt **any two** : **(2×10=20)**

1) Explain installation and maintenance procedure of defibrillator and pacemaker.

2) Explain the criteria for location, space requirement and design of OT.

3) Explain the installation procedure of pathology and radiology equipments with each of 2 examples.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain the importance of ISO and NABH certification.

   2) Explain the need and function of medical gas management.

   3) Explain maintenance procedure of radiology equipments with any one example.

   4) Draw and specify various front panel controls of a standard ventilator.

   5) Explain safety precautions that has to be taken while operating and handling ESU.

5. Attempt **any two** : **(2×10=20)**

   1) Explain various trouble shooting methods of operation theater equipments with any two examples.

   2) List various equipments present in NICU and explain functions of any two of it.

   3) Differentiate between PICU, CCU and AKD in terms of life saving equipments.

SLR-EP – 316

Seat No.	

Set **S**

B.E. (Biomedical Engg.) (Part – II) (New) Examination, 2016
INSTALLATION, MAINTENANCE AND SERVICING

Day and Date : Tuesday, 22-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) In the _____ the air flows through bacteria filter.
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

2) _____ measures analysis in clinical chemistry.
a) Centrifuge b) Gas analyzer
c) Spectrophotometer d) PH meter

3) The _____ inlet in the cardioverter is used for moderate pressure gas.
a) Lower b) Upper c) Moderate d) Ventilator

4) Cardioverter is operated while presence of _____
a) ECG b) Pacemaker c) Defibrillator d) Heart long machine

5) Negative transformer is not used in _____ modality.
a) SPECT b) CT c) X-Ray d) PET

6) UPS systems are essential for clean and stable supply _____ maintenance.
a) During b) Before c) At the time d) For simultaneous

7) X-ray _____ ratings are done in current.
a) Tube b) Gantry c) Frequency d) Collimator

8) Preventive _____ is carried out to reduce the failure to absolute minimum.
a) Installation b) Maintenance c) Care d) Nil

P.T.O.

9) _____ record should be maintained for each equipment to indicate entire history of maintenance of the equipment.
a) Installation b) Maintenance c) Care d) Nil

10) _____ equipments must be maintained at a constant temperature around 20°C.
a) Electronic b) Mechanical c) Pneumatics d) Laboratory

11) Dry skin presents a very _____ resistance of several hundred thousand ohms.
a) High b) Low c) Moderate d) Standard

12) QCI stands for _____
a) Quality Council Integrity b) Quality Control and Implementation
c) Quantity Council in India d) Quality Control and Imaging

13) _____ are included in ventilator to remove mucus from airway passage.
a) Aspirators b) ECG machine
c) Defibrillator d) Humidifier

14) _____ is used to measure lung capacity and volume.
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

15) CCU stands for _____
a) Cardiac Care Unit b) Cardiac Center Unit
c) Coronary Center Unit d) Coronary Care Unit

16) _____ in X-rays is measured in Kilovolt.
a) Voltages b) Power c) kVp d) Energy

17) _____ is part of heart lung machine.
a) Ventilator b) Oxygenator c) Defibrillator d) Humidifier

18) _____ is the examination of certain equipments or their parts to find their state or condition.
a) Inspection b) Calibration c) Maintenance d) None

19) In _____ measurement flow rate “Q=VA” where A stands for area of cross section.
a) Pulse rate b) Heart rate c) Blood flow d) Blood pressure

20) CPAP is a mode of synchrony _____
a) Lung measurement b) Humidifier
c) Spirometer d) Ventilator

_____

SLR-EP – 316

Seat No.	

B.E. (Biomedical Engg.) (Part – II) (New) Examination, 2016
INSTALLATION, MAINTENANCE AND SERVICING

Day and Date : Tuesday, 22-11-2016 Marks : 80

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*

2) ***Assume*** *suitable data* ***wherever*** *required.*

SECTION – I

2. Attempt **any four** : **(4×5=20)**

1) Explain the use of preventive maintenance for biomedical equipments with any two examples.

2) Explain working criteria's of R and D field in hospital.

3) Explain the need and procedure of drawing insurance of medical equipments in hospital.

4) Explain procedure of installing radiology equipment in radiology department.

5) Draw a labeled figure of a ventilator with all its specifications.

3. Attempt **any two** : **(2×10=20)**

1) Explain installation and maintenance procedure of defibrillator and pacemaker.

2) Explain the criteria for location, space requirement and design of OT.

3) Explain the installation procedure of pathology and radiology equipments with each of 2 examples.

SECTION – II

4. Attempt **any four** : **(4×5=20)**

   1) Explain the importance of ISO and NABH certification.

   2) Explain the need and function of medical gas management.

   3) Explain maintenance procedure of radiology equipments with any one example.

   4) Draw and specify various front panel controls of a standard ventilator.

   5) Explain safety precautions that has to be taken while operating and handling ESU.

5. Attempt **any two** : **(2×10=20)**

   1) Explain various trouble shooting methods of operation theater equipments with any two examples.

   2) List various equipments present in NICU and explain functions of any two of it.

   3) Differentiate between PICU, CCU and AKD in terms of life saving equipments.

SLR-EP – 317

Seat No.	

Set **P**

B.E. (Biomedical Engg.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (New)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct alternatives : **(20×1=20)**

1) The packaging technology of microsystems is in _____ stage.
   a) Infant b) Well developed
   c) End d) None

2) _____ is the product of MEMs and Microsystems.
   a) Micro-gears b) Breaks c) Both a) and b) d) None

3) The electrical resistivity of silicon is
   a) $10^{-3} – 10^{8}$ b) $10^{-3} – 10^{6.5}$ c) $10^{-3} – 10^{4.5}$ d) $10^{-3} – 10^{1.5}$

4) The Gallium Arsenide (GaAs) is made of _____ numbers of gallium and arsenide atoms.
   a) 0 b) 10 c) Not equal d) Equal

5) The Kodak KTFR is used as _____ resist.
   a) Positive b) Negative c) Both a) and b) d) None

6) Deposition process of Silicon Dioxide (SiO_2) using CVD need _____ range of Temp. and _____ activation energy.
   a) 400 to 500°C and 0.4 eV b) 650 to 750°C and 1.8 eV
   c) 700 to 900°C and 1.8 eV d) 600 to 750°C and 1.7 eV

7) The selectivity ratio of etchants of silicon for Silicon Dioxide for KOH etchant is
   a) $10^{3} – 10^{4}$ b) 10^{4} c) 10^{3} d) None

8) _____ used as light source in LIGA process.
   a) Gamma ray b) X-ray c) Tungsten Lamp d) All of the above

9) _____ metal is used in the electroplating step of LIGA process.
a) Nickel b) Cu c) Both a) and b) d) None

10) In photodiode _____ is doped layers.
a) P b) N c) Both P and N d) None

11) ISFET sensor is used to sense
a) pH of solution b) pressure
c) biomedical parameter d) none

12) The μTAS simultaneously analyze N No. of _____ using a system containing M No. of
a) Carbides and Silicon b) Substrates and Sensors
c) Components and Sensors d) All of the above

13) METF valve is
a) Micro Electro Thermo Fluidic b) Micro Electrical Temporary Fluidic
c) Micro Electro Temporary Fluidic d) Micro Enable Thermal Flow

14) In μTAS type D micro valve is also known as _____ valve.
a) Pressure thermal b) Thermo Pneumatic Actuation
c) Thermal d) Micro Electro Thermo Fluidic

15) The nanolithography fabrication process creates _____ scale structured pattern.
a) Centimeter b) Millimeter c) Micrometer d) Nanometer

16) Replica molding is type of
a) Photolithography b) Soft Lithography
c) Etching d) Surface Micromachining

17) _____ techniques are currently used to identify urinary tract pathogens.
a) Blood test b) ELISA
c) Microbial culture d) Electro cardiogram

18) The _____ drug is delivered in the application of type A diabetes patients drug delivery system.
a) Insulin b) Glucose c) Sugar d) All

19) _____ is type of nanoparticle that have been used in vivo for bio sensing application.
a) Quantum dots b) X-rays
c) MRI contrast agent d) Both a) and c)

20) The _____ technique is used to create structure at Nano scales as small as 30 nm.
a) Soft Lithography b) PVD c) CVD d) LIGA

_____

SLR-EP – 317

Seat No.	

B.E. (Biomedical Engg.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (New)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

1) List the differences between microsystems and microelectronics.
2) Give the advantages of polymers as industrial material.
3) Explain positive and negative type photoresist.
4) Explain the electroplating process of nickel in the LIGA process.
5) Write a short note on Gallium Arsenide (GaAs).

III. Solve **any two** questions : **(10×2=20)**

1) List and explain silicon compounds used in microsystems.
2) List methods of epitaxial deposition ? Explain vapour phase epitaxy.
3) Explain major fabrication steps in the LIGA process in detail.

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

1) Explain working principle of chemical sensors.
2) Explain principal design of electrostatic micro pump.
3) Give the classification of biosensors by biological signaling.
4) Write a short note on injection molding.
5) Explain the biomedical sensors in detail.

V. Solve **any two** questions : **(10×2=20)**

1) Classify soft lithography. Explain any two.
2) Classify micro-valves used in μTAS and explain each with diagram.
3) Write a short note on :
   i) Application of biosensor in glucose detection in-vivo.
   ii) Application of biosensor in bacterial urinary tract infections.

_____

Set P

Set P

SLR-EP – 317

Seat No.	

Set **Q**

B.E. (Biomedical Engg.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (New)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct alternatives : **(20×1=20)**

1) Replica molding is type of
   a) Photolithography b) Soft Lithography
   c) Etching d) Surface Micromachining

2) _____ techniques are currently used to identify urinary tract pathogens.
   a) Blood test b) ELISA
   c) Microbial culture d) Electro cardiogram

3) The _____ drug is delivered in the application of type A diabetes patients drug delivery system.
   a) Insulin b) Glucose c) Sugar d) All

4) _____ is type of nanoparticle that have been used in vivo for bio sensing application.
   a) Quantum dots b) X-rays
   c) MRI contrast agent d) Both a) and c)

5) The _____ technique is used to create structure at Nano scales as small as 30 nm.
   a) Soft Lithography b) PVD c) CVD d) LIGA

6) The packaging technology of microsystems is in _____ stage.
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   c) End d) None

7) _____ is the product of MEMs and Microsystems.
   a) Micro-gears b) Breaks c) Both a) and b) d) None

P.T.O.

8) The electrical resistivity of silicon is
a) $10^{-3} - 10^{8}$ b) $10^{-3} - 10^{6.5}$ c) $10^{-3} - 10^{4.5}$ d) $10^{-3} - 10^{1.5}$

9) The Gallium Arsenide (GaAs) is made of _____ numbers of gallium and arsenide atoms.
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10) The Kodak KTFR is used as _____ resist.
a) Positive b) Negative c) Both a) and b) d) None

11) Deposition process of Silicon Dioxide (SiO_2) using CVD need _____ range of Temp. and _____ activation energy.
a) 400 to 500°C and 0.4 eV b) 650 to 750°C and 1.8 eV
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12) The selectivity ratio of etchants of silicon for Silicon Dioxide for KOH etchant is
a) $10^{3} - 10^{4}$ b) 10^{4} c) 10^{3} d) None

13) _____ used as light source in LIGA process.
a) Gamma ray b) X-ray c) Tungsten Lamp d) All of the above

14) _____ metal is used in the electroplating step of LIGA process.
a) Nickel b) Cu c) Both a) and b) d) None

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a) P b) N c) Both P and N d) None

16) ISFET sensor is used to sense
a) pH of solution b) pressure
c) biomedical parameter d) none

17) The μTAS simultaneously analyze N No. of _____ using a system containing M No. of
a) Carbides and Silicon b) Substrates and Sensors
c) Components and Sensors d) All of the above

18) METF valve is
a) Micro Electro Thermo Fluidic b) Micro Electrical Temporary Fluidic
c) Micro Electro Temporary Fluidic d) Micro Enable Thermal Flow

19) In μTAS type D micro valve is also known as _____ valve.
a) Pressure thermal b) Thermo Pneumatic Actuation
c) Thermal d) Micro Electro Thermo Fluidic

20) The nanolithography fabrication process creates _____ scale structured pattern.
a) Centimeter b) Millimeter c) Micrometer d) Nanometer

_____

SLR-EP – 317

Seat No.	

B.E. (Biomedical Engg.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (New)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

1) List the differences between microsystems and microelectronics.
2) Give the advantages of polymers as industrial material.
3) Explain positive and negative type photoresist.
4) Explain the electroplating process of nickel in the LIGA process.
5) Write a short note on Gallium Arsenide (GaAs).

III. Solve **any two** questions : **(10×2=20)**

1) List and explain silicon compounds used in microsystems.
2) List methods of epitaxial deposition ? Explain vapour phase epitaxy.
3) Explain major fabrication steps in the LIGA process in detail.

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

1) Explain working principle of chemical sensors.
2) Explain principal design of electrostatic micro pump.
3) Give the classification of biosensors by biological signaling.
4) Write a short note on injection molding.
5) Explain the biomedical sensors in detail.

V. Solve **any two** questions : **(10×2=20)**

1) Classify soft lithography. Explain any two.
2) Classify micro-valves used in μTAS and explain each with diagram.
3) Write a short note on :
   i) Application of biosensor in glucose detection in-vivo.
   ii) Application of biosensor in bacterial urinary tract infections.

———————

Set Q

Set Q

SLR-EP – 317

Seat No.	

Set R

B.E. (Biomedical Engg.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (New)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct alternatives : **(20×1=20)**

1) ISFET sensor is used to sense
   a) pH of solution b) pressure
   c) biomedical parameter d) none

2) The μTAS simultaneously analyze N No. of _____ using a system containing M No. of
   a) Carbides and Silicon b) Substrates and Sensors
   c) Components and Sensors d) All of the above

3) METF valve is
   a) Micro Electro Thermo Fluidic b) Micro Electrical Temporary Fluidic
   c) Micro Electro Temporary Fluidic d) Micro Enable Thermal Flow

4) In μTAS type D micro valve is also known as _____ valve.
   a) Pressure thermal b) Thermo Pneumatic Actuation
   c) Thermal d) Micro Electro Thermo Fluidic

5) The nanolithography fabrication process creates _____ scale structured pattern.
   a) Centimeter b) Millimeter c) Micrometer d) Nanometer

6) Replica molding is type of
   a) Photolithography b) Soft Lithography
   c) Etching d) Surface Micromachining

7) _____ techniques are currently used to identify urinary tract pathogens.
   a) Blood test b) ELISA
   c) Microbial culture d) Electro cardiogram

P.T.O.

8) The _____ drug is delivered in the application of type A diabetes patients drug delivery system.
a) Insulin b) Glucose c) Sugar d) All

9) _____ is type of nanoparticle that have been used in vivo for bio sensing application.
a) Quantum dots b) X-rays
c) MRI contrast agent d) Both a) and c)

10) The _____ technique is used to create structure at Nano scales as small as 30 nm.
a) Soft Lithography b) PVD c) CVD d) LIGA

11) The packaging technology of microsystems is in _____ stage.
a) Infant b) Well developed
c) End d) None

12) _____ is the product of MEMs and Microsystems.
a) Micro-gears b) Breaks c) Both a) and b) d) None

13) The electrical resistivity of silicon is
a) $10^{-3} - 10^{8}$ b) $10^{-3} - 10^{6.5}$ c) $10^{-3} - 10^{4.5}$ d) $10^{-3} - 10^{1.5}$

14) The Gallium Arsenide (GaAs) is made of _____ numbers of gallium and arsenide atoms.
a) 0 b) 10 c) Not equal d) Equal

15) The Kodak KTFR is used as _____ resist.
a) Positive b) Negative c) Both a) and b) d) None

16) Deposition process of Silicon Dioxide (SiO_2) using CVD need _____ range of Temp. and _____ activation energy.
a) 400 to 500°C and 0.4 eV b) 650 to 750°C and 1.8 eV
c) 700 to 900°C and 1.8 eV d) 600 to 750°C and 1.7 eV

17) The selectivity ratio of etchants of silicon for Silicon Dioxide for KOH etchant is
a) $10^{3} - 10^{4}$ b) 10^{4} c) 10^{3} d) None

18) _____ used as light source in LIGA process.
a) Gamma ray b) X-ray c) Tungsten Lamp d) All of the above

19) _____ metal is used in the electroplating step of LIGA process.
a) Nickel b) Cu c) Both a) and b) d) None

20) In photodiode _____ is doped layers.
a) P b) N c) Both P and N d) None

_____

SLR-EP – 317

Seat No.	

B.E. (Biomedical Engg.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (New)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

1) List the differences between microsystems and microelectronics.
2) Give the advantages of polymers as industrial material.
3) Explain positive and negative type photoresist.
4) Explain the electroplating process of nickel in the LIGA process.
5) Write a short note on Gallium Arsenide (GaAs).

III. Solve **any two** questions : **(10×2=20)**

1) List and explain silicon compounds used in microsystems.
2) List methods of epitaxial deposition ? Explain vapour phase epitaxy.
3) Explain major fabrication steps in the LIGA process in detail.

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

1) Explain working principle of chemical sensors.
2) Explain principal design of electrostatic micro pump.
3) Give the classification of biosensors by biological signaling.
4) Write a short note on injection molding.
5) Explain the biomedical sensors in detail.

V. Solve **any two** questions : **(10×2=20)**

1) Classify soft lithography. Explain any two.
2) Classify micro-valves used in μTAS and explain each with diagram.
3) Write a short note on :
   i) Application of biosensor in glucose detection in-vivo.
   ii) Application of biosensor in bacterial urinary tract infections.

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Set R

Set R

SLR-EP – 317

Seat No.	

Set S

B.E. (Biomedical Engg.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (New)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Choose the correct alternatives : **(20×1=20)**

1) Deposition process of Silicon Dioxide (SiO_2) using CVD need _____ range of Temp. and _____ activation energy.
   a) 400 to 500°C and 0.4 eV b) 650 to 750°C and 1.8 eV
   c) 700 to 900°C and 1.8 eV d) 600 to 750°C and 1.7 eV

2) The selectivity ratio of etchants of silicon for Silicon Dioxide for KOH etchant is
   a) $10^3 – 10^4$ b) 10^4 c) 10^3 d) None

3) _____ used as light source in LIGA process.
   a) Gamma ray b) X-ray c) Tungsten Lamp d) All of the above

4) _____ metal is used in the electroplating step of LIGA process.
   a) Nickel b) Cu c) Both a) and b) d) None

5) In photodiode _____ is doped layers.
   a) P b) N c) Both P and N d) None

6) ISFET sensor is used to sense
   a) pH of solution b) pressure
   c) biomedical parameter d) none

7) The μTAS simultaneously analyze N No. of _____ using a system containing M No. of
   a) Carbides and Silicon b) Substrates and Sensors
   c) Components and Sensors d) All of the above

8) METF valve is
   a) Micro Electro Thermo Fluidic b) Micro Electrical Temporary Fluidic
   c) Micro Electro Temporary Fluidic d) Micro Enable Thermal Flow

P.T.O.

9) In μTAS type D micro valve is also known as _____ valve.
   a) Pressure thermal b) Thermo Pneumatic Actuation
   c) Thermal d) Micro Electro Thermo Fluidic

10) The nanolithography fabrication process creates _____ scale structured pattern.
   a) Centimeter b) Millimeter c) Micrometer d) Nanometer

11) Replica molding is type of
   a) Photolithography b) Soft Lithography
   c) Etching d) Surface Micromachining

12) _____ techniques are currently used to identify urinary tract pathogens.
   a) Blood test b) ELISA
   c) Microbial culture d) Electro cardiogram

13) The _____ drug is delivered in the application of type A diabetes patients drug delivery system.
   a) Insulin b) Glucose c) Sugar d) All

14) _____ is type of nanoparticle that have been used in vivo for bio sensing application.
   a) Quantum dots b) X-rays
   c) MRI contrast agent d) Both a) and c)

15) The _____ technique is used to create structure at Nano scales as small as 30 nm.
   a) Soft Lithography b) PVD c) CVD d) LIGA

16) The packaging technology of microsystems is in _____ stage.
   a) Infant b) Well developed
   c) End d) None

17) _____ is the product of MEMs and Microsystems.
   a) Micro-gears b) Breaks c) Both a) and b) d) None

18) The electrical resistivity of silicon is
   a) $10^{-3} – 10^{8}$ b) $10^{-3} – 10^{6.5}$ c) $10^{-3} – 10^{4.5}$ d) $10^{-3} – 10^{1.5}$

19) The Gallium Arsenide (GaAs) is made of _____ numbers of gallium and arsenide atoms.
   a) 0 b) 10 c) Not equal d) Equal

20) The Kodak KTFR is used as _____ resist.
   a) Positive b) Negative c) Both a) and b) d) None

_____

SLR-EP – 317

Seat No.	

B.E. (Biomedical Engg.) (Part – II) Examination, 2016
BIOMEDICAL MICROSYSTEMS (New)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

1) List the differences between microsystems and microelectronics.
2) Give the advantages of polymers as industrial material.
3) Explain positive and negative type photoresist.
4) Explain the electroplating process of nickel in the LIGA process.
5) Write a short note on Gallium Arsenide (GaAs).

III. Solve **any two** questions : **(10×2=20)**

1) List and explain silicon compounds used in microsystems.
2) List methods of epitaxial deposition ? Explain vapour phase epitaxy.
3) Explain major fabrication steps in the LIGA process in detail.

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

1) Explain working principle of chemical sensors.
2) Explain principal design of electrostatic micro pump.
3) Give the classification of biosensors by biological signaling.
4) Write a short note on injection molding.
5) Explain the biomedical sensors in detail.

V. Solve **any two** questions : **(10×2=20)**

1) Classify soft lithography. Explain any two.
2) Classify micro-valves used in μTAS and explain each with diagram.
3) Write a short note on :
   i) Application of biosensor in glucose detection in-vivo.
   ii) Application of biosensor in bacterial urinary tract infections.

_____

Set S

Set S

SLR-EP – 318

Seat No.	

Set **P**

B.E. (Biomedical) (Part – II) Examination, 2016
TISSUE ENGINEERING (New)

Day and Date : Thursday, 24-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

N. B. *: 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) _____ alteration of cells growth and function.
a) In vivo b) In vitro c) Fibroblast d) None

2) The irreversible progression of a cell or cell population to a more mature state is called _____
a) Differentiation b) Poliferation c) Flow cytometry d) None

3) _____ lineage include erythrocyte, monocyte, granulocyte and platelets.
a) Lymphoid b) Myeloid c) Hematopoiesis d) None

4) Which term describes a band of dense regular connective tissue that attaches two bonds ?
a) Aponeurosis b) Tendon c) Ligament d) Capsule

5) Hollow fibers system consist of a shell traversed by a large number of small diameter _____
a) Beads b) Tubes c) Hydrophobia d) None

6) The major function of loose connective tissue include
a) Occupying spaces between organs and supporting epithelia
b) Supporting and surrounding blood vessels and nerves
c) Cushioning organs, storing lipids and facilitating diffusion
d) All of the above

7) _____ cells growth can be very rapid and uncontrollable which can cause design problem.
a) Somatic cells b) Tumor cells
c) Endothelial cells d) None

8) The human body consumes a staggering _____ billions of mature cells every day.
a) 600 Billions b) 500 Millions c) 400 Billions d) None

P.T.O.

9) Cells of the vascular system are constantly exposed to _____ force, due to the flow of blood.
   a) Hemodynamic b) Hydrodynamic c) Stress effect d) None

10) _____ is very often the limiting nutrient in reconstructed tissue for metabolic requirement.
   a) Carbon Dioxide b) Oxygen c) Collagen d) None

11) Hepatocyte transplantation system consist of _____
   a) Injection model and polymer matrices b) Myeloid and Lymphoid
   c) Erythrocytes and Neutrophils d) None

12) Life for most eukaryotes and all mammals begins as a single to totipotent stem cells _____
   a) Adult cells b) Aging cells c) Zygote d) None

13) What do you mean by term BAEC's ?
   a) Bi-Active Endothelial Cells b) Biomedical Active Epithelial Cells
   c) Bovine Aortic Endothelial Cells d) None

14) The equation $Tw = 6 Q\mu /bh^2$, where Q indicates
   a) Viscosity of following fluid b) Channel width
   c) Volumetric flow rate d) None

15) What do you mean by stromal ?
   a) Architecture b) Structure c) Frame work d) None

16) In transplantation, _____ is related to a person who has been declared brain dead.
   a) Death b) Cadaveric c) Cardiac arrest d) None

17) CSFU defines the term
   a) Colony Stimulating Factor Unit b) Colony Stimulating Forming Unit
   c) Colony Steady Fast Unit d) None

18) The _____ properties of neural cells can form the basis of a cell based bio sensing unit.
   a) In Vivo and Invitro b) Hemodynamic and hetrodynamic
   c) Electro chemical and chemo electrical d) None

19) PGA means
   a) Poly Glycolic Acid b) Poly Glycerin Acid
   c) Polymer G Acid d) None

20) Application and reconstituted ex-vivo hematopoiesis
   a) Autologous, allogeneic and alternative
   b) Autologous, allopathic and moderation
   c) Auto generation, allogeneic and alternation
   d) None of the above

_____

SLR-EP – 318

Seat No.	

B.E. (Biomedical) (Part – II) Examination, 2016
TISSUE ENGINEERING (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Explain about the shear stress effect on gene regulation.
   2) Explain about the adult stem cell.
   3) Explain about the gene therapy and tissue engineering in vascular biology.
   4) Explain about the shear effect on endothelial cell metabolite secretion.
   5) Explain briefly about stereotypic culture versus monolayer culture.

3. Solve **any two** : **(2×10=20)**
   1) Explain different methodology and devices for shear stress effect on cellular function.
   2) Discuss with a neat diagram metabolic requirements of cells with a neat labelled diagram.
   3) Explain about the directed motile response for INVIVO for cell motility and tissue architecture.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   1) Explain briefly about tissue reconstruction for nerve generation with diagram.
   2) Explain about the cell based approaches to cartilage.
   3) Explain about the injury and repair for skeletal muscle system.
   4) Explain about the hematopoietic growth factors for bone marrow.
   5) Explain briefly about the tubule reconstruction for kidney function.

5. Solve **any two** : **(2×10=20)**
   1) Explain about invitro neural circuits and biosensors.
   2) Explain briefly about the glomerular ultrafiltration for kidney.
   3) Explain about the myoblast transfer and gene therapy for skeletal muscle.

Set P

Set P

SLR-EP – 318

Seat No.	

Set **Q**

B.E. (Biomedical) (Part – II) Examination, 2016
TISSUE ENGINEERING (New)

Day and Date : Thursday, 24-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) In transplantation, _____ is related to a person who has been declared brain dead.
a) Death b) Cadaveric c) Cardiac arrest d) None

2) CSFU defines the term
a) Colony Stimulating Factor Unit b) Colony Stimulating Forming Unit
c) Colony Steady Fast Unit d) None

3) The _____ properties of neural cells can form the basis of a cell based bio sensing unit.
a) In Vivo and Invitro b) Hemodynamic and hetrodynamic
c) Electro chemical and chemo electrical d) None

4) PGA means
a) Poly Glycolic Acid b) Poly Glycerin Acid
c) Polymer G Acid d) None

5) Application and reconstituted ex-vivo hematopoiesis
a) Autologous, allogeneic and alternative
b) Autologous, allopathic and moderation
c) Auto generation, allogeneic and alternation
d) None of the above

6) _____ alteration of cells growth and function.
a) In vivo b) In vitro c) Fibroblast d) None

7) The irreversible progression of a cell or cell population to a more mature state is called _____
a) Differentiation b) Poliferation c) Flow cytometry d) None

8) _____ lineage include erythrocyte, monocyte, granulocyte and platelets.
a) Lymphoid b) Myeloid c) Hematopoiesis d) None

P.T.O.

9) Which term describes a band of dense regular connective tissue that attaches two bonds ?
   a) Aponeurosis b) Tendon c) Ligament d) Capsule

10) Hollow fibers system consist of a shell traversed by a large number of small diameter _____
   a) Beads b) Tubes c) Hydrophobia d) None

11) The major function of loose connective tissue include
   a) Occupying spaces between organs and supporting epithelia
   b) Supporting and surrounding blood vessels and nerves
   c) Cushioning organs, storing lipids and facilitating diffusion
   d) All of the above

12) _____ cells growth can be very rapid and uncontrollable which can cause design problem.
   a) Somatic cells b) Tumor cells
   c) Endothelial cells d) None

13) The human body consumes a staggering _____ billions of mature cells every day.
   a) 600 Billions b) 500 Millions c) 400 Billions d) None

14) Cells of the vascular system are constantly exposed to _____ force, due to the flow of blood.
   a) Hemodynamic b) Hydrodynamic c) Stress effect d) None

15) _____ is very often the limiting nutrient in reconstructed tissue for metabolic requirement.
   a) Carbon Dioxide b) Oxygen c) Collagen d) None

16) Hepatocyte transplantation system consist of _____
   a) Injection model and polymer matrices b) Myeloid and Lymphoid
   c) Erythrocytes and Neutrophils d) None

17) Life for most eukaryotes and all mammals begins as a single to totipotent stem cells _____
   a) Adult cells b) Aging cells c) Zygote d) None

18) What do you mean by term BAEC's ?
   a) Bi-Active Endothelial Cells b) Biomedical Active Epithelial Cells
   c) Bovine Aortic Endothelial Cells d) None

19) The equation $Tw = 6 Q\mu /bh^2$, where Q indicates
   a) Viscosity of following fluid b) Channel width
   c) Volumetric flow rate d) None

20) What do you mean by stromal ?
   a) Architecture b) Structure c) Frame work d) None

_____

SLR-EP – 318

Seat No.	

B.E. (Biomedical) (Part – II) Examination, 2016
TISSUE ENGINEERING (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Explain about the shear stress effect on gene regulation.
   2) Explain about the adult stem cell.
   3) Explain about the gene therapy and tissue engineering in vascular biology.
   4) Explain about the shear effect on endothelial cell metabolite secretion.
   5) Explain briefly about stereotypic culture versus monolayer culture.

3. Solve **any two** : **(2×10=20)**
   1) Explain different methodology and devices for shear stress effect on cellular function.
   2) Discuss with a neat diagram metabolic requirements of cells with a neat labelled diagram.
   3) Explain about the directed motile response for INVIVO for cell motility and tissue architecture.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   1) Explain briefly about tissue reconstruction for nerve generation with diagram.
   2) Explain about the cell based approaches to cartilage.
   3) Explain about the injury and repair for skeletal muscle system.
   4) Explain about the hematopoietic growth factors for bone marrow.
   5) Explain briefly about the tubule reconstruction for kidney function.

5. Solve **any two** : **(2×10=20)**
   1) Explain about invitro neural circuits and biosensors.
   2) Explain briefly about the glomerular ultrafiltration for kidney.
   3) Explain about the myoblast transfer and gene therapy for skeletal muscle.

Set Q

Set Q

SLR-EP – 318

Seat No.	

Set **R**

B.E. (Biomedical) (Part – II) Examination, 2016
TISSUE ENGINEERING (New)

Day and Date : Thursday, 24-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

N. B. *: 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) Hepatocyte transplantation system consist of _____
   a) Injection model and polymer matrices b) Myeloid and Lymphoid
   c) Erythrocytes and Neutrophils d) None

2) Life for most eukaryotes and all mammals begins as a single to totipotent stem cells _____
   a) Adult cells b) Aging cells c) Zygote d) None

3) What do you mean by term BAEC's ?
   a) Bi-Active Endothelial Cells b) Biomedical Active Epithelial Cells
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4) The equation $Tw = 6\ Q\mu / bh^2$, where Q indicates
   a) Viscosity of following fluid b) Channel width
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6) In transplantation, _____ is related to a person who has been declared brain dead.
   a) Death b) Cadaveric c) Cardiac arrest d) None

7) CSFU defines the term
   a) Colony Stimulating Factor Unit b) Colony Stimulating Forming Unit
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8) The _____ properties of neural cells can form the basis of a cell based bio sensing unit.
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P.T.O.

9) PGA means
   a) Poly Glycolic Acid b) Poly Glycerin Acid
   c) Polymer G Acid d) None

10) Application and reconstituted ex-vivo hematopoiesis
   a) Autologous, allogeneic and alternative
   b) Autologous, allopathic and moderation
   c) Auto generation, allogeneic and alternation
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14) Which term describes a band of dense regular connective tissue that attaches two bonds ?
   a) Aponeurosis b) Tendon c) Ligament d) Capsule

15) Hollow fibers system consist of a shell traversed by a large number of small diameter _____
   a) Beads b) Tubes c) Hydrophobia d) None

16) The major function of loose connective tissue include
   a) Occupying spaces between organs and supporting epithelia
   b) Supporting and surrounding blood vessels and nerves
   c) Cushioning organs, storing lipids and facilitating diffusion
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17) _____ cells growth can be very rapid and uncontrollable which can cause design problem.
   a) Somatic cells b) Tumor cells
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18) The human body consumes a staggering _____ billions of mature cells every day.
   a) 600 Billions b) 500 Millions c) 400 Billions d) None

19) Cells of the vascular system are constantly exposed to _____ force, due to the flow of blood.
   a) Hemodynamic b) Hydrodynamic c) Stress effect d) None

20) _____ is very often the limiting nutrient in reconstructed tissue for metabolic requirement.
   a) Carbon Dioxide b) Oxygen c) Collagen d) None

_____

SLR-EP – 318

Seat No.	

B.E. (Biomedical) (Part – II) Examination, 2016
TISSUE ENGINEERING (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Explain about the shear stress effect on gene regulation.
   2) Explain about the adult stem cell.
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3. Solve **any two** : **(2×10=20)**
   1) Explain different methodology and devices for shear stress effect on cellular function.
   2) Discuss with a neat diagram metabolic requirements of cells with a neat labelled diagram.
   3) Explain about the directed motile response for INVIVO for cell motility and tissue architecture.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   1) Explain briefly about tissue reconstruction for nerve generation with diagram.
   2) Explain about the cell based approaches to cartilage.
   3) Explain about the injury and repair for skeletal muscle system.
   4) Explain about the hematopoietic growth factors for bone marrow.
   5) Explain briefly about the tubule reconstruction for kidney function.

5. Solve **any two** : **(2×10=20)**
   1) Explain about invitro neural circuits and biosensors.
   2) Explain briefly about the glomerular ultrafiltration for kidney.
   3) Explain about the myoblast transfer and gene therapy for skeletal muscle.

Set R

Set R

SLR-EP – 318

Seat No.	

Set S

B.E. (Biomedical) (Part – II) Examination, 2016
TISSUE ENGINEERING (New)

Day and Date : Thursday, 24-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

N. B. *: 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) The major function of loose connective tissue include
   a) Occupying spaces between organs and supporting epithelia
   b) Supporting and surrounding blood vessels and nerves
   c) Cushioning organs, storing lipids and facilitating diffusion
   d) All of the above

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6) Hepatocyte transplantation system consist of _____
   a) Injection model and polymer matrices b) Myeloid and Lymphoid
   c) Erythrocytes and Neutrophils d) None

7) Life for most eukaryotes and all mammals begins as a single to totipotent stem cells _____
   a) Adult cells b) Aging cells c) Zygote d) None

8) What do you mean by term BAEC's ?
   a) Bi-Active Endothelial Cells b) Biomedical Active Epithelial Cells
   c) Bovine Aortic Endothelial Cells d) None

9) The equation $Tw = 6 Q\mu /bh^2$, where Q indicates
   a) Viscosity of following fluid b) Channel width
   c) Volumetric flow rate d) None

10) What do you mean by stromal ?
   a) Architecture b) Structure c) Frame work d) None

11) In transplantation, _____ is related to a person who has been declared brain dead.
   a) Death b) Cadaveric c) Cardiac arrest d) None

12) CSFU defines the term
   a) Colony Stimulating Factor Unit b) Colony Stimulating Forming Unit
   c) Colony Steady Fast Unit d) None

13) The _____ properties of neural cells can form the basis of a cell based bio sensing unit.
   a) In Vivo and Invitro b) Hemodynamic and hetrodynamic
   c) Electro chemical and chemo electrical d) None

14) PGA means
   a) Poly Glycolic Acid b) Poly Glycerin Acid
   c) Polymer G Acid d) None

15) Application and reconstituted ex-vivo hematopoiesis
   a) Autologous, allogeneic and alternative
   b) Autologous, allopathic and moderation
   c) Auto generation, allogeneic and alternation
   d) None of the above

16) _____ alteration of cells growth and function.
   a) In vivo b) In vitro c) Fibroblast d) None

17) The irreversible progression of a cell or cell population to a more mature state is called _____
   a) Differentiation b) Poliferation c) Flow cytometry d) None

18) _____ lineage include erythrocyte, monocyte, granulocyte and platelets.
   a) Lymphoid b) Myeloid c) Hematopoiesis d) None

19) Which term describes a band of dense regular connective tissue that attaches two bonds ?
   a) Aponeurosis b) Tendon c) Ligament d) Capsule

20) Hollow fibers system consist of a shell traversed by a large number of small diameter _____
   a) Beads b) Tubes c) Hydrophobia d) None

_____

SLR-EP – 318

Seat No.	

B.E. (Biomedical) (Part – II) Examination, 2016
TISSUE ENGINEERING (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Solve **any four** : **(4×5=20)**
   1) Explain about the shear stress effect on gene regulation.
   2) Explain about the adult stem cell.
   3) Explain about the gene therapy and tissue engineering in vascular biology.
   4) Explain about the shear effect on endothelial cell metabolite secretion.
   5) Explain briefly about stereotypic culture versus monolayer culture.

3. Solve **any two** : **(2×10=20)**
   1) Explain different methodology and devices for shear stress effect on cellular function.
   2) Discuss with a neat diagram metabolic requirements of cells with a neat labelled diagram.
   3) Explain about the directed motile response for INVIVO for cell motility and tissue architecture.

SECTION – II

4. Solve **any four** : **(4×5=20)**
   1) Explain briefly about tissue reconstruction for nerve generation with diagram.
   2) Explain about the cell based approaches to cartilage.
   3) Explain about the injury and repair for skeletal muscle system.
   4) Explain about the hematopoietic growth factors for bone marrow.
   5) Explain briefly about the tubule reconstruction for kidney function.

5. Solve **any two** : **(2×10=20)**
   1) Explain about invitro neural circuits and biosensors.
   2) Explain briefly about the glomerular ultrafiltration for kidney.
   3) Explain about the myoblast transfer and gene therapy for skeletal muscle.

Set S

Set S