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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III**

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

Total Marks : 70

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(1×14=14)

1) $L\{t^n \cdot f(t)\} =$ where $\phi(s) = L\{f(t)\}$

a) $(-1)^n \frac{d^n}{ds^n} [\phi(s)]$

b) $(-1)^n \frac{d^n}{ds^n} [\phi(s)]$

c) $\frac{d^n}{ds^n} [\phi(s)]$

d) None

2) The conditions for existence of Laplace transform are : If $f(t)$ is continuous and

a) $\lim_{t \rightarrow \infty} \{e^{-at} f(t)\}$ is finite

b) $\lim_{t \rightarrow \infty} \{e^{-at} f(t)\}$ is infinite

c) $\lim_{t \rightarrow \infty} \{e^{at} f(at)\}$ is finite

d) $\lim_{t \rightarrow \infty} \{e^{-at} t f(at)\}$ is finite

3) $L^{-1} \left\{ \frac{1}{4s-5} \right\} =$

a) $\frac{1}{4} e^{-(5/4)t}$

b) $\frac{1}{4} e^{(5/4)t}$

c) $\frac{1}{4} e^{(4/5)t}$

d) $\frac{1}{4} e^{-(4/5)t}$

4) $L \{ \operatorname{erf} \sqrt{t} \} =$

a) $\frac{1}{(s+1)\sqrt{s}}$

b) $\frac{1}{s\sqrt{s}}$

c) $\frac{1}{(s+1)\sqrt{s+1}}$

d) $\frac{1}{s\sqrt{s+1}}$

P.T.O.



5) Let $L\{f_1(t)\} = \phi_1(s)$ and $L\{f_2(t)\} = \phi_2(s)$ then by convolution theorem

$$L^{-1}\{\phi_1(s) \cdot \phi_2(s)\} =$$

a) $\int_0^{\infty} f_1(u) \cdot f_2(t-u) du$

b) $\int_0^{\infty} f_1(t) \cdot f_2(t) du$

c) $\int_0^t f_1(u) \cdot f_2(t-u) du$

d) none

6) If $f(z) = x^2 - y^2 + ikxy$ is analytic then the value of k is

a) $k = 1$

b) $k = 2$

c) $k = 3$

d) $k = 4$

7) If $f(z) = u + iv$ is analytic function. Then which of the following is true ?

a) u is harmonic and v is not harmonic

b) u is harmonic and v is harmonic

c) v is harmonic and u is not harmonic

d) u and v both are not harmonic

8) Which of the following is the fixed point of Bilinear transformation $\omega = \frac{1+3iz}{i+z}$?

a) $z = -i$

b) $z = 2i$

c) $z = i$

d) $z = -2i$

9) $\int_{|z|=1} \frac{1}{(z+2)(z-3)} dz =$

a) $2i$

b) $2\pi i$

c) $-2\pi i$

d) 0

10) $\int_C \frac{z^2}{(z-1)^2(z-2)} dz$ where $C : |z| = 2.5$

a) $2\pi i$

b) πi

c) $3\pi i$

d) $4\pi i$

11) If $f(z)$ and $\overline{f(z)}$ are both analytic then $f(z)$ is

a) constant

b) variable

c) both a and b

d) none

12) Fourier expansion of an odd function has only _____ terms.

a) Sine

b) Cosine

c) Both a and b

d) None

13) The half range sine series for 1 in $(0, \pi)$ is

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

b) $\frac{2}{\pi} \left\{ \sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \dots \right\}$

c) $\frac{4}{\pi} \left\{ \sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \dots \right\}$

d) $\frac{2}{\pi} \left\{ \sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \dots \right\}$

14) If $f(x) = x^4$ in $(-1, 1)$ then the Fourier coefficient b_n is

a) odd

b) zero

c) five

d) none



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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III**

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

Marks : 56

Instructions : 1) Figures to **right** indicate **full** marks.
2) Assume suitable data **whenever** necessary.

SECTION – I

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

- 1) Evaluate $\int_0^{\infty} \frac{\cos at - \cos bt}{t} dt$.
- 2) Determine the constants a, b, c, d if $f(z) = x^2 + 2axy + by^2 + i(cx^2 + 2dxy + y^2)$ is analytic.
- 3) State true or false with proper justification “There does not exist an analytic function whose real part is $u = 3x^2 + \sin x + y^2 + 5y + 4$ ”.
- 4) Find Laplace transform of $f(t) = \begin{cases} 1 & \text{for } 0 \leq t < a \\ -1 & \text{for } a < t < 2a \end{cases}$ and $f(t)$ is periodic with period $2a$.
- 5) Find Laplace transform of $\int_0^t u \cdot \cosh u \cdot du$.

3. Attempt **any two** : **(6×2=12)**

- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{s^2 + 16s - 24}{s^4 + 20s^2 + 64}$ by using partial fractions.
- 2) If $f(z) = u + iv$ is analytic and $u + v = \frac{2 \sin 2x}{e^{2y} + e^{-2y} - 2 \cos 2x}$. Then find $f(z)$.
- 3) Solve using Laplace transform $\frac{d^2y}{dt^2} + 9y = 18t$ given that $y(0) = 0$ and $y(\frac{\pi}{2}) = 0$.

Set P



SECTION – II

4. Attempt **any four** :**(4×4=16)**

1) Evaluate $\int_0^{1+i} z^2 dz$ along i) the line $y = x$ ii) the parabola $y^2 = x$. Is the line integral independent of the path ? Explain.

2) Find half range cosine series for $f(x) = x$ $0 < x < 2$ using Parseval's identity and deduce

$$\text{that } \frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \dots$$

3) Show that the set of functions $\{\sin x, \sin 3x, \sin 5x, \dots\}$ is orthogonal over $[0, \frac{\pi}{2}]$.

4) Find $\int_C \log z dz$ where C is the unit circle in the z-Plane.

5) Evaluate $\int_C \frac{z+3}{2z^2+3z-2} dz$ where C is the circle $|z-i|=2$.

5. Attempt **any two** :**(6×2=12)**

1) Find the bilinear transformation which maps the points $z = 1, i, -1$ onto the points $w = i, 0, -i$ and hence find fixed points of the transformation.

2) Find Fourier series for $f(x)$ in $(0, 2\pi)$ where $f(x) = \begin{cases} x & 0 < x \leq \pi \\ 2\pi - x & \pi \leq x \leq 2\pi \end{cases}$.

3) Find the Fourier expansion of $f(x) = 2x - x^2$ $0 \leq x \leq 3$ whose period 3.



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MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(1×14=14)

- 1) Which of the following is the fixed point of Bilinear transformation $\omega = \frac{1+3iz}{i+z}$?
 a) $z = -i$ b) $z = 2i$ c) $z = i$ d) $z = -2i$
- 2) $\int_{|z|=1} \frac{1}{(z+2)(z-3)} dz =$
 a) $2i$ b) $2\pi i$ c) $-2\pi i$ d) 0
- 3) $\int_C \frac{z^2}{(z-1)^2(z-2)} dz$ where $C : |z| = 2.5$
 a) $2\pi i$ b) πi c) $3\pi i$ d) $4\pi i$
- 4) If $f(z)$ and $\overline{f(z)}$ are both analytic then $f(z)$ is
 a) constant b) variable c) both a and b d) none
- 5) Fourier expansion of an odd function has only _____ terms.
 a) Sine b) Cosine c) Both a and b d) None
- 6) The half range sine series for 1 in $(0, \pi)$ is
 a) $\frac{4}{\pi} \left\{ \sin x - \frac{\sin 5x}{3} + \frac{\sin 3x}{5} - \dots \right\}$ b) $\frac{2}{\pi} \left\{ \sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \dots \right\}$
 c) $\frac{4}{\pi} \left\{ \sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \dots \right\}$ d) $\frac{2}{\pi} \left\{ \sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \dots \right\}$

P.T.O.



- 7) If $f(x) = x^4$ in $(-1, 1)$ then the Fourier coefficient b_n is
 a) odd b) zero c) five d) none
- 8) $L\{t^n \cdot f(t)\} =$ where $\phi(s) = L\{f(t)\}$
 a) $(-1) \frac{d^n}{ds^n} [\phi(s)]$ b) $(-1)^n \frac{d^n}{ds^n} [\phi(s)]$
 c) $\frac{d^n}{ds^n} [\phi(s)]$ d) None
- 9) The conditions for existence of Laplace transform are : If $f(t)$ is continuous and
 a) $\lim_{t \rightarrow \infty} \{e^{-at} f(t)\}$ is finite b) $\lim_{t \rightarrow \infty} \{e^{-at} f(t)\}$ is infinite
 c) $\lim_{t \rightarrow \infty} \{e^{at} f(at)\}$ is finite d) $\lim_{t \rightarrow \infty} \{e^{-at} t f(at)\}$ is finite
- 10) $L^{-1} \left\{ \frac{1}{4s-5} \right\} =$
 a) $\frac{1}{4} e^{-(5/4)t}$ b) $\frac{1}{4} e^{(5/4)t}$ c) $\frac{1}{4} e^{(4/5)t}$ d) $\frac{1}{4} e^{-(4/5)t}$
- 11) $L \{ \operatorname{erf} \sqrt{t} \} =$
 a) $\frac{1}{(s+1)\sqrt{s}}$ b) $\frac{1}{s\sqrt{s}}$ c) $\frac{1}{(s+1)\sqrt{s+1}}$ d) $\frac{1}{s\sqrt{s+1}}$
- 12) Let $L\{f_1(t)\} = \phi_1(s)$ and $L\{f_2(t)\} = \phi_2(s)$ then by convolution theorem
 $L^{-1} \{ \phi_1(s) \cdot \phi_2(s) \} =$
 a) $\int_0^t f_1(u) \cdot f_2(t-u) du$ b) $\int_0^\infty f_1(t) \cdot f_2(t) du$
 c) $\int_0^t f_1(u) \cdot f_2(t-u) du$ d) none
- 13) If $f(z) = x^2 - y^2 + ikxy$ is analytic then the value of k is
 a) $k = 1$ b) $k = 2$ c) $k = 3$ d) $k = 4$
- 14) If $f(z) = u + iv$ is analytic function. Then which of the following is true ?
 a) u is harmonic and v is not harmonic b) u is harmonic and v is harmonic
 c) v is harmonic and u is not harmonic d) u and v both are not harmonic



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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
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Marks : 56

Instructions : 1) Figures to **right** indicate **full** marks.
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SECTION – I

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

- 1) Evaluate $\int_0^{\infty} \frac{\cos at - \cos bt}{t} dt$.
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- 3) State true or false with proper justification “There does not exist an analytic function whose real part is $u = 3x^2 + \sin x + y^2 + 5y + 4$ ”.
- 4) Find Laplace transform of $f(t) = \begin{cases} 1 & \text{for } 0 \leq t < a \\ -1 & \text{for } a < t < 2a \end{cases}$ and $f(t)$ is periodic with period $2a$.
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- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{s^2 + 16s - 24}{s^4 + 20s^2 + 64}$ by using partial fractions.
- 2) If $f(z) = u + iv$ is analytic and $u + v = \frac{2 \sin 2x}{e^{2y} + e^{-2y} - 2 \cos 2x}$. Then find $f(z)$.
- 3) Solve using Laplace transform $\frac{d^2y}{dt^2} + 9y = 18t$ given that $y(0) = 0$ and $y(\frac{\pi}{2}) = 0$.

Set Q



SECTION – II

4. Attempt **any four** :**(4×4=16)**

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1) Find the bilinear transformation which maps the points $z = 1, i, -1$ onto the points $w = i, 0, -i$ and hence find fixed points of the transformation.

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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
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MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(1×14=14)

1) Let $L\{f_1(t)\} = \phi_1(s)$ and $L\{f_2(t)\} = \phi_2(s)$ then by convolution theorem

$$L^{-1}\{\phi_1(s) \cdot \phi_2(s)\} =$$

a) $\int_0^{\infty} f_1(u) \cdot f_2(t-u) du$

b) $\int_0^{\infty} f_1(t) \cdot f_2(t) du$

c) $\int_0^t f_1(u) \cdot f_2(t-u) du$

d) none

2) If $f(z) = x^2 - y^2 + ikxy$ is analytic then the value of k is

a) $k = 1$

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b) $2\pi i$

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- 6) $\int_C \frac{z^2}{(z-1)^2(z-2)} dz$ where $C : |z| = 2.5$
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Set R



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Duration : 30 Minutes

Marks : 14

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(1×14=14)

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- a) $2\pi i$ b) πi c) $3\pi i$ d) $4\pi i$

2) If $f(z)$ and $\overline{f(z)}$ are both analytic then $f(z)$ is

- a) constant b) variable c) both a and b d) none

3) Fourier expansion of an odd function has only _____ terms.

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a) $\frac{4}{\pi} \left\{ \sin x - \frac{\sin 5x}{3} + \frac{\sin 3x}{5} - \dots \right\}$ b) $\frac{2}{\pi} \left\{ \sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \dots \right\}$

c) $\frac{4}{\pi} \left\{ \sin x + \frac{\sin 3x}{3} + \frac{\sin 5x}{5} + \dots \right\}$ d) $\frac{2}{\pi} \left\{ \sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \dots \right\}$

5) If $f(x) = x^4$ in $(-1, 1)$ then the Fourier coefficient b_n is

- a) odd b) zero c) five d) none

6) $L\{t^n \cdot f(t)\} =$ where $\phi(s) = L\{f(t)\}$

a) $(-1) \frac{d^n}{ds^n} [\phi(s)]$ b) $(-1)^n \frac{d^n}{ds^n} [\phi(s)]$

c) $\frac{d^n}{ds^n} [\phi(s)]$ d) None

P.T.O.



7) The conditions for existence of Laplace transform are : If $f(t)$ is continuous and

- a) $\lim_{t \rightarrow \infty} \{e^{-at} f(t)\}$ is finite b) $\lim_{t \rightarrow \infty} \{e^{-at} f(t)\}$ is infinite
 c) $\lim_{t \rightarrow \infty} \{e^{at} f(at)\}$ is finite d) $\lim_{t \rightarrow \infty} \{e^{-at} t f(at)\}$ is finite

8) $L^{-1} \left\{ \frac{1}{4s-5} \right\} =$

- a) $\frac{1}{4} e^{-(5/4)t}$ b) $\frac{1}{4} e^{(5/4)t}$ c) $\frac{1}{4} e^{(4/5)t}$ d) $\frac{1}{4} e^{-(4/5)t}$

9) $L \{ \operatorname{erf} \sqrt{t} \} =$

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

10) Let $L\{f_1(t)\} = \phi_1(s)$ and $L\{f_2(t)\} = \phi_2(s)$ then by convolution theorem

$L^{-1} \{ \phi_1(s) \cdot \phi_2(s) \} =$

- a) $\int_0^{\infty} f_1(u) \cdot f_2(t-u) du$ b) $\int_0^{\infty} f_1(t) \cdot f_2(t) du$
 c) $\int_0^t f_1(u) \cdot f_2(t-u) du$ d) none

11) If $f(z) = x^2 - y^2 + ikxy$ is analytic then the value of k is

- a) $k = 1$ b) $k = 2$ c) $k = 3$ d) $k = 4$

12) If $f(z) = u + iv$ is analytic function. Then which of the following is true ?

- a) u is harmonic and v is not harmonic b) u is harmonic and v is harmonic
 c) v is harmonic and u is not harmonic d) u and v both are not harmonic

13) Which of the following is the fixed point of Bilinear transformation $\omega = \frac{1+3iz}{i+z}$?

- a) $z = -i$ b) $z = 2i$ c) $z = i$ d) $z = -2i$

14) $\int_{|z|=1} \frac{1}{(z+2)(z-3)} dz =$

- a) $2i$ b) $2\pi i$ c) $-2\pi i$ d) 0



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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III**

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

Marks : 56

Instructions : 1) Figures to **right** indicate **full** marks.
2) Assume suitable data **whenever** necessary.

SECTION – I

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

- 1) Evaluate $\int_0^{\infty} \frac{\cos at - \cos bt}{t} dt$.
- 2) Determine the constants a, b, c, d if $f(z) = x^2 + 2axy + by^2 + i(cx^2 + 2dxy + y^2)$ is analytic.
- 3) State true or false with proper justification “There does not exist an analytic function whose real part is $u = 3x^2 + \sin x + y^2 + 5y + 4$ ”.
- 4) Find Laplace transform of $f(t) = \begin{cases} 1 & \text{for } 0 \leq t < a \\ -1 & \text{for } a < t < 2a \end{cases}$ and $f(t)$ is periodic with period $2a$.
- 5) Find Laplace transform of $\int_0^t u \cdot \cosh u \cdot du$.

3. Attempt **any two** : **(6×2=12)**

- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{s^2 + 16s - 24}{s^4 + 20s^2 + 64}$ by using partial fractions.
- 2) If $f(z) = u + iv$ is analytic and $u + v = \frac{2 \sin 2x}{e^{2y} + e^{-2y} - 2 \cos 2x}$. Then find $f(z)$.
- 3) Solve using Laplace transform $\frac{d^2y}{dt^2} + 9y = 18t$ given that $y(0) = 0$ and $y(\frac{\pi}{2}) = 0$.

Set S



SECTION – II

4. Attempt **any four** :**(4×4=16)**

1) Evaluate $\int_0^{1+i} z^2 dz$ along i) the line $y = x$ ii) the parabola $y^2 = x$. Is the line integral independent of the path ? Explain.

2) Find half range cosine series for $f(x) = x$ $0 < x < 2$ using Parseval's identity and deduce

$$\text{that } \frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \dots$$

3) Show that the set of functions $\{\sin x, \sin 3x, \sin 5x, \dots\}$ is orthogonal over $[0, \frac{\pi}{2}]$.

4) Find $\int_C \log z dz$ where C is the unit circle in the z-Plane.

5) Evaluate $\int_C \frac{z+3}{2z^2+3z-2} dz$ where C is the circle $|z-i|=2$.

5. Attempt **any two** :**(6×2=12)**

1) Find the bilinear transformation which maps the points $z = 1, i, -1$ onto the points $w = i, 0, -i$ and hence find fixed points of the transformation.

2) Find Fourier series for $f(x)$ in $(0, 2\pi)$ where $f(x) = \begin{cases} x & 0 < x \leq \pi \\ 2\pi - x & \pi \leq x \leq 2\pi \end{cases}$.

3) Find the Fourier expansion of $f(x) = 2x - x^2$ $0 \leq x \leq 3$ whose period 3.



SLR-VB – 348

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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- 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 _____ is the outer layer of the heart that keeps the outer surface moist.
a) myocardium b) endocardium c) pericardium d) tricuspid
 - 2) 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
 - 3) The outer layer of brain is called as _____
a) cerebrum b) cerebellum c) cerebral cortex d) frontal lobe
 - 4) The _____ controls subjective feelings and emotions.
a) mid brain b) hypothalamus
c) spinal cord d) cortex
 - 5) _____ is a master gland of the endocrine system.
a) adrenal b) pituitary c) thyroid d) pineal
 - 6) Fertilization of an ovum by a spermatozoon occurs in the _____
a) cervix b) fallopian tube c) uterus d) vagina
 - 7) Male hormones are produced by _____
a) glans penis b) prostate c) testes d) prepuce

P.T.O.



- 8) Saliva contains an enzyme that acts upon _____
a) starches b) proteins c) fats d) minerals
- 9) The process whereby the stomach muscles contract to propel food through the digestive tract is called _____
a) absorption b) emulsion c) peristalsis d) regurgitation
- 10) _____ is an accessory organ of the gastrointestinal system that is responsible for secreting insulin.
a) Adrenal gland b) Gall bladder c) Liver d) Pancreas
- 11) Each of the following is a segment of the large intestine EXCEPT the _____
a) ascending colon b) cecum
c) ileum d) sigmoid colon
- 12) Bile enters the gastrointestinal tract at the _____
a) gastroesophageal sphincter b) duodenum
c) ileocecum d) jejunum
- 13) In the lungs, gas exchange occurs in tiny one-celled air sacs called _____
a) alveoli b) bronchi c) bronchioles d) capillaries
- 14) The thoracic cage is a structural unit important for _____
a) alimentation b) menstruation c) mentation d) respiration
- _____



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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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 and explain conduction system of heart related to ECG.
 - 2) Explain functions of S.A. node and A.V. node 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 various functions of hormones in detail.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain circulatory system of heart.
 - 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) Explain structure and working of neuron with neat figure.
 - 4) Explain in detail the various actions carried out by androgens and Progesterone.
 - 5) Differentiate between functions of four lobes of brain.

Set P



5. Attempt **any 2** :

(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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SLR-VB – 348

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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- 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) Saliva contains an enzyme that acts upon _____
a) starches b) proteins c) fats d) minerals
 - 2) The process whereby the stomach muscles contract to propel food through the digestive tract is called _____
a) absorption b) emulsion c) peristalsis d) regurgitation
 - 3) _____ is an accessory organ of the gastrointestinal system that is responsible for secreting insulin.
a) Adrenal gland b) Gall bladder c) Liver d) Pancreas
 - 4) Each of the following is a segment of the large intestine EXCEPT the _____
a) ascending colon b) cecum
c) ileum d) sigmoid colon
 - 5) Bile enters the gastrointestinal tract at the _____
a) gastroesophageal sphincter b) duodenum
c) ileocecum d) jejunum
 - 6) In the lungs, gas exchange occurs in tiny one-celled air sacs called _____
a) alveoli b) bronchi c) bronchioles d) capillaries

P.T.O.



- 7) The thoracic cage is a structural unit important for _____
a) alimentation b) menstruation c) mentation d) respiration
- 8) The _____ is the outer layer of the heart that keeps the outer surface moist.
a) myocardium b) endocardium c) pericardium d) tricuspid
- 9) 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
- 10) The outer layer of brain is called as _____
a) cerebrum b) cerebellum c) cerebral cortex d) frontal lobe
- 11) The _____ controls subjective feelings and emotions.
a) mid brain b) hypothalamus
c) spinal cord d) cortex
- 12) _____ is a master gland of the endocrine system.
a) adrenal b) pituitary c) thyroid d) pineal
- 13) Fertilization of an ovum by a spermatozoon occurs in the _____
a) cervix b) fallopian tube c) uterus d) vagina
- 14) Male hormones are produced by _____
a) glans penis b) prostate c) testes d) prepuce
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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 and explain conduction system of heart related to ECG.
 - 2) Explain functions of S.A. node and A.V. node 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 various functions of hormones in detail.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain circulatory system of heart.
 - 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) Explain structure and working of neuron with neat figure.
 - 4) Explain in detail the various actions carried out by androgens and Progesterone.
 - 5) Differentiate between functions of four lobes of brain.

Set Q



5. Attempt **any 2** :

(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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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- 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 a master gland of the endocrine system.
a) adrenal b) pituitary c) thyroid d) pineal
 - 2) Fertilization of an ovum by a spermatozoon occurs in the _____
a) cervix b) fallopian tube c) uterus d) vagina
 - 3) Male hormones are produced by _____
a) glans penis b) prostate c) testes d) prepuce
 - 4) Saliva contains an enzyme that acts upon _____
a) starches b) proteins c) fats d) minerals
 - 5) The process whereby the stomach muscles contract to propel food through the digestive tract is called _____
a) absorption b) emulsion c) peristalsis d) regurgitation
 - 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

P.T.O.



- 8) Bile enters the gastrointestinal tract at the _____
a) gastroesophageal 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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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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 and explain conduction system of heart related to ECG.
 - 2) Explain functions of S.A. node and A.V. node 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 various functions of hormones in detail.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain circulatory system of heart.
 - 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) Explain structure and working of neuron with neat figure.
 - 4) Explain in detail the various actions carried out by androgens and Progesterone.
 - 5) Differentiate between functions of four lobes of brain.

Set R



5. Attempt **any 2** :

(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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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- 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 an accessory organ of the gastrointestinal system that is responsible for secreting insulin.
a) Adrenal gland b) Gall bladder c) Liver d) Pancreas
 - 2) Each of the following is a segment of the large intestine EXCEPT the _____
a) ascending colon b) cecum
c) ileum d) sigmoid colon
 - 3) Bile enters the gastrointestinal tract at the _____
a) gastroesophageal sphincter b) duodenum
c) ileocecum d) jejunum
 - 4) In the lungs, gas exchange occurs in tiny one-celled air sacs called _____
a) alveoli b) bronchi c) bronchioles d) capillaries
 - 5) The thoracic cage is a structural unit important for _____
a) alimentation b) menstruation c) mentation d) respiration
 - 6) The _____ is the outer layer of the heart that keeps the outer surface moist.
a) myocardium b) endocardium c) pericardium d) tricuspid

P.T.O.



- 7) 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
- 8) The outer layer of brain is called as _____
a) cerebrum b) cerebellum c) cerebral cortex d) frontal lobe
- 9) The _____ controls subjective feelings and emotions.
a) mid brain b) hypothalamus
c) spinal cord d) cortex
- 10) _____ is a master gland of the endocrine system.
a) adrenal b) pituitary c) thyroid d) pineal
- 11) Fertilization of an ovum by a spermatozoon occurs in the _____
a) cervix b) fallopian tube c) uterus d) vagina
- 12) Male hormones are produced by _____
a) glans penis b) prostate c) testes d) prepuce
- 13) Saliva contains an enzyme that acts upon _____
a) starches b) proteins c) fats d) minerals
- 14) The process whereby the stomach muscles contract to propel food through the digestive tract is called _____
a) absorption b) emulsion c) peristalsis d) regurgitation
- _____



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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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 and explain conduction system of heart related to ECG.
 - 2) Explain functions of S.A. node and A.V. node 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 various functions of hormones in detail.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain circulatory system of heart.
 - 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) Explain structure and working of neuron with neat figure.
 - 4) Explain in detail the various actions carried out by androgens and Progesterone.
 - 5) Differentiate between functions of four lobes of brain.



5. Attempt **any 2** :

(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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SLR-VB – 349

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**S.E. Biomedical Engineering (Part – I) (CGPA) Examination, 2017
BIOMATERIALS**

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

Max. Marks : 70

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Out of all the _____ natural rubber has the longest elongation range and flexibility of order of 1-1000.
a) Polymer b) PMMA c) Elastomer d) Composites
 - 2) _____ is the main constituent of most natural fibers.
a) Cellulose b) Spandex c) Acrylic d) Synthetic
 - 3) 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
 - 4) _____ are organic and inorganic in nature.
a) Alumina b) Titanate c) Steel d) Polymer
 - 5) One of the characteristic property of polymer material
a) High temperature stability b) Low hardness
c) High elongation d) High mechanical strength
 - 6) The word 'ceramic' meant for
a) Soft material b) Hard material
c) Burnt material d) Dry material
 - 7) The monomer of polyvinyl chloride is
a) Ethyl chloride b) Chloroethane
c) Ethylene dichloride d) Chloroform
 - 8) _____ cements are mostly used to fix prosthesis due to its strong mechanical fixation.
a) PTFE b) Si rubber c) PHEMA d) PMMA

P.T.O.



- 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) Fluoride 2%
- 10) Corrosion of metals involves _____ reaction.
- a) Physical b) Chemical c) Acidic d) Both a) and b)
- 11) Stiffness refers to
- a) Resistance to elastic deformation b) Degree of elastic deformation
c) Expandability on heating d) Expansion on cooling
- 12) 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 the above
- 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.
- a) Polymeric b) Ceramic c) Metallic d) Carbon
-



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**S.E. Biomedical Engineering (Part – I) (CGPA) Examination, 2017
BIOMATERIALS**

Day and Date : Saturday, 6-5-2017

Marks : 56

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

SECTION – I

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

- 1) Explain the meaning of biocompatibility of biomaterials” with an example.
- 2) Explain properties and applications of Nitinol.
- 3) Explain the classifications and application of bioceramics.
- 4) Discuss the properties and application of Titanium and its alloy.
- 5) Explain the following :
 - a) Structure and application of hydrogel.
 - b) Structure and application of bioglass.

3. Attempt **any two** questions : **(6×2=12)**

- 1) Explain the properties and applications of stainless steel.
- 2) State biomedical uses of alumina. List advantages and disadvantages of ceramic implant.
- 3) Explain why metals are less biocompatible than polymers and ceramics.
How we can improve surface properties of metals ?



SECTION – II

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

- 1) Explain in detail steps of leather processing.
- 2) Discuss thermoplastic and thermosetting resin.
- 3) Which materials are used for soft tissue replacements, discuss their properties.
- 4) Explain various generations of breast implants.
- 5) Write a short note on :
 - a) Wood and binding materials.
 - b) Structure and application of silicon rubber.

5. Answer **any two** questions :**(6×2=12)**

- 1) Explain contact angle method and ESCA method of surface measurement in short.
 - 2) Discuss various methods of biological testing of biomaterials.
 - 3) Write a short note on :
 - a) Carbon implants
 - b) Surface infrared technique of surface measurement.
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SLR-VB – 349

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**S.E. Biomedical Engineering (Part – I) (CGPA) Examination, 2017
BIOMATERIALS**

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

Max. Marks : 70

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) _____ cements are mostly used to fix prosthesis due to its strong mechanical fixation.
a) PTFE b) Si rubber c) PHEMA d) PMMA
 - 2) _____ 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) Fluoride 2%
 - 3) Corrosion of metals involves _____ reaction.
a) Physical b) Chemical c) Acidic d) Both a) and b)
 - 4) Stiffness refers to
a) Resistance to elastic deformation b) Degree of elastic deformation
c) Expandability on heating d) Expansion on cooling
 - 5) 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 the above
 - 6) PMMA is known as _____
a) Bakelite b) Nylon-6 c) Teflon d) Perspex
 - 7) _____ types of materials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) Carbon

P.T.O.



- 8) Out of all the _____ natural rubber has the longest elongation range and flexibility of order of 1-1000.
a) Polymer b) PMMA c) Elastomer d) Composites
- 9) _____ is the main constituent of most natural fibers.
a) Cellulose b) Spandex c) Acrylic d) Synthetic
- 10) 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
- 11) _____ are organic and inorganic in nature.
a) Alumina b) Titanate c) Steel d) Polymer
- 12) One of the characteristic property of polymer material
a) High temperature stability b) Low hardness
c) High elongation d) High mechanical strength
- 13) The word 'ceramic' meant for
a) Soft material b) Hard material
c) Burnt material d) Dry material
- 14) The monomer of polyvinyl chloride is
a) Ethyl chloride b) Chloroethane
c) Ethylene dichloride d) Chloroform
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**S.E. Biomedical Engineering (Part – I) (CGPA) Examination, 2017
BIOMATERIALS**

Day and Date : Saturday, 6-5-2017

Marks : 56

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

SECTION – I

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

- 1) Explain the meaning of biocompatibility of biomaterials” with an example.
- 2) Explain properties and applications of Nitinol.
- 3) Explain the classifications and application of bioceramics.
- 4) Discuss the properties and application of Titanium and its alloy.
- 5) Explain the following :
 - a) Structure and application of hydrogel.
 - b) Structure and application of bioglass.

3. Attempt **any two** questions : **(6×2=12)**

- 1) Explain the properties and applications of stainless steel.
- 2) State biomedical uses of alumina. List advantages and disadvantages of ceramic implant.
- 3) Explain why metals are less biocompatible than polymers and ceramics.
How we can improve surface properties of metals ?



SECTION – II

(4×4=16)

4. Attempt **any four** questions :

- 1) Explain in detail steps of leather processing.
- 2) Discuss thermoplastic and thermosetting resin.
- 3) Which materials are used for soft tissue replacements, discuss their properties.
- 4) Explain various generations of breast implants.
- 5) Write a short note on :
 - a) Wood and binding materials.
 - b) Structure and application of silicon rubber.

5. Answer **any two** questions :

(6×2=12)

- 1) Explain contact angle method and ESCA method of surface measurement in short.
 - 2) Discuss various methods of biological testing of biomaterials.
 - 3) Write a short note on :
 - a) Carbon implants
 - b) Surface infrared technique of surface measurement.
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SLR-VB – 349

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**S.E. Biomedical Engineering (Part – I) (CGPA) Examination, 2017
BIOMATERIALS**

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

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) One of the characteristic property of polymer material
 - a) High temperature stability
 - b) Low hardness
 - c) High elongation
 - d) High mechanical strength
- 2) The word 'ceramic' meant for
 - a) Soft material
 - b) Hard material
 - c) Burnt material
 - d) Dry material
- 3) The monomer of polyvinyl chloride is
 - a) Ethyl chloride
 - b) Chloroethane
 - c) Ethylene dichloride
 - d) Chloroform
- 4) _____ cements are mostly used to fix prosthesis due to its strong mechanical fixation.
 - a) PTFE
 - b) Si rubber
 - c) PHEMA
 - d) PMMA
- 5) _____ 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) Fluoride 2%
- 6) Corrosion of metals involves _____ reaction.
 - a) Physical
 - b) Chemical
 - c) Acidic
 - d) Both a) and b)
- 7) Stiffness refers to
 - a) Resistance to elastic deformation
 - b) Degree of elastic deformation
 - c) Expandability on heating
 - d) Expansion on cooling

P.T.O.



- 8) 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 the above
- 9) PMMA is known as _____
- a) Bakelite
 - b) Nylon-6
 - c) Teflon
 - d) Perspex
- 10) _____ types of materials are used as bridges between human tissues and metals.
- a) Polymeric
 - b) Ceramic
 - c) Metallic
 - d) Carbon
- 11) Out of all the _____ natural rubber has the longest elongation range and flexibility of order of 1-1000.
- a) Polymer
 - b) PMMA
 - c) Elastomer
 - d) Composites
- 12) _____ is the main constituent of most natural fibers.
- a) Cellulose
 - b) Spandex
 - c) Acrylic
 - d) Synthetic
- 13) 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
- 14) _____ are organic and inorganic in nature.
- a) Alumina
 - b) Titanate
 - c) Steel
 - d) Polymer
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**S.E. Biomedical Engineering (Part – I) (CGPA) Examination, 2017
BIOMATERIALS**

Day and Date : Saturday, 6-5-2017

Marks : 56

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

SECTION – I

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

- 1) Explain the meaning of biocompatibility of biomaterials” with an example.
- 2) Explain properties and applications of Nitinol.
- 3) Explain the classifications and application of bioceramics.
- 4) Discuss the properties and application of Titanium and its alloy.
- 5) Explain the following :
 - a) Structure and application of hydrogel.
 - b) Structure and application of bioglass.

3. Attempt **any two** questions : **(6×2=12)**

- 1) Explain the properties and applications of stainless steel.
- 2) State biomedical uses of alumina. List advantages and disadvantages of ceramic implant.
- 3) Explain why metals are less biocompatible than polymers and ceramics.
How we can improve surface properties of metals ?



SECTION – II

(4×4=16)

4. Attempt **any four** questions :

- 1) Explain in detail steps of leather processing.
- 2) Discuss thermoplastic and thermosetting resin.
- 3) Which materials are used for soft tissue replacements, discuss their properties.
- 4) Explain various generations of breast implants.
- 5) Write a short note on :
 - a) Wood and binding materials.
 - b) Structure and application of silicon rubber.

5. Answer **any two** questions :

(6×2=12)

- 1) Explain contact angle method and ESCA method of surface measurement in short.
 - 2) Discuss various methods of biological testing of biomaterials.
 - 3) Write a short note on :
 - a) Carbon implants
 - b) Surface infrared technique of surface measurement.
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SLR-VB – 349

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**S.E. Biomedical Engineering (Part – I) (CGPA) Examination, 2017
BIOMATERIALS**

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

Max. Marks : 70

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Corrosion of metals involves _____ reaction.
a) Physical b) Chemical c) Acidic d) Both a) and b)
 - 2) Stiffness refers to
a) Resistance to elastic deformation b) Degree of elastic deformation
c) Expandability on heating d) Expansion on cooling
 - 3) What is meant by ductility ?
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b) Metals undergo elastic deformation under load
c) Metals undergo plastic deformation under load
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 - 5) _____ types of materials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) Carbon
 - 6) Out of all the _____ natural rubber has the longest elongation range and flexibility of order of 1-1000.
a) Polymer b) PMMA c) Elastomer d) Composites
 - 7) _____ is the main constituent of most natural fibers.
a) Cellulose b) Spandex c) Acrylic d) Synthetic

P.T.O.



- 8) 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
- 9) _____ are organic and inorganic in nature.
a) Alumina b) Titanate c) Steel d) Polymer
- 10) One of the characteristic property of polymer material
a) High temperature stability b) Low hardness
c) High elongation d) High mechanical strength
- 11) The word 'ceramic' meant for
a) Soft material b) Hard material
c) Burnt material d) Dry material
- 12) The monomer of polyvinyl chloride is
a) Ethyl chloride b) Chloroethane
c) Ethylene dichloride d) Chloroform
- 13) _____ cements are mostly used to fix prosthesis due to its strong mechanical fixation.
a) PTFE b) Si rubber c) PHEMA d) PMMA
- 14) _____ 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) Fluoride 2%
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**S.E. Biomedical Engineering (Part – I) (CGPA) Examination, 2017
BIOMATERIALS**

Day and Date : Saturday, 6-5-2017

Marks : 56

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

SECTION – I

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

- 1) Explain the meaning of biocompatibility of biomaterials” with an example.
- 2) Explain properties and applications of Nitinol.
- 3) Explain the classifications and application of bioceramics.
- 4) Discuss the properties and application of Titanium and its alloy.
- 5) Explain the following :
 - a) Structure and application of hydrogel.
 - b) Structure and application of bioglass.

3. Attempt **any two** questions : **(6×2=12)**

- 1) Explain the properties and applications of stainless steel.
- 2) State biomedical uses of alumina. List advantages and disadvantages of ceramic implant.
- 3) Explain why metals are less biocompatible than polymers and ceramics.
How we can improve surface properties of metals ?



SECTION – II

(4×4=16)

4. Attempt **any four** questions :

- 1) Explain in detail steps of leather processing.
- 2) Discuss thermoplastic and thermosetting resin.
- 3) Which materials are used for soft tissue replacements, discuss their properties.
- 4) Explain various generations of breast implants.
- 5) Write a short note on :
 - a) Wood and binding materials.
 - b) Structure and application of silicon rubber.

5. Answer **any two** questions :

(6×2=12)

- 1) Explain contact angle method and ESCA method of surface measurement in short.
 - 2) Discuss various methods of biological testing of biomaterials.
 - 3) Write a short note on :
 - a) Carbon implants
 - b) Surface infrared technique of surface measurement.
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SLR-VB – 350

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**S.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

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

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 correct answer :

14

- 1) If transistor is biased into saturation or cut off region it works as
 - a) Amplifier
 - b) Rectifier
 - c) Switch
 - d) Relay
- 2) In cut off characteristic of transistor $V_{BE} = \underline{\hspace{2cm}}$ volts.
 - a) < 0.7
 - b) > 0.7
 - c) 0.7
 - d) < 0.9
- 3) Gain $\underline{\hspace{2cm}}$ product tells us about the high frequency response of transistor.
 - a) Bandwidth
 - b) Wavelength
 - c) Amplifier
 - d) Frequency
- 4) DC current gain (β) of transistor is given by
 - a) I_B/I_C
 - b) I_C/I_B
 - c) I_E/I_C
 - d) None
- 5) $\underline{\hspace{2cm}}$ stabilization refers to the ability of bias circuit to maintain a fixed operating point against variations in temperature.
 - a) Voltage
 - b) Current
 - c) Power
 - d) Bias
- 6) $\underline{\hspace{2cm}}$ is the process of linearly increasing the amplitude of an electrical signal.
 - a) Rectification
 - b) Filteration
 - c) Amplification
 - d) None of the above
- 7) BJT is a $\underline{\hspace{2cm}}$ controlled device.
 - a) Current
 - b) Voltage
 - c) Power
 - d) Energy

P.T.O.



- 8) JFET has _____ input impedance.
a) Low b) High c) Medium d) Zero
- 9) _____ is the voltage where depletion region which has been wider touch together from either side.
a) Pinch off b) Saturation c) Cut off d) Active
- 10) _____ are used as static switches in power electronic converters.
a) Power FET b) Power BJT
c) Power regulation d) Power JFET
- 11) Triac is a type of thyristors that can conduct in _____ direction.
a) One b) Both c) Upper d) Down
- 12) Diac is made up of two _____ diodes connected back to back.
a) pnp b) npn c) FET d) Zener
- 13) Astable multivibrator using IC 555, gives _____ stable level.
a) One b) Dual c) Mono d) Zero
- 14) A silicon controlled rectifier is a _____ layer solid state device.
a) 3 b) 2 c) 5 d) 4
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**S.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

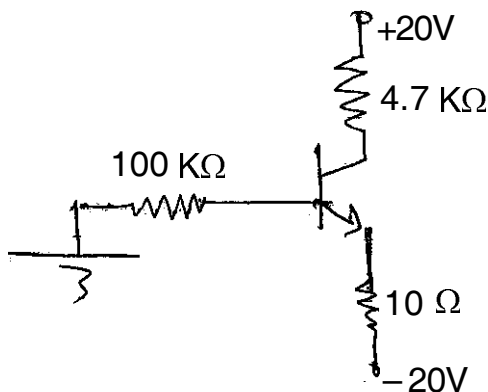
Day and Date : Monday, 8-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** : (4×4=16)

- 1) Draw and explain how transistor works as a switch.
- 2) Explain how transistor works as a amplifier with necessary diagram.
- 3) Discuss thermal runaway's importance in BJT amplifier but not so in FET amplifier.
- 4) Determine operating point (I_{CQ} , V_{CEQ}) for following circuit.

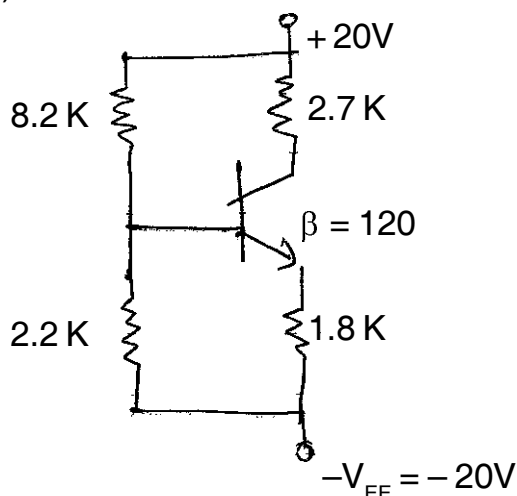


$V_{BE} = 0.7 \text{ V}$, $\beta_{DC} = 85$

5) Differentiate between clipper and clapper circuit using diodes.

3. Attempt **any two** : (6×2=12)

- 1) Determine the co-ordinates of Q point for following circuit.





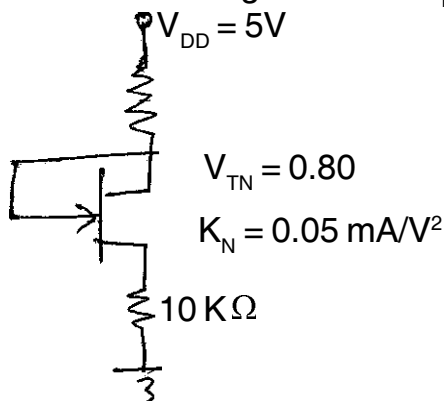
- 2) Explain working of series voltage regulator and shunt regulator with neat diagram.
- 3) Draw and explain basic configuration of BJT.

SECTION – II

4. Attempt **any four** :

(4×4=16)

- 1) Draw and explain JFET characteristics.
- 2) For the following circuit find I_D , V_{GS} and V_{DS} .

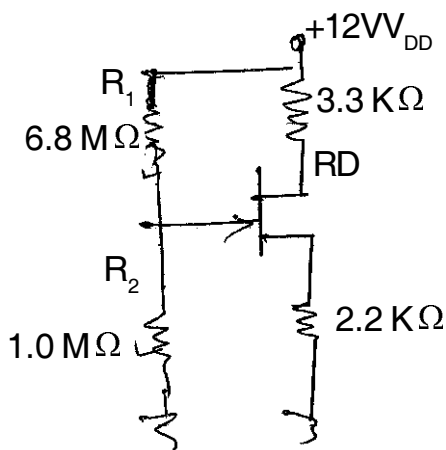


- 3) Explain working of TRIAC with neat diagram.
- 4) Draw and explain working of astable multivibrator using IC 555. Mention its application.
- 5) Explain how JFET can work as an amplifier.

5. Attempt **any two** :

(6×2=12)

- 1) For shown figure determine I_D and V_{GS} for JFET. (given $V_D \cong 7v$)



- 2) Mention various configurations of MOSFET and explain any one in detail.
- 3) Explain working for following :
 - a) SCR
 - b) IGBT structure

Set P



SLR-VB – 350

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| Set | Q |
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**S.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

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

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 correct answer :

14

- 1) JFET has _____ input impedance.
a) Low b) High c) Medium d) Zero
- 2) _____ is the voltage where depletion region which has been wider touch together from eitherside.
a) Pinch off b) Saturation c) Cut off d) Active
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a) Power FET b) Power BJT
c) Power regulation d) Power JFET
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a) One b) Both c) Upper d) Down
- 5) Diac is made up of two _____ diodes connected back to back.
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- 7) A silicon controlled rectifier is a _____ layer solid state device.
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- 8) If transistor is biased into saturation or cut off region it works as
a) Amplifier b) Rectifier c) Switch d) Relay
- 9) In cut off characteristic of transistor $V_{BE} =$ _____ volts.
a) < 0.7 b) > 0.7 c) 0.7 d) < 0.9

P.T.O.



- 10) Gain _____ product tells us about the high frequency response of transistor.
a) Bandwidth b) Wavelength c) Amplifier d) Frequency
- 11) DC current gain (β) of transistor is given by
a) I_B/I_C b) I_C/I_B c) I_E/I_C d) None
- 12) _____ stabilization refers to the ability of bias circuit to maintain a fixed operating point against variations in temperature.
a) Voltage b) Current c) Power d) Bias
- 13) _____ is the process of linearly increasing the amplitude of an electrical signal.
a) Rectification b) Filtration
c) Amplification d) None of the above
- 14) BJT is a _____ controlled device.
a) Current b) Voltage
c) Power d) Energy
-



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**S.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

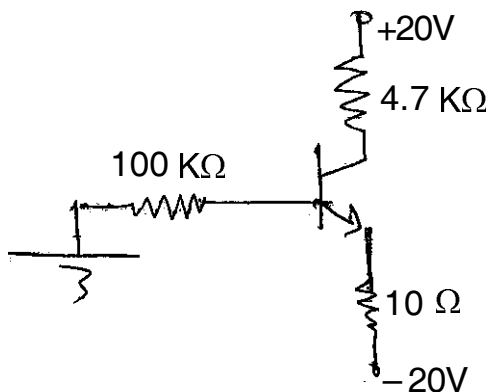
Day and Date : Monday, 8-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** : (4×4=16)

- 1) Draw and explain how transistor works as a switch.
- 2) Explain how transistor works as a amplifier with necessary diagram.
- 3) Discuss thermal runaway's importance in BJT amplifier but not so in FET amplifier.
- 4) Determine operating point (I_{CQ} , V_{CEQ}) for following circuit.

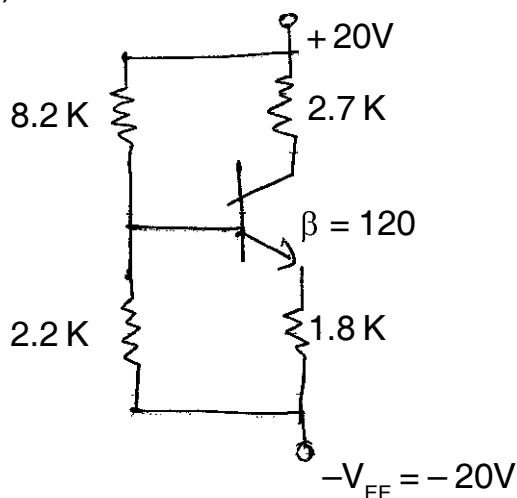


$V_{BE} = 0.7 \text{ V}$, $\beta_{DC} = 85$

5) Differentiate between clipper and clapper circuit using diodes.

3. Attempt **any two** : (6×2=12)

- 1) Determine the co-ordinates of Q point for following circuit.



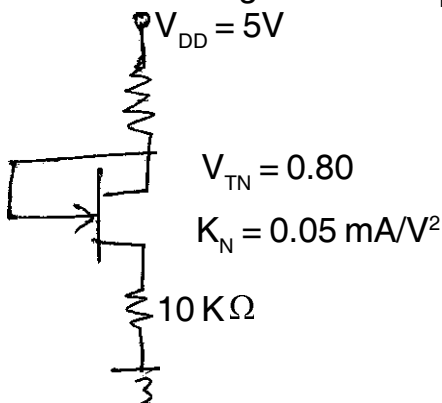


- 2) Explain working of series voltage regulator and shunt regulator with neat diagram.
- 3) Draw and explain basic configuration of BJT.

SECTION – II

4. Attempt **any four** : (4×4=16)

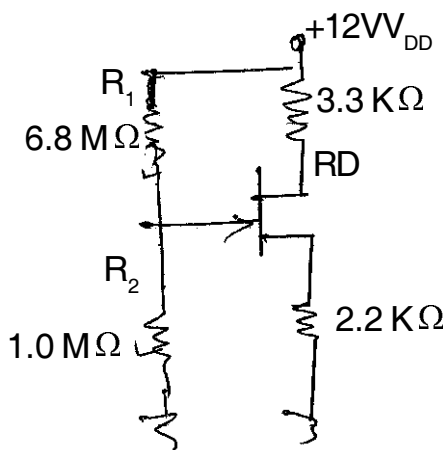
- 1) Draw and explain JFET characteristics.
- 2) For the following circuit find I_D , V_{GS} and V_{DS} .



- 3) Explain working of TRIAC with neat diagram.
- 4) Draw and explain working of astable multivibrator using IC 555. Mention its application.
- 5) Explain how JFET can work as an amplifier.

5. Attempt **any two** : (6×2=12)

- 1) For shown figure determine I_D and V_{GS} for JFET. (given $V_D \cong 7v$)



- 2) Mention various configurations of MOSFET and explain any one in detail.
- 3) Explain working for following :
 - a) SCR
 - b) IGBT structure



SLR-VB – 350

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**S.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

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

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 correct answer :

14

- 1) _____ stabilization refers to the ability of bias circuit to maintain a fixed operating point against variations in temperature.
a) Voltage b) Current c) Power d) Bias
- 2) _____ is the process of linearly increasing the amplitude of an electrical signal.
a) Rectification b) Filtration
c) Amplification d) None of the above
- 3) BJT is a _____ controlled device.
a) Current b) Voltage
c) Power d) Energy
- 4) JFET has _____ input impedance.
a) Low b) High c) Medium d) Zero
- 5) _____ is the voltage where depletion region which has been wider touch together from eitherside.
a) Pinch off b) Saturation c) Cut off d) Active
- 6) _____ are used as static switches in power electronic converters.
a) Power FET b) Power BJT
c) Power regulation d) Power JFET
- 7) Triac is a type of thyristors that can conduct in _____ direction.
a) One b) Both c) Upper d) Down

P.T.O.



- 8) Diac is made up of two _____ diodes connected back to back.
a) pnp b) npn c) FET d) Zener
- 9) Astable multivibrator using IC 555, gives _____ stable level.
a) One b) Dual c) Mono d) Zero
- 10) A silicon controlled rectifier is a _____ layer solid state device.
a) 3 b) 2 c) 5 d) 4
- 11) If transistor is biased into saturation or cut off region it works as
a) Amplifier b) Rectifier c) Switch d) Relay
- 12) In cut off characteristic of transistor $V_{BE} =$ _____ volts.
a) < 0.7 b) > 0.7 c) 0.7 d) < 0.9
- 13) Gain _____ product tells us about the high frequency response of transistor.
a) Bandwidth b) Wavelength c) Amplifier d) Frequency
- 14) DC current gain (β) of transistor is given by
a) I_B/I_C b) I_C/I_B c) I_E/I_C d) None
-



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**S.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

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

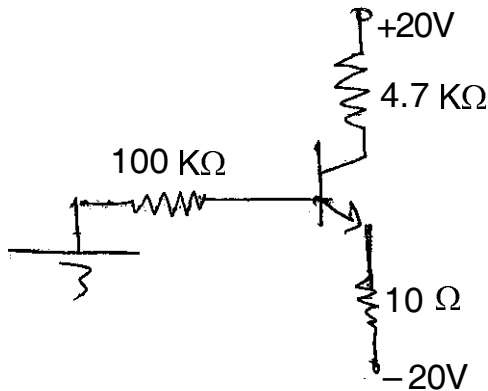
Marks : 56

SECTION – I

2. Attempt **any four** :

(4×4=16)

- 1) Draw and explain how transistor works as a switch.
- 2) Explain how transistor works as a amplifier with necessary diagram.
- 3) Discuss thermal runaway's importance in BJT amplifier but not so in FET amplifier.
- 4) Determine operating point (I_{CQ} , V_{CEQ}) for following circuit.



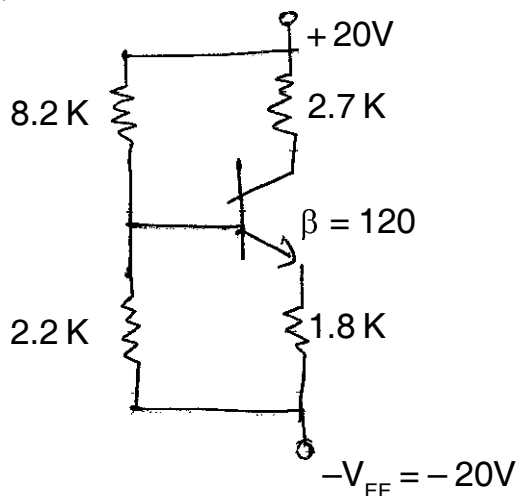
$V_{BE} = 0.7 \text{ V}$, $\beta_{DC} = 85$

5) Differentiate between clipper and clapper circuit using diodes.

3. Attempt **any two** :

(6×2=12)

1) Determine the co-ordinates of Q point for following circuit.



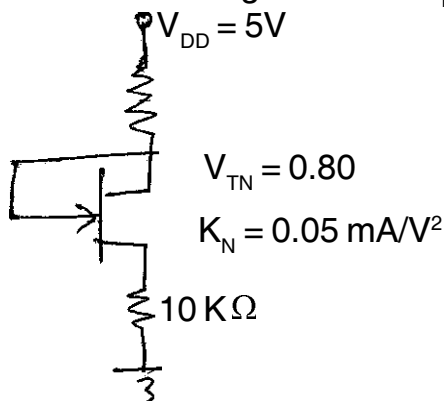


- 2) Explain working of series voltage regulator and shunt regulator with neat diagram.
- 3) Draw and explain basic configuration of BJT.

SECTION – II

4. Attempt **any four** :**(4×4=16)**

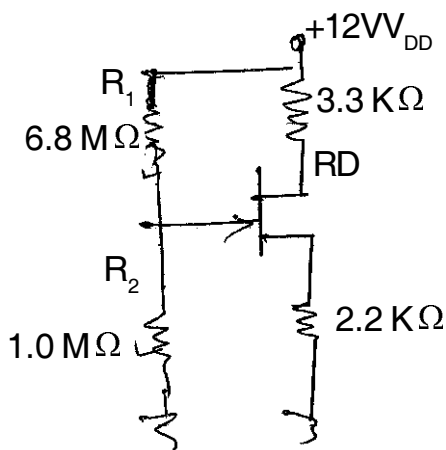
- 1) Draw and explain JFET characteristics.
- 2) For the following circuit find I_D , V_{GS} and V_{DS} .



- 3) Explain working of TRIAC with neat diagram.
- 4) Draw and explain working of astable multivibrator using IC 555. Mention its application.
- 5) Explain how JFET can work as an amplifier.

5. Attempt **any two** :**(6×2=12)**

- 1) For shown figure determine I_D and V_{GS} for JFET. (given $V_D \cong 7v$)



- 2) Mention various configurations of MOSFET and explain any one in detail.
- 3) Explain working for following :
 - a) SCR
 - b) IGBT structure

Set R



SLR-VB – 350

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**S.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

Day and Date : Monday, 8-5-2017

Max. Marks : 70

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

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose correct answer :

14

- 1) _____ are used as static switches in power electronic converters.
 - a) Power FET
 - b) Power BJT
 - c) Power regulation
 - d) Power JFET
- 2) Triac is a type of thyristors that can conduct in _____ direction.
 - a) One
 - b) Both
 - c) Upper
 - d) Down
- 3) Diac is made up of two _____ diodes connected back to back.
 - a) pnp
 - b) npn
 - c) FET
 - d) Zener
- 4) Astable multivibrator using IC 555, gives _____ stable level.
 - a) One
 - b) Dual
 - c) Mono
 - d) Zero
- 5) A silicon controlled rectifier is a _____ layer solid state device.
 - a) 3
 - b) 2
 - c) 5
 - d) 4
- 6) If transistor is biased into saturation or cut off region it works as
 - a) Amplifier
 - b) Rectifier
 - c) Switch
 - d) Relay
- 7) In cut off characteristic of transistor $V_{BE} =$ _____ volts.
 - a) < 0.7
 - b) > 0.7
 - c) 0.7
 - d) < 0.9
- 8) Gain _____ product tells us about the high frequency response of transistor.
 - a) Bandwidth
 - b) Wavelength
 - c) Amplifier
 - d) Frequency



- 9) DC current gain (β) of transistor is given by
a) I_B/I_C b) I_C/I_B c) I_E/I_C d) None
- 10) _____ stabilization refers to the ability of bias circuit to maintain a fixed operating point against variations in temperature.
a) Voltage b) Current c) Power d) Bias
- 11) _____ is the process of linearly increasing the amplitude of an electrical signal.
a) Rectification b) Filtration
c) Amplification d) None of the above
- 12) BJT is a _____ controlled device.
a) Current b) Voltage
c) Power d) Energy
- 13) JFET has _____ input impedance.
a) Low b) High c) Medium d) Zero
- 14) _____ is the voltage where depletion region which has been wider touch together from either side.
a) Pinch off b) Saturation c) Cut off d) Active
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**S.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

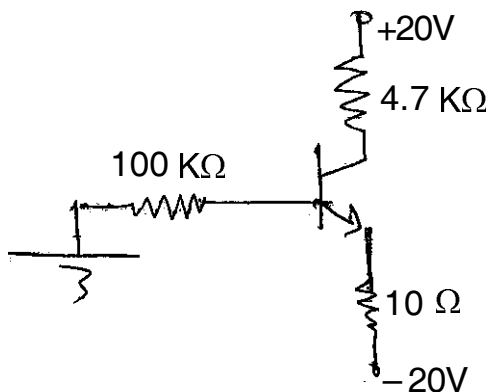
Day and Date : Monday, 8-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** : (4×4=16)

- 1) Draw and explain how transistor works as a switch.
- 2) Explain how transistor works as a amplifier with necessary diagram.
- 3) Discuss thermal runaway's importance in BJT amplifier but not so in FET amplifier.
- 4) Determine operating point (I_{CQ} , V_{CEQ}) for following circuit.

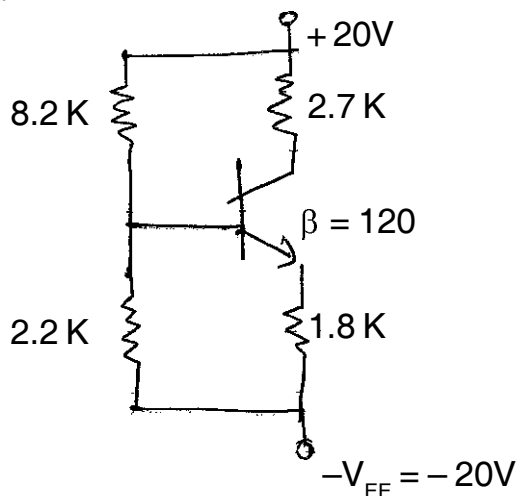


$V_{BE} = 0.7 \text{ V}$, $\beta_{DC} = 85$

5) Differentiate between clipper and clapper circuit using diodes.

3. Attempt **any two** : (6×2=12)

- 1) Determine the co-ordinates of Q point for following circuit.





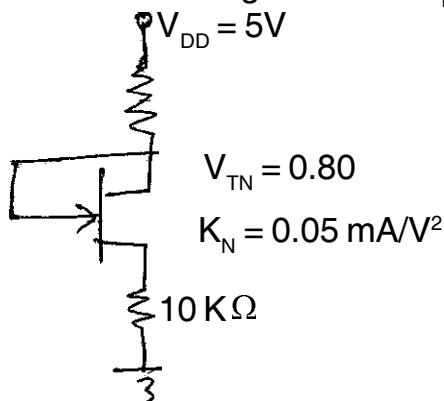
- 2) Explain working of series voltage regulator and shunt regulator with neat diagram.
- 3) Draw and explain basic configuration of BJT.

SECTION – II

4. Attempt **any four** :

(4×4=16)

- 1) Draw and explain JFET characteristics.
- 2) For the following circuit find I_D , V_{GS} and V_{DS} .

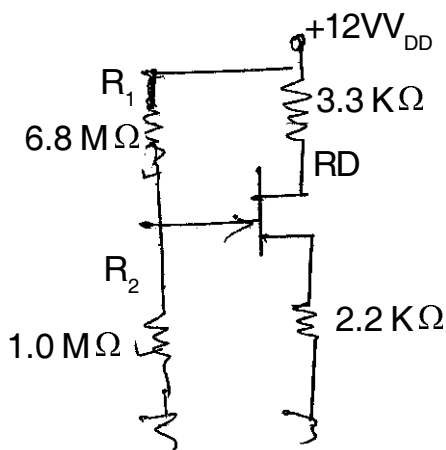


- 3) Explain working of TRIAC with neat diagram.
- 4) Draw and explain working of astable multivibrator using IC 555. Mention its application.
- 5) Explain how JFET can work as an amplifier.

5. Attempt **any two** :

(6×2=12)

- 1) For shown figure determine I_D and V_{GS} for JFET. (given $V_D \cong 7v$)



- 2) Mention various configurations of MOSFET and explain any one in detail.
- 3) Explain working for following :
 - a) SCR
 - b) IGBT structure

Set S



SLR-VB – 351

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**S.E. (Part – I) Biomedical Engineering (CGPA) Examination, 2017
LINEAR CIRCUITS ANALYSIS**

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

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 correct alternatives :

(1×14=14)

- 1) The time taken to change from an initial steady state to the final steady state is called as _____
 - a) Transient period
 - b) Transfer function
 - c) Shifting
 - d) Transient function
- 2) The superposition theorem is essentially based on the concept of _____
 - a) Duality
 - b) Linearity
 - c) Reciprocity
 - d) Non-linearity
- 3) The power factor of a purely resistive circuit is _____
 - a) Zero
 - b) Unity
 - c) Lagging
 - d) Leading
- 4) In an R-L-C circuit, the phase of the current with respect to the circuit voltage will be _____
 - a) Leading
 - b) Same
 - c) Lagging
 - d) Depends upon the value of L and C
- 5) Q factor of an inductive coil is given by _____
 - a) R/z
 - b) $2 \pi fr/R$
 - c) $2 \pi fL/R$
 - d) r/L
- 6) The r.m.s. value of sinusoidal 100 V peak to peak is _____ volt.
 - a) $100/\sqrt{2}$
 - b) $50/\sqrt{2}$
 - c) 50
 - d) 100
- 7) The input of an ac circuit having power factor of 0.8 lagging is 20 KVA. The power drawn by the circuit is _____ KW.
 - a) 12
 - b) 20
 - c) 16
 - d) 8

P.T.O.



- 8) _____ analysis is based on Kirchhoff's law.
- a) Nodal b) Mesh
c) Star delta d) None of the above
- 9) 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
- 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) When a unit impulse voltage is applied to an inductor of 1H, the energy supplied by the source is _____
- a) ∞ b) 1J c) $\frac{1}{2}$ J d) 0
- 12) The transfer function of a low pass RC network is _____
- a) $(RCs) (1 + RCs)$ b) $\frac{1}{1 + RCs}$
c) $\frac{RCs}{1 + RCs}$ d) $\frac{S}{1 + RCs}$
- 13) At 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
- 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) $AB = BC$
- _____



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**S.E. (Part – I) Biomedical Engineering (CGPA) Examination, 2017
LINEAR CIRCUITS ANALYSIS**

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

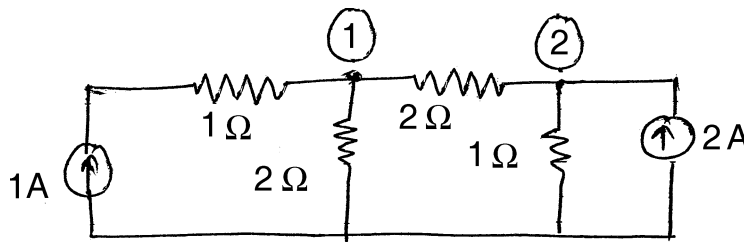
Marks : 56

SECTION – I

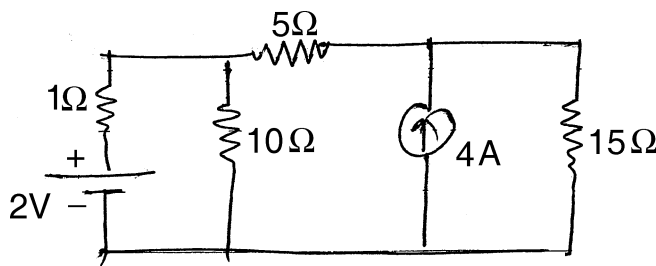
2. Attempt any 4 :

(4×4=16)

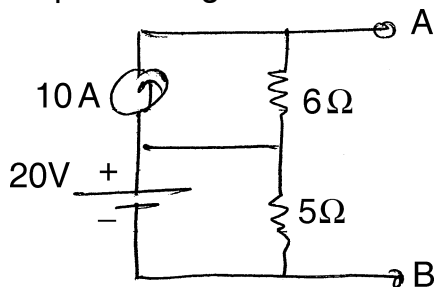
- 1) State and express Thevenin's theorem.
- 2) Find voltage at node 1 and 2 :



3) Applying mesh analysis find the current through 10 Ω resistor :



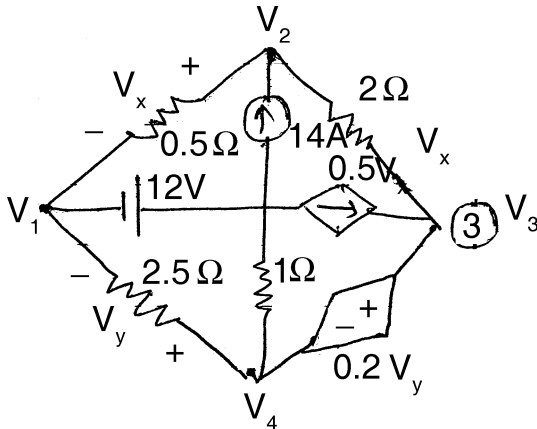
- 4) Define resonance and Q factor of resonance in detail.
- 5) Replace the given network with single current source and a resistor :



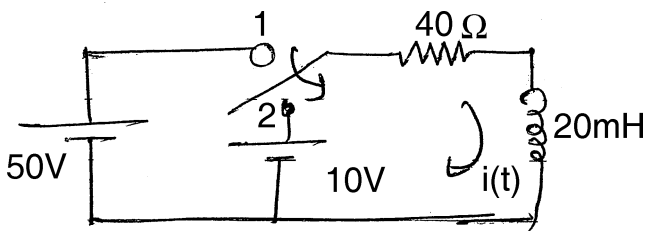


3. Attempt **any two** : (6×2=12)

- 1) State and differentiate between superposition and Norton’s theorem.
- 2) Find the nodal voltage in given circuit :



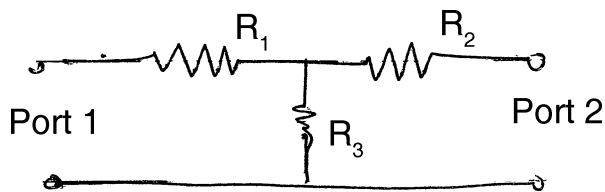
- 3) The network shown is under steady state with switch at the position 1. At $t = 0$, switch is moved to position 2. Find $i(t)$:



SECTION – II

4. Attempt **any 4** : (4×4=16)

- 1) Design an asymmetrical T-network shown below having $Z_{OC1} = 1000 \Omega$, $Z_{OC2} = 1200 \Omega$ and $Z_{SC1} = 700 \Omega$:



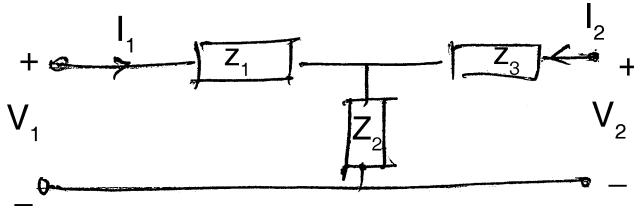


2) A network function is given below. Obtain the pole-zero diagram :

$$p(s) = \frac{2s}{(s + 2)(s^2 + 2s + 2)}$$

3) Prove the condition of reciprocity for transmission parameter.

4) Find the Z parameter for network shown :

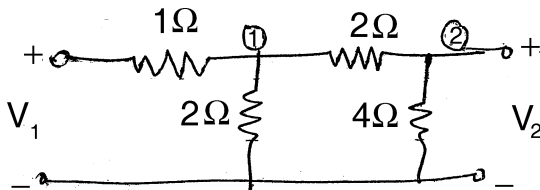


5) Draw and explain working of low pass and high pass filter circuit.

5. Attempt **any 2** :

(6×2=12)

1) Determine Y parameter for network shown :



2) Draw and explain working of notch filters using RC and RL circuits.

3) Design a T type symmetrical attenuator which offers 40 dB attenuation with a load of 400 Ω .



SLR-VB – 351

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**S.E. (Part – I) Biomedical Engineering (CGPA) Examination, 2017
LINEAR CIRCUITS ANALYSIS**

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

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 correct alternatives :

(1×14=14)

- 1) _____ analysis is based on Kirchhoff's law.
 - a) Nodal
 - b) Mesh
 - c) Star delta
 - d) None of the above
- 2) 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
- 3) 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
- 4) When a unit impulse voltage is applied to an inductor of 1H, the energy supplied by the source is _____.
 - a) ∞
 - b) 1J
 - c) $\frac{1}{2}$ J
 - d) 0
- 5) The transfer function of a low pass RC network is _____.
 - a) $(RCs) (1 + RCs)$
 - b) $\frac{1}{1 + RCs}$
 - c) $\frac{RCs}{1 + RCs}$
 - d) $\frac{S}{1 + RCs}$

P.T.O.



- 6) At 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
- 7) For a 2 port network to be reciprocal _____
- a) $Z_{11} = Z_{22}$ b) $Y_{12} = Y_{21}$ c) $h_{21} = -h_{12}$ d) $AB = BC$
- 8) The time taken to change from an initial steady state to the final steady state is called as _____
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- 9) The superposition theorem is essentially based on the concept of _____
- a) Duality b) Linearity c) Reciprocity d) Non-linearity
- 10) The power factor of a purely resistive circuit is _____
- a) Zero b) Unity c) Lagging d) Leading
- 11) In an R-L-C circuit, the phase of the current with respect to the circuit voltage will be _____
- a) Leading b) Same
 c) Lagging d) Depends upon the value of L and C
- 12) Q factor of an inductive coil is given by _____
- a) R/z b) $2 \pi fr/R$ c) $2 \pi fL/R$ d) r/L
- 13) The r.m.s. value of sinusoidal 100 V peak to peak is _____ volt.
- a) $100/\sqrt{2}$ b) $50/\sqrt{2}$ c) 50 d) 100
- 14) The input of an ac circuit having power factor of 0.8 lagging is 20 KVA. The power drawn by the circuit is _____ KW.
- a) 12 b) 20 c) 16 d) 8
-



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| Seat No. | |
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**S.E. (Part – I) Biomedical Engineering (CGPA) Examination, 2017
LINEAR CIRCUITS ANALYSIS**

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

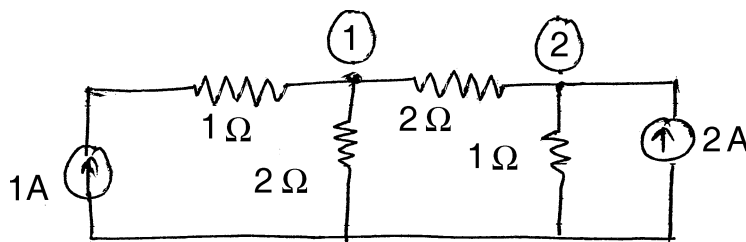
Marks : 56

SECTION – I

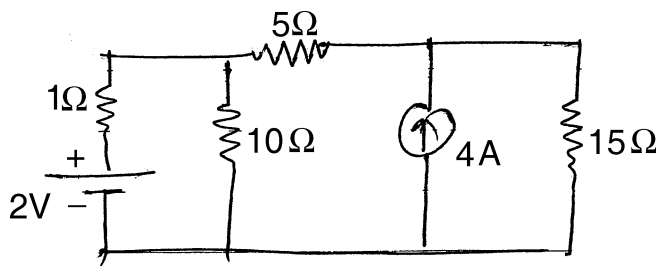
2. Attempt any 4 :

(4×4=16)

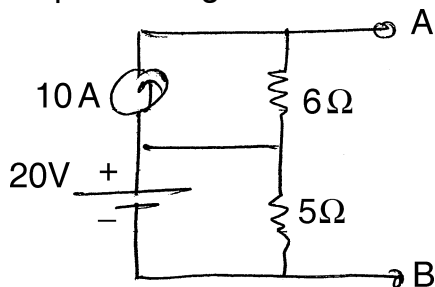
- 1) State and express Thevenin's theorem.
- 2) Find voltage at node 1 and 2 :



3) Applying mesh analysis find the current through 10 Ω resistor :



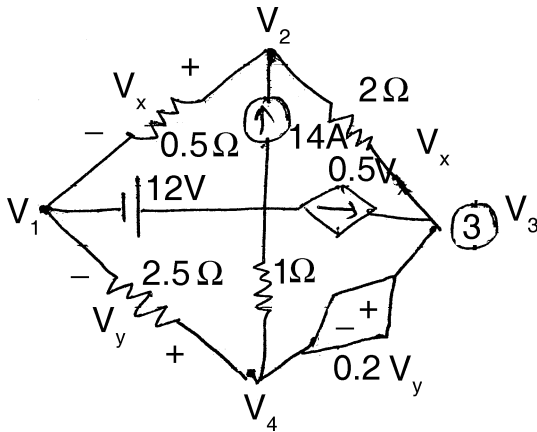
- 4) Define resonance and Q factor of resonance in detail.
- 5) Replace the given network with single current source and a resistor :



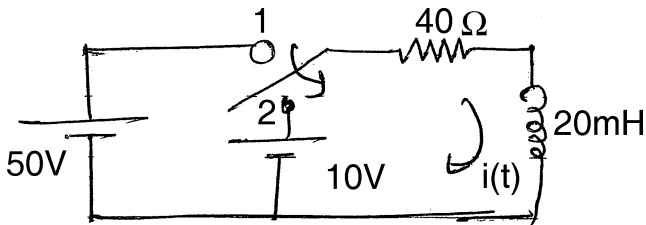


3. Attempt **any two** : (6×2=12)

- 1) State and differentiate between superposition and Norton’s theorem.
- 2) Find the nodal voltage in given circuit :



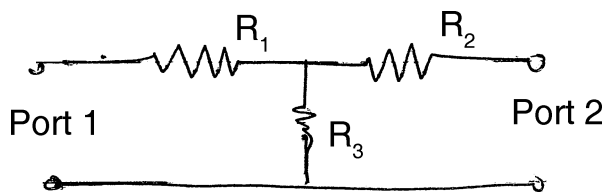
- 3) The network shown is under steady state with switch at the position 1. At $t = 0$, switch is moved to position 2. Find $i(t)$:



SECTION – II

4. Attempt **any 4** : (4×4=16)

- 1) Design an asymmetrical T-network shown below having $Z_{OC1} = 1000 \Omega$, $Z_{OC2} = 1200 \Omega$ and $Z_{SC1} = 700 \Omega$:



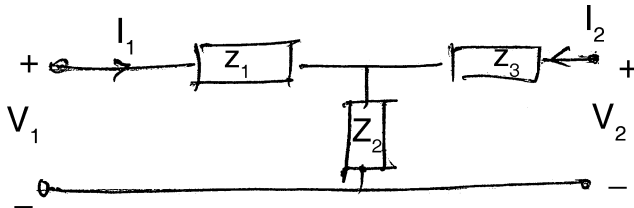


2) A network function is given below. Obtain the pole-zero diagram :

$$p(s) = \frac{2s}{(s + 2)(s^2 + 2s + 2)}$$

3) Prove the condition of reciprocity for transmission parameter.

4) Find the Z parameter for network shown :

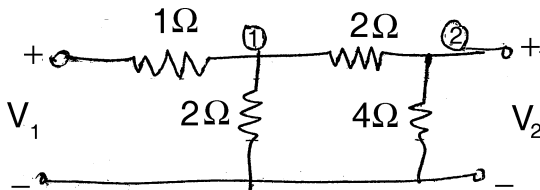


5) Draw and explain working of low pass and high pass filter circuit.

5. Attempt **any 2** :

(6×2=12)

1) Determine Y parameter for network shown :



2) Draw and explain working of notch filters using RC and RL circuits.

3) Design a T type symmetrical attenuator which offers 40 dB attenuation with a load of 400 Ω .



SLR-VB – 351

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**S.E. (Part – I) Biomedical Engineering (CGPA) Examination, 2017
LINEAR CIRCUITS ANALYSIS**

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

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 correct alternatives :

(1×14=14)

- 1) Q factor of an inductive coil is given by _____
a) R/z b) $2 \pi fr/R$ c) $2 \pi fL/R$ d) r/L
- 2) The r.m.s. value of sinusoidal 100 V peak to peak is _____ volt.
a) $100/\sqrt{2}$ b) $50/\sqrt{2}$ c) 50 d) 100
- 3) The input of an ac circuit having power factor of 0.8 lagging is 20 KVA. The power drawn by the circuit is _____ KW.
a) 12 b) 20 c) 16 d) 8
- 4) _____ analysis is based on Kirchhoff's law.
a) Nodal b) Mesh
c) Star delta d) None of the above
- 5) 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
- 6) 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
- 7) When a unit impulse voltage is applied to an inductor of 1H, the energy supplied by the source is _____
a) ∞ b) 1J c) $1/2$ J d) 0

P.T.O.



8) The transfer function of a low pass RC network is _____

- a) $(RCs) (1 + RCs)$ b) $\frac{1}{1 + RCs}$
c) $\frac{RCs}{1 + RCs}$ d) $\frac{S}{1 + RCs}$

9) At 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

10) For a 2 port network to be reciprocal _____

- a) $Z_{11} = Z_{22}$ b) $Y_{12} = Y_{21}$ c) $h_{21} = -h_{12}$ d) $AB = BC$

11) The time taken to change from an initial steady state to the final steady state is called as _____

- a) Transient period b) Transfer function
c) Shifting d) Transient function

12) The superposition theorem is essentially based on the concept of

- _____
- a) Duality b) Linearity c) Reciprocity d) Non-linearity

13) The power factor of a purely resistive circuit is _____

- a) Zero b) Unity c) Lagging d) Leading

14) In an R-L-C circuit, the phase of the current with respect to the circuit voltage will be _____

- a) Leading b) Same
c) Lagging d) Depends upon the value of L and C



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**S.E. (Part – I) Biomedical Engineering (CGPA) Examination, 2017
LINEAR CIRCUITS ANALYSIS**

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

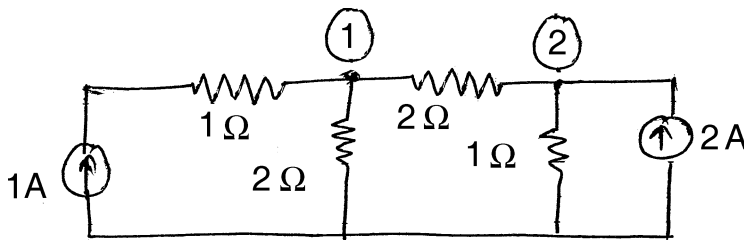
Marks : 56

SECTION – I

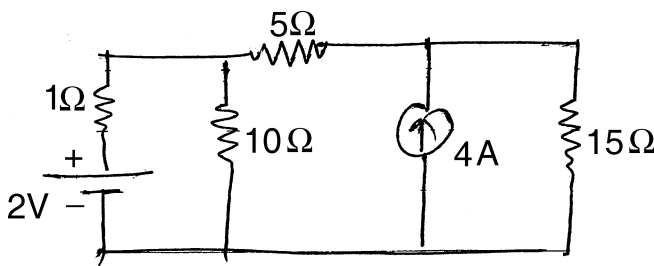
2. Attempt any 4 :

(4×4=16)

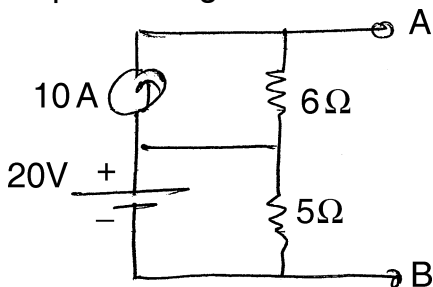
- 1) State and express Thevenin's theorem.
- 2) Find voltage at node 1 and 2 :



3) Applying mesh analysis find the current through 10 Ω resistor :



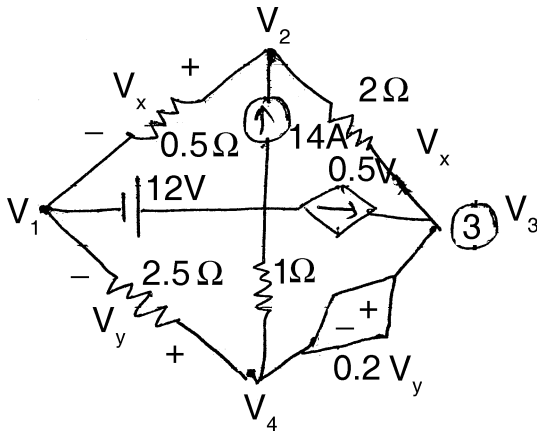
- 4) Define resonance and Q factor of resonance in detail.
- 5) Replace the given network with single current source and a resistor :



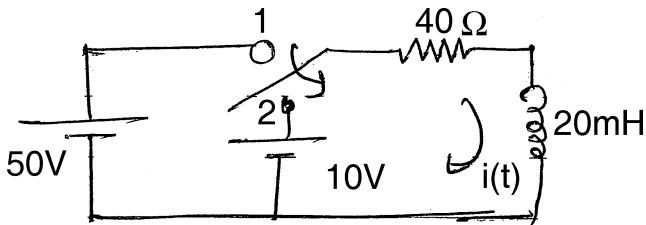


3. Attempt **any two** : (6×2=12)

- 1) State and differentiate between superposition and Norton’s theorem.
- 2) Find the nodal voltage in given circuit :



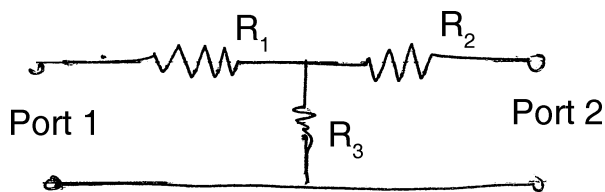
- 3) The network shown is under steady state with switch at the position 1. At $t = 0$, switch is moved to position 2. Find $i(t)$:



SECTION – II

4. Attempt **any 4** : (4×4=16)

- 1) Design an asymmetrical T-network shown below having $Z_{OC1} = 1000 \Omega$, $Z_{OC2} = 1200 \Omega$ and $Z_{SC1} = 700 \Omega$:



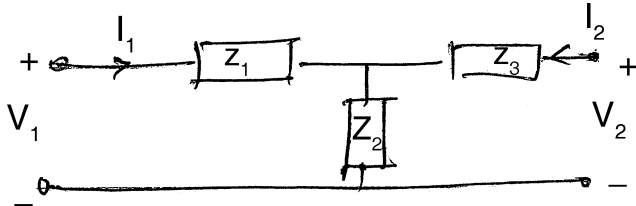


2) A network function is given below. Obtain the pole-zero diagram :

$$p(s) = \frac{2s}{(s + 2)(s^2 + 2s + 2)}$$

3) Prove the condition of reciprocity for transmission parameter.

4) Find the Z parameter for network shown :

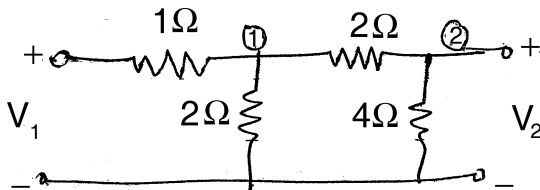


5) Draw and explain working of low pass and high pass filter circuit.

5. Attempt **any 2** :

(6×2=12)

1) Determine Y parameter for network shown :



2) Draw and explain working of notch filters using RC and RL circuits.

3) Design a T type symmetrical attenuator which offers 40 dB attenuation with a load of 400 Ω .



SLR-VB – 351

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**S.E. (Part – I) Biomedical Engineering (CGPA) Examination, 2017
LINEAR CIRCUITS ANALYSIS**

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

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 correct alternatives :

(1×14=14)

1) 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

2) When a unit impulse voltage is applied to an inductor of 1H, the energy supplied by the source is _____

- a) ∞ b) 1J c) $\frac{1}{2}$ J d) 0

3) The transfer function of a low pass RC network is _____

- a) (RCs) b) $\frac{1}{1+RCs}$

- c) $\frac{RCs}{1+RCs}$ d) $\frac{S}{1+RCs}$

4) At 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

5) For a 2 port network to be reciprocal _____

- a) $Z_{11} = Z_{22}$ b) $Y_{12} = Y_{21}$ c) $h_{21} = -h_{12}$ d) $AB = BC$

P.T.O.



- 6) The time taken to change from an initial steady state to the final steady state is called as _____
a) Transient period b) Transfer function
c) Shifting d) Transient function
- 7) The superposition theorem is essentially based on the concept of _____
a) Duality b) Linearity c) Reciprocity d) Non-linearity
- 8) The power factor of a purely resistive circuit is _____
a) Zero b) Unity c) Lagging d) Leading
- 9) In an R-L-C circuit, the phase of the current with respect to the circuit voltage will be _____
a) Leading b) Same
c) Lagging d) Depends upon the value of L and C
- 10) Q factor of an inductive coil is given by _____
a) R/z b) $2 \pi fr/R$ c) $2 \pi fL/R$ d) r/L
- 11) The r.m.s. value of sinusoidal 100 V peak to peak is _____ volt.
a) $100/\sqrt{2}$ b) $50/\sqrt{2}$ c) 50 d) 100
- 12) The input of an ac circuit having power factor of 0.8 lagging is 20 KVA. The power drawn by the circuit is _____ KW.
a) 12 b) 20 c) 16 d) 8
- 13) _____ analysis is based on Kirchhoff's law.
a) Nodal b) Mesh
c) Star delta d) None of the above
- 14) 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
-



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**S.E. (Part – I) Biomedical Engineering (CGPA) Examination, 2017
LINEAR CIRCUITS ANALYSIS**

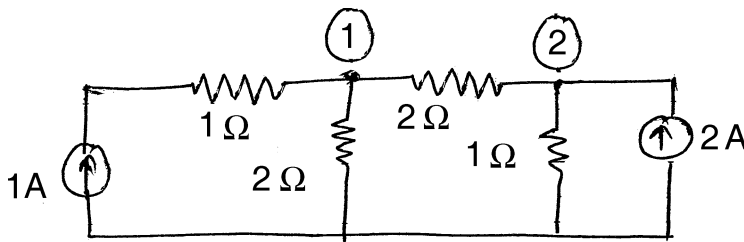
Day and Date : Tuesday, 9-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

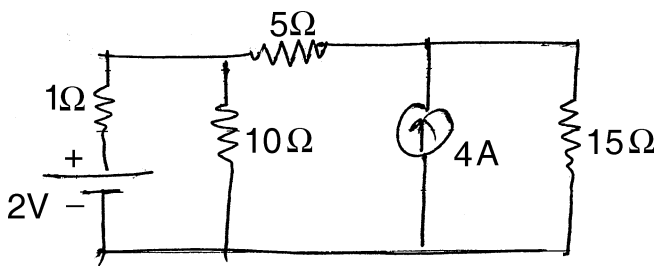
SECTION – I

2. Attempt any 4 : (4×4=16)

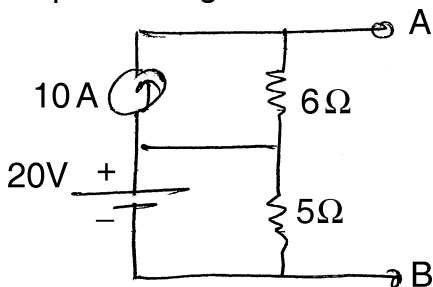
- 1) State and express Thevenin's theorem.
- 2) Find voltage at node 1 and 2 :



3) Applying mesh analysis find the current through 10 Ω resistor :



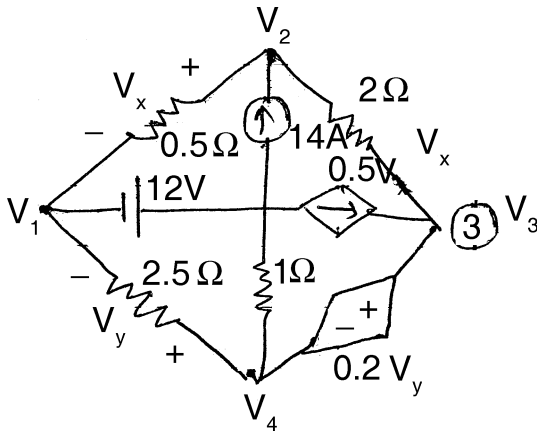
- 4) Define resonance and Q factor of resonance in detail.
- 5) Replace the given network with single current source and a resistor :



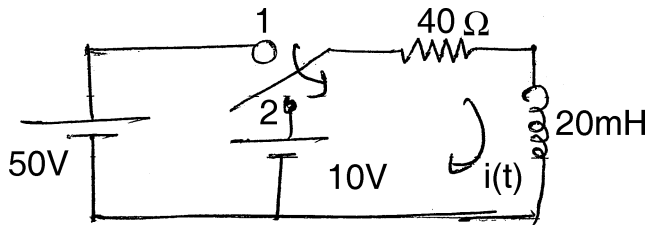


3. Attempt **any two** : (6×2=12)

- 1) State and differentiate between superposition and Norton’s theorem.
- 2) Find the nodal voltage in given circuit :



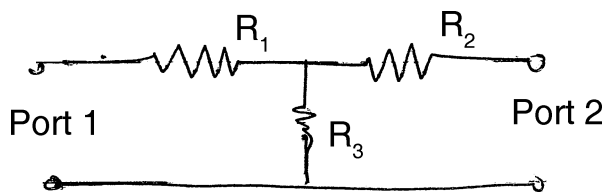
- 3) The network shown is under steady state with switch at the position 1. At $t = 0$, switch is moved to position 2. Find $i(t)$:



SECTION – II

4. Attempt **any 4** : (4×4=16)

- 1) Design an asymmetrical T-network shown below having $Z_{OC1} = 1000 \Omega$, $Z_{OC2} = 1200 \Omega$ and $Z_{SC1} = 700 \Omega$:



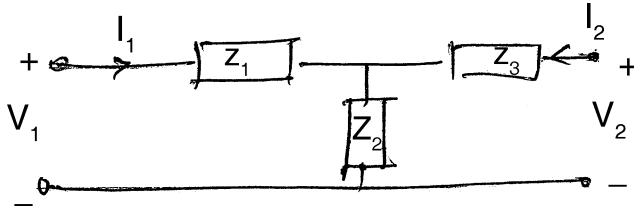


2) A network function is given below. Obtain the pole-zero diagram :

$$p(s) = \frac{2s}{(s + 2)(s^2 + 2s + 2)}$$

3) Prove the condition of reciprocity for transmission parameter.

4) Find the Z parameter for network shown :

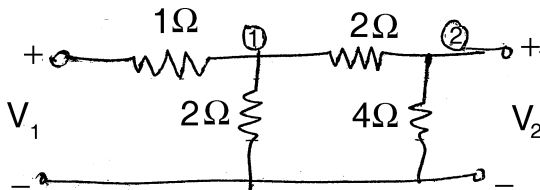


5) Draw and explain working of low pass and high pass filter circuit.

5. Attempt **any 2** :

(6×2=12)

1) Determine Y parameter for network shown :



2) Draw and explain working of notch filters using RC and RL circuits.

3) Design a T type symmetrical attenuator which offers 40 dB attenuation with a load of 400 Ω .



SLR-VB – 352

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**S.E. (Biomedical Engg.) (Part – I) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(20×1=20)**
- 1) If all elements in a particular network are linear then the superposition theorem would hold, when the excitation is
a) DC only b) AC only c) AC or DC d) animpulse
 - 2) Nodal analysis is applied for _____ networks.
a) Planer b) Non planer c) Both a & b d) None of above
 - 3) Mesh analysis is applied for _____ networks.
a) Planer b) Non planer c) Both a & b d) None of above
 - 4) Super position theorem is not applicable for
a) Current calculation b) Voltage calculation
c) Power calculation d) rms calculation
 - 5) To apply reciprocity theorem response to excitation ratio is
a) Ohm b) Mho c) No unit d) Either a or b
 - 6) In series R, L circuit power factor can be defined as
a) R/Z b) P/S c) V_r/V d) All of above
 - 7) In RLC series circuit, if the voltage across capacitor is greater than voltage across inductor, then power factor of network is
a) lagging b) leading c) onunity d) zero
 - 8) For ideal tank, circuit, the value of dynamic admittance is
a) $-\infty$ b) 0 c) both d) none of above
 - 9) In steady state condition capacitor acts as
a) short circuit b) open circuit c) voltage source d) current source

P.T.O.



- 10) In RC series circuit $R = 2\Omega$ $C = 2\mu\text{f}$ and 10 V dc is applied. Value of current is
a) 0A b) 2A c) 5A d) 10A
- 11) Time constant of RC series circuit is
a) L/R b) $2RC$ c) $2L/R$ d) RC
- 12) Given network is having N nodes and B branches, then number of twigs are
a) N b) $N - 1$ c) $B - N + 1$ d) $B - N - 1$
- 13) Reciprocity condition for 'h' parameter is
a) $h_{12} = h_{21}$ b) $h_{12} - h_{21}$
c) $h_{11}h_{22} - h_{21}h_{12} = 0$ d) None of these
- 14) According to duality principle a series inductor (L) can be represented as
a) Series L b) Parallel L c) Series C d) Parallel C
- 15) In a series resonant circuit impedance is
a) Minimum b) Maximum c) Zero d) None of these
- 16) In foster I form first element is
a) Capacitor b) Inductor c) Both d) None
- 17) In two port network $Z_{12} = Z_{21}$ indicates _____ property.
a) unilateral b) bilateral c) linear d) nonlinear
- 18) An electrical circuit with 10 branches and 7 nodes will have _____ loop equations.
a) 10 b) 7 c) 3 d) 4
- 19) Poles and zeros are arranged alternatively on imaginary axis, then type of network is _____ network.
a) LC b) RC c) RL d) Any of above
- 20) Advantage of active filter is
a) do not offer gain b) easy to tune
c) both of above d) derive high impedance load
-



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**S.E. (Biomedical Engg.) (Part – I) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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

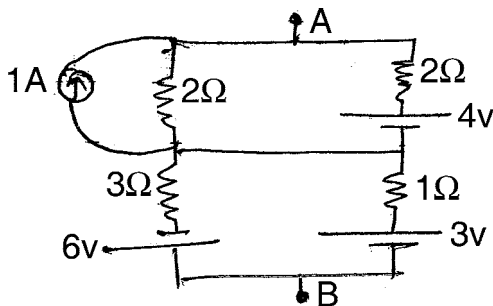
Marks : 80

SECTION – I

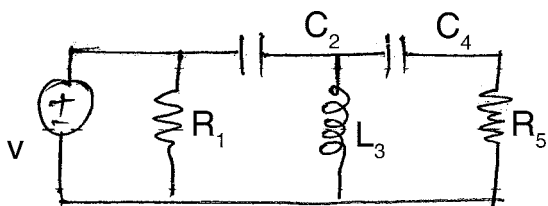
2. Attempt **any four** :

(4×5=20)

- 1) State and explain Kirchoff's current and voltage law.
- 2) Reduce network shown into single source and a single resistor between terminals A and B.



- 3) A non sinusoidal voltage is having a form factor of 1.2 and peak factor of 1.5. If the average value of the voltage is 10 V, calculate :
 - i) rms value
 - ii) maximum value
- 4) Two voltages having rms values of 50 v and 75 v have a phase difference of 60°. Find the resultant sum of these 2 voltages.
- 5) Draw the dual network for given network.

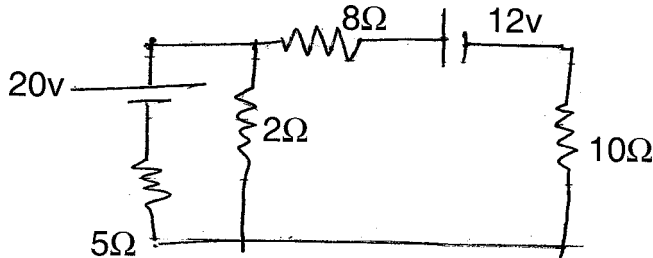




3. Attempt **any two** :

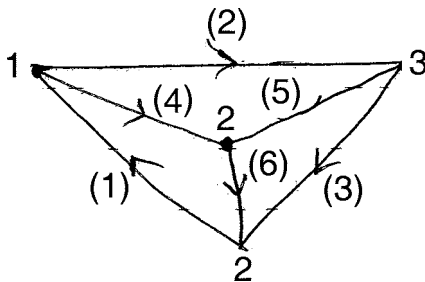
(10×2=20)

- 1) State Norton's theorem and find the current through 10Ω resistor for given network.

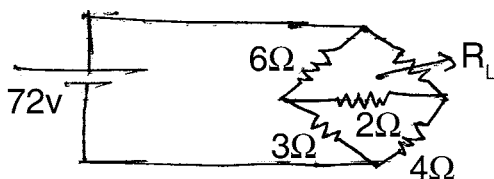


- 2) For given graph of a network shown find :

- i) incidence matrix
- ii) f-cutset matrix
- iii) f-circuit matrix



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



SECTION – II

4. Attempt **any four** :

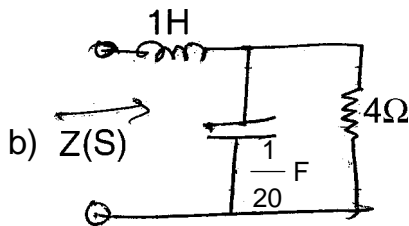
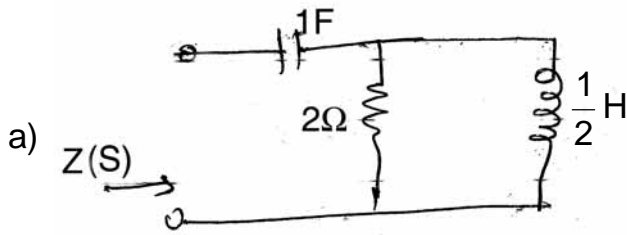
(4×5=20)

- 1) Derive condition for reciprocity for z parameter.
- 2) Explain various properties of positive real function.
- 3) Derive Y parameters interm of Z and ABCD parameter.
- 4) Explain signification and function of T-type and pi-type attenuation.
- 5) Define and differentiate between band pass and band reject filters.

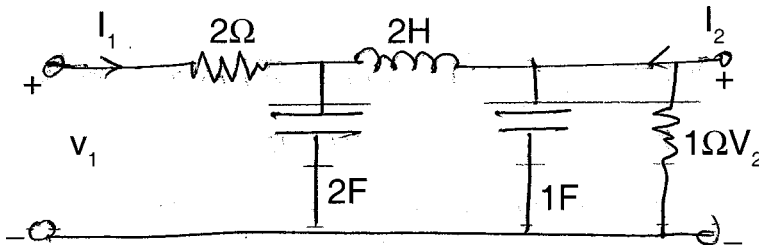


5. Attempt **any two** : (10×2=20)

- 1) The z parameters of a 2 port network are $z_{11} = 20\Omega$, $z_{22} = 30\Omega$, $z_{12} = z_{21} = 10\Omega$. Find Y and ABCD parameter.
- 2) Find poles and zeros of the impedance of following networks and plot them on S-plane.



3) Determine ABCD parameters for given ladder network.





SLR-VB – 352

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**S.E. (Biomedical Engg.) (Part – I) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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 foster I form first element is
a) Capacitor b) Inductor c) Both d) None
- 2) In two port network $Z_{12} = Z_{21}$ indicates _____ property.
a) unilateral b) bilateral c) linear d) nonlinear
- 3) An electrical circuit with 10 branches and 7 nodes will have _____ loop equations.
a) 10 b) 7 c) 3 d) 4
- 4) Poles and zeros are arranged alternatively on imaginary axis, then type of network is _____ network.
a) LC b) RC c) RL d) Any of above
- 5) Advantage of active filter is
a) do not offer gain b) easy to tune
c) both of above d) derive high impedance load
- 6) If all elements in a particular network are linear then the superposition theorem would hold, when the excitation is
a) DC only b) AC only c) AC or DC d) an impulse
- 7) Nodal analysis is applied for _____ networks.
a) Planer b) Non planer c) Both a & b d) None of above
- 8) Mesh analysis is applied for _____ networks.
a) Planer b) Non planer c) Both a & b d) None of above
- 9) Super position theorem is not applicable for
a) Current calculation b) Voltage calculation
c) Power calculation d) rms calculation

P.T.O.



- 10) To apply reciprocity theorem response to excitation ratio is
a) Ohm b) Mho c) No unit d) Either a or b
- 11) In series R, L circuit power factor can be defined as
a) R/Z b) P/S c) V_r/V d) All of above
- 12) In RLC series circuit, if the voltage across capacitor is greater than voltage across inductor, then power factor of network is
a) lagging b) leading c) onunity d) zero
- 13) For ideal tank, circuit, the value of dynamic admittance is
a) $-\infty$ b) 0 c) both d) none of above
- 14) In steady state condition capacitor acts as
a) short circuit b) open circuit c) voltage source d) current source
- 15) In RC series circuit $R = 2\Omega$ $C = 2\mu\text{f}$ and 10 V dc is applied. Value of current is
a) 0A b) 2A c) 5A d) 10A
- 16) Time constant of RC series circuit is
a) L/R b) $2RC$ c) $2L/R$ d) RC
- 17) Given network is having N nodes and B branches, then number of twigs are
a) N b) $N - 1$ c) $B - N + 1$ d) $B - N - 1$
- 18) Reciprocity condition for 'h' parameter is
a) $h_{12} = h_{21}$ b) $h_{12} - h_{21}$
c) $h_{11}h_{22} - h_{21}h_{12} = 0$ d) None of these
- 19) According to duality principle a series inductor (L) can be represented as
a) Series L b) Parallel L c) Series C d) Parallel C
- 20) In a series resonant circuit impedance is
a) Minimum b) Maximum c) Zero d) None of these
-



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**S.E. (Biomedical Engg.) (Part – I) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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

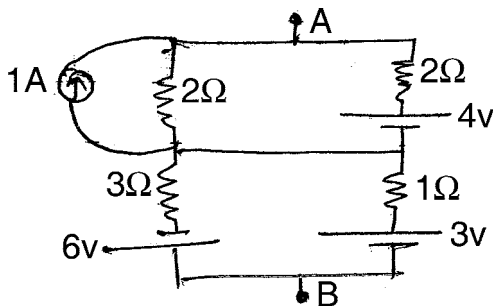
Marks : 80

SECTION – I

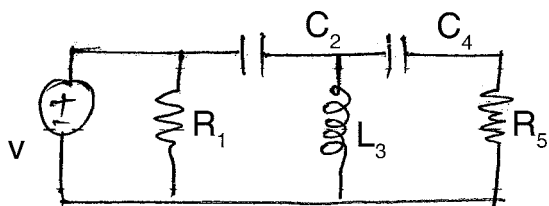
2. Attempt **any four** :

(4×5=20)

- 1) State and explain Kirchoff's current and voltage law.
- 2) Reduce network shown into single source and a single resistor between terminals A and B.



- 3) A non sinusoidal voltage is having a form factor of 1.2 and peak factor of 1.5. If the average value of the voltage is 10 V, calculate :
i) rms value ii) maximum value
- 4) Two voltages having rms values of 50 v and 75 v have a phase difference of 60°. Find the resultant sum of these 2 voltages.
- 5) Draw the dual network for given network.

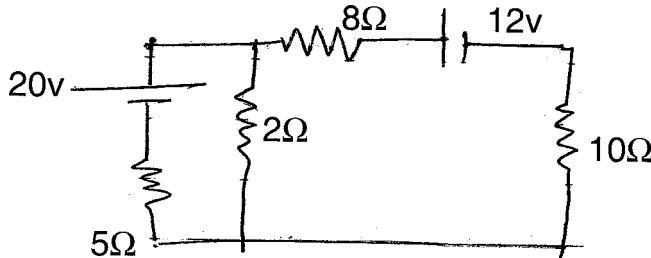




3. Attempt **any two** :

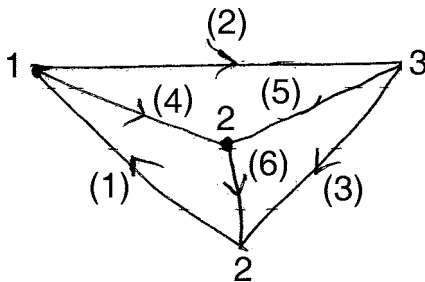
(10×2=20)

- 1) State Norton's theorem and find the current through 10Ω resistor for given network.

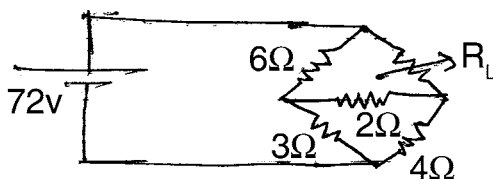


- 2) For given graph of a network shown find :

- i) incidence matrix
- ii) f-cutset matrix
- iii) f-circuit matrix



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



SECTION – II

4. Attempt **any four** :

(4×5=20)

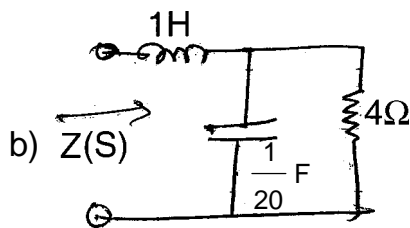
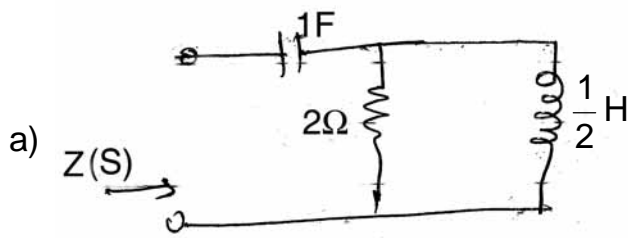
- 1) Derive condition for reciprocity for z parameter.
- 2) Explain various properties of positive real function.
- 3) Derive Y parameters interm of Z and ABCD parameter.
- 4) Explain signification and function of T-type and pi-type attenuation.
- 5) Define and differentiate between band pass and band reject filters.

Set Q

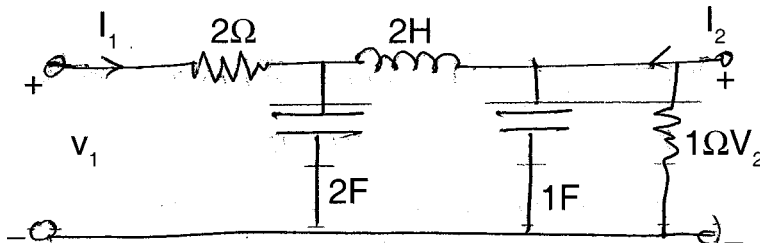


5. Attempt **any two** : (10×2=20)

- 1) The z parameters of a 2 port network are $z_{11} = 20\Omega$, $z_{22} = 30\Omega$, $z_{12} = z_{21} = 10\Omega$. Find Y and ABCD parameter.
- 2) Find poles and zeros of the impedance of following networks and plot them on S-plane.



3) Determine ABCD parameters for given ladder network.





SLR-VB – 352

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**S.E. (Biomedical Engg.) (Part – I) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) Time constant of RC series circuit is
a) L/R b) 2 RC c) 2 L/R d) RC
- 2) Given network is having N nodes and B branches, then number of twigs are
a) N b) N – 1 c) B – N+1 d) B – N – 1
- 3) Reciprocity condition for 'h' parameter is
a) $h_{12} = h_{21}$ b) $h_{12} - h_{21}$
c) $h_{11}h_{22} - h_{21}h_{12} = 0$ d) None of these
- 4) According to duality principle a series inductor (L) can be represented as
a) Series L b) Parallel L c) Series C d) Parallel C
- 5) In a series resonant circuit impedance is
a) Minimum b) Maximum c) Zero d) None of these
- 6) In foster I form first element is
a) Capacitor b) Inductor c) Both d) None
- 7) In two port network $Z_{12} = Z_{21}$ indicates _____ property.
a) unilateral b) bilateral c) linear d) nonlinear
- 8) An electrical circuit with 10 branches and 7 nodes will have _____ loop equations.
a) 10 b) 7 c) 3 d) 4
- 9) Poles and zeros are arranged alternatively on imaginary axis, then type of network is _____ network.
a) LC b) RC c) RL d) Any of above

P.T.O.



- 10) Advantage of active filter is
- a) do not offer gain
 - b) easy to tune
 - c) both of above
 - d) derive high impedance load
- 11) If all elements in a particular network are linear then the superposition theorem would hold, when the excitation is
- a) DC only
 - b) AC only
 - c) AC or DC
 - d) an impulse
- 12) Nodal analysis is applied for _____ networks.
- a) Planer
 - b) Non planer
 - c) Both a & b
 - d) None of above
- 13) Mesh analysis is applied for _____ networks.
- a) Planer
 - b) Non planer
 - c) Both a & b
 - d) None of above
- 14) Super position theorem is not applicable for
- a) Current calculation
 - b) Voltage calculation
 - c) Power calculation
 - d) rms calculation
- 15) To apply reciprocity theorem response to excitation ratio is
- a) Ohm
 - b) Mho
 - c) No unit
 - d) Either a or b
- 16) In series R, L circuit power factor can be defined as
- a) R/Z
 - b) P/S
 - c) V_r/V
 - d) All of above
- 17) In RLC series circuit, if the voltage across capacitor is greater than voltage across inductor, then power factor of network is
- a) lagging
 - b) leading
 - c) onunity
 - d) zero
- 18) For ideal tank, circuit, the value of dynamic admittance is
- a) $-\infty$
 - b) 0
 - c) both
 - d) none of above
- 19) In steady state condition capacitor acts as
- a) short circuit
 - b) open circuit
 - c) voltage source
 - d) current source
- 20) In RC series circuit $R = 2\Omega$ $C = 2\mu f$ and 10 V dc is applied. Value of current is
- a) 0A
 - b) 2A
 - c) 5A
 - d) 10A
-



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**S.E. (Biomedical Engg.) (Part – I) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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

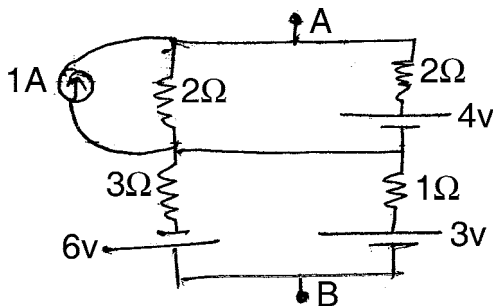
Marks : 80

SECTION – I

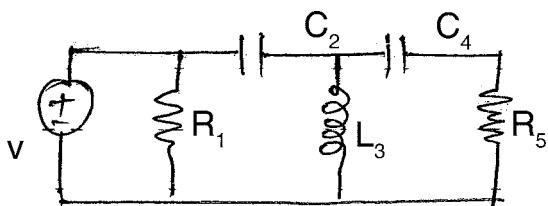
2. Attempt **any four** :

(4×5=20)

- 1) State and explain Kirchoff's current and voltage law.
- 2) Reduce network shown into single source and a single resistor between terminals A and B.



- 3) A non sinusoidal voltage is having a form factor of 1.2 and peak factor of 1.5. If the average value of the voltage is 10 V, calculate :
 - i) rms value
 - ii) maximum value
- 4) Two voltages having rms values of 50 v and 75 v have a phase difference of 60°. Find the resultant sum of these 2 voltages.
- 5) Draw the dual network for given network.

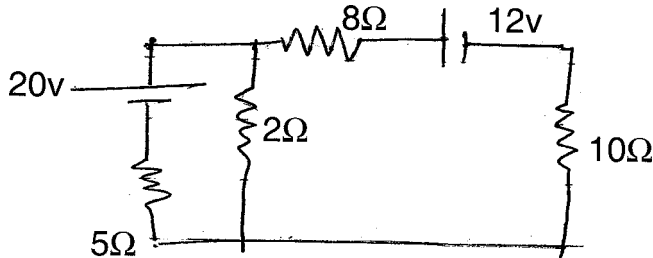




3. Attempt **any two** :

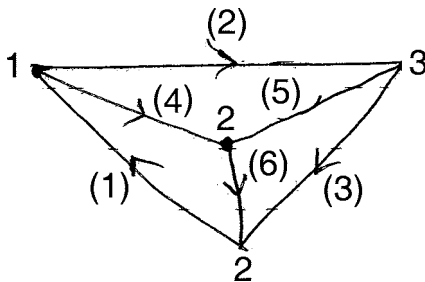
(10×2=20)

- 1) State Norton's theorem and find the current through 10Ω resistor for given network.

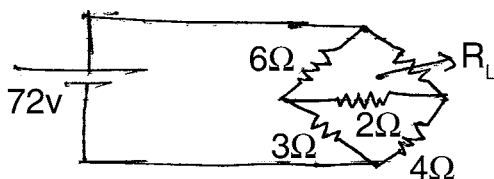


- 2) For given graph of a network shown find :

- i) incidence matrix
- ii) f-cutset matrix
- iii) f-circuit matrix



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



SECTION – II

4. Attempt **any four** :

(4×5=20)

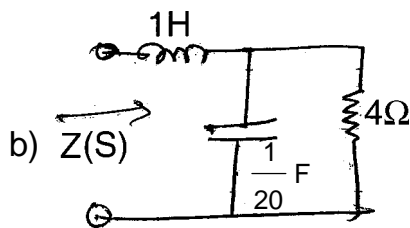
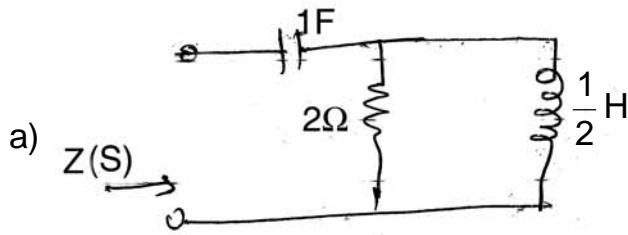
- 1) Derive condition for reciprocity for z parameter.
- 2) Explain various properties of positive real function.
- 3) Derive Y parameters interm of Z and ABCD parameter.
- 4) Explain signification and function of T-type and pi-type attenuation.
- 5) Define and differentiate between band pass and band reject filters.

Set R

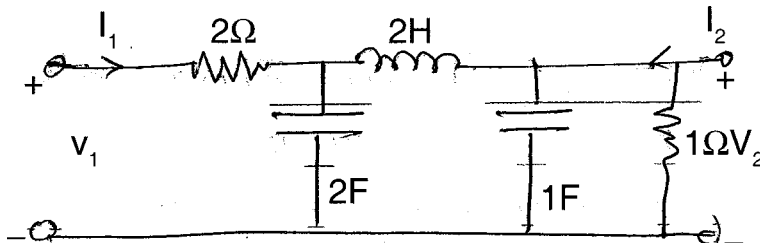


5. Attempt **any two** : (10×2=20)

- 1) The z parameters of a 2 port network are $z_{11} = 20\Omega$, $z_{22} = 30\Omega$, $z_{12} = z_{21} = 10\Omega$. Find Y and ABCD parameter.
- 2) Find poles and zeros of the impedance of following networks and plot them on S-plane.



3) Determine ABCD parameters for given ladder network.





SLR-VB – 352

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**S.E. (Biomedical Engg.) (Part – I) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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 series R, L circuit power factor can be defined as
a) R/Z b) P/S c) V_r/V d) All of above
- 2) In RLC series circuit, if the voltage across capacitor is greater than voltage across inductor, then power factor of network is
a) lagging b) leading c) onunity d) zero
- 3) For ideal tank, circuit, the value of dynamic admittance is
a) $-\infty$ b) 0 c) both d) none of above
- 4) In steady state condition capacitor acts as
a) short circuit b) open circuit c) voltage source d) current source
- 5) In RC series circuit $R = 2\Omega$ $C = 2\mu f$ and 10 V dc is applied. Value of current is
a) 0A b) 2A c) 5A d) 10A
- 6) Time constant of RC series circuit is
a) L/R b) $2 RC$ c) $2 L/R$ d) RC
- 7) Given network is having N nodes and B branches, then number of twigs are
a) N b) $N - 1$ c) $B - N + 1$ d) $B - N - 1$
- 8) Reciprocity condition for 'h' parameter is
a) $h_{12} = h_{21}$ b) $h_{12} - h_{21}$
c) $h_{11}h_{22} - h_{21}h_{12} = 0$ d) None of these
- 9) According to duality principle a series inductor (L) can be represented as
a) Series L b) Parallel L c) Series C d) Parallel C

P.T.O.



- 10) In a series resonant circuit impedance is
a) Minimum b) Maximum c) Zero d) None of these
- 11) In foster I form first element is
a) Capacitor b) Inductor c) Both d) None
- 12) In two port network $Z_{12} = Z_{21}$ indicates _____ property.
a) unilateral b) bilateral c) linear d) nonlinear
- 13) An electrical circuit with 10 branches and 7 nodes will have _____ loop equations.
a) 10 b) 7 c) 3 d) 4
- 14) Poles and zeros are arranged alternatively on imaginary axis, then type of network is _____ network.
a) LC b) RC c) RL d) Any of above
- 15) Advantage of active filter is
a) do not offer gain b) easy to tune
c) both of above d) derive high impedance load
- 16) If all elements in a particular network are linear then the superposition theorem would hold, when the excitation is
a) DC only b) AC only c) AC or DC d) an impulse
- 17) Nodal analysis is applied for _____ networks.
a) Planer b) Non planer c) Both a & b d) None of above
- 18) Mesh analysis is applied for _____ networks.
a) Planer b) Non planer c) Both a & b d) None of above
- 19) Super position theorem is not applicable for
a) Current calculation b) Voltage calculation
c) Power calculation d) rms calculation
- 20) To apply reciprocity theorem response to excitation ratio is
a) Ohm b) Mho c) No unit d) Either a or b
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**S.E. (Biomedical Engg.) (Part – I) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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

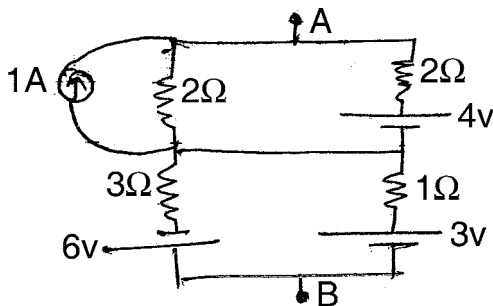
Marks : 80

SECTION – I

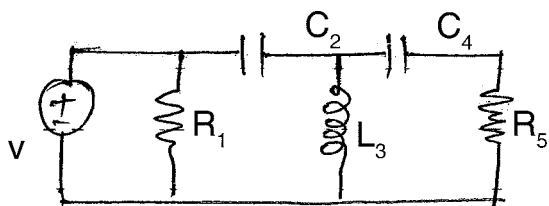
2. Attempt **any four** :

(4×5=20)

- 1) State and explain Kirchoff's current and voltage law.
- 2) Reduce network shown into single source and a single resistor between terminals A and B.



- 3) A non sinusoidal voltage is having a form factor of 1.2 and peak factor of 1.5. If the average value of the voltage is 10 V, calculate :
 - i) rms value
 - ii) maximum value
- 4) Two voltages having rms values 50 v and 75 v have a phase difference of 60°. Find the resultant sum of these 2 voltages.
- 5) Draw the dual network for given network.

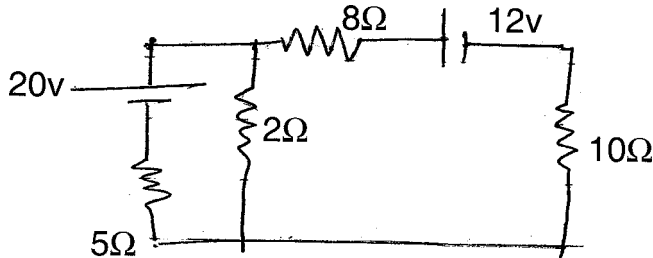




3. Attempt **any two** :

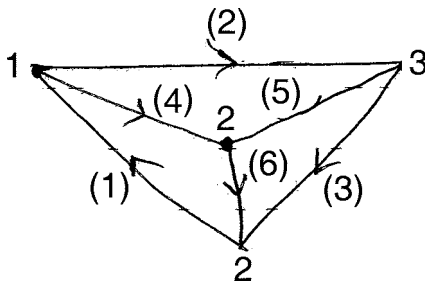
(10×2=20)

- 1) State Norton's theorem and find the current through 10Ω resistor for given network.

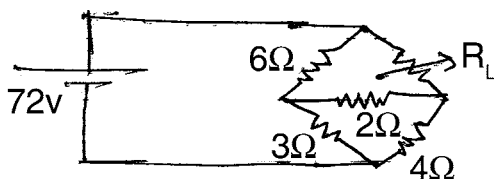


- 2) For given graph of a network shown find :

- i) incidence matrix
- ii) f-cutset matrix
- iii) f-circuit matrix



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



SECTION – II

4. Attempt **any four** :

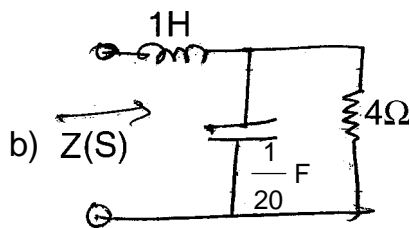
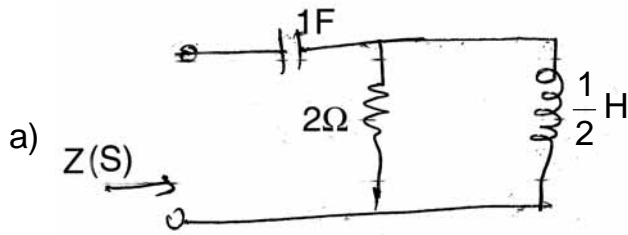
(4×5=20)

- 1) Derive condition for reciprocity for z parameter.
- 2) Explain various properties of positive real function.
- 3) Derive Y parameters interm of Z and ABCD parameter.
- 4) Explain signification and function of T-type and pi-type attenuation.
- 5) Define and differentiate between band pass and band reject filters.

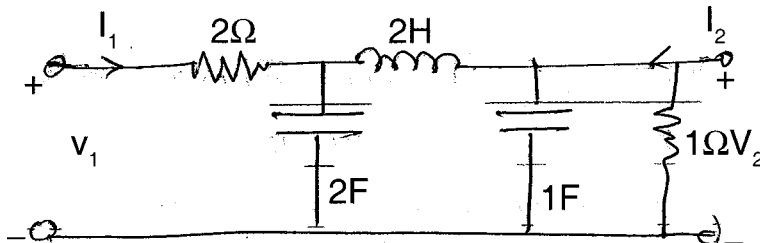


5. Attempt **any two** : (10×2=20)

- 1) The z parameters of a 2 port network are $z_{11} = 20\Omega$, $z_{22} = 30\Omega$, $z_{12} = z_{21} = 10\Omega$. Find Y and ABCD parameter.
- 2) Find poles and zeros of the impedance of following networks and plot them on S-plane.



3) Determine ABCD parameters for given ladder network.





SLR-VB – 353

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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

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

Max. Marks : 70

- 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) _____ is the smallest change in the measured variable to which an instrument will respond.
a) Precision b) Accuracy c) Resolution d) Error
- 2) Accuracy is expressed as _____
a) relative accuracy b) % accuracy
c) error d) % error
- 3) Strain gauge is an example of a _____ transducer.
a) passive b) active c) thermal d) conductive
- 4) The resistance of a conductor changes when its _____ is changed.
a) humidity b) linearity c) conductivity d) temperature
- 5) The metal mostly used in RTD is _____
a) copper b) iron c) platinum d) silver
- 6) Motion artefact is reduced to a negligible magnitude by _____ abrasion.
a) skin b) electrode c) read d) wire
- 7) The micro electrodes have very _____ impedance as compared to conventional electrodes used for recording physiological signals.
a) low b) moderate c) high d) stable

P.T.O.



- 8) Optical fibers are immune to _____ interference.
a) electromagnetic b) a.c.
c) d.c. d) noise
- 9) The biosensor relies upon _____ that recognize and catalyze reactions of glucose.
a) blood b) gas c) CSF d) enzymes
- 10) Optical fiber sensors are _____ properties.
a) electrical b) mechanical c) non electrical d) active
- 11) Percutaneous electrodes are used to detect _____ within the body.
a) blood b) CSF
c) blood pressure d) biopotential
- 12) Thermal sensors absorb radiation and transform it into _____.
a) power b) potential c) heat d) energy
- 13) Fluoroptic temperature sensors are useful devices used for _____ temperature measurement.
a) tissue b) light c) radiation d) retina
- 14) Photoelectric transducer converts _____ energy into electrical energy.
a) light b) radiation c) heat d) photon
-



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

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

Marks : 56

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) What is thermistor ? How thermistors are classified on the basis of temperature resistance characteristics ?
 - 2) What is motion artefact ? How it is minimized ?
 - 3) Draw and explain electrode – skin interface.
 - 4) Explain working of bonded strain gauges with neat diagram.
 - 5) Differentiate between active and passive transducer.
3. Attempt **any two** questions : **(6×2=12)**
- 1) Explain the construction and working of LVDT.
 - 2) Mention types of biopotential electrodes. Explain any 2 biopotential electrodes.
 - 3) Which are the different laws that govern the working of a thermocouple ?

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Differentiate between amperometric and potentiometric sensors.
 - 2) What is pH of a solution ? Classify the solution on basis of pH values.
 - 3) What are the applications of ISFET in medicine ?
 - 4) Define biosensor and immunosensor with example.
 - 5) Mention any 4 applications of radiation sensor.
5. Attempt **any two** questions : **(2×6=12)**
- 1) Explain working of enzyme sensor with neat figure.
 - 2) Explain working of fiber optics along with its one application
 - 3) Explain the construction and working of PO₂ electrode in detail.



SLR-VB – 353

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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

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

Max. Marks : 70

- 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) Optical fibers are immune to _____ interference.

| | |
|--------------------|----------|
| a) electromagnetic | b) a.c. |
| c) d.c. | d) noise |
 - 2) The biosensor relies upon _____ that recognize and catalyze reactions of glucose.

| | | | |
|----------|--------|--------|------------|
| a) blood | b) gas | c) CSF | d) enzymes |
|----------|--------|--------|------------|
 - 3) Optical fiber sensors are _____ properties.

| | | | |
|---------------|---------------|-------------------|-----------|
| a) electrical | b) mechanical | c) non electrical | d) active |
|---------------|---------------|-------------------|-----------|
 - 4) Percutaneous electrodes are used to detect _____ within the body.

| | |
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| a) blood | b) CSF |
| c) blood pressure | d) biopotential |
 - 5) Thermal sensors absorbs radiation and transforms it into _____.

| | | | |
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| a) power | b) potential | c) heat | d) energy |
|----------|--------------|---------|-----------|
 - 6) Fluoroptic temperature sensors are useful device used for _____ temperature measurement.

| | | | |
|-----------|----------|--------------|-----------|
| a) tissue | b) light | c) radiation | d) retina |
|-----------|----------|--------------|-----------|
 - 7) Photo electric transducer converts _____ energy into electrical energy.

| | | | |
|----------|--------------|---------|-----------|
| a) light | b) radiation | c) heat | d) photon |
|----------|--------------|---------|-----------|

P.T.O.



- 8) _____ is the smallest change in the measured variable to which an instrument will respond.
a) Precision b) Accuracy c) Resolution d) Error
- 9) Accuracy is expressed as _____
a) relative accuracy b) % accuracy
c) error d) % error
- 10) Strain gauge is an example of a _____ transducer.
a) passive b) active c) thermal d) conductive
- 11) The resistance of a conductor changes when its _____ is changed.
a) humidity b) linearity c) conductivity d) temperature
- 12) The metal mostly used in RTD is _____
a) copper b) iron c) platinum d) silver
- 13) Motion artefact is reduced to a negligible magnitude by _____ abrasion.
a) skin b) electrode c) read d) wire
- 14) The micro electrodes have very _____ impedance as compared to conventional electrodes used for recording physiological signals.
a) low b) moderate c) high d) stable
- _____



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

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

Marks : 56

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) What is thermistor ? How thermistors are classified on the basis of temperature resistance characteristics ?
 - 2) What is motion artefact ? How it is minimized ?
 - 3) Draw and explain electrode – skin interface.
 - 4) Explain working of bonded strain gauges with neat diagram.
 - 5) Differentiate between active and passive transducer.
3. Attempt **any two** questions : **(6×2=12)**
- 1) Explain the construction and working of LVDT.
 - 2) Mention types of biopotential electrodes. Explain any 2 biopotential electrodes.
 - 3) Which are the different laws that govern the working of a thermocouple ?

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Differentiate between amperometric and potentiometric sensors.
 - 2) What is pH of a solution ? Classify the solution on basis of pH values.
 - 3) What are the applications of ISFET in medicine ?
 - 4) Define biosensor and immunosensor with example.
 - 5) Mention any 4 applications of radiation sensor.
5. Attempt **any two** questions : **(2×6=12)**
- 1) Explain working of enzyme sensor with neat figure.
 - 2) Explain working of fiber optics along with its one application
 - 3) Explain the construction and working of PO₂ electrode in detail.

Set Q



SLR-VB – 353

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| Seat No. | |
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

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

Max. Marks : 70

- 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 metal mostly used in RTD is _____
a) copper b) iron c) platinum d) silver
- 2) Motion artefact is reduced to a negligible magnitude by _____ abrasion.
a) skin b) electrode c) read d) wire
- 3) The micro electrodes have very _____ impedance as compared to conventional electrodes used for recording physiological signals.
a) low b) moderate c) high d) stable
- 4) Optical fibers are immune to _____ interference.
a) electromagnetic b) a.c.
c) d.c. d) noise
- 5) The biosensor relies upon _____ that recognize and catalyze reactions of glucose.
a) blood b) gas c) CSF d) enzymes
- 6) Optical fiber sensors are _____ properties.
a) electrical b) mechanical c) non electrical d) active
- 7) Percutaneous electrodes are used to detect _____ within the body.
a) blood b) CSF
c) blood pressure d) biopotential

P.T.O.



- 8) Thermal sensors absorbs radiation and transforms it into _____
a) power b) potential c) heat d) energy
- 9) Fluoroptic temperature sensors are useful device used for _____
temperature measurement.
a) tissue b) light c) radiation d) retina
- 10) Photo electric transducer converts _____ energy into electrical energy.
a) light b) radiation c) heat d) photon
- 11) _____ is the smallest change in the measured variable to which as
instrument will respond.
a) Precision b) Accuracy c) Resolution d) Error
- 12) Accuracy is expressed as _____
a) relative accuracy b) % accuracy
c) error d) % error
- 13) Strain gauge is an example of a _____ transducer.
a) passive b) active c) thermal d) conductive
- 14) The resistance of a conductor changes when its _____ is changed.
a) humidity b) linearity c) conductivity d) temperature
- _____



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

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

Marks : 56

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) What is thermistor ? How thermistors are classified on the basis of temperature resistance characteristics ?
 - 2) What is motion artefact ? How it is minimized ?
 - 3) Draw and explain electrode – skin interface.
 - 4) Explain working of bonded strain gauges with neat diagram.
 - 5) Differentiate between active and passive transducer.
3. Attempt **any two** questions : **(6×2=12)**
- 1) Explain the construction and working of LVDT.
 - 2) Mention types of biopotential electrodes. Explain any 2 biopotential electrodes.
 - 3) Which are the different laws that govern the working of a thermocouple ?

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Differentiate between amperometric and potentiometric sensors.
 - 2) What is pH of a solution ? Classify the solution on basis of pH values.
 - 3) What are the applications of ISFET in medicine ?
 - 4) Define biosensor and immunosensor with example.
 - 5) Mention any 4 applications of radiation sensor.
5. Attempt **any two** questions : **(2×6=12)**
- 1) Explain working of enzyme sensor with neat figure.
 - 2) Explain working of fiber optics along with its one application
 - 3) Explain the construction and working of PO₂ electrode in detail.



SLR-VB – 353

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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

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

Max. Marks : 70

- 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) Optical fiber sensors are _____ properties.
a) electrical b) mechanical c) non electrical d) active
 - 2) Percutaneous electrodes are used to detect _____ within the body.
a) blood b) CSF
c) blood pressure d) biopotential
 - 3) Thermal sensors absorbs radiation and transforms it into _____
a) power b) potential c) heat d) energy
 - 4) Fluoroptic temperature sensors are useful device used for _____ temperature measurement.
a) tissue b) light c) radiation d) retina
 - 5) Photo electric transducer converts _____ energy into electrical energy.
a) light b) radiation c) heat d) photon
 - 6) _____ is the smallest change in the measured variable to which as instrument will respond.
a) Precision b) Accuracy c) Resolution d) Error
 - 7) Accuracy is expressed as _____
a) relative accuracy b) % accuracy
c) error d) % error

P.T.O.



- 8) Strain gauge is an example of a _____ transducer.
a) passive b) active c) thermal d) conductive
- 9) The resistance of a conductor changes when its _____ is changed.
a) humidity b) linearity c) conductivity d) temperature
- 10) The metal mostly used in RTD is _____
a) copper b) iron c) platinum d) silver
- 11) Motion artefact is reduced to a negligible magnitude by _____ abrasion.
a) skin b) electrode c) read d) wire
- 12) The micro electrodes have very _____ impedance as compared to conventional electrodes used for recording physiological signals.
a) low b) moderate c) high d) stable
- 13) Optical fibers are immune to _____ interference.
a) electromagnetic b) a.c.
c) d.c. d) noise
- 14) The biosensor relies upon _____ that recognize and catalyze reactions of glucose.
a) blood b) gas c) CSF d) enzymes
- _____



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

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

Marks : 56

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

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) What is thermistor ? How thermistors are classified on the basis of temperature resistance characteristics ?
 - 2) What is motion artefact ? How it is minimized ?
 - 3) Draw and explain electrode – skin interface.
 - 4) Explain working of bonded strain gauges with neat diagram.
 - 5) Differentiate between active and passive transducer.
3. Attempt **any two** questions : **(6×2=12)**
- 1) Explain the construction and working of LVDT.
 - 2) Mention types of biopotential electrodes. Explain any 2 biopotential electrodes.
 - 3) Which are the different laws that govern the working of a thermocouple ?

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Differentiate between amperometric and potentiometric sensors.
 - 2) What is pH of a solution ? Classify the solution on basis of pH values.
 - 3) What are the applications of ISFET in medicine ?
 - 4) Define biosensor and immunosensor with example.
 - 5) Mention any 4 applications of radiation sensor.
5. Attempt **any two** questions : **(2×6=12)**
- 1) Explain working of enzyme sensor with neat figure.
 - 2) Explain working of fiber optics along with its one application
 - 3) Explain the construction and working of PO₂ electrode in detail.



SLR-VB – 354

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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Thursday, 18-5-2017

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

I. Choose the correct answer :

(14×1=14)

- 1) Which type of lever is most effective in sport movements ?
 - a) Third class
 - b) Second class
 - c) First class
 - d) None of the above
- 2) Bending forward of the trunk is an example of movement in the
 - a) Frontal plane
 - b) Transverse plane
 - c) Sagittal plane
 - d) Longitudinal axis
- 3) In which type of lever, the weight is in between force and fulcrum ?
 - a) Type I
 - b) Type II
 - c) Type III
 - d) All the above
- 4) Which of the following is responsible for limiting the range of movements of joint ?
 - a) Tendons
 - b) Ligaments
 - c) Both a) and b)
 - d) Muscle fibers
- 5) Which of the following is a ball and socket joint ?
 - a) Hip joint
 - b) Shoulder joint
 - c) Both a) and b)
 - d) None of the above
- 6) Flexion at elbow is brought about by
 - a) Biceps
 - b) Triceps
 - c) Both a) and b)
 - d) None of the above

P.T.O.



- 7) At touch down in walking, the knee is normally
- a) fully extended
 - b) slightly flexed
 - c) fully flexed
 - d) slightly extended
- 8) The center-of-gravity of a limb segment
- a) is always located at the mid-point of the segment
 - b) is the point at which the mass of the segment is equally distributed
 - c) at one end of the segment
 - d) remains constant from segment to segment
- 9) Change in velocity/change in time is
- a) Speed
 - b) Acceleration
 - c) Momentum
 - d) Inertia
- 10) Unit of strain is
- a) Newton
 - b) Kg
 - c) Nm
 - d) Unit less
- 11) A clot formation in blood vessels is also called
- a) Diffusion
 - b) Drift
 - c) Coagulation
 - d) Hydrolysis
- 12) Newton's second law is also known as
- a) Momentum
 - b) Inertia
 - c) Law of gravitation
 - d) Friction
- 13) In eccentric contraction of muscles
- a) muscle length shortens
 - b) muscle length increases
 - c) muscle length remains same
 - d) none
- 14) Forces lying on the same plane are
- a) Coplanar
 - b) Non-coplanar
 - c) Concurrent
 - d) Non-concurrent
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Thursday, 18-5-2017

Marks : 56

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

SECTION – I

II. Attempt any four : (4×4=16)

- 1) Draw and explain working of foot switches.
- 2) Explain the working and application of VICON.
- 3) Classify the force system with appropriate examples.
- 4) Explain SACH foot.
- 5) What do you understand by double stance in Gait cycle ?

III. Attempt any two : (2×6=12)

- 1) Explain three point pressure system and its application for the design of different orthosis.
- 2) Explain normal gait cycle with neat diagram. Explain each stage with its fictional application.
- 3) Explain elbow joint. Give any example in detail.

SECTION – II

IV. Attempt any four : (4×4=16)

- 1) What is single axis foot ?
- 2) What do you mean by spinal orthosis ?
- 3) Write a short note on stress strain curve.
- 4) Draw and explain synovial joint in detail and list the different types of synovial joints.
- 5) Explain shoulder prosthesis using suitable diagram.



V. Attempt **any two** :

(2×6=12)

- 1) Explain the biomechanical properties of bone under various loading effect :
 - i) Compression
 - ii) Tension
 - iii) Shear
 - iv) Torsion
 - v) Combined loading.
 - 2) Explain patient rehabilitation concept and how it helps the patient.
 - 3) Explain the lever system in detail with neat diagram and examples.
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SLR-VB – 354

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Set **Q**

**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Thursday, 18-5-2017

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

I. Choose the correct answer :

(14×1=14)

- 1) The center-of-gravity of a limb segment
 - a) is always located at the mid-point of the segment
 - b) is the point at which the mass of the segment is equally distributed
 - c) at one end of the segment
 - d) remains constant from segment to segment
- 2) Change in velocity/change in time is
 - a) Speed
 - b) Acceleration
 - c) Momentum
 - d) Inertia
- 3) Unit of strain is
 - a) Newton
 - b) Kg
 - c) Nm
 - d) Unit less
- 4) A clot formation in blood vessels is also called
 - a) Diffusion
 - b) Drift
 - c) Coagulation
 - d) Hydrolysis
- 5) Newton's second law is also known as
 - a) Momentum
 - b) Inertia
 - c) Law of gravitation
 - d) Friction
- 6) In eccentric contraction of muscles
 - a) muscle length shortens
 - b) muscle length increases
 - c) muscle length remains same
 - d) none

P.T.O.



- 7) Forces lying on the same plane are
- a) Coplanar
 - b) Non-coplanar
 - c) Concurrent
 - d) Non-concurrent
- 8) Which type of lever is most effective in sport movements ?
- a) Third class
 - b) Second class
 - c) First class
 - d) None of the above
- 9) Bending forward of the trunk is an example of movement in the
- a) Frontal plane
 - b) Transverse plane
 - c) Sagittal plane
 - d) Longitudinal axis
- 10) In which type of lever, the weight is in between force and fulcrum ?
- a) Type I
 - b) Type II
 - c) Type III
 - d) All the above
- 11) Which of the following is responsible for limiting the range of movements of joint ?
- a) Tendons
 - b) Ligaments
 - c) Both a) and b)
 - d) Muscle fibers
- 12) Which of the following is a ball and socket joint ?
- a) Hip joint
 - b) Shoulder joint
 - c) Both a) and b)
 - d) None of the above
- 13) Flexion at elbow is brought about by
- a) Biceps
 - b) Triceps
 - c) Both a) and b)
 - d) None of the above
- 14) At touch down in walking, the knee is normally
- a) fully extended
 - b) slightly flexed
 - c) fully flexed
 - d) slightly extended
-



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Thursday, 18-5-2017

Marks : 56

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

SECTION – I

II. Attempt any four : (4×4=16)

- 1) Draw and explain working of foot switches.
- 2) Explain the working and application of VICON.
- 3) Classify the force system with appropriate examples.
- 4) Explain SACH foot.
- 5) What do you understand by double stance in Gait cycle ?

III. Attempt any two : (2×6=12)

- 1) Explain three point pressure system and its application for the design of different orthosis.
- 2) Explain normal gait cycle with neat diagram. Explain each stage with its fictional application.
- 3) Explain elbow joint. Give any example in detail.

SECTION – II

IV. Attempt any four : (4×4=16)

- 1) What is single axis foot ?
- 2) What do you mean by spinal orthosis ?
- 3) Write a short note on stress strain curve.
- 4) Draw and explain synovial joint in detail and list the different types of synovial joints.
- 5) Explain shoulder prosthesis using suitable diagram.

Set Q



V. Attempt **any two** :

(2×6=12)

- 1) Explain the biomechanical properties of bone under various loading effect :
 - i) Compression
 - ii) Tension
 - iii) Shear
 - iv) Torsion
 - v) Combined loading.
 - 2) Explain patient rehabilitation concept and how it helps the patient.
 - 3) Explain the lever system in detail with neat diagram and examples.
-



SLR-VB – 354

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Set **R**

**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Thursday, 18-5-2017

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

I. Choose the correct answer :

(14×1=14)

- 1) Which of the following is a ball and socket joint ?
 - a) Hip joint
 - b) Shoulder joint
 - c) Both a) and b)
 - d) None of the above
- 2) Flexion at elbow is brought about by
 - a) Biceps
 - b) Triceps
 - c) Both a) and b)
 - d) None of the above
- 3) At touch down in walking, the knee is normally
 - a) fully extended
 - b) slightly flexed
 - c) fully flexed
 - d) slightly extended
- 4) The center-of-gravity of a limb segment
 - a) is always located at the mid-point of the segment
 - b) is the point at which the mass of the segment is equally distributed
 - c) at one end of the segment
 - d) remains constant from segment to segment
- 5) Change in velocity/change in time is
 - a) Speed
 - b) Acceleration
 - c) Momentum
 - d) Inertia

P.T.O.



- 6) Unit of strain is
a) Newton b) Kg c) Nm d) Unit less
- 7) A clot formation in blood vessels is also called
a) Diffusion b) Drift c) Coagulation d) Hydrolysis
- 8) Newton's second law is also known as
a) Momentum b) Inertia
c) Law of gravitation d) Friction
- 9) In eccentric contraction of muscles
a) muscle length shortens b) muscle length increases
c) muscle length remains same d) none
- 10) Forces lying on the same plane are
a) Coplanar b) Non-coplanar
c) Concurrent d) Non-concurrent
- 11) Which type of lever is most effective in sport movements ?
a) Third class b) Second class
c) First class d) None of the above
- 12) Bending forward of the trunk is an example of movement in the
a) Frontal plane b) Transverse plane
c) Sagittal plane d) Longitudinal axis
- 13) In which type of lever, the weight is in between force and fulcrum ?
a) Type I b) Type II c) Type III d) All the above
- 14) Which of the following is responsible for limiting the range of movements of joint ?
a) Tendons b) Ligaments
c) Both a) and b) d) Muscle fibers
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Thursday, 18-5-2017

Marks : 56

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

SECTION – I

II. Attempt any four : (4×4=16)

- 1) Draw and explain working of foot switches.
- 2) Explain the working and application of VICON.
- 3) Classify the force system with appropriate examples.
- 4) Explain SACH foot.
- 5) What do you understand by double stance in Gait cycle ?

III. Attempt any two : (2×6=12)

- 1) Explain three point pressure system and its application for the design of different orthosis.
- 2) Explain normal gait cycle with neat diagram. Explain each stage with its fictional application.
- 3) Explain elbow joint. Give any example in detail.

SECTION – II

IV. Attempt any four : (4×4=16)

- 1) What is single axis foot ?
- 2) What do you mean by spinal orthosis ?
- 3) Write a short note on stress strain curve.
- 4) Draw and explain synovial joint in detail and list the different types of synovial joints.
- 5) Explain shoulder prosthesis using suitable diagram.

Set R



V. Attempt **any two** :

(2×6=12)

1) Explain the biomechanical properties of bone under various loading effect :

- i) Compression
- ii) Tension
- iii) Shear
- iv) Torsion
- v) Combined loading.

2) Explain patient rehabilitation concept and how it helps the patient.

3) Explain the lever system in detail with neat diagram and examples.



SLR-VB – 354

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Set **S**

**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Thursday, 18-5-2017

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

I. Choose the correct answer :

(14×1=14)

- 1) Unit of strain is
 - a) Newton
 - b) Kg
 - c) Nm
 - d) Unit less
- 2) A clot formation in blood vessels is also called
 - a) Diffusion
 - b) Drift
 - c) Coagulation
 - d) Hydrolysis
- 3) Newton's second law is also known as
 - a) Momentum
 - b) Inertia
 - c) Law of gravitation
 - d) Friction
- 4) In eccentric contraction of muscles
 - a) muscle length shortens
 - b) muscle length increases
 - c) muscle length remains same
 - d) none
- 5) Forces lying on the same plane are
 - a) Coplanar
 - b) Non-coplanar
 - c) Concurrent
 - d) Non-concurrent
- 6) Which type of lever is most effective in sport movements ?
 - a) Third class
 - b) Second class
 - c) First class
 - d) None of the above

P.T.O.



- 7) Bending forward of the trunk is an example of movement in the
- a) Frontal plane
 - b) Transverse plane
 - c) Sagittal plane
 - d) Longitudinal axis
- 8) In which type of lever, the weight is in between force and fulcrum ?
- a) Type I
 - b) Type II
 - c) Type III
 - d) All the above
- 9) Which of the following is responsible for limiting the range of movements of joint ?
- a) Tendons
 - b) Ligaments
 - c) Both a) and b)
 - d) Muscle fibers
- 10) Which of the following is a ball and socket joint ?
- a) Hip joint
 - b) Shoulder joint
 - c) Both a) and b)
 - d) None of the above
- 11) Flexion at elbow is brought about by
- a) Biceps
 - b) Triceps
 - c) Both a) and b)
 - d) None of the above
- 12) At touch down in walking, the knee is normally
- a) fully extended
 - b) slightly flexed
 - c) fully flexed
 - d) slightly extended
- 13) The center-of-gravity of a limb segment
- a) is always located at the mid-point of the segment
 - b) is the point at which the mass of the segment is equally distributed
 - c) at one end of the segment
 - d) remains constant from segment to segment
- 14) Change in velocity/change in time is
- a) Speed
 - b) Acceleration
 - c) Momentum
 - d) Inertia
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Thursday, 18-5-2017

Marks : 56

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

SECTION – I

II. Attempt any four : (4×4=16)

- 1) Draw and explain working of foot switches.
- 2) Explain the working and application of VICON.
- 3) Classify the force system with appropriate examples.
- 4) Explain SACH foot.
- 5) What do you understand by double stance in Gait cycle ?

III. Attempt any two : (2×6=12)

- 1) Explain three point pressure system and its application for the design of different orthosis.
- 2) Explain normal gait cycle with neat diagram. Explain each stage with its fictional application.
- 3) Explain elbow joint. Give any example in detail.

SECTION – II

IV. Attempt any four : (4×4=16)

- 1) What is single axis foot ?
- 2) What do you mean by spinal orthosis ?
- 3) Write a short note on stress strain curve.
- 4) Draw and explain synovial joint in detail and list the different types of synovial joints.
- 5) Explain shoulder prosthesis using suitable diagram.



V. Attempt **any two** :

(2×6=12)

- 1) Explain the biomechanical properties of bone under various loading effect :
 - i) Compression
 - ii) Tension
 - iii) Shear
 - iv) Torsion
 - v) Combined loading.
 - 2) Explain patient rehabilitation concept and how it helps the patient.
 - 3) Explain the lever system in detail with neat diagram and examples.
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SLR-VB – 355

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**S.E. (CGPA) (Biomedical Engg.) (Part — II) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Saturday, 20-5-2017

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

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

- 1) _____ is the retardation or delay in the response of an instrument to changes in the measured variable.
a) Lag b) Error c) Fidelity d) Density
- 2) Precision is defined as _____
a) Repeatability b) Uncertainty
c) Accuracy d) Reliability
- 3) Complex waveform are most accurately measured with an _____ voltmeter.
a) peak responding b) average
c) FET d) rms
- 4) The input impedance of the voltmeter should be as _____ as possible.
a) low b) medium c) high d) stable
- 5) The DVM displays ac and dc voltages as _____ numbers.
a) continuous b) discrete c) logical d) digit
- 6) Digital phase meter employs _____ flip flops.
a) 4 b) 2 c) 1 d) 5

P.T.O.



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**S.E. (CGPA) (Biomedical Engg.) (Part — II) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Saturday, 20-5-2017

Marks : 56

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

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**
- 1) Explain working of FET voltmeter with necessary diagram.
 - 2) State the necessary specifications of standard digital voltmeter.
 - 3) Explain response of system for following inputs :
a) Ramp input b) Step input.
 - 4) Draw and explain function of generalized measurement system.
 - 5) Define various dynamic characterisation of an instrument.
3. Attempt **any two** question : **(6×2=12)**
- 1) Define sensitivity of a multimeter and explain operation of simple multimeter.
 - 2) Explain working of successive approximation type digital voltmeter.
 - 3) Explain working of peak reading and rms reading of electronic voltmeter.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain working of LCD display system.
 - 2) Mention the requirement of laboratory type signal generation.
 - 3) Explain working of data acquisition system.
 - 4) State the function of an attenuator in CRO.
 - 5) Explain working of digital storage oscilloscope.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain the following terms related to CRO :
a) Focus and intensity control b) Alt and chop mode.
 - 2) Draw and explain function of function generation.
 - 3) Explain Lissajous patterns and their applications.



SLR-VB – 355

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**S.E. (CGPA) (Biomedical Engg.) (Part — II) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Saturday, 20-5-2017

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

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

- 1) The amplitude read on CRO set of 1V/div is 1.5 cm on the vertical axis.
The value of amplitude in V is _____
a) 1.5 V b) 5 V c) 1 V d) 0.15 V
- 2) A dual beam CRO uses _____
a) electronic switch b) two electron guns
c) one electron gun d) digital switch
- 3) A function generator produces different waveforms of adjustable _____
a) wavelength b) resistors
c) frequency d) density
- 4) The signal generator is called _____
a) Oscillator b) Amplifier
c) Comparator d) Diode shaping circuit
- 5) The multichannel DAS has a single A/D converter preceded by a _____
a) demultiplexer b) amplifier
c) multiplexer d) filter

P.T.O.



- 6) Post deflection acceleration is used to _____
a) enhance the intensity of the beam
b) focus the beam
c) repel the electron beam
d) increase the velocity of electron beam
- 7) _____ is the comparison of specific values of the input and output of an instrument with a corresponding reference standard.
a) Reliability
b) Calibration
c) Span
d) Accuracy
- 8) _____ is the retardation or delay in the response of an instrument to changes in the measured variable.
a) Lag
b) Error
c) Fidelity
d) Density
- 9) Precision is defined as _____
a) Repeatability
b) Uncertainty
c) Accuracy
d) Reliability
- 10) Complex waveform are most accurately measured with an _____ voltmeter.
a) peak responding
b) average
c) FET
d) rms
- 11) The input impedance of the voltmeter should be as _____ as possible.
a) low
b) medium
c) high
d) stable
- 12) The DVM displays ac and dc voltages as _____ numbers.
a) continuous
b) discrete
c) logical
d) digit
- 13) Digital phase meter employs _____ flip flops.
a) 4
b) 2
c) 1
d) 5
- 14) Gross errors occurs due to _____
a) human error
b) instrumental error
c) environmental error
d) random error
- _____



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**S.E. (CGPA) (Biomedical Engg.) (Part — II) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Saturday, 20-5-2017

Marks : 56

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

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**
- 1) Explain working of FET voltmeter with necessary diagram.
 - 2) State the necessary specifications of standard digital voltmeter.
 - 3) Explain response of system for following inputs :
a) Ramp input b) Step input.
 - 4) Draw and explain function of generalized measurement system.
 - 5) Define various dynamic characterisation of an instrument.
3. Attempt **any two** question : **(6×2=12)**
- 1) Define sensitivity of a multimeter and explain operation of simple multimeter.
 - 2) Explain working of successive approximation type digital voltmeter.
 - 3) Explain working of peak reading and rms reading of electronic voltmeter.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain working of LCD display system.
 - 2) Mention the requirement of laboratory type signal generation.
 - 3) Explain working of data acquisition system.
 - 4) State the function of an attenuator in CRO.
 - 5) Explain working of digital storage oscilloscope.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain the following terms related to CRO :
a) Focus and intensity control b) Alt and chop mode.
 - 2) Draw and explain function of function generation.
 - 3) Explain Lissajous patterns and their applications.



SLR-VB – 355

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**S.E. (CGPA) (Biomedical Engg.) (Part — II) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Saturday, 20-5-2017

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(1×14=14)

- 1) The DVM displays ac and dc voltages as _____ numbers.
a) continuous b) discrete c) logical d) digit
- 2) Digital phase meter employs _____ flip flops.
a) 4 b) 2 c) 1 d) 5
- 3) Gross errors occurs due to _____
a) human error b) instrumental error
c) environmental error d) random error
- 4) The amplitude read on CRO set of 1V/div is 1.5 cm on the vertical axis. The value of amplitude in V is _____
a) 1.5 V b) 5 V c) 1 V d) 0.15 V
- 5) A dual beam CRO uses _____
a) electronic switch b) two electron guns
c) one electron gun d) digital switch
- 6) A function generator produces different waveforms of adjustable _____
a) wavelength b) resistors
c) frequency d) density

P.T.O.



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**S.E. (CGPA) (Biomedical Engg.) (Part — II) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Saturday, 20-5-2017

Marks : 56

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

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**
- 1) Explain working of FET voltmeter with necessary diagram.
 - 2) State the necessary specifications of standard digital voltmeter.
 - 3) Explain response of system for following inputs :
a) Ramp input b) Step input.
 - 4) Draw and explain function of generalized measurement system.
 - 5) Define various dynamic characterisation of an instrument.
3. Attempt **any two** question : **(6×2=12)**
- 1) Define sensitivity of a multimeter and explain operation of simple multimeter.
 - 2) Explain working of successive approximation type digital voltmeter.
 - 3) Explain working of peak reading and rms reading of electronic voltmeter.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain working of LCD display system.
 - 2) Mention the requirement of laboratory type signal generation.
 - 3) Explain working of data acquisition system.
 - 4) State the function of an attenuator in CRO.
 - 5) Explain working of digital storage oscilloscope.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain the following terms related to CRO :
a) Focus and intensity control b) Alt and chop mode.
 - 2) Draw and explain function of function generation.
 - 3) Explain Lissajous patterns and their applications.



SLR-VB – 355

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**S.E. (CGPA) (Biomedical Engg.) (Part — II) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Saturday, 20-5-2017

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

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

- 1) A function generator produces different waveforms of adjustable _____
 - a) wavelength
 - b) resistors
 - c) frequency
 - d) density
- 2) The signal generator is called _____
 - a) Oscillator
 - b) Amplifier
 - c) Comparator
 - d) Diode shaping circuit
- 3) The multichannel DAS has a single A/D converter preceded by a _____
 - a) demultiplexer
 - b) amplifier
 - c) multiplexer
 - d) filter
- 4) Post deflection acceleration is used to _____
 - a) enhance the intensity of the beam
 - b) focus the beam
 - c) repel the electron beam
 - d) increase the velocity of electron beam

P.T.O.



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**S.E. (CGPA) (Biomedical Engg.) (Part — II) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Saturday, 20-5-2017

Marks : 56

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

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**
- 1) Explain working of FET voltmeter with necessary diagram.
 - 2) State the necessary specifications of standard digital voltmeter.
 - 3) Explain response of system for following inputs :
a) Ramp input b) Step input.
 - 4) Draw and explain function of generalized measurement system.
 - 5) Define various dynamic characterisation of an instrument.
3. Attempt **any two** question : **(6×2=12)**
- 1) Define sensitivity of a multimeter and explain operation of simple multimeter.
 - 2) Explain working of successive approximation type digital voltmeter.
 - 3) Explain working of peak reading and rms reading of electronic voltmeter.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain working of LCD display system.
 - 2) Mention the requirement of laboratory type signal generation.
 - 3) Explain working of data acquisition system.
 - 4) State the function of an attenuator in CRO.
 - 5) Explain working of digital storage oscilloscope.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain the following terms related to CRO :
a) Focus and intensity control b) Alt and chop mode.
 - 2) Draw and explain function of function generation.
 - 3) Explain Lissajous patterns and their applications.



SLR-VB – 356

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S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL DESIGNS

Day and Date : Tuesday, 23-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answers : **(14×1=14)**
- 1) De Morgan's second theorem says that NAND gate is replaced by a bubbled _____ gate.
a) NOT
b) OR
c) AND
d) EX-OR
 - 2) The AND gate has a high output only when all i/ps are _____.
a) High
b) Low
c) Active high
d) Active low
 - 3) The _____ is a visual display of the fundamental products needed for a sum of products solution.
a) Multiplexer
b) TTL gate
c) Karnaugh map
d) Demultiplexer
 - 4) _____ of a multiplexer is called an active low signal.
a) Select lines
b) Control lines
c) Bubble
d) Strobe
 - 5) The exclusive OR gate has a high output only when an odd number of inputs is _____.
a) High
b) Low
c) Zero
d) One

P.T.O.



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL DESIGNS**

Day and Date : Tuesday, 23-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) State and explain De Morgan's theorems.
- 2) Convert the following :
 - a) $(23.6)_{10} = (?)_2$
 - b) $(65535)_{10} = (?)_{16}$
- 3) Explain Hamming code of data correction with an example.
- 4) List various types of shift register and explain any one.
- 5) Draw and explain function of TTL NAND gate.

3. Attempt **any two** : **(2×6=12)**

- 1) Draw and explain basic logic gates using universal NAND gate.
- 2) List applications of shift registers and explain working of any one of it with necessary diagram.
- 3) Define following characteristics of digital IC's :
 - a) Figure of merit
 - b) Fanout
 - c) Speed of operation.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) List technical specification of digital to analog converter and explain any 2 in detail.
 - 2) Draw and explain working of half adder and full adder using logic gates.
 - 3) Define and differentiate between synchronous and asynchronous counter.
 - 4) Explain the working of ALU in detail.
 - 5) Perform following operations using 2's complement method :
 - a) $23 - 48$
 - b) $-48 - 23$.
5. Attempt **any 2** : **(2×6=12)**
- 1) Design divide by -5 ripple counter using flip-flops.
 - 2) Draw and explain working of successive approximation A to D converter.
 - 3) Explain the working of basic bipolar RAM storage cell with necessary diagram.
-



- 6) BCD code is _____ code.
- a) Weighted
 - b) Unweighted
 - c) Parity
 - d) Random
- 7) Equivalent binary number of $(736)_8 =$ _____ ?
- a) $(110\ 011\ 110)_2$
 - b) $(111\ 011\ 110)_2$
 - c) $(101\ 011\ 110)_2$
 - d) $(111\ 111\ 101)_2$
- 8) De Morgan's second theorem says that NAND gate is replaced by a bubbled _____ gate.
- a) NOT
 - b) OR
 - c) AND
 - d) EX-OR
- 9) The AND gate has a high output only when all i/ps are _____
- a) High
 - b) Low
 - c) Active high
 - d) Active low
- 10) The _____ is a visual display of the fundamental products needed for a sum of products solution.
- a) Multiplexer
 - b) TTL gate
 - c) Karnaugh map
 - d) Demultiplexer
- 11) _____ of a multiplexer is called an active low signal.
- a) Select lines
 - b) Control lines
 - c) Bubble
 - d) Strobe
- 12) The exclusive OR gate has a high output only when an odd number of inputs is _____
- a) High
 - b) Low
 - c) Zero
 - d) One
- 13) A flip-flop is a _____ electronic circuit that has two stable states.
- a) monostable
 - b) astable
 - c) triggered
 - d) bistable
- 14) A _____ is a group of flip-flops that can be used to store a binary number.
- a) Register
 - b) Counter
 - c) Multiplexer
 - d) K-map
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL DESIGNS**

Day and Date : Tuesday, 23-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) State and explain De Morgan's theorems.
- 2) Convert the following :
 - a) $(23.6)_{10} = (?)_2$
 - b) $(65535)_{10} = (?)_{16}$
- 3) Explain Hamming code of data correction with an example.
- 4) List various types of shift register and explain any one.
- 5) Draw and explain function of TTL NAND gate.

3. Attempt **any two** : **(2×6=12)**

- 1) Draw and explain basic logic gates using universal NAND gate.
- 2) List applications of shift registers and explain working of any one of it with necessary diagram.
- 3) Define following characteristics of digital IC's :
 - a) Figure of merit
 - b) Fanout
 - c) Speed of operation.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) List technical specification of digital to analog converter and explain any 2 in detail.
 - 2) Draw and explain working of half adder and full adder using logic gates.
 - 3) Define and differentiate between synchronous and asynchronous counter.
 - 4) Explain the working of ALU in detail.
 - 5) Perform following operations using 2's complement method :
 - a) $23 - 48$
 - b) $-48 - 23$.
5. Attempt **any 2** : **(2×6=12)**
- 1) Design divide by -5 ripple counter using flip-flops.
 - 2) Draw and explain working of successive approximation A to D converter.
 - 3) Explain the working of basic bipolar RAM storage cell with necessary diagram.
-



SLR-VB – 356

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S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL DESIGNS

Day and Date : Tuesday, 23-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

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

- 1) The exclusive OR gate has a high output only when an odd number of inputs is _____
 - a) High
 - b) Low
 - c) Zero
 - d) One
- 2) A flip-flop is a _____ electronic circuit that has two stable states.
 - a) monostable
 - b) astable
 - c) triggered
 - d) bistable
- 3) A _____ is a group of flip-flops that can be used to store a binary number.
 - a) Register
 - b) Counter
 - c) Multiplexer
 - d) K-map
- 4) The modulus of a _____ is the total number of status through which the counter can progress.
 - a) register
 - b) flip-flop
 - c) counter
 - d) bits
- 5) A read only memory device is used to store _____ information.
 - a) Permanent
 - b) Random
 - c) Temporary
 - d) 8 bit

P.T.O.



- 6) In _____ code, each decimal digit is coded into a 4 bit binary code.
- a) Hexadecimal
 - b) Octal
 - c) Excess-3
 - d) Binary
- 7) A code in which only one bit changes between successive numbers is called as _____ code.
- a) Excess-3
 - b) ASCII
 - c) Parity
 - d) Gray
- 8) Multiplication of 1001 by 1101 = _____ ?
- a) 1110101
 - b) 1111000
 - c) 0111001
 - d) 1101100
- 9) BCD code is _____ code.
- a) Weighted
 - b) Unweighted
 - c) Parity
 - d) Random
- 10) Equivalent binary number of $(736)_8 =$ _____ ?
- a) $(110\ 011\ 110)_2$
 - b) $(111\ 011\ 110)_2$
 - c) $(101\ 011\ 110)_2$
 - d) $(111\ 111\ 101)_2$
- 11) De Morgan's second theorem says that NAND gate is replaced by a bubbled _____ gate.
- a) NOT
 - b) OR
 - c) AND
 - d) EX-OR
- 12) The AND gate has a high output only when all i/ps are _____
- a) High
 - b) Low
 - c) Active high
 - d) Active low
- 13) The _____ is a visual display of the fundamental products needed for a sum of products solution.
- a) Multiplexer
 - b) TTL gate
 - c) Karnaugh map
 - d) Demultiplexer
- 14) _____ of a multiplexer is called an active low signal.
- a) Select lines
 - b) Control lines
 - c) Bubble
 - d) Strobe
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL DESIGNS**

Day and Date : Tuesday, 23-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) State and explain De Morgan's theorems.
- 2) Convert the following :
 - a) $(23.6)_{10} = (?)_2$
 - b) $(65535)_{10} = (?)_{16}$
- 3) Explain Hamming code of data correction with an example.
- 4) List various types of shift register and explain any one.
- 5) Draw and explain function of TTL NAND gate.

3. Attempt **any two** : **(2×6=12)**

- 1) Draw and explain basic logic gates using universal NAND gate.
- 2) List applications of shift registers and explain working of any one of it with necessary diagram.
- 3) Define following characteristics of digital IC's :
 - a) Figure of merit
 - b) Fanout
 - c) Speed of operation.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) List technical specification of digital to analog converter and explain any 2 in detail.
 - 2) Draw and explain working of half adder and full adder using logic gates.
 - 3) Define and differentiate between synchronous and asynchronous counter.
 - 4) Explain the working of ALU in detail.
 - 5) Perform following operations using 2's complement method :
 - a) $23 - 48$
 - b) $-48 - 23$.
5. Attempt **any 2** : **(2×6=12)**
- 1) Design divide by -5 ripple counter using flip-flops.
 - 2) Draw and explain working of successive approximation A to D converter.
 - 3) Explain the working of basic bipolar RAM storage cell with necessary diagram.
-



SLR-VB – 356

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S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL DESIGNS

Day and Date : Tuesday, 23-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

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

- 1) In _____ code, each decimal digit is coded into a 4 bit binary code.
 - a) Hexadecimal
 - b) Octal
 - c) Excess-3
 - d) Binary
- 2) A code in which only one bit changes between successive numbers is called as _____ code.
 - a) Excess-3
 - b) ASCII
 - c) Parity
 - d) Gray
- 3) Multiplication of 1001 by 1101 = _____ ?
 - a) 1110101
 - b) 1111000
 - c) 0111001
 - d) 1101100
- 4) BCD code is _____ code.
 - a) Weighted
 - b) Unweighted
 - c) Parity
 - d) Random
- 5) Equivalent binary number of $(736)_8 =$ _____ ?
 - a) $(110\ 011\ 110)_2$
 - b) $(111\ 011\ 110)_2$
 - c) $(101\ 011\ 110)_2$
 - d) $(111\ 111\ 101)_2$

P.T.O.



- 6) De Morgan's second theorem says that NAND gate is replaced by a bubbled _____ gate.
- a) NOT
 - b) OR
 - c) AND
 - d) EX-OR
- 7) The AND gate has a high output only when all i/ps are _____
- a) High
 - b) Low
 - c) Active high
 - d) Active low
- 8) The _____ is a visual display of the fundamental products needed for a sum of products solution.
- a) Multiplexer
 - b) TTL gate
 - c) Karnaugh map
 - d) Demultiplexer
- 9) _____ of a multiplexer is called an active low signal.
- a) Select lines
 - b) Control lines
 - c) Bubble
 - d) Strobe
- 10) The exclusive OR gate has a high output only when an odd number of inputs is _____
- a) High
 - b) Low
 - c) Zero
 - d) One
- 11) A flip-flop is a _____ electronic circuit that has two stable states.
- a) monostable
 - b) astable
 - c) triggered
 - d) bistable
- 12) A _____ is a group of flip-flops that can be used to store a binary number.
- a) Register
 - b) Counter
 - c) Multiplexer
 - d) K-map
- 13) The modulus of a _____ is the total number of status through which the counter can progress.
- a) register
 - b) flip-flop
 - c) counter
 - d) bits
- 14) A read only memory device is used to store _____ information.
- a) Permanent
 - b) Random
 - c) Temporary
 - d) 8 bit
- _____



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL DESIGNS**

Day and Date : Tuesday, 23-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) State and explain De Morgan's theorems.
- 2) Convert the following :
 - a) $(23.6)_{10} = (?)_2$
 - b) $(65535)_{10} = (?)_{16}$
- 3) Explain Hamming code of data correction with an example.
- 4) List various types of shift register and explain any one.
- 5) Draw and explain function of TTL NAND gate.

3. Attempt **any two** : **(2×6=12)**

- 1) Draw and explain basic logic gates using universal NAND gate.
- 2) List applications of shift registers and explain working of any one of it with necessary diagram.
- 3) Define following characteristics of digital IC's :
 - a) Figure of merit
 - b) Fanout
 - c) Speed of operation.

Set S



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) List technical specification of digital to analog converter and explain any 2 in detail.
 - 2) Draw and explain working of half adder and full adder using logic gates.
 - 3) Define and differentiate between synchronous and asynchronous counter.
 - 4) Explain the working of ALU in detail.
 - 5) Perform following operations using 2's complement method :
 - a) $23 - 48$
 - b) $-48 - 23$.
5. Attempt **any 2** : **(2×6=12)**
- 1) Design divide by -5 ripple counter using flip-flops.
 - 2) Draw and explain working of successive approximation A to D converter.
 - 3) Explain the working of basic bipolar RAM storage cell with necessary diagram.
-



SLR-VB – 357

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Set **P**

**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – II**

Day and Date : Thursday, 25-5-2017

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

I. Choose the correct answer :

(14×1=14)

- 1) Current mirror is used to _____ the cross over distortion.
a) eliminate b) filter c) oscillate d) none
- 2) The _____ feed back in an amplifier reduces the voltage gain.
a) positive b) negative
c) partial d) both a and b
- 3) Working of two class _____ amplifier together is push pull.
a) A b) AB c) C d) B
- 4) The common mode gain of op-amp is
a) very high b) very low
c) unity d) none
- 5) An _____ is said to suffer from distortion when its output is different from its input.
a) amplifier b) filter c) oscillator d) none
- 6) If 2 stages of a cascaded amplifier have decibel gains of 60 and then over all gain is
a) 120 b) 1800 c) 2 d) 0.5

P.T.O.



- 7) Wein bridge oscillator uses _____ feed back.
a) negative b) positive c) both d) none
- 8) The average rate of change in input offset voltage per unit change in temperature is called as
a) thermal voltage drift b) slew rate
c) noise d) thermal current drift
- 9) First order low pass Butterworth filter uses as RC network for
a) Filtering b) Amplifying c) Oscillating d) None
- 10) Square wave generator using op-amp is also called as _____ multivibrator.
a) Monostable b) Bistable c) Astable d) None
- 11) The op-amp can amplify
a) a.c. signals b) d.c. signals
c) both a.c. and d.c. signals d) neither a.c. nor d.c.
- 12) The output impedance of an ideal op-amp is
a) zero b) 50Ω c) 100Ω d) ∞
- 13) If $ADM = 3500$ and $ACM = 0.35$, the CMRR is
a) 1225 b) 10,000 c) 80 dB d) both a and c
- 14) Op-amps used as high and low pass filters circuit employ _____ configuration.
a) non inverting b) comparator
c) open loop d) inverting
-



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – II**

Day and Date : Thursday, 25-5-2017

Marks : 56

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

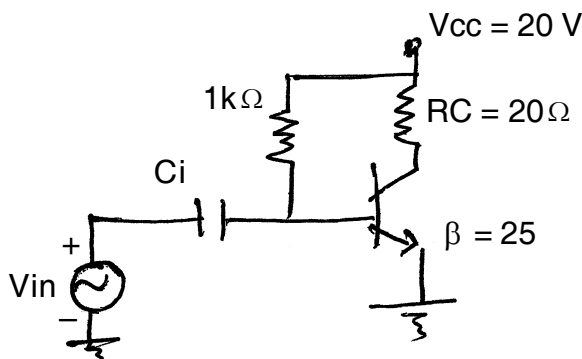
SECTION – I

2. Attempt **any 4** questions. **(4×4=16)**

- 1) Differentiate between class A, B, AB amplifier.
- 2) State various advantages and disadvantages of negative feedback on performance of amplifier.
- 3) State and prove Barkhunson’s criteria for sustained oscillation.
- 4) Calculate the efficiency of a class B amplifier for a supply voltage of $V_{cc} = 24\text{ V}$ with peak voltage output of
 - a) $V_{L(p)} = 22\text{ V}$
 - b) $V_{L(p)} = 6\text{ V}$
- 5) Explain working of cascade amplifier with necessary diagram.

3. Attempt **any 2** questions : **(6×2=12)**

- 1) Calculate input power, output power and efficiency of the amplifier circuit shown below

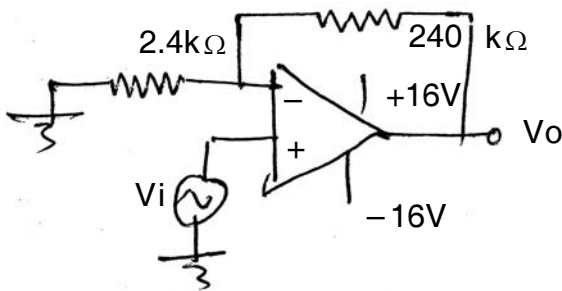




- 2) Write a short note on :
 - a) Series shunt configuration
 - b) Shunt shunt configuration.
- 3) Draw and explain working of wein bridge oscillator and derive expression for frequency of oscillation.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
 - 1) Differentiate between designing of instrumentation amplifier for ECG and EEG.
 - 2) Define and explain virtual ground concept of op-amp.
 - 3) Calculate the output voltage for given circuit for an input of $120 \mu\text{v}$.



- 4) Define following terms of op-amp :

| | |
|-------------------------|---------------------------|
| a) slew rate | b) CMRR |
| c) input offset current | d) output offset voltage. |
- 5) Draw block diagram of operational amplifier and explain each block in short.
5. Attempt **any two** questions : **(6×2=12)**
 - 1) Derive an expression for summing and averaging amplifier in case of inverting and non inverting amplifier.
 - 2) Explain working of integrator and differentiator with necessary circuit and waveform diagram.
 - 3) With the help of diagram differentiate between first order low pass and first order high pass Butterworth filter using op-amp.



SLR-VB – 357

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Set **Q**

**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – II**

Day and Date : Thursday, 25-5-2017

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

I. Choose the correct answer :

(14×1=14)

- 1) The average rate of change in input offset voltage per unit change in temperature is called as
 - a) thermal voltage drift
 - b) slew rate
 - c) noise
 - d) thermal current drift
- 2) First order low pass Butterworth filter uses as RC network for
 - a) Filtering
 - b) Amplifying
 - c) Oscillating
 - d) None
- 3) Square wave generator using op-amp is also called as _____ multivibrator.
 - a) Monostable
 - b) Bistable
 - c) Astable
 - d) None
- 4) The op-amp can amplify
 - a) a.c. signals
 - b) d.c. signals
 - c) both a.c. and d.c. signals
 - d) neither a.c. nor d.c.
- 5) The output impedance of an ideal op-amp is
 - a) zero
 - b) 50Ω
 - c) 100Ω
 - d) ∞
- 6) If $ADM = 3500$ and $ACM = 0.35$, the CMRR is
 - a) 1225
 - b) 10,000
 - c) 80 dB
 - d) both a and c

P.T.O.



7) Op-amps used as high and low pass filters circuit employ _____ configuration.

- a) non inverting
- b) comparator
- c) open loop
- d) inverting

8) Current mirror is used to _____ the cross over distortion.

- a) eliminate
- b) filter
- c) oscillate
- d) none

9) The _____ feed back in an amplifier reduces the voltage gain.

- a) positive
- b) negative
- c) partial
- d) both a and b

10) Working of two class _____ amplifier together is push pull.

- a) A
- b) AB
- c) C
- d) B

11) The common mode gain of op-amp is

- a) very high
- b) very low
- c) unity
- d) none

12) An _____ is said to suffer from distortion when its output is different from its input.

- a) amplifier
- b) filter
- c) oscillator
- d) none

13) If 2 stages of a cascaded amplifier have decibel gains of 60 and then over all gain is

- a) 120
- b) 1800
- c) 2
- d) 0.5

14) Wein bridge oscillator uses _____ feed back.

- a) negative
- b) positive
- c) both
- d) none



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – II**

Day and Date : Thursday, 25-5-2017

Marks : 56

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

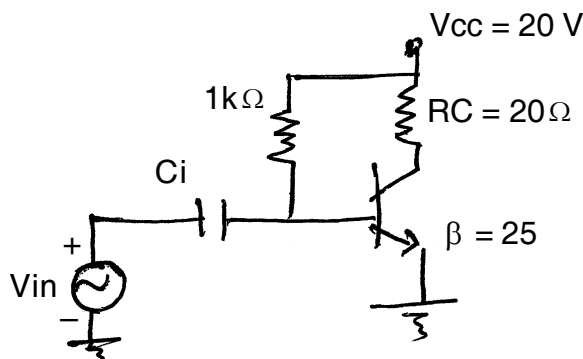
SECTION – I

2. Attempt **any 4** questions. **(4×4=16)**

- 1) Differentiate between class A, B, AB amplifier.
- 2) State various advantages and disadvantages of negative feedback on performance of amplifier.
- 3) State and prove Barkhunson’s criteria for sustained oscillation.
- 4) Calculate the efficiency of a class B amplifier for a supply voltage of $V_{cc} = 24\text{ V}$ with peak voltage output of
 - a) $V_{L(p)} = 22\text{ V}$
 - b) $V_{L(p)} = 6\text{ V}$
- 5) Explain working of cascade amplifier with necessary diagram.

3. Attempt **any 2** questions : **(6×2=12)**

- 1) Calculate input power, output power and efficiency of the amplifier circuit shown below



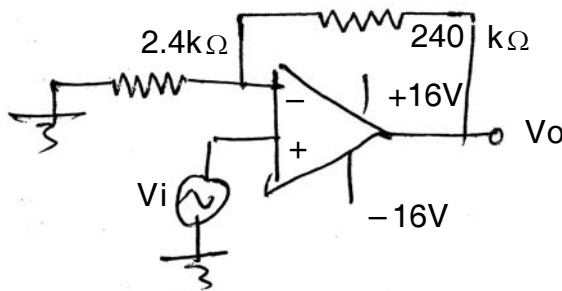


- 2) Write a short note on :
 - a) Series shunt configuration
 - b) Shunt shunt configuration.
- 3) Draw and explain working of wein bridge oscillator and derive expression for frequency of oscillation.

SECTION – II

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

- 1) Differentiate between designing of instrumentation amplifier for ECG and EEG.
- 2) Define and explain virtual ground concept of op-amp.
- 3) Calculate the output voltage for given circuit for an input of $120 \mu\text{v}$.



- 4) Define following terms of op-amp :

| | |
|-------------------------|---------------------------|
| a) slew rate | b) CMRR |
| c) input offset current | d) output offset voltage. |
- 5) Draw block diagram of operational amplifier and explain each block in short.

5. Attempt **any two** questions : **(6×2=12)**

- 1) Derive an expression for summing and averaging amplifier in case of inverting and non inverting amplifier.
- 2) Explain working of integrator and differentiator with necessary circuit and waveform diagram.
- 3) With the help of diagram differentiate between first order low pass and first order high pass Butterworth filter using op-amp.



SLR-VB – 357

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Set **R**

**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – II**

Day and Date : Thursday, 25-5-2017

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

I. Choose the correct answer :

(14×1=14)

- 1) An _____ is said to suffer from distortion when its output is different from its input.
a) amplifier b) filter c) oscillator d) none
- 2) If 2 stages of a cascaded amplifier have decibel gains of 60 and then over all gain is
a) 120 b) 1800 c) 2 d) 0.5
- 3) Wein bridge oscillator uses _____ feed back.
a) negative b) positive c) both d) none
- 4) The average rate of change in input offset voltage per unit change in temperature is called as
a) thermal voltage drift b) slew rate
c) noise d) thermal current drift
- 5) First order low pass Butterworth filter uses as RC network for
a) Filtering b) Amplifying c) Oscillating d) None
- 6) Square wave generator using op-amp is also called as _____ multivibrator.
a) Monostable b) Bistable c) Astable d) None

P.T.O.



- 7) The op-amp can amplify
- a) a.c. signals
 - b) d.c. signals
 - c) both a.c. and d.c. signals
 - d) neither a.c. nor d.c.
- 8) The output impedance of an ideal op-amp is
- a) zero
 - b) 50Ω
 - c) 100Ω
 - d) ∞
- 9) If $ADM = 3500$ and $ACM = 0.35$, the CMRR is
- a) 1225
 - b) 10,000
 - c) 80 dB
 - d) both a and c
- 10) Op-amps used as high and low pass filters circuit employ _____ configuration.
- a) non inverting
 - b) comparator
 - c) open loop
 - d) inverting
- 11) Current mirror is used to _____ the cross over distortion.
- a) eliminate
 - b) filter
 - c) oscillate
 - d) none
- 12) The _____ feed back in an amplifier reduces the voltage gain.
- a) positive
 - b) negative
 - c) partial
 - d) both a and b
- 13) Working of two class _____ amplifier together is push pull.
- a) A
 - b) AB
 - c) C
 - d) B
- 14) The common mode gain of op-amp is
- a) very high
 - b) very low
 - c) unity
 - d) none
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – II**

Day and Date : Thursday, 25-5-2017

Marks : 56

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

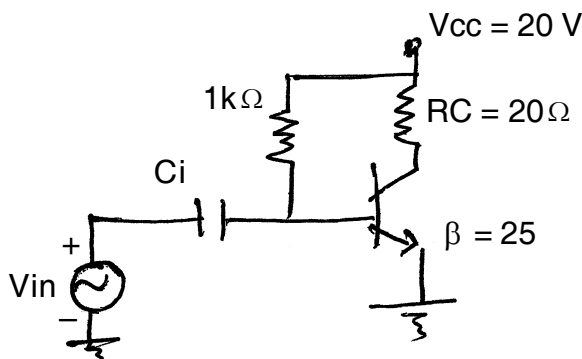
SECTION – I

2. Attempt **any 4** questions. **(4×4=16)**

- 1) Differentiate between class A, B, AB amplifier.
- 2) State various advantages and disadvantages of negative feedback on performance of amplifier.
- 3) State and prove Barkhunson’s criteria for sustained oscillation.
- 4) Calculate the efficiency of a class B amplifier for a supply voltage of $V_{cc} = 24\text{ V}$ with peak voltage output of
 - a) $V_{L(p)} = 22\text{ V}$
 - b) $V_{L(p)} = 6\text{ V}$
- 5) Explain working of cascade amplifier with necessary diagram.

3. Attempt **any 2** questions : **(6×2=12)**

- 1) Calculate input power, output power and efficiency of the amplifier circuit shown below

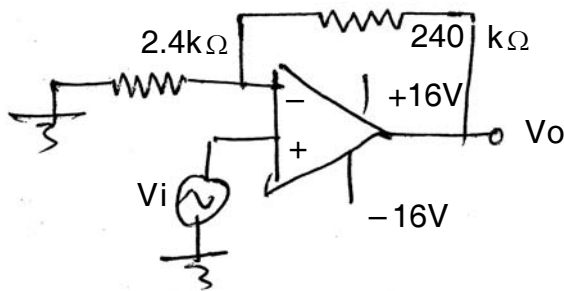




- 2) Write a short note on :
 - a) Series shunt configuration
 - b) Shunt shunt configuration.
- 3) Draw and explain working of wein bridge oscillator and derive expression for frequency of oscillation.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
 - 1) Differentiate between designing of instrumentation amplifier for ECG and EEG.
 - 2) Define and explain virtual ground concept of op-amp.
 - 3) Calculate the output voltage for given circuit for an input of $120 \mu\text{v}$.



- 4) Define following terms of op-amp :

| | |
|-------------------------|---------------------------|
| a) slew rate | b) CMRR |
| c) input offset current | d) output offset voltage. |
- 5) Draw block diagram of operational amplifier and explain each block in short.

5. Attempt **any two** questions : **(6×2=12)**
 - 1) Derive an expression for summing and averaging amplifier in case of inverting and non inverting amplifier.
 - 2) Explain working of integrator and differentiator with necessary circuit and waveform diagram.
 - 3) With the help of diagram differentiate between first order low pass and first order high pass Butterworth filter using op-amp.



SLR-VB – 357

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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – II**

Day and Date : Thursday, 25-5-2017

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

I. Choose the correct answer :

(14×1=14)

- 1) Square wave generator using op-amp is also called as _____ multivibrator.
a) Monostable b) Bistable c) Astable d) None
- 2) The op-amp can amplify
a) a.c. signals b) d.c. signals
c) both a.c. and d.c. signals d) neither a.c. nor d.c.
- 3) The output impedance of an ideal op-amp is
a) zero b) 50Ω c) 100Ω d) ∞
- 4) If $ADM = 3500$ and $ACM = 0.35$, the CMRR is
a) 1225 b) 10,000 c) 80 dB d) both a and c
- 5) Op-amps used as high and low pass filters circuit employ _____ configuration.
a) non inverting b) comparator
c) open loop d) inverting
- 6) Current mirror is used to _____ the cross over distortion.
a) eliminate b) filter c) oscillate d) none

P.T.O.



- 7) The _____ feed back in an amplifier reduces the voltage gain.
a) positive b) negative
c) partial d) both a and b
 - 8) Working of two class _____ amplifier together is push pull.
a) A b) AB c) C d) B
 - 9) The common mode gain of op-amp is
a) very high b) very low
c) unity d) none
 - 10) An _____ is said to suffer from distortion when its output is different from its input.
a) amplifier b) filter c) oscillator d) none
 - 11) If 2 stages of a cascaded amplifier have decibel gains of 60 and then over all gain is
a) 120 b) 1800 c) 2 d) 0.5
 - 12) Wein bridge oscillator uses _____ feed back.
a) negative b) positive c) both d) none
 - 13) The average rate of change in input offset voltage per unit change in temperature is called as
a) thermal voltage drift b) slew rate
c) noise d) thermal current drift
 - 14) First order low pass Butterworth filter uses as RC network for
a) Filtering b) Amplifying c) Oscillating d) None
-



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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUIT ANALYSIS AND DESIGN – II**

Day and Date : Thursday, 25-5-2017

Marks : 56

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

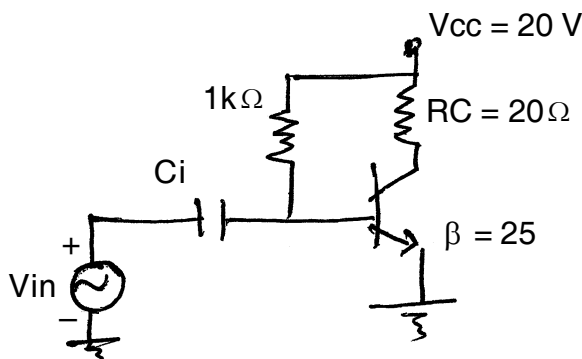
SECTION – I

2. Attempt **any 4** questions. (4×4=16)

- 1) Differentiate between class A, B, AB amplifier.
- 2) State various advantages and disadvantages of negative feedback on performance of amplifier.
- 3) State and prove Barkhunson’s criteria for sustained oscillation.
- 4) Calculate the efficiency of a class B amplifier for a supply voltage of $V_{cc} = 24\text{ V}$ with peak voltage output of
 - a) $V_{L(p)} = 22\text{ V}$
 - b) $V_{L(p)} = 6\text{ V}$
- 5) Explain working of cascade amplifier with necessary diagram.

3. Attempt **any 2** questions : (6×2=12)

- 1) Calculate input power, output power and efficiency of the amplifier circuit shown below



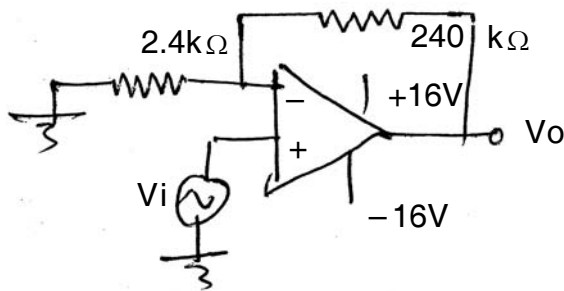


- 2) Write a short note on :
 - a) Series shunt configuration
 - b) Shunt shunt configuration.
- 3) Draw and explain working of wein bridge oscillator and derive expression for frequency of oscillation.

SECTION – II

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

- 1) Differentiate between designing of instrumentation amplifier for ECG and EEG.
- 2) Define and explain virtual ground concept of op-amp.
- 3) Calculate the output voltage for given circuit for an input of $120 \mu v$.



- 4) Define following terms of op-amp :

| | |
|-------------------------|---------------------------|
| a) slew rate | b) CMRR |
| c) input offset current | d) output offset voltage. |
- 5) Draw block diagram of operational amplifier and explain each block in short.

5. Attempt **any two** questions : **(6×2=12)**

- 1) Derive an expression for summing and averaging amplifier in case of inverting and non inverting amplifier.
- 2) Explain working of integrator and differentiator with necessary circuit and waveform diagram.
- 3) With the help of diagram differentiate between first order low pass and first order high pass Butterworth filter using op-amp.



SLR-VB – 358

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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Thursday, 4-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternatives :

(14×1=14)

- 1) _____ are devices that utilizes prism as diffraction grating.
 - a) Lens
 - b) Monochromatous
 - c) Filter
 - d) Quartz
- 2) The inert gas is the _____ phase of the chromatograph.
 - a) Mobile
 - b) Real
 - c) Stationary
 - d) Continuous
- 3) _____ is defined as the movement of a solid phase with respect to a liquid.
 - a) Diffusion
 - b) Drift
 - c) Osmosis
 - d) Electrophoresis
- 4) The electromagnetic flow meter measures instantaneous _____ flow of blood.
 - a) pulsatile
 - b) pulsed
 - c) continuous
 - d) real
- 5) The peak to peak volume changes during a quiet breath is called as
 - a) absolute volume
 - b) tidal volume
 - c) vital capacity
 - d) closing of valves

P.T.O.



- 6) The relationship between $\log PCO_2$ and pH is linear over the range of _____ mmHg.
- a) 100-900
 - b) 50-500
 - c) 10-90
 - d) 100-150
- 7) Dry gas supplied by anaesthesia machine may cause clinically desiccation of
- a) saliva
 - b) bilirubin
 - c) mucus
 - d) blood
- 8) Nebulizers are used to supply moisture in the form of
- a) droplets
 - b) vapour
 - c) water
 - d) gas
- 9) The _____ provides a positive force for transporting respiratory and anaesthesia gas into apneic patient.
- a) spirometer
 - b) oxygenerator
 - c) audiometer
 - d) ventilator
- 10) _____ pressure ventilators operate either in mandatory or spontaneous mode.
- a) Negative
 - b) Positive
 - c) Both a) and b)
 - d) Air
- 11) Lung _____ is the ability of the alveoli and lung tissue to expand on inspiration.
- a) volume
 - b) capacity
 - c) discharge
 - d) compliance
- 12) _____ volume is the depth of breathing inspired or expired during each respiratory cycle.
- a) Tidal
 - b) Minute
 - c) Sigh
 - d) Lung
- 13) An audiometer is a equipment which is used for the identification of
- a) evoked potential
 - b) masking
 - c) bone conduction
 - d) hearing loss
- 14) White noise is a noise containing all frequencies in audible spectrum at _____ intensities.
- a) different
 - b) same
 - c) equal
 - d) approximate



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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Thursday, 4-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Draw and explain schematic diagram and working of calorimeter.
 - 2) Draw and explain working of any one type of blood cell counter.
 - 3) List various blood flow measurement techniques and explain electromagnetic blood flow meter.
 - 4) Define electrophoresis process and discuss its applications in medicine.
 - 5) Explain the optical ray diagram of spectrometer and its significance in clinical application.
3. Attempt **any two** : **(6×2=12)**
- 1) Draw and explain working of complete blood gas analyzer.
 - 2) Define pH. Explain in detail the process and application of pH measurement.
 - 3) Draw and explain working of impedance plethysmograph in detail.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**
- 1) Discuss the concept and significance of masking in audiometry.
 - 2) Explain the principle of pulse oximeter with necessary diagram.
 - 3) Discuss various modes of ventilator in detail.
 - 4) Explain the function of spirometer and mention its application.
 - 5) Define and differentiate between pure tone and speech audiometry.
5. Attempt **any two** questions : **(6×2=12)**
- 1) Explain working of evoked response audiometry with necessary diagram.
 - 2) Explain working of anesthesia machine in detail.
 - 3) List various parts of heart lung machine and explain any two of it.



SLR-VB – 358

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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Thursday, 4-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternatives :

(14×1=14)

- 1) Nebulizers are used to supply moisture in the form of
 - a) droplets
 - b) vapour
 - c) water
 - d) gas
- 2) The _____ provides a positive force for transporting respiratory and anaesthesia gas into apneic patient.
 - a) spirometer
 - b) oxygenerator
 - c) audiometer
 - d) ventilator
- 3) _____ pressure ventilators operate either in mandatory or spontaneous mode.
 - a) Negative
 - b) Positive
 - c) Both a) and b)
 - d) Air
- 4) Lung _____ is the ability of the alveoli and lung tissue to expand on inspiration.
 - a) volume
 - b) capacity
 - c) discharge
 - d) compliance
- 5) _____ volume is the depth of breathing inspired or expired during each respiratory cycle.
 - a) Tidal
 - b) Minute
 - c) Sigh
 - d) Lung

P.T.O.



- 6) An audiometer is a equipment which is used for the identification of
- a) evoked potential
 - b) masking
 - c) bone conduction
 - d) hearing loss
- 7) White noise is a noise containing all frequencies in audible spectrum at _____ intensities.
- a) different
 - b) same
 - c) equal
 - d) approximate
- 8) _____ are devices that utilizes prism as diffraction grating.
- a) Lens
 - b) Monochromatous
 - c) Filter
 - d) Quartz
- 9) The inert gas is the _____ phase of the chromatograph.
- a) Mobile
 - b) Real
 - c) Stationary
 - d) Continuous
- 10) _____ is defined as the movement of a solid phase with respect to a liquid.
- a) Diffusion
 - b) Drift
 - c) Osmosis
 - d) Electrophoresis
- 11) The electromagnetic flow meter measures instantaneous _____ flow of blood.
- a) pulsatile
 - b) pulsed
 - c) continuous
 - d) real
- 12) The peak to peak volume changes during a quiet breath is called as
- a) absolute volume
 - b) tidal volume
 - c) vital capacity
 - d) closing of valves
- 13) The relationship between $\log PCO_2$ and pH is linear over the range of _____ mmHg.
- a) 100-900
 - b) 50-500
 - c) 10-90
 - d) 100-150
- 14) Dry gas supplied by anaesthesia machine may cause clinically desiccation of
- a) saliva
 - b) bilirubin
 - c) mucus
 - d) blood
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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Thursday, 4-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Draw and explain schematic diagram and working of calorimeter.
 - 2) Draw and explain working of any one type of blood cell counter.
 - 3) List various blood flow measurement techniques and explain electromagnetic blood flow meter.
 - 4) Define electrophoresis process and discuss its applications in medicine.
 - 5) Explain the optical ray diagram of spectrometer and its significance in clinical application.
3. Attempt **any two** : **(6×2=12)**
- 1) Draw and explain working of complete blood gas analyzer.
 - 2) Define pH. Explain in detail the process and application of pH measurement.
 - 3) Draw and explain working of impedance plethysmograph in detail.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**
- 1) Discuss the concept and significance of masking in audiometry.
 - 2) Explain the principle of pulse oximeter with necessary diagram.
 - 3) Discuss various modes of ventilator in detail.
 - 4) Explain the function of spirometer and mention its application.
 - 5) Define and differentiate between pure tone and speech audiometry.
5. Attempt **any two** questions : **(6×2=12)**
- 1) Explain working of evoked response audiometry with necessary diagram.
 - 2) Explain working of anesthesia machine in detail.
 - 3) List various parts of heart lung machine and explain any two of it.

Set Q



SLR-VB – 358

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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Thursday, 4-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternatives :

(14×1=14)

- 1) The peak to peak volume changes during a quiet breath is called as
 - a) absolute volume
 - b) tidal volume
 - c) vital capacity
 - d) closing of valves
- 2) The relationship between $\log PCO_2$ and pH is linear over the range of _____ mmHg.
 - a) 100-900
 - b) 50-500
 - c) 10-90
 - d) 100-150
- 3) Dry gas supplied by anaesthesia machine may cause clinically desiccation of
 - a) saliva
 - b) bilirubin
 - c) mucus
 - d) blood
- 4) Nebulizers are used to supply moisture in the form of
 - a) droplets
 - b) vapour
 - c) water
 - d) gas
- 5) The _____ provides a positive force for transporting respiratory and anaesthesia gas into apneic patient.
 - a) spirometer
 - b) oxygenator
 - c) audiometer
 - d) ventilator

P.T.O.



- 6) _____ pressure ventilators operate either in mandatory or spontaneous mode.
- a) Negative
 - b) Positive
 - c) Both a) and b)
 - d) Air
- 7) Lung _____ is the ability of the alveoli and lung tissue to expand on inspiration.
- a) volume
 - b) capacity
 - c) discharge
 - d) compliance
- 8) _____ volume is the depth of breathing inspired or expired during each respiratory cycle.
- a) Tidal
 - b) Minute
 - c) Sigh
 - d) Lung
- 9) An audiometer is a equipment which is used for the identification of _____
- a) evoked potential
 - b) masking
 - c) bone conduction
 - d) hearing loss
- 10) White noise is a noise containing all frequencies in audible spectrum at _____ intensities.
- a) different
 - b) same
 - c) equal
 - d) approximate
- 11) _____ are devices that utilizes prism as diffraction grating.
- a) Lens
 - b) Monochromatous
 - c) Filter
 - d) Quartz
- 12) The inert gas is the _____ phase of the chromatograph.
- a) Mobile
 - b) Real
 - c) Stationary
 - d) Continuous
- 13) _____ is defined as the movement of a solid phase with respect to a liquid.
- a) Diffusion
 - b) Drift
 - c) Osmosis
 - d) Electrophoresis
- 14) The electromagnetic flow meter measures instantaneous _____ flow of blood.
- a) pulsatile
 - b) pulsed
 - c) continuous
 - d) real



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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Thursday, 4-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Draw and explain schematic diagram and working of calorimeter.
 - 2) Draw and explain working of any one type of blood cell counter.
 - 3) List various blood flow measurement techniques and explain electromagnetic blood flow meter.
 - 4) Define electrophoresis process and discuss its applications in medicine.
 - 5) Explain the optical ray diagram of spectrometer and its significance in clinical application.
3. Attempt **any two** : **(6×2=12)**
- 1) Draw and explain working of complete blood gas analyzer.
 - 2) Define pH. Explain in detail the process and application of pH measurement.
 - 3) Draw and explain working of impedance plethysmograph in detail.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**
- 1) Discuss the concept and significance of masking in audiometry.
 - 2) Explain the principle of pulse oximeter with necessary diagram.
 - 3) Discuss various modes of ventilator in detail.
 - 4) Explain the function of spirometer and mention its application.
 - 5) Define and differentiate between pure tone and speech audiometry.
5. Attempt **any two** questions : **(6×2=12)**
- 1) Explain working of evoked response audiometry with necessary diagram.
 - 2) Explain working of anesthesia machine in detail.
 - 3) List various parts of heart lung machine and explain any two of it.

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SLR-VB – 358

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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Thursday, 4-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternatives :

(14×1=14)

- 1) _____ pressure ventilators operate either in mandatory or spontaneous mode.
 - a) Negative
 - b) Positive
 - c) Both a) and b)
 - d) Air
- 2) Lung _____ is the ability of the alveoli and lung tissue to expand on inspiration.
 - a) volume
 - b) capacity
 - c) discharge
 - d) compliance
- 3) _____ volume is the depth of breathing inspired or expired during each respiratory cycle.
 - a) Tidal
 - b) Minute
 - c) Sigh
 - d) Lung
- 4) An audiometer is a equipment which is used for the identification of
 - a) evoked potential
 - b) masking
 - c) bone conduction
 - d) hearing loss
- 5) White noise is a noise containing all frequencies in audible spectrum at _____ intensities.
 - a) different
 - b) same
 - c) equal
 - d) approximate

P.T.O.



- 6) _____ are devices that utilizes prism as diffraction grating.
- a) Lens
 - b) Monochromatous
 - c) Filter
 - d) Quartz
- 7) The inert gas is the _____ phase of the chromatograph.
- a) Mobile
 - b) Real
 - c) Stationary
 - d) Continuous
- 8) _____ is defined as the movement of a solid phase with respect to a liquid.
- a) Diffusion
 - b) Drift
 - c) Osmosis
 - d) Electrophoresis
- 9) The electromagnetic flow meter measures instantaneous _____ flow of blood.
- a) pulsatile
 - b) pulsed
 - c) continuous
 - d) real
- 10) The peak to peak volume changes during a quiet breath is called as
- a) absolute volume
 - b) tidal volume
 - c) vital capacity
 - d) closing of valves
- 11) The relationship between $\log PCO_2$ and pH is linear over the range of _____ mmHg.
- a) 100-900
 - b) 50-500
 - c) 10-90
 - d) 100-150
- 12) Dry gas supplied by anaesthesia machine may cause clinically desiccation of
- a) saliva
 - b) bilirubin
 - c) mucus
 - d) blood
- 13) Nebulizers are used to supply moisture in the form of
- a) droplets
 - b) vapour
 - c) water
 - d) gas
- 14) The _____ provides a positive force for transporting respiratory and anaesthesia gas into apneic patient.
- a) spirometer
 - b) oxygenerator
 - c) audiometer
 - d) ventilator
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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Thursday, 4-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Draw and explain schematic diagram and working of calorimeter.
 - 2) Draw and explain working of any one type of blood cell counter.
 - 3) List various blood flow measurement techniques and explain electromagnetic blood flow meter.
 - 4) Define electrophoresis process and discuss its applications in medicine.
 - 5) Explain the optical ray diagram of spectrometer and its significance in clinical application.
3. Attempt **any two** : **(6×2=12)**
- 1) Draw and explain working of complete blood gas analyzer.
 - 2) Define pH. Explain in detail the process and application of pH measurement.
 - 3) Draw and explain working of impedance plethysmograph in detail.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**
- 1) Discuss the concept and significance of masking in audiometry.
 - 2) Explain the principle of pulse oximeter with necessary diagram.
 - 3) Discuss various modes of ventilator in detail.
 - 4) Explain the function of spirometer and mention its application.
 - 5) Define and differentiate between pure tone and speech audiometry.
5. Attempt **any two** questions : **(6×2=12)**
- 1) Explain working of evoked response audiometry with necessary diagram.
 - 2) Explain working of anesthesia machine in detail.
 - 3) List various parts of heart lung machine and explain any two of it.

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SLR-VB – 359

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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELLING AND SIMULATION**

Day and Date : Friday, 5-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Parkinson's occurrence syndrome is related to _____ system.
a) Respiratory b) Nervous c) Urinary d) Digestive
- 2) _____ law defines diffusion process.
a) Ohm's b) Fick's c) Donnan's d) Goldman
- 3) _____ law defines drift process.
a) Ohm's b) Fick's c) Goldman d) Donnan's
- 4) _____ are simplified representation of objects.
a) Models b) Drifts c) Images d) None of the above
- 5) _____ is defined as a controlling of load dynamics of muscles.
a) Control system b) Drift
c) Stretch reflex d) None of the above
- 6) _____ neutrality is representation of cations and anions.
a) Space charge b) Diffusion c) Drift d) Reflex
- 7) Resting state of action potential starts from
a) -20 mV b) 35 mV c) 90 mV d) -90 mV
- 8) In thermoregulatory plant model short resistor represents
a) Conduction b) Convection c) Radiation d) Insulation
- 9) Goldman equation is called as _____ equation.
a) Variable field b) Complex field
c) Constant field d) Electric field

P.T.O.



- 10) Donnan's equation is called as _____ ion equation.
a) one b) three c) four d) two
- 11) _____ equation defines membrane current.
a) Nernst b) Donnan
c) Cable d) Goldman
- 12) Saccadic eye movements are very _____ that jumps from one eye position to another.
a) Slow b) Linear c) Variable d) Fast
- 13) Smooth pursuit eye movements tracks _____ objects.
a) Moving b) Stable c) Fixed d) None of the above
- 14) Excited nerve muscle cells action potential state reaches to _____ mV.
a) +20 mV b) +35 mV c) -90 mV d) -35 mV
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELLING AND SIMULATION**

Day and Date : Friday, 5-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Define and differentiate lumped and distributed parameter models.
- 2) Explain Donnan's equation and its importance.
- 3) Define modelling and mention list of steps in modeling.
- 4) Explain concept of compartmental modeling.
- 5) Define and differentiate between Goldman's equation and Nernst equation.

3. Attempt **any two** : **(6×2=12)**

- 1) Explain active transport mechanism with neat diagram.
- 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 $KT/q = 25.3$ mV. Calculate,
Nernst potential for Na⁺ and K⁺ ion.

- 3) Draw and explain electrical equivalent model of a biological membrane.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Differentiate between one control and two control mechanism for neuro muscular system.
 - 2) Draw and explain drug delivery system.
 - 3) Explain insulin glucose feedback system in short.
 - 4) Discuss any two industrial applications of thermoregulatory system.
 - 5) Define and explain concept of pharmacokinetics.
5. Attempt **any two** : **(6×2=12)**
- 1) Explain four types of eye movement and mention names of eye muscles responsible for eye movement.
 - 2) Draw and explain thermoregulatory plant model in detail.
 - 3) Discuss reciprocal innervation model of neuromuscular system in detail.
-



SLR-VB – 359

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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELLING AND SIMULATION**

Day and Date : Friday, 5-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(1×14=14)

- 1) In thermoregulatory plant model short resistor represents
 - a) Conduction
 - b) Convection
 - c) Radiation
 - d) Insulation
- 2) Goldman equation is called as _____ equation.
 - a) Variable field
 - b) Complex field
 - c) Constant field
 - d) Electric field
- 3) Donnan's equation is called as _____ ion equation.
 - a) one
 - b) three
 - c) four
 - d) two
- 4) _____ equation defines membrane current.
 - a) Nernst
 - b) Donnan
 - c) Cable
 - d) Goldman
- 5) Saccadic eye movements are very _____ that jumps from one eye position to another.
 - a) Slow
 - b) Linear
 - c) Variable
 - d) Fast
- 6) Smooth pursuit eye movements tracks _____ objects.
 - a) Moving
 - b) Stable
 - c) Fixed
 - d) None of the above
- 7) Excited nerve muscle cells action potential state reaches to _____ mV.
 - a) +20 mV
 - b) +35 mV
 - c) -90 mV
 - d) -35 mV
- 8) Parkinson's occurrence syndrome is related to _____ system.
 - a) Respiratory
 - b) Nervous
 - c) Urinary
 - d) Digestive

P.T.O.



- 9) _____ law defines diffusion process.
a) Ohm's b) Fick's c) Donnan's d) Goldman
- 10) _____ law defines drift process.
a) Ohm's b) Fick's c) Goldman d) Donnan's
- 11) _____ are simplified representation of objects.
a) Models b) Drifts c) Images d) None of the above
- 12) _____ is defined as a controlling of load dynamics of muscles.
a) Control system b) Drift
c) Stretch reflex d) None of the above
- 13) _____ neutrality is representation of cations and anions.
a) Space charge b) Diffusion c) Drift d) Reflex
- 14) Resting state of action potential starts from
a) -20 mV b) 35 mV c) 90 mV d) -90 mV
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELLING AND SIMULATION**

Day and Date : Friday, 5-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** : **(4×4=16)**
- 1) Define and differentiate lumped and distributed parameter models.
 - 2) Explain Donnan's equation and its importance.
 - 3) Define modelling and mention list of steps in modeling.
 - 4) Explain concept of compartmental modeling.
 - 5) Define and differentiate between Goldman's equation and Nernst equation.

3. Attempt **any two** : **(6×2=12)**
- 1) Explain active transport mechanism with neat diagram.
 - 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 $KT/q = 25.3$ mV. Calculate,
Nernst potential for Na⁺ and K⁺ ion.

- 3) Draw and explain electrical equivalent model of a biological membrane.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Differentiate between one control and two control mechanism for neuro muscular system.
 - 2) Draw and explain drug delivery system.
 - 3) Explain insulin glucose feedback system in short.
 - 4) Discuss any two industrial applications of thermoregulatory system.
 - 5) Define and explain concept of pharmacokinetics.
5. Attempt **any two** : **(6×2=12)**
- 1) Explain four types of eye movement and mention names of eye muscles responsible for eye movement.
 - 2) Draw and explain thermoregulatory plant model in detail.
 - 3) Discuss reciprocal innervation model of neuromuscular system in detail.
-



- 9) Smooth pursuit eye movements tracks _____ objects.
a) Moving b) Stable c) Fixed d) None of the above
- 10) Excited nerve muscle cells action potential state reaches to _____ mV.
a) +20 mV b) +35 mV c) -90 mV d) -35 mV
- 11) Parkinson's occurrence syndrome is related to _____ system.
a) Respiratory b) Nervous c) Urinary d) Digestive
- 12) _____ law defines diffusion process.
a) Ohm's b) Fick's c) Donnan's d) Goldman
- 13) _____ law defines drift process.
a) Ohm's b) Fick's c) Goldman d) Donnan's
- 14) _____ are simplified representation of objects.
a) Models b) Drifts c) Images d) None of the above
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELLING AND SIMULATION**

Day and Date : Friday, 5-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Define and differentiate lumped and distributed parameter models.
- 2) Explain Donnan's equation and its importance.
- 3) Define modelling and mention list of steps in modeling.
- 4) Explain concept of compartmental modeling.
- 5) Define and differentiate between Goldman's equation and Nernst equation.

3. Attempt **any two** : **(6×2=12)**

- 1) Explain active transport mechanism with neat diagram.
- 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 $KT/q = 25.3$ mV. Calculate,
Nernst potential for Na⁺ and K⁺ ion.

- 3) Draw and explain electrical equivalent model of a biological membrane.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Differentiate between one control and two control mechanism for neuro muscular system.
 - 2) Draw and explain drug delivery system.
 - 3) Explain insulin glucose feedback system in short.
 - 4) Discuss any two industrial applications of thermoregulatory system.
 - 5) Define and explain concept of pharmacokinetics.
5. Attempt **any two** : **(6×2=12)**
- 1) Explain four types of eye movement and mention names of eye muscles responsible for eye movement.
 - 2) Draw and explain thermoregulatory plant model in detail.
 - 3) Discuss reciprocal innervation model of neuromuscular system in detail.
-



SLR-VB – 359

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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELLING AND SIMULATION**

Day and Date : Friday, 5-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) _____ equation defines membrane current.
a) Nernst b) Donnan
c) Cable d) Goldman
- 3) Saccadic eye movements are very _____ that jumps from one eye position to another.
a) Slow b) Linear c) Variable d) Fast
- 4) Smooth pursuit eye movements tracks _____ objects.
a) Moving b) Stable c) Fixed d) None of the above
- 5) Excited nerve muscle cells action potential state reaches to _____ mV.
a) +20 mV b) +35 mV c) -90 mV d) -35 mV
- 6) Parkinson's occurrence syndrome is related to _____ system.
a) Respiratory b) Nervous c) Urinary d) Digestive
- 7) _____ law defines diffusion process.
a) Ohm's b) Fick's c) Donnan's d) Goldman
- 8) _____ law defines drift process.
a) Ohm's b) Fick's c) Goldman d) Donnan's
- 9) _____ are simplified representation of objects.
a) Models b) Drifts c) Images d) None of the above

P.T.O.



- 10) _____ is defined as a controlling of load dynamics of muscles.
 - a) Control system
 - b) Drift
 - c) Stretch reflex
 - d) None of the above
 - 11) _____ neutrality is representation of cations and anions.
 - a) Space charge
 - b) Diffusion
 - c) Drift
 - d) Reflex
 - 12) Resting state of action potential starts from
 - a) -20 mV
 - b) 35 mV
 - c) 90 mV
 - d) -90 mV
 - 13) In thermoregulatory plant model short resistor represents
 - a) Conduction
 - b) Convection
 - c) Radiation
 - d) Insulation
 - 14) Goldman equation is called as _____ equation.
 - a) Variable field
 - b) Complex field
 - c) Constant field
 - d) Electric field
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELLING AND SIMULATION**

Day and Date : Friday, 5-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Define and differentiate lumped and distributed parameter models.
- 2) Explain Donnan's equation and its importance.
- 3) Define modelling and mention list of steps in modeling.
- 4) Explain concept of compartmental modeling.
- 5) Define and differentiate between Goldman's equation and Nernst equation.

3. Attempt **any two** : **(6×2=12)**

- 1) Explain active transport mechanism with neat diagram.
- 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 $KT/q = 25.3$ mV. Calculate,
Nernst potential for Na⁺ and K⁺ ion.

- 3) Draw and explain electrical equivalent model of a biological membrane.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Differentiate between one control and two control mechanism for neuro muscular system.
 - 2) Draw and explain drug delivery system.
 - 3) Explain insulin glucose feedback system in short.
 - 4) Discuss any two industrial applications of thermoregulatory system.
 - 5) Define and explain concept of pharmacokinetics.
5. Attempt **any two** : **(6×2=12)**
- 1) Explain four types of eye movement and mention names of eye muscles responsible for eye movement.
 - 2) Draw and explain thermoregulatory plant model in detail.
 - 3) Discuss reciprocal innervation model of neuromuscular system in detail.
-



SLR-VB – 360

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**T.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Saturday, 6-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Total Marks :70

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

- 2) **Answer MCQ/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) **Figures to the right indicate full marks.**
- 5) **Make suitable assumptions if necessary and mention them clearly.**

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Which of the following is used as a primary storage device
 - a) Magnetic tape
 - b) PROM
 - c) Floppy disc
 - d) None of these
- 2) The communication line between the CPU, memory and peripherals
 - a) BUS
 - b) Line
 - c) Media
 - d) None of these
- 3) IC74LS373 is
 - a) Latch
 - b) Buffer
 - c) Media
 - d) None of these
- 4) Program counter is _____ bit of address.
 - a) 8
 - b) 16
 - c) 4
 - d) 0
- 5) When referring to instruction words, a mnemonic is
 - a) A short abbreviation for the operand address
 - b) A short abbreviation for the operation to be performed
 - c) A short abbreviation for the data word stored at the operand address
 - d) Shorthand for machine language

P.T.O.



- 6) The technique of assigning a memory address to each I/O device in the computer system is called
- a) memory-mapped I/O
 - b) ported I/O
 - c) dedicated I/O
 - d) wired I/O
- 7) The interrupt request line is
- a) Data line
 - b) Control line
 - c) Address line
 - d) None
- 8) The time between receipt of an interrupt and its service is
- a) Interrupt delay
 - b) Cycle time
 - c) Interrupt latency
 - d) Switching time
- 9) The 8085 microprocessor responds to the presence of an interrupt
- a) As soon as the trap pin becomes 'LOW'
 - b) By checking the trap pin for 'high' status at the end of each instruction fetch
 - c) By checking the trap pin for 'high' status at the end of execution of each instruction
 - d) By checking the trap pin for 'high' status at regular intervals
- 10) To avoid loading during read operation, the device used is
- a) latch
 - b) flip-flop
 - c) buffer
 - d) tristate buffer
- 11) In memory-mapped scheme, the devices are viewed as
- a) distinct I/O devices
 - b) memory locations
 - c) only input devices
 - d) only output devices
- 12) 8051 series has how many 16 bit registers ?
- a) 2
 - b) 3
 - c) 1
 - d) 0
- 13) If we push data onto the stack then the stack pointer.
- a) Increases with every push
 - b) Decreases with every push
 - c) None of the mentioned
 - d) Both of the mentioned
- 14) Which hardware triggers some operation after certain programmed count ?
- a) Programmable interval timer
 - b) Interrupt timer
 - c) Programmable timer
 - d) None of the mentioned
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**T.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Saturday, 6-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks :56

- 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 non programmable single memory calculator is allowed.**

SECTION – I

2. Answer **any five** of the following questions. **15**
 - a) Explain in detail different type of ROM. **3**
 - b) Explain in detail flag register (PSW) of 8085. **3**
 - c) Discuss the concept of HOLD and WAIT states in microprocessor ? **3**
 - d) Define addressing mode. Discuss different addressing mode with an example. **3**
 - e) Explain following : **3**
 - i) LXI
 - ii) LHL address.
 - f) Write differences between hardware and software interrupts. **3**
 - g) Draw the opcode fetch machine cycle. **3**
3. Answer **any three** of the following questions : **13**
 - a) With a neat diagram explain the architecture of 8085 ? **5**
 - b) Write an assembly language program to arrange array of numbers in descending order. **4**
 - c) Explain and draw RIM and SIM instruction format. **4**
 - d) With a neat diagram explain interrupt structure of 8085 microprocessor. **4**

Set P



SECTION – II

4. Answer **any five** of the following questions : **15**
- a) List out all SFRs of MCS 51 and explain TMOD. **3**
 - b) Differentiate between memory mapped I/O and I/O mapped I/O. **3**
 - c) Compare microcontroller and microprocessor. **3**
 - d) Explain following : **3**
 - i) DA A ii) MUL AB.
 - e) Explain various type of serial data input output. **3**
 - f) Explain the features and operator of I/O port of 8051. Sketch the internal circuit of port 1 and explain its operation. **3**
5. Answer **any three** of the following questions : **13**
- a) With a neat diagram explain the architecture of 8051. **4**
 - b) List and explain in detail different data transfer techniques. **4**
 - c) Interface LED 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-VB – 360

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**T.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Saturday, 6-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Total Marks :70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/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) **Figures to the right indicate full marks.**
- 5) **Make suitable assumptions if necessary and mention them clearly.**

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The time between recieval of an interrupt and its service is
 - a) Interrupt delay
 - b) Cycle time
 - c) Interrupt latency
 - d) Switching time
- 2) The 8085 microprocessor respond to the presence of an interrupt
 - a) As soon as the trap pin becomes 'LOW'
 - b) By checking the trap pin for 'high' status at the end of each instruction fetch
 - c) By checking the trap pin for 'high' status at the end of execution of each instruction
 - d) By checking the trap pin for 'high' status at regular intervals
- 3) To avoid loading during read operation, the device used is
 - a) latch
 - b) flip-flop
 - c) buffer
 - d) tristate buffer
- 4) In memory-mapped scheme, the devices are viewed as
 - a) distinct I/O devices
 - b) memory locations
 - c) only input devices
 - d) only output devices

P.T.O.



- 5) 8051 series has how many 16 bit registers ?
a) 2 b) 3 c) 1 d) 0
- 6) If we push data onto the stack then the stack pointer.
a) Increases with every push b) Decreases with every push
c) None of the mentioned d) Both of the mentioned
- 7) Which hardware triggers some operation after certain programmed count ?
a) Programmable interval timer b) Interrupt timer
c) Programmable timer d) None of the mentioned
- 8) Which of the following is used as a primary storage device
a) Magnetic tape b) PROM
c) Floppy disc d) None of these
- 9) The communication line between the CPU, memory and peripherals
a) BUS b) Line c) Media d) None of these
- 10) IC74LS373 is
a) Latch b) Buffer c) Media d) None of these
- 11) Program counter is _____ bit of address.
a) 8 b) 16 c) 4 d) 0
- 12) When referring to instruction words, a mnemonic is
a) A short abbreviation for the operand address
b) A short abbreviation for the operation to be performed
c) A short abbreviation for the data word stored at the operand address
d) Shorthand for machine language
- 13) The technique of assigning a memory address to each I/O device in the computer system is called
a) memory-mapped I/O b) ported I/O
c) dedicated I/O d) wired I/O
- 14) The interrupt request line is
a) Data line b) Control line c) Address line d) None
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**T.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Saturday, 6-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks :56

- 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 non programmable single memory calculator is allowed.**

SECTION – I

2. Answer **any five** of the following questions. **15**
- a) Explain in detail different type of ROM. **3**
 - b) Explain in detail flag register (PSW) of 8085. **3**
 - c) Discuss the concept of HOLD and WAIT states in microprocessor ? **3**
 - d) Define addressing mode. Discuss different addressing mode with an example. **3**
 - e) Explain following : **3**
 - i) LXI
 - ii) LHL address.
 - f) Write differences between hardware and software interrupts. **3**
 - g) Draw the opcode fetch machine cycle. **3**
3. Answer **any three** of the following questions : **13**
- a) With a neat diagram explain the architecture of 8085 ? **5**
 - b) Write an assembly language program to arrange array of numbers in descending order. **4**
 - c) Explain and draw RIM and SIM instruction format. **4**
 - d) With a neat diagram explain interrupt structure of 8085 microprocessor. **4**

Set Q



SECTION – II

4. Answer **any five** of the following questions : **15**
- a) List out all SFRs of MCS 51 and explain TMOD. **3**
 - b) Differentiate between memory mapped I/O and I/O mapped I/O. **3**
 - c) Compare microcontroller and microprocessor. **3**
 - d) Explain following : **3**
 - i) DA A ii) MUL AB.
 - e) Explain various type of serial data input output. **3**
 - f) Explain the features and operator of I/O port of 8051. Sketch the internal circuit of port 1 and explain its operation. **3**
5. Answer **any three** of the following questions : **13**
- a) With a neat diagram explain the architecture of 8051. **4**
 - b) List and explain in detail different data transfer techniques. **4**
 - c) Interface LED 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-VB – 360

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**T.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Saturday, 6-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Total Marks :70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/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) **Figures to the right indicate full marks.**
- 5) **Make suitable assumptions if necessary and mention them clearly.**

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) When referring to instruction words, a mnemonic is
- A short abbreviation for the operand address
 - A short abbreviation for the operation to be performed
 - A short abbreviation for the data word stored at the operand address
 - Shorthand for machine language
- 2) The technique of assigning a memory address to each I/O device in the computer system is called
- memory-mapped I/O
 - ported I/O
 - dedicated I/O
 - wired I/O
- 3) The interrupt request line is
- Data line
 - Control line
 - Address line
 - None
- 4) The time between recieval of an interrupt and its service is
- Interrupt delay
 - Cycle time
 - Interrupt latency
 - Switching time

P.T.O.



- 5) The 8085 microprocessor respond to the presence of an interrupt
- a) As soon as the trap pin becomes 'LOW'
 - b) By checking the trap pin for 'high' status at the end of each instruction fetch
 - c) By checking the trap pin for 'high' status at the end of execution of each instruction
 - d) By checking the trap pin for 'high' status at regular intervals
- 6) To avoid loading during read operation, the device used is
- a) latch
 - b) flip-flop
 - c) buffer
 - d) tristate buffer
- 7) In memory-mapped scheme, the devices are viewed as
- a) distinct I/O devices
 - b) memory locations
 - c) only input devices
 - d) only output devices
- 8) 8051 series has how many 16 bit registers ?
- a) 2
 - b) 3
 - c) 1
 - d) 0
- 9) If we push data onto the stack then the stack pointer.
- a) Increases with every push
 - b) Decreases with every push
 - c) None of the mentioned
 - d) Both of the mentioned
- 10) Which hardware triggers some operation after certain programmed count ?
- a) Programmable interval timer
 - b) Interrupt timer
 - c) Programmable timer
 - d) None of the mentioned
- 11) Which of the following is used as a primary storage device
- a) Magnetic tape
 - b) PROM
 - c) Floppy disc
 - d) None of these
- 12) The communication line between the CPU, memory and peripherals
- a) BUS
 - b) Line
 - c) Media
 - d) None of these
- 13) IC74LS373 is
- a) Latch
 - b) Buffer
 - c) Media
 - d) None of these
- 14) Program counter is _____ bit of address.
- a) 8
 - b) 16
 - c) 4
 - d) 0



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**T.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Saturday, 6-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks :56

- 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 non programmable single memory calculator is allowed.**

SECTION – I

2. Answer **any five** of the following questions. **15**
- a) Explain in detail different type of ROM. **3**
 - b) Explain in detail flag register (PSW) of 8085. **3**
 - c) Discuss the concept of HOLD and WAIT states in microprocessor ? **3**
 - d) Define addressing mode. Discuss different addressing mode with an example. **3**
 - e) Explain following : **3**
 - i) LXI
 - ii) LHL address.
 - f) Write differences between hardware and software interrupts. **3**
 - g) Draw the opcode fetch machine cycle. **3**
3. Answer **any three** of the following questions : **13**
- a) With a neat diagram explain the architecture of 8085 ? **5**
 - b) Write an assembly language program to arrange array of numbers in descending order. **4**
 - c) Explain and draw RIM and SIM instruction format. **4**
 - d) With a neat diagram explain interrupt structure of 8085 microprocessor. **4**

Set R



SECTION – II

4. Answer **any five** of the following questions : **15**
- a) List out all SFRs of MCS 51 and explain TMOD. **3**
 - b) Differentiate between memory mapped I/O and I/O mapped I/O. **3**
 - c) Compare microcontroller and microprocessor. **3**
 - d) Explain following : **3**
 - i) DA A ii) MUL AB.
 - e) Explain various type of serial data input output. **3**
 - f) Explain the features and operator of I/O port of 8051. Sketch the internal circuit of port 1 and explain its operation. **3**
5. Answer **any three** of the following questions : **13**
- a) With a neat diagram explain the architecture of 8051. **4**
 - b) List and explain in detail different data transfer techniques. **4**
 - c) Interface LED 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-VB – 360

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**T.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Saturday, 6-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Total Marks :70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/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) **Figures to the right indicate full marks.**
- 5) **Make suitable assumptions if necessary and mention them clearly.**

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) To avoid loading during read operation, the device used is
a) latch b) flip-flop c) buffer d) tristate buffer
- 2) In memory-mapped scheme, the devices are viewed as
a) distinct I/O devices b) memory locations
c) only input devices d) only output devices
- 3) 8051 series has how many 16 bit registers ?
a) 2 b) 3 c) 1 d) 0
- 4) If we push data onto the stack then the stack pointer.
a) Increases with every push b) Decreases with every push
c) None of the mentioned d) Both of the mentioned
- 5) Which hardware triggers some operation after certain programmed count ?
a) Programmable interval timer b) Interrupt timer
c) Programmable timer d) None of the mentioned

P.T.O.



- 6) Which of the following is used as a primary storage device
- a) Magnetic tape
 - b) PROM
 - c) Floppy disc
 - d) None of these
- 7) The communication line between the CPU, memory and peripherals
- a) BUS
 - b) Line
 - c) Media
 - d) None of these
- 8) IC74LS373 is
- a) Latch
 - b) Buffer
 - c) Media
 - d) None of these
- 9) Program counter is _____ bit of address.
- a) 8
 - b) 16
 - c) 4
 - d) 0
- 10) When referring to instruction words, a mnemonic is
- a) A short abbreviation for the operand address
 - b) A short abbreviation for the operation to be performed
 - c) A short abbreviation for the data word stored at the operand address
 - d) Shorthand for machine language
- 11) The technique of assigning a memory address to each I/O device in the computer system is called
- a) memory-mapped I/O
 - b) ported I/O
 - c) dedicated I/O
 - d) wired I/O
- 12) The interrupt request line is
- a) Data line
 - b) Control line
 - c) Address line
 - d) None
- 13) The time between recieval of an interrupt and its service is
- a) Interrupt delay
 - b) Cycle time
 - c) Interrupt latency
 - d) Switching time
- 14) The 8085 microprocessor respond to the presence of an interrupt
- a) As soon as the trap pin becomes 'LOW'
 - b) By checking the trap pin for 'high' status at the end of each instruction fetch
 - c) By checking the trap pin for 'high' status at the end of execution of each instruction
 - d) By checking the trap pin for 'high' status at regular intervals



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**T.E. (Part – I) (CGPA) (Biomedical Engineering) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Saturday, 6-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks :56

- 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 non programmable single memory calculator is allowed.**

SECTION – I

2. Answer **any five** of the following questions. **15**
- a) Explain in detail different type of ROM. **3**
 - b) Explain in detail flag register (PSW) of 8085. **3**
 - c) Discuss the concept of HOLD and WAIT states in microprocessor ? **3**
 - d) Define addressing mode. Discuss different addressing mode with an example. **3**
 - e) Explain following : **3**
 - i) LXI
 - ii) LHL address.
 - f) Write differences between hardware and software interrupts. **3**
 - g) Draw the opcode fetch machine cycle. **3**
3. Answer **any three** of the following questions : **13**
- a) With a neat diagram explain the architecture of 8085 ? **5**
 - b) Write an assembly language program to arrange array of numbers in descending order. **4**
 - c) Explain and draw RIM and SIM instruction format. **4**
 - d) With a neat diagram explain interrupt structure of 8085 microprocessor. **4**

Set S



SECTION – II

4. Answer **any five** of the following questions : **15**
- a) List out all SFRs of MCS 51 and explain TMOD. **3**
 - b) Differentiate between memory mapped I/O and I/O mapped I/O. **3**
 - c) Compare microcontroller and microprocessor. **3**
 - d) Explain following : **3**
 - i) DA A ii) MUL AB.
 - e) Explain various type of serial data input output. **3**
 - f) Explain the features and operator of I/O port of 8051. Sketch the internal circuit of port 1 and explain its operation. **3**
5. Answer **any three** of the following questions : **13**
- a) With a neat diagram explain the architecture of 8051. **4**
 - b) List and explain in detail different data transfer techniques. **4**
 - c) Interface LED 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-VB – 361

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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION**

Day and Date : Monday, 8-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

Instructions: 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) Bandwidth d) Wavelength
- 2) _____ noise is caused by random variations in the arrival of electrons at output electrodes of an amplifying device.
a) Internal b) Atmospheric c) Transit d) Shot
- 3) Maximum power in amplitude modulation is given by PAM = _____ PC when $m = 1$.
a) 2 b) 1.5 c) 2.5 d) 5
- 4) A _____ diode is a semiconductor diode whose junction capacitance varies linearly with applied voltage.
a) PNP b) NPN c) Zener d) Varactor
- 5) Sampling theorem states that
a) $F_s \geq 2 F_m$ b) $F_s \leq 2 F_m$ c) $F_m \leq 2 F_s$ d) $F_m \geq 2 F_s$
- 6) _____ modulation is obtained by simplifying the quantization and encoding process of PCM.
a) Delta b) ASK c) PSK d) VSB
- 7) Frequency division multiplexing is an _____ type multiplexing system.
a) Digital b) Analog c) Pulsed d) Linear
- 8) _____ of error is the function of a carrier to noise power ratio and number of possible encoding conditions used.
a) Sequence b) Linearity c) Dimensions d) Probability

P.T.O.



- 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) _____ is the measurement of remote variables or quantities.
a) Telemetry b) ASK c) FSK d) PSK
- 11) OSI reference model defines a networking framework to implement protocols in _____ layer.
a) 5 b) 7 c) 10 d) 11
- 12) In half duplex data communication modes transmission is possible in _____ direction.
a) single b) tripple c) 3D d) dual
- 13) _____ is the physical medium that connects the transmitter with receiver.
a) Channel b) OSI c) FSK d) PSK
- 14) Modulation index is amplitude modulation is given by $m =$
a) V_m/V_c b) V_c/V_m c) $2 V_m/V_c$ d) $2 V_c/V_m$
-



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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION**

Day and Date : Monday, 8-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Define following terms :
 - a) Bandwidth
 - b) Modulation
 - c) Wavelength
 - d) Channel bandwidth.
 - 2) Differentiate between amplitude modulation and frequency modulation.
 - 3) Explain block diagram of element of analog communication.
 - 4) Derive power relations in amplitude modulated wave.
 - 5) Define and explain Pre-emphasis and De-emphasis concepts.
3. Attempt **any two** : **(6×2=12)**
- 1) Calculate the % power saving when carrier and one of side band are suppressed in an AM wave modulated to a depth of
 - a) 100%
 - b) 50%.
 - 2) Define vestigial side band and derive power relations in VSB value.
 - 3) Draw and explain working of stabilized reactance modulator of frequency modulation.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) State sampling theorem and mention its condition.
 - 2) Explain Frequency Division Multiplexing (FDM) with necessary diagram.
 - 3) Define following codes :
 - a) Convolution codes
 - b) Hamming codes.

Set P



4) Differentiate between Pulse Amplitude Modulation (PAM) and Pulse Position Modulation (PPM).

5) Draw and explain Pulse Amplitude Modulation (PAM) circuit.

5. Attempt **any two** :

(6×2=12)

1) Draw and explain working of indirect method (Armstrong frequency) of modulation system.

2) Draw and explain working of M-array FSK system.

3) Explain following techniques :

a) DPCM b) DM.



SLR-VB – 361

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Set **Q**

**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION**

Day and Date : Monday, 8-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) _____ of error is the function of a carrier to noise power ratio and number of possible encoding conditions used.
a) Sequence b) Linearity c) Dimensions d) Probability
- 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) _____ is the measurement of remote variables or quantities.
a) Telemetry b) ASK c) FSK d) PSK
- 4) OSI reference model defines a networking framework to implement protocols in _____ layer.
a) 5 b) 7 c) 10 d) 11
- 5) In half duplex data communication modes transmission is possible in _____ direction.
a) single b) tripple c) 3D d) dual
- 6) _____ is the physical medium that connects the transmitter with receiver.
a) Channel b) OSI c) FSK d) PSK
- 7) Modulation index is amplitude modulation is given by $m =$
a) V_m/V_c b) V_c/V_m c) $2 V_m/V_c$ d) $2 V_c/V_m$
- 8) _____ is the range of frequencies required for transmission of modulated signal.
a) Time b) Frequency c) Bandwidth d) Wavelength

P.T.O.



- 9) _____ noise is caused by random variations in the arrival of electrons at output electrodes of an amplifying device.
a) Internal b) Atmospheric c) Transit d) Shot
- 10) Maximum power in amplitude modulation is given by PAM = _____ PC when $m = 1$.
a) 2 b) 1.5 c) 2.5 d) 5
- 11) A _____ diode is a semiconductor diode whose junction capacitance varies linearly with applied voltage.
a) PNP b) NPN c) Zener d) Varactor
- 12) Sampling theorem states that
a) $F_s \geq 2 F_m$ b) $F_s \leq 2 F_m$ c) $F_m \leq 2 F_s$ d) $F_m \geq 2 F_s$
- 13) _____ modulation is obtained by simplifying the quantization and encoding process of PCM.
a) Delta b) ASK c) PSK d) VSB
- 14) Frequency division multiplexing is an _____ type multiplexing system.
a) Digital b) Analog c) Pulsed d) Linear
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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION**

Day and Date : Monday, 8-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

1) Define following terms :

- | | |
|---------------|-----------------------|
| a) Bandwidth | b) Modulation |
| c) Wavelength | d) Channel bandwidth. |

2) Differentiate between amplitude modulation and frequency modulation.

3) Explain block diagram of element of analog communication.

4) Derive power relations in amplitude modulated wave.

5) Define and explain Pre-emphasis and De-emphasis concepts.

3. Attempt **any two** : **(6×2=12)**

1) Calculate the % power saving when carrier and one of side band are suppressed in an AM wave modulated to a depth of

- | | |
|---------|---------|
| a) 100% | b) 50%. |
|---------|---------|

2) Define vestigial side band and derive power relations in VSB value.

3) Draw and explain working of stabilized reactance modulator of frequency modulation.

SECTION – II

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

1) State sampling theorem and mention its condition.

2) Explain Frequency Division Multiplexing (FDM) with necessary diagram.

3) Define following codes :

- | | |
|----------------------|-------------------|
| a) Convolution codes | b) Hamming codes. |
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Set Q



- 4) Differentiate between Pulse Amplitude Modulation (PAM) and Pulse Position Modulation (PPM).
- 5) Draw and explain Pulse Amplitude Modulation (PAM) circuit.

5. Attempt **any two** : **(6×2=12)**

- 1) Draw and explain working of indirect method (Armstrong frequency) of modulation system.
 - 2) Draw and explain working of M-array FSK system.
 - 3) Explain following techniques :
 - a) DPCM
 - b) DM.
-



SLR-VB – 361

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T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 8-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) Sampling theorem states that
a) $F_s \geq 2 F_m$ b) $F_s \leq 2 F_m$ c) $F_m \leq 2 F_s$ d) $F_m \geq 2 F_s$
- 2) _____ modulation is obtained by simplifying the quantization and encoding process of PCM.
a) Delta b) ASK c) PSK d) VSB
- 3) Frequency division multiplexing is an _____ type multiplexing system.
a) Digital b) Analog c) Pulsed d) Linear
- 4) _____ of error is the function of a carrier to noise power ratio and number of possible encoding conditions used.
a) Sequence b) Linearity c) Dimensions d) Probability
- 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) _____ is the measurement of remote variables or quantities.
a) Telemetry b) ASK c) FSK d) PSK
- 7) OSI reference model defines a networking framework to implement protocols in _____ layer.
a) 5 b) 7 c) 10 d) 11
- 8) In half duplex data communication modes transmission is possible in _____ direction.
a) single b) tripple c) 3D d) dual

P.T.O.



- 9) _____ is the physical medium that connects the transmitter with receiver.
a) Channel b) OSI c) FSK d) PSK
- 10) Modulation index is amplitude modulation is given by $m =$
a) V_m/V_c b) V_c/V_m c) $2 V_m/V_c$ d) $2 V_c/V_m$
- 11) _____ is the range of frequencies required for transmission of modulated signal.
a) Time b) Frequency c) Bandwidth d) Wavelength
- 12) _____ noise is caused by random variations in the arrival of electrons at output electrodes of an amplifying device.
a) Internal b) Atmospheric c) Transit d) Shot
- 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) A _____ diode is a semiconductor diode whose junction capacitance varies linearly with applied voltage.
a) PNP b) NPN c) Zener d) Varactor
-



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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION**

Day and Date : Monday, 8-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Define following terms :
 - a) Bandwidth
 - b) Modulation
 - c) Wavelength
 - d) Channel bandwidth.
 - 2) Differentiate between amplitude modulation and frequency modulation.
 - 3) Explain block diagram of element of analog communication.
 - 4) Derive power relations in amplitude modulated wave.
 - 5) Define and explain Pre-emphasis and De-emphasis concepts.
3. Attempt **any two** : **(6×2=12)**
- 1) Calculate the % power saving when carrier and one of side band are suppressed in an AM wave modulated to a depth of
 - a) 100%
 - b) 50%.
 - 2) Define vestigial side band and derive power relations in VSB value.
 - 3) Draw and explain working of stabilized reactance modulator of frequency modulation.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) State sampling theorem and mention its condition.
 - 2) Explain Frequency Division Multiplexing (FDM) with necessary diagram.
 - 3) Define following codes :
 - a) Convolution codes
 - b) Hamming codes.

Set R



4) Differentiate between Pulse Amplitude Modulation (PAM) and Pulse Position Modulation (PPM).

5) Draw and explain Pulse Amplitude Modulation (PAM) circuit.

5. Attempt **any two** : **(6×2=12)**

1) Draw and explain working of indirect method (Armstrong frequency) of modulation system.

2) Draw and explain working of M-array FSK system.

3) Explain following techniques :

a) DPCM b) DM.



SLR-VB – 361

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T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION

Day and Date : Monday, 8-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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 measurement of remote variables or quantities.
a) Telemetry b) ASK c) FSK d) PSK
- 2) OSI reference model defines a networking framework to implement protocols in _____ layer.
a) 5 b) 7 c) 10 d) 11
- 3) In half duplex data communication modes transmission is possible in _____ direction.
a) single b) tripple c) 3D d) dual
- 4) _____ is the physical medium that connects the transmitter with receiver.
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a) V_m/V_c b) V_c/V_m c) $2 V_m/V_c$ d) $2 V_c/V_m$
- 6) _____ is the range of frequencies required for transmission of modulated signal.
a) Time b) Frequency c) Bandwidth d) Wavelength
- 7) _____ noise is caused by random variations in the arrival of electrons at output electrodes of an amplifying device.
a) Internal b) Atmospheric c) Transit d) Shot
- 8) Maximum power in amplitude modulation is given by PAM = _____ PC when $m = 1$.
a) 2 b) 1.5 c) 2.5 d) 5

P.T.O.



- 9) A _____ diode is a semiconductor diode whose junction capacitance varies linearly with applied voltage.
a) PNP b) NPN c) Zener d) Varactor
- 10) Sampling theorem states that
a) $F_s \geq 2 F_m$ b) $F_s \leq 2 F_m$ c) $F_m \leq 2 F_s$ d) $F_m \geq 2 F_s$
- 11) _____ modulation is obtained by simplifying the quantization and encoding process of PCM.
a) Delta b) ASK c) PSK d) VSB
- 12) Frequency division multiplexing is an _____ type multiplexing system.
a) Digital b) Analog c) Pulsed d) Linear
- 13) _____ of error is the function of a carrier to noise power ratio and number of possible encoding conditions used.
a) Sequence b) Linearity c) Dimensions d) Probability
- 14) _____ efficiency is used to compare the performance of one digital modulation technique to an other.
a) Wavelength b) Modulation c) Probability d) Bandwidth
-



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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION**

Day and Date : Monday, 8-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Define following terms :
 - a) Bandwidth
 - b) Modulation
 - c) Wavelength
 - d) Channel bandwidth.
 - 2) Differentiate between amplitude modulation and frequency modulation.
 - 3) Explain block diagram of element of analog communication.
 - 4) Derive power relations in amplitude modulated wave.
 - 5) Define and explain Pre-emphasis and De-emphasis concepts.
3. Attempt **any two** : **(6×2=12)**
- 1) Calculate the % power saving when carrier and one of side band are suppressed in an AM wave modulated to a depth of
 - a) 100%
 - b) 50%.
 - 2) Define vestigial side band and derive power relations in VSB value.
 - 3) Draw and explain working of stabilized reactance modulator of frequency modulation.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) State sampling theorem and mention its condition.
 - 2) Explain Frequency Division Multiplexing (FDM) with necessary diagram.
 - 3) Define following codes :
 - a) Convolution codes
 - b) Hamming codes.

Set S



4) Differentiate between Pulse Amplitude Modulation (PAM) and Pulse Position Modulation (PPM).

5) Draw and explain Pulse Amplitude Modulation (PAM) circuit.

5. Attempt **any two** :

(6×2=12)

1) Draw and explain working of indirect method (Armstrong frequency) of modulation system.

2) Draw and explain working of M-array FSK system.

3) Explain following techniques :

a) DPCM b) DM.



SLR-VB – 362

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| Set | P |
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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Tuesday, 9-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 discrete time signal $x(n) = (-1)^n$ is periodic with fundamental period
a) 6 b) 4 c) 2 d) 0

2) The Fourier transform of the exponential signal $e^{j\omega_0 t}$ is
a) can't be determined b) is zero
c) is unity d) is infinity

3) The unit impulse response of a linear time invariant system is the unit step function $u(t)$. For $t > 0$, the response of the system to an excitation $e^{-at} u(t)$; $a > 0$ will be

a) ae^{-at} b) $1 - e^{-at}$ c) $a(1 - e^{-at})$ d) 1

4) The system characterized by the equation $y(t) = ax(t) + b$ is
a) Linear for any value of b b) linear of $b > 0$
c) Linear if $b < 0$ d) Non linear

5) The region of convergence if the z-transform of the signal $2^n u(n) - 3^n u(-n - 1)$ is
a) $|z| > 1$ b) $|z| < 1$
c) $2 < |z| < 3$ d) Does not exist

P.T.O.



- 6) Given a unit step function $u(t)$, its time derivative is
- unit impulse
 - another step function
 - unit ramp function
 - sine function
- 7) Z transform converts convolution of time signals to
- Addition
 - Subtraction
 - Multiplication
 - Division
- 8) Region of convergence of a causal LTI system is
- entire s-plane
 - right half of s-plane
 - left half of s-plane
 - does not exist
- 9) The unit step response of a system with impulse response $h(n) = \delta(n) - \delta(n - 1)$ is
- $\delta(n - 1)$
 - $\delta(n)$
 - $u(n - 1)$
 - $u(n)$
- 10) The Fourier transform of $u(t)$ is
- $\frac{1}{2j\pi f}$
 - $2j\pi f$
 - $\frac{1}{1 + 2j\pi f}$
 - None of these
- 11) The region convergence of the z transform of the signal $x(n) = \{2, 1, 1, 2\}$ is
- all z, except $z = 0$ and $z = \infty$
 - all z except $z = 0$
 - all z, except $z = \infty$
 - all z
- 12) A given system is characterized by the differential equation
- $$\frac{d^2 y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t), \text{ system is}$$
- linear and unstable
 - linear and stable
 - nonlinear and unstable
 - nonlinear and stable
- 13) The number of possible region of convergence of the function
- $$\frac{(e^{-2} - 2)z}{(z - e^{-2})(z - 2)}$$
- is
- 1
 - 2
 - 3
 - 4
- 14) If $G(f)$ represents the fourier transform of a signal $g(t)$ which is real and odd symmetric in time then $G(f)$ is
- complex
 - imaginary
 - real
 - real and complex



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| Seat No. | |
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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Tuesday, 9-5-2017

Marks : 56

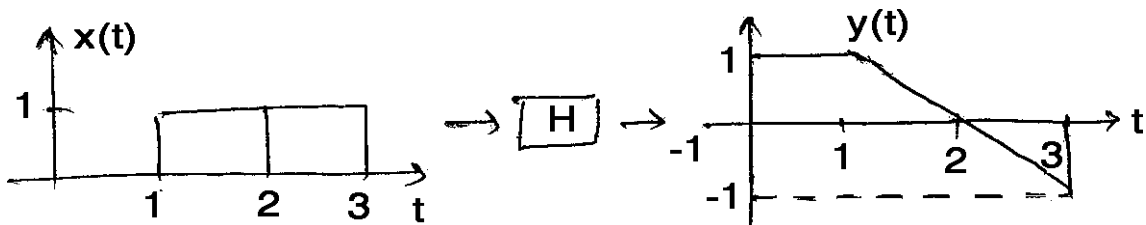
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. Answer any 4:

(4×4=16)

- 1) Determine whether the signal $x(t)$ described by $x(t) = \exp[-at] u(t)$, $a > 0$ is a power signal or energy signal.
- 2) Define energy and power signals of a system with their expressions.
- 3) A linear system H has an input output pair as shown. Determine whether the system is causal and time invariant

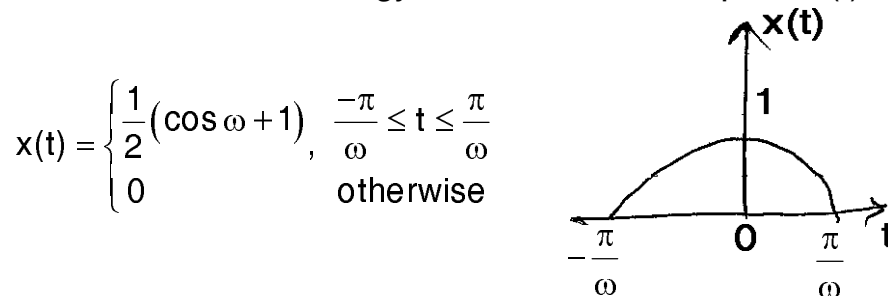


- 4) State and explain sampling theorem in time and frequency domain.
- 5) Define a unit impulse function $\delta(t)$.

3. Answer the following questions :

(6×2=12)

- 1) Determine the total energy of the raised cosine pulse $x(t)$, defined by





2) State the initial value and final value theorem of Laplace transform compute it

for given below $x(s) = \frac{3s + 4}{s(s + 1)(s + 2)^2}$.

SECTION – II

4. Attempt **any 4** :

(4×4=16)

- 1) Explain convolution property for Fourier transform signal.
- 2) Let the z transform of $x(n)$ be $X(z)$. Show that the z transform of $x(-n)$ is $X\left(\frac{1}{z}\right)$.
- 3) Calculate the fundamental frequency of given signal, $x(n) = e^{-4j\pi n/3} + e^{-3j\pi n}$.
- 4) Determine the Fourier transform a two sided exponential function $x(t) = e^{-|t|}$ add draw its magnitude spectrum.
- 5) State and prove Parseval's theorem for continuous time periodic signal.

5. Attempt **any two** :

(6×2=12)

- 1) Determine the inverse z transform of following $x(z)$ by the partial fraction expansion method $x(z) = \frac{z + 2}{2z^2 - 7z + 3}$ if, ROC's are
 - i) $|z| > 3$
 - ii) $z < \frac{1}{2}$
 - iii) $\frac{1}{2} < |z| < 3$
- 2) Determine the Fourier transforms of
 - i) $x_1[n] = \sin \omega_0$
 - ii) $x_2[n] = (\sin n\omega_0) u(n)$
- 3) Explain following terms :
 - a) Stability and causality of system in z transform
 - b) Convolution method for z transform.



SLR-VB – 362

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| Set | Q |
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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Tuesday, 9-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

Instructions: 1) 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) Region of convergence of a causal LTI system is

- a) entire s-plane b) right half of s-plane
c) left half of s-plane d) does not exist

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 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 these

4) The region convergence of the z transform of the signal $x(n) = \{2, 1, 1, 2\}$ is

- a) all z, except $z = 0$ and $z = \infty$ b) all z except $z = 0$
c) all z, except $z = \infty$ d) all z

5) A given system is characterized by the differential equation

$$\frac{d^2y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t), \text{ system is}$$

- a) linear and unstable b) linear and stable
c) nonlinear and unstable d) nonlinear and stable

P.T.O.



6) The number of possible region of convergence of the function

$$\frac{(e^{-2} - 2)z}{(z - e^{-2})(z - 2)} \text{ is}$$

- a) 1 b) 2 c) 3 d) 4

7) If $G(f)$ represents the fourier transform of a signal $g(t)$ which is real and odd symmetric in time then $G(f)$ is

- a) complex b) imaginary
c) real d) real and complex

8) A discrete time signal $x(n) = (-1)^n$ is periodic with fundamental period

- a) 6 b) 4 c) 2 d) 0

9) The Fourier transform of the exponential signal $e^{j\omega_0 t}$ is

- a) can't be determined b) is zero
c) is unity d) is infinity

10) The unit impulse response of a linear time invariant system is the unit step function $u(t)$. For $t > 0$, the response of the system to an excitation $e^{-at} u(t)$; $a > 0$ will be

- a) ae^{-at} b) $1 - e^{-at}$ c) $a(1 - e^{-at})$ d) 1

11) The system characterized by the equation $y(t) = ax(t) + b$ is

- a) Linear for any value of b b) linear of $b > 0$
c) Linear if $b < 0$ d) Non linear

12) The region of convergence if the z-transform of the signal

$$2^n u(n) - 3^n u(-n - 1) \text{ is}$$

- a) $|z| > 1$ b) $|z| < 1$
c) $2 < |z| < 3$ d) Does not exist

13) Given a unit step function $u(t)$, its time derivative is

- a) unit impulse b) another step function
c) unit vamp function d) sine function

14) Z transform converts convolution of time signals to

- a) Addition b) Substraction c) Multiplication d) Division



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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Tuesday, 9-5-2017

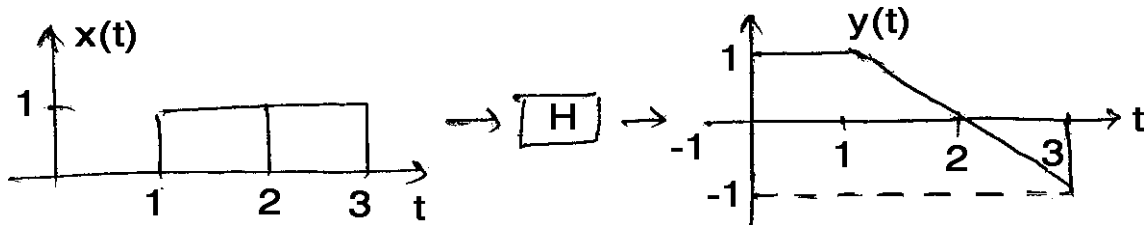
Marks : 56

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

SECTION – I

2. Answer any 4: (4×4=16)

- 1) Determine whether the signal $x(t)$ described by $x(t) = \exp[-at] u(t)$, $a > 0$ is a power signal or energy signal.
- 2) Define energy and power signals of a system with their expressions.
- 3) A linear system H has an input output pair as shown. Determine whether the system is causal and time invariant

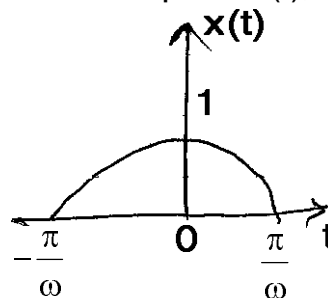


- 4) State and explain sampling theorem in time and frequency domain.
- 5) Define a unit impulse function $\delta(t)$.

3. Answer the following questions : (6×2=12)

- 1) Determine the total energy of the raised cosine pulse $x(t)$, defined by

$$x(t) = \begin{cases} \frac{1}{2}(\cos \omega t + 1), & -\frac{\pi}{\omega} \leq t \leq \frac{\pi}{\omega} \\ 0 & \text{otherwise} \end{cases}$$





2) State the initial value and final value theorem of Laplace transform compute it

for given below $x(s) = \frac{3s + 4}{s(s + 1)(s + 2)^2}$.

SECTION – II

4. Attempt **any 4** :

(4×4=16)

- 1) Explain convolution property for Fourier transform signal.
- 2) Let the z transform of $x(n)$ be $X(z)$. Show that the z transform of $x(-n)$ is $X\left(\frac{1}{z}\right)$.
- 3) Calculate the fundamental frequency of given signal, $x(n) = e^{-4j\pi n/3} + e^{-3j\pi n}$.
- 4) Determine the Fourier transform a two sided exponential function $x(t) = e^{-|t|}$ add draw its magnitude spectrum.
- 5) State and prove Parseval's theorem for continuous time periodic signal.

5. Attempt **any two** :

(6×2=12)

- 1) Determine the inverse z transform of following $x(z)$ by the partial fraction expansion method $x(z) = \frac{z + 2}{2z^2 - 7z + 3}$ if, ROC's are
 - i) $|z| > 3$
 - ii) $z < \frac{1}{2}$
 - iii) $\frac{1}{2} < |z| < 3$
- 2) Determine the Fourier transforms of
 - i) $x_1[n] = \sin \omega_0$
 - ii) $x_2[n] = (\sin n\omega_0) u(n)$
- 3) Explain following terms :
 - a) Stability and causality of system in z transform
 - b) Convolution method for z transform.



SLR-VB – 362

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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Tuesday, 9-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 region of convergence if the z-transform of the signal $2^n u(n) - 3^n u(-n - 1)$ is
 - a) $|z| > 1$
 - b) $|z| < 1$
 - c) $2 < |z| < 3$
 - d) Does not exist
- 2) Given a unit step function $u(t)$, its time derivative is
 - a) unit impulse
 - b) another step function
 - c) unit ramp function
 - d) sine function
- 3) Z transform converts convolution of time signals to
 - a) Addition
 - b) Subtraction
 - c) Multiplication
 - d) Division
- 4) Region of convergence of a causal LTI system is
 - a) entire s-plane
 - b) right half of s-plane
 - c) left half of s-plane
 - d) does not exist
- 5) 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) $u(n)$
- 6) 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 these

P.T.O.



7) The region convergence of the z transform of the signal $x(n) = \{2, 1, 1, 2\}$ is

- a) all z, except $z = 0$ and $z = \infty$ b) all z except $z = 0$
 c) all z, except $z = \infty$ d) all z

8) A given system is characterized by the differential equation

$$\frac{d^2y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t), \text{ system is}$$

- a) linear and unstable b) linear and stable
 c) nonlinear and unstable d) nonlinear and stable

9) The number of possible region of convergence of the function

$$\frac{(e^{-2} - 2)z}{(z - e^{-2})(z - 2)} \text{ is}$$

- a) 1 b) 2 c) 3 d) 4

10) If $G(f)$ represents the fourier transform of a signal $g(t)$ which is real and odd symmetric in time then $G(f)$ is

- a) complex b) imaginary
 c) real d) real and complex

11) A discrete time signal $x(n) = (-1)^n$ is periodic with fundamental period

- a) 6 b) 4 c) 2 d) 0

12) The Fourier transform of the exponential signal $e^{j\omega_0 t}$ is

- a) can't be determined b) is zero
 c) is unity d) is infinity

13) The unit impulse response of a linear time invariant system is the unit step function $u(t)$. For $t > 0$, the response of the system to an excitation $e^{-at} u(t)$; $a > 0$ will be

- a) ae^{-at} b) $1 - e^{-at}$ c) $a(1 - e^{-at})$ d) 1

14) The system characterized by the equation $y(t) = ax(t) + b$ is

- a) Linear for any value of b b) linear of $b > 0$
 c) Linear if $b < 0$ d) Non linear



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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Tuesday, 9-5-2017

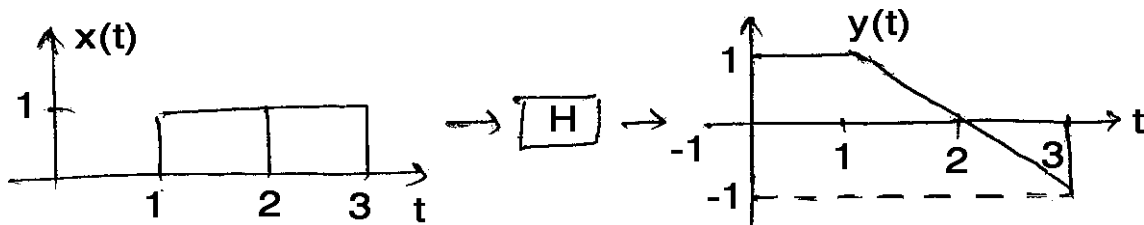
Marks : 56

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

SECTION – I

2. Answer any 4: (4×4=16)

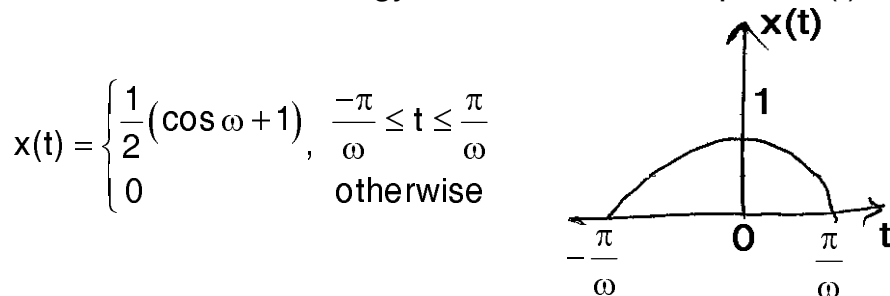
- 1) Determine whether the signal $x(t)$ described by $x(t) = \exp[-at] u(t)$, $a > 0$ is a power signal or energy signal.
- 2) Define energy and power signals of a system with their expressions.
- 3) A linear system H has an input output pair as shown. Determine whether the system is causal and time invariant



- 4) State and explain sampling theorem in time and frequency domain.
- 5) Define a unit impulse function $\delta(t)$.

3. Answer the following questions : (6×2=12)

- 1) Determine the total energy of the raised cosine pulse $x(t)$, defined by





2) State the initial value and final value theorem of Laplace transform compute it

for given below $x(s) = \frac{3s + 4}{s(s + 1)(s + 2)^2}$.

SECTION – II

4. Attempt **any 4** :

(4×4=16)

- 1) Explain convolution property for Fourier transform signal.
- 2) Let the z transform of $x(n)$ be $X(z)$. Show that the z transform of $x(-n)$ is $X\left(\frac{1}{z}\right)$.
- 3) Calculate the fundamental frequency of given signal, $x(n) = e^{-4j\pi n/3} + e^{-3j\pi n}$.
- 4) Determine the Fourier transform a two sided exponential function $x(t) = e^{-|t|}$ add draw its magnitude spectrum.
- 5) State and prove Parseval's theorem for continuous time periodic signal.

5. Attempt **any two** :

(6×2=12)

- 1) Determine the inverse z transform of following $x(z)$ by the partial fraction expansion method $x(z) = \frac{z + 2}{2z^2 - 7z + 3}$ if, ROC's are
 - i) $|z| > 3$
 - ii) $z < \frac{1}{2}$
 - iii) $\frac{1}{2} < |z| < 3$
- 2) Determine the Fourier transforms of
 - i) $x_1[n] = \sin \omega_0$
 - ii) $x_2[n] = (\sin n\omega_0) u(n)$
- 3) Explain following terms :
 - a) Stability and causality of system in z transform
 - b) Convolution method for z transform.



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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Tuesday, 9-5-2017
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 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 these

2) The region convergence of the z transform of the signal $x(n) = \{2, 1, 1, 2\}$ is

- a) all z, except $z = 0$ and $z = \infty$ b) all z except $z = 0$
c) all z, except $z = \infty$ d) all z

3) A given system is characterized by the differential equation

$$\frac{d^2y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t), \text{ system is}$$

- a) linear and unstable b) linear and stable
c) nonlinear and unstable d) nonlinear and stable

4) The number of possible region of convergence of the function

$$\frac{(e^{-2} - 2)z}{(z - e^{-2})(z - 2)} \text{ is}$$

- a) 1 b) 2 c) 3 d) 4

P.T.O.



- 5) If $G(f)$ represents the fourier transform of a signal $g(t)$ which is real and odd symmetric in time then $G(f)$ is
a) complex
b) imaginary
c) real
d) real and complex
- 6) A discrete time signal $x(n) = (-1)^n$ is periodic with fundamental period
a) 6
b) 4
c) 2
d) 0
- 7) The Fourier transform of the exponential signal $e^{j\omega_0 t}$ is
a) can't be determined
b) is zero
c) is unity
d) is infinity
- 8) The unit impulse response of a linear time invariant system is the unit step function $u(t)$. For $t > 0$, the response of the system to an excitation $e^{-at} u(t)$; $a > 0$ will be
a) ae^{-at}
b) $1 - e^{-at}$
c) $a(1 - e^{-at})$
d) 1
- 9) The system characterized by the equation $y(t) = ax(t) + b$ is
a) Linear for any value of b
b) linear of $b > 0$
c) Linear if $b < 0$
d) Non linear
- 10) The region of convergence if the z-transform of the signal $2^n u(n) - 3^n u(-n - 1)$ is
a) $|z| > 1$
b) $|z| < 1$
c) $2 < |z| < 3$
d) Does not exist
- 11) Given a unit step function $u(t)$, its time derivative is
a) unit impulse
b) another step function
c) unit vamp function
d) sine function
- 12) Z transform converts convolution of time signals to
a) Addition
b) Substraction
c) Multiplication
d) Division
- 13) Region of convergence of a causal LTI system is
a) entire s-plane
b) right half of s-plane
c) left half of s-plane
d) does not exist
- 14) 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) $u(n)$
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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Tuesday, 9-5-2017

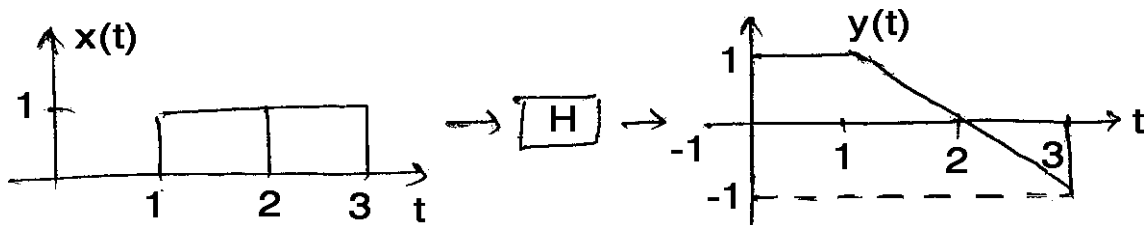
Marks : 56

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

SECTION – I

2. Answer any 4: (4×4=16)

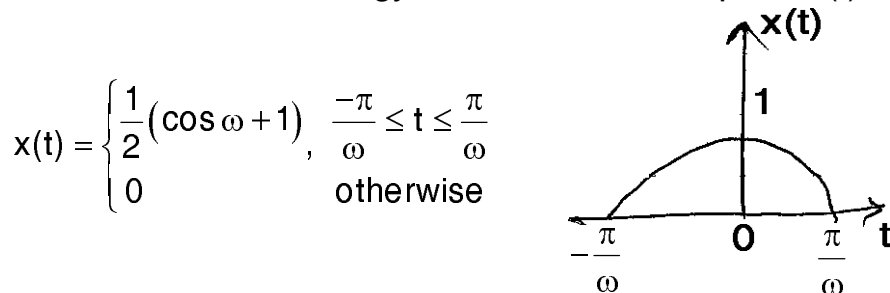
- 1) Determine whether the signal $x(t)$ described by $x(t) = \exp[-at] u(t)$, $a > 0$ is a power signal or energy signal.
- 2) Define energy and power signals of a system with their expressions.
- 3) A linear system H has an input output pair as shown. Determine whether the system is causal and time invariant



- 4) State and explain sampling theorem in time and frequency domain.
- 5) Define a unit impulse function $\delta(t)$.

3. Answer the following questions : (6×2=12)

- 1) Determine the total energy of the raised cosine pulse $x(t)$, defined by





2) State the initial value and final value theorem of Laplace transform compute it

for given below $x(s) = \frac{3s + 4}{s(s + 1)(s + 2)^2}$.

SECTION – II

4. Attempt **any 4** :

(4×4=16)

- 1) Explain convolution property for Fourier transform signal.
- 2) Let the z transform of $x(n)$ be $X(z)$. Show that the z transform of $x(-n)$ is $X\left(\frac{1}{z}\right)$.
- 3) Calculate the fundamental frequency of given signal, $x(n) = e^{-4j\pi n/3} + e^{-3j\pi n}$.
- 4) Determine the Fourier transform a two sided exponential function $x(t) = e^{-|t|}$ add draw its magnitude spectrum.
- 5) State and prove Parseval's theorem for continuous time periodic signal.

5. Attempt **any two** :

(6×2=12)

- 1) Determine the inverse z transform of following $x(z)$ by the partial fraction expansion method $x(z) = \frac{z + 2}{2z^2 - 7z + 3}$ if, ROC's are
 - i) $|z| > 3$
 - ii) $z < \frac{1}{2}$
 - iii) $\frac{1}{2} < |z| < 3$
- 2) Determine the Fourier transforms of
 - i) $x_1[n] = \sin \omega_0$
 - ii) $x_2[n] = (\sin n\omega_0) u(n)$
- 3) Explain following terms :
 - a) Stability and causality of system in z transform
 - b) Convolution method for z transform.



SLR-VB – 363

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Set **P**

**T.E. (Biomedical Engineering) (Part – II) (New – CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Monday, 15-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
 - 2) **Assume** the 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 'P' wave of ECG represents electrical activity associated with
 - a) Depolarization of atria
 - b) Repolarization of atria
 - c) Depolarization of ventricles
 - d) None
 - 2) Tracing of _____ difference at any two sites due to electrical activity of the heart is called a lead.
 - a) Current
 - b) Resistance
 - c) Voltage
 - d) ECG wave
 - 3) The heart sounds are produced by mechanical events that occur during the _____ cycle.
 - a) Cardiac
 - b) Respiratory
 - c) Circulation
 - d) Chemical
 - 4) A pattern of electrodes on the head and the channels they are connected to is called as
 - a) Leads
 - b) Scalp
 - c) Jack box
 - d) Montage
 - 5) _____ potential is the integrated response of the action of many cells.
 - a) Resting
 - b) Polarizing
 - c) Evoked
 - d) Depolarized

P.T.O.



- 6) The oscillometric method is based on oscillometric _____ generated in the cuff during inflation.
- a) Nerves b) Veins c) Arteries d) Pulses
- 7) The respiratory cycle is accomplished by changes in the thoracic
- a) Volume b) Distance c) Blood d) Air
- 8) _____ are designed to measure and record foetal heart rate on a beat to beat basis.
- a) Pulse oximetry b) Blood pressure meter
c) Hb meter d) Cardiographs
- 9) The foetal heart rate is computed from the foetal ECG by appropriately shaping the foetal _____ wave.
- a) QRS b) P c) PQRST d) T
- 10) In a telemedicine _____ is the primary information source.
- a) Records b) Reports c) Patients d) Scans
- 11) The _____ current at which the subject is still capable of releasing a conductor by using muscles is called as let go current.
- a) Threshold b) Minimum c) Maximum d) Leakage
- 12) The risk of producing _____ fibrillation is related to the current density and electrode area.
- a) Ventricular b) Arterial c) Cardiac valves d) A. V. node
- 13) The patient leakage current is determined by connecting the measuring instrument between _____ and one of the patient inputs.
- a) Line b) Metal chases c) Neutral d) Earth
- 14) Holter monitors provide continuous recording of 24-72 hours of
- a) Heart rate b) Pulse rate c) ECG d) Telemedicine
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**T.E. (Biomedical Engineering) (Part – II) (New – CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Monday, 15-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain process of action potential generation with necessary diagram.
 - 2) Explain the ways of measuring human body temperature.
 - 3) Define and explain various types of heart sounds with neat figures.
 - 4) List various blood pressure measurement techniques and explain any one direct method.
 - 5) Design an instrumentation amplifier for amplifying EMG signal.
3. Attempt **any 2** questions : **(6×2=12)**
- 1) Explain using suitable diagram 12 lead ECG machine.
 - 2) Explain working of EEG machine and draw various EEG wave patterns.
 - 3) Classify arrhythmia and explain working of ambulatory monitoring system.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the concept of telemedicine with example.
 - 2) Differentiate between Micro, Macro and Leakage current with their ranges.
 - 3) Draw and explain working of ECG telemetry transmitter.
 - 4) Discuss various effects of electric current on the human body.
 - 5) Which precautions that has to be taken to minimize electric hazards.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Draw and explain block diagram of fetal monitoring system.
 - 2) Draw and explain block diagram of EEG biofeedback technique.
 - 3) Explain block diagram and working of a typical telemedicine setup.



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**T.E. (Biomedical Engineering) (Part – II) (New – CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Monday, 15-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:**
- 1) Figures to the **right** indicate **full** marks.
 - 2) **Assume** the 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) _____ are designed to measure and record foetal heart rate on a beat to beat basis.

| | |
|-------------------|-------------------------|
| a) Pulse oximetry | b) Blood pressure meter |
| c) Hb meter | d) Cardiographs |
- 2) The foetal heart rate is computed from the foetal ECG by appropriately shaping the foetal _____ wave.

| | | | |
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| a) QRS | b) P | c) PQRST | d) T |
|--------|------|----------|------|
- 3) In a telemedicine _____ is the primary information source.

| | | | |
|------------|------------|-------------|----------|
| a) Records | b) Reports | c) Patients | d) Scans |
|------------|------------|-------------|----------|
- 4) The _____ current at which the subject is still capable of releasing a conductor by using muscles is called as let go current.

| | | | |
|--------------|------------|------------|------------|
| a) Threshold | b) Minimum | c) Maximum | d) Leakage |
|--------------|------------|------------|------------|
- 5) The risk of producing _____ fibrillation is related to the current density and electrode area.

| | | | |
|----------------|-------------|-------------------|---------------|
| a) Ventricular | b) Arterial | c) Cardiac valves | d) A. V. node |
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- 6) The patient leakage current is determined by connecting the measuring instrument between _____ and one of the patient inputs.
- a) Line b) Metal chases c) Neutral d) Earth
- 7) Holter monitors provide continuous recording of 24-72 hours of
- a) Heart rate b) Pulse rate c) ECG d) Telemedicine
- 8) The 'P' wave of ECG represents electrical activity associated with
- a) Depolarization of atria b) Repolarization of atria
c) Depolarization of ventricles d) None
- 9) Tracing of _____ difference at any two sites due to electrical activity of the heart is called a lead.
- a) Current b) Resistance c) Voltage d) ECG wave
- 10) The heart sounds are produced by mechanical events that occur during the _____ cycle.
- a) Cardiac b) Respiratory c) Circulation d) Chemical
- 11) A pattern of electrodes on the head and the channels they are connected to is called as
- a) Leads b) Scalp c) Jack box d) Montage
- 12) _____ potential is the integrated response of the action of many cells.
- a) Resting b) Polarizing c) Evoked d) Depolarized
- 13) The oscillometric method is based on oscillometric _____ generated in the cuff during inflation.
- a) Nerves b) Veins c) Arteries d) Pulses
- 14) The respiratory cycle is accomplished by changes in the thoracic
- a) Volume b) Distance c) Blood d) Air
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**T.E. (Biomedical Engineering) (Part – II) (New – CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Monday, 15-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain process of action potential generation with necessary diagram.
 - 2) Explain the ways of measuring human body temperature.
 - 3) Define and explain various types of heart sounds with neat figures.
 - 4) List various blood pressure measurement techniques and explain any one direct method.
 - 5) Design an instrumentation amplifier for amplifying EMG signal.
3. Attempt **any 2** questions : **(6×2=12)**
- 1) Explain using suitable diagram 12 lead ECG machine.
 - 2) Explain working of EEG machine and draw various EEG wave patterns.
 - 3) Classify arrhythmia and explain working of ambulatory monitoring system.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the concept of telemedicine with example.
 - 2) Differentiate between Micro, Macro and Leakage current with their ranges.
 - 3) Draw and explain working of ECG telemetry transmitter.
 - 4) Discuss various effects of electric current on the human body.
 - 5) Which precautions that has to be taken to minimize electric hazards.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Draw and explain block diagram of fetal monitoring system.
 - 2) Draw and explain block diagram of EEG biofeedback technique.
 - 3) Explain block diagram and working of a typical telemedicine setup.



SLR-VB – 363

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Set **R**

**T.E. (Biomedical Engineering) (Part – II) (New – CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Monday, 15-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
 - 2) **Assume** the 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) _____ potential is the integrated response of the action of many cells.
a) Resting b) Polarizing c) Evoked d) Depolarized
 - 2) The oscillometric method is based on oscillometric _____ generated in the cuff during inflation.
a) Nerves b) Veins c) Arteries d) Pulses
 - 3) The respiratory cycle is accomplished by changes in the thoracic
a) Volume b) Distance c) Blood d) Air
 - 4) _____ are designed to measure and record foetal heart rate on a beat to beat basis.
a) Pulse oximetry b) Blood pressure meter
c) Hb meter d) Cardiographs
 - 5) The foetal heart rate is computed from the foetal ECG by appropriately shaping the foetal _____ wave.
a) QRS b) P c) PQRST d) T

P.T.O.



- 6) In a telemedicine _____ is the primary information source.
a) Records b) Reports c) Patients d) Scans
- 7) The _____ current at which the subject is still capable of releasing a conductor by using muscles is called as let go current.
a) Threshold b) Minimum c) Maximum d) Leakage
- 8) The risk of producing _____ fibrillation is related to the current density and electrode area.
a) Ventricular b) Arterial c) Cardiac valves d) A. V. node
- 9) The patient leakage current is determined by connecting the measuring instrument between _____ and one of the patient inputs.
a) Line b) Metal chases c) Neutral d) Earth
- 10) Holter monitors provide continuous recording of 24-72 hours of
a) Heart rate b) Pulse rate c) ECG d) Telemedicine
- 11) The 'P' wave of ECG represents electrical activity associated with
a) Depolarization of atria b) Repolarization of atria
c) Depolarization of ventricles d) None
- 12) Tracing of _____ difference at any two sites due to electrical activity of the heart is called a lead.
a) Current b) Resistance c) Voltage d) ECG wave
- 13) The heart sounds are produced by mechanical events that occur during the _____ cycle.
a) Cardiac b) Respiratory c) Circulation d) Chemical
- 14) A pattern of electrodes on the head and the channels they are connected to is called as
a) Leads b) Scalp c) Jack box d) Montage
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**T.E. (Biomedical Engineering) (Part – II) (New – CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Monday, 15-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain process of action potential generation with necessary diagram.
 - 2) Explain the ways of measuring human body temperature.
 - 3) Define and explain various types of heart sounds with neat figures.
 - 4) List various blood pressure measurement techniques and explain any one direct method.
 - 5) Design an instrumentation amplifier for amplifying EMG signal.
3. Attempt **any 2** questions : **(6×2=12)**
- 1) Explain using suitable diagram 12 lead ECG machine.
 - 2) Explain working of EEG machine and draw various EEG wave patterns.
 - 3) Classify arrhythmia and explain working of ambulatory monitoring system.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the concept of telemedicine with example.
 - 2) Differentiate between Micro, Macro and Leakage current with their ranges.
 - 3) Draw and explain working of ECG telemetry transmitter.
 - 4) Discuss various effects of electric current on the human body.
 - 5) Which precautions that has to be taken to minimize electric hazards.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Draw and explain block diagram of fetal monitoring system.
 - 2) Draw and explain block diagram of EEG biofeedback technique.
 - 3) Explain block diagram and working of a typical telemedicine setup.



SLR-VB – 363

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Set **S**

**T.E. (Biomedical Engineering) (Part – II) (New – CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Monday, 15-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Figures to the **right** indicate **full** marks.
2) **Assume** the 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) In a telemedicine _____ is the primary information source.
a) Records b) Reports c) Patients d) Scans
 - 2) The _____ current at which the subject is still capable of releasing a conductor by using muscles is called as let go current.
a) Threshold b) Minimum c) Maximum d) Leakage
 - 3) The risk of producing _____ fibrillation is related to the current density and electrode area.
a) Ventricular b) Arterial c) Cardiac valves d) A. V. node
 - 4) The patient leakage current is determined by connecting the measuring instrument between _____ and one of the patient inputs.
a) Line b) Metal chases c) Neutral d) Earth
 - 5) Holter monitors provide continuous recording of 24-72 hours of
a) Heart rate b) Pulse rate c) ECG d) Telemedicine

P.T.O.



- 6) The 'P' wave of ECG represents electrical activity associated with
- a) Depolarization of atria
 - b) Repolarization of atria
 - c) Depolarization of ventricles
 - d) None
- 7) Tracing of _____ difference at any two sites due to electrical activity of the heart is called a lead.
- a) Current
 - b) Resistance
 - c) Voltage
 - d) ECG wave
- 8) The heart sounds are produced by mechanical events that occur during the _____ cycle.
- a) Cardiac
 - b) Respiratory
 - c) Circulation
 - d) Chemical
- 9) A pattern of electrodes on the head and the channels they are connected to is called as
- a) Leads
 - b) Scalp
 - c) Jack box
 - d) Montage
- 10) _____ potential is the integrated response of the action of many cells.
- a) Resting
 - b) Polarizing
 - c) Evoked
 - d) Depolarized
- 11) The oscillometric method is based on oscillometric _____ generated in the cuff during inflation.
- a) Nerves
 - b) Veins
 - c) Arteries
 - d) Pulses
- 12) The respiratory cycle is accomplished by changes in the thoracic
- a) Volume
 - b) Distance
 - c) Blood
 - d) Air
- 13) _____ are designed to measure and record foetal heart rate on a beat to beat basis.
- a) Pulse oximetry
 - b) Blood pressure meter
 - c) Hb meter
 - d) Cardiographs
- 14) The foetal heart rate is computed from the foetal ECG by appropriately shaping the foetal _____ wave.
- a) QRS
 - b) P
 - c) PQRST
 - d) T
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**T.E. (Biomedical Engineering) (Part – II) (New – CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Monday, 15-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain process of action potential generation with necessary diagram.
 - 2) Explain the ways of measuring human body temperature.
 - 3) Define and explain various types of heart sounds with neat figures.
 - 4) List various blood pressure measurement techniques and explain any one direct method.
 - 5) Design an instrumentation amplifier for amplifying EMG signal.
3. Attempt **any 2** questions : **(6×2=12)**
- 1) Explain using suitable diagram 12 lead ECG machine.
 - 2) Explain working of EEG machine and draw various EEG wave patterns.
 - 3) Classify arrhythmia and explain working of ambulatory monitoring system.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the concept of telemedicine with example.
 - 2) Differentiate between Micro, Macro and Leakage current with their ranges.
 - 3) Draw and explain working of ECG telemetry transmitter.
 - 4) Discuss various effects of electric current on the human body.
 - 5) Which precautions that has to be taken to minimize electric hazards.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Draw and explain block diagram of fetal monitoring system.
 - 2) Draw and explain block diagram of EEG biofeedback technique.
 - 3) Explain block diagram and working of a typical telemedicine setup.



SLR-VB – 364

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**T.E. (Biomedical Engineering) (Part – II) (New-CGPA) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 17-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) The primary X-ray beam penetration (percent) through a patient can be increased by increasing the _____
a) focus b) MAS c) Filtration d) Beam area
- 2) Speed of ultrasound depends upon _____
a) medium b) amplitude
c) material d) wavelength
- 3) Gradual decrease in X-ray beam intensity as it passes through material is called
a) attenuation b) decay c) radioactivity d) imaging
- 4) Scattered X-ray beams approach detector screen _____
a) perpendicularly b) parallel
c) anti parallel d) at an angle
- 5) Change in speed of ultrasound causes _____
a) reflection b) diffraction c) refraction d) image
- 6) Wavelength of X-rays is in range _____
a) 10^{-8} to 10^{-13} m b) 10^{-7} to 10^{-14} m
c) 10^{-10} to 10^{-15} m d) 10^2 to 10^9 m

P.T.O.



- 7) Attenuation coefficient depends on _____
- a) frequency of X-ray photons
 - b) wavelength of X-ray photons
 - c) energy of X-ray photons
 - d) amplitude of X-ray photons
- 8) While fluoroscopy, the gain of the image intensifier tube can be increased by increasing the _____
- a) KV
 - b) Density control
 - c) Gain control
 - d) Field of view (mode)
- 9) Visibility of detail in fluoroscopy can generally be improved by using _____
- a) Low KV
 - b) Small FOV (field of view)
 - c) Low MA
 - d) Low exposure rate
- 10) The quantum noise in a fluoroscopic image can generally be reduced by increasing _____
- a) The KV
 - b) The field of view (mode)
 - c) Focal spot size
 - d) none of above
- 11) The maximum MA which can be used for a single radiographic exposure is related to the _____
- a) KV
 - b) Exposure time
 - c) Focal spot size
 - d) all above
- 12) Molybdenum is the most common filter material in mammographic systems. It is used because it produces _____
- a) Characteristic radiation
 - b) Increased breast penetration
 - c) High absorption above the K-edge energy
 - d) High absorption below the K-edge energy
- 13) The radiographic visibility and contrast of a 1 cm soft tissue mass in the body would generally be decreased by an increase in the _____
- a) Focal spot size
 - b) Field of view
 - c) Object
 - d) Object-receptor distance
- 14) The thickness of an intensifying screen has a significant effect on _____
- a) Image contrast
 - b) Image data
 - c) Receptor capacity
 - d) Patient exposure
- _____



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**T.E. (Biomedical Engineering) (Part – II) (New-CGPA) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 17-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 56

SECTION – I

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

- 1) Explain given terms with reference to X rays :
 - a) Saturation voltage
 - b) Line focus principle
- 2) Describe various modes and applications of ultrasound imaging.
- 3) Define and explain Doppler principle.
- 4) Draw and explain construction of ultrasound transducer.
- 5) Explain all techniques of X-ray interaction with matter in short.

3. Attempt **any 2** questions : **(6×2=12)**

- 1) Draw and explain working of X-ray image intensifier.
- 2) Explain continuous and pulsed Doppler ultrasound system.
- 3) Draw and explain working of X-ray tube and X-ray generator.

SECTION – II

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

- 1) Explain construction and working principle of endoscopy.
- 2) Explain various detectors used in radiographic recording.
- 3) Describe principle and applications of mammography technique.
- 4) List and explain various components of endoscopy equipment.
- 5) Define and differentiate between fluoroscopy and image intensifier.

Set P



5. Attempt **any 2** questions :

(6×2=12)

- 1) List various medical applications of endoscopy.
 - 2) Explain working of thermographic machine with necessary diagrams.
 - 3) Describe angiographic technique and with its applications.
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SLR-VB – 364

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**T.E. (Biomedical Engineering) (Part – II) (New-CGPA) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 17-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*
2) *Answer MCQ/Objective type questions on Page No. 3 only. 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) While fluoroscopy, the gain of the image intensifier tube can be increased by increasing the _____
 - a) KV
 - b) Density control
 - c) Gain control
 - d) Field of view (mode)
- 2) Visibility of detail in fluoroscopy can generally be improved by using _____
 - a) Low KV
 - b) Small FOV (field of view)
 - c) Low MA
 - d) Low exposure rate
- 3) The quantum noise in a fluoroscopic image can generally be reduced by increasing _____
 - a) The KV
 - b) The field of view (mode)
 - c) Focal spot size
 - d) none of above
- 4) The maximum MA which can be used for a single radiographic exposure is related to the _____
 - a) KV
 - b) Exposure time
 - c) Focal spot size
 - d) all above

P.T.O.



- 5) Molybdenum is the most common filter material in mammographic systems. It is used because it produces _____
- a) Characteristic radiation
 - b) Increased breast penetration
 - c) High absorption above the K-edge energy
 - d) High absorption below the K-edge energy
- 6) The radiographic visibility and contrast of a 1 cm soft tissue mass in the body would generally be decreased by an increase in the _____
- a) Focal spot size
 - b) Field of view
 - c) Object
 - d) Object-receptor distance
- 7) The thickness of an intensifying screen has a significant effect on _____
- a) Image contrast
 - b) Image data
 - c) Receptor capacity
 - d) Patient exposure
- 8) The primary X-ray beam penetration (percent) through a patient can be increased by increasing the _____
- a) focus
 - b) MAS
 - c) Filtration
 - d) Beam area
- 9) Speed of ultrasound depends upon _____
- a) medium
 - b) amplitude
 - c) material
 - d) wavelength
- 10) Gradual decrease in X-ray beam intensity as it passes through material is called
- a) attenuation
 - b) decay
 - c) radioactivity
 - d) imaging
- 11) Scattered X-ray beams approach detector screen _____
- a) perpendicularly
 - b) parallel
 - c) anti parallel
 - d) at an angle
- 12) Change in speed of ultrasound causes _____
- a) reflection
 - b) diffraction
 - c) refraction
 - d) image
- 13) Wavelength of X-rays is in range _____
- a) 10^{-8} to 10^{-13} m
 - b) 10^{-7} to 10^{-14} m
 - c) 10^{-10} to 10^{-15} m
 - d) 10^2 to 10^9 m
- 14) Attenuation coefficient depends on _____
- a) frequency of X-ray photons
 - b) wavelength of X-ray photons
 - c) energy of X-ray photons
 - d) amplitude of X-ray photons
- _____



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**T.E. (Biomedical Engineering) (Part – II) (New-CGPA) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 17-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 56

SECTION – I

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

- 1) Explain given terms with reference to X rays :
 - a) Saturation voltage
 - b) Line focus principle
- 2) Describe various modes and applications of ultrasound imaging.
- 3) Define and explain Doppler principle.
- 4) Draw and explain construction of ultrasound transducer.
- 5) Explain all techniques of X-ray interaction with matter in short.

3. Attempt **any 2** questions : **(6×2=12)**

- 1) Draw and explain working of X-ray image intensifier.
- 2) Explain continuous and pulsed Doppler ultrasound system.
- 3) Draw and explain working of X-ray tube and X-ray generator.

SECTION – II

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

- 1) Explain construction and working principle of endoscopy.
- 2) Explain various detectors used in radiographic recording.
- 3) Describe principle and applications of mammography technique.
- 4) List and explain various components of endoscopy equipment.
- 5) Define and differentiate between fluoroscopy and image intensifier.

Set Q



5. Attempt **any 2** questions :

(6×2=12)

- 1) List various medical applications of endoscopy.
 - 2) Explain working of thermographic machine with necessary diagrams.
 - 3) Describe angiographic technique and with its applications.
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SLR-VB – 364

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**T.E. (Biomedical Engineering) (Part – II) (New-CGPA) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 17-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) Change in speed of ultrasound causes _____
a) reflection b) diffraction c) refraction d) image
- 2) Wavelength of X-rays is in range _____
a) 10^{-8} to 10^{-13} m b) 10^{-7} to 10^{-14} m
c) 10^{-10} to 10^{-15} m d) 10^2 to 10^9 m
- 3) Attenuation coefficient depends on _____
a) frequency of X-ray photons b) wavelength of X-ray photons
c) energy of X-ray photons d) amplitude of X-ray photons
- 4) While fluoroscopy, the gain of the image intensifier tube can be increased by increasing the _____
a) KV b) Density control
c) Gain control d) Field of view (mode)
- 5) Visibility of detail in fluoroscopy can generally be improved by using _____
a) Low KV b) Small FOV (field of view)
c) Low MA d) Low exposure rate

P.T.O.



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**T.E. (Biomedical Engineering) (Part – II) (New-CGPA) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 17-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 56

SECTION – I

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

- 1) Explain given terms with reference to X rays :
 - a) Saturation voltage
 - b) Line focus principle
- 2) Describe various modes and applications of ultrasound imaging.
- 3) Define and explain Doppler principle.
- 4) Draw and explain construction of ultrasound transducer.
- 5) Explain all techniques of X-ray interaction with matter in short.

3. Attempt **any 2** questions : **(6×2=12)**

- 1) Draw and explain working of X-ray image intensifier.
- 2) Explain continuous and pulsed Doppler ultrasound system.
- 3) Draw and explain working of X-ray tube and X-ray generator.

SECTION – II

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

- 1) Explain construction and working principle of endoscopy.
- 2) Explain various detectors used in radiographic recording.
- 3) Describe principle and applications of mammography technique.
- 4) List and explain various components of endoscopy equipment.
- 5) Define and differentiate between fluoroscopy and image intensifier.

Set R



5. Attempt **any 2** questions :

(6×2=12)

- 1) List various medical applications of endoscopy.
 - 2) Explain working of thermographic machine with necessary diagrams.
 - 3) Describe angiographic technique and with its applications.
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SLR-VB – 364

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**T.E. (Biomedical Engineering) (Part – II) (New-CGPA) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 17-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

Instructions : 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*
2) *Answer MCQ/Objective type questions on Page No. 3 only. 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) The quantum noise in a fluoroscopic image can generally be reduced by increasing _____
 - a) The KV
 - b) The field of view (mode)
 - c) Focal spot size
 - d) none of above
- 2) The maximum MA which can be used for a single radiographic exposure is related to the _____
 - a) KV
 - b) Exposure time
 - c) Focal spot size
 - d) all above
- 3) Molybdenum is the most common filter material in mammographic systems. It is used because it produces _____
 - a) Characteristic radiation
 - b) Increased breast penetration
 - c) High absorption above the K-edge energy
 - d) High absorption below the K-edge energy
- 4) The radiographic visibility and contrast of a 1 cm soft tissue mass in the body would generally be decreased by an increase in the _____
 - a) Focal spot size
 - b) Field of view
 - c) Object
 - d) Object-receptor distance

P.T.O.



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**T.E. (Biomedical Engineering) (Part – II) (New-CGPA) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 17-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 56

SECTION – I

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

- 1) Explain given terms with reference to X rays :
 - a) Saturation voltage
 - b) Line focus principle
- 2) Describe various modes and applications of ultrasound imaging.
- 3) Define and explain Doppler principle.
- 4) Draw and explain construction of ultrasound transducer.
- 5) Explain all techniques of X-ray interaction with matter in short.

3. Attempt **any 2** questions : **(6×2=12)**

- 1) Draw and explain working of X-ray image intensifier.
- 2) Explain continuous and pulsed Doppler ultrasound system.
- 3) Draw and explain working of X-ray tube and X-ray generator.

SECTION – II

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

- 1) Explain construction and working principle of endoscopy.
- 2) Explain various detectors used in radiographic recording.
- 3) Describe principle and applications of mammography technique.
- 4) List and explain various components of endoscopy equipment.
- 5) Define and differentiate between fluoroscopy and image intensifier.

Set S



5. Attempt **any 2** questions :

(6×2=12)

- 1) List various medical applications of endoscopy.
 - 2) Explain working of thermographic machine with necessary diagrams.
 - 3) Describe angiographic technique and with its applications.
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SLR-VB – 365

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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Friday, 19-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 signal flow graph is a graphical representation of the relationships between the variables of a set of _____ equations.
 - a) Linear algebraic
 - b) Zero order
 - c) First order
 - d) Variable algebraic
- 2) The _____ input is a signal which starts at a value of zero and increases linearly with time.
 - a) Step
 - b) Impulse
 - c) Ramp
 - d) None
- 3) With the use of _____ element mechanical translational systems are obtained.
 - a) Mass
 - b) Spring
 - c) Dashpot
 - d) All above
- 4) For Nyquist contour, the size of radius is _____.
 - a) 25
 - b) 0
 - c) 1
 - d) ∞
- 5) According to Nyquist stability criterion, where should be the position of all zero's of $g(s)$ corresponding g to s-plane.
 - a) On left half
 - b) At the center
 - c) On right half
 - d) Random

P.T.O.



- 6) If the constant 'K' is positive then its contribution on the phase plot will be _____
a) 0° b) 45° c) 90° d) 180°
- 7) The system is said to be marginally stable, if gain margin is _____
a) 0 b) 1 c) $+\infty$ d) None of above
- 8) For a unity feedback system with $G(s) = 10/s^2$ the value of centroid will be _____
a) 0 b) 2 c) 5 d) 10
- 9) The steady state error of the system depends on _____
a) Order b) Type c) Size d) Prototype
- 10) In signal flow graph, the product of all _____ gains while going through a forward path is known as "Path gain".
a) Branch b) Path c) Node d) Loop
- 11) The nature of bandwidth for a good control system is _____
a) Large b) Small
c) Medium d) All above
- 12) The nature of root locus about the real axis is _____
a) Asymmetric b) Symmetric
c) Exponential d) Decaying
- 13) In a second order system, if the damping ratio is greater than equal to '1' then, the nature of roots will be _____
a) Imaginary b) Real and equal
c) Real but not equal d) Complex conjugate
- 14) In block diagram representation, the lines connecting the blocks, called as _____
a) Branches b) Nodes
c) Daturm d) Sources
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| Seat No. | |
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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Friday, 19-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

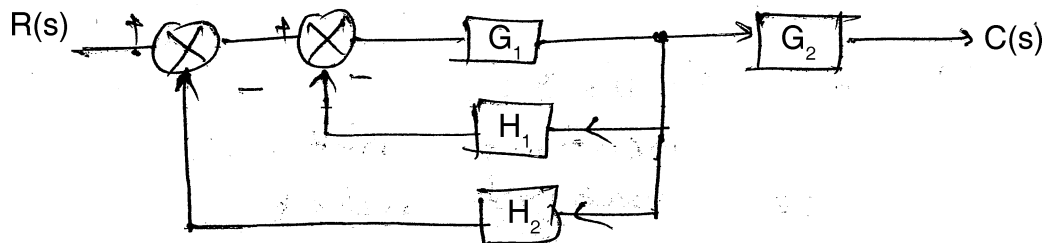
SECTION – I

2. Attempt any 4 questions : (4×4=16)

- 1) State and explain Mason's gain formula in detail.
- 2) Explain differential equation for translational systems with necessary figure.
- 3) Draw symbols for following block diagram reduction technique.
 - a) Moving summing point after a block.
 - b) Eliminating a feedback loop.
- 4) Define following standard test signals.
 - a) Step function
 - b) Ramp signal
 - c) Parabolic function
 - d) Impulse signal
- 5) Draw time response specifications of 2nd order system and indicate all time constants.

3. Attempt any 2 : (6×2=12)

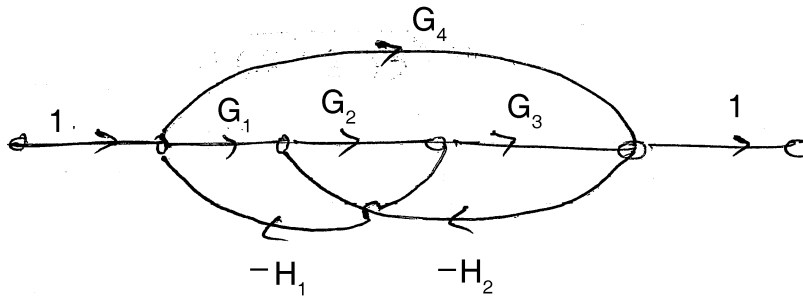
- 1) Find $C(s)/R(s)$ for given block diagram using block reduction technique.



- 2) With the help of diagram explain time response specifications of second order system.



3) Find transfer function of given system using Mason's gain formula.



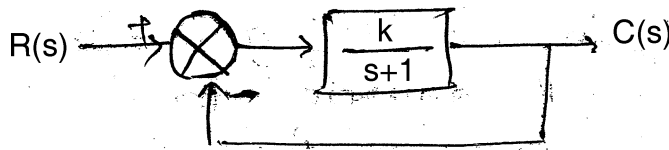
SECTION – II

4. Attempt **any four** questions :

(4×4=16)

1) Define following terms and mention their significance.
 a) Gain margin b) Phase margin

2) Find the root locus of the unity feedback system having $G(s) = \frac{k}{s+1}$ for given figure.



3) Define and differentiate between Bode plot and Polar plot.

4) A unity feedback control system has $G(s) = 40$. Draw Bode plot.

5) Find the polar plot of $G(s) = \frac{8}{[s(s+1)]}$.

5. Attempt **any two** questions :

(6×2=12)

1) A unity feedback system has $G(s) = \frac{20}{s(s+2)}$. Draw the Bode plot.

2) Write a note on :
 a) Lead compensating network.
 b) Log compensating network.

3) Find frequency domain specification with a unity feedback system having

$$G(s) = \frac{36}{[s(s+8)]}$$



SLR-VB – 365

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| Set | Q |
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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Friday, 19-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 a unity feedback system with $G(s) = 10/s^2$ the value of centroid will be _____
a) 0 b) 2 c) 5 d) 10
- 2) The steady state error of the system depends on _____
a) Order b) Type c) Size d) Prototype
- 3) In signal flow graph, the product of all _____ gains while going through a forward path is known as "Path gain".
a) Branch b) Path c) Node d) Loop
- 4) The nature of bandwidth for a good control system is _____
a) Large b) Small
c) Medium d) All above
- 5) The nature of root locus about the real axis is _____
a) Asymmetric b) Symmetric
c) Exponential d) Decaying

P.T.O.



- 6) In a second order system, if the damping ratio is greater than equal to '1' then, the nature of roots will be _____
- a) Imaginary b) Real and equal
c) Real but not equal d) Complex conjugate
- 7) In block diagram representation, the lines connecting the blocks, called as _____
- a) Branches b) Nodes
c) Datur d) Sources
- 8) A signal flow graph is a graphical representation of the relationships between the variables of a set of _____ equations.
- a) Linear algebraic b) Zero order
c) First order d) Variable algebraic
- 9) The _____ input is a signal which starts at a value of zero and increases linearly with time.
- a) Step b) Impulse
c) Ramp d) None
- 10) With the use of _____ element mechanical translational systems are obtained.
- a) Mass b) Spring
c) Dashpot d) All above
- 11) For Nyquist contour, the size of radius is _____
- a) 25 b) 0 c) 1 d) ∞
- 12) According to Nyquist stability criterion, where should be the position of all zero's of $9(s)$ corresponding 9 to s-plane.
- a) On left half b) At the center
c) On right half d) Random
- 13) If the constant 'K' is positive then its contribution on the phase plot will be _____
- a) 0° b) 45° c) 90° d) 180°
- 14) The system is said to be marginally stable, if gain margin is _____
- a) 0 b) 1 c) $+\infty$ d) None of above



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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Friday, 19-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

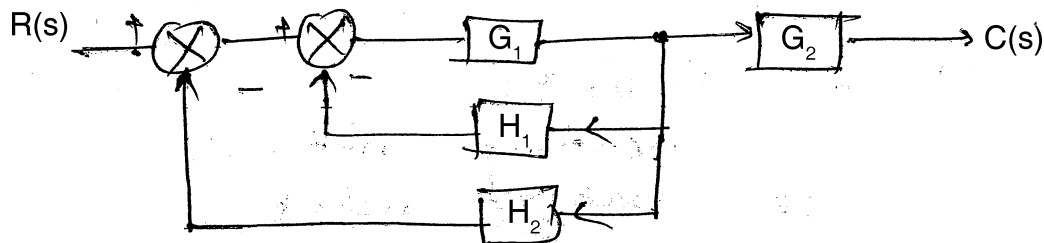
SECTION – I

2. Attempt any 4 questions : (4×4=16)

- 1) State and explain Mason's gain formula in detail.
- 2) Explain differential equation for translational systems with necessary figure.
- 3) Draw symbols for following block diagram reduction technique.
 - a) Moving summing point after a block.
 - b) Eliminating a feedback loop.
- 4) Define following standard test signals.
 - a) Step function
 - b) Ramp signal
 - c) Parabolic function
 - d) Impulse signal
- 5) Draw time response specifications of 2nd order system and indicate all time constants.

3. Attempt any 2 : (6×2=12)

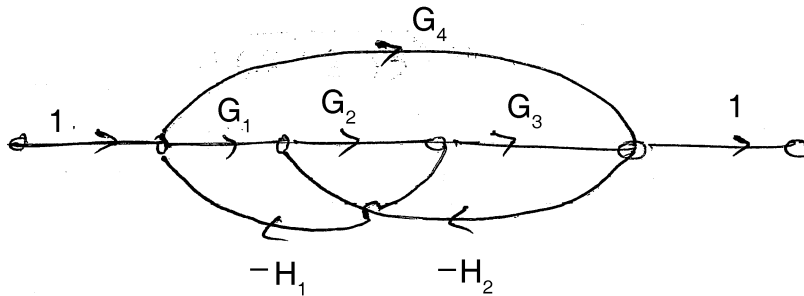
- 1) Find $C(s)/R(s)$ for given block diagram using block reduction technique.



- 2) With the help of diagram explain time response specifications of second order system.



3) Find transfer function of given system using Mason's gain formula.

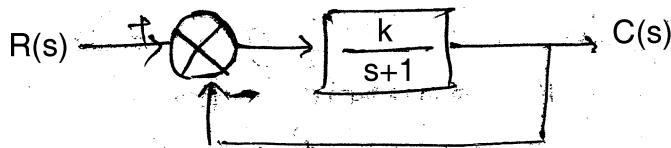


SECTION – II

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

1) Define following terms and mention their significance.
 a) Gain margin b) Phase margin

2) Find the root locus of the unity feedback system having $G(s) = \frac{k}{s+1}$ for given figure.



3) Define and differentiate between Bode plot and Polar plot.
 4) A unity feedback control system has $G(s) = 40$. Draw Bode plot.

5) Find the polar plot of $G(s) = \frac{8}{[s(s+1)]}$.

5. Attempt **any two** questions : (6×2=12)

1) A unity feedback system has $G(s) = \frac{20}{s(s+2)}$. Draw the Bode plot.

2) Write a note on :
 a) Lead compensating network.
 b) Log compensating network.

3) Find frequency domain specification with a unity feedback system having

$$G(s) = \frac{36}{[s(s+8)]}$$



SLR-VB – 365

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| Set | R |
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T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
CONTROL SYSTEMS

Day and Date : Friday, 19-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) According to Nyquist stability criterion, where should be the position of all zero's of $G(s)$ corresponding G to s-plane.
 - a) On left half
 - b) At the center
 - c) On right half
 - d) Random
- 2) If the constant 'K' is positive then its contribution on the phase plot will be _____
 - a) 0°
 - b) 45°
 - c) 90°
 - d) 180°
- 3) The system is said to be marginally stable, if gain margin is _____
 - a) 0
 - b) 1
 - c) $+\infty$
 - d) None of above
- 4) For a unity feedback system with $G(s) = 10/s^2$ the value of centroid will be _____
 - a) 0
 - b) 2
 - c) 5
 - d) 10
- 5) The steady state error of the system depends on _____
 - a) Order
 - b) Type
 - c) Size
 - d) Prototype
- 6) In signal flow graph, the product of all _____ gains while going through a forward path is known as "Path gain".
 - a) Branch
 - b) Path
 - c) Node
 - d) Loop

P.T.O.



- 7) The nature of bandwidth for a good control system is _____
- a) Large b) Small
c) Medium d) All above
- 8) The nature of root locus about the real axis is _____
- a) Asymmetric b) Symmetric
c) Exponential d) Decaying
- 9) In a second order system, if the damping ratio is greater than equal to '1' then, the nature of roots will be _____
- a) Imaginary b) Real and equal
c) Real but not equal d) Complex conjugate
- 10) In block diagram representation, the lines connecting the blocks, called as _____
- a) Branches b) Nodes
c) Darn d) Sources
- 11) A signal flow graph is a graphical representation of the relationships between the variables of a set of _____ equations.
- a) Linear algebraic b) Zero order
c) First order d) Variable algebraic
- 12) The _____ input is a signal which starts at a value of zero and increases linearly with time.
- a) Step b) Impulse
c) Ramp d) None
- 13) With the use of _____ element mechanical translational systems are obtained.
- a) Mass b) Spring
c) Dashpot d) All above
- 14) For Nyquist contour, the size of radius is _____
- a) 25 b) 0 c) 1 d) ∞



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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Friday, 19-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

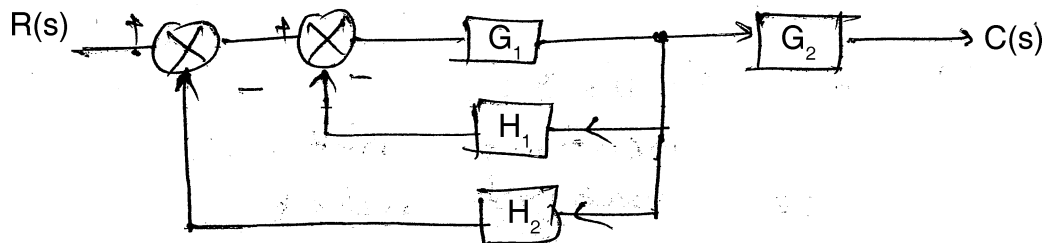
SECTION – I

2. Attempt any 4 questions : (4×4=16)

- 1) State and explain Mason's gain formula in detail.
- 2) Explain differential equation for translational systems with necessary figure.
- 3) Draw symbols for following block diagram reduction technique.
 - a) Moving summing point after a block.
 - b) Eliminating a feedback loop.
- 4) Define following standard test signals.
 - a) Step function
 - b) Ramp signal
 - c) Parabolic function
 - d) Impulse signal
- 5) Draw time response specifications of 2nd order system and indicate all time constants.

3. Attempt any 2 : (6×2=12)

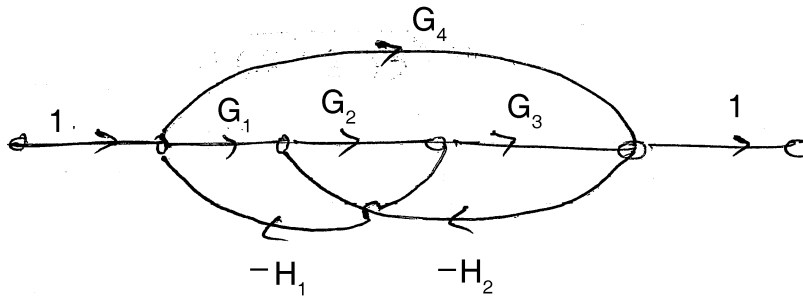
- 1) Find $C(s)/R(s)$ for given block diagram using block reduction technique.



- 2) With the help of diagram explain time response specifications of second order system.



3) Find transfer function of given system using Mason's gain formula.



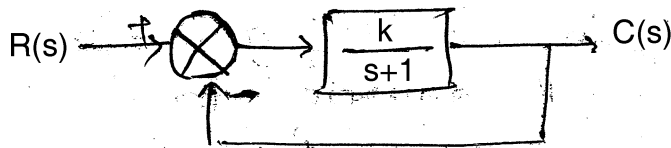
SECTION – II

4. Attempt **any four** questions :

(4×4=16)

1) Define following terms and mention their significance.
 a) Gain margin b) Phase margin

2) Find the root locus of the unity feedback system having $G(s) = \frac{k}{s+1}$ for given figure.



- 3) Define and differentiate between Bode plot and Polar plot.
- 4) A unity feedback control system has $G(s) = 40$. Draw Bode plot.
- 5) Find the polar plot of $G(s) = \frac{8}{[s(s+1)]}$.

5. Attempt **any two** questions :

(6×2=12)

- 1) A unity feedback system has $G(s) = \frac{20}{s(s+2)}$. Draw the Bode plot.
- 2) Write a note on :
 a) Lead compensating network.
 b) Log compensating network.
- 3) Find frequency domain specification with a unity feedback system having

$$G(s) = \frac{36}{[s(s+8)]}$$



SLR-VB – 365

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T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
CONTROL SYSTEMS

Day and Date : Friday, 19-5-2017

Max. Marks : 70

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

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(1×14=14)

- 1) In signal flow graph, the product of all _____ gains while going through a forward path is known as "Path gain".
a) Branch b) Path c) Node d) Loop
- 2) The nature of bandwidth for a good control system is _____.
a) Large b) Small
c) Medium d) All above
- 3) The nature of root locus about the real axis is _____.
a) Asymmetric b) Symmetric
c) Exponential d) Decaying
- 4) In a second order system, if the damping ratio is greater than equal to '1' then, the nature of roots will be _____.
a) Imaginary b) Real and equal
c) Real but not equal d) Complex conjugate

P.T.O.



- 5) In block diagram representation, the lines connecting the blocks, called as _____
- a) Branches
 - b) Nodes
 - c) Daturm
 - d) Sources
- 6) A signal flow graph is a graphical representation of the relationships between the variables of a set of _____ equations.
- a) Linear algebraic
 - b) Zero order
 - c) First order
 - d) Variable algebraic
- 7) The _____ input is a signal which starts at a value of zero and increases linearly with time.
- a) Step
 - b) Impulse
 - c) Ramp
 - d) None
- 8) With the use of _____ element mechanical translational systems are obtained.
- a) Mass
 - b) Spring
 - c) Dashpot
 - d) All above
- 9) For Nyquist contour, the size of radius is _____
- a) 25
 - b) 0
 - c) 1
 - d) ∞
- 10) According to Nyquist stability criterion, where should be the position of all zero's of $9(s)$ corresponding 9 to s -plane.
- a) On left half
 - b) At the center
 - c) On right half
 - d) Random
- 11) If the constant 'K' is positive then its contribution on the phase plot will be _____
- a) 0°
 - b) 45°
 - c) 90°
 - d) 180°
- 12) The system is said to be marginally stable, if gain margin is _____
- a) 0
 - b) 1
 - c) $+\infty$
 - d) None of above
- 13) For a unity feedback system with $G(s) = 10/s^2$ the value of centroid will be _____
- a) 0
 - b) 2
 - c) 5
 - d) 10
- 14) The steady state error of the system depends on _____
- a) Order
 - b) Type
 - c) Size
 - d) Prototype



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| Seat No. | |
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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Friday, 19-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

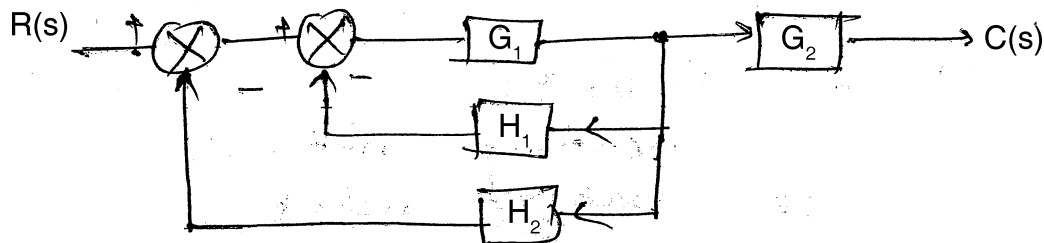
SECTION – I

2. Attempt any 4 questions : (4×4=16)

- 1) State and explain Mason's gain formula in detail.
- 2) Explain differential equation for translational systems with necessary figure.
- 3) Draw symbols for following block diagram reduction technique.
 - a) Moving summing point after a block.
 - b) Eliminating a feedback loop.
- 4) Define following standard test signals.
 - a) Step function
 - b) Ramp signal
 - c) Parabolic function
 - d) Impulse signal
- 5) Draw time response specifications of 2nd order system and indicate all time constants.

3. Attempt any 2 : (6×2=12)

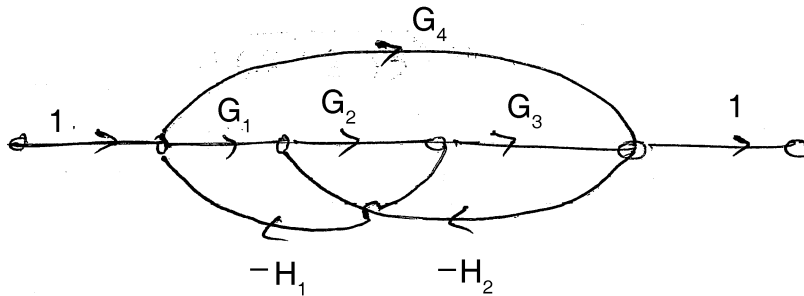
- 1) Find $C(s)/R(s)$ for given block diagram using block reduction technique.



- 2) With the help of diagram explain time response specifications of second order system.



3) Find transfer function of given system using Mason's gain formula.



SECTION – II

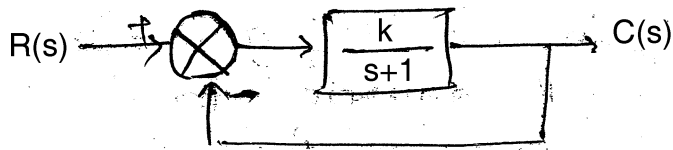
4. Attempt **any four** questions :

(4×4=16)

1) Define following terms and mention their significance.

- a) Gain margin b) Phase margin

2) Find the root locus of the unity feedback system having $G(s) = \frac{k}{s+1}$ for given figure.



3) Define and differentiate between Bode plot and Polar plot.

4) A unity feedback control system has $G(s) = 40$. Draw Bode plot.

5) Find the polar plot of $G(s) = \frac{8}{[s(s+1)]}$.

5. Attempt **any two** questions :

(6×2=12)

1) A unity feedback system has $G(s) = \frac{20}{s(s+2)}$. Draw the Bode plot.

2) Write a note on :

- a) Lead compensating network.
b) Log compensating network.

3) Find frequency domain specification with a unity feedback system having

$$G(s) = \frac{36}{[s(s+8)]}$$



SLR-VB – 366

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| Seat No. | |
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| Set | P |
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T.E. (Biomedical Engg.) (Part – II) (New CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING

Day and Date : Monday, 22-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 the disadvantage of impulse invariant method.
a) aliasing b) one mapping c) anti aliasing d) warping
- 2) The most common technique for design of IIR digital filter is _____ method.
a) direct b) indirect c) recursive d) non recursive
- 3) The transition band is move in
a) Butterworth filter b) Chebyshev 1
c) Chebyshev 2 d) FIR filter
- 4) A causal and stable IIR filter has
a) linear phase b) non linear phase
c) linear amplitude d) no amplitude
- 5) DFT is applied to
a) infinite sequence
b) finite discrete sequence
c) continuous infinite signals
d) continuous finite sequence
- 6) The basic properties of DFT includes
a) linearity b) periodicity c) summation d) circular symmetry
- 7) Giving one period of periodic convolution is called _____ convolution.
a) periodic b) aperiodic c) correlation d) circular
- 8) Forward and inverse Fourier transform exists for samples having values
a) integers b) infinite c) finite d) discrete

P.T.O.



- 9) _____ is the width of the main lobe of the frequency response of a rectangular window of length $M - 1$.
- a) π/M b) $2\pi/M$ c) $4\pi/M$ d) $8\pi/M$
- 10) _____ is the approximate transition width of main lobe of a Hamming window.
- a) $4\pi/M$ b) $8\pi/M$ c) $12\pi/M$ d) $2\pi/M$
- 11) For the calculation of N-point DFT, Radix – 2 FFT algorithm repeats _____ stages.
- a) $2(N \text{ Log } 2N)$ b) $(N \text{ Log}_2 N)^2/2$
c) $(N \text{ Log } 2N)/2$ stage d) $(\text{Log } N)/2N$
- 12) _____ system filters exhibit their dependency upon the system design for stability response.
- a) FIR b) IIR c) Both a and b d) None
- 13) In cascade form of realization _____ bits should be used to represent the FIR filter coefficient.
- a) 5 to 10 b) 12 to 14 c) 20 to 24 d) 28 to 40
- 14) _____ is the operating level of sampling rate for the sub filters involved in polyphase filters.
- a) low b) moderate c) high d) none
-



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**T.E. (Biomedical Engg.) (Part – II) (New CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Monday, 22-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** : **(4×4=16)**

- 1) State shifting property of DFT.
- 2) State the relationship between DTFT and Z transform.
- 3) Find the DTFT of $u(n)$.
- 4) Find the N point DFT for $x(n) = a^n$ for $0 < a < 1$.
- 5) Realise the following non-causal linear phase FIR system function $H(z) = \frac{2}{3}z + 1 + \frac{2}{3}z^{-1}$.

3. Attempt **any two** : **(6×2=12)**

- 1) Find 4 point DFT sequence of $x(n) = \cos \frac{n\pi}{4}$.
- 2) Compute $X_1(n) \times X_2(n)$ if,

 $x_1(n) = \delta(n) + \delta(n - 1) - \delta(n - 2) - \delta(n - 3)$

 $x_2(n) = \delta(n) - \delta(n - 2) + \delta(n - 4)$ for $N = 5$.
- 3) Obtain a cascade realisation of the system characterized by transfer function

$$H(z) = \frac{2(z + 2)}{z(z - 0.1)(z + 0.5)(z + 0.4)}$$

SECTION – II

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

- 1) A low pass filter has the desired response as given below :

$$H_d(e^{j\omega}) = \begin{cases} e^{-3j\omega} & , 0 \leq \omega < \frac{\pi}{2} \\ 0 & , \frac{\pi}{2} \leq \omega \leq \pi \end{cases}$$

Determine filter coefficient $h(n)$ for $M = 7$ using Type I frequency sampling technique.

Set P



2) Use the backward difference for the derivative and convert the analog filter with system

$$\text{function } H(s) = \frac{1}{s^2 + 16}.$$

3) What is an IIR filter ? Compare its characteristics with an FIR filter.

4) Explain how noise cancellation is done using adaptive filters.

5) The length of FIR filter is 13. If the filter has a linear phase show that

$$\sum_{n=0}^{\frac{M-1}{2}} h(n) \sin \omega (\tau - n) = 0.$$

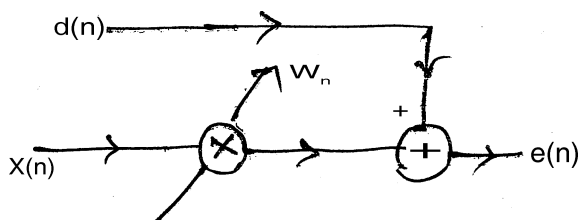
5. Attempt **any two** :

(6×2=12)

1) Using a rectangular window, design a low pass filter with passband gain of unity, cutoff frequency of 1 KHz and working at a sampling frequency of 5 KHz. The length of the impulse response is 7.

2) Apply bilinear transformation to $H(s) = \frac{2}{(s+1)(s+3)}$ with $T = 0.1s$.

3) Consider a single weight adaptive filter shown and write LMS algorithm for updating the weight w .





SLR-VB – 366

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T.E. (Biomedical Engg.) (Part – II) (New CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING

Day and Date : Monday, 22-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Forward and inverse Fourier transform exists for samples having values
a) integers b) infinite c) finite d) discrete
- 2) _____ is the width of the main lobe of the frequency response of a rectangular window of length $M - 1$.
a) π/M b) $2\pi/M$ c) $4\pi/M$ d) $8\pi/M$
- 3) _____ is the approximate transition width of main lobe of a Hamming window.
a) $4\pi/M$ b) $8\pi/M$ c) $12\pi/M$ d) $2\pi/M$
- 4) For the calculation of N-point DFT, Radix – 2 FFT algorithm repeats _____ stages.
a) $2(N \text{ Log } 2N)$ b) $(N \text{ Log}_2 N)^2/2$
c) $(N \text{ Log } 2N)/2$ stage d) $(\text{Log } N)/2N$
- 5) _____ system filters exhibit their dependency upon the system design for stability response.
a) FIR b) IIR c) Both a and b d) None
- 6) In cascade form of realization _____ bits should be used to represent the FIR filter coefficient.
a) 5 to 10 b) 12 to 14 c) 20 to 24 d) 28 to 40
- 7) _____ is the operating level of sampling rate for the sub filters involved in polyphase filters.
a) low b) moderate c) high d) none
- 8) _____ is the disadvantage of impulse invariant method.
a) aliasing b) one mapping c) anti aliasing d) warping

P.T.O.



- 9) The most common technique for design of IIR digital filter is _____ method.
a) direct b) indirect c) recursive d) non recursive
- 10) The transition band is move in
a) Butterworth filter b) Chebyshev 1
c) Chebyshev 2 d) FIR filter
- 11) A causal and stable IIR filter has
a) linear phase b) non linear phase
c) linear amplitude d) no amplitude
- 12) DFT is applied to
a) infinite sequence
b) finite discrete sequence
c) continuous infinite signals
d) continuous finite sequence
- 13) The basic properties of DFT includes
a) linearity b) periodicity c) summation d) circular symmetry
- 14) Giving one period of periodic convolution is called _____ convolution.
a) periodic b) aperiodic c) correlation d) circular
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**T.E. (Biomedical Engg.) (Part – II) (New CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Monday, 22-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** : **(4×4=16)**

- 1) State shifting property of DFT.
- 2) State the relationship between DTFT and Z transform.
- 3) Find the DTFT of $u(n)$.
- 4) Find the N point DFT for $x(n) = a^n$ for $0 < a < 1$.
- 5) Realise the following non-causal linear phase FIR system function $H(z) = \frac{2}{3}z + 1 + \frac{2}{3}z^{-1}$.

3. Attempt **any two** : **(6×2=12)**

- 1) Find 4 point DFT sequence of $x(n) = \cos \frac{n\pi}{4}$.
- 2) Compute $X_1(n) \times X_2(n)$ if,
 $x_1(n) = \delta(n) + \delta(n - 1) - \delta(n - 2) - \delta(n - 3)$
 $x_2(n) = \delta(n) - \delta(n - 2) + \delta(n - 4)$ for $N = 5$.
- 3) Obtain a cascade realisation of the system characterized by transfer function

$$H(z) = \frac{2(z + 2)}{z(z - 0.1)(z + 0.5)(z + 0.4)}$$

SECTION – II

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

- 1) A low pass filter has the desired response as given below :

$$H_d(e^{j\omega}) = \begin{cases} e^{-3j\omega} & , 0 \leq \omega < \frac{\pi}{2} \\ 0 & , \frac{\pi}{2} \leq \omega \leq \pi \end{cases}$$

Determine filter coefficient $h(n)$ for $M = 7$ using Type I frequency sampling technique.

Set Q



- 2) Use the backward difference for the derivative and convert the analog filter with system

$$\text{function } H(s) = \frac{1}{s^2 + 16}.$$

- 3) What is an IIR filter ? Compare its characteristics with an FIR filter.
 4) Explain how noise cancellation is done using adaptive filters.
 5) The length of FIR filter is 13. If the filter has a linear phase show that

$$\sum_{n=0}^{\frac{M-1}{2}} h(n) \sin \omega (\tau - n) = 0.$$

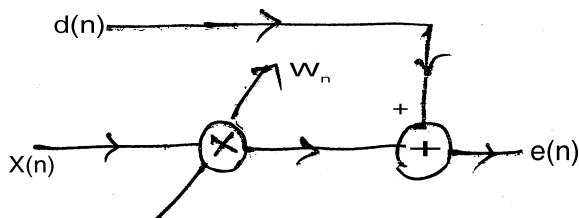
5. Attempt **any two** :

(6×2=12)

- 1) Using a rectangular window, design a low pass filter with passband gain of unity, cutoff frequency of 1 KHz and working at a sampling frequency of 5 KHz. The length of the impulse response is 7.

- 2) Apply bilinear transformation to $H(s) = \frac{2}{(s+1)(s+3)}$ with $T = 0.1s$.

- 3) Consider a single weight adaptive filter shown and write LMS algorithm for updating the weight w .





SLR-VB – 366

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T.E. (Biomedical Engg.) (Part – II) (New CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING

Day and Date : Monday, 22-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) DFT is applied to
 - a) infinite sequence
 - b) finite discrete sequence
 - c) continuous infinite signals
 - d) continuous finite sequence
- 2) The basic properties of DFT includes
 - a) linearity
 - b) periodicity
 - c) summation
 - d) circular symmetry
- 3) Giving one period of periodic convolution is called _____ convolution.
 - a) periodic
 - b) aperiodic
 - c) correlation
 - d) circular
- 4) Forward and inverse Fourier transform exists for samples having values
 - a) integers
 - b) infinite
 - c) finite
 - d) discrete
- 5) _____ is the width of the main lobe of the frequency response of a rectangular window of length $M - 1$.
 - a) π/M
 - b) $2\pi/M$
 - c) $4\pi/M$
 - d) $8\pi/M$
- 6) _____ is the approximate transition width of main lobe of a Hamming window.
 - a) $4\pi/M$
 - b) $8\pi/M$
 - c) $12\pi/M$
 - d) $2\pi/M$
- 7) For the calculation of N-point DFT, Radix – 2 FFT algorithm repeats _____ stages.
 - a) $2(N \text{ Log } 2N)$
 - b) $(N \text{ Log}_2 N)^2/2$
 - c) $(N \text{ Log } 2N)/2$ stage
 - d) $(\text{Log } N)/2N$

P.T.O.



- 8) _____ system filters exhibit their dependency upon the system design for stability response.
- a) FIR b) IIR c) Both a and b d) None
- 9) In cascade form of realization _____ bits should be used to represent the FIR filter coefficient.
- a) 5 to 10 b) 12 to 14 c) 20 to 24 d) 28 to 40
- 10) _____ is the operating level of sampling rate for the sub filters involved in polyphase filters.
- a) low b) moderate c) high d) none
- 11) _____ is the disadvantage of impulse invariant method.
- a) aliasing b) one mapping c) anti aliasing d) warping
- 12) The most common technique for design of IIR digital filter is _____ method.
- a) direct b) indirect c) recursive d) non recursive
- 13) The transition band is move in
- a) Butterworth filter b) Chebyshev 1
c) Chebyshev 2 d) FIR filter
- 14) A causal and stable IIR filter has
- a) linear phase b) non linear phase
c) linear amplitude d) no amplitude
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**T.E. (Biomedical Engg.) (Part – II) (New CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Monday, 22-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** : **(4×4=16)**

- 1) State shifting property of DFT.
- 2) State the relationship between DTFT and Z transform.
- 3) Find the DTFT of $u(n)$.
- 4) Find the N point DFT for $x(n) = a^n$ for $0 < a < 1$.
- 5) Realise the following non-causal linear phase FIR system function $H(z) = \frac{2}{3}z + 1 + \frac{2}{3}z^{-1}$.

3. Attempt **any two** : **(6×2=12)**

- 1) Find 4 point DFT sequence of $x(n) = \cos \frac{n\pi}{4}$.
- 2) Compute $X_1(n) \times X_2(n)$ if,

 $x_1(n) = \delta(n) + \delta(n - 1) - \delta(n - 2) - \delta(n - 3)$

 $x_2(n) = \delta(n) - \delta(n - 2) + \delta(n - 4)$ for $N = 5$.
- 3) Obtain a cascade realisation of the system characterized by transfer function

$$H(z) = \frac{2(z + 2)}{z(z - 0.1)(z + 0.5)(z + 0.4)}$$

SECTION – II

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

- 1) A low pass filter has the desired response as given below :

$$H_d(e^{j\omega}) = \begin{cases} e^{-3j\omega} & , 0 \leq \omega < \frac{\pi}{2} \\ 0 & , \frac{\pi}{2} \leq \omega \leq \pi \end{cases}$$

Determine filter coefficient $h(n)$ for $M = 7$ using Type I frequency sampling technique.

Set R



2) Use the backward difference for the derivative and convert the analog filter with system

$$\text{function } H(s) = \frac{1}{s^2 + 16}.$$

3) What is an IIR filter ? Compare its characteristics with an FIR filter.

4) Explain how noise cancellation is done using adaptive filters.

5) The length of FIR filter is 13. If the filter has a linear phase show that

$$\sum_{n=0}^{\frac{M-1}{2}} h(n) \sin \omega (\tau - n) = 0.$$

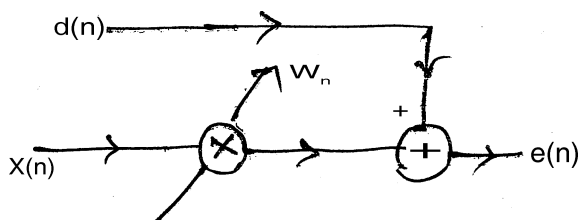
5. Attempt **any two** :

(6×2=12)

1) Using a rectangular window, design a low pass filter with passband gain of unity, cutoff frequency of 1 KHz and working at a sampling frequency of 5 KHz. The length of the impulse response is 7.

2) Apply bilinear transformation to $H(s) = \frac{2}{(s+1)(s+3)}$ with $T = 0.1s$.

3) Consider a single weight adaptive filter shown and write LMS algorithm for updating the weight w .





SLR-VB – 366

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**T.E. (Biomedical Engg.) (Part – II) (New CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Monday, 22-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 the approximate transition width of main lobe of a Hamming window.
a) $4\pi/M$ b) $8\pi/M$ c) $12\pi/M$ d) $2\pi/M$
- 2) For the calculation of N-point DFT, Radix – 2 FFT algorithm repeats _____ stages.
a) $2(N \text{ Log } 2N)$ b) $(N \text{ Log}_2 N)^2/2$
c) $(N \text{ Log } 2N)/2$ stage d) $(\text{Log } N)/2N$
- 3) _____ system filters exhibit their dependency upon the system design for stability response.
a) FIR b) IIR c) Both a and b d) None
- 4) In cascade form of realization _____ bits should be used to represent the FIR filter coefficient.
a) 5 to 10 b) 12 to 14 c) 20 to 24 d) 28 to 40
- 5) _____ is the operating level of sampling rate for the sub filters involved in polyphase filters.
a) low b) moderate c) high d) none
- 6) _____ is the disadvantage of impulse invariant method.
a) aliasing b) one mapping c) anti aliasing d) warping
- 7) The most common technique for design of IIR digital filter is _____ method.
a) direct b) indirect c) recursive d) non recursive
- 8) The transition band is move in
a) Butterworth filter b) Chebyshev 1
c) Chebyshev 2 d) FIR filter

P.T.O.



- 9) A causal and stable IIR filter has
- a) linear phase
 - b) non linear phase
 - c) linear amplitude
 - d) no amplitude
- 10) DFT is applied to
- a) infinite sequence
 - b) finite discrete sequence
 - c) continuous infinite signals
 - d) continuous finite sequence
- 11) The basic properties of DFT includes
- a) linearity
 - b) periodicity
 - c) summation
 - d) circular symmetry
- 12) Giving one period of periodic convolution is called _____ convolution.
- a) periodic
 - b) aperiodic
 - c) correlation
 - d) circular
- 13) Forward and inverse Fourier transform exists for samples having values
- a) integers
 - b) infinite
 - c) finite
 - d) discrete
- 14) _____ is the width of the main lobe of the frequency response of a rectangular window of length $M - 1$.
- a) π/M
 - b) $2\pi/M$
 - c) $4\pi/M$
 - d) $8\pi/M$
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**T.E. (Biomedical Engg.) (Part – II) (New CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Monday, 22-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** : **(4×4=16)**

- 1) State shifting property of DFT.
- 2) State the relationship between DTFT and Z transform.
- 3) Find the DTFT of $u(n)$.
- 4) Find the N point DFT for $x(n) = a^n$ for $0 < a < 1$.
- 5) Realise the following non-causal linear phase FIR system function $H(z) = \frac{2}{3}z + 1 + \frac{2}{3}z^{-1}$.

3. Attempt **any two** : **(6×2=12)**

- 1) Find 4 point DFT sequence of $x(n) = \cos \frac{n\pi}{4}$.
- 2) Compute $X_1(n) \times X_2(n)$ if,
 $x_1(n) = \delta(n) + \delta(n - 1) - \delta(n - 2) - \delta(n - 3)$
 $x_2(n) = \delta(n) - \delta(n - 2) + \delta(n - 4)$ for $N = 5$.
- 3) Obtain a cascade realisation of the system characterized by transfer function

$$H(z) = \frac{2(z + 2)}{z(z - 0.1)(z + 0.5)(z + 0.4)}$$

SECTION – II

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

- 1) A low pass filter has the desired response as given below :

$$H_d(e^{j\omega}) = \begin{cases} e^{-3j\omega} & , 0 \leq \omega < \frac{\pi}{2} \\ 0 & , \frac{\pi}{2} \leq \omega \leq \pi \end{cases}$$

Determine filter coefficient $h(n)$ for $M = 7$ using Type I frequency sampling technique.

Set S



2) Use the backward difference for the derivative and convert the analog filter with system

$$\text{function } H(s) = \frac{1}{s^2 + 16}.$$

3) What is an IIR filter ? Compare its characteristics with an FIR filter.

4) Explain how noise cancellation is done using adaptive filters.

5) The length of FIR filter is 13. If the filter has a linear phase show that

$$\sum_{n=0}^{\frac{M-1}{2}} h(n) \sin \omega (\tau - n) = 0.$$

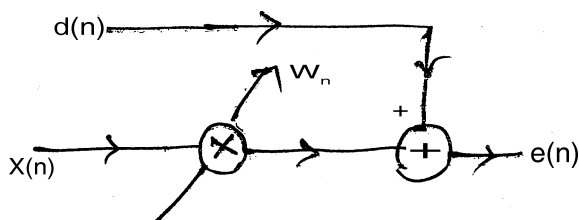
5. Attempt **any two** :

(6×2=12)

1) Using a rectangular window, design a low pass filter with passband gain of unity, cutoff frequency of 1 KHz and working at a sampling frequency of 5 KHz. The length of the impulse response is 7.

2) Apply bilinear transformation to $H(s) = \frac{2}{(s+1)(s+3)}$ with $T = 0.1s$.

3) Consider a single weight adaptive filter shown and write LMS algorithm for updating the weight w .





SLR-VB – 367

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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
EMBEDDED SYSTEMS**

Day and Date : Wednesday, 24-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- 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 a half-duplex communication protocol.
a) SPI b) 12C c) CAN d) All of the above
 - 2) A communication protocol specifies
a) The ways of communication of signals on the bus
b) Ways of arbitration when several devices need to communicate through the bus or the ways of polling from the devices need of the bus at an instance
c) Both a) and b)
d) Minimum rate of data transfer during communication
 - 3) Inter process communication can be done through
a) Mails b) Messages c) System cells d) Traps
 - 4) _____ software allows the system activities to be divided into multiple independent elements called tasks.
a) Kernel b) Shell c) Processor d) Device Driver
 - 5) _____ is the μ C/OS-II services is used to delete task.
a) OSTaskCreate() b) OSTaskDel()
c) OSTaskResume() d) OSSemTask()
 - 6) μ cos – II can manage upto _____ tasks.
a) 20 b) 64 c) 128 d) 256

P.T.O.



- 7) For real time operating systems, interrupt latency should be
- a) Minimal
 - b) Maximum
 - c) Zero
 - d) Dependent on the scheduling
- 8) RISC stands for
- a) Restricted Instruction Sequencing Computer
 - b) Restricted Instruction Sequential Compiler
 - c) Reduced Instruction Set Computer
 - d) Reduced Induction Set Computer
- 9) In ARM7 core architecture register _____ is used as stack pointer.
- a) R12
 - b) R13
 - c) R14
 - d) R15
- 10) In ARM7TDMI-S, T stands for
- a) Transfer
 - b) Transmission
 - c) Thumb
 - d) Telecommunication
- 11) A _____ is a situation in which two tasks are each unknowingly waiting for resources held by each other.
- a) Priority Inversion
 - b) Deadlock
 - c) Pending
 - d) Dormant
- 12) In ARM _____ exception is having the highest priority.
- a) Reset
 - b) Supervisor
 - c) System
 - d) Interrupt request
- 13) _____ mode is a special version of user mode that allows full read-write access to the cpsr.
- a) Supervisor
 - b) System
 - c) Undefined
 - d) Abort
- 14) _____ is the multi master protocol.
- a) SPI
 - b) CAN
 - c) 12C
 - d) None of above
-



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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
EMBEDDED SYSTEMS**

Day and Date : Wednesday, 24-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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) List and explain various communication protocols used in embedded systems.
 - 2) Differentiate between RISC and CISC architecture.
 - 3) Explain PLL with neat block diagram.
 - 4) List and explain different addressing modes used in ARM processor.
 - 5) Explain the communication protocol I2C in detail.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain the concept of interrupt controller for LPC2148.
 - 2) What are three types of instruction sets in ARM ? Explain each with two instructions.
 - 3) Explain the concept of direct memory access in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Write short note on embedded communication using CAN and Ethernet.
 - 2) Write a short note on RTOS poring in embedded.
 - 3) Explain GSM module with AT commands and state its importance in embedded communication.
 - 4) What is RTOS ? Differentiate between soft and hard real time systems with examples.
 - 5) List down the types of priority-based kernels. Elaborate any with example.

Set P



5. Attempt **any two** : **(6×2=12)**
- 1) Define task. What are the states of task ? Draw and explain the characteristics of each task state with block diagram of task control block.
 - 2) List and explain various features of Micro OS-II system.
 - 3) Elaborate with examples various inter-task/process communication tools like mailbox and message queue used in RTOS environment.
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SLR-VB – 367

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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
EMBEDDED SYSTEMS**

Day and Date : Wednesday, 24-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- 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) RISC stands for
 - a) Restricted Instruction Sequencing Computer
 - b) Restricted Instruction Sequential Compiler
 - c) Reduced Instruction Set Computer
 - d) Reduced Induction Set Computer
- 2) In ARM7 core architecture register _____ is used as stack pointer.
 - a) R12
 - b) R13
 - c) R14
 - d) R15
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 - a) Transfer
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- 4) A _____ is a situation in which two tasks are each unknowingly waiting for resources held by each other.
 - a) Priority Inversion
 - b) Deadlock
 - c) Pending
 - d) Dormant
- 5) In ARM _____ exception is having the highest priority.
 - a) Reset
 - b) Supervisor
 - c) System
 - d) Interrupt request

P.T.O.



- 6) _____ mode is a special version of user mode that allows full read-write access to the cpsr.
a) Supervisor b) System c) Undefined d) Abort
- 7) _____ is the multi master protocol.
a) SPI b) CAN c) 12C d) None of above
- 8) _____ is a half-duplex communication protocol.
a) SPI b) 12C c) CAN d) All of the above
- 9) A communication protocol specifies
a) The ways of communication of signals on the bus
b) Ways of arbitration when several devices need to communicate through the bus or the ways of polling from the devices need of the bus at an instance
c) Both a) and b)
d) Minimum rate of data transfer during communication
- 10) Inter process communication can be done through
a) Mails b) Messages c) System cells d) Traps
- 11) _____ software allows the system activities to be divided into multiple independent elements called tasks.
a) Kernel b) Shell c) Processor d) Device Driver
- 12) _____ is the μ C/OS-II services is used to delete task.
a) OSTaskCreate() b) OSTaskDel()
c) OSTaskResume() d) OSSemTask()
- 13) μ cos – II can manage upto _____ tasks.
a) 20 b) 64 c) 128 d) 256
- 14) For real time operating systems, interrupt latency should be
a) Minimal b) Maximum
c) Zero d) Dependent on the scheduling
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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
EMBEDDED SYSTEMS**

Day and Date : Wednesday, 24-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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) List and explain various communication protocols used in embedded systems.
 - 2) Differentiate between RISC and CISC architecture.
 - 3) Explain PLL with neat block diagram.
 - 4) List and explain different addressing modes used in ARM processor.
 - 5) Explain the communication protocol I2C in detail.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain the concept of interrupt controller for LPC2148.
 - 2) What are three types of instruction sets in ARM ? Explain each with two instructions.
 - 3) Explain the concept of direct memory access in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Write short note on embedded communication using CAN and Ethernet.
 - 2) Write a short note on RTOS poring in embedded.
 - 3) Explain GSM module with AT commands and state its importance in embedded communication.
 - 4) What is RTOS ? Differentiate between soft and hard real time systems with examples.
 - 5) List down the types of priority-based kernels. Elaborate any with example.

Set Q



5. Attempt **any two** : **(6×2=12)**

- 1) Define task. What are the states of task ? Draw and explain the characteristics of each task state with block diagram of task control block.
 - 2) List and explain various features of Micro OS-II system.
 - 3) Elaborate with examples various inter-task/process communication tools like mailbox and message queue used in RTOS environment.
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SLR-VB – 367

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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
EMBEDDED SYSTEMS**

Day and Date : Wednesday, 24-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- 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 μ C/OS-II services is used to delete task.
a) OSTaskCreate() b) OSTaskDel()
c) OSTaskResume() d) OSSemTask()
- 2) μ cos – II can manage upto _____ tasks.
a) 20 b) 64 c) 128 d) 256
- 3) For real time operating systems, interrupt latency should be
a) Minimal b) Maximum
c) Zero d) Dependent on the scheduling
- 4) RISC stands for
a) Restricted Instruction Sequencing Computer
b) Restricted Instruction Sequential Compiler
c) Reduced Instruction Set Computer
d) Reduced Induction Set Computer
- 5) In ARM7 core architecture register _____ is used as stack pointer.
a) R12 b) R13 c) R14 d) R15
- 6) In ARM7TDMI-S, T stands for
a) Transfer b) Transmission
c) Thumb d) Telecommunication

P.T.O.



- 7) A _____ is a situation in which two tasks are each unknowingly waiting for resources held by each other.
- a) Priority Inversion b) Deadlock
c) Pending d) Dormant
- 8) In ARM _____ exception is having the highest priority.
- a) Reset b) Supervisor
c) System d) Interrupt request
- 9) _____ mode is a special version of user mode that allows full read-write access to the cpsr.
- a) Supervisor b) System c) Undefined d) Abort
- 10) _____ is the multi master protocol.
- a) SPI b) CAN c) 12C d) None of above
- 11) _____ is a half-duplex communication protocol.
- a) SPI b) 12C c) CAN d) All of the above
- 12) A communication protocol specifies
- a) The ways of communication of signals on the bus
b) Ways of arbitration when several devices need to communicate through the bus or the ways of polling from the devices need of the bus at an instance
c) Both a) and b)
d) Minimum rate of data transfer during communication
- 13) Inter process communication can be done through
- a) Mails b) Messages c) System cells d) Traps
- 14) _____ software allows the system activities to be divided into multiple independent elements called tasks.
- a) Kernel b) Shell c) Processor d) Device Driver
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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
EMBEDDED SYSTEMS**

Day and Date : Wednesday, 24-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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) List and explain various communication protocols used in embedded systems.
 - 2) Differentiate between RISC and CISC architecture.
 - 3) Explain PLL with neat block diagram.
 - 4) List and explain different addressing modes used in ARM processor.
 - 5) Explain the communication protocol I2C in detail.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain the concept of interrupt controller for LPC2148.
 - 2) What are three types of instruction sets in ARM ? Explain each with two instructions.
 - 3) Explain the concept of direct memory access in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Write short note on embedded communication using CAN and Ethernet.
 - 2) Write a short note on RTOS poring in embedded.
 - 3) Explain GSM module with AT commands and state its importance in embedded communication.
 - 4) What is RTOS ? Differentiate between soft and hard real time systems with examples.
 - 5) List down the types of priority-based kernels. Elaborate any with example.

Set R



5. Attempt **any two** :

(6×2=12)

- 1) Define task. What are the states of task ? Draw and explain the characteristics of each task state with block diagram of task control block.
 - 2) List and explain various features of Micro OS-II system.
 - 3) Elaborate with examples various inter-task/process communication tools like mailbox and message queue used in RTOS environment.
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SLR-VB – 367

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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
EMBEDDED SYSTEMS**

Day and Date : Wednesday, 24-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- 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) In ARM7TDMI-S, T stands for
 - a) Transfer
 - b) Transmission
 - c) Thumb
 - d) Telecommunication
- 2) A _____ is a situation in which two tasks are each unknowingly waiting for resources held by each other.
 - a) Priority Inversion
 - b) Deadlock
 - c) Pending
 - d) Dormant
- 3) In ARM _____ exception is having the highest priority.
 - a) Reset
 - b) Supervisor
 - c) System
 - d) Interrupt request
- 4) _____ mode is a special version of user mode that allows full read-write access to the cpsr.
 - a) Supervisor
 - b) System
 - c) Undefined
 - d) Abort
- 5) _____ is the multi master protocol.
 - a) SPI
 - b) CAN
 - c) 12C
 - d) None of above
- 6) _____ is a half-duplex communication protocol.
 - a) SPI
 - b) 12C
 - c) CAN
 - d) All of the above

P.T.O.



- 7) A communication protocol specifies
- a) The ways of communication of signals on the bus
 - b) Ways of arbitration when several devices need to communicate through the bus or the ways of polling from the devices need of the bus at an instance
 - c) Both a) and b)
 - d) Minimum rate of data transfer during communication
- 8) Inter process communication can be done through
- a) Mails
 - b) Messages
 - c) System cells
 - d) Traps
- 9) _____ software allows the system activities to be divided into multiple independent elements called tasks.
- a) Kernel
 - b) Shell
 - c) Processor
 - d) Device Driver
- 10) _____ is the μ C/OS-II services is used to delete task.
- a) OSTaskCreate()
 - b) OSTaskDel()
 - c) OSTaskResume()
 - d) OSSemTask()
- 11) μ cos – II can manage upto _____ tasks.
- a) 20
 - b) 64
 - c) 128
 - d) 256
- 12) For real time operating systems, interrupt latency should be
- a) Minimal
 - b) Maximum
 - c) Zero
 - d) Dependent on the scheduling
- 13) RISC stands for
- a) Restricted Instruction Sequencing Computer
 - b) Restricted Instruction Sequential Compiler
 - c) Reduced Instruction Set Computer
 - d) Reduced Induction Set Computer
- 14) In ARM7 core architecture register _____ is used as stack pointer.
- a) R12
 - b) R13
 - c) R14
 - d) R15
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**T.E. (Biomedical Engg.) (Part – II) (New – CGPA) Examination, 2017
EMBEDDED SYSTEMS**

Day and Date : Wednesday, 24-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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) List and explain various communication protocols used in embedded systems.
 - 2) Differentiate between RISC and CISC architecture.
 - 3) Explain PLL with neat block diagram.
 - 4) List and explain different addressing modes used in ARM processor.
 - 5) Explain the communication protocol I2C in detail.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain the concept of interrupt controller for LPC2148.
 - 2) What are three types of instruction sets in ARM ? Explain each with two instructions.
 - 3) Explain the concept of direct memory access in detail.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Write short note on embedded communication using CAN and Ethernet.
 - 2) Write a short note on RTOS poring in embedded.
 - 3) Explain GSM module with AT commands and state its importance in embedded communication.
 - 4) What is RTOS ? Differentiate between soft and hard real time systems with examples.
 - 5) List down the types of priority-based kernels. Elaborate any with example.

Set S



5. Attempt **any two** : **(6×2=12)**
- 1) Define task. What are the states of task ? Draw and explain the characteristics of each task state with block diagram of task control block.
 - 2) List and explain various features of Micro OS-II system.
 - 3) Elaborate with examples various inter-task/process communication tools like mailbox and message queue used in RTOS environment.
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SLR-VB – 368

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
NUCLEAR MEDICINE**

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

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) _____ decays involves the emission of energy from an unstable nucleus in form of electromagnetic radiation.
a) Beta b) Alpha c) Electromagnet d) Gamma
- 2) Decay process are used to give a visual representation of _____ decay.
a) radioactive b) emission c) tracer d) transition
- 3) _____ is not a characteristic of PET.
a) lead collimators b) positron emitter
c) 511 KeV photons d) attenuation correction
- 4) The principle disadvantage in using a high resolution collimator on a gamma camera is that it has _____
a) limited FOV b) more distortion
c) less scatter rejection d) lower sensitivity
- 5) _____ rays are emitted during radioactivity.
a) α rays b) β rays c) Gamma d) All of above
- 6) 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) $2\lambda N$
- 7) The international system of units (SI) of radioactivity is _____
a) Becquerel b) Curie c) Fermi d) Ronetgen
- 8) The half life of radioactive nuclei is _____
a) $0.693/\lambda$ b) $0.793/\lambda$ c) 0.693λ d) 0.793λ
- 9) Compound containing same amount of radio isotope is _____
a) tracer b) spontaneous
c) radioactive compound d) non radioactive

P.T.O.



- 10) The Full Width at Half Maximum (FWHM) of a photo peak is a measure of _____
- a) PHA window setting
 - b) Camera sensitivity
 - c) Field of view
 - d) Detector energy resolution
- 11) To minimize dose, patients are advised to _____
- a) drink less water
 - b) empty bladder frequently
 - c) wear lead gowns
 - d) wear lead goggles
- 12) Dose to a patient is reduced by using _____
- a) grids
 - b) high kV
 - c) transform
 - d) camera
- 13) Tc. 99m is used in _____
- a) PET scan
 - b) Renal scan
 - c) Spleen scan
 - d) SPECT scan
- 14) Desirable properties of radionuclide include _____
- a) low specific activity
 - b) long effective half life
 - c) non toxic
 - d) disperse all over body
- 15) Regarding SPECT _____
- a) Noise limited
 - b) Noise unlimited
 - c) Worse resolution
 - d) Good contrast
- 16) _____ would be the most desirable for radionuclide imaging.
- a) 15 KeV gamma
 - b) 150 KeV gamma
 - c) 150 KeV beta
 - d) 1500 KeV gamma
- 17) In crystal scintillation detector the size of electrical pulse is proportional to _____
- a) activity
 - b) gamma photon energy
 - c) focusing
 - d) constant
- 18) A flood source can be used to check a gamma camera's _____
- a) maximum concentrate
 - b) collimator focusing
 - c) uniformity
 - d) spatial distortion
- 19) If PHA window on a gamma camera is incorrectly set below the photo peak energy, it will produce _____
- a) decreased FOV
 - b) decreased sensitivity
 - c) increased FOV
 - d) increased contrast
- 20) Compared to diverging collimator, a converging collimator will produce _____
- a) reduced FOV
 - b) increased FOV
 - c) moderate FOV
 - d) smaller image
- _____



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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
NUCLEAR MEDICINE**

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

Marks : 80

SECTION – I

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

- 1) Derive relationship between the linear attenuation coefficient and half value layer of radioactivity.
- 2) Discuss alpha, beta and gamma radiation emission in detail.
- 3) 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}
- 4) Derive an expression for radioactive decay law and mention various units of radioactivities.
- 5) Explain following :
 - a) Single channel pulse height analyzer.
 - b) Thyroid uptake monitoring system.

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

- 1) Explain working of scintillation detector and gas filled detector with necessary figure.
- 2) Explain working of gamma camera in detail and explain various quality control functions in short.
- 3) Explain working of rectilinear scanner with neat figure, also differentiate between rectilinear scanner and gamma camera.



SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) List and explain various radio tracers used in RIA and also mention its advantage.
 - 2) List and explain various types of collimatous with neat figures.
 - 3) Explain principle of PET scanning with neat figure.
 - 4) Differentiate between PET and SPECT system.
 - 5) Define RIA technique and explain its functioning.
5. Attempt **any 2** : **(10×2=20)**
- 1) Write a note on :
 - a) Principle and advantages of SPECT over PET.
 - b) Disposal of biological waste.
 - 2) Explain working of liquid scintillation counting system with neat diagram.
 - 3) Discuss internal and external radiation exposure and hazards. List various biological effects of radiation exposure.
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SLR-VB – 368

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
NUCLEAR MEDICINE**

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

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) _____ would be the most desirable for radionuclide imaging.
a) 15 KeV gamma
b) 150 KeV gamma
c) 150 KeV beta
d) 1500 KeV gamma
- 2) In crystal scintillation detector the size of electrical pulse is proportional to _____.
a) activity
b) gamma photon energy
c) focusing
d) constant
- 3) A flood source can be used to check a gamma camera's _____.
a) maximum concentrate
b) collimator focusing
c) uniformity
d) spatial distortion
- 4) If PHA window on a gamma camera is incorrectly set below the photo peak energy, it will produce _____.
a) decreased FOV
b) decreased sensitivity
c) increased FOV
d) increased contrast
- 5) Compared to diverging collimator, a converging collimator will produce _____.
a) reduced FOV
b) increased FOV
c) moderate FOV
d) smaller image
- 6) _____ decays involves the emission of energy from an unstable nucleus in form of electromagnetic radiation.
a) Beta
b) Alpha
c) Electromagnet
d) Gamma
- 7) Decay process are used to give a visual representation of _____ decay.
a) radioactive
b) emission
c) tracer
d) transition
- 8) _____ is not a characteristic of PET.
a) lead collimators
b) positron emitter
c) 511 KeV photons
d) attenuation correction

P.T.O.



- 9) The principle disadvantage in using a high resolution collimator on a gamma camera is that it has _____
a) limited FOV
b) more distortion
c) less scatter rejection
d) lower sensitivity
- 10) _____ rays are emitted during radioactivity.
a) α rays
b) β rays
c) Gamma
d) All of above
- 11) 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) $2\lambda N$
- 12) The international system of units (SI) of radioactivity is _____
a) Becquerel
b) Curie
c) Fermi
d) Ronetgen
- 13) The half life of radioactive nuclei is _____
a) $0.693/\lambda$
b) $0.793/\lambda$
c) 0.693λ
d) 0.793λ
- 14) Compound containing same amount of radio isotope is _____
a) tracer
b) spontaneous
c) radioactive compound
d) non radioactive
- 15) The Full Width at Half Maximum (FWHM) of a photo peak is a measure of _____
a) PHA window setting
b) Camera sensitivity
c) Field of view
d) Detector energy resolution
- 16) To minimize dose, patients are advised to _____
a) drink less water
b) empty bladder frequently
c) wear lead gowns
d) wear lead goggles
- 17) Dose to a patient is reduced by using _____
a) grids
b) high kV
c) transform
d) camera
- 18) Tc. 99m is used in _____
a) PET scan
b) Renal scan
c) Spleen scan
d) SPECT scan
- 19) Desirable properties of radionuclide include _____
a) low specific activity
b) long effective half life
c) non toxic
d) disperse all over body
- 20) Regarding SPECT _____
a) Noise limited
b) Noise unlimited
c) Worse resolution
d) Good contrast
- _____



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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
NUCLEAR MEDICINE**

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

Marks : 80

SECTION – I

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

- 1) Derive relationship between the linear attenuation coefficient and half value layer of radioactivity.
- 2) Discuss alpha, beta and gamma radiation emission in detail.
- 3) 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}
- 4) Derive an expression for radioactive decay law and mention various units of radioactivities.
- 5) Explain following :
 - a) Single channel pulse height analyzer.
 - b) Thyroid uptake monitoring system.

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

- 1) Explain working of scintillation detector and gas filled detector with necessary figure.
- 2) Explain working of gamma camera in detail and explain various quality control functions in short.
- 3) Explain working of rectilinear scanner with neat figure, also differentiate between rectilinear scanner and gamma camera.



SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) List and explain various radio tracers used in RIA and also mention its advantage.
 - 2) List and explain various types of collimatous with neat figures.
 - 3) Explain principle of PET scanning with neat figure.
 - 4) Differentiate between PET and SPECT system.
 - 5) Define RIA technique and explain its functioning.
5. Attempt **any 2** : **(10×2=20)**
- 1) Write a note on :
 - a) Principle and advantages of SPECT over PET.
 - b) Disposal of biological waste.
 - 2) Explain working of liquid scintillation counting system with neat diagram.
 - 3) Discuss internal and external radiation exposure and hazards. List various biological effects of radiation exposure.
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SLR-VB – 368

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
NUCLEAR MEDICINE**

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

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- 1) To minimize dose, patients are advised to _____
 - a) drink less water
 - b) empty bladder frequently
 - c) wear lead gowns
 - d) wear lead goggles
- 2) Dose to a patient is reduced by using _____
 - a) grids
 - b) high kV
 - c) transform
 - d) camera
- 3) Tc. 99m is used in _____
 - a) PET scan
 - b) Renal scan
 - c) Spleen scan
 - d) SPECT scan
- 4) Desirable properties of radionuclide include _____
 - a) low specific activity
 - b) long effective half life
 - c) non toxic
 - d) disperse all over body
- 5) Regarding SPECT _____
 - a) Noise limited
 - b) Noise unlimited
 - c) Worse resolution
 - d) Good contrast
- 6) _____ would be the most desirable for radionuclide imaging.
 - a) 15 KeV gamma
 - b) 150 KeV gamma
 - c) 150 KeV beta
 - d) 1500 KeV gamma
- 7) In crystal scintillation detector the size of electrical pulse is proportional to _____
 - a) activity
 - b) gamma photon energy
 - c) focusing
 - d) constant
- 8) A flood source can be used to check a gamma camera's _____
 - a) maximum concentrate
 - b) collimator focusing
 - c) uniformity
 - d) spatial distortion

P.T.O.



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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
NUCLEAR MEDICINE**

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

Marks : 80

SECTION – I

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

- 1) Derive relationship between the linear attenuation coefficient and half value layer of radioactivity.
- 2) Discuss alpha, beta and gamma radiation emission in detail.
- 3) 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}
- 4) Derive an expression for radioactive decay law and mention various units of radioactivities.
- 5) Explain following :
 - a) Single channel pulse height analyzer.
 - b) Thyroid uptake monitoring system.

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

- 1) Explain working of scintillation detector and gas filled detector with necessary figure.
- 2) Explain working of gamma camera in detail and explain various quality control functions in short.
- 3) Explain working of rectilinear scanner with neat figure, also differentiate between rectilinear scanner and gamma camera.



SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) List and explain various radio tracers used in RIA and also mention its advantage.
 - 2) List and explain various types of collimatous with neat figures.
 - 3) Explain principle of PET scanning with neat figure.
 - 4) Differentiate between PET and SPECT system.
 - 5) Define RIA technique and explain its functioning.
5. Attempt **any 2** : **(10×2=20)**
- 1) Write a note on :
 - a) Principle and advantages of SPECT over PET.
 - b) Disposal of biological waste.
 - 2) Explain working of liquid scintillation counting system with neat diagram.
 - 3) Discuss internal and external radiation exposure and hazards. List various biological effects of radiation exposure.
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SLR-VB – 368

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
NUCLEAR MEDICINE**

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

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

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

- 1) As 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) $2\lambda N$
- 2) The international system of units (SI) of radioactivity is _____
a) Becquerel b) Curie c) Fermi d) Ronetgen
- 3) The half life of radioactive nuclei is _____
a) $0.693/\lambda$ b) $0.793/\lambda$ c) 0.693λ d) 0.793λ
- 4) Compound containing same amount of radio isotope is _____
a) tracer b) spontaneous
c) radioactive compound d) non radioactive
- 5) The Full Width at Half Maximum (FWHM) of a photo peak is a measure of _____
a) PHA window setting b) Camera sensitivity
c) Field of view d) Detector energy resolution
- 6) To minimize dose, patients are advised to _____
a) drink less water b) empty bladder frequently
c) wear lead gowns d) wear lead goggles
- 7) Dose to a patient is reduced by using _____
a) grids b) high kV c) transform d) camera
- 8) Tc. 99m is used in _____
a) PET scan b) Renal scan c) Spleen scan d) SPECT scan
- 9) Desirable properties of radionuclide include _____
a) low specific activity b) long effective half life
c) non toxic d) disperse all over body

P.T.O.



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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
NUCLEAR MEDICINE**

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

Marks : 80

SECTION – I

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

- 1) Derive relationship between the linear attenuation coefficient and half value layer of radioactivity.
- 2) Discuss alpha, beta and gamma radiation emission in detail.
- 3) 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}
- 4) Derive an expression for radioactive decay law and mention various units of radioactivities.
- 5) Explain following :
 - a) Single channel pulse height analyzer.
 - b) Thyroid uptake monitoring system.

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

- 1) Explain working of scintillation detector and gas filled detector with necessary figure.
- 2) Explain working of gamma camera in detail and explain various quality control functions in short.
- 3) Explain working of rectilinear scanner with neat figure, also differentiate between rectilinear scanner and gamma camera.



SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) List and explain various radio tracers used in RIA and also mention its advantage.
 - 2) List and explain various types of collimatous with neat figures.
 - 3) Explain principle of PET scanning with neat figure.
 - 4) Differentiate between PET and SPECT system.
 - 5) Define RIA technique and explain its functioning.
5. Attempt **any 2** : **(10×2=20)**
- 1) Write a note on :
 - a) Principle and advantages of SPECT over PET.
 - b) Disposal of biological waste.
 - 2) Explain working of liquid scintillation counting system with neat diagram.
 - 3) Discuss internal and external radiation exposure and hazards. List various biological effects of radiation exposure.
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SLR-VB – 369

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**B.E. (Bio-medical Engg.) (Part – I) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) DICOM stands for
 - a) Digital Image Compression
 - b) Digital Image Communication
 - c) Data Integration Communication
 - d) None
- 2) HIMS fail due to
 - a) Incomplete entry of data
 - b) Lack of communication
 - c) Both a) and b)
 - d) None
- 3) Expert systems generate alerts and _____ assist in diagnosis.
 - a) help
 - b) information
 - c) reminders
 - d) none of above
- 4) 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
- 5) PACS having benefit of
 - a) Reduced cost
 - b) Simultaneous viewing of images
 - c) Film consumption
 - d) All above
- 6) Artificial Intelligence (AI) having following branches
 - a) ES
 - b) KBS
 - c) GPS
 - d) All above
- 7) In CAS the computer provide _____ for the surgeon.
 - a) Image guidance
 - b) Patient's situation
 - c) Lab guidance
 - d) None
- 8) Ethernet network offers maximum speed of
 - a) 1000 mbps
 - b) 100 mbps
 - c) 10 mbps
 - d) 10000 mbps
- 9) MRI required
 - a) Less acquisition time periods
 - b) Long acquisition time periods
 - c) Long scanning time
 - d) Less scanning time

P.T.O.



- 10) Tele-education consists of _____ video conferencing.
- Synchronous
 - Asynchronous
 - Synchronous as well as asynchronous
 - None
- 11) Telemedicine technique is used in _____ areas.
- urban
 - rural
 - urban and rural
 - none
- 12) In robotic surgery the robot consists of
- Actuator and sensors
 - Scanner and X-ray
 - Only scanner
 - Only X-ray
- 13) _____ is the heart of web browser.
- HTTP
 - WWW
 - HTML
 - CGI
- 14) Because of incomplete entering of data _____ fails.
- ES
 - HMIS
 - KBS
 - CPR
- 15) CORBA stands for
- Common Organization Request Broker Architecture
 - Committee Of Request Based Assembly
 - Computer Organization Request Broker Architecture
 - Common Object Request Broker Architecture
- 16) Pre anaesthetic checkup is a function of
- Blood Bank Module
 - Pharmacy Module
 - Operation theater module
 - Inventory Module
- 17) While sending the data in tele-medicine the analog data is convert into digital data with the help of
- Multiplexer
 - Counter
 - Decoder
 - Modem
- 18) Render means
- Convert a numeric representation of an object into a visual representation
 - Convert visual representation into a numeric representation of an object
 - Convert graphical image
 - Convert large image into small image
- 19) Prospect of medical informatics includes
- Medical informatics
 - Introduction of health care informatics
 - Introduction of digital knowledge system
 - All the above
- 20) Among these which is not type of knowledge in expert system ?
- Declarative knowledge
 - Procedural knowledge
 - Heuristic knowledge
 - Standard knowledge



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**B.E. (Bio-medical Engg.) (Part – I) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

2. Attempt **any four** of the following : **(4×5=20)**
- 1) State and explain different application of medical informatics.
 - 2) Explain needs and benefits of HMIS.
 - 3) Explain in detail need and different technology used in surgical simulation.
 - 4) Explain about radiology modules.
 - 5) Write note on future of surgical simulation.
3. Attempt **any two** of the following : **(2×10=20)**
- 1) Explain in detail the need for medical informatics education/training field.
 - 2) State and explain different reasons to faults the HMIS.
 - 3) Write a note on :
 - a) Patient care module
 - b) Advantages of surgical simulation.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**
- 1) With a neat figure explain Artificial Intelligence (AI).
 - 2) State and explain different patient counselling software.
 - 3) What are the different needs of telemedicine ?
 - 4) What are the limitations of conventional surgery ?
 - 5) Write benefits and risk of ASP (Application Service Provider).
5. Attempt **any two** of the following : **(2×10=20)**
- 1) Write and explain different application of telemedicine.
 - 2) Write and explain different components and functionality of CPR.
 - 3) Write in detail reliability and cost analysis of telemedicine.



SLR-VB – 369

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**B.E. (Bio-medical Engg.) (Part – I) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Pre anaesthetic checkup is a function of
 - a) Blood Bank Module
 - b) Pharmacy Module
 - c) Operation theater module
 - d) Inventory Module
- 2) While sending the data in tele-medicine the analog data is convert into digital data with the help of
 - a) Multiplexer
 - b) Counter
 - c) Decoder
 - d) Modem
- 3) Render means
 - a) Convert a numeric representation of an object into a visual representation
 - b) Convert visual representation into a numeric representation of an object
 - c) Convert graphical image
 - d) Convert large image into small image
- 4) Prospect of medical informatics includes
 - a) Medical informatics
 - b) Introduction of health care informatics
 - c) Introduction of digital knowledge system
 - d) All the above
- 5) Among these which is not type of knowledge in expert system ?
 - a) Declarative knowledge
 - b) Procedural knowledge
 - c) Heuristic knowledge
 - d) Standard knowledge
- 6) DICOM stands for
 - a) Digital Image Compression
 - b) Digital Image Communication
 - c) Data Integration Communication
 - d) None
- 7) HIMS fail due to
 - a) Incomplete entry of data
 - b) Lack of communication
 - c) Both a) and b)
 - d) None

P.T.O.



- 8) Expert systems generate alerts and _____ assist in diagnosis.
a) help b) information c) reminders d) none of above
- 9) 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
- 10) PACS having benefit of
a) Reduced cost b) Simultaneous viewing of images
c) Film consumption d) All above
- 11) Artificial Intelligence (AI) having following branches
a) ES b) KBS c) GPS d) All above
- 12) In CAS the computer provide _____ for the surgeon.
a) Image guidance b) Patient's situation
c) Lab guidance d) None
- 13) Ethernet network offers maximum speed of
a) 1000 mbps b) 100 mbps c) 10 mbps d) 10000 mbps
- 14) MRI required
a) Less acquisition time periods b) Long acquisition time periods
c) Long scanning time d) Less scanning time
- 15) Tele-education consists of _____ video conferencing.
a) Synchronous
b) Asynchronous
c) Synchronous as well as asynchronous
d) None
- 16) Telemedicine technique is used in _____ areas.
a) urban b) rural
c) urban and rural d) none
- 17) In robotic surgery the robot consists of
a) Actuator and sensors b) Scanner and X-ray
c) Only scanner d) Only X-ray
- 18) _____ is the heart of web browser.
a) HTTP b) WWW c) HTML d) CGI
- 19) Because of incomplete entering of data _____ fails.
a) ES b) HMIS c) KBS d) CPR
- 20) CORBA stands for
a) Common Organization Request Broker Architecture
b) Committee Of Request Based Assembly
c) Computer Organization Request Broker Architecture
d) Common Object Request Broker Architecture



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**B.E. (Bio-medical Engg.) (Part – I) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

2. Attempt **any four** of the following : **(4×5=20)**
- 1) State and explain different application of medical informatics.
 - 2) Explain needs and benefits of HMIS.
 - 3) Explain in detail need and different technology used in surgical simulation.
 - 4) Explain about radiology modules.
 - 5) Write note on future of surgical simulation.
3. Attempt **any two** of the following : **(2×10=20)**
- 1) Explain in detail the need for medical informatics education/training field.
 - 2) State and explain different reasons to faults the HMIS.
 - 3) Write a note on :
 - a) Patient care module
 - b) Advantages of surgical simulation.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**
- 1) With a neat figure explain Artificial Intelligence (AI).
 - 2) State and explain different patient counselling software.
 - 3) What are the different needs of telemedicine ?
 - 4) What are the limitations of conventional surgery ?
 - 5) Write benefits and risk of ASP (Application Service Provider).
5. Attempt **any two** of the following : **(2×10=20)**
- 1) Write and explain different application of telemedicine.
 - 2) Write and explain different components and functionality of CPR.
 - 3) Write in detail reliability and cost analysis of telemedicine.



- 9) Prospect of medical informatics includes
- Medical informatics
 - Introduction of health care informatics
 - Introduction of digital knowledge system
 - All the above
- 10) Among these which is not type of knowledge in expert system ?
- Declarative knowledge
 - Procedural knowledge
 - Heuristic knowledge
 - Standard knowledge
- 11) DICOM stands for
- Digital Image Compression
 - Digital Image Communication
 - Data Integration Communication
 - None
- 12) HIMS fail due to
- Incomplete entry of data
 - Lack of communication
 - Both a) and b)
 - None
- 13) Expert systems generate alerts and _____ assist in diagnosis.
- help
 - information
 - reminders
 - none of above
- 14) Medical information system deals with
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 - Only doctor related information
 - Only hospital related information
 - Only health related information
- 15) PACS having benefit of
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 - Simultaneous viewing of images
 - Film consumption
 - All above
- 16) Artificial Intelligence (AI) having following branches
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 - KBS
 - GPS
 - All above
- 17) In CAS the computer provide _____ for the surgeon.
- Image guidance
 - Patient's situation
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 - None
- 18) Ethernet network offers maximum speed of
- 1000 mbps
 - 100 mbps
 - 10 mbps
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- 19) MRI required
- Less acquisition time periods
 - Long acquisition time periods
 - Long scanning time
 - Less scanning time
- 20) Tele-education consists of _____ video conferencing.
- Synchronous
 - Asynchronous
 - Synchronous as well as asynchronous
 - None
-



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**B.E. (Bio-medical Engg.) (Part – I) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

2. Attempt **any four** of the following : **(4×5=20)**
- 1) State and explain different application of medical informatics.
 - 2) Explain needs and benefits of HMIS.
 - 3) Explain in detail need and different technology used in surgical simulation.
 - 4) Explain about radiology modules.
 - 5) Write note on future of surgical simulation.
3. Attempt **any two** of the following : **(2×10=20)**
- 1) Explain in detail the need for medical informatics education/training field.
 - 2) State and explain different reasons to faults the HMIS.
 - 3) Write a note on :
 - a) Patient care module
 - b) Advantages of surgical simulation.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**
- 1) With a neat figure explain Artificial Intelligence (AI).
 - 2) State and explain different patient counselling software.
 - 3) What are the different needs of telemedicine ?
 - 4) What are the limitations of conventional surgery ?
 - 5) Write benefits and risk of ASP (Application Service Provider).
5. Attempt **any two** of the following : **(2×10=20)**
- 1) Write and explain different application of telemedicine.
 - 2) Write and explain different components and functionality of CPR.
 - 3) Write in detail reliability and cost analysis of telemedicine.



SLR-VB – 369

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**B.E. (Bio-medical Engg.) (Part – I) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Artificial Intelligence (AI) having following branches
a) ES b) KBS c) GPS d) All above
- 2) In CAS the computer provide _____ for the surgeon.
a) Image guidance b) Patient's situation
c) Lab guidance d) None
- 3) Ethernet network offers maximum speed of
a) 1000 mbps b) 100 mbps c) 10 mbps d) 10000 mbps
- 4) MRI required
a) Less acquisition time periods b) Long acquisition time periods
c) Long scanning time d) Less scanning time
- 5) Tele-education consists of _____ video conferencing.
a) Synchronous
b) Asynchronous
c) Synchronous as well as asynchronous
d) None
- 6) Telemedicine technique is used in _____ areas.
a) urban b) rural
c) urban and rural d) none
- 7) In robotic surgery the robot consists of
a) Actuator and sensors b) Scanner and X-ray
c) Only scanner d) Only X-ray
- 8) _____ is the heart of web browser.
a) HTTP b) WWW c) HTML d) CGI
- 9) Because of incomplete entering of data _____ fails.
a) ES b) HMIS c) KBS d) CPR

P.T.O.



- 10) CORBA stands for
- Common Organization Request Broker Architecture
 - Committee Of Request Based Assembly
 - Computer Organization Request Broker Architecture
 - Common Object Request Broker Architecture
- 11) Pre anaesthetic checkup is a function of
- Blood Bank Module
 - Pharmacy Module
 - Operation theater module
 - Inventory Module
- 12) While sending the data in tele-medicine the analog data is convert into digital data with the help of
- Multiplexer
 - Counter
 - Decoder
 - Modem
- 13) Render means
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- 16) DICOM stands for
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 - None
- 17) HIMS fail due to
- Incomplete entry of data
 - Lack of communication
 - Both a) and b)
 - None
- 18) Expert systems generate alerts and _____ assist in diagnosis.
- help
 - information
 - reminders
 - none of above
- 19) Medical information system deals with
- Only patient related information
 - Only doctor related information
 - Only hospital related information
 - Only health related information
- 20) PACS having benefit of
- Reduced cost
 - Simultaneous viewing of images
 - Film consumption
 - All above
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**B.E. (Bio-medical Engg.) (Part – I) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Friday, 5-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

2. Attempt **any four** of the following : **(4×5=20)**
- 1) State and explain different application of medical informatics.
 - 2) Explain needs and benefits of HMIS.
 - 3) Explain in detail need and different technology used in surgical simulation.
 - 4) Explain about radiology modules.
 - 5) Write note on future of surgical simulation.
3. Attempt **any two** of the following : **(2×10=20)**
- 1) Explain in detail the need for medical informatics education/training field.
 - 2) State and explain different reasons to faults the HMIS.
 - 3) Write a note on :
 - a) Patient care module
 - b) Advantages of surgical simulation.

SECTION – II

4. Attempt **any four** of the following : **(4×5=20)**
- 1) With a neat figure explain Artificial Intelligence (AI).
 - 2) State and explain different patient counselling software.
 - 3) What are the different needs of telemedicine ?
 - 4) What are the limitations of conventional surgery ?
 - 5) Write benefits and risk of ASP (Application Service Provider).
5. Attempt **any two** of the following : **(2×10=20)**
- 1) Write and explain different application of telemedicine.
 - 2) Write and explain different components and functionality of CPR.
 - 3) Write in detail reliability and cost analysis of telemedicine.



SLR-VB – 370

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**B.E. (Part – I) (Biomedical Engineering) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

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

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 _____ needle point electrodes are stuck into tissue and then kept steady.
a) Cutting b) Coagulation c) Fulguration d) Derivation
- 2) _____ refers to a superficial tissue destruction without affecting deep-seated tissue.
a) Cutting b) Coagulation
c) Fulguration d) None of above
- 3) The frequency of currents used in surgical diathermy units in the range at _____ MHz.
a) 10 – 20 b) 15 – 20 c) 5 – 10 d) 1 – 3
- 4) _____ current is a steady flow of direct current that is passed through a tissue affects chemically.
a) Galvanic b) Faradic c) Surging d) None of above
- 5) Timed _____ produces the electrical oscillation of the required frequency in ultrasonic therapy unit.
a) Amplifier b) Power amplifier
c) Rectifier d) Oscillator
- 6) Ultrasonic generators are constructed on the _____ effect.
a) Peltier b) Seebeck c) Ohm's d) Piezo electric
- 7) In the capacitor plate method of short wave diathermy electrodes used are called as _____
a) Pads b) Sacs c) Sutures d) Leads

P.T.O.



- 8) In the five letter code of pacemaker the first letter indicates the _____ that are paced.
a) Muscles b) Nerves c) Chambers d) Bones
- 9) In current pacemaker throughout the inputs the current in the circuit is determined by the _____ of the pacemaker.
a) Internal resistance b) External resistance
c) Internal capacitance d) External capacitance
- 10) The energy of muscle contraction is derived from following except _____
a) ATP b) Muscle fiber c) Lactic acid d) Na^+
- 11) A defibrillator analyzer is used to measure the _____ content in the discharge pulse.
a) Energy b) Power c) Charging d) Potential
- 12) The electrodes for external defibrillator are usually metal discs about _____ in diameter.
a) 10 – 20 cm b) 10 – 15 cm c) 3 – 5 cm d) 1 – 2 cm
- 13) The _____ lasers operate primarily in the ultraviolet spectral region.
a) Excimer b) Ruby c) CO_2 d) Nd-yag
- 14) _____ ion laser photocoagulator is suitable for photo coagulation of the retina.
a) Sodium b) Calcium c) Nitrogen d) Argon
- 15) Biological tissues are coagulated by thermal means of the requisite temperature is maintained at _____ °C.
a) 35° b) 55° c) 70° d) 50°
- 16) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amounts of solutes on two sides.
a) Drift b) Diffusion
c) Osmosis d) Ultrafilter action
- 17) The artificial kidney is a membrane _____ device that serves as a mass exchanger during clinical use.
a) Separation b) Filter c) Mixed d) Exchanger
- 18) _____ is the used membrane for hemodialysis.
a) Polymer b) Cupraphan c) Phosphor d) Sodium
- 19) The laser action depends upon the phenomenon of stimulated _____
a) Current b) Energy c) Emission d) Radiation
- 20) A ruby laser is operated in _____ bursts.
a) Short b) Big c) Long d) Large



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**B.E. (Part – I) (Biomedical Engineering) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Saturday, 6-5-2017

Marks : 80

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

SECTION – I

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

- 1) Explain application techniques of short wave diathermy with neat figures.
- 2) Differentiate between internal and external pacemaker.
- 3) List various performance aspects of implantable pacemaker.
- 4) Define cut, coagulation, desiccation and fulguration modes of surgical diathermy.
- 5) Draw and explain various output current waveform of nerve muscle stimulation.

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

- 1) Discuss unipolar and bipolar modes of ESU. Draw and explain circuit of coagulation mode.
- 2) Draw circuit diagram of ultrasonic therapy unit and explain its working. Also mention its clinical applications.
- 3) Draw and explain working rate of generator and pace pulse generator circuit of pacemaker.



SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Define and differentiate between AC and DC defibrillator.
 - 2) Explain any two types of dialyzers of dialysis machine.
 - 3) Explain the principle of dialysis machine.
 - 4) Draw and explain working of monitoring conductivity of dialysate.
 - 5) Explain how capacitor discharges in INST mode of difibrillator.
5. Attempt **any two** questions : **(10×2=20)**
- 1) Discuss principle of LASER and list various LASER equipment techniques and explain any two in detail.
 - 2) Draw and explain working of dialysis machine. Mention the precautions that has to be taken in procedure.
 - 3) Explain the need and working of heart rate variability meter. Mention its application.
-



- 8) The frequency of currents used in surgical diathermy units in the range at _____ MHz.
a) 10 – 20 b) 15 – 20 c) 5 – 10 d) 1 – 3
- 9) _____ current is a steady flow of direct current that is passed through a tissue affects chemically.
a) Galvanic b) Faradic c) Surging d) None of above
- 10) Timed _____ produces the electrical oscillation of the required frequency in ultrasonic therapy unit.
a) Amplifier b) Power amplifier
c) Rectifier d) Oscillator
- 11) Ultrasonic generators are constructed on the _____ effect.
a) Peltier b) Seebeck c) Ohm's d) Piezo electric
- 12) In the capacitor plate method of short wave diathermy electrodes used are called as _____
a) Pads b) Sacs c) Sutures d) Leads
- 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 current pacemaker throughout the inputs the current in the circuit is determined by the _____ of the pacemaker.
a) Internal resistance b) External resistance
c) Internal capacitance d) External capacitance
- 15) The energy of muscle contraction is derived from following except _____
a) ATP b) Muscle fiber c) Lactic acid d) Na⁺
- 16) A defibrillator analyzer is used to measure the _____ content in the discharge pulse.
a) Energy b) Power c) Charging d) Potential
- 17) The electrodes for external defibrillator are usually metal discs about _____ in diameter.
a) 10 – 20 cm b) 10 – 15 cm c) 3 – 5 cm d) 1 – 2 cm
- 18) The _____ lasers operate primarily in the ultraviolet spectral region.
a) Excimer b) Ruby c) CO₂ d) Nd-yag
- 19) _____ ion laser photocoagulator is suitable for photo coagulation of the retina.
a) Sodium b) Calcium c) Nitrogen d) Argon
- 20) Biological tissues are coagulated by thermal means of the requisite temperature is maintained at _____ °C.
a) 35° b) 55° c) 70° d) 50°



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**B.E. (Part – I) (Biomedical Engineering) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Saturday, 6-5-2017

Marks : 80

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

SECTION – I

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

- 1) Explain application techniques of short wave diathermy with neat figures.
- 2) Differentiate between internal and external pacemaker.
- 3) List various performance aspects of implantable pacemaker.
- 4) Define cut, coagulation, desiccation and fulguration modes of surgical diathermy.
- 5) Draw and explain various output current waveform of nerve muscle stimulation.

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

- 1) Discuss unipolar and bipolar modes of ESU. Draw and explain circuit of coagulation mode.
- 2) Draw circuit diagram of ultrasonic therapy unit and explain its working. Also mention its clinical applications.
- 3) Draw and explain working rate of generator and pace pulse generator circuit of pacemaker.

Set Q



SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Define and differentiate between AC and DC defibrillator.
 - 2) Explain any two types of dialyzers of dialysis machine.
 - 3) Explain the principle of dialysis machine.
 - 4) Draw and explain working of monitoring conductivity of dialysate.
 - 5) Explain how capacitor discharges in INST mode of difibrillator.
5. Attempt **any two** questions : **(10×2=20)**
- 1) Discuss principle of LASER and list various LASER equipment techniques and explain any two in detail.
 - 2) Draw and explain working of dialysis machine. Mention the precautions that has to be taken in procedure.
 - 3) Explain the need and working of heart rate variability meter. Mention its application.
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SLR-VB – 370

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**B.E. (Part – I) (Biomedical Engineering) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

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

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 defibrillator analyzer is used to measure the _____ content in the discharge pulse.
a) Energy b) Power c) Charging d) Potential
- 2) The electrodes for external defibrillator are usually metal discs about _____ in diameter.
a) 10 – 20 cm b) 10 – 15 cm c) 3 – 5 cm d) 1 – 2 cm
- 3) The _____ lasers operate primarily in the ultraviolet spectral region.
a) Excimer b) Ruby c) CO₂ d) Nd-yag
- 4) _____ ion laser photocoagulator is suitable for photo coagulation of the retina.
a) Sodium b) Calcium c) Nitrogen d) Argon
- 5) Biological tissues are coagulated by thermal means of the requisite temperature is maintained at _____ °C.
a) 35° b) 55° c) 70° d) 50°
- 6) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amounts of solutes on two sides.
a) Drift b) Diffusion
c) Osmosis d) Ultrafilter action
- 7) The artificial kidney is a membrane _____ device that serves as a mass exchanger during clinical use.
a) Separation b) Filter c) Mixed d) Exchanger

P.T.O.



- 8) _____ is the used membrane for hemodialysis.
a) Polymer b) Cupraphan c) Phospher d) Sodium
- 9) The laser action depends upon the phenomenon of stimulated _____.
a) Current b) Energy c) Emission d) Radiation
- 10) A ruby laser is operated in _____ bursts.
a) Short b) Big c) Long d) Large
- 11) In _____ needle point electrodes are stuck into tissue and then kept steady.
a) Cutting b) Coagulation c) Fulguration d) Derivation
- 12) _____ refers to a superficial tissue destruction without affecting deep-seated tissue.
a) Cutting b) Coagulation
c) Fulguration d) None of above
- 13) The frequency of currents used in surgical diathermy units in the range at _____ MHz.
a) 10 – 20 b) 15 – 20 c) 5 – 10 d) 1 – 3
- 14) _____ current is a steady flow of direct current that is passed through a tissue affects chemically.
a) Galvanic b) Faradic c) Surging d) None of above
- 15) Timed _____ produces the electrical oscillation of the required frequency in urtrasonic therapy unit.
a) Amplifier b) Power amplifier
c) Rectifier d) Oscillator
- 16) Ultrasonic generators are constructed on the _____ effect.
a) Peltier b) Seebeck c) Ohm's d) Piezo electric
- 17) In the capacitor plate method of short wave diathermy electrodes used are called as _____.
a) Pads b) Sacs c) Sutures d) Leads
- 18) In the five letter code of pacemaker the first letter indicates the _____ that are paced.
a) Muscles b) Nerves c) Chambers d) Bones
- 19) In current pacemaker throughout the inputs the current in the circuit is determined by the _____ of the pacemaker.
a) Internal resistance b) External resistance
c) Internal capacitance d) External capacitance
- 20) The energy of muscle contraction is derived from following except _____.
a) ATP b) Muscle fiber c) Lactic acid d) Na⁺



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**B.E. (Part – I) (Biomedical Engineering) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Saturday, 6-5-2017

Marks : 80

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

SECTION – I

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

- 1) Explain application techniques of short wave diathermy with neat figures.
- 2) Differentiate between internal and external pacemaker.
- 3) List various performance aspects of implantable pacemaker.
- 4) Define cut, coagulation, desiccation and fulguration modes of surgical diathermy.
- 5) Draw and explain various output current waveform of nerve muscle stimulation.

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

- 1) Discuss unipolar and bipolar modes of ESU. Draw and explain circuit of coagulation mode.
- 2) Draw circuit diagram of ultrasonic therapy unit and explain its working. Also mention its clinical applications.
- 3) Draw and explain working rate of generator and pace pulse generator circuit of pacemaker.



SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Define and differentiate between AC and DC defibrillator.
 - 2) Explain any two types of dialyzers of dialysis machine.
 - 3) Explain the principle of dialysis machine.
 - 4) Draw and explain working of monitoring conductivity of dialysate.
 - 5) Explain how capacitor discharges in INST mode of difibrillator.
5. Attempt **any two** questions : **(10×2=20)**
- 1) Discuss principle of LASER and list various LASER equipment techniques and explain any two in detail.
 - 2) Draw and explain working of dialysis machine. Mention the precautions that has to be taken in procedure.
 - 3) Explain the need and working of heart rate variability meter. Mention its application.
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SLR-VB – 370

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**B.E. (Part – I) (Biomedical Engineering) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

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

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Ultrasonic generators are constructed on the _____ effect.
a) Peltier b) Seebeck c) Ohm's d) Piezo electric
- 2) In the capacitor plate method of short wave diathermy electrodes used are called as _____
a) Pads b) Sacs c) Sutures d) Leads
- 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 current pacemaker throughout the inputs the current in the circuit is determined by the _____ of the pacemaker.
a) Internal resistance b) External resistance
c) Internal capacitance d) External capacitance
- 5) The energy of muscle contraction is derived from following except _____
a) ATP b) Muscle fiber c) Lactic acid d) Na⁺
- 6) A defibrillator analyzer is used to measure the _____ content in the discharge pulse.
a) Energy b) Power c) Charging d) Potential
- 7) The electrodes for external defibrillator are usually metal discs about _____ in diameter.
a) 10 – 20 cm b) 10 – 15 cm c) 3 – 5 cm d) 1 – 2 cm

P.T.O.



- 8) The _____ lasers operate primarily in the ultraviolet spectral region.
a) Excimer b) Ruby c) CO₂ d) Nd-yag
- 9) _____ ion laser photocoagulator is suitable for photo coagulation of the retina.
a) Sodium b) Calcium c) Nitrogen d) Argon
- 10) Biological tissues are coagulated by thermal means of the requisite temperature is maintained at _____ °C.
a) 35° b) 55° c) 70° d) 50°
- 11) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amounts of solutes on two sides.
a) Drift b) Diffusion
c) Osmosis d) Ultrafilter action
- 12) The artificial kidney is a membrane _____ device that serves as a mass exchanger during clinical use.
a) Separation b) Filter c) Mixed d) Exchanger
- 13) _____ is the used membrane for hemodialysis.
a) Polymer b) Cupraphan c) Phosphor d) Sodium
- 14) The laser action depends upon the phenomenon of stimulated _____.
a) Current b) Energy c) Emission d) Radiation
- 15) A ruby laser is operated in _____ bursts.
a) Short b) Big c) Long d) Large
- 16) In _____ needle point electrodes are stuck into tissue and then kept steady.
a) Cutting b) Coagulation c) Fulguration d) Derivation
- 17) _____ refers to a superficial tissue destruction without affecting deep-seated tissue.
a) Cutting b) Coagulation
c) Fulguration d) None of above
- 18) The frequency of currents used in surgical diathermy units in the range at _____ MHz.
a) 10 – 20 b) 15 – 20 c) 5 – 10 d) 1 – 3
- 19) _____ current is a steady flow of direct current that is passed through a tissue affects chemically.
a) Galvanic b) Faradic c) Surging d) None of above
- 20) Timed _____ produces the electrical oscillation of the required frequency in ultrasonic therapy unit.
a) Amplifier b) Power amplifier
c) Rectifier d) Oscillator



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**B.E. (Part – I) (Biomedical Engineering) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Saturday, 6-5-2017

Marks : 80

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

SECTION – I

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

- 1) Explain application techniques of short wave diathermy with neat figures.
- 2) Differentiate between internal and external pacemaker.
- 3) List various performance aspects of implantable pacemaker.
- 4) Define cut, coagulation, desiccation and fulguration modes of surgical diathermy.
- 5) Draw and explain various output current waveform of nerve muscle stimulation.

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

- 1) Discuss unipolar and bipolar modes of ESU. Draw and explain circuit of coagulation mode.
- 2) Draw circuit diagram of ultrasonic therapy unit and explain its working. Also mention its clinical applications.
- 3) Draw and explain working rate of generator and pace pulse generator circuit of pacemaker.



SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Define and differentiate between AC and DC defibrillator.
 - 2) Explain any two types of dialyzers of dialysis machine.
 - 3) Explain the principle of dialysis machine.
 - 4) Draw and explain working of monitoring conductivity of dialysate.
 - 5) Explain how capacitor discharges in INST mode of difibrillator.
5. Attempt **any two** questions : **(10×2=20)**
- 1) Discuss principle of LASER and list various LASER equipment techniques and explain any two in detail.
 - 2) Draw and explain working of dialysis machine. Mention the precautions that has to be taken in procedure.
 - 3) Explain the need and working of heart rate variability meter. Mention its application.
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SLR-VB – 371

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B.E. (Biomedical Engineering) (Part – I) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) Spatial domain is denoted by _____
 - a) $g(X, Y) = [f(X, Y)]$
 - b) $g(X, Y) = T[f(X, Y)]$
 - c) $g(X, Y) = T [f'(X, Y)]$
 - d) $g(X, Y) = T[f(Y)]$
- 2) Smoothing spatial filters are useful for _____
 - a) Image enhancement
 - b) Image restoration
 - c) Highlight gross details
 - d) Highlight fine details
- 3) In _____ filters, there is no difference between correction and convolution.
 - a) Symmetric
 - b) Asymmetric
 - c) Equal
 - d) Simple
- 4) In _____ image we notice the components of histogram are concentrated on low side on intensity scale.
 - a) Dark
 - b) Colorful
 - c) Bridge
 - d) None of above
- 5) The _____ obtain image show us the distribution of grey levels on the image.
 - a) Histogram
 - b) Histogram equalization
 - c) Contrast stretching
 - d) All of above
- 6) In bit plane slicing the most of the information of an image is contained by _____
 - a) Mid order plane
 - b) Highest order plane
 - c) Lowest order plane
 - d) All planes

P.T.O.



- 7) High pass filters are used for image _____
 a) Contrast b) Blurring c) Sharpening d) Resizing
- 8) Digitizing co-ordinate value is called _____
 a) Quantization b) Fourier transform
 c) Sampling d) Discrete Fourier transform
- 9) Object _____ is the process of assigns a label to an object based on its descriptors.
 a) Stretching b) Blurring c) Tracking d) Recognition
- 10) _____ plots how many times (frequency) each intensity value in image occurs.
 a) Quantization b) Sampling c) Histogram d) Segment
- 11) Smallest possible neighbourhood in a image must be of size _____
 a) 3×3 b) 2×2 c) 1×1 d) 4×4
- 12) _____ is not process of image processing.
 a) High level b) Low level c) Last level d) Mid level
- 13) Image quantised with sufficient brighten levels will lead to occurrence of _____
 a) Pixillation b) Blurring c) False contours d) None of above
- 14) _____ tool is used in tasks such as zooming, shrinking, rotating etc.
 a) Sampling b) Interpolation c) Filters d) Histogram
- 15) Dynamic rage of imaging system is a ratio where the upper limit is determined by _____
 a) Saturation b) Noise c) Brightness d) Contrast
- 16) A continuous image is digitised at _____ points.
 a) Random b) Vertex c) Contour d) Sampling
- 17) Transition objects and background shows _____
 a) Ramp edges b) Step edges c) Sharp edges d) Both a) and b)
- 18) Hit or miss transformation is used for shape _____
 a) Removal b) Detection c) Compression d) Sampling
- 19) Structuring element is also called _____
 a) Pixels b) Lines c) Subimage d) Noise
- 20) Gaussian noise is referred to as _____
 a) Red noise b) Black noise c) White noise d) Normal noise



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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

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

Marks : 80

SECTION – I

2. Attempt **any four** : **(4×5=20)**
- 1) Mention various properties of 2D-DFT in detail.
 - 2) Define Gaussian noise and Salt Pepper noise.
 - 3) Define and differentiate between point operation and neighbourhood operation.
 - 4) Discuss the significance of chain coding with its application.
 - 5) Define and explain sampling and quantization with each one example.
3. Attempt **any two** : **(10×2=20)**
- 1) Define and discuss various blurring and ringing effects. How they can be avoided ?
 - 2) Explain following image enhancement technique and mention their application.
 - a) Contrast stretching
 - b) Log transformation.
 - 3) Explain various region based segmentation methods in detail.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Differentiate between DFT and FFT transform with an example.
 - 2) Explain Hit and Miss function and their role in image processing.
 - 3) Explain opening and closing operation in detail with each of example.
 - 4) Explain concept of skeletonization and mention its advantages.
 - 5) Define moments and explain its importance in image processing.
5. Attempt **any two** : **(10×2=20)**
- 1) Explain all image compression technique in detail with two example.
 - 2) Define and explain dilation and erosion operation with their significance.
 - 3) List various image reconstruction technique in CT scanning and explain any one in detail



SLR-VB – 371

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

Day and Date : Monday, 8-5-2017

Max. Marks : 100

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(1×20=20)

- 1) A continuous image is digitised at _____ points.
a) Random b) Vertex c) Contour d) Sampling
- 2) Transition objects and background shows _____
a) Ramp edges b) Step edges c) Sharp edges d) Both a) and b)
- 3) Hit or miss transformation is used for shape _____
a) Removal b) Detection c) Compression d) Sampling
- 4) Structuring element is also called _____
a) Pixels b) Lines c) Subimage d) Noise
- 5) Gaussian noise is referred to as _____
a) Red noise b) Black noise c) White noise d) Normal noise
- 6) Spatial domain is denoted by _____
a) $g(X, Y) = [f(X, Y)]$ b) $g(X, Y) = T[f(X, Y)]$
c) $g(X, Y) = T [f'(X, Y)]$ d) $g(X, Y) = T[f(Y)]$
- 7) Smoothing spatial filters are useful for _____
a) Image enhancement b) Image restoration
c) Highlight gross details d) Highlight fine details
- 8) In _____ filters, there is no difference between correction and convolution.
a) Symmetric b) Asymmetric c) Equal d) Simple

P.T.O.



- 9) In _____ image we notice the components of histogram are concentrated on low side on intensity scale.
a) Dark b) Colorful c) Bridge d) None of above
- 10) The _____ obtain image show us the distribution of grey levels on the image.
a) Histogram b) Histogram equalization
c) Contrast stretching d) All of above
- 11) In bit plane slicing the most of the information of an image is contained by _____
a) Mid order plane b) Highest order plane
c) Lowest order plane d) All planes
- 12) High pass filters are used for image _____
a) Contrast b) Blurring c) Sharpening d) Resizing
- 13) Digitizing co-ordinate value is called _____
a) Quantization b) Fourier transform
c) Sampling d) Discrete Fourier transform
- 14) Object _____ is the process of assigns a label to an object based on its descriptors.
a) Stretching b) Blurring c) Tracking d) Recognition
- 15) _____ plots how many times (frequency) each intensity value in image occurs.
a) Quantization b) Sampling c) Histogram d) Segment
- 16) Smallest possible neighbourhood in a image must be of size _____
a) 3×3 b) 2×2 c) 1×1 d) 4×4
- 17) _____ is not process of image processing.
a) High level b) Low level c) Last level d) Mid level
- 18) Image quantised with sufficient brighten levels will lead to occurrence of _____
a) Pixillation b) Blurring c) False contours d) None of above
- 19) _____ tool is used in tasks such as zooming, shrinking, rotating etc.
a) Sampling b) Interpolation c) Filters d) Histogram
- 20) Dynamic rage of imaging system is a ratio where the upper limit is determined by _____
a) Saturation b) Noise c) Brightness d) Contrast



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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

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

Marks : 80

SECTION – I

2. Attempt **any four** : **(4×5=20)**
- 1) Mention various properties of 2D-DFT in detail.
 - 2) Define Gaussian noise and Salt Pepper noise.
 - 3) Define and differentiate between point operation and neighbourhood operation.
 - 4) Discuss the significance of chain coding with its application.
 - 5) Define and explain sampling and quantization with each one example.
3. Attempt **any two** : **(10×2=20)**
- 1) Define and discuss various blurring and ringing effects. How they can be avoided ?
 - 2) Explain following image enhancement technique and mention their application.
 - a) Contrast stretching
 - b) Log transformation.
 - 3) Explain various region based segmentation methods in detail.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Differentiate between DFT and FFT transform with an example.
 - 2) Explain Hit and Miss function and their role in image processing.
 - 3) Explain opening and closing operation in detail with each of example.
 - 4) Explain concept of skeletonization and mention its advantages.
 - 5) Define moments and explain its importance in image processing.
5. Attempt **any two** : **(10×2=20)**
- 1) Explain all image compression technique in detail with two example.
 - 2) Define and explain dilation and erosion operation with their significance.
 - 3) List various image reconstruction technique in CT scanning and explain any one in detail



SLR-VB – 371

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B.E. (Biomedical Engineering) (Part – I) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Monday, 8-5-2017

Max. Marks : 100

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(1×20=20)

- 1) Smallest possible neighbourhood in a image must be of size _____
a) 3×3 b) 2×2 c) 1×1 d) 4×4
- 2) _____ is not process of image processing.
a) High level b) Low level c) Last level d) Mid level
- 3) Image quantised with sufficient brighten levels will lead to occurrence of _____
a) Pixillation b) Blurring c) False contours d) None of above
- 4) _____ tool is used in tasks such as zooming, shrinking, rotating etc.
a) Sampling b) Interpolation c) Filters d) Histogram
- 5) Dynamic rage of imaging system is a ratio where the upper limit is determined by _____
a) Saturation b) Noise c) Brightness d) Contrast
- 6) A continuous image is digitised at _____ points.
a) Random b) Vertex c) Contour d) Sampling
- 7) Transition objects and background shows _____
a) Ramp edges b) Step edges c) Sharp edges d) Both a) and b)
- 8) Hit or miss transformation is used for shape _____
a) Removal b) Detection c) Compression d) Sampling
- 9) Structuring element is also called _____
a) Pixels b) Lines c) Subimage d) Noise

P.T.O.



- 10) Gaussian noise is referred to as _____
a) Red noise b) Black noise c) White noise d) Normal noise
- 11) Spatial domain is denoted by _____
a) $g(X, Y) = [f(X, Y)]$ b) $g(X, Y) = T[f(X, Y)]$
c) $g(X, Y) = T [f'(X, Y)]$ d) $g(X, Y) = T[f(Y)]$
- 12) Smoothing spatial filters are useful for _____
a) Image enhancement b) Image restoration
c) Highlight gross details d) Highlight fine details
- 13) In _____ filters, there is no difference between correction and convolution.
a) Symmetric b) Asymmetric c) Equal d) Simple
- 14) In _____ image we notice the components of histogram are concentrated on low side on intensity scale.
a) Dark b) Colorful c) Bridge d) None of above
- 15) The _____ obtain image show us the distribution of grey levels on the image.
a) Histogram b) Histogram equalization
c) Contrast stretching d) All of above
- 16) In bit plane slicing the most of the information of an image is contained by _____
a) Mid order plane b) Highest order plane
c) Lowest order plane d) All planes
- 17) High pass filters are used for image _____
a) Contrast b) Blurring c) Sharpening d) Resizing
- 18) Digitizing co-ordinate value is called _____
a) Quantization b) Fourier transform
c) Sampling d) Discrete Fourier transform
- 19) Object _____ is the process of assigns a label to an object based on its descriptors.
a) Stretching b) Blurring c) Tracking d) Recognition
- 20) _____ plots how many times (frequency) each intensity value in image occurs.
a) Quantization b) Sampling c) Histogram d) Segment
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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

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

Marks : 80

SECTION – I

2. Attempt **any four** : **(4×5=20)**
- 1) Mention various properties of 2D-DFT in detail.
 - 2) Define Gaussian noise and Salt Pepper noise.
 - 3) Define and differentiate between point operation and neighbourhood operation.
 - 4) Discuss the significance of chain coding with its application.
 - 5) Define and explain sampling and quantization with each one example.
3. Attempt **any two** : **(10×2=20)**
- 1) Define and discuss various blurring and ringing effects. How they can be avoided ?
 - 2) Explain following image enhancement technique and mention their application.
 - a) Contrast stretching
 - b) Log transformation.
 - 3) Explain various region based segmentation methods in detail.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Differentiate between DFT and FFT transform with an example.
 - 2) Explain Hit and Miss function and their role in image processing.
 - 3) Explain opening and closing operation in detail with each of example.
 - 4) Explain concept of skeletonization and mention its advantages.
 - 5) Define moments and explain its importance in image processing.
5. Attempt **any two** : **(10×2=20)**
- 1) Explain all image compression technique in detail with two example.
 - 2) Define and explain dilation and erosion operation with their significance.
 - 3) List various image reconstruction technique in CT scanning and explain any one in detail



SLR-VB – 371

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B.E. (Biomedical Engineering) (Part – I) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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 bit plane slicing the most of the information of an image is contained by _____
 - a) Mid order plane
 - b) Highest order plane
 - c) Lowest order plane
 - d) All planes
- 2) High pass filters are used for image _____
 - a) Contrast
 - b) Blurring
 - c) Sharpening
 - d) Resizing
- 3) Digitizing co-ordinate value is called _____
 - a) Quantization
 - b) Fourier transform
 - c) Sampling
 - d) Discrete Fourier transform
- 4) Object _____ is the process of assigns a label to an object based on its descriptors.
 - a) Stretching
 - b) Blurring
 - c) Tracking
 - d) Recognition
- 5) _____ plots how many times (frequency) each intensity value in image occurs.
 - a) Quantization
 - b) Sampling
 - c) Histogram
 - d) Segment
- 6) Smallest possible neighbourhood in a image must be of size _____
 - a) 3 × 3
 - b) 2 × 2
 - c) 1 × 1
 - d) 4 × 4
- 7) _____ is not process of image processing.
 - a) High level
 - b) Low level
 - c) Last level
 - d) Mid level

P.T.O.



- 8) Image quantised with sufficient brighten levels will lead to occurrence of _____
a) Pixillation b) Blurring c) False contours d) None of above
- 9) _____ tool is used in tasks such as zooming, shrinking, rotating etc.
a) Sampling b) Interpolation c) Filters d) Histogram
- 10) Dynamic rage of imaging system is a ratio where the upper limit is determined by _____
a) Saturation b) Noise c) Brightness d) Contrast
- 11) A continuous image is digitised at _____ points.
a) Random b) Vertex c) Contour d) Sampling
- 12) Transition objects and background shows _____
a) Ramp edges b) Step edges c) Sharp edges d) Both a) and b)
- 13) Hit or miss transformation is used for shape _____
a) Removal b) Detection c) Compression d) Sampling
- 14) Structuring element is also called _____
a) Pixels b) Lines c) Subimage d) Noise
- 15) Gaussian noise is referred to as _____
a) Red noise b) Black noise c) White noise d) Normal noise
- 16) Spatial domain is denoted by _____
a) $g(X, Y) = [f(X, Y)]$ b) $g(X, Y) = T[f(X, Y)]$
c) $g(X, Y) = T [f'(X, Y)]$ d) $g(X, Y) = T[f(Y)]$
- 17) Smoothing spatial filters are useful for _____
a) Image enhancement b) Image restoration
c) Highlight gross details d) Highlight fine details
- 18) In _____ filters, there is no difference between correction and convolution.
a) Symmetric b) Asymmetric c) Equal d) Simple
- 19) In _____ image we notice the components of histogram are concentrated on low side on intensity scale.
a) Dark b) Colorful c) Bridge d) None of above
- 20) The _____ obtain image show us the distribution of grey levels on the image.
a) Histogram b) Histogram equalization
c) Contrast stretching d) All of above



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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

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

Marks : 80

SECTION – I

2. Attempt **any four** : **(4×5=20)**
- 1) Mention various properties of 2D-DFT in detail.
 - 2) Define Gaussian noise and Salt Pepper noise.
 - 3) Define and differentiate between point operation and neighbourhood operation.
 - 4) Discuss the significance of chain coding with its application.
 - 5) Define and explain sampling and quantization with each one example.
3. Attempt **any two** : **(10×2=20)**
- 1) Define and discuss various blurring and ringing effects. How they can be avoided ?
 - 2) Explain following image enhancement technique and mention their application.
 - a) Contrast stretching
 - b) Log transformation.
 - 3) Explain various region based segmentation methods in detail.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Differentiate between DFT and FFT transform with an example.
 - 2) Explain Hit and Miss function and their role in image processing.
 - 3) Explain opening and closing operation in detail with each of example.
 - 4) Explain concept of skeletonization and mention its advantages.
 - 5) Define moments and explain its importance in image processing.
5. Attempt **any two** : **(10×2=20)**
- 1) Explain all image compression technique in detail with two example.
 - 2) Define and explain dilation and erosion operation with their significance.
 - 3) List various image reconstruction technique in CT scanning and explain any one in detail



SLR-VB – 372

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
HOSPITAL MANAGEMENT**

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) Defibrillator machine is apart of OT
a) cardiac b) respiratory c) orthopedic d) none of these
- 2) _____ 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
- 3) _____ is the element of directing in hospital.
a) Evaluation b) Discipline c) Planning d) Delegation
- 4) Functional nursing is method of providing
a) patient care b) caring of records
c) care management d) equipment care
- 5) To create a good organization relation is a function of _____ department of hospital.
a) Nursing b) CEO c) HR d) Administrator
- 6) PICU is related to _____ treatments.
a) adult b) neonatal c) child d) aged
- 7) _____ of health is a function of OPD.
a) Promotion b) Restriction c) Support d) Upgradation
- 8) Preventive maintenance is carried out to reduce the failure to a absolute
a) moderate b) minimum c) maximum d) zero
- 9) Capability to identity who has the disease is done by measuring
a) validity b) sensitivity c) specificity d) repeatability

P.T.O.



- 10) 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
- 11) Air change requirement/hour in OT is _____ %.
- a) 10 – 12
 - b) 16 – 18
 - c) 28 – 30
 - d) 58 – 60
- 12) _____ is the best suited for walls ends ceiling of OT.
- a) Ceramic tiles
 - b) Terrazo tiles
 - c) Glaze tiles
 - d) Situ Mosaic finish
- 13) _____ are not part of hospital services.
- a) Essential services
 - b) Additional services
 - c) Utility services
 - d) Administrative services
- 14) _____ is the skeleton of organization.
- a) Organizational function
 - b) Organization structure
 - c) Decentralization
 - d) Co-ordination
- 15) “Shopping window” of a hospital is
- a) Operation theater
 - b) ICU
 - c) OPD
 - d) Cafeteria
- 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 satisfaction
 - b) public relation
 - c) quality of care
 - d) machine
- 18) Supportive services of the hospital include all except _____ services.
- a) pharmacy
 - b) laboratory
 - c) housekeeping
 - 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 include
- a) promotion of health
 - b) training of medical and nursing staff
 - c) social services
 - d) all the above
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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
HOSPITAL MANAGEMENT**

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

Marks : 80

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
- 1) Explain various roles of CEO in hospital.
 - 2) Explain the need and importance of maintenance and calibration of medical equipment in hospital with one example.
 - 3) Define the concept of risk management and mention its significance in hospital management.
 - 4) List various engineering departments in hospital and mention each of two function.
 - 5) Explain the role of hospital administrator while handling the hospital in detail.
3. Attempt **any two** questions : **(10×2=20)**
- 1) Explain the concept, need and importance of preventive maintenance with one example.
 - 2) Describe the role of Biomedical engineer in hospital as well as in R and D departments.
 - 3) Write short note on :
 - a) Classification of hospitals based on various factors and associated norms.
 - b) Importance of health insurance and medical legal aspects.

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**
- 1) List various laboratories, equipments and discuss their role in hospital management.
 - 2) What is the role and need of disaster management in hospital management ?
 - 3) Explain the need and ways of infection control in hospitals.
 - 4) Discuss the importance of medical records in hospital.
 - 5) Explain the role of housekeeping and dietary food services in hospitals in detail.

Set P



5. Attempt **any two** questions :

(10×2=20)

- 1) Draw layout of OPD and OT and explain importance of each.
 - 2) List various equipments used in OT and ICU. Discuss maintenance procedure of any one equipment in each of.
 - 3) Write a short note on :
 - a) Need and structure of blood bank.
 - b) Waste managements functions.
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SLR-VB – 372

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
HOSPITAL MANAGEMENT**

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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 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 satisfaction
 - b) public relation
 - c) quality of care
 - d) machine
- 3) Supportive services of the hospital include all except _____ services.
 - a) pharmacy
 - b) laboratory
 - c) housekeeping
 - 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 include
 - a) promotion of health
 - b) training of medical and nursing staff
 - c) social services
 - d) all the above
- 6) Defibrillator machine is apart of OT
 - a) cardiac
 - b) respiratory
 - c) orthopedic
 - d) none of these
- 7) _____ 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
- 8) _____ is the element of directing in hospital.
 - a) Evaluation
 - b) Discipline
 - c) Planning
 - d) Delegation

P.T.O.



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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
HOSPITAL MANAGEMENT**

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

Marks : 80

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
- 1) Explain various roles of CEO in hospital.
 - 2) Explain the need and importance of maintenance and calibration of medical equipment in hospital with one example.
 - 3) Define the concept of risk management and mention its significance in hospital management.
 - 4) List various engineering departments in hospital and mention each of two function.
 - 5) Explain the role of hospital administrator while handling the hospital in detail.
3. Attempt **any two** questions : **(10×2=20)**
- 1) Explain the concept, need and importance of preventive maintenance with one example.
 - 2) Describe the role of Biomedical engineer in hospital as well as in R and D departments.
 - 3) Write short note on :
 - a) Classification of hospitals based on various factors and associated norms.
 - b) Importance of health insurance and medical legal aspects.

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**
- 1) List various laboratories, equipments and discuss their role in hospital management.
 - 2) What is the role and need of disaster management in hospital management ?
 - 3) Explain the need and ways of infection control in hospitals.
 - 4) Discuss the importance of medical records in hospital.
 - 5) Explain the role of housekeeping and dietary food services in hospitals in detail.

Set Q



5. Attempt **any two** questions :

(10×2=20)

- 1) Draw layout of OPD and OT and explain importance of each.
 - 2) List various equipments used in OT and ICU. Discuss maintenance procedure of any one equipment in each of.
 - 3) Write a short note on :
 - a) Need and structure of blood bank.
 - b) Waste managements functions.
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SLR-VB – 372

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
HOSPITAL MANAGEMENT**

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) Air change requirement/hour in OT is _____ %.
a) 10 – 12 b) 16 – 18 c) 28 – 30 d) 58 – 60
- 2) _____ is the best suited for walls ends ceiling of OT.
a) Ceramic tiles b) Terrazo tiles
c) Glaze tiles d) Situ Mosaic finish
- 3) _____ are not part of hospital services.
a) Essential services b) Additional services
c) Utility services d) Administrative services
- 4) _____ is the skeleton of organization.
a) Organizational function b) Organization structure
c) Decentralization d) Co-ordination
- 5) “Shopping window” of a hospital is
a) Operation theater b) ICU
c) OPD d) Cafeteria
- 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 satisfaction b) public relation
c) quality of care d) machine
- 8) Supportive services of the hospital include all except _____ services.
a) pharmacy b) laboratory c) housekeeping d) laundry

P.T.O.



- 9) _____ is not a basis of classification of hospital.
a) Speciality b) Functional c) Size d) Shape
- 10) The function of the OPD include
a) promotion of health
b) training of medical and nursing staff
c) social services
d) all the above
- 11) Defibrillator machine is apart of OT
a) cardiac b) respiratory c) orthopedic d) none of these
- 12) _____ 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
- 13) _____ is the element of directing in hospital.
a) Evaluation b) Discipline c) Planning d) Delegation
- 14) Functional nursing is method of providing
a) patient care b) caring of records
c) care management d) equipment care
- 15) To create a good organization relation is a function of _____ department of hospital.
a) Nursing b) CEO c) HR d) Administrator
- 16) PICU is related to _____ treatments.
a) adult b) neonatal c) child d) aged
- 17) _____ of health is a function of OPD.
a) Promotion b) Restriction c) Support d) Upgradation
- 18) Preventive maintenance is carried out to reduce the failure to a absolute
a) moderate b) minimum c) maximum d) zero
- 19) Capability to identity who has the disease is done by measuring
a) validity b) sensitivity c) specificity d) repeatability
- 20) 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
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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
HOSPITAL MANAGEMENT**

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

Marks : 80

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
- 1) Explain various roles of CEO in hospital.
 - 2) Explain the need and importance of maintenance and calibration of medical equipment in hospital with one example.
 - 3) Define the concept of risk management and mention its significance in hospital management.
 - 4) List various engineering departments in hospital and mention each of two function.
 - 5) Explain the role of hospital administrator while handling the hospital in detail.
3. Attempt **any two** questions : **(10×2=20)**
- 1) Explain the concept, need and importance of preventive maintenance with one example.
 - 2) Describe the role of Biomedical engineer in hospital as well as in R and D departments.
 - 3) Write short note on :
 - a) Classification of hospitals based on various factors and associated norms.
 - b) Importance of health insurance and medical legal aspects.

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**
- 1) List various laboratories, equipments and discuss their role in hospital management.
 - 2) What is the role and need of disaster management in hospital management ?
 - 3) Explain the need and ways of infection control in hospitals.
 - 4) Discuss the importance of medical records in hospital.
 - 5) Explain the role of housekeeping and dietary food services in hospitals in detail.

Set R



5. Attempt **any two** questions :

(10×2=20)

- 1) Draw layout of OPD and OT and explain importance of each.
 - 2) List various equipments used in OT and ICU. Discuss maintenance procedure of any one equipment in each of.
 - 3) Write a short note on :
 - a) Need and structure of blood bank.
 - b) Waste managements functions.
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SLR-VB – 372

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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
HOSPITAL MANAGEMENT**

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

Max. Marks : 100

Instructions : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only.**
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) PICU is related to _____ treatments.
a) adult b) neonatal c) child d) aged
- 2) _____ of health is a function of OPD.
a) Promotion b) Restriction c) Support d) Upgradation
- 3) Preventive maintenance is carried out to reduce the failure to a absolute
a) moderate b) minimum c) maximum d) zero
- 4) Capability to identify who has the disease is done by measuring
a) validity b) sensitivity c) specificity d) repeatability
- 5) 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
- 6) Air change requirement/hour in OT is _____ %.
a) 10 – 12 b) 16 – 18 c) 28 – 30 d) 58 – 60
- 7) _____ is the best suited for walls ends ceiling of OT.
a) Ceramic tiles b) Terrazo tiles
c) Glaze tiles d) Situ Mosaic finish
- 8) _____ are not part of hospital services.
a) Essential services b) Additional services
c) Utility services d) Administrative services

P.T.O.



- 9) _____ is the skeleton of organization.
a) Organizational function b) Organization structure
c) Decentralization d) Co-ordination
- 10) “Shopping window” of a hospital is
a) Operation theater b) ICU
c) OPD d) Cafeteria
- 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 satisfaction b) public relation
c) quality of care d) machine
- 13) Supportive services of the hospital include all except _____ services.
a) pharmacy b) laboratory c) housekeeping 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 include
a) promotion of health
b) training of medical and nursing staff
c) social services
d) all the above
- 16) Defibrillator machine is apart of OT
a) cardiac b) respiratory c) orthopedic d) none of these
- 17) _____ 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
- 18) _____ is the element of directing in hospital.
a) Evaluation b) Discipline c) Planning d) Delegation
- 19) Functional nursing is method of providing
a) patient care b) caring of records
c) care management d) equipment care
- 20) To create a good organization relation is a function of _____ department of hospital.
a) Nursing b) CEO c) HR d) Administrator
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**B.E. (Biomedical Engineering) (Part – I) Examination, 2017
HOSPITAL MANAGEMENT**

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

Marks : 80

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
- 1) Explain various roles of CEO in hospital.
 - 2) Explain the need and importance of maintenance and calibration of medical equipment in hospital with one example.
 - 3) Define the concept of risk management and mention its significance in hospital management.
 - 4) List various engineering departments in hospital and mention each of two function.
 - 5) Explain the role of hospital administrator while handling the hospital in detail.
3. Attempt **any two** questions : **(10×2=20)**
- 1) Explain the concept, need and importance of preventive maintenance with one example.
 - 2) Describe the role of Biomedical engineer in hospital as well as in R and D departments.
 - 3) Write short note on :
 - a) Classification of hospitals based on various factors and associated norms.
 - b) Importance of health insurance and medical legal aspects.

SECTION – II

4. Attempt **any four** questions : **(4×5=20)**
- 1) List various laboratories, equipments and discuss their role in hospital management.
 - 2) What is the role and need of disaster management in hospital management ?
 - 3) Explain the need and ways of infection control in hospitals.
 - 4) Discuss the importance of medical records in hospital.
 - 5) Explain the role of housekeeping and dietary food services in hospitals in detail.



5. Attempt **any two** questions :

(10×2=20)

- 1) Draw layout of OPD and OT and explain importance of each.
 - 2) List various equipments used in OT and ICU. Discuss maintenance procedure of any one equipment in each of.
 - 3) Write a short note on :
 - a) Need and structure of blood bank.
 - b) Waste managements functions.
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SLR-VB – 373

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Set **P**

**B.E. (Biomedical Engineering) (Part – II) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 16-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Ring artifacts on the CT image are associated with _____ tube detector relationship.
 - a) Rotate-Nutate
 - b) Rotate-Stationary
 - c) Rotate-Rotate
 - d) Translate-Rotate
 - 2) In the binary number system, a byte series of _____ bits of information.
 - a) 2
 - b) 4
 - c) 8
 - d) 16
 - 3) _____ reconstruction methods is used by most modern CT scanners.
 - a) Back projection
 - b) Iterative method
 - c) Fourier transform
 - d) Filtered back projection
 - 4) The full width at half maximum of a CT scanner is used to describe
 - a) spatial resolution
 - b) Contrast resolution
 - c) Noise
 - d) Calibration accuracy
 - 5) The Hounsfield value of a pixel is directly related to which of following
 - a) Window width
 - b) Field of view size
 - c) U of H₂O
 - d) Window level
 - 6) The average photon energy of the primary beam of a CT scanner operating at a tube potential of 120 KVP is
 - a) 50 KeV
 - b) 70 KeV
 - c) 100 KeV
 - d) 120 KeV
 - 7) High frequency generator usually located in modern CT scanners
 - a) Inside the gantry
 - b) Outside the scan room
 - c) Beneath CT table
 - d) Inside operation console

P.T.O.



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**B.E. (Biomedical Engineering) (Part – II) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 16-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

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

- 1) Explain water suppression techniques and mention its medical applications.
- 2) List various types of CT detectors and explain any one of it in detail.
- 3) Define CT number of bone whose attenuation coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.190 . (Magnification constant 1000).
- 4) Explain working of spiral CT with necessary figure.
- 5) Discuss various artifacts that occurs in CT imaging.

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

- 1) Explain following techniques with their advantages in image reconstruction.
 - a) Iteration method
 - b) Fourier transform.
- 2) Explain the principle and working of Magnet Resonance Spectroscopy. Mention its any two clinical application.
- 3) Compare between four generations for CT scanning with suitable diagram. List the advantages of spiral CT over conventional CT.



SECTION – II

4. Attempt **any four** questions : **(4×5=20)**
- 1) Define and explain working of electrical impedance tomography in short.
 - 2) Discuss spin echotechniques of MRI.
 - 3) Explain working of MDCT imaging.
 - 4) Define image contrast and resolution concepts of image processing.
 - 5) Discuss various types of magnets used in MRI imaging modality.
5. Attempt **any two** questions : **(10×2=20)**
- 1) Explain the need and procedure for CT angiography technique in detail.
 - 2) Explain basic principle and working of MRI with necessary diagram.
 - 3) List various hybrid imaging modalities and explain any one of it in detail. Mention its advantages.
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SLR-VB – 373

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Set **Q**

**B.E. (Biomedical Engineering) (Part – II) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 16-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Resolution is the characteristic that is not directly proportional to
 - a) Image noise
 - b) Image blurring
 - c) Unsharpness
 - d) Visibility of anatomical detector
- 2) _____ modality doesn't uniform of ionizing radiation.
 - a) Radiography
 - b) CT
 - c) PET
 - d) MRI
- 3) The best modality to image the spinal nervous system is
 - a) Myelography
 - b) CT
 - c) MRI
 - d) MRS
- 4) A pixel is defined as
 - a) portion of CRT display
 - b) volume element
 - c) a picture element
 - d) miniature image
- 5) _____ is not used commonly used in CT scintillation detector.
 - a) Ceramic rare earth
 - b) NaI
 - c) Silver halide
 - d) Bismuth germinate
- 6) Ring artifacts on the CT image are associated with _____ tube detector relationship.
 - a) Rotate-Nutate
 - b) Rotate-Stationary
 - c) Rotate-Rotate
 - d) Translate-Rotate
- 7) In the binary number system, a byte series of _____ bits of information.
 - a) 2
 - b) 4
 - c) 8
 - d) 16
- 8) _____ reconstruction methods is used by most modern CT scanners.
 - a) Back projection
 - b) Iterative method
 - c) Fourier transform
 - d) Filtered back projection

P.T.O.



- 9) The full width at half maximum of a CT scanner is used to describe
- a) spatial resolution
 - b) Contrast resolution
 - c) Noise
 - d) Calibration accuracy
- 10) The Hounsfield value of a pixel is directly related to which of following
- a) Window width
 - b) Field of view size
 - c) U of H₂O
 - d) Window level
- 11) The average photon energy of the primary beam of a CT scanner operating at a tube potential of 120 KVP is
- a) 50 KeV
 - b) 70 KeV
 - c) 100 KeV
 - d) 120 KeV
- 12) High frequency generator usually located in modern CT scanners
- a) Inside the gantry
 - b) Outside the scan room
 - c) Beneath CT table
 - d) Inside operation console
- 13) Process of which electrons are produced at cathode of CT X-ray tube is called as
- a) Rectification
 - b) Anode Heel effect
 - c) Thermionic emission
 - d) Isotropic emission
- 14) An accurate CT scanner is capable of spatial resolution of upto _____ lp/mm.
- a) 10
 - b) 20
 - c) 100
 - d) 20
- 15) The MR imaging in multiple sclerosis shows lesion in
- a) white matter
 - b) gray matter
 - c) thalamus
 - d) basal ganglia
- 16) _____ imaging technique gives maximum radiation exposure to the patient.
- a) Chest X-ray
 - b) CT
 - c) MRI
 - d) Bone scan
- 17) _____ has maximum ionization potential.
- a) Electron
 - b) Proton
 - c) Helium
 - d) Gamma
- 18) Phosphorous 32 emits
- a) Beta particles
 - b) Alpha
 - c) X-rays
 - d) Neutron
- 19) The most accurate investigation for assessing ventricular function is
- a) Multislice CT
 - b) Nuclear scan
 - c) MRI
 - d) MRS
- 20) The value of a CT number in Hounsfield unit is determined by
- a) Matrix size
 - b) Slice thickness
 - c) KV
 - d) Tissue density



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**B.E. (Biomedical Engineering) (Part – II) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 16-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

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

- 1) Explain water suppression techniques and mention its medical applications.
- 2) List various types of CT detectors and explain any one of it in detail.
- 3) Define CT number of bone whose attenuation coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.190. (Magnification constant 1000).
- 4) Explain working of spiral CT with necessary figure.
- 5) Discuss various artifacts that occurs in CT imaging.

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

- 1) Explain following techniques with their advantages in image reconstruction.
 - a) Iteration method
 - b) Fourier transform.
- 2) Explain the principle and working of Magnet Resonance Spectroscopy. Mention its any two clinical application.
- 3) Compare between four generations for CT scanning with suitable diagram. List the advantages of spiral CT over conventional CT.



SECTION – II

4. Attempt **any four** questions : **(4×5=20)**
- 1) Define and explain working of electrical impedance tomography in short.
 - 2) Discuss spin echotechniques of MRI.
 - 3) Explain working of MDCT imaging.
 - 4) Define image contrast and resolution concepts of image processing.
 - 5) Discuss various types of magnets used in MRI imaging modality.
5. Attempt **any two** questions : **(10×2=20)**
- 1) Explain the need and procedure for CT angiography technique in detail.
 - 2) Explain basic principle and working of MRI with necessary diagram.
 - 3) List various hybrid imaging modalities and explain any one of it in detail. Mention its advantages.
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SLR-VB – 373

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**B.E. (Biomedical Engineering) (Part – II) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 16-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*
 2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) _____ imaging technique gives maximum radiation exposure to the patient.
 - a) Chest X-ray
 - b) CT
 - c) MRI
 - d) Bone scan
- 2) _____ has maximum ionization potential.
 - a) Electron
 - b) Proton
 - c) Helium
 - d) Gamma
- 3) Phosphorous 32 emits
 - a) Beta particles
 - b) Alpha
 - c) X-rays
 - d) Neutron
- 4) The most accurate investigation for assessing ventricular function is
 - a) Multislice CT
 - b) Nuclear scan
 - c) MRI
 - d) MRS
- 5) The value of a CT number in Hounsfield unit is determined by
 - a) Matrix size
 - b) Slice thickness
 - c) KV
 - d) Tissue density
- 6) Resolution is the characteristic that is not directly proportional to
 - a) Image noise
 - b) Image blurring
 - c) Unsharpness
 - d) Visibility of anatomical detector
- 7) _____ modality doesn't uniform of ionizing radiation.
 - a) Radiography
 - b) CT
 - c) PET
 - d) MRI
- 8) The best modality to image the spinal nervous system is
 - a) Myelography
 - b) CT
 - c) MRI
 - d) MRS

P.T.O.



- 9) A pixel is defined as
a) portion of CRT display b) volume element
c) a picture element d) miniature image
- 10) _____ is not used commonly used in CT scintillation detector.
a) Ceramic rare earth b) NaI
c) Silver halide d) Bismuth germinate
- 11) Ring artifacts on the CT image are associated with _____ tube detector relationship.
a) Rotate-Nutate b) Rotate-Stationary
c) Rotate-Rotate d) Translate-Rotate
- 12) In the binary number system, a byte series of _____ bits of information.
a) 2 b) 4 c) 8 d) 16
- 13) _____ reconstruction methods is used by most modern CT scanners.
a) Back projection b) Iterative method
c) Fourier transform d) Filtered back projection
- 14) The full width at half maximum of a CT scanner is used to describe
a) spatial resolution b) Contrast resolution
c) Noise d) Calibration accuracy
- 15) The Hounsfield value of a pixel is directly related to which of following
a) Window width b) Field of view size
c) U of H₂O d) Window level
- 16) The average photon energy of the primary beam of a CT scanner operating at a tube potential of 120 KVP is
a) 50 KeV b) 70 KeV c) 100 KeV d) 120 KeV
- 17) High frequency generator usually located in modern CT scanners
a) Inside the gantry b) Outside the scan room
c) Beneath CT table d) Inside operation console
- 18) Process of which electrons are produced at cathode of CT X-ray tube is called as
a) Rectification b) Anode Heel effect
c) Thermionic emission d) Isotropic emission
- 19) An accurate CT scanner is capable of spatial resolution of upto _____ lp/mm.
a) 10 b) 20 c) 100 d) 20
- 20) The MR imaging in multiple sclerosis shows lesion in
a) white matter b) gray matter
c) thalamus d) basal ganglia



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**B.E. (Biomedical Engineering) (Part – II) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 16-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

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

- 1) Explain water suppression techniques and mention its medical applications.
- 2) List various types of CT detectors and explain any one of it in detail.
- 3) Define CT number of bone whose attenuation coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.190. (Magnification constant 1000).
- 4) Explain working of spiral CT with necessary figure.
- 5) Discuss various artifacts that occurs in CT imaging.

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

- 1) Explain following techniques with their advantages in image reconstruction.
 - a) Iteration method
 - b) Fourier transform.
- 2) Explain the principle and working of Magnet Resonance Spectroscopy. Mention its any two clinical application.
- 3) Compare between four generations for CT scanning with suitable diagram. List the advantages of spiral CT over conventional CT.



SECTION – II

4. Attempt **any four** questions : **(4×5=20)**
- 1) Define and explain working of electrical impedance tomography in short.
 - 2) Discuss spin echotechniques of MRI.
 - 3) Explain working of MDCT imaging.
 - 4) Define image contrast and resolution concepts of image processing.
 - 5) Discuss various types of magnets used in MRI imaging modality.
5. Attempt **any two** questions : **(10×2=20)**
- 1) Explain the need and procedure for CT angiography technique in detail.
 - 2) Explain basic principle and working of MRI with necessary diagram.
 - 3) List various hybrid imaging modalities and explain any one of it in detail. Mention its advantages.
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SLR-VB – 373

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**B.E. (Biomedical Engineering) (Part – II) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 16-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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 average photon energy of the primary beam of a CT scanner operating at a tube potential of 120 KVP is
a) 50 KeV b) 70 KeV c) 100 KeV d) 120 KeV
- 2) High frequency generator usually located in modern CT scanners
a) Inside the gantry b) Outside the scan room
c) Beneath CT table d) Inside operation console
- 3) Process of which electrons are produced at cathode of CT X-ray tube is called as
a) Rectification b) Anode Heel effect
c) Thermionic emission d) Isotropic emission
- 4) An accurate CT scanner is capable of spatial resolution of upto _____ lp/mm.
a) 10 b) 20 c) 100 d) 20
- 5) The MR imaging in multiple sclerosis shows lesion in
a) white matter b) gray matter
c) thalamus d) basal ganglia
- 6) _____ imaging technique gives maximum radiation exposure to the patient.
a) Chest X-ray b) CT c) MRI d) Bone scan
- 7) _____ has maximum ionization potential.
a) Electron b) Proton c) Helium d) Gamma
- 8) Phosphorous 32 emits
a) Beta particles b) Alpha c) X-rays d) Neutron

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**B.E. (Biomedical Engineering) (Part – II) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 16-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

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

- 1) Explain water suppression techniques and mention its medical applications.
- 2) List various types of CT detectors and explain any one of it in detail.
- 3) Define CT number of bone whose attenuation coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.190 . (Magnification constant 1000).
- 4) Explain working of spiral CT with necessary figure.
- 5) Discuss various artifacts that occurs in CT imaging.

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

- 1) Explain following techniques with their advantages in image reconstruction.
 - a) Iteration method
 - b) Fourier transform.
- 2) Explain the principle and working of Magnet Resonance Spectroscopy. Mention its any two clinical application.
- 3) Compare between four generations for CT scanning with suitable diagram. List the advantages of spiral CT over conventional CT.



SECTION – II

4. Attempt **any four** questions : **(4×5=20)**
- 1) Define and explain working of electrical impedance tomography in short.
 - 2) Discuss spin echotechniques of MRI.
 - 3) Explain working of MDCT imaging.
 - 4) Define image contrast and resolution concepts of image processing.
 - 5) Discuss various types of magnets used in MRI imaging modality.
5. Attempt **any two** questions : **(10×2=20)**
- 1) Explain the need and procedure for CT angiography technique in detail.
 - 2) Explain basic principle and working of MRI with necessary diagram.
 - 3) List various hybrid imaging modalities and explain any one of it in detail. Mention its advantages.
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SLR-VB – 374

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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION, MAINTENANCE AND SERVICING**

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- 1) NICU stand for
 - a) Neonatal Intensive Care Unit
 - b) Nephro Intensive Care Unit
 - c) Neuro Intensive Care Unit
 - d) None
- 2) Spirometer is used to measure
 - a) Lung capacity
 - b) Lung passage
 - c) Lung weight
 - d) Air
- 3) Voltages in x-rays in measured in
 - a) Milliamp
 - b) KVP
 - c) Millivolt
 - d) KV
- 4) Maintenance record should be maintained for each equipment to indicate entire _____ of maintenance of the equipment.
 - a) Servicing
 - b) Implanted polyvinyl tubes
 - c) Repairing
 - d) History
- 5) All the sides of an X-ray machine chamber must be
 - a) 3" thick
 - b) 9" thick
 - c) 6" thick
 - d) 12" thick
- 6) Autoclave uses
 - a) Medium pressure stream
 - b) High pressure stream
 - c) Low pressure stream
 - d) Both a and c
- 7) Sterilizations is done using _____ mixed with chemicals.
 - a) Boiling water
 - b) Running water
 - c) Cooled water
 - d) Cool water with chemical

P.T.O.



- 8) ECG machine is used to monitor
a) Lung activity b) Heart activity c) Brain activity d) Muscle activity
- 9) Flow meter is used to measure
a) Small diameter tubes b) Large diameter tubes
c) Medium diameter tubes d) None
- 10) Non invasive device used to measure oxygen saturation of patients' blood
a) Spirometer b) Pulse recorder
c) Pulse oximeter d) Pulse stabilizer
- 11) Sphygmomanometer is used to measure
a) O₂ b) CO₂ c) Heart rate d) Blood Pressure
- 12) _____ machine is used to remove unwanted fluid from body cavities.
a) Defibrillator b) Ventilators
c) Suction machines d) Anesthesia machine
- 13) The flow transducer on _____ side measures the gas flow to the patient.
a) Expiration b) a and c c) Inspiration d) None
- 14) _____ is a mode of synchrony ventilator.
a) CT b) Cm/s/cm c) CPAP d) None
- 15) In blood flow measurement flow rate "Q = VA" where A stands for
a) Acceleration b) Constant
c) Amplitude d) Area of cross section
- 16) _____ works at QRS Values.
a) Cardioverter b) Defibrillator
c) Pacemaker d) Heart lung machine
- 17) QCI is the
a) Quality and Certified Implementation
b) Quality Control and Implementation
c) Quality Council of India
d) None
- 18) Battery used in patient monitoring systems is of
a) 3 volts b) 6 volts c) 9 volts d) 12 volts
- 19) CPAP stands for
a) Coronary Positive Airway Pressure
b) Continuous Pulmonary Airway Pressure
c) Continuous Positive Airway Pressure
d) Cardiac Positive Airway Pressure
- 20) UPS systems are essential for clean and stable supply during
a) Repairing b) Servicing c) Maintenance d) Calibration
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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION, MAINTENANCE AND SERVICING**

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- 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 following questions : **(4×5=20)**
- 1) Discuss the role of biomedical Engineer in a hospital.
 - 2) Explain needs and advantages of drawing insurance of medical equipment's in hospital.
 - 3) What care should be taken before the installation of biomedical equipment ?
 - 4) Draw a labelled diagram of a ventilator with all its specifications.
 - 5) What kind of tests and checkups must be performed before the final acceptance of the instrument ?
3. Answer **any two** of following questions : **(2×10=20)**
- 1) Give the Pre installation techniques of the auto analyzer in detail.
 - 2) Explain installation and maintenance procedure of any two cardiac equipment's.
 - 3) Explain the following modes of operation of the synchronous ventilators
 - a) CPAP mode
 - b) S-mode
 - c) S/T mode
 - d) PC mode
 - e) Timed mode.

Set P



SECTION – II

4. Answer **any four** of following questions : **(4×5=20)**
- 1) Draw any five pictorial safety instructions of the electrosurgical unit and explain each of them.
 - 2) Explain the need and the function of medical gas management.
 - 3) What is an incubator ? Explain its significances.
 - 4) Define and differentiate between CMC and AMC in detail.
 - 5) Explain trouble shooting methods.
5. Answer **any two** of following questions : **(2×10=20)**
- 1) Explain the operation theater with respect to the following.
 - a) Location
 - b) Space requirement for OT
 - c) Design of OT.
 - 2) Differentiate between ICU, NICU and ICCU in terms of life saving equipments.
 - 3) a) Calibration procedure of PH meter
b) ISO and NABH certifications.
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SLR-VB – 374

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Set **Q**

**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION, MAINTENANCE AND SERVICING**

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- 1) _____ works at QRS Values.
 - a) Cardioverter
 - b) Defibrillator
 - c) Pacemaker
 - d) Heart lung machine
- 2) QCI is the
 - a) Quality and Certified Implementation
 - b) Quality Control and Implementation
 - c) Quality Council of India
 - d) None
- 3) Battery used in patient monitoring systems is of
 - a) 3 volts
 - b) 6 volts
 - c) 9 volts
 - d) 12 volts
- 4) CPAP stands for
 - a) Coronary Positive Airway Pressure
 - b) Continuous Pulmonary Airway Pressure
 - c) Continuous Positive Airway Pressure
 - d) Cardiac Positive Airway Pressure
- 5) UPS systems are essential for clean and stable supply during
 - a) Repairing
 - b) Servicing
 - c) Maintenance
 - d) Calibration
- 6) NICU stand for
 - a) Neonatal Intensive Care Unit
 - b) Nephro Intensive Care Unit
 - c) Neuro Intensive Care Unit
 - d) None

P.T.O.



- 7) Spirometer is used to measure
a) Lung capacity b) Lung passage c) Lung weight d) Air
- 8) Voltages in x-rays in measured in
a) Milliamp b) KVP c) Millivolt d) KV
- 9) Maintenance record should be maintained for each equipment to indicate entire _____ of maintenance of the equipment.
a) Servicing b) Implanted polyvinyl tubes
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- 10) All the sides of an X-ray machine chamber must be
a) 3" thick b) 9" thick c) 6" thick d) 12" thick
- 11) Autoclave uses
a) Medium pressure stream b) High pressure stream
c) Low pressure stream d) Both a and c
- 12) Sterilizations is done using _____ mixed with chemicals.
a) Boiling water b) Running water
c) Cooled water d) Cool water with chemical
- 13) ECG machine is used to monitor
a) Lung activity b) Heart activity c) Brain activity d) Muscle activity
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a) Spirometer b) Pulse recorder
c) Pulse oximeter d) Pulse stabilizer
- 16) Sphygmomanometer is used to measure
a) O₂ b) CO₂ c) Heart rate d) Blood Pressure
- 17) _____ machine is used to remove unwanted fluid from body cavities.
a) Defibrillator b) Ventilators
c) Suction machines d) Anesthesia machine
- 18) The flow transducer on _____ side measures the gas flow to the patient.
a) Expiration b) a and c c) Inspiration d) None
- 19) _____ is a mode of synchrony ventilator.
a) CT b) Cm/s/cm c) CPAP d) None
- 20) In blood flow measurement flow rate "Q = VA" where A stands for
a) Acceleration b) Constant
c) Amplitude d) Area of cross section
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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION, MAINTENANCE AND SERVICING**

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- 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 following questions : **(4×5=20)**
- 1) Discuss the role of biomedical Engineer in a hospital.
 - 2) Explain needs and advantages of drawing insurance of medical equipment's in hospital.
 - 3) What care should be taken before the installation of biomedical equipment ?
 - 4) Draw a labelled diagram of a ventilator with all its specifications.
 - 5) What kind of tests and checkups must be performed before the final acceptance of the instrument ?
3. Answer **any two** of following questions : **(2×10=20)**
- 1) Give the Pre installation techniques of the auto analyzer in detail.
 - 2) Explain installation and maintenance procedure of any two cardiac equipment's.
 - 3) Explain the following modes of operation of the synchronous ventilators
 - a) CPAP mode
 - b) S-mode
 - c) S/T mode
 - d) PC mode
 - e) Timed mode.

Set Q



SECTION – II

4. Answer **any four** of following questions : **(4×5=20)**
- 1) Draw any five pictorial safety instructions of the electrosurgical unit and explain each of them.
 - 2) Explain the need and the function of medical gas management.
 - 3) What is an incubator ? Explain its significances.
 - 4) Define and differentiate between CMC and AMC in detail.
 - 5) Explain trouble shooting methods.
5. Answer **any two** of following questions : **(2×10=20)**
- 1) Explain the operation theater with respect to the following.
 - a) Location
 - b) Space requirement for OT
 - c) Design of OT.
 - 2) Differentiate between ICU, NICU and ICCU in terms of life saving equipments.
 - 3) a) Calibration procedure of PH meter
b) ISO and NABH certifications.
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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION, MAINTENANCE AND SERVICING**

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(20×1=20)**
- 1) Sphygmomanometer is used to measure
a) O₂ b) CO₂ c) Heart rate d) Blood Pressure
 - 2) _____ machine is used to remove unwanted fluid from body cavities.
a) Defibrillator b) Ventilators
c) Suction machines d) Anesthesia machine
 - 3) The flow transducer on _____ side measures the gas flow to the patient.
a) Expiration b) a and c c) Inspiration d) None
 - 4) _____ is a mode of synchrony ventilator.
a) CT b) Cm/s/cm c) CPAP d) None
 - 5) In blood flow measurement flow rate "Q = VA" where A stands for
a) Acceleration b) Constant
c) Amplitude d) Area of cross section
 - 6) _____ works at QRS Values.
a) Cardioverter b) Defibrillator
c) Pacemaker d) Heart lung machine
 - 7) QCI is the
a) Quality and Certified Implementation
b) Quality Control and Implementation
c) Quality Council of India
d) None

P.T.O.



- 8) Battery used in patient monitoring systems is of
a) 3 volts b) 6 volts c) 9 volts d) 12 volts
- 9) CPAP stands for
a) Coronary Positive Airway Pressure
b) Continuous Pulmonary Airway Pressure
c) Continuous Positive Airway Pressure
d) Cardiac Positive Airway Pressure
- 10) UPS systems are essential for clean and stable supply during
a) Repairing b) Servicing c) Maintenance d) Calibration
- 11) NICU stand for
a) Neonatal Intensive Care Unit b) Nephro Intensive Care Unit
c) Neuro Intensive Care Unit d) None
- 12) Spirometer is used to measure
a) Lung capacity b) Lung passage c) Lung weight d) Air
- 13) Voltages in x-rays are measured in
a) Milliamp b) KVP c) Millivolt d) KV
- 14) Maintenance record should be maintained for each equipment to indicate entire _____ of maintenance of the equipment.
a) Servicing b) Implanted polyvinyl tubes
c) Repairing d) History
- 15) All the sides of an X-ray machine chamber must be
a) 3" thick b) 9" thick c) 6" thick d) 12" thick
- 16) Autoclave uses
a) Medium pressure steam b) High pressure steam
c) Low pressure steam d) Both a and c
- 17) Sterilizations is done using _____ mixed with chemicals.
a) Boiling water b) Running water
c) Cooled water d) Cool water with chemical
- 18) ECG machine is used to monitor
a) Lung activity b) Heart activity c) Brain activity d) Muscle activity
- 19) Flow meter is used to measure
a) Small diameter tubes b) Large diameter tubes
c) Medium diameter tubes d) None
- 20) Non invasive device used to measure oxygen saturation of patients' blood
a) Spirometer b) Pulse recorder
c) Pulse oximeter d) Pulse stabilizer
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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION, MAINTENANCE AND SERVICING**

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- 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 following questions : **(4×5=20)**
- 1) Discuss the role of biomedical Engineer in a hospital.
 - 2) Explain needs and advantages of drawing insurance of medical equipment's in hospital.
 - 3) What care should be taken before the installation of biomedical equipment ?
 - 4) Draw a labelled diagram of a ventilator with all its specifications.
 - 5) What kind of tests and checkups must be performed before the final acceptance of the instrument ?
3. Answer **any two** of following questions : **(2×10=20)**
- 1) Give the Pre installation techniques of the auto analyzer in detail.
 - 2) Explain installation and maintenance procedure of any two cardiac equipment's.
 - 3) Explain the following modes of operation of the synchronous ventilators
 - a) CPAP mode
 - b) S-mode
 - c) S/T mode
 - d) PC mode
 - e) Timed mode.

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SECTION – II

4. Answer **any four** of following questions : **(4×5=20)**
- 1) Draw any five pictorial safety instructions of the electrosurgical unit and explain each of them.
 - 2) Explain the need and the function of medical gas management.
 - 3) What is an incubator ? Explain its significances.
 - 4) Define and differentiate between CMC and AMC in detail.
 - 5) Explain trouble shooting methods.
5. Answer **any two** of following questions : **(2×10=20)**
- 1) Explain the operation theater with respect to the following.
 - a) Location
 - b) Space requirement for OT
 - c) Design of OT.
 - 2) Differentiate between ICU, NICU and ICCU in terms of life saving equipments.
 - 3) a) Calibration procedure of PH meter
b) ISO and NABH certifications.
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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION, MAINTENANCE AND SERVICING**

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- 1) Autoclave uses
 - a) Medium pressure stream
 - b) High pressure stream
 - c) Low pressure stream
 - d) Both a and c
- 2) Sterilizations is done using _____ mixed with chemicals.
 - a) Boiling water
 - b) Running water
 - c) Cooled water
 - d) Cool water with chemical
- 3) ECG machine is used to monitor
 - a) Lung activity
 - b) Heart activity
 - c) Brain activity
 - d) Muscle activity
- 4) Flow meter is used to measure
 - a) Small diameter tubes
 - b) Large diameter tubes
 - c) Medium diameter tubes
 - d) None
- 5) Non invasive device used to measure oxygen saturation of patients' blood
 - a) Spirometer
 - b) Pulse recorder
 - c) Pulse oximeter
 - d) Pulse stabilizer
- 6) Sphygmomanometer is used to measure
 - a) O₂
 - b) CO₂
 - c) Heart rate
 - d) Blood Pressure
- 7) _____ machine is used to remove unwanted fluid from body cavities.
 - a) Defibrillator
 - b) Ventilators
 - c) Suction machines
 - d) Anesthesia machine

P.T.O.



- 8) The flow transducer on _____ side measures the gas flow to the patient.
a) Expiration b) a and c c) Inspiration d) None
- 9) _____ is a mode of synchrony ventilator.
a) CT b) Cm/s/cm c) CPAP d) None
- 10) In blood flow measurement flow rate " $Q = VA$ " where A stands for
a) Acceleration b) Constant
c) Amplitude d) Area of cross section
- 11) _____ works at QRS Values.
a) Cardioverter b) Defibrillator
c) Pacemaker d) Heart lung machine
- 12) QCI is the
a) Quality and Certified Implementation
b) Quality Control and Implementation
c) Quality Council of India
d) None
- 13) Battery used in patient monitoring systems is of
a) 3 volts b) 6 volts c) 9 volts d) 12 volts
- 14) CPAP stands for
a) Coronary Positive Airway Pressure
b) Continuous Pulmonary Airway Pressure
c) Continuous Positive Airway Pressure
d) Cardiac Positive Airway Pressure
- 15) UPS systems are essential for clean and stable supply during
a) Repairing b) Servicing c) Maintenance d) Calibration
- 16) NICU stand for
a) Neonatal Intensive Care Unit b) Nephro Intensive Care Unit
c) Neuro Intensive Care Unit d) None
- 17) Spirometer is used to measure
a) Lung capacity b) Lung passage c) Lung weight d) Air
- 18) Voltages in x-rays in measured in
a) Milliamp b) KVP c) Millivolt d) KV
- 19) Maintenance record should be maintained for each equipment to indicate entire _____ of maintenance of the equipment.
a) Servicing b) Implanted polyvinyl tubes
c) Repairing d) History
- 20) All the sides of an X-ray machine chamber must be
a) 3" thick b) 9" thick c) 6" thick d) 12" thick



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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION, MAINTENANCE AND SERVICING**

Day and Date : Thursday, 18-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- 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 following questions : **(4×5=20)**
- 1) Discuss the role of biomedical Engineer in a hospital.
 - 2) Explain needs and advantages of drawing insurance of medical equipment's in hospital.
 - 3) What care should be taken before the installation of biomedical equipment ?
 - 4) Draw a labelled diagram of a ventilator with all its specifications.
 - 5) What kind of tests and checkups must be performed before the final acceptance of the instrument ?
3. Answer **any two** of following questions : **(2×10=20)**
- 1) Give the Pre installation techniques of the auto analyzer in detail.
 - 2) Explain installation and maintenance procedure of any two cardiac equipment's.
 - 3) Explain the following modes of operation of the synchronous ventilators
 - a) CPAP mode
 - b) S-mode
 - c) S/T mode
 - d) PC mode
 - e) Timed mode.

Set S



SECTION – II

4. Answer **any four** of following questions : **(4×5=20)**
- 1) Draw any five pictorial safety instructions of the electrosurgical unit and explain each of them.
 - 2) Explain the need and the function of medical gas management.
 - 3) What is an incubator ? Explain its significances.
 - 4) Define and differentiate between CMC and AMC in detail.
 - 5) Explain trouble shooting methods.
5. Answer **any two** of following questions : **(2×10=20)**
- 1) Explain the operation theater with respect to the following.
 - a) Location
 - b) Space requirement for OT
 - c) Design of OT.
 - 2) Differentiate between ICU, NICU and ICCU in terms of life saving equipments.
 - 3) a) Calibration procedure of PH meter
b) ISO and NABH certifications.
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
BIOMEDICAL MICROSYSTEMS**

Day and Date : Saturday, 20-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) The microsystems contains _____ sized devices.
a) m b) cm c) mm d) μm
- 2) One principal application of Silicon Carbide (SiC) is
a) Dimensional stability at high temperature
b) Chemical stability at high temperature
c) Both a) and b)
d) None
- 3) The gallium arsenide contains _____ numbers gallium and arsenic atoms.
a) Equal b) Unequal c) 20 d) 40
- 4) In photolithography the material used for positive resists are
a) PMMA b) 2 component of DQN resist
c) Both a) and b)
d) None
- 5) APCVD is
a) Automatic Pressure Chemical Vapor Deposition
b) Atmospheric Pressure Chemical Vapor Deposition
c) Arsenic Phosphate Chemical Vapor Deposition
d) None
- 6) _____ is a common carrier gas for depositing silicon nitride on silicon substrate in CVD process.
a) O_2 b) NO c) NH_3 d) CO_2
- 7) "Epitaxial deposition has a high risk of explosion as a result of the use of Hydrogen as a carrier gas at a high Temperature"; whether this statement is true or false ?
a) TRUE b) FALSE
c) Either TRUE or FALSE d) None

P.T.O.



- 8) _____ photoresist become more soluble under the shadow of UV light.
a) Positive b) Negative c) Both d) None
- 9) _____ is used in LIGA to create necessary void space in the depth.
a) Substrate b) Mask c) Sacrificial layers d) Photo resist
- 10) SLIGA means
a) Sacrificial LIGA b) Silicon LIGA c) Standard LIGA d) None
- 11) Metal Oxide gas sensor is one type of _____ sensor.
a) Pressure b) Chemical c) Optical d) Bio
- 12) In μ TAS M and N indicates No. of _____ and No. of _____ respectively used in a system.
a) Sensors and components b) Sensors and substrates
c) Silicon's and carbides d) All of the above
- 13) Analyte phase (the input sample) of μ TAS is usually
a) Gas b) Liquid c) Both a) and b) d) Chemical
- 14) In μ TAS Type D micro valve is also known as _____ valve.
a) Pressure thermal b) Thermo pneumatic actuation
c) Thermal d) Micro electro thermo fluidic
- 15) In Cantilever based biosensor the mechanism of transduction is recognized by
a) Micro Mechanical Bend b) Micro Mechanical Twist
c) Micro Mechanical Rotation d) Micro Mechanical Balance
- 16) The complementary relations between adenosine and thymine and cytosine in DNA from the basis of specificity _____ biosensors.
a) Enzymes b) Nucleic Acids
c) Cells and viruses d) Biomimetic
- 17) _____ sensor is used to sense the intensity of light.
a) Thermal b) Chemical c) Optical d) Acoustic
- 18) Micro contact printing is type of
a) Photolithography b) Soft Lithography
c) Etching d) Surface Micromachining
- 19) For type A diabetes patients drug delivery system is used to deliver
a) Insulin b) Glucose c) Sugar d) All
- 20) The _____ technique is used to create structure at Nano scales as small as 30 nm.
a) LIGA b) PVD c) CVD d) Soft Lithography
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
BIOMEDICAL MICROSYSTEMS**

Day and Date : Saturday, 20-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

- 1) Explain the components of microsystems.
- 2) List the properties of silicon.
- 3) Classify methods of epitaxial deposition. Explain Vapor Phase Epitaxy (VPE).
- 4) Explain the etch stop techniques in detail.
- 5) Draw and explain the design steps of Surface micromachining.

III. Solve **any two** questions : **(10×2=20)**

- 1) List application of polymers for MEMS and Microsystems.
- 2) Explain types of Enhanced CVD each in detail.
- 3) Explain LIGA process in detail.

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

- 1) Classification biosensors based on transduction and explain.
- 2) Classify μ TAS. Explain elements of μ TAS with neat diagram.
- 3) With neat diagram explain thermo pneumatic actuation.
- 4) Define pressure sensor. Explain packaged pressure sensors.
- 5) Write a short note on injection molding.

Set P



V. Solve **any two** questions :

(10×2=20)

- 1) Explain fabrication of microstructure on a processed Si wafer using compression molding technique.
 - 2) Classify micro-valves used in μ TAS and explain each with diagram.
 - 3) Write a short note on :
 - i) Cantilever based biosensor.
 - ii) Cell and protein array.
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B.E. (Biomedical Engg.) (Part – II) Examination, 2017
BIOMEDICAL MICROSYSTEMS

Day and Date : Saturday, 20-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) The complementary relations between adenosine and thymine and cytosine in DNA from the basis of specificity _____ biosensors.
a) Enzymes
b) Nucleic Acids
c) Cells and viruses
d) Biomimetic
- 2) _____ sensor is used to sense the intensity of light.
a) Thermal
b) Chemical
c) Optical
d) Acoustic
- 3) Micro contact printing is type of
a) Photolithography
b) Soft Lithography
c) Etching
d) Surface Micromachining
- 4) For type A diabetes patients drug delivery system is used to deliver
a) Insulin
b) Glucose
c) Sugar
d) All
- 5) The _____ technique is used to create structure at Nano scales as small as 30 nm.
a) LIGA
b) PVD
c) CVD
d) Soft Lithography
- 6) The microsystems contains _____ sized devices.
a) m
b) cm
c) mm
d) μm
- 7) One principal application of Silicon Carbide (SiC) is
a) Dimensional stability at high temperature
b) Chemical stability at high temperature
c) Both a) and b)
d) None
- 8) The gallium arsenide contains _____ numbers gallium and arsenic atoms.
a) Equal
b) Unequal
c) 20
d) 40

P.T.O.



- 9) In photolithography the material used for positive resists are
a) PMMA
b) 2 component of DQN resist
c) Both a) and b)
d) None
- 10) APCVD is
a) Automatic Pressure Chemical Vapor Deposition
b) Atmospheric Pressure Chemical Vapor Deposition
c) Arsenic Phosphate Chemical Vapor Deposition
d) None
- 11) _____ is a common carrier gas for depositing silicon nitride on silicon substrate in CVD process.
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b) NO
c) NH₃
d) CO₂
- 12) “Epitaxial deposition has a high risk of explosion as a result of the use of Hydrogen as a carrier gas at a high Temperature”; whether this statement is true or false ?
a) TRUE
b) FALSE
c) Either TRUE or FALSE
d) None
- 13) _____ photoresist become more soluble under the shadow of UV light.
a) Positive
b) Negative
c) Both
d) None
- 14) _____ is used in LIGA to create necessary void space in the depth.
a) Substrate
b) Mask
c) Sacrificial layers
d) Photo resist
- 15) SLIGA means
a) Sacrificial LIGA
b) Silicon LIGA
c) Standard LIGA
d) None
- 16) Metal Oxide gas sensor is one type of _____ sensor.
a) Pressure
b) Chemical
c) Optical
d) Bio
- 17) In μ TAS M and N indicates No. of _____ and No. of _____ respectively used in a system.
a) Sensors and components
b) Sensors and substrates
c) Silicon’s and carbides
d) All of the above
- 18) Analyte phase (the input sample) of μ TAS is usually
a) Gas
b) Liquid
c) Both a) and b)
d) Chemical
- 19) In μ TAS Type D micro valve is also known as _____ valve.
a) Pressure thermal
b) Thermo pneumatic actuation
c) Thermal
d) Micro electro thermo fluidic
- 20) In Cantilever based biosensor the mechanism of transduction is recognized by
a) Micro Mechanical Bend
b) Micro Mechanical Twist
c) Micro Mechanical Rotation
d) Micro Mechanical Balance
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
BIOMEDICAL MICROSYSTEMS**

Day and Date : Saturday, 20-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

- 1) Explain the components of microsystems.
- 2) List the properties of silicon.
- 3) Classify methods of epitaxial deposition. Explain Vapor Phase Epitaxy (VPE).
- 4) Explain the etch stop techniques in detail.
- 5) Draw and explain the design steps of Surface micromachining.

III. Solve **any two** questions : **(10×2=20)**

- 1) List application of polymers for MEMS and Microsystems.
- 2) Explain types of Enhanced CVD each in detail.
- 3) Explain LIGA process in detail.

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

- 1) Classification biosensors based on transduction and explain.
- 2) Classify μ TAS. Explain elements of μ TAS with neat diagram.
- 3) With neat diagram explain thermo pneumatic actuation.
- 4) Define pressure sensor. Explain packaged pressure sensors.
- 5) Write a short note on injection molding.

Set Q



V. Solve **any two** questions :

(10×2=20)

- 1) Explain fabrication of microstructure on a processed Si wafer using compression molding technique.
 - 2) Classify micro-valves used in μ TAS and explain each with diagram.
 - 3) Write a short note on :
 - i) Cantilever based biosensor.
 - ii) Cell and protein array.
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
BIOMEDICAL MICROSYSTEMS**

Day and Date : Saturday, 20-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) Metal Oxide gas sensor is one type of _____ sensor.
a) Pressure b) Chemical c) Optical d) Bio
- 2) In μ TAS M and N indicates No. of _____ and No. of _____ respectively used in a system.
a) Sensors and components b) Sensors and substrates
c) Silicon's and carbides d) All of the above
- 3) Analyte phase (the input sample) of μ TAS is usually
a) Gas b) Liquid c) Both a) and b) d) Chemical
- 4) In μ TAS Type D micro valve is also known as _____ valve.
a) Pressure thermal b) Thermo pneumatic actuation
c) Thermal d) Micro electro thermo fluidic
- 5) In Cantilever based biosensor the mechanism of transduction is recognized by
a) Micro Mechanical Bend b) Micro Mechanical Twist
c) Micro Mechanical Rotation d) Micro Mechanical Balance
- 6) The complementary relations between adenosine and thymine and cytosine in DNA from the basis of specificity _____ biosensors.
a) Enzymes b) Nucleic Acids
c) Cells and viruses d) Biomimetic
- 7) _____ sensor is used to sense the intensity of light.
a) Thermal b) Chemical c) Optical d) Acoustic
- 8) Micro contact printing is type of
a) Photolithography b) Soft Lithography
c) Etching d) Surface Micromachining

P.T.O.



- 9) For type A diabetes patients drug delivery system is used to deliver
a) Insulin b) Glucose c) Sugar d) All
- 10) The _____ technique is used to create structure at Nano scales as small as 30 nm.
a) LIGA b) PVD c) CVD d) Soft Lithography
- 11) The microsystems contains _____ sized devices.
a) m b) cm c) mm d) μm
- 12) One principal application of Silicon Carbide (SiC) is
a) Dimensional stability at high temperature
b) Chemical stability at high temperature
c) Both a) and b)
d) None
- 13) The gallium arsenide contains _____ numbers gallium and arsenic atoms.
a) Equal b) Unequal c) 20 d) 40
- 14) In photolithography the material used for positive resists are
a) PMMA b) 2 component of DQN resist
c) Both a) and b)
d) None
- 15) APCVD is
a) Automatic Pressure Chemical Vapor Deposition
b) Atmospheric Pressure Chemical Vapor Deposition
c) Arsenic Phosphate Chemical Vapor Deposition
d) None
- 16) _____ is a common carrier gas for depositing silicon nitride on silicon substrate in CVD process.
a) O_2 b) NO c) NH_3 d) CO_2
- 17) "Epitaxial deposition has a high risk of explosion as a result of the use of Hydrogen as a carrier gas at a high Temperature"; whether this statement is true or false ?
a) TRUE b) FALSE
c) Either TRUE or FALSE d) None
- 18) _____ photoresist become more soluble under the shadow of UV light.
a) Positive b) Negative c) Both d) None
- 19) _____ is used in LIGA to create necessary void space in the depth.
a) Substrate b) Mask c) Sacrificial layers d) Photo resist
- 20) SLIGA means
a) Sacrificial LIGA b) Silicon LIGA c) Standard LIGA d) None
-



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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
BIOMEDICAL MICROSYSTEMS**

Day and Date : Saturday, 20-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

- 1) Explain the components of microsystems.
- 2) List the properties of silicon.
- 3) Classify methods of epitaxial deposition. Explain Vapor Phase Epitaxy (VPE).
- 4) Explain the etch stop techniques in detail.
- 5) Draw and explain the design steps of Surface micromachining.

III. Solve **any two** questions : **(10×2=20)**

- 1) List application of polymers for MEMS and Microsystems.
- 2) Explain types of Enhanced CVD each in detail.
- 3) Explain LIGA process in detail.

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

- 1) Classification biosensors based on transduction and explain.
- 2) Classify μ TAS. Explain elements of μ TAS with neat diagram.
- 3) With neat diagram explain thermo pneumatic actuation.
- 4) Define pressure sensor. Explain packaged pressure sensors.
- 5) Write a short note on injection molding.

Set R



V. Solve **any two** questions :

(10×2=20)

- 1) Explain fabrication of microstructure on a processed Si wafer using compression molding technique.
 - 2) Classify micro-valves used in μ TAS and explain each with diagram.
 - 3) Write a short note on :
 - i) Cantilever based biosensor.
 - ii) Cell and protein array.
-



SLR-VB – 375

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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
BIOMEDICAL MICROSYSTEMS**

Day and Date : Saturday, 20-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

2) **Answer MCQ/Objective type questions on Page No. 3 only. 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) _____ is a common carrier gas for depositing silicon nitride on silicon substrate in CVD process.
a) O₂ b) NO c) NH₃ d) CO₂
- 2) "Epitaxial deposition has a high risk of explosion as a result of the use of Hydrogen as a carrier gas at a high Temperature"; whether this statement is true or false ?
a) TRUE b) FALSE
c) Either TRUE or FALSE d) None
- 3) _____ photoresist become more soluble under the shadow of UV light.
a) Positive b) Negative c) Both d) None
- 4) _____ is used in LIGA to create necessary void space in the depth.
a) Substrate b) Mask c) Sacrificial layers d) Photo resist
- 5) SLIGA means
a) Sacrificial LIGA b) Silicon LIGA c) Standard LIGA d) None
- 6) Metal Oxide gas sensor is one type of _____ sensor.
a) Pressure b) Chemical c) Optical d) Bio
- 7) In μ TAS M and N indicates No. of _____ and No. of _____ respectively used in a system.
a) Sensors and components b) Sensors and substrates
c) Silicon's and carbides d) All of the above
- 8) Analyte phase (the input sample) of μ TAS is usually
a) Gas b) Liquid c) Both a) and b) d) Chemical
- 9) In μ TAS Type D micro valve is also known as _____ valve.
a) Pressure thermal b) Thermo pneumatic actuation
c) Thermal d) Micro electro thermo fluidic

P.T.O.



- 10) In Cantilever based biosensor the mechanism of transduction is recognized by
a) Micro Mechanical Bend b) Micro Mechanical Twist
c) Micro Mechanical Rotation d) Micro Mechanical Balance
- 11) The complementary relations between adenosine and thymine and cytosine in DNA from the basis of specificity _____ biosensors.
a) Enzymes b) Nucleic Acids
c) Cells and viruses d) Biomimetic
- 12) _____ sensor is used to sense the intensity of light.
a) Thermal b) Chemical c) Optical d) Acoustic
- 13) Micro contact printing is type of
a) Photolithography b) Soft Lithography
c) Etching d) Surface Micromachining
- 14) For type A diabetes patients drug delivery system is used to deliver
a) Insulin b) Glucose c) Sugar d) All
- 15) The _____ technique is used to create structure at Nano scales as small as 30 nm.
a) LIGA b) PVD c) CVD d) Soft Lithography
- 16) The microsystems contains _____ sized devices.
a) m b) cm c) mm d) μm
- 17) One principal application of Silicon Carbide (SiC) is
a) Dimensional stability at high temperature
b) Chemical stability at high temperature
c) Both a) and b)
d) None
- 18) The gallium arsenide contains _____ numbers gallium and arsenic atoms.
a) Equal b) Unequal c) 20 d) 40
- 19) In photolithography the material used for positive resists are
a) PMMA b) 2 component of DQN resist
c) Both a) and b) d) None
- 20) APCVD is
a) Automatic Pressure Chemical Vapor Deposition
b) Atmospheric Pressure Chemical Vapor Deposition
c) Arsenic Phosphate Chemical Vapor Deposition
d) None
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
BIOMEDICAL MICROSYSTEMS**

Day and Date : Saturday, 20-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

II. Solve **any four** questions : **(5×4=20)**

- 1) Explain the components of microsystems.
- 2) List the properties of silicon.
- 3) Classify methods of epitaxial deposition. Explain Vapor Phase Epitaxy (VPE).
- 4) Explain the etch stop techniques in detail.
- 5) Draw and explain the design steps of Surface micromachining.

III. Solve **any two** questions : **(10×2=20)**

- 1) List application of polymers for MEMS and Microsystems.
- 2) Explain types of Enhanced CVD each in detail.
- 3) Explain LIGA process in detail.

SECTION – II

IV. Solve **any four** questions : **(5×4=20)**

- 1) Classification biosensors based on transduction and explain.
- 2) Classify μ TAS. Explain elements of μ TAS with neat diagram.
- 3) With neat diagram explain thermo pneumatic actuation.
- 4) Define pressure sensor. Explain packaged pressure sensors.
- 5) Write a short note on injection molding.

Set S



V. Solve **any two** questions :

(10×2=20)

- 1) Explain fabrication of microstructure on a processed Si wafer using compression molding technique.
 - 2) Classify micro-valves used in μ TAS and explain each with diagram.
 - 3) Write a short note on :
 - i) Cantilever based biosensor.
 - ii) Cell and protein array.
-



SLR-VB – 376

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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Tuesday, 23-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

I. Choose correct answer :

(20×1=20)

- 1) Hydrogen and potassium ions are secreted into the tubular fluid in the
 - a) renal corpuscle
 - b) proximal convoluted tubule
 - c) nephron loop
 - d) distal convoluted tubule
- 2) Connective tissue exists in different forms (within the human body) from liquids to very hard solids of the presence of the
 - a) Cartilage
 - b) Collagen and elastin
 - c) Extracellular matrix
 - d) Cells are surrounded by membranes
- 3) Which of the following is a function of epithelial tissue ?
 - a) Conduction of action potentials
 - b) Secretion and absorption of molecules
 - c) Support and covering of other tissue types
 - d) Contraction and relaxation
- 4) What is the most common cause of renal dysfunction in Cirrhosis ?
 - a) Spontaneous Bacterial Peritonitis
 - b) Hypovolemia due to Haematemesis
 - c) Intrinsic Renal Disease
 - d) Hepatorenal Syndrome
- 5) According to the sliding filament mechanism of skeletal-muscle contraction, during contraction
 - a) The thick filaments stay the same size but the thin filaments shorten
 - b) The sarcomeres shorten
 - c) The thin filaments stay the same size but the thick filaments shorten
 - d) Both thick and thin filaments shorten
- 6) Which of the following is an important function of ATP in skeletal muscle ?
 - a) It is required for the dissociation of actin from myosin
 - b) It is hydrolyzed by the ATPase that pumps calcium ions into the sarcoplasmic reticulum
 - c) It is used for the phosphorylation of myosin
 - d) a and b
- 7) What is sarcomere ?
 - a) Parts between two H line
 - b) Parts between two A
 - c) Parts between two Z
 - d) Parts between two I band

P.T.O.



- 8) The layer of connective tissue that separates the muscle tissue into small sections is called the
a) aponeuroses b) epimysium c) perimysium d) endomysium
- 9) Which of these statements is correct regarding muscle contraction ?
a) All motor units act together
b) Muscle contraction continues for long periods after nervous stimulation ceases
c) The cross bridges bind to the actin and shorten the sarcomeres
d) Dystrophin is not needed to strengthen the contracting muscle cell
- 10) The basic unit of contraction is the
a) myosin b) actin c) Z-Lines d) sarcomeres
- 11) What is a pluripotent stem cell ?
a) Cells found in the inner mass of blastocyst that can differentiate into over 200 different cell types except placental cells
b) Stem cells derived from adult tissue, cord blood and bone marrow and that do not differentiate into all the different cell types
c) Any progenitor cell found in human embryos
d) None of the above
- 12) Which of the following statements about liver failure are correct ?
a) Severe hyperglycaemia develops
b) Plasma levels of ammonia will rise
c) The digestion and absorption of fats is impaired
d) The plasma oncotic pressure will rise
- 13) In foetal and embryonic life, red blood cells are formed in
a) spleen and liver b) liver and kidneys
c) kidneys and lungs d) pancreas and liver
- 14) Method of removal of kidney stones in which non-electrical shock waves are bombarded on stones is classified as
a) angioplasty b) lithotripsy c) endoscopy d) angiography
- 15) Each kidney contains approximately
a) 1 thousand nephrons b) 1 million nephrons
c) 1 billion nephrons d) 1 hundred nephrons
- 16) Kind of dialysis in which blood of patient is pumped through dialyzer is classified as
a) hypotonic dialysis b) peritoneal dialysis
c) abdominal dialysis d) haemodialysis
- 17) Collagen is
a) Lipid b) Fibrous protein c) Globular protein d) Carbohydrate
- 18) Skeletal muscles are also known as
a) striated muscles b) impulsive muscles
c) reflexive muscles d) adipose muscles
- 19) Each muscle fiber is directly surrounded by connective tissue called the
a) perimysium b) fascia c) endomysium d) epimysium
- 20) Junction between two neurons is called as
a) node of Ranvier b) loop of Henle c) synapse d) dendrit
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Tuesday, 23-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

II. Solve any four : **(4×5=20)**

- 1) Define scaffolds. What are the desired properties for the suitable scaffold in tissue engineering ?
- 2) Demonstrate the continuous nutrient transport in the bioreactor with an example.
- 3) Explain the nerve regeneration with diagram.
- 4) What do you understand by the potency of the stem cells ? Briefly describe the types of potency of stem cells.
- 5) Explain the development studies of cartilage.

III. Solve any two : **(2×10=20)**

- 1) Explain about the importance of stromal cells and tissue composition.
- 2) Explain the different methodology and devices for shear stress effect on cellular function.
- 3) Define tissue engineering. Mention the basic clinical goals and fundamental challenges in tissue engineering.

SECTION – II

IV. Solve any four : **(4×5=20)**

- 1) Describe the concept of bio-artificial kidney.
- 2) Explain the hepatocyte transplantation.
- 3) Explain about the reconstruction of connective tissue.
- 4) Explain about the hematopoietic growth factors for bone marrow.
- 5) Describe the methods of cell seeding in scaffolds.

V. Solve any two : **(2×10=20)**

- 1) Explain about the injury and repair mechanism of skeletal muscles.
- 2) What are the defining characteristics of stem cells ? Describe the adult and embryonic stem cells.
- 3) Explain about the in-vitro neural circuits and bio sensors.
- 4) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.



SLR-VB – 376

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Set **Q**

**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Tuesday, 23-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

I. Choose correct answer :

(20x1=20)

- 1) Kind of dialysis in which blood of patient is pumped through dialyzer is classified as
 - a) hypotonic dialysis
 - b) peritoneal dialysis
 - c) abdominal dialysis
 - d) haemodialysis
- 2) Collagen is
 - a) Lipid
 - b) Fibrous protein
 - c) Globular protein
 - d) Carbohydrate
- 3) Skeletal muscles are also known as
 - a) striated muscles
 - b) impulsive muscles
 - c) reflexive muscles
 - d) adipose muscles
- 4) Each muscle fiber is directly surrounded by connective tissue called the
 - a) perimysium
 - b) fascia
 - c) endomysium
 - d) epimysium
- 5) Junction between two neurons is called as
 - a) node of Ranvier
 - b) loop of Henle
 - c) synapse
 - d) dendrit
- 6) Hydrogen and potassium ions are secreted into the tubular fluid in the
 - a) renal corpuscle
 - b) proximal convoluted tubule
 - c) nephron loop
 - d) distal convoluted tubule
- 7) Connective tissue exists in different forms (within the human body) from liquids to very hard solids of the presence of the
 - a) Cartilage
 - b) Collagen and elastin
 - c) Extracellular matrix
 - d) Cells are surrounded by membranes
- 8) Which of the following is a function of epithelial tissue ?
 - a) Conduction of action potentials
 - b) Secretion and absorption of molecules
 - c) Support and covering of other tissue types
 - d) Contraction and relaxation
- 9) What is the most common cause of renal dysfunction in Cirrhosis ?
 - a) Spontaneous Bacterial Peritonitis
 - b) Hypovolemia due to Haematemesis
 - c) Intrinsic Renal Disease
 - d) Hepatorenal Syndrome

P.T.O.



- 10) According to the sliding filament mechanism of skeletal-muscle contraction, during contraction
- The thick filaments stay the same size but the thin filaments shorten
 - The sarcomeres shorten
 - The thin filaments stay the same size but the thick filaments shorten
 - Both thick and thin filaments shorten
- 11) Which of the following is an important function of ATP in skeletal muscle ?
- It is required for the dissociation of actin from myosin
 - It is hydrolyzed by the ATPase that pumps calcium ions into the sarcoplasmic reticulum
 - It is used for the phosphorylation of myosin
 - a and b
- 12) What is sarcomere ?
- Parts between two H line
 - Parts between two A
 - Parts between two Z
 - Parts between two I band
- 13) The layer of connective tissue that separates the muscle tissue into small sections is called the
- aponeuroses
 - epimysium
 - perimysium
 - endomysium
- 14) Which of these statements is correct regarding muscle contraction ?
- All motor units act together
 - Muscle contraction continues for long periods after nervous stimulation ceases
 - The cross bridges bind to the actin and shorten the sarcomeres
 - Dystrophin is not needed to strengthen the contracting muscle cell
- 15) The basic unit of contraction is the
- myosin
 - actin
 - Z-Lines
 - sarcomeres
- 16) What is a pluripotent stem cell ?
- Cells found in the inner mass of blastocyst that can differentiate into over 200 different cell types except placental cells
 - Stem cells derived from adult tissue, cord blood and bone marrow and that do not differentiate into all the different cell types
 - Any progenitor cell found in human embryos
 - None of the above
- 17) Which of the following statements about liver failure are correct ?
- Severe hyperglycaemia develops
 - Plasma levels of ammonia will rise
 - The digestion and absorption of fats is impaired
 - The plasma oncotic pressure will rise
- 18) In foetal and embryonic life, red blood cells are formed in
- spleen and liver
 - liver and kidneys
 - kidneys and lungs
 - pancreas and liver
- 19) Method of removal of kidney stones in which non-electrical shock waves are bombarded on stones is classified as
- angioplasty
 - lithotripsy
 - endoscopy
 - angiography
- 20) Each kidney contains approximately
- 1 thousand nephrons
 - 1 million nephrons
 - 1 billion nephrons
 - 1 hundred nephrons



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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Tuesday, 23-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

II. Solve any four : **(4×5=20)**

- 1) Define scaffolds. What are the desired properties for the suitable scaffold in tissue engineering ?
- 2) Demonstrate the continuous nutrient transport in the bioreactor with an example.
- 3) Explain the nerve regeneration with diagram.
- 4) What do you understand by the potency of the stem cells ? Briefly describe the types of potency of stem cells.
- 5) Explain the development studies of cartilage.

III. Solve any two : **(2×10=20)**

- 1) Explain about the importance of stromal cells and tissue composition.
- 2) Explain the different methodology and devices for shear stress effect on cellular function.
- 3) Define tissue engineering. Mention the basic clinical goals and fundamental challenges in tissue engineering.

SECTION – II

IV. Solve any four : **(4×5=20)**

- 1) Describe the concept of bio-artificial kidney.
- 2) Explain the hepatocyte transplantation.
- 3) Explain about the reconstruction of connective tissue.
- 4) Explain about the hematopoietic growth factors for bone marrow.
- 5) Describe the methods of cell seeding in scaffolds.

V. Solve any two : **(2×10=20)**

- 1) Explain about the injury and repair mechanism of skeletal muscles.
- 2) What are the defining characteristics of stem cells ? Describe the adult and embryonic stem cells.
- 3) Explain about the in-vitro neural circuits and bio sensors.
- 4) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.

Set Q



SLR-VB – 376

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Set **R**

**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Tuesday, 23-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

I. Choose correct answer :

(20×1=20)

- 1) What is a pluripotent stem cell ?
 - a) Cells found in the inner mass of blastocyst that can differentiate into over 200 different cell types except placental cells
 - b) Stem cells derived from adult tissue, cord blood and bone marrow and that do not differentiate into all the different cell types
 - c) Any progenitor cell found in human embryos
 - d) None of the above
- 2) Which of the following statements about liver failure are correct ?
 - a) Severe hyperglycaemia develops
 - b) Plasma levels of ammonia will rise
 - c) The digestion and absorption of fats is impaired
 - d) The plasma oncotic pressure will rise
- 3) In foetal and embryonic life, red blood cells are formed in
 - a) spleen and liver
 - b) liver and kidneys
 - c) kidneys and lungs
 - d) pancreas and liver
- 4) Method of removal of kidney stones in which non-electrical shock waves are bombarded on stones is classified as
 - a) angioplasty
 - b) lithotripsy
 - c) endoscopy
 - d) angiography
- 5) Each kidney contains approximately
 - a) 1 thousand nephrons
 - b) 1 million nephrons
 - c) 1 billion nephrons
 - d) 1 hundred nephrons
- 6) Kind of dialysis in which blood of patient is pumped through dialyzer is classified as
 - a) hypotonic dialysis
 - b) peritoneal dialysis
 - c) abdominal dialysis
 - d) haemodialysis
- 7) Collagen is
 - a) Lipid
 - b) Fibrous protein
 - c) Globular protein
 - d) Carbohydrate

P.T.O.



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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Tuesday, 23-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

II. Solve any four : **(4×5=20)**

- 1) Define scaffolds. What are the desired properties for the suitable scaffold in tissue engineering ?
- 2) Demonstrate the continuous nutrient transport in the bioreactor with an example.
- 3) Explain the nerve regeneration with diagram.
- 4) What do you understand by the potency of the stem cells ? Briefly describe the types of potency of stem cells.
- 5) Explain the development studies of cartilage.

III. Solve any two : **(2×10=20)**

- 1) Explain about the importance of stromal cells and tissue composition.
- 2) Explain the different methodology and devices for shear stress effect on cellular function.
- 3) Define tissue engineering. Mention the basic clinical goals and fundamental challenges in tissue engineering.

SECTION – II

IV. Solve any four : **(4×5=20)**

- 1) Describe the concept of bio-artificial kidney.
- 2) Explain the hepatocyte transplantation.
- 3) Explain about the reconstruction of connective tissue.
- 4) Explain about the hematopoietic growth factors for bone marrow.
- 5) Describe the methods of cell seeding in scaffolds.

V. Solve any two : **(2×10=20)**

- 1) Explain about the injury and repair mechanism of skeletal muscles.
- 2) What are the defining characteristics of stem cells ? Describe the adult and embryonic stem cells.
- 3) Explain about the in-vitro neural circuits and bio sensors.
- 4) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.



SLR-VB – 376

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Set **S**

**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Tuesday, 23-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

I. Choose correct answer :

(20×1=20)

- 1) Which of the following is an important function of ATP in skeletal muscle ?
 - a) It is required for the dissociation of actin from myosin
 - b) It is hydrolyzed by the ATPase that pumps calcium ions into the sarcoplasmic reticulum
 - c) It is used for the phosphorylation of myosin
 - d) a and b
- 2) What is sarcomere ?
 - a) Parts between two H line
 - b) Parts between two A
 - c) Parts between two Z
 - d) Parts between two I band
- 3) The layer of connective tissue that separates the muscle tissue into small sections is called the
 - a) aponeuroses
 - b) epimysium
 - c) perimysium
 - d) endomysium
- 4) Which of these statements is correct regarding muscle contraction ?
 - a) All motor units act together
 - b) Muscle contraction continues for long periods after nervous stimulation ceases
 - c) The cross bridges bind to the actin and shorten the sarcomeres
 - d) Dystrophin is not needed to strengthen the contracting muscle cell
- 5) The basic unit of contraction is the
 - a) myosin
 - b) actin
 - c) Z-Lines
 - d) sarcomeres
- 6) What is a pluripotent stem cell ?
 - a) Cells found in the inner mass of blastocyst that can differentiate into over 200 different cell types except placental cells
 - b) Stem cells derived from adult tissue, cord blood and bone marrow and that do not differentiate into all the different cell types
 - c) Any progenitor cell found in human embryos
 - d) None of the above

P.T.O.



- 7) Which of the following statements about liver failure are correct ?
- Severe hyperglycaemia develops
 - Plasma levels of ammonia will rise
 - The digestion and absorption of fats is impaired
 - The plasma oncotic pressure will rise
- 8) In foetal and embryonic life, red blood cells are formed in
- spleen and liver
 - liver and kidneys
 - kidneys and lungs
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- 9) Method of removal of kidney stones in which non-electrical shock waves are bombarded on stones is classified as
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- 10) Each kidney contains approximately
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- 11) Kind of dialysis in which blood of patient is pumped through dialyzer is classified as
- hypotonic dialysis
 - peritoneal dialysis
 - abdominal dialysis
 - haemodialysis
- 12) Collagen is
- Lipid
 - Fibrous protein
 - Globular protein
 - Carbohydrate
- 13) Skeletal muscles are also known as
- striated muscles
 - impulsive muscles
 - reflexive muscles
 - adipose muscles
- 14) Each muscle fiber is directly surrounded by connective tissue called the
- perimysium
 - fascia
 - endomysium
 - epimysium
- 15) Junction between two neurons is called as
- node of Ranvier
 - loop of Henle
 - synapse
 - dendrit
- 16) Hydrogen and potassium ions are secreted into the tubular fluid in the
- renal corpuscle
 - proximal convoluted tubule
 - nephron loop
 - distal convoluted tubule
- 17) Connective tissue exists in different forms (within the human body) from liquids to very hard solids of the presence of the
- Cartilage
 - Collagen and elastin
 - Extracellular matrix
 - Cells are surrounded by membranes
- 18) Which of the following is a function of epithelial tissue ?
- Conduction of action potentials
 - Secretion and absorption of molecules
 - Support and covering of other tissue types
 - Contraction and relaxation
- 19) What is the most common cause of renal dysfunction in Cirrhosis ?
- Spontaneous Bacterial Peritonitis
 - Hypovolemia due to Haematemesis
 - Intrinsic Renal Disease
 - Hepatorenal Syndrome
- 20) According to the sliding filament mechanism of skeletal-muscle contraction, during contraction
- The thick filaments stay the same size but the thin filaments shorten
 - The sarcomeres shorten
 - The thin filaments stay the same size but the thick filaments shorten
 - Both thick and thin filaments shorten



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| Seat No. | |
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Tuesday, 23-5-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

II. Solve any four : **(4×5=20)**

- 1) Define scaffolds. What are the desired properties for the suitable scaffold in tissue engineering ?
- 2) Demonstrate the continuous nutrient transport in the bioreactor with an example.
- 3) Explain the nerve regeneration with diagram.
- 4) What do you understand by the potency of the stem cells ? Briefly describe the types of potency of stem cells.
- 5) Explain the development studies of cartilage.

III. Solve any two : **(2×10=20)**

- 1) Explain about the importance of stromal cells and tissue composition.
- 2) Explain the different methodology and devices for shear stress effect on cellular function.
- 3) Define tissue engineering. Mention the basic clinical goals and fundamental challenges in tissue engineering.

SECTION – II

IV. Solve any four : **(4×5=20)**

- 1) Describe the concept of bio-artificial kidney.
- 2) Explain the hepatocyte transplantation.
- 3) Explain about the reconstruction of connective tissue.
- 4) Explain about the hematopoietic growth factors for bone marrow.
- 5) Describe the methods of cell seeding in scaffolds.

V. Solve any two : **(2×10=20)**

- 1) Explain about the injury and repair mechanism of skeletal muscles.
- 2) What are the defining characteristics of stem cells ? Describe the adult and embryonic stem cells.
- 3) Explain about the in-vitro neural circuits and bio sensors.
- 4) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.

