



SLR-TJ – 397

Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
(New – CBCS)
ENGINEERING MATHEMATICS – III**

Day and Date : Tuesday, 12-12-2017
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) $L\{t^n \cdot f(t)\} = \dots$ where $\phi(s) = L\{f(t)\}$.

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

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

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

d) None

2) Regular function with constant Modulus is

a) Constant

b) Variable

c) Both a) and b)

d) None

3) $L\{\text{Sinhat}\} =$

a) $\frac{a}{a^2 - s^2}$

b) $\frac{a}{s^2 + a^2}$

c) $\frac{a}{s^2 - a^2}$

d) $\frac{s}{s^2 + a^2}$

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

a) $\frac{1}{2}e^{\frac{5}{2}t}$

b) $-\frac{1}{2}e^{\frac{5}{2}t}$

c) $\frac{1}{2}e^{\frac{-5}{2}t}$

d) $\frac{1}{4}e^{\frac{5}{2}t}$

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

6) $L\left\{\frac{1}{t}f(t)\right\} =$ _____ where $\phi(s) = L\{f(t)\}$

a) $\int_0^{\infty} \phi(s) ds$ b) $\int_2^{\infty} \phi(s) ds$ c) $\int_{-\infty}^{\infty} \phi(s) ds$ d) $\int_s^{\infty} \phi(s) ds$

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

a) $K = 1$ b) $K = 3$ c) $K = 2$ d) $K = 4$

8) Which of the following is the fixed point of Bilinear transformation $w = \frac{z-4}{2z-5}$?

a) $z = 2$ b) $z = 7$ c) $z = 8$ d) $z = 4$

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) Not constant c) Variable d) None

12) Fourier expansion of an even 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) $\frac{4}{\pi} \left\{ \sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \dots \right\}$ 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) Examination, 2017
(New – CBCS)
ENGINEERING MATHEMATICS – III**

Day and Date : Tuesday, 12-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

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

2. Attempt **any four** :

(4×4=16)

1) Evaluate $\int_0^{\infty} e^{-t} \cdot \frac{\sin^2 t}{t} dt$.

2) Find the constants a, b, c, d, e if $f(z) = (ax^4 + bx^2y^2 + (y^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy)$ 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

$$f(t) = a \sin pt \quad 0 < t < \frac{\pi}{p}$$

$$= 0 \quad \frac{\pi}{p} < t < \frac{2\pi}{p} \quad \text{and} \quad f(t) = f\left(t + \frac{2\pi}{p}\right)$$

5) Find Laplace transform of $\int_0^t u \cdot \cosh u \, du$.



3. Attempt **any two** :

(6×2=12)

- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{(s+2)^2}{(s^2+4s+8)^2}$ by using convolution method.
- 2) If $f(z) = u + iv$ is analytic and $u + v = e^x(\cos y + \sin y)$
- 3) Solve using Laplace transform $3\frac{dy}{dt} + 2y = e^{3t}$ $y = 1$ at $t = 0$.

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 deduce 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 $\cosh x$ $h = 1, 2, \dots$ is orthogonal on $(0, 2\pi)$
- 4) Find $\int_C f \circ g dz$ 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 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 of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in the interval $0 \leq x \leq 2\pi$ and $f(x+2\pi) = f(x)$.
- 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 $w = \frac{z-4}{2z-5}$?
a) $z = 2$ b) $z = 7$ c) $z = 8$ d) $z = 4$
- 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) Not constant c) Variable d) None
- 5) Fourier expansion of an even 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) $\frac{4}{\pi} \left\{ \sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \dots \right\}$ 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) $L\{t^n \cdot f(t)\} = \dots$ where $\phi(s) = L\{f(t)\}$.

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

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

- 9) Regular function with constant Modulus is

- a) Constant b) Variable
 c) Both a) and b) d) None

- 10) $L\{\text{Sinhat}\} =$

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

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

a) $\frac{1}{2}e^{\frac{5}{2}t}$ b) $-\frac{1}{2}e^{\frac{5}{2}t}$ c) $\frac{1}{2}e^{-\frac{5}{2}t}$ d) $\frac{1}{4}e^{\frac{5}{2}t}$

- 12) Let $L\{f_1(t)\} = \phi_1(s)$ and $L\{f_2(t)\} = \phi_2(s)$. Then by convolution theorem

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c) $\int_0^t f_1(u) \cdot f_2(t-u) du$ d) None

13) $L\left\{\frac{1}{t}f(t)\right\} = \underline{\hspace{2cm}}$ where $\phi(s) = L\{f(t)\}$

a) $\int_0^{\infty} \phi(s) ds$ b) $\int_2^{\infty} \phi(s) ds$ c) $\int_{-\infty}^{\infty} \phi(s) ds$ d) $\int_s^{\infty} \phi(s) ds$

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SECTION – I

2. Attempt **any four** :

(4×4=16)

1) Evaluate $\int_0^{\infty} e^{-t} \cdot \frac{\sin^2 t}{t} dt$.

2) Find the constants a, b, c, d, e if $f(z) = (ax^4 + bx^2y^2 + (y^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy)$ 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

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5) Find Laplace transform of $\int_0^t u \cdot \cosh u \, du$.

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- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{(s+2)^2}{(s^2+4s+8)^2}$ by using convolution method.
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SECTION – II

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- 1) Evaluate $\int_0^{1+i} z^2 dz$ along
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MCQ/Objective Type Questions

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(1×14=14)

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

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

2) $L\left\{\frac{1}{t}f(t)\right\} =$ _____ where $\phi(s) = L\{f(t)\}$

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P.T.O.



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SECTION – II

4. Attempt **any four** :

(4×4=16)

- 1) Evaluate $\int_0^{1+i} z^2 dz$ along
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Duration : 30 Minutes

Marks : 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) Not constant |
| c) Variable | d) None |

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

- | | | | |
|---------|-----------|-------------------|---------|
| a) Sine | b) Cosine | c) Both a) and b) | d) None |
|---------|-----------|-------------------|---------|

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

- | | |
|--|--|
| a) $\frac{4}{\pi} \left\{ \sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \dots \right\}$ | 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 |
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P.T.O.



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7) Regular function with constant Modulus is

a) Constant

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d) None

8) $L\{\text{Sinhat}\} =$

a) $\frac{a}{a^2 - s^2}$

b) $\frac{a}{s^2 + a^2}$

c) $\frac{a}{s^2 - a^2}$

d) $\frac{s}{s^2 + a^2}$

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

a) $\frac{1}{2}e^{\frac{5}{2}t}$

b) $-\frac{1}{2}e^{\frac{5}{2}t}$

c) $\frac{1}{2}e^{-\frac{5}{2}t}$

d) $\frac{1}{4}e^{\frac{5}{2}t}$

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

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

d) None

11) $L\left\{\frac{1}{t}f(t)\right\} = \underline{\hspace{2cm}}$ where $\phi(s) = L\{f(t)\}$

a) $\int_0^\infty \phi(s) ds$

b) $\int_2^\infty \phi(s) ds$

c) $\int_{-\infty}^\infty \phi(s) ds$

d) $\int_s^\infty \phi(s) ds$

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

a) $K = 1$

b) $K = 3$

c) $K = 2$

d) $K = 4$

13) Which of the following is the fixed point of Bilinear transformation $w = \frac{z-4}{2z-5}$?

a) $z = 2$

b) $z = 7$

c) $z = 8$

d) $z = 4$

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

a) $2i$

b) $2\pi i$

c) $-2\pi i$

d) 0



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
(New – CBCS)
ENGINEERING MATHEMATICS – III**

Day and Date : Tuesday, 12-12-2017
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 **whenever** necessary.

SECTION – I

2. Attempt **any four** :

(4×4=16)

1) Evaluate $\int_0^{\infty} e^{-t} \cdot \frac{\sin^2 t}{t} dt$.

2) Find the constants a, b, c, d, e if $f(z) = (ax^4 + bx^2y^2 + (y^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy)$ 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

$$f(t) = a \sin pt \quad 0 < t < \frac{\pi}{p}$$

$$= 0 \quad \frac{\pi}{p} < t < \frac{2\pi}{p} \quad \text{and} \quad f(t) = f\left(t + \frac{2\pi}{p}\right)$$

5) Find Laplace transform of $\int_0^t u \cdot \cosh u \, du$.



3. Attempt **any two** :

(6×2=12)

- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{(s+2)^2}{(s^2+4s+8)^2}$ by using convolution method.
- 2) If $f(z) = u + iv$ is analytic and $u + v = e^x(\cos y + \sin y)$
- 3) Solve using Laplace transform $3\frac{dy}{dt} + 2y = e^{3t}$ $y = 1$ at $t = 0$.

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 deduce 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 $\cosh x$ $h = 1, 2, \dots$ is orthogonal on $(0, 2\pi)$
- 4) Find $\int_C f(z) dz$ 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 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 of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in the interval $0 \leq x \leq 2\pi$ and $f(x+2\pi) = f(x)$.
- 3) Find the Fourier expansion of $f(x) = 2x - x^2$ $0 \leq x \leq 3$ whose period 3.



SLR-TJ – 398

Seat No.	
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**S.E. (Biomedical) (Part – I) (New CBCS) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Thursday, 14-12-2017
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) The _____ of a cell is the most critical factor in determining its function.
a) size b) shape c) age d) chromosome
- 2) The only blood vessels whose walls permit exchange between the blood and the surrounding interstitial fluid are the _____.
a) venules b) capillaries
c) arterioles d) veins
- 3) The formed elements of the blood are made up of all of the following except _____.
a) RBC's b) WBC's c) Plasma d) Platelets
- 4) O₂ and CO₂ are exchanged in the lungs and through all cell membranes by _____.
a) Active transport b) Diffusion
c) Osmosis d) Drift

P.T.O.



- 5) The conducting passage ways of respiratory system include all of the following except _____
- a) Pharynx b) Larynx
c) Trachea d) Alveoli
- 6) Compared to arteries, veins are _____
- a) Move elastic b) Move smoother
c) Hold their shape better d) Have thinner
- 7) Sinu atrial node is located at _____
- a) Right atrium b) Right ventricle
c) Left atrium d) Left ventricle
- 8) _____ is the master gland of endocrine system.
- a) Adrenal b) Pancreas c) Thyroid d) Pituitary
- 9) Saliva contains an enzyme that acts upon _____ of the following nutrients.
- a) Starches b) Proteins c) Fats d) Minerals
- 10) _____ controls body temperature, steep and appetite.
- a) Adrenal gland b) Hypothalamus
c) Pancreas d) Thalamus
- 11) _____ is a joint at which an impulse is transmitted from one neuron to another neuron.
- a) Synapse b) Terminal plate
c) Dendrite d) Nerve center
- 12) _____ is the large bone found superior to the patella and inferior to ischium.
- a) Calcaneus b) Femur c) Tibia d) Ulna
- 13) _____ is the body cavity that contains the pituitary gland.
- a) Abdominal b) Cranial c) Spinal d) Thorax
- 14) _____ is the flexible connective tissue that is attached to bones at the joints.
- a) Adipose b) Cartilage c) Muscle d) Nerve



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

Day and Date : Thursday, 14-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Explain polarization and depolarization process of a cell with necessary diagram.
- 2) Define and explain concept of Einthoven's triangle.
- 3) Draw structure of skin and list any four functions of skin.
- 4) Explain various types of heart valves and mention function of each.
- 5) Differentiate between inspiration and expiration process of respiratory system.

3. Attempt **any two** : **(6×2=12)**

- 1) Explain the functions of stomach and large intestine of a digestive system with necessary figure.
- 2) With the help of diagram explain working of conduction system of heart.
- 3) Write a short note on :
 - a) Blood composition.
 - b) Blood groups.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

- 1) Explain the structure and function of nephron.
- 2) Draw and name complete structure eye and formation of image on retina.
- 3) Define and explain reflex action process and reflex arcs.
- 4) Differentiate between endocrine and exocrine glands.
- 5) Explain the structure of neuron with neat figure.

Set P



5. Attempt **any 2** :

(6×2=12)

- 1) With the help of neat diagram explain process of urine formation in detail.
 - 2) Explain process of hearing mechanism with necessary diagram.
 - 3) Write a short note on :
 - a) Female reproductive system.
 - b) Ophthalmoscope.
-



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Seat No.	
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Set	Q
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**S.E. (Biomedical) (Part – I) (New CBCS) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Thursday, 14-12-2017
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) _____ is the master gland of endocrine system.
a) Adrenal b) Pancreas c) Thyroid d) Pituitary
- 2) Saliva contains an enzyme that acts upon _____ of the following nutrients.
a) Starches b) Proteins c) Fats d) Minerals
- 3) _____ controls body temperature, sleep and appetite.
a) Adrenal gland b) Hypothalamus
c) Pancreas d) Thalamus
- 4) _____ is a joint at which an impulse is transmitted from one neuron to another neuron.
a) Synapse b) Terminal plate
c) Dendrite d) Nerve center
- 5) _____ is the large bone found superior to the patella and inferior to ischium.
a) Calcaneus b) Femur c) Tibia d) Ulna
- 6) _____ is the body cavity that contains the pituitary gland.
a) Abdominal b) Cranial c) Spinal d) Thorax

P.T.O.



- 7) _____ is the flexible connective tissue that is attached to bones at the joints.
- a) Adipose b) Cartilage c) Muscle d) Nerve
- 8) The _____ of a cell is the most critical factor in determining its function.
- a) size b) shape c) age d) chromosome
- 9) The only blood vessels whose walls permit exchange between the blood and the surrounding interstitial fluid are the _____
- a) venules b) capillaries
c) arterioles d) veins
- 10) The formed elements of the blood are made up of all of the following except _____
- a) RBC's b) WBC's c) Plasma d) Platelets
- 11) O_2 and CO_2 are exchanged in the lungs and through all cell membranes by _____
- a) Active transport b) Diffusion
c) Osmosis d) Drift
- 12) The conducting passage ways of respiratory system include all of the following except _____
- a) Pharynx b) Larynx
c) Trachea d) Alveoli
- 13) Compared to arteries, veins are _____
- a) Move elastic b) Move smoother
c) Hold their shape better d) Have thinner
- 14) Sinu atrial node is located at _____
- a) Right atrium b) Right ventricle
c) Left atrium d) Left ventricle
- _____



Seat No.	
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**S.E. (Biomedical) (Part – I) (New CBCS) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Thursday, 14-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Explain polarization and depolarization process of a cell with necessary diagram.
- 2) Define and explain concept of Einthoven's triangle.
- 3) Draw structure of skin and list any four functions of skin.
- 4) Explain various types of heart valves and mention function of each.
- 5) Differentiate between inspiration and expiration process of respiratory system.

3. Attempt **any two** : **(6×2=12)**

- 1) Explain the functions of stomach and large intestine of a digestive system with necessary figure.
- 2) With the help of diagram explain working of conduction system of heart.
- 3) Write a short note on :
 - a) Blood composition.
 - b) Blood groups.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

- 1) Explain the structure and function of nephron.
- 2) Draw and name complete structure eye and formation of image on retina.
- 3) Define and explain reflex action process and reflex arcs.
- 4) Differentiate between endocrine and exocrine glands.
- 5) Explain the structure of neuron with neat figure.

Set Q



5. Attempt **any 2** :

(6×2=12)

- 1) With the help of neat diagram explain process of urine formation in detail.
 - 2) Explain process of hearing mechanism with necessary diagram.
 - 3) Write a short note on :
 - a) Female reproductive system.
 - b) Ophthalmoscope.
-



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Seat No.	
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**S.E. (Biomedical) (Part – I) (New CBCS) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Thursday, 14-12-2017
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) The conducting passage ways of respiratory system include all of the following except _____
 - a) Pharynx
 - b) Larynx
 - c) Trachea
 - d) Alveoli
- 2) Compared to arteries, veins are _____
 - a) Move elastic
 - b) Move smoother
 - c) Hold their shape better
 - d) Have thinner
- 3) Sinu atrial node is located at _____
 - a) Right atrium
 - b) Right ventricle
 - c) Left atrium
 - d) Left ventricle
- 4) _____ is the master gland of endocrine system.
 - a) Adrenal
 - b) Pancreas
 - c) Thyroid
 - d) Pituitary
- 5) Saliva contains an enzyme that acts upon _____ of the following nutrients.
 - a) Starches
 - b) Proteins
 - c) Fats
 - d) Minerals
- 6) _____ controls body temperature, steep and appetite.
 - a) Adrenal gland
 - b) Hypothalamus
 - c) Pancreas
 - d) Thalamus

P.T.O.



- 7) _____ is a joint at which an impulse is transmitted from one neuron to another neuron.
- a) Synapse
b) Terminal plate
c) Dendrite
d) Nerve center
- 8) _____ is the large bone found superior to the patella and inferior to ischium.
- a) Calcaneus b) Femur c) Tibia d) Ulna
- 9) _____ is the body cavity that contains the pituitary gland.
- a) Abdominal b) Cranial c) Spinal d) Thorax
- 10) _____ is the flexible connective tissue that is attached to bones at the joints.
- a) Adipose b) Cartilage c) Muscle d) Nerve
- 11) The _____ of a cell is the most critical factor in determining its function.
- a) size b) shape c) age d) chromosome
- 12) The only blood vessels whose walls permit exchange between the blood and the surrounding interstitial fluid are the _____
- a) venules b) capillaries
c) arterioles d) veins
- 13) The formed elements of the blood are made up of all of the following except _____
- a) RBC's b) WBC's c) Plasma d) Platelets
- 14) O₂ and CO₂ are exchanged in the lungs and through all cell membranes by _____
- a) Active transport b) Diffusion
c) Osmosis d) Drift
- _____



Seat No.	
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**S.E. (Biomedical) (Part – I) (New CBCS) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Thursday, 14-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Explain polarization and depolarization process of a cell with necessary diagram.
- 2) Define and explain concept of Einthoven's triangle.
- 3) Draw structure of skin and list any four functions of skin.
- 4) Explain various types of heart valves and mention function of each.
- 5) Differentiate between inspiration and expiration process of respiratory system.

3. Attempt **any two** : **(6×2=12)**

- 1) Explain the functions of stomach and large intestine of a digestive system with necessary figure.
- 2) With the help of diagram explain working of conduction system of heart.
- 3) Write a short note on :
 - a) Blood composition.
 - b) Blood groups.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

- 1) Explain the structure and function of nephron.
- 2) Draw and name complete structure eye and formation of image on retina.
- 3) Define and explain reflex action process and reflex arcs.
- 4) Differentiate between endocrine and exocrine glands.
- 5) Explain the structure of neuron with neat figure.

Set R



5. Attempt **any 2** :

(6×2=12)

- 1) With the help of neat diagram explain process of urine formation in detail.
 - 2) Explain process of hearing mechanism with necessary diagram.
 - 3) Write a short note on :
 - a) Female reproductive system.
 - b) Ophthalmoscope.
-



- 7) The only blood vessels whose walls permit exchange between the blood and the surrounding interstitial fluid are the _____
- | | |
|---------------|----------------|
| a) venules | b) capillaries |
| c) arterioles | d) veins |
- 8) The formed elements of the blood are made up of all of the following except _____
- | | | | |
|----------|----------|-----------|--------------|
| a) RBC's | b) WBC's | c) Plasma | d) Platelets |
|----------|----------|-----------|--------------|
- 9) O₂ and CO₂ are exchanged in the lungs and through all cell membranes by _____
- | | |
|---------------------|--------------|
| a) Active transport | b) Diffusion |
| c) Osmosis | d) Drift |
- 10) The conducting passage ways of respiratory system include all of the following except _____
- | | |
|------------|------------|
| a) Pharynx | b) Larynx |
| c) Trachea | d) Alveoli |
- 11) Compared to arteries, veins are _____
- | | |
|----------------------------|------------------|
| a) Move elastic | b) Move smoother |
| c) Hold their shape better | d) Have thinner |
- 12) Sinu atrial node is located at _____
- | | |
|-----------------|--------------------|
| a) Right atrium | b) Right ventricle |
| c) Left atrium | d) Left ventricle |
- 13) _____ is the master gland of endocrine system.
- | | | | |
|------------|-------------|------------|--------------|
| a) Adrenal | b) Pancreas | c) Thyroid | d) Pituitary |
|------------|-------------|------------|--------------|
- 14) Saliva contains an enzyme that acts upon _____ of the following nutrients.
- | | | | |
|-------------|-------------|---------|-------------|
| a) Starches | b) Proteins | c) Fats | d) Minerals |
|-------------|-------------|---------|-------------|



Seat No.	
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**S.E. (Biomedical) (Part – I) (New CBCS) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY**

Day and Date : Thursday, 14-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Explain polarization and depolarization process of a cell with necessary diagram.
- 2) Define and explain concept of Einthoven's triangle.
- 3) Draw structure of skin and list any four functions of skin.
- 4) Explain various types of heart valves and mention function of each.
- 5) Differentiate between inspiration and expiration process of respiratory system.

3. Attempt **any two** : **(6×2=12)**

- 1) Explain the functions of stomach and large intestine of a digestive system with necessary figure.
- 2) With the help of diagram explain working of conduction system of heart.
- 3) Write a short note on :
 - a) Blood composition.
 - b) Blood groups.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

- 1) Explain the structure and function of nephron.
- 2) Draw and name complete structure eye and formation of image on retina.
- 3) Define and explain reflex action process and reflex arcs.
- 4) Differentiate between endocrine and exocrine glands.
- 5) Explain the structure of neuron with neat figure.

Set S



5. Attempt **any 2** :

(6×2=12)

- 1) With the help of neat diagram explain process of urine formation in detail.
 - 2) Explain process of hearing mechanism with necessary diagram.
 - 3) Write a short note on :
 - a) Female reproductive system.
 - b) Ophthalmoscope.
-



SLR-TJ – 399

Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (New – CBCS) Examination, 2017
BIOMATERIALS**

Day and Date : Saturday, 16-12-2017

Total Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **14**
- 1) _____ types of biomaterials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) All of these
 - 2) Which of the following statements is true ?
a) Ceramic materials have low melting point
b) Porcelain is used as insulating material in spark plugs
c) Graphite is viscoelastic in nature
d) Compacting iron oxide powder ceramic tools are prepared
 - 3) _____ materials can be used to manufacture elastomers.
a) Limestone b) Petroleum c) Alcohol d) All of the above
 - 4) Malleability means
a) Metals undergo plastic deformation under compressive stresses
b) Metals can be drawn into wires
c) Both a) and b)
d) None of the above
 - 5) Ductility means
a) Metals can be drawn into sheets
b) Metals undergo elastic deformation under tensile loads
c) Metals undergo plastic deformation under tensile loads
d) All of the above

P.T.O.



- 6) Biosensors are used in
- a) Medical field
 - b) Agricultural field
 - c) Pollution monitoring
 - d) All of the above
- 7) Restorative biomaterials are designed to recover the shape and the function of the
- a) Teeth
 - b) Bone
 - c) Tissue
 - d) None of above
- 8) _____ are three-dimensional (3D) networks of atoms having no regular pattern to the spacing.
- a) Glasses
 - b) Fiber
 - c) Metal
 - d) Polymer
- 9) Polycrystalline ceramics have no _____ components.
- a) glassy
 - b) liquid
 - c) solid
 - d) crystal
- 10) _____ is the ability of a material to perform with an appropriate host response in a specific application.
- a) Reduction
 - b) Biocompatibility
 - c) Oxidation
 - d) None of above
- 11) Elastic deformation in polymers is due to
- a) Slight adjust of molecular chains
 - b) Slippage of molecular chains
 - c) Straightening of molecular chains
 - d) Severe of Covalent bonds
- 12) One of characteristic properties of polymer material
- a) High temperature stability
 - b) High mechanical strength
 - c) High elongation
 - d) Low hardness
- 13) Polymers are _____ in nature.
- a) Organic
 - b) Inorganic
 - c) Both a) and b)
 - d) None
- 14) _____ polymers cannot be recycled.
- a) Thermoplasts
 - b) Thermosets
 - c) Elastomers
 - d) All polymers
-



Seat No.	
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S.E. (Biomedical Engg.) (Part – I) (New – CBCS) Examination, 2017
BIOMATERIALS

Day and Date : Saturday, 16-12-2017

Marks : 56

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

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

SECTION – I

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

- 1) Define and classify biomaterial.
- 2) Explain applications of CO based alloys.
- 3) Explain applications of PMMA.
- 4) Explain classification of bioceramics and mention its any 2 applications.
- 5) What are bioglasses ? Mention its any 2 applications.

3. Attempt **any 2** : **(6×2=12)**

- 1) Explain biocompatibility test performed on Ti based alloy.
- 2) Explain properties of composite biomaterials with example.
- 3) Write a short note on (structure, applications) :
 - a) Silicon rubber
 - b) Hydrogels.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain which material is suited as bone cement ? Mention its properties.
 - 2) Explain materials can be protected from corrosion.
 - 3) Which materials are used for soft tissue replacement ? Discuss their properties.
 - 4) Define thermoplastic and thermosetting resins. Mention its any two applications.
 - 5) Discuss the properties and types of materials used in breast implants.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain how surface properties of biomaterials are tested.
 - 2) Write a short note on :
 - a) Wood and binding materials
 - b) Types and applications of rubber.
 - 3) Explain the methods of biological testing of biomaterials in short.
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SLR-TJ – 399

Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (New – CBCS) Examination, 2017
BIOMATERIALS**

Day and Date : Saturday, 16-12-2017
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) _____ are three-dimensional (3D) networks of atoms having no regular pattern to the spacing.
a) Glasses b) Fiber c) Metal d) Polymer
 - 2) Polycrystalline ceramics have no _____ components.
a) glassy b) liquid c) solid d) crystal
 - 3) _____ is the ability of a material to perform with an appropriate host response in a specific application.
a) Reduction b) Biocompatibility
c) Oxidation d) None of above
 - 4) Elastic deformation in polymers is due to
a) Slight adjust of molecular chains
b) Slippage of molecular chains
c) Straightening of molecular chains
d) Severe of Covalent bonds
 - 5) One of characteristic properties of polymer material
a) High temperature stability b) High mechanical strength
c) High elongation d) Low hardness
 - 6) Polymers are _____ in nature.
a) Organic b) Inorganic c) Both a) and b) d) None

P.T.O.



- 7) _____ polymers cannot be recycled.
a) Thermoplasts b) Thermosets c) Elastomers d) All polymers
- 8) _____ types of biomaterials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) All of these
- 9) Which of the following statements is true ?
a) Ceramic materials have low melting point
b) Porcelain is used as insulating material in spark plugs
c) Graphite is viscoelastic in nature
d) Compacting iron oxide powder ceramic tools are prepared
- 10) _____ materials can be used to manufacture elastomers.
a) Limestone b) Petroleum c) Alcohol d) All of the above
- 11) Malleability means
a) Metals undergo plastic deformation under compressive stresses
b) Metals can be drawn into wires
c) Both a) and b)
d) None of the above
- 12) Ductility means
a) Metals can be drawn into sheets
b) Metals undergo elastic deformation under tensile loads
c) Metals undergo plastic deformation under tensile loads
d) All of the above
- 13) Biosensors are used in
a) Medical field b) Agricultural field
c) Pollution monitoring d) All of the above
- 14) Restorative biomaterials are designed to recover the shape and the function of the
a) Teeth b) Bone c) Tissue d) None of above
-



Seat No.	
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S.E. (Biomedical Engg.) (Part – I) (New – CBCS) Examination, 2017
BIOMATERIALS

Day and Date : Saturday, 16-12-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any four** : **(4×4=16)**
- 1) Define and classify biomaterial.
 - 2) Explain applications of CO based alloys.
 - 3) Explain applications of PMMA.
 - 4) Explain classification of bioceramics and mention its any 2 applications.
 - 5) What are bioglasses ? Mention its any 2 applications.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain biocompatibility test performed on Ti based alloy.
 - 2) Explain properties of composite biomaterials with example.
 - 3) Write a short note on (structure, applications) :
 - a) Silicon rubber
 - b) Hydrogels.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain which material is suited as bone cement ? Mention its properties.
 - 2) Explain materials can be protected from corrosion.
 - 3) Which materials are used for soft tissue replacement ? Discuss their properties.
 - 4) Define thermoplastic and thermosetting resins. Mention its any two applications.
 - 5) Discuss the properties and types of materials used in breast implants.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain how surface properties of biomaterials are tested.
 - 2) Write a short note on :
 - a) Wood and binding materials
 - b) Types and applications of rubber.
 - 3) Explain the methods of biological testing of biomaterials in short.
-



SLR-TJ – 399

Seat No.	
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Set	R
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**S.E. (Biomedical Engg.) (Part – I) (New – CBCS) Examination, 2017
BIOMATERIALS**

Day and Date : Saturday, 16-12-2017

Total Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) Ductility means
 - a) Metals can be drawn into sheets
 - b) Metals undergo elastic deformation under tensile loads
 - c) Metals undergo plastic deformation under tensile loads
 - d) All of the above
- 2) Biosensors are used in
 - a) Medical field
 - b) Agricultural field
 - c) Pollution monitoring
 - d) All of the above
- 3) Restorative biomaterials are designed to recover the shape and the function of the
 - a) Teeth
 - b) Bone
 - c) Tissue
 - d) None of above
- 4) _____ are three-dimensional (3D) networks of atoms having no regular pattern to the spacing.
 - a) Glasses
 - b) Fiber
 - c) Metal
 - d) Polymer
- 5) Polycrystalline ceramics have no _____ components.
 - a) glassy
 - b) liquid
 - c) solid
 - d) crystal
- 6) _____ is the ability of a material to perform with an appropriate host response in a specific application.
 - a) Reduction
 - b) Biocompatibility
 - c) Oxidation
 - d) None of above

P.T.O.



- 7) Elastic deformation in polymers is due to
- Slight adjust of molecular chains
 - Slippage of molecular chains
 - Straightening of molecular chains
 - Severe of Covalent bonds
- 8) One of characteristic properties of polymer material
- High temperature stability
 - High mechanical strength
 - High elongation
 - Low hardness
- 9) Polymers are _____ in nature.
- Organic
 - Inorganic
 - Both a) and b)
 - None
- 10) _____ polymers cannot be recycled.
- Thermoplasts
 - Thermosets
 - Elastomers
 - All polymers
- 11) _____ types of biomaterials are used as bridges between human tissues and metals.
- Polymeric
 - Ceramic
 - Metallic
 - All of these
- 12) Which of the following statements is true ?
- Ceramic materials have low melting point
 - Porcelain is used as insulating material in spark plugs
 - Graphite is viscoelastic in nature
 - Compacting iron oxide powder ceramic tools are prepared
- 13) _____ materials can be used to manufacture elastomers.
- Limestone
 - Petroleum
 - Alcohol
 - All of the above
- 14) Malleability means
- Metals undergo plastic deformation under compressive stresses
 - Metals can be drawn into wires
 - Both a) and b)
 - None of the above
-



Seat No.	
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S.E. (Biomedical Engg.) (Part – I) (New – CBCS) Examination, 2017
BIOMATERIALS

Day and Date : Saturday, 16-12-2017

Marks : 56

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

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

SECTION – I

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

- 1) Define and classify biomaterial.
- 2) Explain applications of CO based alloys.
- 3) Explain applications of PMMA.
- 4) Explain classification of bioceramics and mention its any 2 applications.
- 5) What are bioglasses ? Mention its any 2 applications.

3. Attempt **any 2** : **(6×2=12)**

- 1) Explain biocompatibility test performed on Ti based alloy.
- 2) Explain properties of composite biomaterials with example.
- 3) Write a short note on (structure, applications) :
 - a) Silicon rubber
 - b) Hydrogels.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain which material is suited as bone cement ? Mention its properties.
 - 2) Explain materials can be protected from corrosion.
 - 3) Which materials are used for soft tissue replacement ? Discuss their properties.
 - 4) Define thermoplastic and thermosetting resins. Mention its any two applications.
 - 5) Discuss the properties and types of materials used in breast implants.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain how surface properties of biomaterials are tested.
 - 2) Write a short note on :
 - a) Wood and binding materials
 - b) Types and applications of rubber.
 - 3) Explain the methods of biological testing of biomaterials in short.
-



SLR-TJ – 399

Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (New – CBCS) Examination, 2017
BIOMATERIALS**

Day and Date : Saturday, 16-12-2017

Total Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **14**
- 1) _____ is the ability of a material to perform with an appropriate host response in a specific application.
a) Reduction b) Biocompatibility
c) Oxidation d) None of above
 - 2) Elastic deformation in polymers is due to
a) Slight adjust of molecular chains
b) Slippage of molecular chains
c) Straightening of molecular chains
d) Severe of Covalent bonds
 - 3) One of characteristic properties of polymer material
a) High temperature stability b) High mechanical strength
c) High elongation d) Low hardness
 - 4) Polymers are _____ in nature.
a) Organic b) Inorganic
c) Both a) and b) d) None
 - 5) _____ polymers cannot be recycled.
a) Thermoplasts b) Thermosets c) Elastomers d) All polymers
 - 6) _____ types of biomaterials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) All of these **P.T.O.**



- 7) Which of the following statements is true ?
- a) Ceramic materials have low melting point
 - b) Porcelain is used as insulating material in spark plugs
 - c) Graphite is viscoelastic in nature
 - d) Compacting iron oxide powder ceramic tools are prepared
- 8) _____ materials can be used to manufacture elastomers.
- a) Limestone
 - b) Petroleum
 - c) Alcohol
 - d) All of the above
- 9) Malleability means
- a) Metals undergo plastic deformation under compressive stresses
 - b) Metals can be drawn into wires
 - c) Both a) and b)
 - d) None of the above
- 10) Ductility means
- a) Metals can be drawn into sheets
 - b) Metals undergo elastic deformation under tensile loads
 - c) Metals undergo plastic deformation under tensile loads
 - d) All of the above
- 11) Biosensors are used in
- a) Medical field
 - b) Agricultural field
 - c) Pollution monitoring
 - d) All of the above
- 12) Restorative biomaterials are designed to recover the shape and the function of the
- a) Teeth
 - b) Bone
 - c) Tissue
 - d) None of above
- 13) _____ are three-dimensional (3D) networks of atoms having no regular pattern to the spacing.
- a) Glasses
 - b) Fiber
 - c) Metal
 - d) Polymer
- 14) Polycrystalline ceramics have no _____ components.
- a) glassy
 - b) liquid
 - c) solid
 - d) crystal
-



Seat No.	
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S.E. (Biomedical Engg.) (Part – I) (New – CBCS) Examination, 2017
BIOMATERIALS

Day and Date : Saturday, 16-12-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any four** : **(4×4=16)**
- 1) Define and classify biomaterial.
 - 2) Explain applications of CO based alloys.
 - 3) Explain applications of PMMA.
 - 4) Explain classification of bioceramics and mention its any 2 applications.
 - 5) What are bioglasses ? Mention its any 2 applications.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain biocompatibility test performed on Ti based alloy.
 - 2) Explain properties of composite biomaterials with example.
 - 3) Write a short note on (structure, applications) :
 - a) Silicon rubber
 - b) Hydrogels.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain which material is suited as bone cement ? Mention its properties.
 - 2) Explain materials can be protected from corrosion.
 - 3) Which materials are used for soft tissue replacement ? Discuss their properties.
 - 4) Define thermoplastic and thermosetting resins. Mention its any two applications.
 - 5) Discuss the properties and types of materials used in breast implants.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain how surface properties of biomaterials are tested.
 - 2) Write a short note on :
 - a) Wood and binding materials
 - b) Types and applications of rubber.
 - 3) Explain the methods of biological testing of biomaterials in short.
-



SLR-TJ – 400

Seat No.	
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Set	P
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**S.E. (Part – I) (Biomedical Engineering) (New CBCS) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

Day and Date : Tuesday, 19-12-2017
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) In a transistor, $I_C = 100$ mA and $I_E = 100.2$ mA. The value of β is
a) 100 b) 50 c) about 1 d) 200
- 2) The value of β for a transistor is generally
a) 1 b) > 1 c) $20 > \beta > 500$ d) none of above
- 3) The collector base junction in a transistor has
a) forward bias at all times b) reverse bias all times
c) low resistance d) none of above
- 4) A JFET is a _____ driven devices.
a) current b) voltage c) power d) both a and b
- 5) The pinch-off voltage of a JFET is about
a) 5V b) 0.6V c) 15V d) 25V
- 6) For $V_{GS} = 0V_1$ the I_D becomes constant, when V_{DS} exceeds
a) cutoff b) V_{DD} c) V_P d) 0V
- 7) A certain P channel E-MOSFET has $V_{GS(th)} = -2V$. If $V_{GS} = 0V$, the I_D is
a) 0mA b) $I_{D(on)}$ c) maximum d) I_{DSS}
- 8) IGBT is modern power semiconductor device that combine the characteristic of
a) BJT and SCR b) SCR and MOSFET
c) MOSFET and BJT d) BJT and JFET

P.T.O.



- 9) _____ semiconductor device acts like a diode and two transistor.
a) UJT b) Diac c) Triac d) SCR
- 10) A n-channel D-MOSFET with a positive V_{GS} is operating in
a) depletion mode b) enhancement mode
c) cutoff d) saturation
- 11) The gate voltage in a JFET at which drain current becomes zero is called _____ voltage.
a) saturation b) pinch off c) active d) cutoff
- 12) _____ controls the output pulse width of a one shot.
a) Clock frequency b) Width of clock pulse
c) RL time constant d) RC time constant
- 13) _____ is the another name for a bistable multivibrator.
a) on-off switch b) oscillator c) flipflop d) register
- 14) Shunting of a component away from the load is the task of a
a) transformer b) filter c) regulator d) rectifier
-



Seat No.	
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**S.E. (Part – I) (Biomedical Engineering) (New CBCS) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

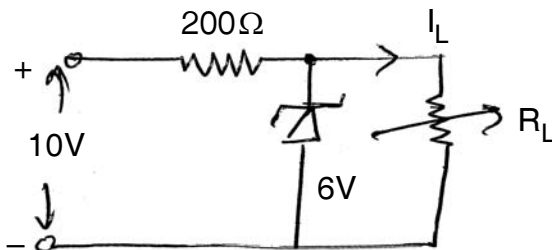
Day and Date : Tuesday, 19-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Draw the circuit diagram of full wave rectifier with LC filter and explain its working with neat sketch.
- 2) Define following performance parameter of a voltage regulator
 - a) Ripple rejection
 - b) Voltage stability factor
- 3) For the given circuit find I_L , I , I_Z for $R_L = 300\Omega$ and $R_L = 100\Omega$.



- 4) Differentiate between series regulator and shunt regulator.
- 5) Draw and explain working of positive and negative clipper circuit with waveform.

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

- 1) Design and draw a zener regulator circuit to meet the following specification
 $V_L = 8V$, $V_S = 30V$, $I_L = 50\text{ mA}$
Assume $I_Z \text{ min} = 25\text{ mA}$, $P_Z = 1.0\text{ watt}$.
- 2) Explain the operation of a capacitor input filter with a half wave rectifier and draw the load voltage waveform.
- 3) Design the emitter bias circuit to satisfy the following specification $V_{CC} = 18V$,
 $I_{CQ} = 2\text{mA}$, $V_{CEQ} = 9V$, $\beta = 100$.

Set P

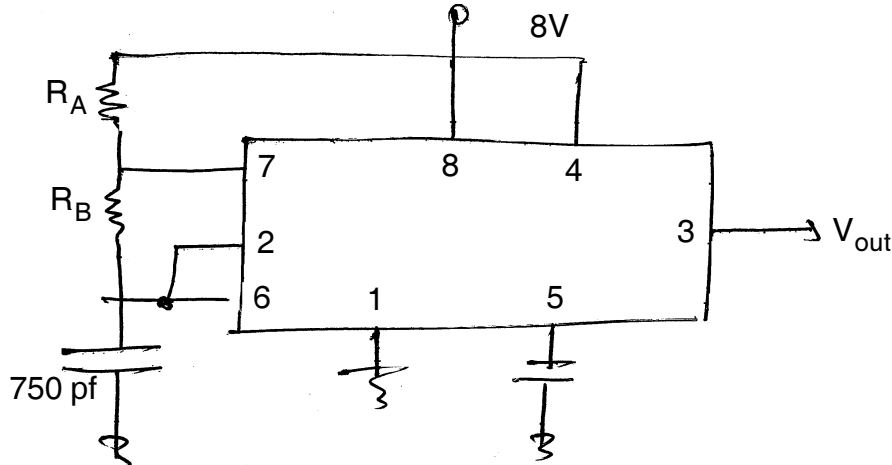


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

- 1) Explain the concept and significance of thermal runaway in BJT.
- 2) Explain zero temperature biasing and self thermal stability concept of JFET.
- 3) Compare between SCR and power MOSFET.
- 4) What is the duty cycle of the waveform at the output of the circuit given below ?

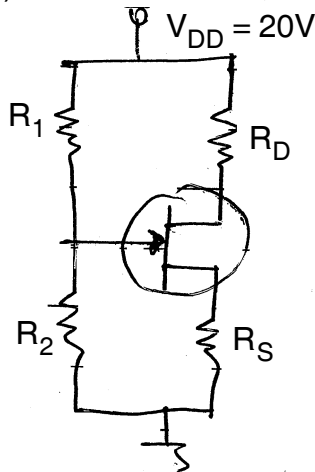


5) Explain the working and construction of JFET with necessary diagram.

5. Attempt **any 2** questions :

(6×2=12)

- 1) For JFET shown, determine V_G , I_{DSQ} , V_{GSQ} , V_{DSQ} . Given $I_{DSS} = 8 \text{ mA}$, $V_P = -4 \text{ V}$



- 2) Define following designing specifications for single stage CB amplifier
 - a) Voltage gain and current gain
 - b) Band width
 - c) Bias stability
- 3) Draw and explain working of monostable and bistable multivibrator using IC 555 with waveform.

Set P



SLR-TJ – 400

Seat No.	
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Set	Q
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**S.E. (Part – I) (Biomedical Engineering) (New CBCS) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

Day and Date : Tuesday, 19-12-2017
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) IGBT is modern power semiconductor device that combine the characteristic of
 - a) BJT and SCR
 - b) SCR and MOSFET
 - c) MOSFET and BJT
 - d) BJT and JFET
- 2) _____ semiconductor device acts like a diode and two transistor.
 - a) UJT
 - b) Diac
 - c) Triac
 - d) SCR
- 3) A n-channel D-MOSFET with a positive V_{GS} is operating in
 - a) depletion mode
 - b) enhancement mode
 - c) cutoff
 - d) saturation
- 4) The gate voltage in a JFET at which drain current becomes zero is called _____ voltage.
 - a) saturation
 - b) pinch off
 - c) active
 - d) cutoff
- 5) _____ controls the output pulse width of a one shot.
 - a) Clock frequency
 - b) Width of clock pulse
 - c) RL time constant
 - d) RC time constant
- 6) _____ is the another name for a bistable multivibrator.
 - a) on-off switch
 - b) oscillator
 - c) flipflop
 - d) register
- 7) Shunting of component away from the load is the task of a
 - a) transformer
 - b) filter
 - c) regulator
 - d) rectifier

P.T.O.



- 8) In a transistor, $I_C = 100 \text{ mA}$ and $I_E = 100.2 \text{ mA}$. The value of β is
a) 100 b) 50 c) about 1 d) 200
- 9) The value of β for a transistor is generally
a) 1 b) > 1 c) $20 > \beta > 500$ d) none of above
- 10) The collector base junction in a transistor has
a) forward bias at all times b) reverse bias all times
c) low resistance d) none of above
- 11) A JFET is a _____ driven devices.
a) current b) voltage c) power d) both a and b
- 12) The pinch-off voltage of a JFET is about
a) 5V b) 0.6V c) 15V d) 25V
- 13) For $V_{GS} = 0V_1$ the I_D becomes constant, when V_{DS} exceeds
a) cutoff b) V_{DD} c) V_P d) 0V
- 14) A certain P channel E-MOSFET has $V_{GS(th)} = -2V$. If $V_{GS} = 0V$, the I_D is
a) 0mA b) $I_{D(on)}$ c) maximum d) I_{DSS}
-



Seat No.	
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**S.E. (Part – I) (Biomedical Engineering) (New CBCS) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

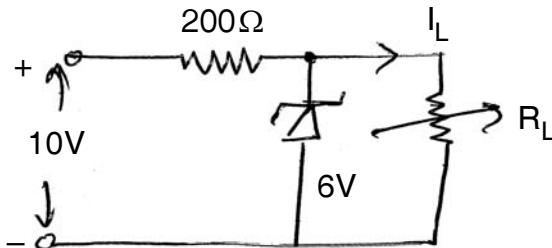
Day and Date : Tuesday, 19-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Draw the circuit diagram of full wave rectifier with LC filter and explain its working with neat sketch.
- 2) Define following performance parameter of a voltage regulator
 - a) Ripple rejection
 - b) Voltage stability factor
- 3) For the given circuit find I_L , I , I_Z for $R_L = 300\Omega$ and $R_L = 100\Omega$.



- 4) Differentiate between series regulator and shunt regulator.
- 5) Draw and explain working of positive and negative clipper circuit with waveform.

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

- 1) Design and draw a zener regulator circuit to meet the following specification
 $V_L = 8V$, $V_S = 30V$, $I_L = 50\text{ mA}$
Assume $I_Z \text{ min} = 25\text{ mA}$, $P_Z = 1.0\text{ watt}$.
- 2) Explain the operation of a capacitor input filter with a half wave rectifier and draw the load voltage waveform.
- 3) Design the emitter bias circuit to satisfy the following specification $V_{CC} = 18V$,
 $I_{CQ} = 2\text{mA}$, $V_{CEQ} = 9V$, $\beta = 100$.

Set Q

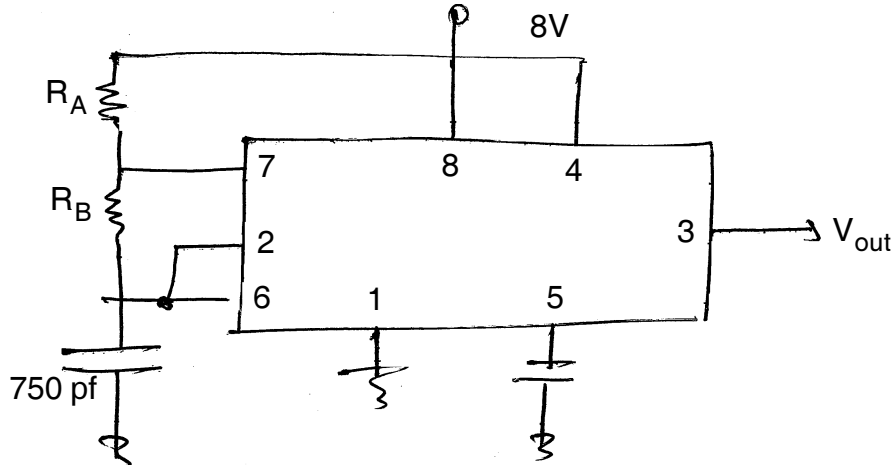


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

- 1) Explain the concept and significance of thermal runaway in BJT.
- 2) Explain zero temperature biasing and self thermal stability concept of JFET.
- 3) Compare between SCR and power MOSFET.
- 4) What is the duty cycle of the waveform at the output of the circuit given below ?

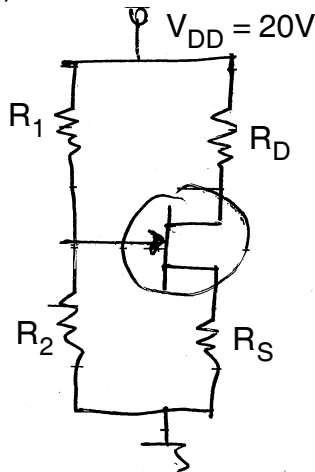


5) Explain the working and construction of JFET with necessary diagram.

5. Attempt **any 2** questions :

(6×2=12)

- 1) For JFET shown, determine V_G , I_{DSQ} , V_{GSQ} , V_{DSQ} . Given $I_{DSS} = 8 \text{ mA}$, $V_P = -4 \text{ V}$



- 2) Define following designing specifications for single stage CB amplifier
 - a) Voltage gain and current gain
 - b) Band width
 - c) Bias stability
- 3) Draw and explain working of monostable and bistable multivibrator using IC 555 with waveform.

Set Q



SLR-TJ – 400

Seat No.	
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Set	R
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**S.E. (Part – I) (Biomedical Engineering) (New CBCS) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

Day and Date : Tuesday, 19-12-2017
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) The pinch-off voltage of a JFET is about
a) 5V b) 0.6V c) 15V d) 25V
- 2) For $V_{GS} = 0V_1$ the I_D becomes constant, when V_{DS} exceeds
a) cutoff b) V_{DD} c) V_P d) 0V
- 3) A certain P channel E-MOSFET has $V_{GS(th)} = -2V$. If $V_{GS} = 0V$, the I_D is
a) 0mA b) $I_{D(on)}$ c) maximum d) I_{DSS}
- 4) IGBT is modern power semiconductor device that combine the characteristic of
a) BJT and SCR b) SCR and MOSFET
c) MOSFET and BJT d) BJT and JFET
- 5) _____ semiconductor device acts like a diode and two transistor.
a) UJT b) Diac c) Triac d) SCR
- 6) A n-channel D-MOSFET with a positive V_{GS} is operating in
a) depletion mode b) enhancement mode
c) cutoff d) saturation
- 7) The gate voltage in a JFET at which drain current becomes zero is called _____ voltage.
a) saturation b) pinch off
c) active d) cutoff

P.T.O.



- 8) _____ controls the output pulse width of a one shot.
- a) Clock frequency b) Width of clock pulse
c) RL time constant d) RC time constant
- 9) _____ is the another name for a bistable multivibrator.
- a) on-off switch b) oscillator c) flipflop d) register
- 10) Shunting of a component away from the load is the task of a
- a) transformer b) filter c) regulator d) rectifier
- 11) In a transistor, $I_C = 100$ mA and $I_E = 100.2$ mA. The value of β is
- a) 100 b) 50 c) about 1 d) 200
- 12) The value of β for a transistor is generally
- a) 1 b) > 1 c) $20 > \beta > 500$ d) none of above
- 13) The collector base junction in a transistor has
- a) forward bias at all times b) reverse bias all times
c) low resistance d) none of above
- 14) A JFET is a _____ driven devices.
- a) current b) voltage c) power d) both a and b
-



Seat No.	
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**S.E. (Part – I) (Biomedical Engineering) (New CBCS) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

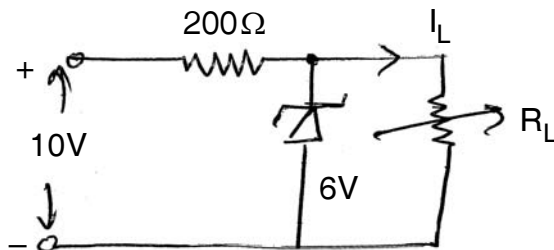
Day and Date : Tuesday, 19-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Draw the circuit diagram of full wave rectifier with LC filter and explain its working with neat sketch.
- 2) Define following performance parameter of a voltage regulator
 - a) Ripple rejection
 - b) Voltage stability factor
- 3) For the given circuit find I_L , I , I_Z for $R_L = 300\Omega$ and $R_L = 100\Omega$.



- 4) Differentiate between series regulator and shunt regulator.
- 5) Draw and explain working of positive and negative clipper circuit with waveform.

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

- 1) Design and draw a zener regulator circuit to meet the following specification
 $V_L = 8V$, $V_S = 30V$, $I_L = 50\text{ mA}$
Assume $I_Z \text{ min} = 25\text{ mA}$, $P_Z = 1.0\text{ watt}$.
- 2) Explain the operation of a capacitor input filter with a half wave rectifier and draw the load voltage waveform.
- 3) Design the emitter bias circuit to satisfy the following specification $V_{CC} = 18V$,
 $I_{CQ} = 2\text{mA}$, $V_{CEQ} = 9V$, $\beta = 100$.

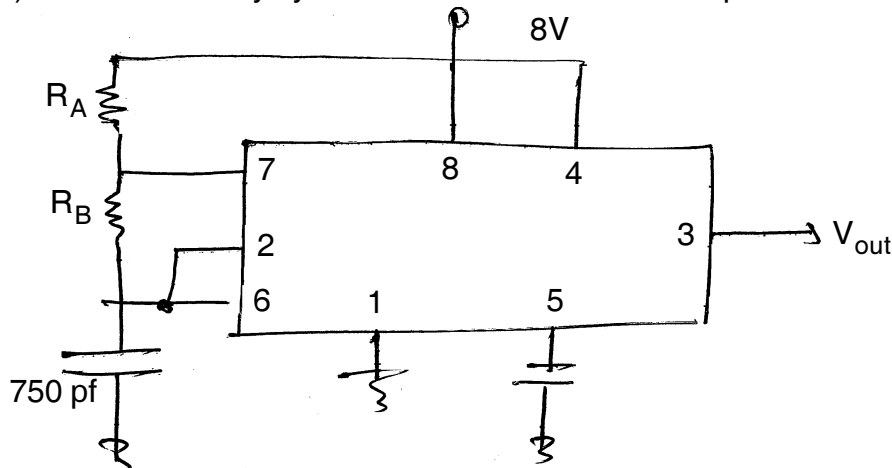
Set R



SECTION – II

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

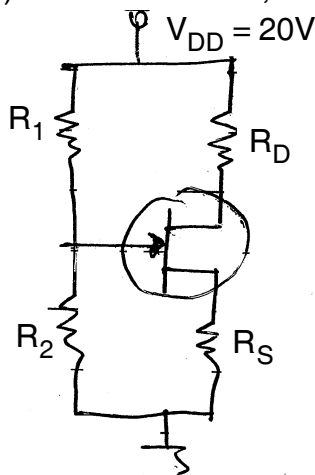
- 1) Explain the concept and significance of thermal runaway in BJT.
- 2) Explain zero temperature biasing and self thermal stability concept of JFET.
- 3) Compare between SCR and power MOSFET.
- 4) What is the duty cycle of the waveform at the output of the circuit given below ?



5) Explain the working and construction of JFET with necessary diagram.

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

- 1) For JFET shown, determine V_G , I_{DSQ} , V_{GSQ} , V_{DSQ} . Given $I_{DSS} = 8 \text{ mA}$, $V_P = -4 \text{ V}$



- 2) Define following designing specifications for single stage CB amplifier
 - a) Voltage gain and current gain
 - b) Band width
 - c) Bias stability
- 3) Draw and explain working of monostable and bistable multivibrator using IC 555 with waveform.

Set R



SLR-TJ – 400

Seat No.	
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Set	S
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**S.E. (Part – I) (Biomedical Engineering) (New CBCS) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

Day and Date : Tuesday, 19-12-2017
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) A n-channel D-MOSFET with a positive V_{GS} is operating in
 - a) depletion mode
 - b) enhancement mode
 - c) cutoff
 - d) saturation
- 2) The gate voltage in a JFET at which drain current becomes zero is called _____ voltage.
 - a) saturation
 - b) pinch off
 - c) active
 - d) cutoff
- 3) _____ controls the output pulse width of a one shot.
 - a) Clock frequency
 - b) Width of clock pulse
 - c) RL time constant
 - d) RC time constant
- 4) _____ is the another name for a bistable multivibrator.
 - a) on-off switch
 - b) oscillator
 - c) flipflop
 - d) register
- 5) Shunting of accomponent away from the load is the task of a
 - a) transformer
 - b) filter
 - c) regulator
 - d) rectifier
- 6) In a transistor, $I_C = 100$ mA and $I_E = 100.2$ mA. The value of β is
 - a) 100
 - b) 50
 - c) about 1
 - d) 200
- 7) The value of β for a transistor is generally
 - a) 1
 - b) > 1
 - c) $20 > \beta > 500$
 - d) none of above

P.T.O.



- 8) The collector base junction in a transistor has
- a) forward bias at all times
 - b) reverse bias all times
 - c) low resistance
 - d) none of above
- 9) A JFET is a _____ driven devices.
- a) current
 - b) voltage
 - c) power
 - d) both a and b
- 10) The pinch-off voltage of a JFET is about
- a) 5V
 - b) 0.6V
 - c) 15V
 - d) 25V
- 11) For $V_{GS} = 0V_1$ the I_D becomes constant, when V_{DS} exceeds
- a) cutoff
 - b) V_{DD}
 - c) V_P
 - d) 0V
- 12) A certain P channel E-MOSFET has $V_{GS(th)} = -2V$. If $V_{GS} = 0V$, the I_D is
- a) 0mA
 - b) $I_{D(on)}$
 - c) maximum
 - d) I_{DSS}
- 13) IGBT is modern power semiconductor device that combine the characteristic of
- a) BJT and SCR
 - b) SCR and MOSFET
 - c) MOSFET and BJT
 - d) BJT and JFET
- 14) _____ semiconductor device acts like a diode and two transistor.
- a) UJT
 - b) Diac
 - c) Triac
 - d) SCR
-



Seat No.	
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**S.E. (Part – I) (Biomedical Engineering) (New CBCS) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – I**

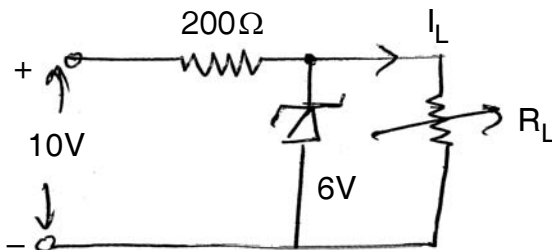
Day and Date : Tuesday, 19-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Draw the circuit diagram of full wave rectifier with LC filter and explain its working with neat sketch.
- 2) Define following performance parameter of a voltage regulator
 - a) Ripple rejection
 - b) Voltage stability factor
- 3) For the given circuit find I_L , I , I_Z for $R_L = 300\Omega$ and $R_L = 100\Omega$.



- 4) Differentiate between series regulator and shunt regulator.
- 5) Draw and explain working of positive and negative clipper circuit with waveform.

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

- 1) Design and draw a zener regulator circuit to meet the following specification
 $V_L = 8V$, $V_S = 30V$, $I_L = 50\text{ mA}$
Assume $I_Z \text{ min} = 25\text{ mA}$, $P_Z = 1.0\text{ watt}$.
- 2) Explain the operation of a capacitor input filter with a half wave rectifier and draw the load voltage waveform.
- 3) Design the emitter bias circuit to satisfy the following specification $V_{CC} = 18V$,
 $I_{CQ} = 2\text{mA}$, $V_{CEQ} = 9V$, $\beta = 100$.

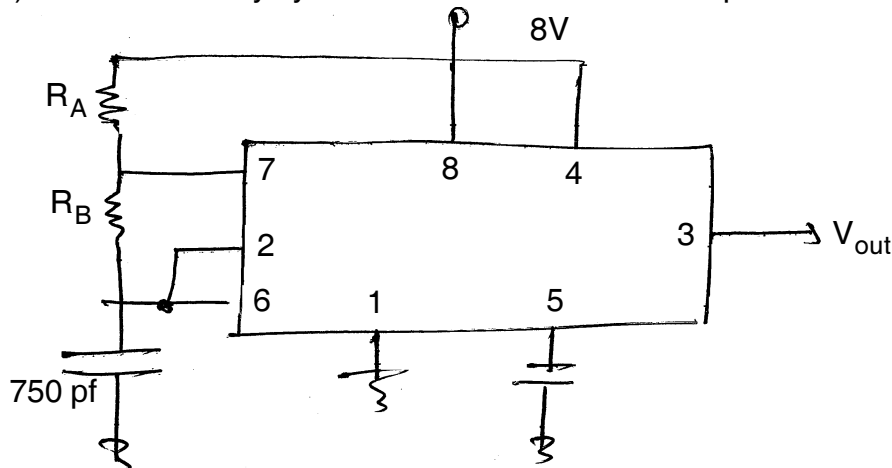
Set S



SECTION – II

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

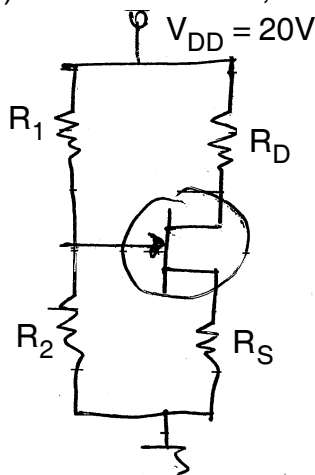
- 1) Explain the concept and significance of thermal runaway in BJT.
- 2) Explain zero temperature biasing and self thermal stability concept of JFET.
- 3) Compare between SCR and power MOSFET.
- 4) What is the duty cycle of the waveform at the output of the circuit given below ?



5) Explain the working and construction of JFET with necessary diagram.

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

- 1) For JFET shown, determine V_G , I_{DSQ} , V_{GSQ} , V_{DSQ} . Given $I_{DSS} = 8 \text{ mA}$, $V_P = -4 \text{ V}$



- 2) Define following designing specifications for single stage CB amplifier
 - a) Voltage gain and current gain
 - b) Band width
 - c) Bias stability
- 3) Draw and explain working of monostable and bistable multivibrator using IC 555 with waveform.

Set S



SLR-TJ – 401

Seat No.	
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Set **P**

**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
LINEAR CIRCUITS ANALYSIS (New – CBCS)**

Day and Date : Thursday, 21-12-2017
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 network contains only an independent current source and resistors. If the values of all resistors are doubled the value of the node voltages will
 - a) become half
 - b) remains unchanged
 - c) become double
 - d) none of these

- 2) In a series R-L-C circuit, $R = 2 \text{ k}\Omega$, $L = 1\text{H}$, $C = \frac{1}{400} \mu\text{F}$. The resonant frequency is
 - a) $2 \times 10^4 \text{ Hz}$
 - b) $\frac{1}{\pi} \times 10^4 \text{ Hz}$
 - c) 10^4 Hz
 - d) $2\pi \times 10^4 \text{ Hz}$

- 3) A circuit with a resistor, inductor and capacitor in series is resonant at $F_0 \text{ Hz}$. If all the component values are now doubled. The new resonant frequency is
 - a) $2 F_0$
 - b) F_0
 - c) $F_0/4$
 - d) $F_0/2$

- 4) Super position theorem is not applicable for
 - a) Current calculation
 - b) Voltage calculation
 - c) Power calculation
 - d) Energy calculation

- 5) In series R, L circuit power factor can be defined as
 - a) R/Z
 - b) P/S
 - c) V_r/V
 - d) All above

P.T.O.



- 6) A 2 port network is driven by a source $V_s = 100\text{ V}$ in series with $5\ \Omega$ and terminated in a $25\ \Omega$ resistor. The impedance parameters are
- a) $\begin{bmatrix} 20 & 2 \\ 40 & 10 \end{bmatrix}$ b) $\begin{bmatrix} 20 & 40 \\ 2 & 10 \end{bmatrix}$ c) $\begin{bmatrix} 10 & 40 \\ 10 & 20 \end{bmatrix}$ d) $\begin{bmatrix} 20 & 2 \\ 10 & 40 \end{bmatrix}$
- 7) Number of an ideal value of attenuation for the frequencies in pass band especially for cascade configuration is
- a) Zero b) Unity c) Infinity d) Unpredictable
- 8) Advantage of active filter is
- a) Do not offer again b) Easy to tune
c) Both a) and b) d) Derive high impedance load
- 9) In 2 port network $Z_{12} = Z_{21}$ indicates _____ property.
- a) Unilateral b) Bilateral c) Linear d) Non-linear
- 10) In an AC circuit containing pure inductance the voltage applied is 120 V, 50 Hz, while the current is 10 A. The value of inductance will be
- a) 35 mH b) 34 mH c) 30 mH d) 38 mH
- 11) Under resonance condition the power factor of a system is
- a) Unity b) Lagging c) Leading d) None of above
- 12) Reactive power drawn by a pure resistor is
- a) 0 b) minimum c) maximum d) average
- 13) In active filter _____ element is absent.
- a) Inductor b) Capacitor c) Both a) and b) d) Resistor
- 14) _____ is not a bilateral.
- a) Resistor b) Diode c) Capacitor d) Inductor
-



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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
LINEAR CIRCUITS ANALYSIS (New – CBCS)**

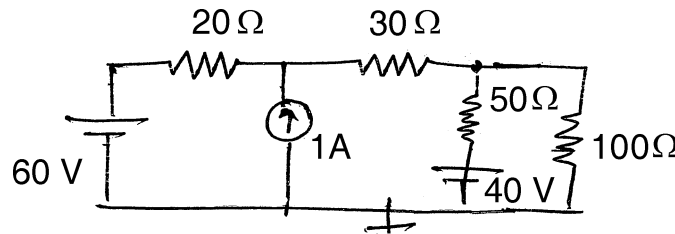
Day and Date : Thursday, 21-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

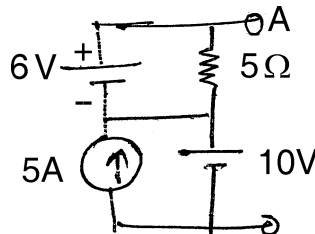
SECTION – I

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

- 1) Define and differentiate between Nodal and Mesh analysis with one example.
- 2) Find the current in the 100 Ω resistor



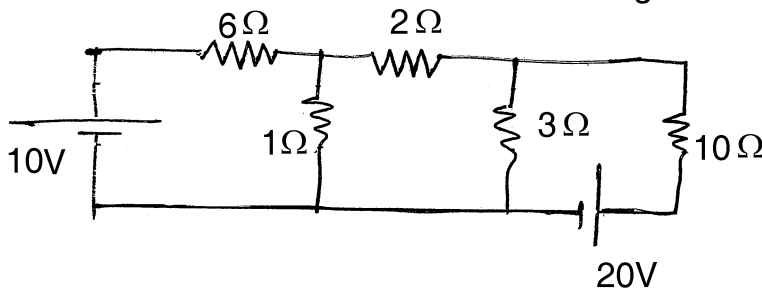
3) Find the voltage V_{AB} using super position theorem.



- 4) Define and compare Thevenin's and Norton's theorem.
- 5) A series resonant circuit has impedance of 500 Ω at resonant frequency. Cut off frequencies are 10 KHz and 100 Hz. Determine
 - i) Resonant frequency
 - ii) Value of R-L-C.

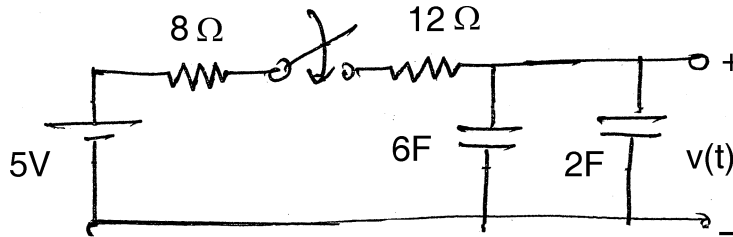
3. Attempt **any two** questions : **(6×2=12)**

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

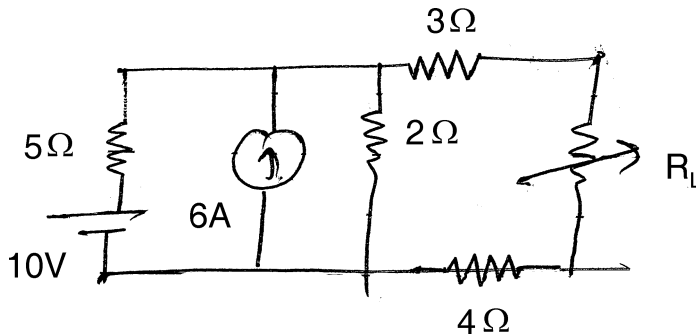




- 2) The switch is open until $t = 100$ sec. and is closed for all times thereafter. Find $v(t)$ for all times greater than 100 if $v(100) = -3$.



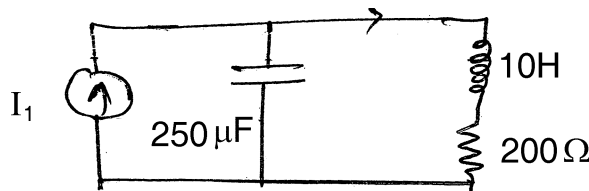
- 3) State Maximum power transfer theorem and for the circuit shown find value of resistance R_L for maximum power and calculate maximum power.



SECTION – II

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

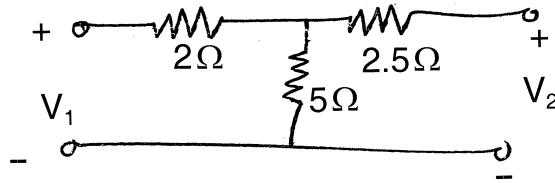
- 1) With necessary diagram explain working of lowpass and bandpass filters.
- 2) Draw the pole zero diagrams of I_2/I_1 for the network shown.



- 3) Derive the condition for reciprocity for inverse hybrid parameters.
- 4) Differentiate between T type and bridged T type attenuator.



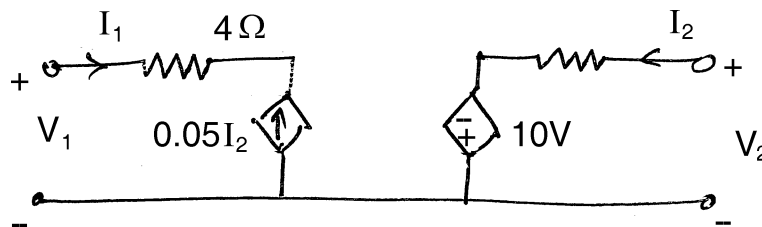
5) Find the equivalent π network for the given T network :



5. Attempt **any 2** questions :

(6×2=12)

1) Determine Z and Y parameters of the network shown.



2) The current $I(s)$ in a network is given by $I(s) = \frac{2s}{(s+1)(s+2)}$. Plot the pole zero pattern in the 's' plane and hence obtain $i(t)$.

3) Write a short note on :

- a) ABCD parameters in terms of hybrid parameters.
- b) ABCD parameters in terms of Y parameters.



SLR-TJ – 401

Seat No.	
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Set **Q**

**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
LINEAR CIRCUITS ANALYSIS (New – CBCS)**

Day and Date : Thursday, 21-12-2017
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) Advantage of active filter is
 - a) Do not offer again
 - b) Easy to tune
 - c) Both a) and b)
 - d) Derive high impedance load
- 2) In 2 port network $Z_{12} = Z_{21}$ indicates _____ property.
 - a) Unilateral
 - b) Bilateral
 - c) Linear
 - d) Non-linear
- 3) In an AC circuit containing pure inductance the voltage applied is 120 V, 50 Hz, while the current is 10 A. The value of inductance will be
 - a) 35 mH
 - b) 34 mH
 - c) 30 mH
 - d) 38 mH
- 4) Under resonance condition the power factor of a system is
 - a) Unity
 - b) Lagging
 - c) Leading
 - d) None of above
- 5) Reactive power drawn by a pure resistor is
 - a) 0
 - b) minimum
 - c) maximum
 - d) average
- 6) In active filter _____ element is absent.
 - a) Inductor
 - b) Capacitor
 - c) Both a) and b)
 - d) Resistor
- 7) _____ is not a bilateral.
 - a) Resistor
 - b) Diode
 - c) Capacitor
 - d) Inductor

P.T.O.



- 8) A network contains only an independent current source and resistors. If the values of all resistors are doubled the value of the node voltages will
- a) become half
 - b) remains unchanged
 - c) become double
 - d) none of these
- 9) In a series R-L-C circuit, $R = 2 \text{ k}\Omega$, $L = 1\text{H}$, $C = \frac{1}{400} \mu\text{F}$. The resonant frequency is
- a) $2 \times 10^4 \text{ Hz}$
 - b) $\frac{1}{\pi} \times 10^4 \text{ Hz}$
 - c) 10^4 Hz
 - d) $2\pi \times 10^4 \text{ Hz}$
- 10) A circuit with a resistor, inductor and capacitor in series is resonant at $F_0 \text{ Hz}$. If all the component values are now doubled. The new resonant frequency is
- a) $2 F_0$
 - b) F_0
 - c) $F_0/4$
 - d) $F_0/2$
- 11) Super position theorem is not applicable for
- a) Current calculation
 - b) Voltage calculation
 - c) Power calculation
 - d) Energy calculation
- 12) In series R, L circuit power factor can be defined as
- a) R/Z
 - b) P/S
 - c) V_r/V
 - d) All above
- 13) A 2 port network is driven by a source $V_s = 100 \text{ V}$ in series with 5Ω and terminated in a 25Ω resistor. The impedance parameters are
- a) $\begin{bmatrix} 20 & 2 \\ 40 & 10 \end{bmatrix}$
 - b) $\begin{bmatrix} 20 & 40 \\ 2 & 10 \end{bmatrix}$
 - c) $\begin{bmatrix} 10 & 40 \\ 10 & 20 \end{bmatrix}$
 - d) $\begin{bmatrix} 20 & 2 \\ 10 & 40 \end{bmatrix}$
- 14) Number of an ideal value of attenuation for the frequencies in pass band especially for cascade configuration is
- a) Zero
 - b) Unity
 - c) Infinity
 - d) Unpredictable
-



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
LINEAR CIRCUITS ANALYSIS (New – CBCS)**

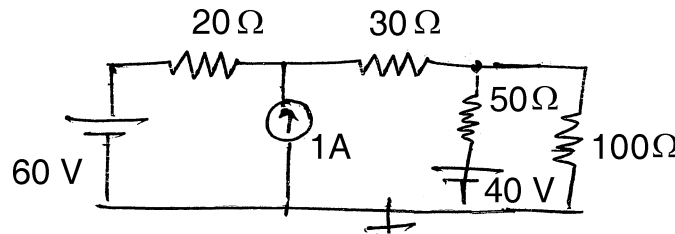
Day and Date : Thursday, 21-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

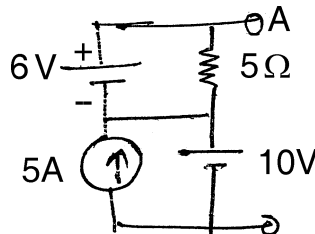
SECTION – I

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

- 1) Define and differentiate between Nodal and Mesh analysis with one example.
- 2) Find the current in the 100 Ω resistor



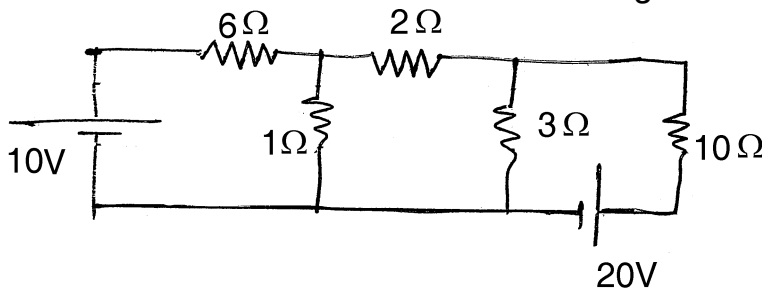
- 3) Find the voltage V_{AB} using super position theorem.



- 4) Define and compare Thevenin's and Norton's theorem.
- 5) A series resonant circuit has impedance of 500 Ω at resonant frequency. Cut off frequencies are 10 KHz and 100 Hz. Determine
 - i) Resonant frequency
 - ii) Value of R-L-C.

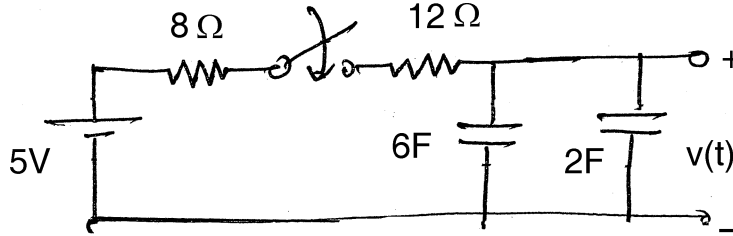
3. Attempt **any two** questions : **(6×2=12)**

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

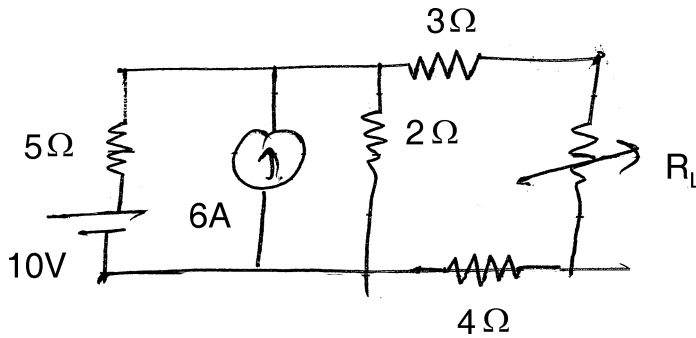




- 2) The switch is open until $t = 100$ sec. and is closed for all times thereafter. Find $v(t)$ for all times greater than 100 if $v(100) = -3$.



- 3) State Maximum power transfer theorem and for the circuit shown find value of resistance R_L for maximum power and calculate maximum power.

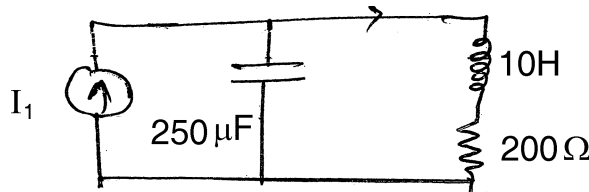


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

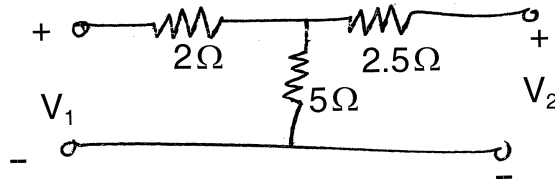
- 1) With necessary diagram explain working of lowpass and bandpass filters.
- 2) Draw the pole zero diagrams of I_2/I_1 for the network shown.



- 3) Derive the condition for reciprocity for inverse hybrid parameters.
- 4) Differentiate between T type and bridged T type attenuator.



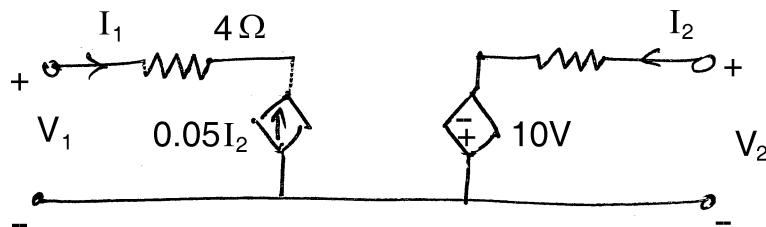
5) Find the equivalent π network for the given T network :



5. Attempt **any 2** questions :

(6×2=12)

1) Determine Z and Y parameters of the network shown.



2) The current $I(s)$ in a network is given by $I(s) = \frac{2s}{(s+1)(s+2)}$. Plot the pole zero pattern in the 's' plane and hence obtain $i(t)$.

3) Write a short note on :

- a) ABCD parameters in terms of hybrid parameters.
- b) ABCD parameters in terms of Y parameters.



SLR-TJ – 401

Seat No.	
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Set **R**

**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
LINEAR CIRCUITS ANALYSIS (New – CBCS)**

Day and Date : Thursday, 21-12-2017
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) In series R, L circuit power factor can be defined as
 - a) R/Z
 - b) P/S
 - c) V_r/V
 - d) All above
- 2) A 2 port network is driven by a source $V_s = 100\text{ V}$ in series with $5\ \Omega$ and terminated in a $25\ \Omega$ resistor. The impedance parameters are
 - a) $\begin{bmatrix} 20 & 2 \\ 40 & 10 \end{bmatrix}$
 - b) $\begin{bmatrix} 20 & 40 \\ 2 & 10 \end{bmatrix}$
 - c) $\begin{bmatrix} 10 & 40 \\ 10 & 20 \end{bmatrix}$
 - d) $\begin{bmatrix} 20 & 2 \\ 10 & 40 \end{bmatrix}$
- 3) Number of an ideal value of attenuation for the frequencies in pass band especially for cascade configuration is
 - a) Zero
 - b) Unity
 - c) Infinity
 - d) Unpredictable
- 4) Advantage of active filter is
 - a) Do not offer again
 - b) Easy to tune
 - c) Both a) and b)
 - d) Derive high impedance load
- 5) In 2 port network $Z_{12} = Z_{21}$ indicates _____ property.
 - a) Unilateral
 - b) Bilateral
 - c) Linear
 - d) Non-linear
- 6) In an AC circuit containing pure inductance the voltage applied is 120 V, 50 Hz, while the current is 10 A. The value of inductance will be
 - a) 35 mH
 - b) 34 mH
 - c) 30 mH
 - d) 38 mH

P.T.O.



- 7) Under resonance condition the power factor of a system is
a) Unity b) Lagging c) Leading d) None of above
- 8) Reactive power drawn by a pure resistor is
a) 0 b) minimum c) maximum d) average
- 9) In active filter _____ element is absent.
a) Inductor b) Capacitor c) Both a) and b) d) Resistor
- 10) _____ is not a bilateral.
a) Resistor b) Diode c) Capacitor d) Inductor
- 11) A network contains only an independent current source and resistors. If the values of all resistors are doubled the value of the node voltages will
a) become half b) remains unchanged
c) become double d) none of these
- 12) In a series R-L-C circuit, $R = 2 \text{ k}\Omega$, $L = 1\text{H}$, $C = \frac{1}{400} \mu\text{F}$. The resonant frequency is
a) $2 \times 10^4 \text{ Hz}$ b) $\frac{1}{\pi} \times 10^4 \text{ Hz}$
c) 10^4 Hz d) $2\pi \times 10^4 \text{ Hz}$
- 13) A circuit with a resistor, inductor and capacitor in series is resonant at $F_0 \text{ Hz}$. If all the component values are now doubled. The new resonant frequency is
a) $2 F_0$ b) F_0 c) $F_0/4$ d) $F_0/2$
- 14) Super position theorem is not applicable for
a) Current calculation b) Voltage calculation
c) Power calculation d) Energy calculation
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
LINEAR CIRCUITS ANALYSIS (New – CBCS)**

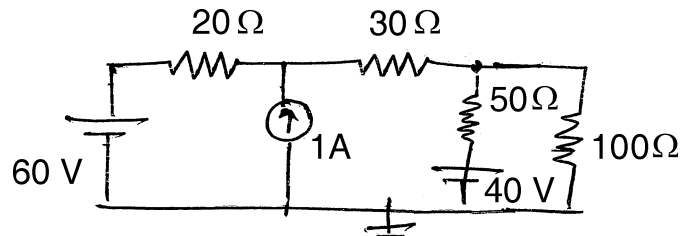
Day and Date : Thursday, 21-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

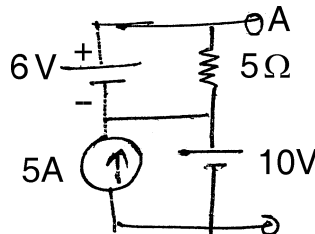
SECTION – I

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

- 1) Define and differentiate between Nodal and Mesh analysis with one example.
- 2) Find the current in the 100 Ω resistor



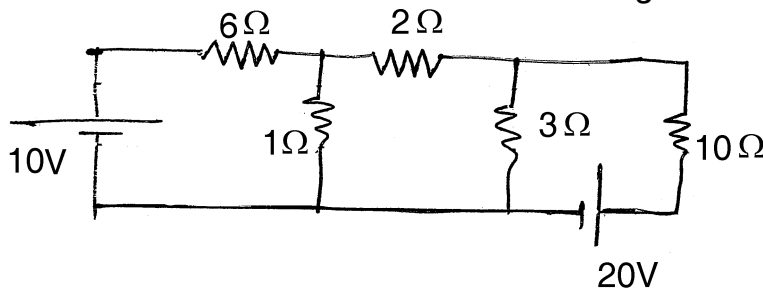
3) Find the voltage V_{AB} using super position theorem.



- 4) Define and compare Thevenin's and Norton's theorem.
- 5) A series resonant circuit has impedance of 500 Ω at resonant frequency. Cut off frequencies are 10 KHz and 100 Hz. Determine
 - i) Resonant frequency
 - ii) Value of R-L-C.

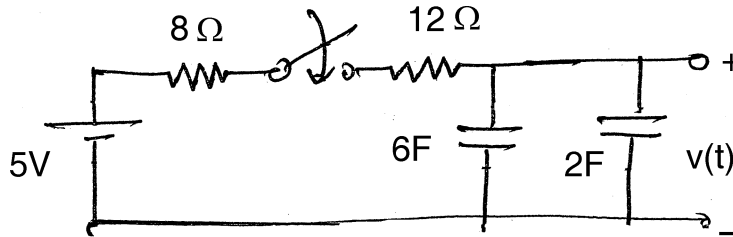
3. Attempt **any two** questions : (6×2=12)

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

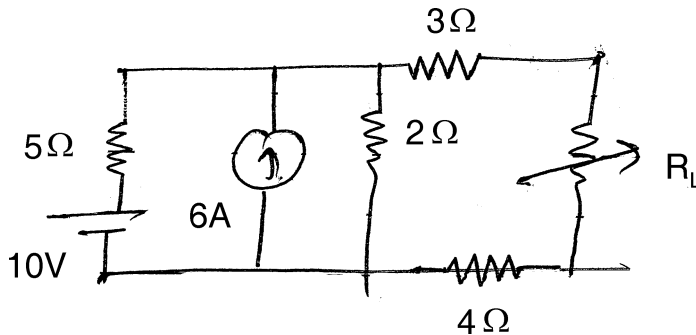




- 2) The switch is open until $t = 100$ sec. and is closed for all times thereafter. Find $v(t)$ for all times greater than 100 if $v(100) = -3$.



- 3) State Maximum power transfer theorem and for the circuit shown find value of resistance R_L for maximum power and calculate maximum power.

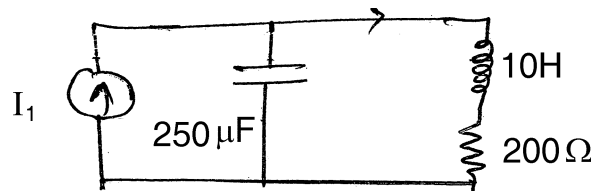


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

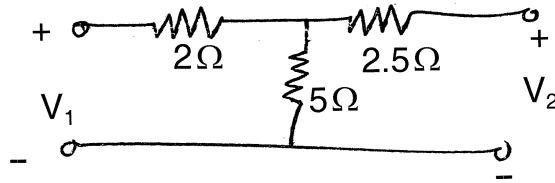
- 1) With necessary diagram explain working of lowpass and bandpass filters.
- 2) Draw the pole zero diagrams of I_2/I_1 for the network shown.



- 3) Derive the condition for reciprocity for inverse hybrid parameters.
- 4) Differentiate between T type and bridged T type attenuator.



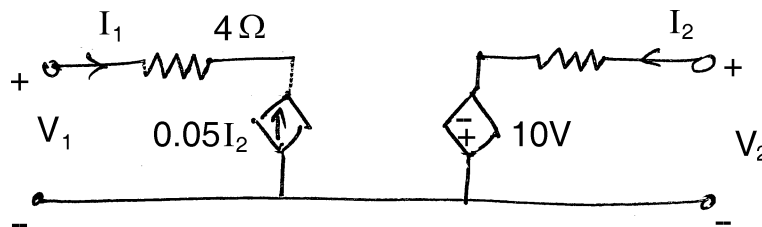
5) Find the equivalent π network for the given T network :



5. Attempt **any 2** questions :

(6×2=12)

1) Determine Z and Y parameters of the network shown.



2) The current $I(s)$ in a network is given by $I(s) = \frac{2s}{(s+1)(s+2)}$. Plot the pole zero pattern in the 's' plane and hence obtain $i(t)$.

3) Write a short note on :

- a) ABCD parameters in terms of hybrid parameters.
- b) ABCD parameters in terms of Y parameters.



SLR-TJ – 401

Seat No.	
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S

**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
LINEAR CIRCUITS ANALYSIS (New – CBCS)**

Day and Date : Thursday, 21-12-2017
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) In an AC circuit containing pure inductance the voltage applied is 120 V, 50 Hz, while the current is 10 A. The value of inductance will be
a) 35 mH b) 34 mH c) 30 mH d) 38 mH
- 2) Under resonance condition the power factor of a system is
a) Unity b) Lagging
c) Leading d) None of above
- 3) Reactive power drawn by a pure resistor is
a) 0 b) minimum c) maximum d) average
- 4) In active filter _____ element is absent.
a) Inductor b) Capacitor
c) Both a) and b) d) Resistor
- 5) _____ is not a bilateral.
a) Resistor b) Diode c) Capacitor d) Inductor
- 6) A network contains only an independent current source and resistors. If the values of all resistors are doubled the value of the node voltages will
a) become half b) remains unchanged
c) become double d) none of these

P.T.O.



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
LINEAR CIRCUITS ANALYSIS (New – CBCS)**

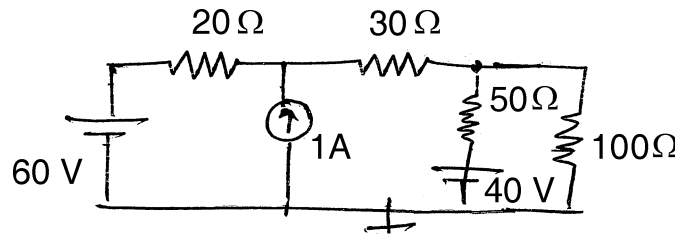
Day and Date : Thursday, 21-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

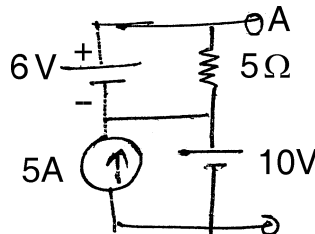
SECTION – I

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

- 1) Define and differentiate between Nodal and Mesh analysis with one example.
- 2) Find the current in the 100 Ω resistor



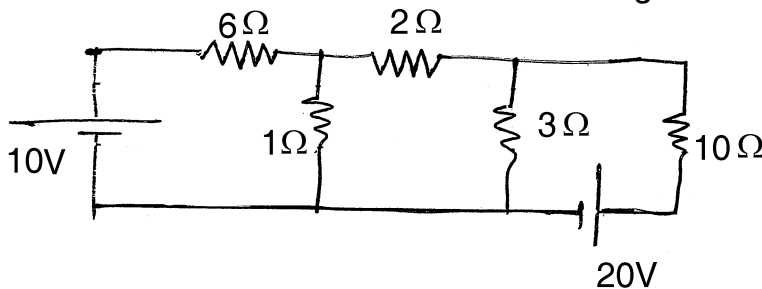
- 3) Find the voltage V_{AB} using super position theorem.



- 4) Define and compare Thevenin's and Norton's theorem.
- 5) A series resonant circuit has impedance of 500 Ω at resonant frequency. Cut off frequencies are 10 KHz and 100 Hz. Determine
 - i) Resonant frequency
 - ii) Value of R-L-C.

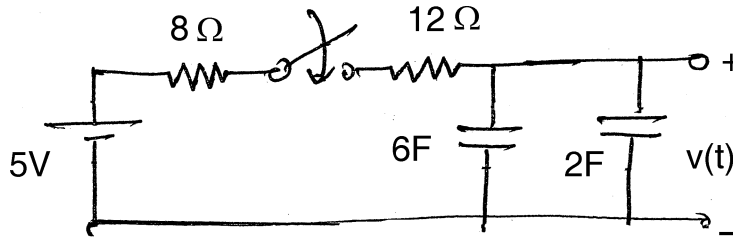
3. Attempt **any two** questions : **(6×2=12)**

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

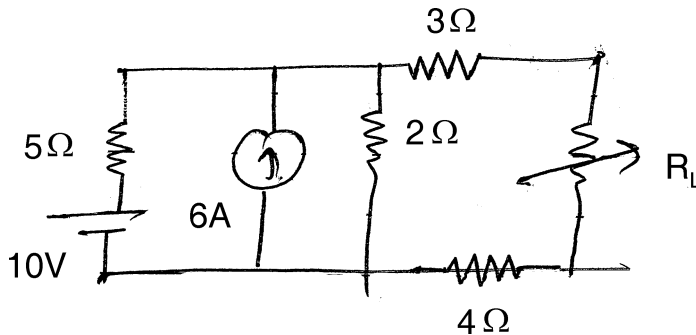




- 2) The switch is open until $t = 100$ sec. and is closed for all times thereafter. Find $v(t)$ for all times greater than 100 if $v(100) = -3$.



- 3) State Maximum power transfer theorem and for the circuit shown find value of resistance R_L for maximum power and calculate maximum power.

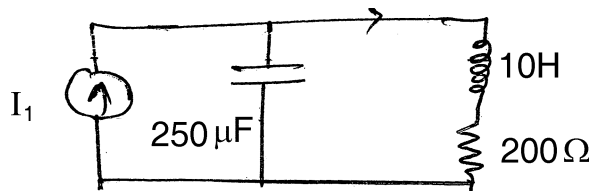


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

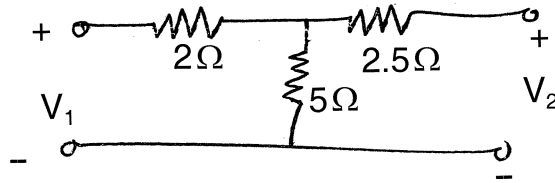
- 1) With necessary diagram explain working of lowpass and bandpass filters.
- 2) Draw the pole zero diagrams of I_2/I_1 for the network shown.



- 3) Derive the condition for reciprocity for inverse hybrid parameters.
- 4) Differentiate between T type and bridged T type attenuator.



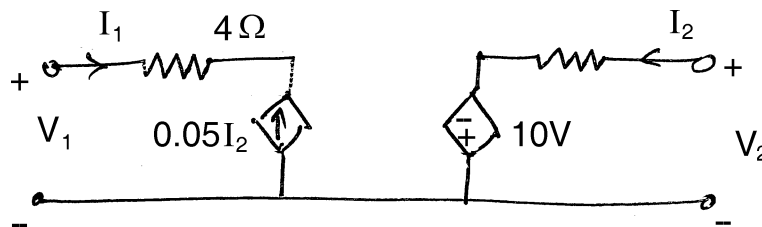
5) Find the equivalent π network for the given T network :



5. Attempt **any 2** questions :

(6×2=12)

1) Determine Z and Y parameters of the network shown.



2) The current $I(s)$ in a network is given by $I(s) = \frac{2s}{(s+1)(s+2)}$. Plot the pole zero pattern in the 's' plane and hence obtain $i(t)$.

3) Write a short note on :

- a) ABCD parameters in terms of hybrid parameters.
- b) ABCD parameters in terms of Y parameters.



SLR-TJ – 402

Seat No.	
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Set	P
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
(Old – CGPA)
ENGINEERING MATHEMATICS – III**

Day and Date : Tuesday, 12-12-2017
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) $L\{t^n \cdot f(t)\} = \dots$ where $\phi(s) = L\{f(t)\}$.

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

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

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

d) None

2) Regular function with constant Modulus is

a) Constant

b) Variable

c) Both a) and b)

d) None

3) $L\{\text{Sinhat}\} =$

a) $\frac{a}{a^2 - s^2}$

b) $\frac{a}{s^2 + a^2}$

c) $\frac{a}{s^2 - a^2}$

d) $\frac{s}{s^2 + a^2}$

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

a) $\frac{1}{2}e^{\frac{5}{2}t}$

b) $-\frac{1}{2}e^{\frac{5}{2}t}$

c) $\frac{1}{2}e^{\frac{-5}{2}t}$

d) $\frac{1}{4}e^{\frac{5}{2}t}$

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

6) $L\left\{\frac{1}{t}f(t)\right\} =$ _____ where $\phi(s) = L\{f(t)\}$

a) $\int_0^{\infty} \phi(s) ds$ b) $\int_2^{\infty} \phi(s) ds$ c) $\int_{-\infty}^{\infty} \phi(s) ds$ d) $\int_s^{\infty} \phi(s) ds$

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

a) $K = 1$ b) $K = 3$ c) $K = 2$ d) $K = 4$

8) Which of the following is the fixed point of Bilinear transformation $w = \frac{z-4}{2z-5}$?

a) $z = 2$ b) $z = 7$ c) $z = 8$ d) $z = 4$

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) Not constant c) Variable d) None

12) Fourier expansion of an even 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) $\frac{4}{\pi} \left\{ \sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \dots \right\}$ 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



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
(Old – CGPA)
ENGINEERING MATHEMATICS – III**

Day and Date : Tuesday, 12-12-2017
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 **whenever** necessary.

SECTION – I

2. Attempt **any four** :

(4×4=16)

1) Evaluate $\int_0^{\infty} e^{-t} \cdot \frac{\sin^2 t}{t} dt$.

2) Find the constants a, b, c, d, e if $f(z) = (ax^4 + bx^2y^2 + (y^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy)$ 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

$$f(t) = a \sin pt \quad 0 < t < \frac{\pi}{p}$$

$$= 0 \quad \frac{\pi}{p} < t < \frac{2\pi}{p} \quad \text{and} \quad f(t) = f\left(t + \frac{2\pi}{p}\right)$$

5) Find Laplace transform of $\int_0^t u \cdot \cosh u \, du$.



3. Attempt **any two** :

(6×2=12)

- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{(s+2)^2}{(s^2+4s+8)^2}$ by using convolution method.
- 2) If $f(z) = u + iv$ is analytic and $u + v = e^x(\cos y + \sin y)$
- 3) Solve using Laplace transform $3\frac{dy}{dt} + 2y = e^{3t}$ $y = 1$ at $t = 0$.

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 deduce 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 $\cosh x$ $h = 1, 2, \dots$ is orthogonal on $(0, 2\pi)$
- 4) Find $\int_C f \circ g dz$ 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 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 of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in the interval $0 \leq x \leq 2\pi$ and $f(x+2\pi) = f(x)$.
- 3) Find the Fourier expansion of $f(x) = 2x - x^2$ $0 \leq x \leq 3$ whose period 3.



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

Day and Date : Tuesday, 12-12-2017

Total Marks : 70

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

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
 - 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) Which of the following is the fixed point of Bilinear transformation $w = \frac{z-4}{2z-5}$?
- a) $z = 2$ b) $z = 7$ c) $z = 8$ d) $z = 4$

- 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) Not constant c) Variable d) None

- 5) Fourier expansion of an even 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) $\frac{4}{\pi} \left\{ \sin x - \frac{\sin 3x}{3} + \frac{\sin 5x}{5} - \dots \right\}$ 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) $L\{t^n \cdot f(t)\} = \dots$ where $\phi(s) = L\{f(t)\}$.

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

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

- 9) Regular function with constant Modulus is

- a) Constant b) Variable
 c) Both a) and b) d) None

- 10) $L\{\text{Sinhat}\} =$

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

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

a) $\frac{1}{2}e^{\frac{5}{2}t}$ b) $-\frac{1}{2}e^{\frac{5}{2}t}$ c) $\frac{1}{2}e^{-\frac{5}{2}t}$ d) $\frac{1}{4}e^{\frac{5}{2}t}$

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

c) $\int_0^t f_1(u) \cdot f_2(t-u) du$ d) None

13) $L\left\{\frac{1}{t}f(t)\right\} = \underline{\hspace{2cm}}$ where $\phi(s) = L\{f(t)\}$

a) $\int_0^{\infty} \phi(s) ds$ b) $\int_2^{\infty} \phi(s) ds$ c) $\int_{-\infty}^{\infty} \phi(s) ds$ d) $\int_s^{\infty} \phi(s) ds$

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

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



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
(Old – CGPA)
ENGINEERING MATHEMATICS – III**

Day and Date : Tuesday, 12-12-2017
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 **whenever** necessary.

SECTION – I

2. Attempt **any four** :

(4×4=16)

1) Evaluate $\int_0^{\infty} e^{-t} \cdot \frac{\sin^2 t}{t} dt$.

2) Find the constants a, b, c, d, e if $f(z) = (ax^4 + bx^2y^2 + (y^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy))$ 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

$$f(t) = a \sin pt \quad 0 < t < \frac{\pi}{p}$$

$$= 0 \quad \frac{\pi}{p} < t < \frac{2\pi}{p} \quad \text{and} \quad f(t) = f\left(t + \frac{2\pi}{p}\right)$$

5) Find Laplace transform of $\int_0^t u \cdot \cosh u \, du$.



3. Attempt **any two** :

(6×2=12)

- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{(s+2)^2}{(s^2+4s+8)^2}$ by using convolution method.
- 2) If $f(z) = u + iv$ is analytic and $u + v = e^x(\cos y + \sin y)$
- 3) Solve using Laplace transform $3\frac{dy}{dt} + 2y = e^{3t}$ $y = 1$ at $t = 0$.

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 deduce 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 $\cosh x$ $h = 1, 2, \dots$ is orthogonal on $(0, 2\pi)$
- 4) Find $\int_C f \circ g dz$ 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 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 of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in the interval $0 \leq x \leq 2\pi$ and $f(x+2\pi) = f(x)$.
- 3) Find the Fourier expansion of $f(x) = 2x - x^2$ $0 \leq x \leq 3$ whose period 3.



Seat No.	
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Set	R
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
(Old – CGPA)
ENGINEERING MATHEMATICS – III**

Day and Date : Tuesday, 12-12-2017
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) 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) $\int_0^{\infty} f_1(t) \cdot f_2(t-u) du$ c) $\int_0^t f_1(u) \cdot f_2(t-u) du$ d) None

2) $L\left\{\frac{1}{t}f(t)\right\} =$ _____ where $\phi(s) = L\{f(t)\}$

- a) $\int_0^{\infty} \phi(s) ds$ b) $\int_2^{\infty} \phi(s) ds$ c) $\int_{-\infty}^{\infty} \phi(s) ds$ d) $\int_s^{\infty} \phi(s) ds$

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

- a) K = 1 b) K = 3 c) K = 2 d) K = 4

4) Which of the following is the fixed point of Bilinear transformation $w = \frac{z-4}{2z-5}$?

- a) z = 2 b) z = 7 c) z = 8 d) z = 4



$$5) \int_{|z|=1} \frac{1}{(z-2)(z-3)} dz =$$

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

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

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

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

- a) Constant b) Not constant c) Variable d) None

8) Fourier expansion of an even function has only _____ terms.

- a) Sine b) Cosine c) Both a) and b) d) None

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

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

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

- a) Odd b) Zero c) Five d) None

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

- a) $(-1)^n \frac{d^n}{ds^n} [\phi(s)]$ b) $(-1)^n \cdot \frac{d^n}{ds^n} [\phi(s)]$
 c) $\frac{d^n}{ds^n} [\phi(s)]$ d) None

12) Regular function with constant Modulus is

- a) Constant b) Variable c) Both a) and b) d) None

13) $L\{\text{Sinhat}\} =$

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

$$14) L^{-1} \left\{ \frac{1}{2s-5} \right\} =$$

- a) $\frac{1}{2} e^{\frac{5}{2}t}$ b) $-\frac{1}{2} e^{\frac{5}{2}t}$ c) $\frac{1}{2} e^{-\frac{5}{2}t}$ d) $\frac{1}{4} e^{\frac{5}{2}t}$



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

Day and Date : Tuesday, 12-12-2017
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 **whenever** necessary.

SECTION – I

2. Attempt **any four** :

(4×4=16)

1) Evaluate $\int_0^{\infty} e^{-t} \cdot \frac{\sin^2 t}{t} dt$.

2) Find the constants a, b, c, d, e if $f(z) = (ax^4 + bx^2y^2 + (y^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy)$ 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

$$f(t) = a \sin pt \quad 0 < t < \frac{\pi}{p}$$

$$= 0 \quad \frac{\pi}{p} < t < \frac{2\pi}{p} \quad \text{and} \quad f(t) = f\left(t + \frac{2\pi}{p}\right)$$

5) Find Laplace transform of $\int_0^t u \cdot \cosh u \, du$.



3. Attempt **any two** :

(6×2=12)

- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{(s+2)^2}{(s^2+4s+8)^2}$ by using convolution method.
- 2) If $f(z) = u + iv$ is analytic and $u + v = e^x(\cos y + \sin y)$
- 3) Solve using Laplace transform $3\frac{dy}{dt} + 2y = e^{3t}$ $y = 1$ at $t = 0$.

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 deduce 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 $\cosh x$ $h = 1, 2, \dots$ is orthogonal on $(0, 2\pi)$
- 4) Find $\int_C f \circ g dz$ 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 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 of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in the interval $0 \leq x \leq 2\pi$ and $f(x+2\pi) = f(x)$.
- 3) Find the Fourier expansion of $f(x) = 2x - x^2$ $0 \leq x \leq 3$ whose period 3.



SLR-TJ – 402

Seat No.	
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S.E. (Biomedical Engg.) (Part – I) Examination, 2017
(Old – CGPA)
ENGINEERING MATHEMATICS – III

Day and Date : Tuesday, 12-12-2017
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) $\int_C \frac{z^2}{(z-1)^2(z-2)} dz = \underline{\hspace{2cm}}$ where $C : |z| = 2.5$

- | | |
|-------------|-------------|
| 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) Not constant |
| c) Variable | d) None |

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

- | | | | |
|---------|-----------|-------------------|---------|
| a) Sine | b) Cosine | c) Both a) and b) | d) None |
|---------|-----------|-------------------|---------|

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

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

P.T.O.



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

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

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

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

d) None

7) Regular function with constant Modulus is

a) Constant

b) Variable

c) Both a) and b)

d) None

8) $L\{\text{Sinhat}\} =$

a) $\frac{a}{a^2 - s^2}$

b) $\frac{a}{s^2 + a^2}$

c) $\frac{a}{s^2 - a^2}$

d) $\frac{s}{s^2 + a^2}$

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

a) $\frac{1}{2}e^{\frac{5}{2}t}$

b) $-\frac{1}{2}e^{\frac{5}{2}t}$

c) $\frac{1}{2}e^{-\frac{5}{2}t}$

d) $\frac{1}{4}e^{\frac{5}{2}t}$

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

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

d) None

11) $L\left\{\frac{1}{t}f(t)\right\} = \underline{\hspace{2cm}}$ where $\phi(s) = L\{f(t)\}$

a) $\int_0^\infty \phi(s) ds$

b) $\int_2^\infty \phi(s) ds$

c) $\int_{-\infty}^\infty \phi(s) ds$

d) $\int_s^\infty \phi(s) ds$

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

a) $K = 1$

b) $K = 3$

c) $K = 2$

d) $K = 4$

13) Which of the following is the fixed point of Bilinear transformation $w = \frac{z-4}{2z-5}$?

a) $z = 2$

b) $z = 7$

c) $z = 8$

d) $z = 4$

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

a) $2i$

b) $2\pi i$

c) $-2\pi i$

d) 0



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) Examination, 2017
(Old – CGPA)
ENGINEERING MATHEMATICS – III**

Day and Date : Tuesday, 12-12-2017
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 **whenever** necessary.

SECTION – I

2. Attempt **any four** :

(4×4=16)

1) Evaluate $\int_0^{\infty} e^{-t} \cdot \frac{\sin^2 t}{t} dt$.

2) Find the constants a, b, c, d, e if $f(z) = (ax^4 + bx^2y^2 + (y^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy)$ 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

$$f(t) = a \sin pt \quad 0 < t < \frac{\pi}{p}$$

$$= 0 \quad \frac{\pi}{p} < t < \frac{2\pi}{p} \quad \text{and} \quad f(t) = f\left(t + \frac{2\pi}{p}\right)$$

5) Find Laplace transform of $\int_0^t u \cdot \cosh u \, du$.



3. Attempt **any two** :

(6×2=12)

- 1) Find inverse Laplace transforms of $\phi(s)$ where $\phi(s) = \frac{(s+2)^2}{(s^2+4s+8)^2}$ by using convolution method.
- 2) If $f(z) = u + iv$ is analytic and $u + v = e^x(\cos y + \sin y)$
- 3) Solve using Laplace transform $3\frac{dy}{dt} + 2y = e^{3t}$ $y = 1$ at $t = 0$.

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 deduce 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 $\cosh x$ $h = 1, 2, \dots$ is orthogonal on $(0, 2\pi)$
- 4) Find $\int_C f \circ g dz$ 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 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 of $f(x) = \left(\frac{\pi-x}{2}\right)^2$ in the interval $0 \leq x \leq 2\pi$ and $f(x+2\pi) = f(x)$.
- 3) Find the Fourier expansion of $f(x) = 2x - x^2$ $0 \leq x \leq 3$ whose period 3.



SLR-TJ – 403

Seat No.	
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Set	P
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY (Old)**

Day and Date : Thursday, 14-12-2017
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 the **right** indicate **full** marks.
4) Assume suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks :14

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

- 1) The spinal cord is a _____ continuation of the medulla oblongata in the brain.
a) Upward
b) Downward
c) Lateral
d) Medial
- 2) The heart rate is partly controlled by autonomous nervous system and partly by _____.
a) Blood WBC's
b) Blood plasma
c) Heart pumping
d) Hormone action
- 3) The exact amount of carbon dioxide expired is decided by _____.
a) Metabolism
b) Inspiration
c) Cerebral cortex
d) Heart pumping
- 4) _____ consists of 2 hemispheres.
a) Cerebrum
b) Hypothalamus
c) Cerebellum
d) Cortex
- 5) The dendrites normally conduct impulses towards the _____.
a) Axon
b) Pituitary gland
c) Cell body
d) Synapse

P.T.O.



- 6) Veins are _____ walls that carry deoxygenated blood towards heart.
- a) Thin b) Thick
c) Rigid d) Transparent
- 7) The bone that protects the brain is called the _____
- a) Sternum b) Cranium
c) Clavicle d) Pelvis
- 8) The thoracic cage is a structural unit important for which of the following functions ?
- a) Alimentation b) Menstruation
c) Mentation d) Respiration
- 9) _____ allows gas exchange in the lungs.
- a) Alveoli b) Bronchi
c) Bronchioles d) Capillaries
- 10) _____ structures are part of the small intestine.
- a) Ascending colon b) Cecum
c) Ileum d) Sigmoid colon
- 11) Molecules that are soluble in _____ can pass through the fatty acid portion of the cell membrane unassisted.
- a) Water b) Cholesterol
c) Gases d) Lipids
- 12) The _____ serves as the source of the flagellum in sperm.
- a) Nucleus b) Cilia
c) Cell membrane d) Centriole
- 13) Saliva contains an enzyme that acts upon _____ of the nutrients.
- a) Starches b) Proteins
c) Fats d) Minerals
- 14) _____ is the lymphoid organ that is a reservoir for red blood cells and filters organisms from the blood.
- a) Appendix b) Gall bladder
c) Pancreas d) Spleen
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Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY (Old)**

Day and Date : Thursday, 14-12-2017
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) Explain types and significance of heart walls.
 - 2) List types and explain role of heart valves with necessary figure.
 - 3) Explain the origin of ECG waveform in reference with conduction system of heart.
 - 4) Draw respiratory system and indicate all naming.
 - 5) List various secretions by alimentary system and mention each of significance.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain circulation system in detail.
 - 2) Define heart rate, pulse rate, cardiac output and stroke volume.
 - 3) Explain path of digestive system with necessary diagram.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Draw microscopic structure of nephron and list its components.
 - 2) Draw and explain structure of ear.
 - 3) Draw and explain the process of impulse transmission in nervous system.
 - 4) Define and differentiate endocrine and exocrine glands with each one example.
 - 5) Draw and explain types of neurons with neat figures.



5. Attempt **any 2** :

(6×2=12)

- 1) Explain the process of urine formation with neat figures.
 - 2) Draw and explain the function of female reproductive system in detail.
 - 3) Draw and explain the structure of eye and process of forming image on the retina.
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SLR-TJ – 403

Seat No.	
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Set	Q
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY (Old)**

Day and Date : Thursday, 14-12-2017
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 the **right** indicate **full** marks.
4) Assume suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks :14

1. Choose the correct answer : **(1×14=14)**
- 1) The thoracic cage is a structural unit important for which of the following functions ?
 - a) Alimentation
 - b) Menstruation
 - c) Mentation
 - d) Respiration
 - 2) _____ allows gas exchange in the lungs.
 - a) Alveoli
 - b) Bronchi
 - c) Bronchioles
 - d) Capillaries
 - 3) _____ structures are part of the small intestine.
 - a) Ascending colon
 - b) Cecum
 - c) Ileum
 - d) Sigmoid colon
 - 4) Molecules that are soluble in _____ can pass through the fatty acid portion of the cell membrane unassisted.
 - a) Water
 - b) Cholesterol
 - c) Gases
 - d) Lipids

P.T.O.



- 5) The _____ serves as the source of the flagellum in sperm.
- a) Nucleus
 - b) Cilia
 - c) Cell membrane
 - d) Centriole
- 6) Saliva contains an enzyme that acts upon _____ of the nutrients.
- a) Starches
 - b) Proteins
 - c) Fats
 - d) Minerals
- 7) _____ is the lymphoid organ that is a reservoir for red blood cells and filters organisms from the blood.
- a) Appendix
 - b) Gall bladder
 - c) Pancreas
 - d) Spleen
- 8) The spinal cord is a _____ continuation of the medulla oblongata in the brain.
- a) Upward
 - b) Downward
 - c) Lateral
 - d) Medial
- 9) The heart rate is partly controlled by autonomous nervous system and partly by _____
- a) Blood WBC's
 - b) Blood plasma
 - c) Heart pumping
 - d) Hormone action
- 10) The exact amount of carbon dioxide expired is decided by _____
- a) Metabolism
 - b) Inspiration
 - c) Cerebral cortex
 - d) Heart pumping
- 11) _____ consists of 2 hemispheres.
- a) Cerebrum
 - b) Hypothalamus
 - c) Cerebellum
 - d) Cortex
- 12) The dendrites normally conduct impulses towards the _____
- a) Axon
 - b) Pituitary gland
 - c) Cell body
 - d) Synapse
- 13) Veins are _____ walls that carry deoxygenated blood towards heart.
- a) Thin
 - b) Thick
 - c) Rigid
 - d) Transparent
- 14) The bone that protects the brain is called the _____
- a) Sternum
 - b) Cranium
 - c) Clavicle
 - d) Pelvis



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY (Old)**

Day and Date : Thursday, 14-12-2017
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) Explain types and significance of heart walls.
 - 2) List types and explain role of heart valves with necessary figure.
 - 3) Explain the origin of ECG waveform in reference with conduction system of heart.
 - 4) Draw respiratory system and indicate all naming.
 - 5) List various secretions by alimentary system and mention each of significance.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain circulation system in detail.
 - 2) Define heart rate, pulse rate, cardiac output and stroke volume.
 - 3) Explain path of digestive system with necessary diagram.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Draw microscopic structure of nephron and list its components.
 - 2) Draw and explain structure of ear.
 - 3) Draw and explain the process of impulse transmission in nervous system.
 - 4) Define and differentiate endocrine and exocrine glands with each one example.
 - 5) Draw and explain types of neurons with neat figures.



5. Attempt **any 2** :

(6×2=12)

- 1) Explain the process of urine formation with neat figures.
- 2) Draw and explain the function of female reproductive system in detail.
- 3) Draw and explain the structure of eye and process of forming image on the retina.



SLR-TJ – 403

Seat No.	
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Set	R
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY (Old)**

Day and Date : Thursday, 14-12-2017
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 the **right** indicate **full** marks.
4) Assume suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks :14

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

- 1) The dendrites normally conduct impulses towards the _____
 - a) Axon
 - b) Pituitary gland
 - c) Cell body
 - d) Synapse
- 2) Veins are _____ walls that carry deoxygenated blood towards heart.
 - a) Thin
 - b) Thick
 - c) Rigid
 - d) Transparent
- 3) The bone that protects the brain is called the _____
 - a) Sternum
 - b) Cranium
 - c) Clavicle
 - d) Pelvis
- 4) The thoracic cage is a structural unit important for which of the following functions ?
 - a) Alimentation
 - b) Menstruation
 - c) Mentation
 - d) Respiration
- 5) _____ allows gas exchange in the lungs.
 - a) Alveoli
 - b) Bronchi
 - c) Bronchioles
 - d) Capillaries

P.T.O.



- 6) _____ structures are part of the small intestine.
- a) Ascending colon b) Cecum
c) Ileum d) Sigmoid colon
- 7) Molecules that are soluble in _____ can pass through the fatty acid portion of the cell membrane unassisted.
- a) Water b) Cholesterol
c) Gases d) Lipids
- 8) The _____ serves as the source of the flagellum in sperm.
- a) Nucleus b) Cilia
c) Cell membrane d) Centriole
- 9) Saliva contains an enzyme that acts upon _____ of the nutrients.
- a) Starches b) Proteins
c) Fats d) Minerals
- 10) _____ is the lymphoid organ that is a reservoir for red blood cells and filters organisms from the blood.
- a) Appendix b) Gall bladder
c) Pancreas d) Spleen
- 11) The spinal cord is a _____ continuation of the medulla oblongata in the brain.
- a) Upward b) Downward
c) Lateral d) Medial
- 12) The heart rate is partly controlled by autonomous nervous system and partly by _____
- a) Blood WBC's b) Blood plasma
c) Heart pumping d) Hormone action
- 13) The exact amount of carbon dioxide expired is decided by _____
- a) Metabolism b) Inspiration
c) Cerebral cortex d) Heart pumping
- 14) _____ consists of 2 hemispheres.
- a) Cerebrum b) Hypothalamus
c) Cerebellum d) Cortex



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY (Old)**

Day and Date : Thursday, 14-12-2017
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) Explain types and significance of heart walls.
 - 2) List types and explain role of heart valves with necessary figure.
 - 3) Explain the origin of ECG waveform in reference with conduction system of heart.
 - 4) Draw respiratory system and indicate all naming.
 - 5) List various secretions by alimentary system and mention each of significance.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain circulation system in detail.
 - 2) Define heart rate, pulse rate, cardiac output and stroke volume.
 - 3) Explain path of digestive system with necessary diagram.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Draw microscopic structure of nephron and list its components.
 - 2) Draw and explain structure of ear.
 - 3) Draw and explain the process of impulse transmission in nervous system.
 - 4) Define and differentiate endocrine and exocrine glands with each one example.
 - 5) Draw and explain types of neurons with neat figures.



5. Attempt **any 2** :

(6×2=12)

- 1) Explain the process of urine formation with neat figures.
 - 2) Draw and explain the function of female reproductive system in detail.
 - 3) Draw and explain the structure of eye and process of forming image on the retina.
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SLR-TJ – 403

Seat No.	
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Set	S
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY (Old)**

Day and Date : Thursday, 14-12-2017
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 the **right** indicate **full** marks.
4) Assume suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks :14

1. Choose the correct answer :

(1×14=14)

- 1) _____ structures are part of the small intestine.
 - a) Ascending colon
 - b) Cecum
 - c) Ileum
 - d) Sigmoid colon
- 2) Molecules that are soluble in _____ can pass through the fatty acid portion of the cell membrane unassisted.
 - a) Water
 - b) Cholesterol
 - c) Gases
 - d) Lipids
- 3) The _____ serves as the source of the flagellum in sperm.
 - a) Nucleus
 - b) Cilia
 - c) Cell membrane
 - d) Centriole
- 4) Saliva contains an enzyme that acts upon _____ of the nutrients.
 - a) Starches
 - b) Proteins
 - c) Fats
 - d) Minerals
- 5) _____ is the lymphoid organ that is a reservoir for red blood cells and filters organisms from the blood.
 - a) Appendix
 - b) Gall bladder

P.T.O.



- c) Pancreas
d) Spleen
- 6) The spinal cord is a _____ continuation of the medulla oblongata in the brain.
a) Upward
b) Downward
c) Lateral
d) Medial
- 7) The heart rate is partly controlled by autonomous nervous system and partly by _____.
a) Blood WBC's
b) Blood plasma
c) Heart pumping
d) Hormone action
- 8) The exact amount of carbon dioxide expired is decided by _____.
a) Metabolism
b) Inspiration
c) Cerebral cortex
d) Heart pumping
- 9) _____ consists of 2 hemispheres.
a) Cerebrum
b) Hypothalamus
c) Cerebellum
d) Cortex
- 10) The dendrites normally conduct impulses towards the _____.
a) Axon
b) Pituitary gland
c) Cell body
d) Synapse
- 11) Veins are _____ walls that carry deoxygenated blood towards heart.
a) Thin
b) Thick
c) Rigid
d) Transparent
- 12) The bone that protects the brain is called the _____.
a) Sternum
b) Cranium
c) Clavicle
d) Pelvis
- 13) The thoracic cage is a structural unit important for which of the following functions ?
a) Alimentation
b) Menstruation
c) Mentation
d) Respiration
- 14) _____ allows gas exchange in the lungs.
a) Alveoli
b) Bronchi
c) Bronchioles
d) Capillaries



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
HUMAN ANATOMY AND PHYSIOLOGY (Old)**

Day and Date : Thursday, 14-12-2017
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) Explain types and significance of heart walls.
 - 2) List types and explain role of heart valves with necessary figure.
 - 3) Explain the origin of ECG waveform in reference with conduction system of heart.
 - 4) Draw respiratory system and indicate all naming.
 - 5) List various secretions by alimentary system and mention each of significance.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain circulation system in detail.
 - 2) Define heart rate, pulse rate, cardiac output and stroke volume.
 - 3) Explain path of digestive system with necessary diagram.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Draw microscopic structure of nephron and list its components.
 - 2) Draw and explain structure of ear.
 - 3) Draw and explain the process of impulse transmission in nervous system.
 - 4) Define and differentiate endocrine and exocrine glands with each one example.
 - 5) Draw and explain types of neurons with neat figures.



5. Attempt **any 2** :

(6×2=12)

- 1) Explain the process of urine formation with neat figures.
 - 2) Draw and explain the function of female reproductive system in detail.
 - 3) Draw and explain the structure of eye and process of forming image on the retina.
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SLR-TJ – 404

Seat No.	
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Set	P
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMATERIALS (Old)**

Day and Date : Saturday, 16-12-2017

Total Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **14**
- 1) _____ types of biomaterials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) All of these
 - 2) Which of the following statements is true ?
a) Ceramic materials have low melting point
b) Porcelain is used as insulating material in spark plugs
c) Graphite is viscoelastic in nature
d) Compacting iron oxide powder ceramic tools are prepared
 - 3) _____ materials can be used to manufacture elastomers.
a) Limestone b) Petroleum c) Alcohol d) All of the above
 - 4) Malleability means
a) Metals undergo plastic deformation under compressive stresses
b) Metals can be drawn into wires
c) Both a) and b)
d) None of the above
 - 5) Ductility means
a) Metals can be drawn into sheets
b) Metals undergo elastic deformation under tensile loads
c) Metals undergo plastic deformation under tensile loads
d) All of the above

P.T.O.



- 6) Biosensors are used in
- a) Medical field
 - b) Agricultural field
 - c) Pollution monitoring
 - d) All of the above
- 7) Restorative biomaterials are designed to recover the shape and the function of the
- a) Teeth
 - b) Bone
 - c) Tissue
 - d) None of above
- 8) _____ are three-dimensional (3D) networks of atoms having no regular pattern to the spacing.
- a) Glasses
 - b) Fiber
 - c) Metal
 - d) Polymer
- 9) Polycrystalline ceramics have no _____ components.
- a) glassy
 - b) liquid
 - c) solid
 - d) crystal
- 10) _____ is the ability of a material to perform with an appropriate host response in a specific application.
- a) Reduction
 - b) Biocompatibility
 - c) Oxidation
 - d) None of above
- 11) Elastic deformation in polymers is due to
- a) Slight adjust of molecular chains
 - b) Slippage of molecular chains
 - c) Straightening of molecular chains
 - d) Severe of Covalent bonds
- 12) One of characteristic properties of polymer material
- a) High temperature stability
 - b) High mechanical strength
 - c) High elongation
 - d) Low hardness
- 13) Polymers are _____ in nature.
- a) Organic
 - b) Inorganic
 - c) Both a) and b)
 - d) None
- 14) _____ polymers cannot be recycled.
- a) Thermoplasts
 - b) Thermosets
 - c) Elastomers
 - d) All polymers
-



Seat No.	
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S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMATERIALS (Old)

Day and Date : Saturday, 16-12-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any four** : **(4×4=16)**
- 1) Define and classify biomaterial.
 - 2) Explain applications of CO based alloys.
 - 3) Explain applications of PMMA.
 - 4) Explain classification of bioceramics and mention its any 2 applications.
 - 5) What are bioglasses ? Mention its any 2 applications.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain biocompatibility test performed on Ti based alloy.
 - 2) Explain properties of composite biomaterials with example.
 - 3) Write a short note on (structure, applications) :
 - a) Silicon rubber
 - b) Hydrogels.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain which material is suited as bone cement ? Mention its properties.
 - 2) Explain materials can be protected from corrosion.
 - 3) Which materials are used for soft tissue replacement ? Discuss their properties.
 - 4) Define thermoplastic and thermosetting resins. Mention its any two applications.
 - 5) Discuss the properties and types of materials used in breast implants.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain how surface properties of biomaterials are tested.
 - 2) Write a short note on :
 - a) Wood and binding materials
 - b) Types and applications of rubber.
 - 3) Explain the methods of biological testing of biomaterials in short.
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SLR-TJ – 404

Seat No.	
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Set	Q
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMATERIALS (Old)**

Day and Date : Saturday, 16-12-2017
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) _____ are three-dimensional (3D) networks of atoms having no regular pattern to the spacing.
a) Glasses b) Fiber c) Metal d) Polymer
 - 2) Polycrystalline ceramics have no _____ components.
a) glassy b) liquid c) solid d) crystal
 - 3) _____ is the ability of a material to perform with an appropriate host response in a specific application.
a) Reduction b) Biocompatibility
c) Oxidation d) None of above
 - 4) Elastic deformation in polymers is due to
a) Slight adjust of molecular chains
b) Slippage of molecular chains
c) Straightening of molecular chains
d) Severe of Covalent bonds
 - 5) One of characteristic properties of polymer material
a) High temperature stability b) High mechanical strength
c) High elongation d) Low hardness
 - 6) Polymers are _____ in nature.
a) Organic b) Inorganic c) Both a) and b) d) None

P.T.O.



- 7) _____ polymers cannot be recycled.
a) Thermoplasts b) Thermosets c) Elastomers d) All polymers
- 8) _____ types of biomaterials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) All of these
- 9) Which of the following statements is true ?
a) Ceramic materials have low melting point
b) Porcelain is used as insulating material in spark plugs
c) Graphite is viscoelastic in nature
d) Compacting iron oxide powder ceramic tools are prepared
- 10) _____ materials can be used to manufacture elastomers.
a) Limestone b) Petroleum c) Alcohol d) All of the above
- 11) Malleability means
a) Metals undergo plastic deformation under compressive stresses
b) Metals can be drawn into wires
c) Both a) and b)
d) None of the above
- 12) Ductility means
a) Metals can be drawn into sheets
b) Metals undergo elastic deformation under tensile loads
c) Metals undergo plastic deformation under tensile loads
d) All of the above
- 13) Biosensors are used in
a) Medical field b) Agricultural field
c) Pollution monitoring d) All of the above
- 14) Restorative biomaterials are designed to recover the shape and the function of the
a) Teeth b) Bone c) Tissue d) None of above
-



Seat No.	
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S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMATERIALS (Old)

Day and Date : Saturday, 16-12-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any four** : **(4×4=16)**
- 1) Define and classify biomaterial.
 - 2) Explain applications of CO based alloys.
 - 3) Explain applications of PMMA.
 - 4) Explain classification of bioceramics and mention its any 2 applications.
 - 5) What are bioglasses ? Mention its any 2 applications.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain biocompatibility test performed on Ti based alloy.
 - 2) Explain properties of composite biomaterials with example.
 - 3) Write a short note on (structure, applications) :
 - a) Silicon rubber
 - b) Hydrogels.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain which material is suited as bone cement ? Mention its properties.
 - 2) Explain materials can be protected from corrosion.
 - 3) Which materials are used for soft tissue replacement ? Discuss their properties.
 - 4) Define thermoplastic and thermosetting resins. Mention its any two applications.
 - 5) Discuss the properties and types of materials used in breast implants.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain how surface properties of biomaterials are tested.
 - 2) Write a short note on :
 - a) Wood and binding materials
 - b) Types and applications of rubber.
 - 3) Explain the methods of biological testing of biomaterials in short.
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SLR-TJ – 404

Seat No.	
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Set	R
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMATERIALS (Old)**

Day and Date : Saturday, 16-12-2017

Total Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) Ductility means
 - a) Metals can be drawn into sheets
 - b) Metals undergo elastic deformation under tensile loads
 - c) Metals undergo plastic deformation under tensile loads
 - d) All of the above
- 2) Biosensors are used in
 - a) Medical field
 - b) Agricultural field
 - c) Pollution monitoring
 - d) All of the above
- 3) Restorative biomaterials are designed to recover the shape and the function of the
 - a) Teeth
 - b) Bone
 - c) Tissue
 - d) None of above
- 4) _____ are three-dimensional (3D) networks of atoms having no regular pattern to the spacing.
 - a) Glasses
 - b) Fiber
 - c) Metal
 - d) Polymer
- 5) Polycrystalline ceramics have no _____ components.
 - a) glassy
 - b) liquid
 - c) solid
 - d) crystal
- 6) _____ is the ability of a material to perform with an appropriate host response in a specific application.
 - a) Reduction
 - b) Biocompatibility
 - c) Oxidation
 - d) None of above

P.T.O.



- 7) Elastic deformation in polymers is due to
- Slight adjust of molecular chains
 - Slippage of molecular chains
 - Straightening of molecular chains
 - Severe of Covalent bonds
- 8) One of characteristic properties of polymer material
- High temperature stability
 - High mechanical strength
 - High elongation
 - Low hardness
- 9) Polymers are _____ in nature.
- Organic
 - Inorganic
 - Both a) and b)
 - None
- 10) _____ polymers cannot be recycled.
- Thermoplasts
 - Thermosets
 - Elastomers
 - All polymers
- 11) _____ types of biomaterials are used as bridges between human tissues and metals.
- Polymeric
 - Ceramic
 - Metallic
 - All of these
- 12) Which of the following statements is true ?
- Ceramic materials have low melting point
 - Porcelain is used as insulating material in spark plugs
 - Graphite is viscoelastic in nature
 - Compacting iron oxide powder ceramic tools are prepared
- 13) _____ materials can be used to manufacture elastomers.
- Limestone
 - Petroleum
 - Alcohol
 - All of the above
- 14) Malleability means
- Metals undergo plastic deformation under compressive stresses
 - Metals can be drawn into wires
 - Both a) and b)
 - None of the above
-



Seat No.	
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S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMATERIALS (Old)

Day and Date : Saturday, 16-12-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any four** : **(4×4=16)**
- 1) Define and classify biomaterial.
 - 2) Explain applications of CO based alloys.
 - 3) Explain applications of PMMA.
 - 4) Explain classification of bioceramics and mention its any 2 applications.
 - 5) What are bioglasses ? Mention its any 2 applications.
3. Attempt **any 2** : **(6×2=12)**
- 1) Explain biocompatibility test performed on Ti based alloy.
 - 2) Explain properties of composite biomaterials with example.
 - 3) Write a short note on (structure, applications) :
 - a) Silicon rubber
 - b) Hydrogels.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain which material is suited as bone cement ? Mention its properties.
 - 2) Explain materials can be protected from corrosion.
 - 3) Which materials are used for soft tissue replacement ? Discuss their properties.
 - 4) Define thermoplastic and thermosetting resins. Mention its any two applications.
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5. Attempt **any 2** : **(6×2=12)**
- 1) Explain how surface properties of biomaterials are tested.
 - 2) Write a short note on :
 - a) Wood and binding materials
 - b) Types and applications of rubber.
 - 3) Explain the methods of biological testing of biomaterials in short.
-



SLR-TJ – 404

Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMATERIALS (Old)**

Day and Date : Saturday, 16-12-2017

Total Marks : 70

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

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

- 1) _____ is the ability of a material to perform with an appropriate host response in a specific application.
a) Reduction b) Biocompatibility
c) Oxidation d) None of above
- 2) Elastic deformation in polymers is due to
a) Slight adjust of molecular chains
b) Slippage of molecular chains
c) Straightening of molecular chains
d) Severe of Covalent bonds
- 3) One of characteristic properties of polymer material
a) High temperature stability b) High mechanical strength
c) High elongation d) Low hardness
- 4) Polymers are _____ in nature.
a) Organic b) Inorganic
c) Both a) and b) d) None
- 5) _____ polymers cannot be recycled.
a) Thermoplasts b) Thermosets c) Elastomers d) All polymers
- 6) _____ types of biomaterials are used as bridges between human tissues and metals.
a) Polymeric b) Ceramic c) Metallic d) All of these

P.T.O.



- 7) Which of the following statements is true ?
- Ceramic materials have low melting point
 - Porcelain is used as insulating material in spark plugs
 - Graphite is viscoelastic in nature
 - Compacting iron oxide powder ceramic tools are prepared
- 8) _____ materials can be used to manufacture elastomers.
- Limestone
 - Petroleum
 - Alcohol
 - All of the above
- 9) Malleability means
- Metals undergo plastic deformation under compressive stresses
 - Metals can be drawn into wires
 - Both a) and b)
 - None of the above
- 10) Ductility means
- Metals can be drawn into sheets
 - Metals undergo elastic deformation under tensile loads
 - Metals undergo plastic deformation under tensile loads
 - All of the above
- 11) Biosensors are used in
- Medical field
 - Agricultural field
 - Pollution monitoring
 - All of the above
- 12) Restorative biomaterials are designed to recover the shape and the function of the
- Teeth
 - Bone
 - Tissue
 - None of above
- 13) _____ are three-dimensional (3D) networks of atoms having no regular pattern to the spacing.
- Glasses
 - Fiber
 - Metal
 - Polymer
- 14) Polycrystalline ceramics have no _____ components.
- glassy
 - liquid
 - solid
 - crystal
-



Seat No.	
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S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMATERIALS (Old)

Day and Date : Saturday, 16-12-2017

Marks : 56

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

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

SECTION – I

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

- 1) Define and classify biomaterial.
- 2) Explain applications of CO based alloys.
- 3) Explain applications of PMMA.
- 4) Explain classification of bioceramics and mention its any 2 applications.
- 5) What are bioglasses ? Mention its any 2 applications.

3. Attempt **any 2** : **(6×2=12)**

- 1) Explain biocompatibility test performed on Ti based alloy.
- 2) Explain properties of composite biomaterials with example.
- 3) Write a short note on (structure, applications) :
 - a) Silicon rubber
 - b) Hydrogels.



SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain which material is suited as bone cement ? Mention its properties.
 - 2) Explain materials can be protected from corrosion.
 - 3) Which materials are used for soft tissue replacement ? Discuss their properties.
 - 4) Define thermoplastic and thermosetting resins. Mention its any two applications.
 - 5) Discuss the properties and types of materials used in breast implants.
5. Attempt **any 2** : **(6×2=12)**
- 1) Explain how surface properties of biomaterials are tested.
 - 2) Write a short note on :
 - a) Wood and binding materials
 - b) Types and applications of rubber.
 - 3) Explain the methods of biological testing of biomaterials in short.
-



SLR-TJ – 405

Seat No.	
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Set

P

**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS & DESIGN – I (Old)**

Day and Date : Tuesday, 19-12-2017
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 : **(14×1=14)**

- 1) The voltage gain of common collector configuration is
a) unity b) zero c) very high d) moderate
- 2) _____ is considered as an amplifier figure of merit.
a) Bandwidth gain product b) Beta
c) Alpha d) Temperature
- 3) The operating point in the characteristic curve is called as _____ point.
a) quiescent b) load c) biasing d) saturation
- 4) _____ represents common emitter small signal input resistance.
a) hie b) hfe c) hib d) hoe
- 5) _____ configuration has the lowest current gain.
a) common base b) common collector
c) common emitter d) emitter follower
- 6) The input impedance of common gate configured JFET is
a) very low b) low c) high d) very high
- 7) When $\Delta I_D = 1 \text{ mA}$ and $\Delta V_{GS} = 1 \text{ V}$, the transconduct of an FET will be
a) 1 ks b) 1 ms c) 1 k Ω d) 1 m Ω

P.T.O.



- 8) When $V_{os} = 0$ V, a JFET is
- a) saturated
 - b) an analog device
 - c) an open switch
 - d) cut off
- 9) Bidirectional semiconductor device is
- a) Diode
 - b) BJT
 - c) SCR
 - d) TRIAC
- 10) A monostable multivibrator has $R = 120$ k Ω and time delay $T = 1000$ ms, value of C
- a) 0.9 μ f
 - b) 1.32 μ f
 - c) 7.5 μ f
 - d) $2.4g$ μ f
- 11) A triac is equivalent to two SCR's
- a) in parallel
 - b) in series
 - c) in inverse parallel
 - d) none of above
- 12) The controlling parameter of IGBT is the
- a) I_G
 - b) V_{GE}
 - c) I_C
 - d) V_{CE}
- 13) The arrow on the symbol of MOSFET indicates
- a) it is a N-channel MOSFET
 - b) direction of electrons
 - c) direction of conventional current flow
 - d) it is p channel MOSFET
- 14) In CE configuration, an emitter resistor is used for
- a) stabilization
 - b) ac signal bypass
 - c) collector bias
 - d) higher gain
-



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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS & DESIGN – I (Old)**

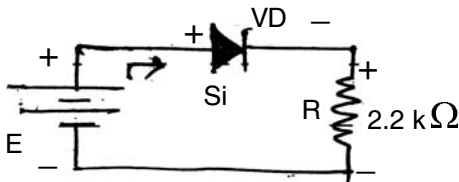
Day and Date : Tuesday, 19-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

1) For the series diode configuration, determine V_D , V_R and I_D .



- 2) Explain working of positive clipper and negative clipper with necessary waveforms.
- 3) Define and explain various modes of operation of BJT.
- 4) Design a fixed bias circuit using silicon transistor having $h_{FE} = 100$, V_{CC} is 12 V and dc bias conditions are $V_{CE} = 6$ V, $I_C = 3$ mA, $V_{BE} = 0.7$ V.
- 5) Draw circuit and explain working of zener diode voltage regulator.

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

- 1) Define α , β and γ factors of a BJT. Explain how they are related to each other.
- 2) Compare common base, common emitter and common collector configurations of BJT amplifier.
- 3) Explain working of full wave rectifier (center tap and bridge) with necessary diagram.

SECTION – II

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

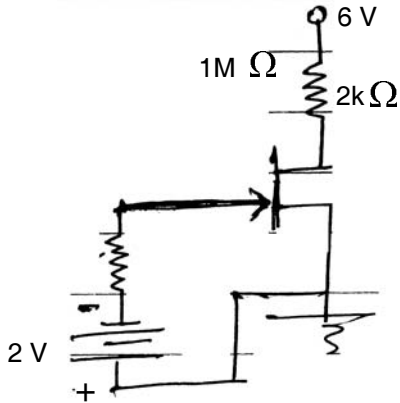
1) Explain how BJT amplifier works as a switch.

Set P



2) Determine following for the given network.

- a) V_{GSQ} b) I_{DQ} c) V_{DS} d) V_D



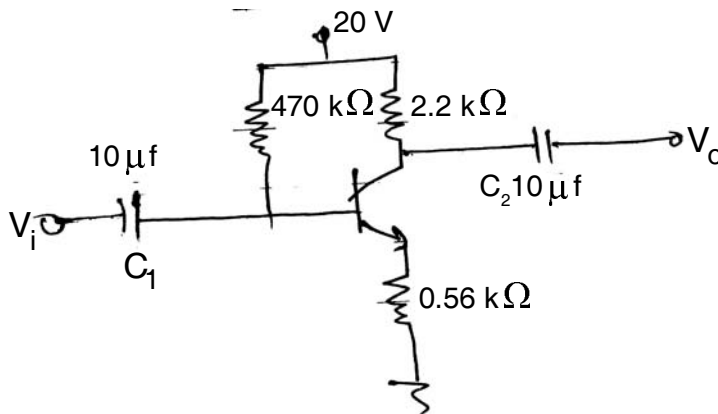
- 3) Explain construction and working of triac power device.
 4) Differentiate between BJT and FET.
 5) Explain working of monostable multivibrate using IC 555.

5. Attempt **any 2** questions :

(6×2=12)

1) For a given circuit find,

- a) r_e b) Z_i c) Z_o d) A_v



Given :
 $\beta = 120$
 $V_O = 40 \text{ k}\Omega$

- 2) Explain construction and working of SCR and power MOSFET.
 3) Explain the construction of JFET and also describe how JFET works as an amplifier.



SLR-TJ – 405

Seat No.	
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Set **Q**

**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS & DESIGN – I (Old)**

Day and Date : Tuesday, 19-12-2017
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 :

(14×1=14)

- 1) When $V_{OS} = 0$ V, a JFET is
 - a) saturated
 - b) an analog device
 - c) an open switch
 - d) cut off
- 2) Bidirectional semiconductor device is
 - a) Diode
 - b) BJT
 - c) SCR
 - d) TRIAC
- 3) A monostable multivibrator has $R = 120$ k Ω and time delay $T = 1000$ ms, value of C
 - a) $0.9 \mu\text{f}$
 - b) $1.32 \mu\text{f}$
 - c) $7.5 \mu\text{f}$
 - d) $2.4 \mu\text{f}$
- 4) A triac is equivalent to two SCR's
 - a) in parallel
 - b) in series
 - c) in inverse parallel
 - d) none of above
- 5) The controlling parameter of IGBT is the
 - a) I_G
 - b) V_{GE}
 - c) I_C
 - d) V_{CE}
- 6) The arrow on the symbol of MOSFET indicates
 - a) it is a N-channel MOSFET
 - b) direction of electrons
 - c) direction of conventional current flow
 - d) it is p channel MOSFET

P.T.O.



- 7) In CE configuration, an emitter resistor is used for
- a) stabilization
 - b) ac signal bypass
 - c) collector bias
 - d) higher gain
- 8) The voltage gain of common collector configuration is
- a) unity
 - b) zero
 - c) very high
 - d) moderate
- 9) _____ is considered as an amplifier figure of merit.
- a) Bandwidth gain product
 - b) Beta
 - c) Alpha
 - d) Temperature
- 10) The operating point in the characteristic curve is called as _____ point.
- a) quiescent
 - b) load
 - c) biasing
 - d) saturation
- 11) _____ represents common emitter small signal input resistance.
- a) h_{ie}
 - b) h_{fe}
 - c) h_{ib}
 - d) h_{oe}
- 12) _____ configuration has the lowest current gain.
- a) common base
 - b) common collector
 - c) common emitter
 - d) emitter follower
- 13) The input impedance of common gate configured JFET is
- a) very low
 - b) low
 - c) high
 - d) very high
- 14) When $\Delta I_D = 1 \text{ mA}$ and $\Delta V_{G_S} = 1 \text{ V}$, the transconductance of an FET will be
- a) 1 ks
 - b) 1 ms
 - c) $1 \text{ k}\Omega$
 - d) $1 \text{ m}\Omega$
-



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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS & DESIGN – I (Old)**

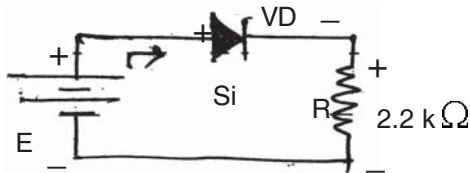
Day and Date : Tuesday, 19-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

1) For the series diode configuration, determine V_D , V_R and I_D .



- 2) Explain working of positive clipper and negative clipper with necessary waveforms.
- 3) Define and explain various modes of operation of BJT.
- 4) Design a fixed bias circuit using silicon transistor having $h_{FE} = 100$, V_{CC} is 12 V and dc bias conditions are $V_{CE} = 6$ V, $I_C = 3$ mA, $V_{BE} = 0.7$ V.
- 5) Draw circuit and explain working of zener diode voltage regulator.

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

- 1) Define α , β and γ factors of a BJT. Explain how they are related to each other.
- 2) Compare common base, common emitter and common collector configurations of BJT amplifier.
- 3) Explain working of full wave rectifier (center tap and bridge) with necessary diagram.

SECTION – II

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

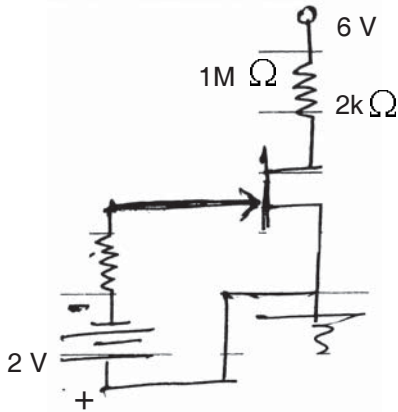
1) Explain how BJT amplifier works as a switch.

Set Q



2) Determine following for the given network.

- a) V_{GSQ} b) I_{DQ} c) V_{DS} d) V_D



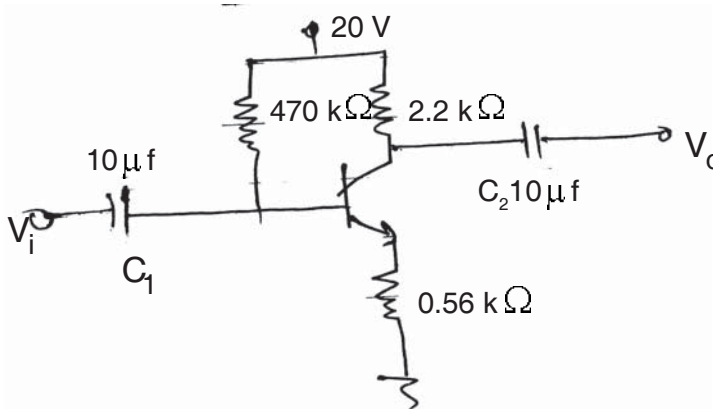
- 3) Explain construction and working of triac power device.
 4) Differentiate between BJT and FET.
 5) Explain working of monostable multivibrator using IC 555.

5. Attempt **any 2** questions :

(6×2=12)

1) For a given circuit find,

- a) r_e b) Z_i c) Z_o d) A_v



Given :
 $\beta = 120$
 $V_0 = 40 \text{ k}\Omega$

- 2) Explain construction and working of SCR and power MOSFET.
 3) Explain the construction of JFET and also describe how JFET works as an amplifier.



- 7) A triac is equivalent to two SCR's
- a) in parallel
 - b) in series
 - c) in inverse parallel
 - d) none of above
- 8) The controlling parameter of IGBT is the
- a) I_G
 - b) V_{GE}
 - c) I_C
 - d) V_{CE}
- 9) The arrow on the symbol of MOSFET indicates
- a) it is a N-channel MOSFET
 - b) direction of electrons
 - c) direction of conventional current flow
 - d) it is p channel MOSFET
- 10) In CE configuration, an emitter resistor is used for
- a) stabilization
 - b) ac signal bypass
 - c) collector bias
 - d) higher gain
- 11) The voltage gain of common collector configuration is
- a) unity
 - b) zero
 - c) very high
 - d) moderate
- 12) _____ is considered as an amplifier figure of merit.
- a) Bandwidth gain product
 - b) Beta
 - c) Alpha
 - d) Temperature
- 13) The operating point in the characteristic curve is called as _____ point.
- a) quiescent
 - b) load
 - c) biasing
 - d) saturation
- 14) _____ represents common emitter small signal input resistance.
- a) h_{ie}
 - b) h_{fe}
 - c) h_{ib}
 - d) h_{oe}
-



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS & DESIGN – I (Old)**

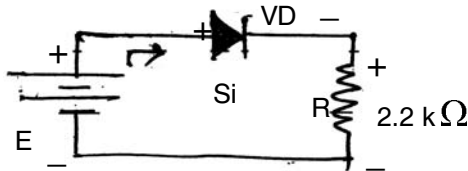
Day and Date : Tuesday, 19-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

1) For the series diode configuration, determine V_D , V_R and I_D .



- 2) Explain working of positive clipper and negative clipper with necessary waveforms.
- 3) Define and explain various modes of operation of BJT.
- 4) Design a fixed bias circuit using silicon transistor having $h_{FE} = 100$, V_{CC} is 12 V and dc bias conditions are $V_{CE} = 6$ V, $I_C = 3$ mA, $V_{BE} = 0.7$ V.
- 5) Draw circuit and explain working of zener diode voltage regulator.

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

- 1) Define α , β and γ factors of a BJT. Explain how they are related to each other.
- 2) Compare common base, common emitter and common collector configurations of BJT amplifier.
- 3) Explain working of full wave rectifier (center tap and bridge) with necessary diagram.

SECTION – II

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

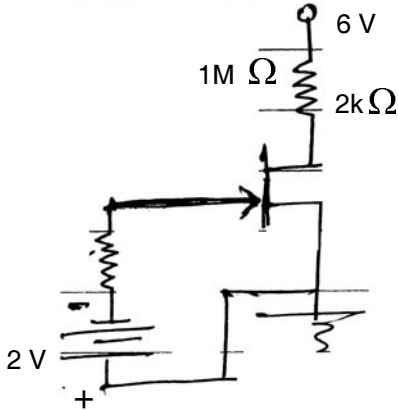
1) Explain how BJT amplifier works as a switch.

Set R



2) Determine following for the given network.

- a) V_{GSQ} b) I_{DQ} c) V_{DS} d) V_D



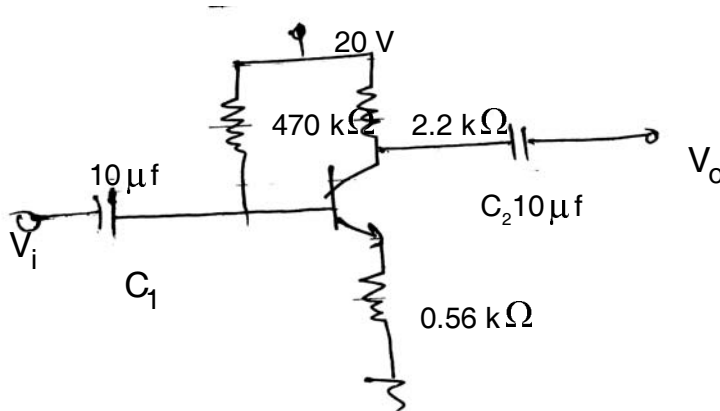
- 3) Explain construction and working of triac power device.
 4) Differentiate between BJT and FET.
 5) Explain working of monostable multivibrate using IC 555.

5. Attempt **any 2** questions :

(6×2=12)

1) For a given circuit find,

- a) r_e b) Z_i c) Z_o d) A_v



Given :
 $\beta = 120$
 $V_0 = 40 \text{ k}\Omega$

- 2) Explain construction and working of SCR and power MOSFET.
 3) Explain the construction of JFET and also describe how JFET works as an amplifier.



SLR-TJ – 405

Seat No.	
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Set **S**

**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS & DESIGN – I (Old)**

Day and Date : Tuesday, 19-12-2017
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 : **(14×1=14)**

- 1) A monostable multivibrator has $R = 120 \text{ k}\Omega$ and time delay $T = 1000 \text{ ms}$, value of C
 - a) $0.9 \mu\text{f}$
 - b) $1.32 \mu\text{f}$
 - c) $7.5 \mu\text{f}$
 - d) $2.4 \mu\text{f}$
- 2) A triac is equivalent to two SCR's
 - a) in parallel
 - b) in series
 - c) in inverse parallel
 - d) none of above
- 3) The controlling parameter of IGBT is the
 - a) I_G
 - b) V_{GE}
 - c) I_C
 - d) V_{CE}
- 4) The arrow on the symbol of MOSFET indicates
 - a) it is a N-channel MOSFET
 - b) direction of electrons
 - c) direction of conventional current flow
 - d) it is p channel MOSFET
- 5) In CE configuration, an emitter resistor is used for
 - a) stabilization
 - b) ac signal bypass
 - c) collector bias
 - d) higher gain

P.T.O.



- 6) The voltage gain of common collector configuration is
a) unity b) zero c) very high d) moderate
- 7) _____ is considered as an amplifier figure of merit.
a) Bandwidth gain product b) Beta
c) Alpha d) Temperature
- 8) The operating point in the characteristic curve is called as _____ point.
a) quiescent b) load c) biasing d) saturation
- 9) _____ represents common emitter small signal input resistance.
a) h_{ie} b) h_{fe} c) h_{ib} d) h_{oe}
- 10) _____ configuration has the lowest current gain.
a) common base b) common collector
c) common emitter d) emitter follower
- 11) The input impedance of common gate configured JFET is
a) very low b) low c) high d) very high
- 12) When $\Delta I_D = 1 \text{ mA}$ and $\Delta V_{GS} = 1 \text{ V}$, the transconduct of an FET will be
a) 1 ks b) 1 ms c) 1 k Ω d) 1 m Ω
- 13) When $V_{OS} = 0 \text{ V}$, a JFET is
a) saturated b) an analog device
c) an open switch d) cut off
- 14) Bidirectional semiconductor device is
a) Diode b) BJT c) SCR d) TRIAC
-



Seat No.	
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**S.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS & DESIGN – I (Old)**

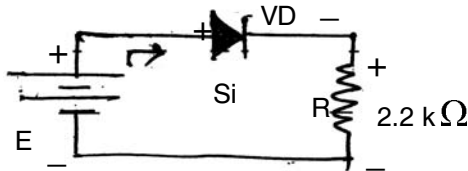
Day and Date : Tuesday, 19-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

1) For the series diode configuration, determine V_D , V_R and I_D .



- 2) Explain working of positive clipper and negative clipper with necessary waveforms.
- 3) Define and explain various modes of operation of BJT.
- 4) Design a fixed bias circuit using silicon transistor having $h_{FE} = 100$, V_{CC} is 12 V and dc bias conditions are $V_{CE} = 6$ V, $I_C = 3$ mA, $V_{BE} = 0.7$ V.
- 5) Draw circuit and explain working of zener diode voltage regulator.

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

- 1) Define α , β and γ factors of a BJT. Explain how they are related to each other.
- 2) Compare common base, common emitter and common collector configurations of BJT amplifier.
- 3) Explain working of full wave rectifier (center tap and bridge) with necessary diagram.

SECTION – II

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

1) Explain how BJT amplifier works as a switch.

Set S



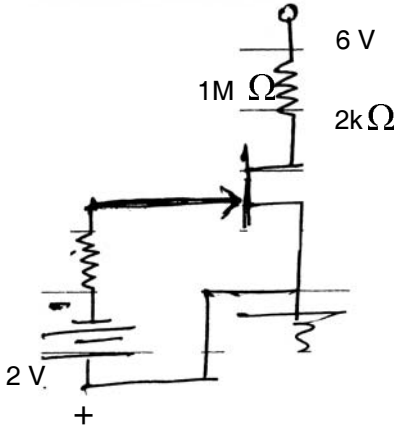
2) Determine following for the given network.

a) V_{GSQ}

b) I_{DQ}

c) V_{DS}

d) V_D



3) Explain construction and working of triac power device.

4) Differentiate between BJT and FET.

5) Explain working of monostable multivibrator using IC 555.

5. Attempt **any 2** questions :

(6×2=12)

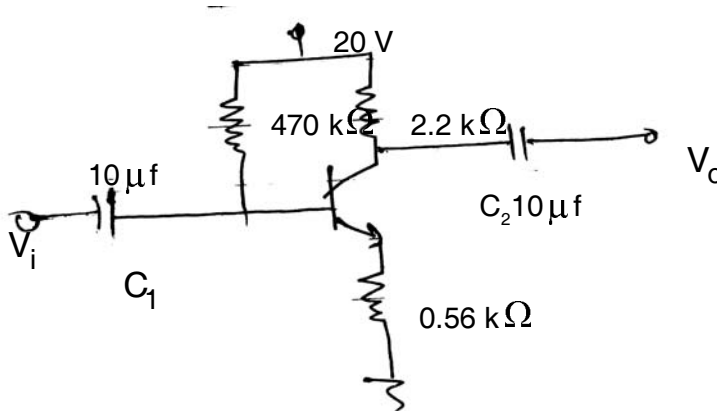
1) For a given circuit find,

a) r_e

b) Z_i

c) Z_o

d) A_v



Given :

$\beta = 120$

$V_0 = 40 \text{ k}\Omega$

2) Explain construction and working of SCR and power MOSFET.

3) Explain the construction of JFET and also describe how JFET works as an amplifier.



Seat No.	
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Set

P

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

Day and Date : Thursday, 21-12-2017
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) Given $V_{Th} = 20V$ and $R_{Th} = 5\Omega$, the current in the load resistance of a network is

- a) 4A b) $\geq 4A$ c) $\leq 4A$ d) 4A or more

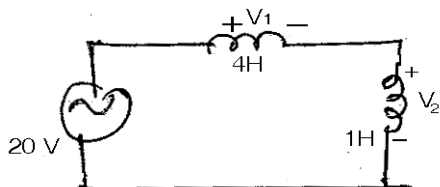
2) A $(3 + 4j)$ voltage source delivers a current of $(4 + j5)$. The power delivered by source is

- a) 12 W b) 15 W c) 20 W d) 32 W

3) An RLC series circuit is said to be inductive if

- a) $\omega L < 1/\omega C$ b) $\omega L = 1/\omega C$
c) $\omega L > 1/\omega C$ d) $\omega L = \omega C$

4) Voltages to V_1 and V_2 in the given circuit are



- a) 20 V each b) 10 Volts each c) 16V, 4V d) 4V, 16V



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

Day and Date : Thursday, 21-12-2017
Time : 3.00 p.m. to 6.00 p.m.

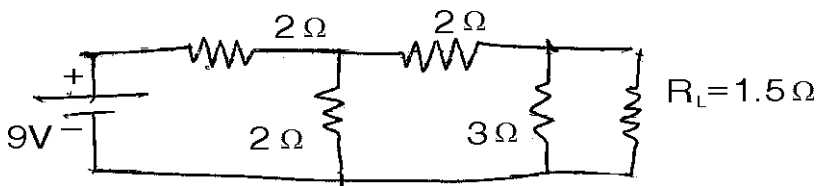
Marks : 56

SECTION – I

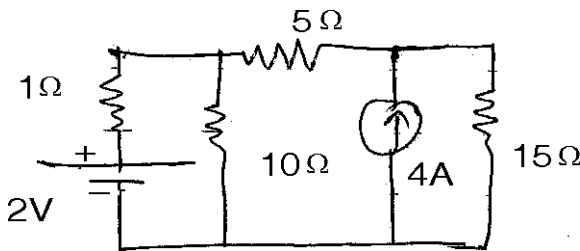
2. Attempt **any four** :

(4×4=16)

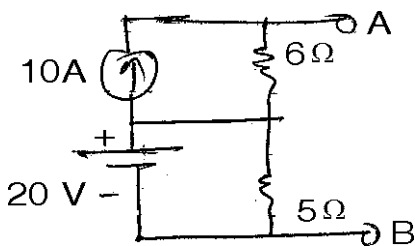
- 1) State and explain Norton's theorem.
- 2) By using Norton's theorem, find the current in the load resistor R_L for circuit shown.



- 3) Define and differentiate between RLC series and parallel resonance circuit.
- 4) Applying mesh analysis find the current through 10 Ω resistor.



- 5) Replace the given network with single current source and a resistor.

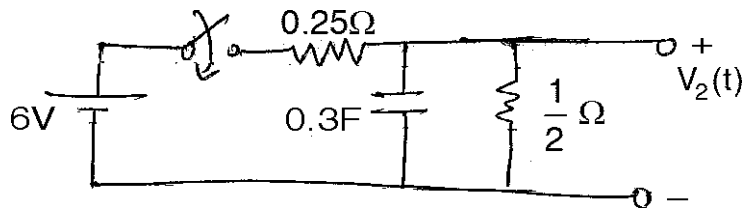




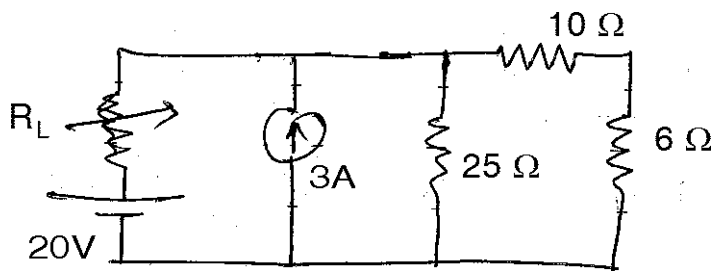
SECTION – II

3. Attempt **any 2**:**(6×2=12)**

- 1) In the network shown below, the switch is open for a long time and at $t = 0$, it is closed. Determine $V_2(t)$.



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



- 3) Define Q factor and series and parallel resonance terms and explain their significance in detail.

4. Attempt **any 4**:**(4×4=16)**

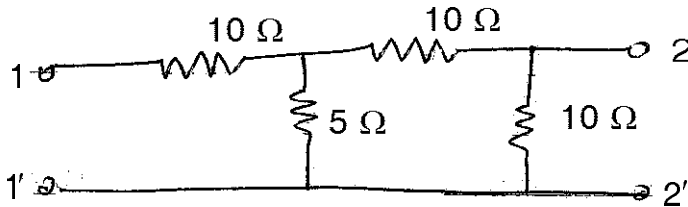
- 1) For a series resonant circuit $R = 5\Omega$, $L = 1\text{H}$ and $C = 0.25\mu\text{f}$. Find resonant frequency and bandwidth.
- 2) A network function is given below, obtain the pole zero diagram.

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

- 3) Define transfer function and explain the effect of pole and zero on circuit performance.



- 4) Find the transmission parameters of the network shown, determine whether the given circuit is reciprocal and symmetric or not.

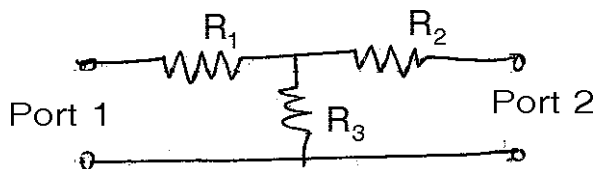


- 5) Prove the condition of reciprocity for transmission parameters.

5. Attempt any 2:

(6×2=12)

- 1) Design an asymmetrical T network shown below having $Z_{oc_1} = 1000 \Omega$, $Z_{oc_2} = 1200 \Omega$ and $Z_{sc_1} = 700 \Omega$.



- 2) Explain following terms with neat diagram.
a) Band pass filter
b) Band reject filter.
- 3) Design 'T' type symmetrical attenuator which offers 40dB, attenuation with a load of 400Ω .



SLR-TJ – 406

Seat No.	
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Set

Q

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

Day and Date : Thursday, 21-12-2017
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

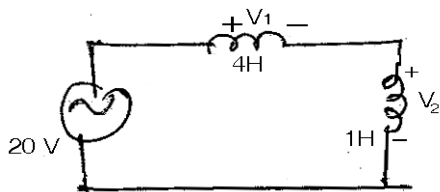
1. Choose the correct answer : **(14×1=14)**

- In an R.L.C. circuit, the phase of the current with respect to the circuit voltage will be
 - Leading
 - Same
 - Logging
 - Depends on the values of L and C
- An attenuator is a
 - R's network
 - RL network
 - RC network
 - LC network
- The characteristics impedance of a low pass filter is attenuation band is
 - Purely imaginary
 - Zero
 - Complex quantity
 - Real value
- The reflection coefficient of a transmission line with a short circuited load is
 - 0
 - ∞
 - $1.0 \angle 0^\circ$
 - $1.0 \angle 180^\circ$
- A series resonant circuit is inductive at $f = 1000$ Hz. The circuit will be capacitive some where at
 - $F > 1000$ Hz
 - $F < 1000$ Hz
 - $F = 1000$ Hz + R
 - $F = 1000 + f_0$

P.T.O.



- 6) If $Z_x = 120 \Omega$ and $Z_{sc} = 30 \Omega$, the characteristic impedance is
 a) 30Ω b) 60Ω c) 120Ω d) 150Ω
- 7) The dynamic impedance of a parallel, RLC circuit at resonance is
 a) C/LR b) R/LC c) L/CR d) LC/R
- 8) Given $V_{Th} = 20V$ and $R_{Th} = 5 \Omega$, the current in the load resistance of a network is
 a) $4A$ b) $\geq 4A$ c) $\leq 4A$ d) $4A$ or more
- 9) A $(3 + 4j)$ voltage source delivers a current of $(4 + j5)$. The power delivered by source is
 a) $12 W$ b) $15 W$ c) $20 W$ d) $32 W$
- 10) An RLC series circuit is said to be inductive if
 a) $\omega L > 1/\omega C$ b) $\omega L = 1/\omega C$
 c) $\omega L < 1/\omega C$ d) $\omega L = \omega C$
- 11) Voltages to V_1 and V_2 in the given circuit are



- a) $20 V$ each b) 10 Volts each c) $16V, 4V$ d) $4V, 16V$
- 12) To a highly inductive circuit, a small capacitor is added in series. The angle between voltage and current will
 a) Decreases b) Increases
 c) Remains same d) Becomes indeterminate
- 13) The superposition theorem is essentially based on the concept of
 a) Duality b) Linearity c) Reciprocity d) Non linear
- 14) The r.m.s. value of sinusoidal $100 V$ peak to peak is _____ volts.
 a) $100/\sqrt{2}$ b) $50/\sqrt{2}$ c) 50 d) 100



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

Day and Date : Thursday, 21-12-2017
Time : 3.00 p.m. to 6.00 p.m.

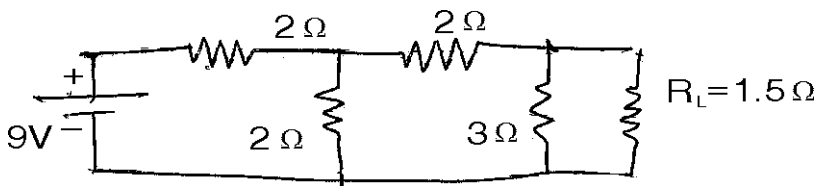
Marks : 56

SECTION – I

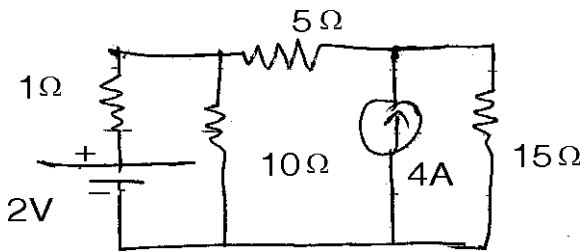
2. Attempt **any four** :

(4×4=16)

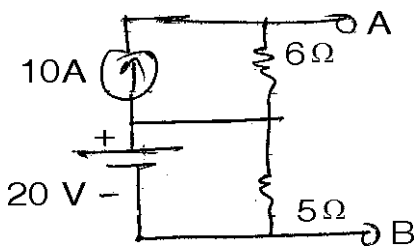
- 1) State and explain Norton's theorem.
- 2) By using Norton's theorem, find the current in the load resistor R_L for circuit shown.



- 3) Define and differentiate between RLC series and parallel resonance circuit.
- 4) Applying mesh analysis find the current through 10 Ω resistor.



- 5) Replace the given network with single current source and a resistor.

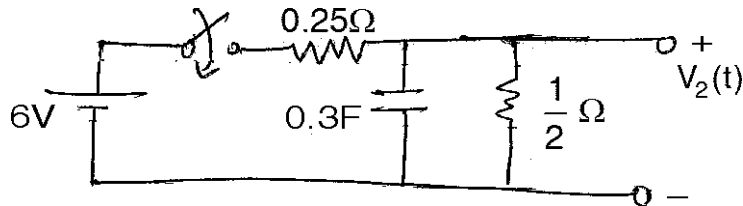




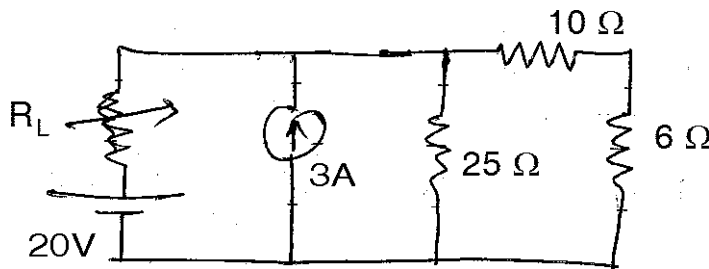
SECTION – II

3. Attempt **any 2**:**(6×2=12)**

- 1) In the network shown below, the switch is open for a long time and at $t = 0$, it is closed. Determine $V_2(t)$.



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



- 3) Define Q factor and series and parallel resonance terms and explain their significance in detail.

4. Attempt **any 4**:**(4×4=16)**

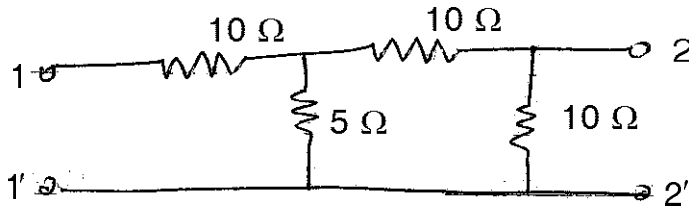
- 1) For a series resonant circuit $R = 5\Omega$, $L = 1\text{H}$ and $C = 0.25\mu\text{f}$. Find resonant frequency and bandwidth.
- 2) A network function is given below, obtain the pole zero diagram.

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

- 3) Define transfer function and explain the effect of pole and zero on circuit performance.



- 4) Find the transmission parameters of the network shown, determine whether the given circuit is reciprocal and symmetric or not.

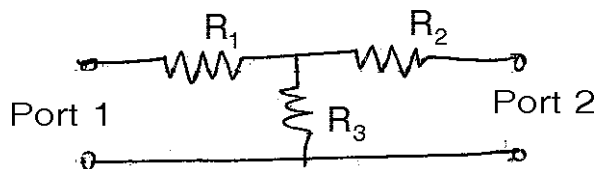


- 5) Prove the condition of reciprocity for transmission parameters.

5. Attempt any 2:

(6×2=12)

- 1) Design an asymmetrical T network shown below having $Z_{oc_1} = 1000 \Omega$, $Z_{oc_2} = 1200 \Omega$ and $Z_{sc_1} = 700 \Omega$.



- 2) Explain following terms with neat diagram.
a) Band pass filter
b) Band reject filter.
- 3) Design 'T' type symmetrical attenuator which offers 40dB, attenuation with a load of 400Ω .



SLR-TJ – 406

Seat No.	
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Set **R**

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

Day and Date : Thursday, 21-12-2017
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

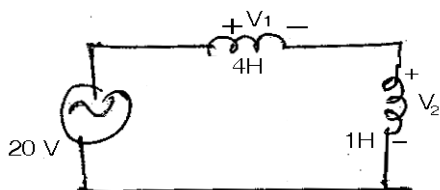
1. Choose the correct answer : **(14×1=14)**

- 1) To a highly inductive circuit, a small capacitor is added in series. The angle between voltage and current will
 - a) Decreases
 - b) Increases
 - c) Remains same
 - d) Becomes indeterminate
- 2) The superposition theorem is essentially based on the concept of
 - a) Duality
 - b) Linearity
 - c) Reciprocity
 - d) Non linear
- 3) The r.m.s. value of sinusoidal 100 V peak to peak is _____ volts.
 - a) $100/\sqrt{2}$
 - b) $50/\sqrt{2}$
 - c) 50
 - d) 100
- 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 on the values of L and C
- 5) An attenuator is a
 - a) R's network
 - b) RL network
 - c) RC network
 - d) LC network

P.T.O.



- 6) The characteristics impedance of a low pass filter is attenuation band is
- a) Purely imaginary b) Zero
c) Complex quantity d) Real value
- 7) The reflection coefficient of a transmission line with a short circuited load is
- a) 0 b) ∞ c) $1.0 \angle 0^\circ$ d) $1.0 \angle 180^\circ$
- 8) A series resonant circuit is inductive at $f = 1000$ Hz. The circuit will be capacitive some where at
- a) $F > 1000$ Hz b) $F < 1000$ Hz
c) $F = 1000$ Hz + R d) $F = 1000 + f_0$
- 9) If $Z_x = 120 \Omega$ and $Z_{sc} = 30 \Omega$, the characteristic impedance is
- a) 30Ω b) 60Ω c) 120Ω d) 150Ω
- 10) The dynamic impedance of a parallel, RLC circuit at resonance is
- a) C/LR b) R/LC c) L/CR d) LC/R
- 11) Given $V_{Th} = 20V$ and $R_{Th} = 5 \Omega$, the current in the load resistance of a network is
- a) 4A b) $\geq 4A$ c) $\leq 4A$ d) 4A or more
- 12) A $(3 + 4j)$ voltage source delivers a current of $(4 + j5)$. The power delivered by source is
- a) 12 W b) 15 W c) 20 W d) 32 W
- 13) An RLC series circuit is said to be inductive if
- a) $\omega L > 1/\omega C$ b) $\omega L = 1/\omega C$
c) $\omega L < 1/\omega C$ d) $\omega L = \omega C$
- 14) Voltages to V_1 and V_2 in the given circuit are



- a) 20 V each b) 10 Volts each c) 16V, 4V d) 4V, 16V



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

Day and Date : Thursday, 21-12-2017
Time : 3.00 p.m. to 6.00 p.m.

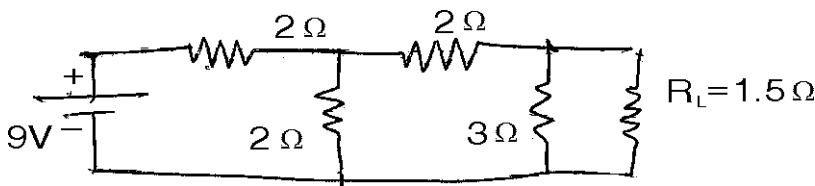
Marks : 56

SECTION – I

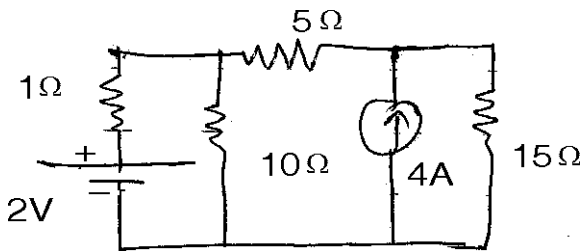
2. Attempt **any four** :

(4×4=16)

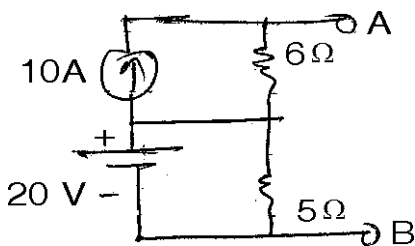
- 1) State and explain Norton's theorem.
- 2) By using Norton's theorem, find the current in the load resistor R_L for circuit shown.



- 3) Define and differentiate between RLC series and parallel resonance circuit.
- 4) Applying mesh analysis find the current through 10 Ω resistor.



- 5) Replace the given network with single current source and a resistor.

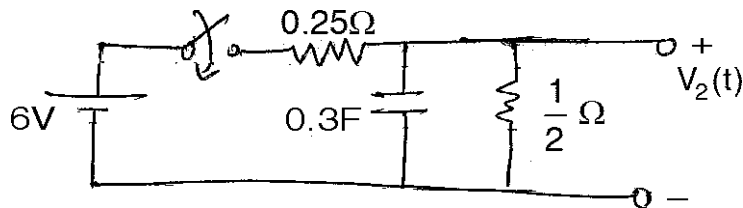




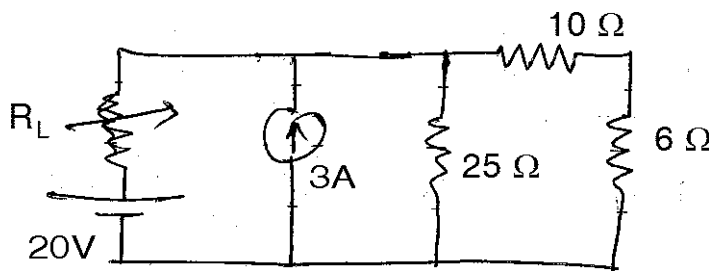
SECTION – II

3. Attempt **any 2**:**(6×2=12)**

- 1) In the network shown below, the switch is open for a long time and at $t = 0$, it is closed. Determine $V_2(t)$.



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



- 3) Define Q factor and series and parallel resonance terms and explain their significance in detail.

4. Attempt **any 4**:**(4×4=16)**

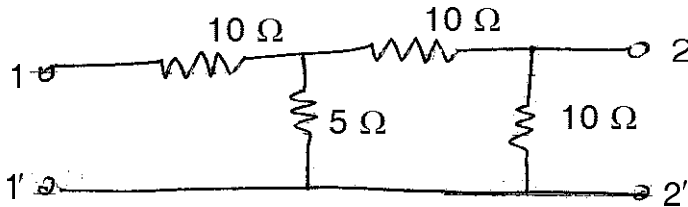
- 1) For a series resonant circuit $R = 5\Omega$, $L = 1\text{H}$ and $C = 0.25\mu\text{f}$. Find resonant frequency and bandwidth.
- 2) A network function is given below, obtain the pole zero diagram.

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

- 3) Define transfer function and explain the effect of pole and zero on circuit performance.



- 4) Find the transmission parameters of the network shown, determine whether the given circuit is reciprocal and symmetric or not.

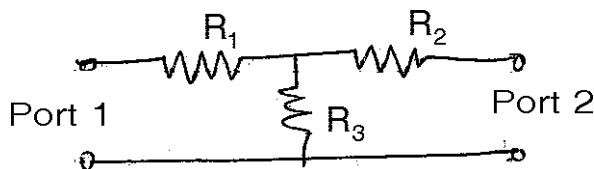


- 5) Prove the condition of reciprocity for transmission parameters.

5. Attempt any 2:

(6×2=12)

- 1) Design an asymmetrical T network shown below having $Z_{oc_1} = 1000 \Omega$, $Z_{oc_2} = 1200 \Omega$ and $Z_{sc_1} = 700 \Omega$.



- 2) Explain following terms with neat diagram.
a) Band pass filter
b) Band reject filter.
- 3) Design 'T' type symmetrical attenuator which offers 40dB, attenuation with a load of 400Ω .



SLR-TJ – 406

Seat No.	
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Set

S

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

Day and Date : Thursday, 21-12-2017
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) The characteristics impedance of a low pass filter is attenuation band is

- a) Purely imaginary b) Zero
c) Complex quantity d) Real value

2) The reflection coefficient of a transmission line with a short circuited load is

- a) 0 b) ∞ c) $1.0 \angle 0^\circ$ d) $1.0 \angle 180^\circ$

3) A series resonant circuit is inductive at $f = 1000$ Hz. The circuit will be capacitive some where at

- a) $F > 1000$ Hz b) $F < 1000$ Hz
c) $F = 1000$ Hz + R d) $F = 1000 + f_0$

4) If $Z_x = 120 \Omega$ and $Z_{sc} = 30 \Omega$, the characteristic impedance is

- a) 30Ω b) 60Ω c) 120Ω d) 150Ω

5) The dynamic impedance of a parallel, RLC circuit at resonance is

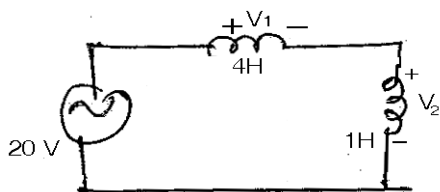
- a) C/LR b) R/LC c) L/CR d) LC/R

6) Given $V_{Th} = 20V$ and $R_{Th} = 5 \Omega$, the current in the load resistance of a network is

- a) 4A b) $\geq 4A$ c) $\leq 4A$ d) 4A or more P.T.O.



- 7) A $(3 + 4j)$ voltage source delivers a current of $(4 + j5)$. The power delivered by source is
- a) 12 W b) 15 W c) 20 W d) 32 W
- 8) An RLC series circuit is said to be inductive if
- a) $\omega L > 1/\omega C$ b) $\omega L = 1/\omega C$
 c) $\omega L < 1/\omega C$ d) $\omega L = \omega C$
- 9) Voltages to V_1 and V_2 in the given circuit are



- a) 20 V each b) 10 Volts each c) 16V, 4V d) 4V, 16V
- 10) To a highly inductive circuit, a small capacitor is added in series. The angle between voltage and current will
- a) Decreases b) Increases
 c) Remains same d) Becomes indeterminate
- 11) The superposition theorem is essentially based on the concept of
- a) Duality b) Linearity c) Reciprocity d) Non linear
- 12) The r.m.s. value of sinusoidal 100 V peak to peak is _____ volts.
- a) $100/\sqrt{2}$ b) $50/\sqrt{2}$ c) 50 d) 100
- 13) 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 on the values of L and C
- 14) An attenuator is a
- a) R's network b) RL network c) RC network d) LC network



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

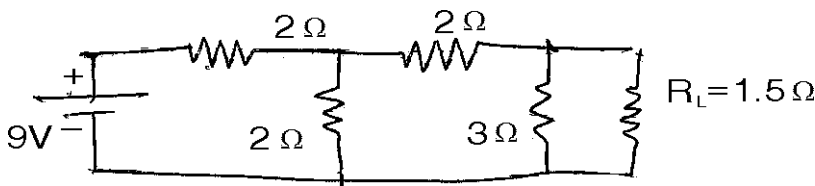
Day and Date : Thursday, 21-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

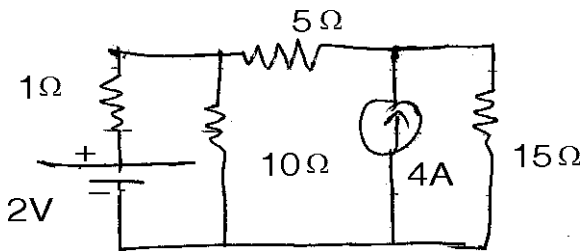
SECTION – I

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

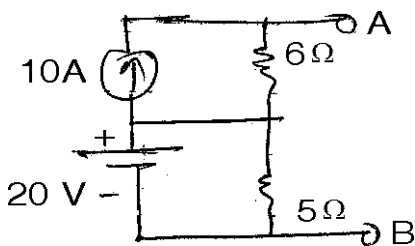
- 1) State and explain Norton's theorem.
- 2) By using Norton's theorem, find the current in the load resistor R_L for circuit shown.



- 3) Define and differentiate between RLC series and parallel resonance circuit.
- 4) Applying mesh analysis find the current through 10 Ω resistor.



- 5) Replace the given network with single current source and a resistor.

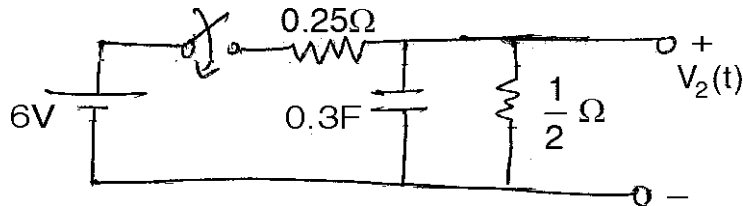




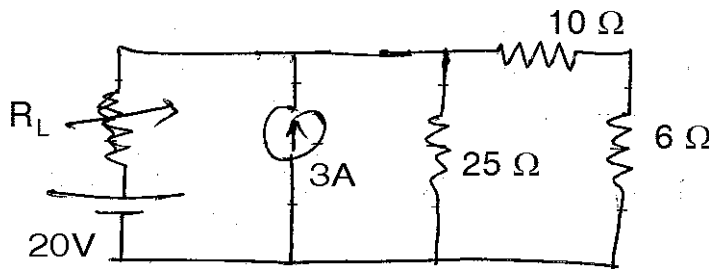
SECTION – II

3. Attempt **any 2**:**(6×2=12)**

- 1) In the network shown below, the switch is open for a long time and at $t = 0$, it is closed. Determine $V_2(t)$.



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



- 3) Define Q factor and series and parallel resonance terms and explain their significance in detail.

4. Attempt **any 4**:**(4×4=16)**

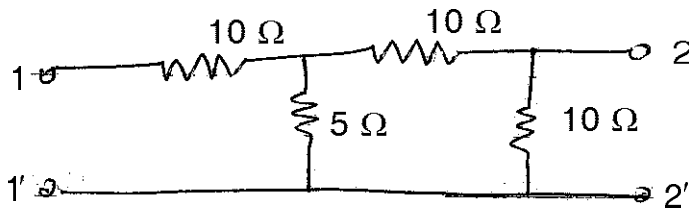
- 1) For a series resonant circuit $R = 5\Omega$, $L = 1\text{H}$ and $C = 0.25\mu\text{f}$. Find resonant frequency and bandwidth.
- 2) A network function is given below, obtain the pole zero diagram.

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

- 3) Define transfer function and explain the effect of pole and zero on circuit performance.



- 4) Find the transmission parameters of the network shown, determine whether the given circuit is reciprocal and symmetric or not.

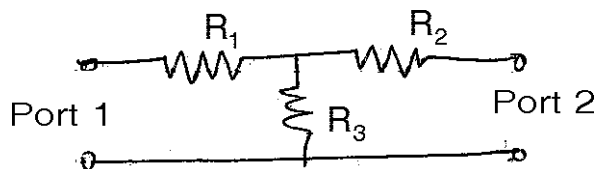


- 5) Prove the condition of reciprocity for transmission parameters.

5. Attempt any 2:

(6×2=12)

- 1) Design an asymmetrical T network shown below having $Z_{oc_1} = 1000 \Omega$, $Z_{oc_2} = 1200 \Omega$ and $Z_{sc_1} = 700 \Omega$.



- 2) Explain following terms with neat diagram.
a) Band pass filter
b) Band reject filter.
- 3) Design 'T' type symmetrical attenuator which offers 40dB, attenuation with a load of 400Ω .



SLR-TJ – 407

Seat No.	
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Set **P**

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

Day and Date : Tuesday, 28-11-2017
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) For a transmission line, open circuit and short circuit impedances are 20Ω and 5Ω . Then characteristics impedance is _____ Ω .
a) 100 b) 50 c) 25 d) 10
 - 2) In an ac circuit, the maximum and minimum values of power factor can be _____.
a) 2 and 0 b) 1 and 0 c) 0 and -1 d) 1 and -1
 - 3) To apply reciprocity theorem response to excitation ratio is _____.
a) Ohm b) Mho c) No units d) either a or b
 - 4) KCL works on the principle of which of the following ?
a) Law of conservation of charge b) Time
c) Law of conservation of energy d) Both a and b
 - 5) In RLC parallel circuit, current through inductor is more than current through capacitor. Then the power factor of the circuit will be _____.
a) lagging b) leading c) unity d) zero
 - 6) To obtain wide bandwidth, network is designed with which of the following ?
a) High Q factor b) Low Q factor
c) Unity Q factor d) Zero Q factor
 - 7) In series RLC circuit, to get $Q > 1$, _____ is required.
a) $X_L > R$ b) $X_L < R$ c) $X_L = R$ d) All above

P.T.O.



- 8) Rank of cut set matrix is _____
a) N b) $N - 1$ c) $b - N + 1$ d) $b - N - 1$
- 9) Basic cut set matrix consists of _____
a) One branch b) no branches
c) 2 branch d) any no. of branches
- 10) Active filters consists of _____
a) Capacitor b) Inductor
c) op amp and capacitor d) op amp
- 11) According to duality principle, a series inductor (L) can be represented as _____
a) series L b) parallel L c) series C d) parallel C
- 12) For band pass filter, cut-off frequency of low pass filter should be _____ high pass filter.
a) greater than b) less than c) equals to d) all of the above
- 13) In two port network, $Z_{12} = Z_{21}$ indicates _____ property.
a) unilateral b) bilateral c) linear d) nonlinear
- 14) Reactive power drawn by a pure resistor is _____
a) 0 b) minimum c) maximum d) none of the above
- 15) An electrical circuit with 10 branches and 7 nodes will have _____ loop equations.
a) 10 b) 7 c) 3 d) ϕ
- 16) In active filter _____ element is absent.
a) inductor b) capacitor
c) both a) and b) d) resistor
- 17) _____ can not be connected in series unless they are identical.
a) voltage source b) current source
c) both of above d) resistance
- 18) A branch of a network is said to be active when it consists of one _____
a) resistor b) voltage source
c) inductor d) capacitor
- 19) Super position theorem is not applicable for _____ calculations.
a) current b) voltage c) power d) energy
- 20) Time constant of RC series circuit is _____
a) L/R b) $2 RC$ c) $2L/R$ d) RC
- _____



Seat No.	
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**S.E. (Part – I) (Biomedical Engg.) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

Day and Date : Tuesday, 28-11-2017
Time : 3.00 p.m. to 6.00 p.m.

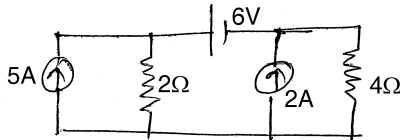
Marks : 80

SECTION – I

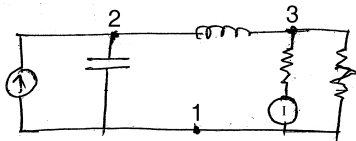
2. Attempt **any four** :

(4×5=20)

- 1) State and explain Kirchoff's current law and Kirchoff's voltage law.
- 2) Find the current in 4 Ω resistor for given circuit.



- 3) Differentiate between Mesh analysis and Nodal analysis with suitable example.
- 4) How many trees are possible for the graph shown network ?

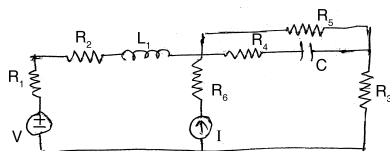


- 5) Define following terms :
 - a) RMS value of sinusoidal waveform
 - b) Millman's theorem.

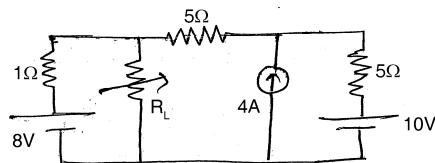
3. Attempt **any two** :

(2×10=20)

- 1) For the circuit shown, draw the original graph and write the
 - i) incidence matrix
 - ii) f-cut set matrix
 - iii) tie set matrix

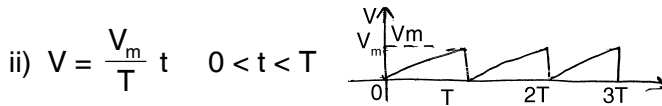
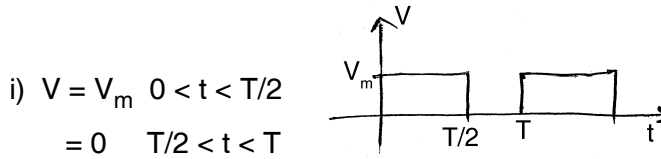


- 2) State maximum power transfer theorem and for the circuit shown, find value of resistance R_L for maximum power and also calculate maximum power.





3) Find the rms and average value of given waveforms :

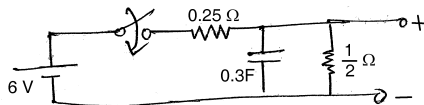


SECTION – II

4. Attempt **any four** questions :

(4×5=20)

- 1) Explain and derive condition for reciprocity and symmetry for ABCD parameters.
- 2) State whether the given polynomial is Harwitz or not. Give reasons in each case
 - i) $s^4 + 4s^3 + 3s + 2$
 - ii) $s^6 + 5s^5 + 4s^4 + 3s^2 - 2s^2 + s + 3$
- 3) Mention any 5 properties of positive real function and state their necessary and sufficient condition.
- 4) In the network shown, the switch is open for a long time and at $t = 0$, it is closed. Determine $V_2(t)$.



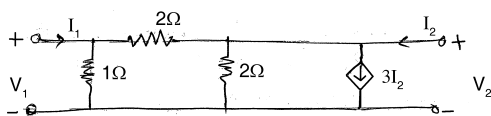
5) Using pole-zero plot, find magnitude and phase of given function.

$$F(s) = \frac{(s + 1)(s + 3)}{s(s + 2)} \text{ at } s = j4.$$

5. Attempt **any two** questions :

(2×10=20)

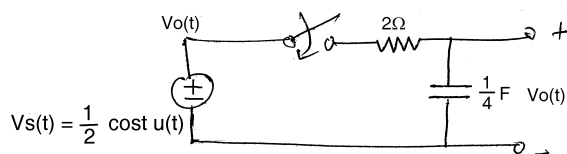
1) For the network shown, find Z and Y parameter.



2) Realize the given network function in Cauer I form.

$$z(s) = \frac{6s^4 + 42s^2 + 48}{s^5 + 18s^3 + 48s}$$

3) For the network shown, find the response.





Seat No.	
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Set	Q
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**S.E. (Part – I) (Biomedical Engg.) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

Day and Date : Tuesday, 28-11-2017
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) In active filter _____ element is absent.
a) inductor
b) capacitor
c) both a) and b)
d) resistor
 - 2) _____ can not be connected in series unless they are identical.
a) voltage source
b) current source
c) both of above
d) resistance
 - 3) A branch of a network is said to be active when it consists of one _____.
a) resistor
b) voltage source
c) inductor
d) capacitor
 - 4) Super position theorem is not applicable for _____ calculations.
a) current b) voltage c) power d) energy
 - 5) Time constant of RC series circuit is _____.
a) L/R b) 2 RC c) 2L/R d) RC
 - 6) For a transmission line, open circuit and short circuit impedances are 20 Ω and 5 Ω . Then characteristics impedance is _____ Ω .
a) 100 b) 50 c) 25 d) 10
 - 7) In an ac circuit, the maximum and minimum values of power factor can be _____.
a) 2 and 0 b) 1 and 0 c) 0 and –1 d) 1 and –1

P.T.O.



- 8) To apply reciprocity theorem response to excitation ratio is _____
a) Ohm b) Mho c) No units d) either a or b
- 9) KCL works on the principle of which of the following ?
a) Law of conservation of charge b) Time
c) Law of conservation of energy d) Both a and b
- 10) In RLC parallel circuit, current through inductor is more than current through capacitor. Then the power factor of the circuit will be _____
a) lagging b) leading c) unity d) zero
- 11) To obtain wide bandwidth, network is designed with which of the following ?
a) High Q factor b) Low Q factor
c) Unity Q factor d) Zero Q factor
- 12) In series RLC circuit, to get $Q > 1$, _____ is required.
a) $X_L > R$ b) $X_L < R$ c) $X_L = R$ d) All above
- 13) Rank of cut set matrix is _____
a) N b) N – 1 c) b – N + 1 d) b – N – 1
- 14) Basic cut set matrix consists of _____
a) One branch b) no branches
c) 2 branch d) any no. of branches
- 15) Active filters consists of _____
a) Capacitor b) Inductor
c) op amp and capacitor d) op amp
- 16) According to duality principle, a series inductor (L) can be represented as _____
a) series L b) parallel L c) series C d) parallel C
- 17) For band pass filter, cut-off frequency of low pass filter should be _____ high pass filter.
a) greater than b) less than c) equals to d) all of the above
- 18) In two port network, $Z_{12} = Z_{21}$ indicates _____ property.
a) unilateral b) bilateral c) linear d) nonlinear
- 19) Reactive power drawn by a pure resistor is _____
a) 0 b) minimum c) maximum d) none of the above
- 20) An electrical circuit with 10 branches and 7 nodes will have _____ loop equations.
a) 10 b) 7 c) 3 d) ϕ
-



Seat No.	
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**S.E. (Part – I) (Biomedical Engg.) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

Day and Date : Tuesday, 28-11-2017
Time : 3.00 p.m. to 6.00 p.m.

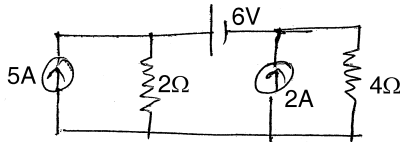
Marks : 80

SECTION – I

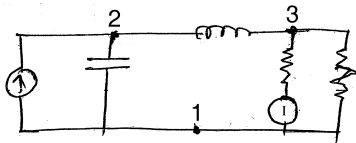
2. Attempt **any four** :

(4×5=20)

- 1) State and explain Kirchoff's current law and Kirchoff's voltage law.
- 2) Find the current in $4\ \Omega$ resistor for given circuit.



- 3) Differentiate between Mesh analysis and Nodal analysis with suitable example.
- 4) How many trees are possible for the graph shown network ?

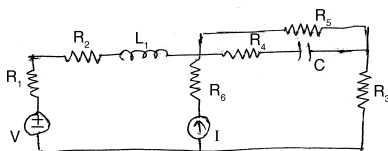


- 5) Define following terms :
 - a) RMS value of sinusoidal waveform
 - b) Millman's theorem.

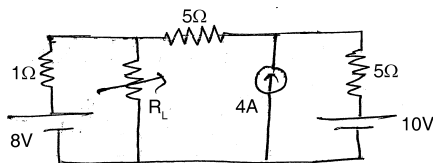
3. Attempt **any two** :

(2×10=20)

- 1) For the circuit shown, draw the original graph and write the
 - i) incidence matrix
 - ii) f-cut set matrix
 - iii) tie set matrix

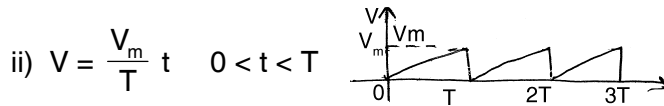
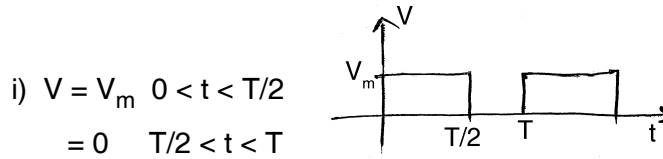


- 2) State maximum power transfer theorem and for the circuit shown, find value of resistance R_L for maximum power and also calculate maximum power.





3) Find the rms and average value of given waveforms :

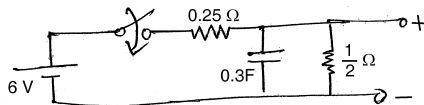


SECTION – II

4. Attempt **any four** questions :

(4×5=20)

- 1) Explain and derive condition for reciprocity and symmetry for ABCD parameters.
- 2) State whether the given polynomial is Hurwitz or not. Give reasons in each case
 - i) $s^4 + 4s^3 + 3s + 2$
 - ii) $s^6 + 5s^5 + 4s^4 + 3s^2 - 2s^2 + s + 3$
- 3) Mention any 5 properties of positive real function and state their necessary and sufficient condition.
- 4) In the network shown, the switch is open for a long time and at $t = 0$, it is closed. Determine $V_2(t)$.



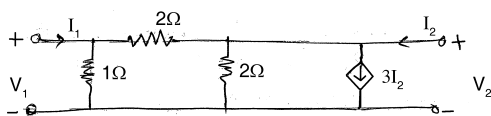
5) Using pole-zero plot, find magnitude and phase of given function.

$$F(s) = \frac{(s + 1)(s + 3)}{s(s + 2)} \text{ at } s = j4.$$

5. Attempt **any two** questions :

(2×10=20)

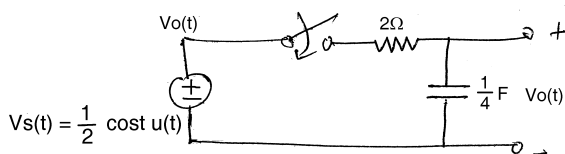
1) For the network shown, find Z and Y parameter.



2) Realize the given network function in Cauer I form.

$$z(s) = \frac{6s^4 + 42s^2 + 48}{s^5 + 18s^3 + 48s}$$

3) For the network shown, find the response.





SLR-TJ – 407

Seat No.	
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Set **R**

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

Day and Date : Tuesday, 28-11-2017
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) According to duality principle, a series inductor (L) can be represented as _____
a) series L b) parallel L c) series C d) parallel C
 - 2) For band pass filter, cut-off frequency of low pass filter should be _____ high pass filter.
a) greater than b) less than c) equals to d) all of the above
 - 3) In two port network, $Z_{12} = Z_{21}$ indicates _____ property.
a) unilateral b) bilateral c) linear d) nonlinear
 - 4) Reactive power drawn by a pure resistor is _____
a) 0 b) minimum c) maximum d) none of the above
 - 5) An electrical circuit with 10 branches and 7 nodes will have _____ loop equations.
a) 10 b) 7 c) 3 d) ϕ
 - 6) In active filter _____ element is absent.
a) inductor b) capacitor
c) both a) and b) d) resistor
 - 7) _____ can not be connected in series unless they are identical.
a) voltage source b) current source
c) both of above d) resistance

P.T.O.



- 8) A branch of a network is said to be active when it consists of one _____
 - a) resistor
 - b) voltage source
 - c) inductor
 - d) capacitor
- 9) Super position theorem is not applicable for _____ calculations.
 - a) current
 - b) voltage
 - c) power
 - d) energy
- 10) Time constant of RC series circuit is _____
 - a) L/R
 - b) $2 RC$
 - c) $2L/R$
 - d) RC
- 11) For a transmission line, open circuit and short circuit impedances are 20Ω and 5Ω . Then characteristics impedance is _____ Ω .
 - a) 100
 - b) 50
 - c) 25
 - d) 10
- 12) In an ac circuit, the maximum and minimum values of power factor can be _____
 - a) 2 and 0
 - b) 1 and 0
 - c) 0 and -1
 - d) 1 and -1
- 13) To apply reciprocity theorem response to excitation ratio is _____
 - a) Ohm
 - b) Mho
 - c) No units
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- 14) KCL works on the principle of which of the following ?
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 - a) N
 - b) $N - 1$
 - c) $b - N + 1$
 - d) $b - N - 1$
- 19) Basic cut set matrix consists of _____
 - a) One branch
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 - c) 2 branch
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- 20) Active filters consists of _____
 - a) Capacitor
 - b) Inductor
 - c) op amp and capacitor
 - d) op amp



Seat No.	
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**S.E. (Part – I) (Biomedical Engg.) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

Day and Date : Tuesday, 28-11-2017
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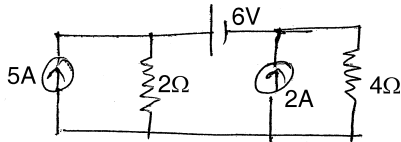
Marks : 80

SECTION – I

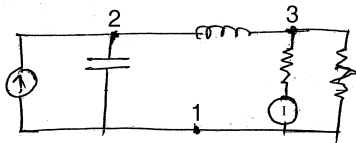
2. Attempt **any four** :

(4×5=20)

- 1) State and explain Kirchoff's current law and Kirchoff's voltage law.
- 2) Find the current in 4 Ω resistor for given circuit.



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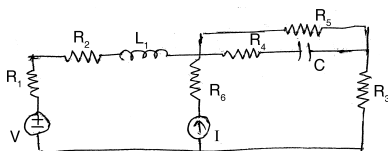


- 5) Define following terms :
 - a) RMS value of sinusoidal waveform
 - b) Millman's theorem.

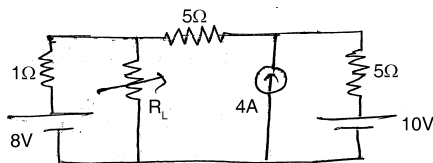
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(2×10=20)

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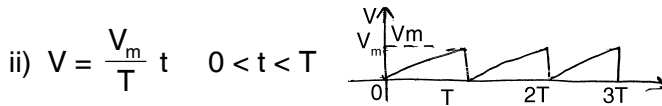
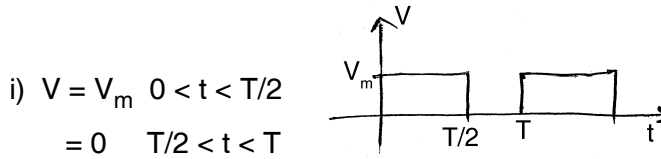


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3) Find the rms and average value of given waveforms :

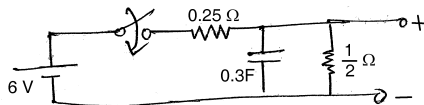


SECTION – II

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(4×5=20)

- 1) Explain and derive condition for reciprocity and symmetry for ABCD parameters.
- 2) State whether the given polynomial is Harwitz or not. Give reasons in each case
 - i) $s^4 + 4s^3 + 3s + 2$
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- 4) In the network shown, the switch is open for a long time and at $t = 0$, it is closed. Determine $V_2(t)$.



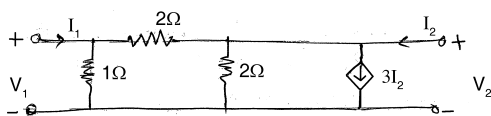
5) Using pole-zero plot, find magnitude and phase of given function.

$$F(s) = \frac{(s + 1)(s + 3)}{s(s + 2)} \text{ at } s = j4.$$

5. Attempt **any two** questions :

(2×10=20)

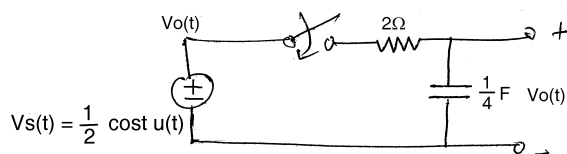
1) For the network shown, find Z and Y parameter.



2) Realize the given network function in Cauer I form.

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3) For the network shown, find the response.





SLR-TJ – 407

Seat No.	
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Set	S
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**S.E. (Part – I) (Biomedical Engg.) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

Day and Date : Tuesday, 28-11-2017
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- 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- 1) To obtain wide bandwidth, network is designed with which of the following ?
 - a) High Q factor
 - b) Low Q factor
 - c) Unity Q factor
 - d) Zero Q factor
- 2) In series RLC circuit, to get $Q > 1$, _____ is required.
 - a) $X_L > R$
 - b) $X_L < R$
 - c) $X_L = R$
 - d) All above
- 3) Rank of cut set matrix is _____
 - a) N
 - b) $N - 1$
 - c) $b - N + 1$
 - d) $b - N - 1$
- 4) Basic cut set matrix consists of _____
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 - b) no branches
 - c) 2 branch
 - d) any no. of branches
- 5) Active filters consists of _____
 - a) Capacitor
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 - c) op amp and capacitor
 - d) op amp
- 6) According to duality principle, a series inductor (L) can be represented as _____
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 - b) parallel L
 - c) series C
 - d) parallel C
- 7) For band pass filter, cut-off frequency of low pass filter should be _____ high pass filter.
 - a) greater than
 - b) less than
 - c) equals to
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P.T.O.



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- 15) Time constant of RC series circuit is _____
a) L/R b) 2 RC c) 2L/R d) RC
- 16) For a transmission line, open circuit and short circuit impedances are 20 Ω and 5 Ω . Then characteristics impedance is _____ Ω .
a) 100 b) 50 c) 25 d) 10
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a) Ohm b) Mho c) No units d) either a or b
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- _____



Seat No.	
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**S.E. (Part – I) (Biomedical Engg.) (Old) Examination, 2017
ELECTRICAL NETWORK ANALYSIS AND SYNTHESIS**

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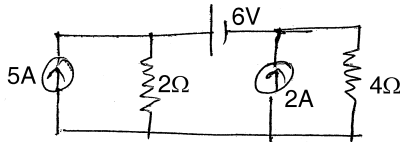
Marks : 80

SECTION – I

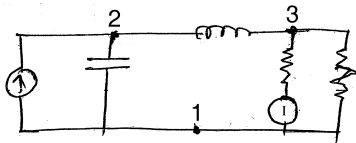
2. Attempt **any four** :

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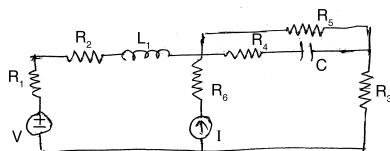


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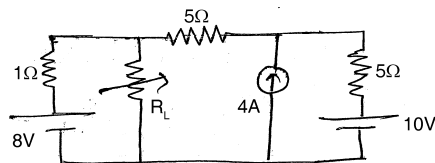
3. Attempt **any two** :

(2×10=20)

- 1) For the circuit shown, draw the original graph and write the
 - i) incidence matrix
 - ii) f-cut set matrix
 - iii) tie set matrix

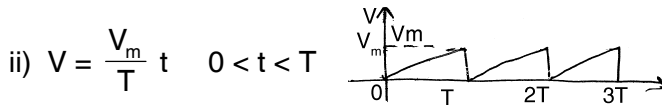
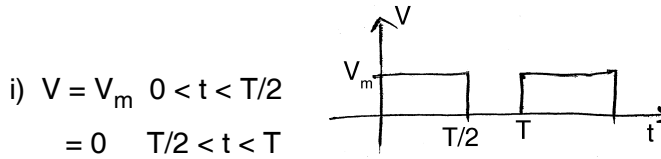


- 2) State maximum power transfer theorem and for the circuit shown, find value of resistance R_L for maximum power and also calculate maximum power.





3) Find the rms and average value of given waveforms :

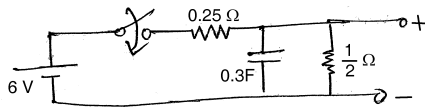


SECTION – II

4. Attempt **any four** questions :

(4×5=20)

- 1) Explain and derive condition for reciprocity and symmetry for ABCD parameters.
- 2) State whether the given polynomial is Harwitz or not. Give reasons in each case
 - i) $s^4 + 4s^3 + 3s + 2$
 - ii) $s^6 + 5s^5 + 4s^4 + 3s^2 - 2s^2 + s + 3$
- 3) Mention any 5 properties of positive real function and state their necessary and sufficient condition.
- 4) In the network shown, the switch is open for a long time and at $t = 0$, it is closed. Determine $V_2(t)$.



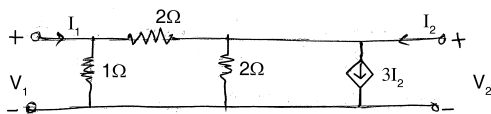
5) Using pole-zero plot, find magnitude and phase of given function.

$$F(s) = \frac{(s + 1)(s + 3)}{s(s + 2)} \text{ at } s = j4.$$

5. Attempt **any two** questions :

(2×10=20)

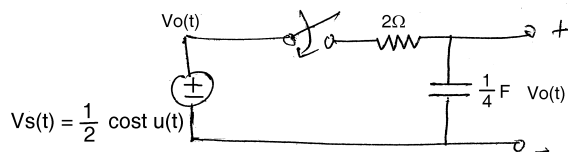
1) For the network shown, find Z and Y parameter.



2) Realize the given network function in Cauer I form.

$$z(s) = \frac{6s^4 + 42s^2 + 48}{s^5 + 18s^3 + 48s}$$

3) For the network shown, find the response.





SLR-TJ – 408

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Set **P**

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

Day and Date : Tuesday, 21-11-2017
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) Improper setting of range of a multimeter leads to an error called _____ error.
 - a) random
 - b) limiting
 - c) instrumental
 - d) human
- 2) Strain gauge is an example of _____ transducer.
 - a) passive
 - b) active
 - c) electrical
 - d) physical
- 3) Thermistors are _____ resistors.
 - a) metallic
 - b) non metallic
 - c) constant
 - d) variable
- 4) Mercury in glass thermometer is an example _____ order system.
 - a) zero
 - b) first
 - c) second
 - d) third
- 5) Source of biopotential is _____ in nature.
 - a) invasive
 - b) non invasive
 - c) ionic
 - d) stable
- 6) The difference in half cell potentials that exists between 2 electrodes is called _____ potential.
 - a) offset
 - b) active
 - c) null
 - d) decay
- 7) Motion artefact is reduced to negligible magnitude by _____ abrasion.
 - a) gel
 - b) skin
 - c) electrode
 - d) lead

P.T.O.



- 8) Photo electric transducer converts _____ energy into electrical energy.
a) light b) radiation c) heat d) photon
- 9) Fluoroptic _____ sensors are useful devices used for tissue temperature measurement.
a) temperature b) pressure c) light d) radiation
- 10) Thermal sensors absorbs radiation and transform it into
a) power b) potential c) heat d) energy
- 11) _____ electrodes are used to electect biopotential within the body.
a) Percutaneous b) Surface c) Energy d) Sensor
- 12) Optical fiber sensors are _____ properties.
a) nonelectrical b) mechanical c) passive d) active
- 13) Optical fibers are Immune to _____ interference.
a) electromagnetic b) AC
c) DC 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. (Part – II) (Biomedical Engineering) (CGPA) Examination, 2017
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION**

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions. **(4×4=16)**
- 1) Differentiate between active and passive transducer.
 - 2) What is motion artefact ? How it is minimized ?
 - 3) How is capacitive transducer used to measure displacement ?
 - 4) Differentiate between first order system and second order system with an example.
 - 5) Mention the laws applied for functioning of thermocouple.
3. Attempt **any two** questions. **(6×2=12)**
- 1) Explain the construction and working of LVDT.
 - 2) Explain with a neat diagram any one application of piezoelectric transducer.
 - 3) Define half cell potential. How it is measured ?

SECTION – II

4. Attempt **any four** questions. **(4×4=16)**
- 1) Define and explain working principle of ISFET.
 - 2) Define pH of solution and classify the solutions on basis of pH values.
 - 3) Differentiate between amperometric and potentiometric sensors.
 - 4) Mention any four medical applications of enzyme sensor.
 - 5) Mention any four medical applications of fiber optic sensors.
5. Attempt **any 2** questions. **(2×6=12)**
- 1) Explain the construction and working of pCO₂ electrode in detail.
 - 2) What are the radiation sensors ? Explain application of each in short.
 - 3) Classify biosensors. Explain catalytic biosensor in detail.

Set P



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Set

Q

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

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

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

- 1) Photo electric transducer converts _____ energy into electrical energy.
a) light b) radiation c) heat d) photon
- 2) Fluoroptic _____ sensors are useful devices used for tissue temperature measurement.
a) temperature b) pressure c) light d) radiation
- 3) Thermal sensors absorbs radiation and transform it into
a) power b) potential c) heat d) energy
- 4) _____ electrodes are used to electect biopotential within the body.
a) Percutaneous b) Surface c) Energy d) Sensor
- 5) Optical fiber sensors are _____ properties.
a) nonelectrical b) mechanical c) passive d) active
- 6) Optical fibers are Immune to _____ interference.
a) electromagnetic b) AC
c) DC d) noise

P.T.O.



- 7) The biosensor relies upon _____ that recognize and catalyze reactions of glucose.
a) blood b) gas c) CSF d) enzymes
- 8) Improper setting of range of a multimeter leads to an error called _____ error.
a) random b) limiting
c) instrumental d) human
- 9) Strain gauge is an example of _____ transducer.
a) passive b) active c) electrical d) physical
- 10) Thermistors are _____ resistors.
a) metallic b) non metallic c) constant d) variable
- 11) Mercury in glass thermometer is an example _____ order system.
a) zero b) first c) second d) third
- 12) Source of biopotential is _____ in nature.
a) invasive b) non invasive c) ionic d) stable
- 13) The difference in half cell potentials that exists between 2 electrodes is called _____ potential.
a) offset b) active c) null d) decay
- 14) Motion artefact is reduced to negligible magnitude by _____ abrasion.
a) gel b) skin c) electrode d) lead
-



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

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions. **(4×4=16)**
- 1) Differentiate between active and passive transducer.
 - 2) What is motion artefact ? How it is minimized ?
 - 3) How is capacitive transducer used to measure displacement ?
 - 4) Differentiate between first order system and second order system with an example.
 - 5) Mention the laws applied for functioning of thermocouple.
3. Attempt **any two** questions. **(6×2=12)**
- 1) Explain the construction and working of LVDT.
 - 2) Explain with a neat diagram any one application of piezoelectric transducer.
 - 3) Define half cell potential. How it is measured ?

SECTION – II

4. Attempt **any four** questions. **(4×4=16)**
- 1) Define and explain working principle of ISFET.
 - 2) Define pH of solution and classify the solutions on basis of pH values.
 - 3) Differentiate between amperometric and potentiometric sensors.
 - 4) Mention any four medical applications of enzyme sensor.
 - 5) Mention any four medical applications of fiber optic sensors.
5. Attempt **any 2** questions. **(2×6=12)**
- 1) Explain the construction and working of pCO₂ electrode in detail.
 - 2) What are the radiation sensors ? Explain application of each in short.
 - 3) Classify biosensors. Explain catalytic biosensor in detail.

Set Q



SLR-TJ – 408

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Set **R**

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

Day and Date : Tuesday, 21-11-2017
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) Source of biopotential is _____ in nature.
a) invasive b) non invasive c) ionic d) stable
- 2) The difference in half cell potentials that exists between 2 electrodes is called _____ potential.
a) offset b) active c) null d) decay
- 3) Motion artefact is reduced to negligible magnitude by _____ abrasion.
a) gel b) skin c) electrode d) lead
- 4) Photo electric transducer converts _____ energy into electrical energy.
a) light b) radiation c) heat d) photon
- 5) Fluoroptic _____ sensors are useful devices used for tissue temperature measurement.
a) temperature b) pressure c) light d) radiation
- 6) Thermal sensors absorbs radiation and transform it into
a) power b) potential c) heat d) energy
- 7) _____ electrodes are used to electect biopotential within the body.
a) Percutaneous b) Surface c) Energy d) Sensor

P.T.O.



- 8) Optical fiber sensors are _____ properties.
a) nonelectrical b) mechanical c) passive d) active
- 9) Optical fibers are Immune to _____ interference.
a) electromagnetic b) AC
c) DC d) noise
- 10) The biosensor relies upon _____ that recognize and catalyze reactions of glucose.
a) blood b) gas c) CSF d) enzymes
- 11) Improper setting of range of a multimeter leads to an error called _____ error.
a) random b) limiting
c) instrumental d) human
- 12) Strain gauge is an example of _____ transducer.
a) passive b) active c) electrical d) physical
- 13) Thermistors are _____ resistors.
a) metallic b) non metallic c) constant d) variable
- 14) Mercury in glass thermometer is an example _____ order system.
a) zero b) first c) second d) third
-



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

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions. **(4×4=16)**
- 1) Differentiate between active and passive transducer.
 - 2) What is motion artefact ? How it is minimized ?
 - 3) How is capacitive transducer used to measure displacement ?
 - 4) Differentiate between first order system and second order system with an example.
 - 5) Mention the laws applied for functioning of thermocouple.
3. Attempt **any two** questions. **(6×2=12)**
- 1) Explain the construction and working of LVDT.
 - 2) Explain with a neat diagram any one application of piezoelectric transducer.
 - 3) Define half cell potential. How it is measured ?

SECTION – II

4. Attempt **any four** questions. **(4×4=16)**
- 1) Define and explain working principle of ISFET.
 - 2) Define pH of solution and classify the solutions on basis of pH values.
 - 3) Differentiate between amperometric and potentiometric sensors.
 - 4) Mention any four medical applications of enzyme sensor.
 - 5) Mention any four medical applications of fiber optic sensors.
5. Attempt **any 2** questions. **(2×6=12)**
- 1) Explain the construction and working of pCO₂ electrode in detail.
 - 2) What are the radiation sensors ? Explain application of each in short.
 - 3) Classify biosensors. Explain catalytic biosensor in detail.

Set R



SLR-TJ – 408

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Set

S

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

Day and Date : Tuesday, 21-11-2017
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) Thermal sensors absorbs radiation and transform it into
a) power b) potential c) heat d) energy
- 2) _____ electrodes are used to electect biopotential within the body.
a) Percutaneous b) Surface c) Energy d) Sensor
- 3) Optical fiber sensors are _____ properties.
a) nonelectrical b) mechanical c) passive d) active
- 4) Optical fibers are Immune to _____ interference.
a) electromagnetic b) AC
c) DC d) noise
- 5) The biosensor relies upon _____ that recognize and catalyze reactions of glucose.
a) blood b) gas c) CSF d) enzymes
- 6) Improper setting of range of a multimeter leads to an error called _____ error.
a) random b) limiting
c) instrumental d) human

P.T.O.



- 7) Strain gauge is an example of _____ transducer.
a) passive b) active c) electrical d) physical
- 8) Thermistors are _____ resistors.
a) metallic b) non metallic c) constant d) variable
- 9) Mercury in glass thermometer is an example _____ order system.
a) zero b) first c) second d) third
- 10) Source of biopotential is _____ in nature.
a) invasive b) non invasive c) ionic d) stable
- 11) The difference in half cell potentials that exists between 2 electrodes is called _____ potential.
a) offset b) active c) null d) decay
- 12) Motion artefact is reduced to negligible magnitude by _____ abrasion.
a) gel b) skin c) electrode d) lead
- 13) Photo electric transducer converts _____ energy into electrical energy.
a) light b) radiation c) heat d) photon
- 14) Fluoroptic _____ sensors are useful devices used for tissue temperature measurement.
a) temperature b) pressure c) light d) radiation
-



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

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions. **(4×4=16)**
- 1) Differentiate between active and passive transducer.
 - 2) What is motion artefact ? How it is minimized ?
 - 3) How is capacitive transducer used to measure displacement ?
 - 4) Differentiate between first order system and second order system with an example.
 - 5) Mention the laws applied for functioning of thermocouple.
3. Attempt **any two** questions. **(6×2=12)**
- 1) Explain the construction and working of LVDT.
 - 2) Explain with a neat diagram any one application of piezoelectric transducer.
 - 3) Define half cell potential. How it is measured ?

SECTION – II

4. Attempt **any four** questions. **(4×4=16)**
- 1) Define and explain working principle of ISFET.
 - 2) Define pH of solution and classify the solutions on basis of pH values.
 - 3) Differentiate between amperometric and potentiometric sensors.
 - 4) Mention any four medical applications of enzyme sensor.
 - 5) Mention any four medical applications of fiber optic sensors.
5. Attempt **any 2** questions. **(2×6=12)**
- 1) Explain the construction and working of pCO₂ electrode in detail.
 - 2) What are the radiation sensors ? Explain application of each in short.
 - 3) Classify biosensors. Explain catalytic biosensor in detail.



SLR-TJ – 409

Seat No.	
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Set	P
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Wednesday, 22-11-2017
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

I. Choose the correct answer :

14

- 1) Lever system prevalent in human arm is
 - a) Class III
 - b) Class II
 - c) Class I
 - d) None of the above
- 2) First law of motion is also called
 - a) Law of action and reaction
 - b) Law of conservation of energy
 - c) Law of inertia
 - d) Law of transference of momentum
- 3) Imaginary plane divides body into front and back is called
 - a) Transverse plane
 - b) Sagittal plane
 - c) Parasagittal plane
 - d) Coronal plane
- 4) In isometric contraction, the muscle
 - a) Shortens
 - b) Lengthens
 - c) Neither shortens nor lengthens
 - d) Shortens as well as lengthens

P.T.O.



- 5) Which of the following is an example of Hinge joint ?
a) Knee joint b) Elbow joint c) Ankle joint d) All the above
- 6) The outer covering of each bone, made from fibrous connective tissue, is called the
a) Epiphysis b) Diaphysis
c) Articular cartilage d) Periosteum
- 7) _____ is defined as stress/strain.
a) Young's Modulus b) Modulus of elasticity
c) Plasticity d) Rigidity
- 8) Three point pressure point system is used for
a) Foot b) Muscle c) Nervous tissue d) Sternum
- 9) What is velocity ?
a) Displacement/time b) Total distance travelled/time
c) Change in displacement/speed d) Time/change in displacement
- 10) A rugby prop sprints away from a scrum with an acceleration of 0.2 ms^{-2} for 10 s.
How far did he travel ?
a) 15 m b) 20 m c) 18 m d) 10 m
- 11) How would you convert an angle in degrees to radians ?
a) $(\text{angle in degrees})/360^\circ \times 2 \pi = \text{angle in radians}$
b) $(\text{angle in degrees})/2 \pi \times 360^\circ = \text{angle in radians}$
c) $2 \pi/360^\circ \times (\text{angle in degrees}) = \text{angle in radians}$
d) $(\text{angle in degrees}) \times 360^\circ/2 \pi = \text{angle in radians}$
- 12) Study of joints is called
a) Kinesiology b) Biology c) Anthropometry d) Anthology
- 13) 'Neck joint' is an example of
a) Pivot joint b) Hinge joint c) Saddle joint d) Condylloid joint
- 14) In which type of lever, the force is in between weight and fulcrum ?
a) Type I b) Type II c) Type III d) All the above
-



Seat No.	
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Wednesday, 22-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

II. Solve **any four** : **(4×4=16)**

- 1) Explain briefly about the reconstruction of connective tissue with diagram.
- 2) Explain muscle contraction mechanism of muscle with diagram.
- 3) Explain aging of the cell.
- 4) Explain about the injury and repair of skeletal muscle.
- 5) What are basic criteria of a scaffold used for tissue engineering ? Give two common examples of scaffolds constructed from natural materials. State three major component of ECM.

III. Solve **any two** : **(2×6=12)**

- 1) Define tissue engineering, its methods and basic principles and consideration for tissue engineering.
- 2) What is bioreactor ? Why cell seeding is important in bioreactor ? Explain the working of two example of bioreactor with diagram.
- 3) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.

SECTION – II

IV. Solve **any four** : **(4×4=16)**

- 1) With help of suitable diagram explain the process of differentiation of stem cells into cell lines.
- 2) Why embryonic cells are important ? What are source of the embryonic cells ?
- 3) Describe the function of kidney and working mechanism of nephron with diagram.
- 4) Explain the active usage of channels properties of nervous system.
- 5) Explain about the directed motile response for in-vivo.

V. Solve **any two** : **(2×6=12)**

- 1) Describe the function of kidney and working mechanism of nephron with diagram.
- 2) Explain about the delivery of neuro-active molecules for the nervous system.
- 3) What are the metabolic requirements of cells ? Discuss with a neat diagram for tissue engineering.

Set P



SLR-TJ – 409

Seat No.	
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Set	Q
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Wednesday, 22-11-2017
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

I. Choose the correct answer :

14

- 1) Three point pressure point system is used for
a) Foot b) Muscle c) Nervous tissue d) Sternum
- 2) What is velocity ?
a) Displacement/time b) Total distance travelled/time
c) Change in displacement/speed d) Time/change in displacement
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c) $2\pi/360^\circ \times (\text{angle in degrees}) = \text{angle in radians}$
d) $(\text{angle in degrees}) \times 360^\circ/2\pi = \text{angle in radians}$
- 5) Study of joints is called
a) Kinesiology b) Biology c) Anthropometry d) Anthology
- 6) 'Neck joint' is an example of
a) Pivot joint b) Hinge joint c) Saddle joint d) Condyloid joint
- 7) In which type of lever, the force is in between weight and fulcrum ?
a) Type I b) Type II c) Type III d) All the above

P.T.O.



- 8) Lever system prevalent in human arm is
- a) Class III
 - b) Class II
 - c) Class I
 - d) None of the above
- 9) First law of motion is also called
- a) Law of action and reaction
 - b) Law of conservation of energy
 - c) Law of inertia
 - d) Law of transference of momentum
- 10) Imaginary plane divides body into front and back is called
- a) Transverse plane
 - b) Sagittal plane
 - c) Parasagittal plane
 - d) Coronal plane
- 11) In isometric contraction, the muscle
- a) Shortens
 - b) Lengthens
 - c) Neither shortens nor lengthens
 - d) Shortens as well as lengthens
- 12) Which of the following is an example of Hinge joint ?
- a) Knee joint
 - b) Elbow joint
 - c) Ankle joint
 - d) All the above
- 13) The outer covering of each bone, made from fibrous connective tissue, is called the
- a) Epiphysis
 - b) Diaphysis
 - c) Articular cartilage
 - d) Periosteum
- 14) _____ is defined as stress/strain.
- a) Young's Modulus
 - b) Modulus of elasticity
 - c) Plasticity
 - d) Rigidity
-



Seat No.	
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Wednesday, 22-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

II. Solve **any four** : **(4×4=16)**

- 1) Explain briefly about the reconstruction of connective tissue with diagram.
- 2) Explain muscle contraction mechanism of muscle with diagram.
- 3) Explain aging of the cell.
- 4) Explain about the injury and repair of skeletal muscle.
- 5) What are basic criteria of a scaffold used for tissue engineering ? Give two common examples of scaffolds constructed from natural materials. State three major component of ECM.

III. Solve **any two** : **(2×6=12)**

- 1) Define tissue engineering, its methods and basic principles and consideration for tissue engineering.
- 2) What is bioreactor ? Why cell seeding is important in bioreactor ? Explain the working of two example of bioreactor with diagram.
- 3) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.

SECTION – II

IV. Solve **any four** : **(4×4=16)**

- 1) With help of suitable diagram explain the process of differentiation of stem cells into cell lines.
- 2) Why embryonic cells are important ? What are source of the embryonic cells ?
- 3) Describe the function of kidney and working mechanism of nephron with diagram.
- 4) Explain the active usage of channels properties of nervous system.
- 5) Explain about the directed motile response for in-vivo.

V. Solve **any two** : **(2×6=12)**

- 1) Describe the function of kidney and working mechanism of nephron with diagram.
- 2) Explain about the delivery of neuro-active molecules for the nervous system.
- 3) What are the metabolic requirements of cells ? Discuss with a neat diagram for tissue engineering.

Set Q



SLR-TJ – 409

Seat No.	
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Set	R
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Wednesday, 22-11-2017
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

I. Choose the correct answer :

14

- 1) Which of the following is an example of Hinge joint ?
a) Knee joint b) Elbow joint c) Ankle joint d) All the above
- 2) The outer covering of each bone, made from fibrous connective tissue, is called the
a) Epiphysis b) Diaphysis
c) Articular cartilage d) Periosteum
- 3) _____ is defined as stress/strain.
a) Young's Modulus b) Modulus of elasticity
c) Plasticity d) Rigidity
- 4) Three point pressure point system is used for
a) Foot b) Muscle c) Nervous tissue d) Sternum
- 5) What is velocity ?
a) Displacement/time
b) Total distance travelled/time
c) Change in displacement/speed
d) Time/change in displacement
- 6) A rugby prop sprints away from a scrum with an acceleration of 0.2 ms^{-2} for 10 s.
How far did he travel ?
a) 15 m b) 20 m
c) 18 m d) 10 m

P.T.O.



- 7) How would you convert an angle in degrees to radians ?
- a) $(\text{angle in degrees})/360^\circ \times 2\pi = \text{angle in radians}$
 - b) $(\text{angle in degrees})/2\pi \times 360^\circ = \text{angle in radians}$
 - c) $2\pi/360^\circ \times (\text{angle in degrees}) = \text{angle in radians}$
 - d) $(\text{angle in degrees}) \times 360^\circ/2\pi = \text{angle in radians}$
- 8) Study of joints is called
- a) Kinesiology
 - b) Biology
 - c) Anthropometry
 - d) Anthology
- 9) 'Neck joint' is an example of
- a) Pivot joint
 - b) Hinge joint
 - c) Saddle joint
 - d) Condyloid joint
- 10) In which type of lever, the force is in between weight and fulcrum ?
- a) Type I
 - b) Type II
 - c) Type III
 - d) All the above
- 11) Lever system prevalent in human arm is
- a) Class III
 - b) Class II
 - c) Class I
 - d) None of the above
- 12) First law of motion is also called
- a) Law of action and reaction
 - b) Law of conservation of energy
 - c) Law of inertia
 - d) Law of transference of momentum
- 13) Imaginary plane divides body into front and back is called
- a) Transverse plane
 - b) Sagittal plane
 - c) Parasagittal plane
 - d) Coronal plane
- 14) In isometric contraction, the muscle
- a) Shortens
 - b) Lengthens
 - c) Neither shortens nor lengthens
 - d) Shortens as well as lengthens
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Seat No.	
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Wednesday, 22-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

II. Solve **any four** : **(4×4=16)**

- 1) Explain briefly about the reconstruction of connective tissue with diagram.
- 2) Explain muscle contraction mechanism of muscle with diagram.
- 3) Explain aging of the cell.
- 4) Explain about the injury and repair of skeletal muscle.
- 5) What are basic criteria of a scaffold used for tissue engineering ? Give two common examples of scaffolds constructed from natural materials. State three major component of ECM.

III. Solve **any two** : **(2×6=12)**

- 1) Define tissue engineering, its methods and basic principles and consideration for tissue engineering.
- 2) What is bioreactor ? Why cell seeding is important in bioreactor ? Explain the working of two example of bioreactor with diagram.
- 3) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.

SECTION – II

IV. Solve **any four** : **(4×4=16)**

- 1) With help of suitable diagram explain the process of differentiation of stem cells into cell lines.
- 2) Why embryonic cells are important ? What are source of the embryonic cells ?
- 3) Describe the function of kidney and working mechanism of nephron with diagram.
- 4) Explain the active usage of channels properties of nervous system.
- 5) Explain about the directed motile response for in-vivo.

V. Solve **any two** : **(2×6=12)**

- 1) Describe the function of kidney and working mechanism of nephron with diagram.
- 2) Explain about the delivery of neuro-active molecules for the nervous system.
- 3) What are the metabolic requirements of cells ? Discuss with a neat diagram for tissue engineering.

Set R



SLR-TJ – 409

Seat No.	
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Set	S
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Wednesday, 22-11-2017
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

I. Choose the correct answer :

14

- 1) A rugby prop sprints away from a scrum with an acceleration of 0.2 ms^{-2} for 10 s. How far did he travel ?
a) 15 m b) 20 m c) 18 m d) 10 m
- 2) How would you convert an angle in degrees to radians ?
a) $(\text{angle in degrees})/360^\circ \times 2\pi = \text{angle in radians}$
b) $(\text{angle in degrees})/2\pi \times 360^\circ = \text{angle in radians}$
c) $2\pi/360^\circ \times (\text{angle in degrees}) = \text{angle in radians}$
d) $(\text{angle in degrees}) \times 360^\circ/2\pi = \text{angle in radians}$
- 3) Study of joints is called
a) Kinesiology b) Biology
c) Anthropometry d) Anthology
- 4) 'Neck joint' is an example of
a) Pivot joint b) Hinge joint
c) Saddle joint d) Condyloid joint
- 5) In which type of lever, the force is in between weight and fulcrum ?
a) Type I b) Type II c) Type III d) All the above
- 6) Lever system prevalent in human arm is
a) Class III b) Class II
c) Class I d) None of the above

P.T.O.



- 7) First law of motion is also called
- Law of action and reaction
 - Law of conservation of energy
 - Law of inertia
 - Law of transference of momentum
- 8) Imaginary plane divides body into front and back is called
- Transverse plane
 - Sagittal plane
 - Parasagittal plane
 - Coronal plane
- 9) In isometric contraction, the muscle
- Shortens
 - Lengthens
 - Neither shortens nor lengthens
 - Shortens as well as lengthens
- 10) Which of the following is an example of Hinge joint ?
- Knee joint
 - Elbow joint
 - Ankle joint
 - All the above
- 11) The outer covering of each bone, made from fibrous connective tissue, is called the
- Epiphysis
 - Diaphysis
 - Articular cartilage
 - Periosteum
- 12) _____ is defined as stress/strain.
- Young's Modulus
 - Modulus of elasticity
 - Plasticity
 - Rigidity
- 13) Three point pressure point system is used for
- Foot
 - Muscle
 - Nervous tissue
 - Sternum
- 14) What is velocity ?
- Displacement/time
 - Total distance travelled/time
 - Change in displacement/speed
 - Time/change in displacement
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Seat No.	
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL PROSTHETIC AND ORTHOTICS**

Day and Date : Wednesday, 22-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

II. Solve **any four** : **(4×4=16)**

- 1) Explain briefly about the reconstruction of connective tissue with diagram.
- 2) Explain muscle contraction mechanism of muscle with diagram.
- 3) Explain aging of the cell.
- 4) Explain about the injury and repair of skeletal muscle.
- 5) What are basic criteria of a scaffold used for tissue engineering ? Give two common examples of scaffolds constructed from natural materials. State three major component of ECM.

III. Solve **any two** : **(2×6=12)**

- 1) Define tissue engineering, its methods and basic principles and consideration for tissue engineering.
- 2) What is bioreactor ? Why cell seeding is important in bioreactor ? Explain the working of two example of bioreactor with diagram.
- 3) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.

SECTION – II

IV. Solve **any four** : **(4×4=16)**

- 1) With help of suitable diagram explain the process of differentiation of stem cells into cell lines.
- 2) Why embryonic cells are important ? What are source of the embryonic cells ?
- 3) Describe the function of kidney and working mechanism of nephron with diagram.
- 4) Explain the active usage of channels properties of nervous system.
- 5) Explain about the directed motile response for in-vivo.

V. Solve **any two** : **(2×6=12)**

- 1) Describe the function of kidney and working mechanism of nephron with diagram.
- 2) Explain about the delivery of neuro-active molecules for the nervous system.
- 3) What are the metabolic requirements of cells ? Discuss with a neat diagram for tissue engineering.

Set S



SLR-TJ – 410

Seat No.	
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Set	P
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**S.E. (Part – II) (CGPA) (Biomedical Engg.) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Thursday, 23-11-2017
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 :

(1×14=14)

- 1) _____ errors occurs due to human errors.
 - a) Instrumental
 - b) Environmental
 - c) Random
 - d) Human
- 2) Digital _____ meter employs 2 flip flops.
 - a) Phase
 - b) Frequency
 - c) Volt
 - d) Current
- 3) The DVM displays ac and dc voltages as _____ numbers.
 - a) Continuous
 - b) Discrete
 - c) Digital
 - d) Logical
- 4) The input _____ of the voltmeter should be as high as possible.
 - a) Inductance
 - b) Capacitance
 - c) Impedance
 - d) Capacity
- 5) Complex waveform are most accurately measured with an _____ voltmeter.
 - a) Peak responding
 - b) Average
 - c) FET
 - d) rms
- 6) Precision is defined as _____
 - a) Reliability
 - b) Uncertainty
 - c) Repeatability
 - d) Accuracy

P.T.O.



- 7) Mercury in glass thermometer is an example of _____ order instrument.
a) Zero b) First c) Second d) Infinite
- 8) The range of the measure and variable for which an instrument is designed to measure linearly is called the _____
a) Span b) Linearity c) Occurancy d) Calibration
- 9) In _____ recorder data can be recorded indefinite times.
a) Laser b) Potentiometer
c) Magnetic d) Strip chart
- 10) The amplitude read on CRO set of 1V/div is 1.5cm 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
- 11) The multichannel DAS has a single A/D converter preceded by a _____
a) Demultiplexer b) Amplifier
c) Multiplexer d) Filter
- 12) The signal generator is called _____
a) Oscillator b) Amplifier
c) Comparator d) Diode shaping circuit
- 13) A time base selector basically consists of _____
a) LC oscillator b) RC oscillator
c) Crystal oscillator d) Wein bridge oscillator
- 14) Schmitt trigger used in digital measurement time converts into input to _____
a) Square wave b) Sine wave
c) Pulses d) Sawtooth wave
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Seat No.	
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**S.E. (Part – II) (CGPA) (Biomedical Engg.) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Thursday, 23-11-2017

Marks : 56

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

SECTION – I

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

- 1) Explain the requirements of analog type multimeter.
- 2) Explain response of system for following inputs :
 - a) Ramp input
 - b) Impulse input.
- 3) Define and explain zero order and first order system with respective example.
- 4) Differentiate between analog and digital phase meter.
- 5) Define resolution and sensitivity of digital voltmeter.

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

- 1) Explain with a neat diagram working of Ramp type digital voltmeter.
- 2) Explain working of peak reading and average reading of electronic voltmeter.
- 3) With neat diagram explain the working of an electronic frequency meter.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

- 1) Explain working of touch screen display system.
- 2) Explain in brief sampling oscilloscope.

Set P



- 3) Explain working of nonfade display system.
- 4) Draw and explain working of data acquisition system.
- 5) State the function of an attenuator in CRU.

5. Attempt **any two** :

(6×2=12)

- 1) Explain the following terms related to CRO.
 - a) Post detection acceleration.
 - b) Alt and chop mode.
 - 2) Explain working of A. F. generator with necessary diagram.
 - 3) Define Lissajous patterns and explain how it can be used for measurement of frequency and phase.
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SLR-TJ – 410

Seat No.	
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Set	Q
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**S.E. (Part – II) (CGPA) (Biomedical Engg.) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Thursday, 23-11-2017
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 : **(1×14=14)**

- 1) The range of the measure and variable for which an instrument is designed to measure linearly is called the _____
a) Span b) Linearity c) Occurancy d) Calibration
- 2) In _____ recorder data can be recorded indefinite times.
a) Laser b) Potentiometer
c) Magnetic d) Strip chart
- 3) The amplitude read on CRO set of 1V/div is 1.5cm 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
- 4) The multichannel DAS has a single A/D converter preceded by a _____
a) Demultiplexer b) Amplifier
c) Multiplexer d) Filter
- 5) The signal generator is called _____
a) Oscillator b) Amplifier
c) Comparator d) Diode shaping circuit

P.T.O.



- 6) A time base selector basically consists of _____
- a) LC oscillator
 - b) RC oscillator
 - c) Crystal oscillator
 - d) Wein bridge oscillator
- 7) Schmitt trigger used in digital measurement time converts into input to _____
- a) Square wave
 - b) Sine wave
 - c) Pulses
 - d) Sawtooth wave
- 8) _____ errors occurs due to human errors.
- a) Instrumental
 - b) Environmental
 - c) Random
 - d) Human
- 9) Digital _____ meter employs 2 flip flops.
- a) Phase
 - b) Frequency
 - c) Volt
 - d) Current
- 10) The DVM displays ac and dc voltages as _____ numbers.
- a) Continuous
 - b) Discrete
 - c) Digital
 - d) Logical
- 11) The input _____ of the voltmeter should be as high as possible.
- a) Inductance
 - b) Capacitance
 - c) Impedance
 - d) Capacity
- 12) Complex waveform are most accurately measured with an _____ voltmeter.
- a) Peak responding
 - b) Average
 - c) FET
 - d) rms
- 13) Precision is defined as _____
- a) Reliability
 - b) Uncertainty
 - c) Repeatability
 - d) Accuracy
- 14) Mercury in glass thermometer is an example of _____ order instrument.
- a) Zero
 - b) First
 - c) Second
 - d) Infinite
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Seat No.	
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**S.E. (Part – II) (CGPA) (Biomedical Engg.) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Thursday, 23-11-2017

Marks : 56

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

SECTION – I

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

- 1) Explain the requirements of analog type multimeter.
- 2) Explain response of system for following inputs :
 - a) Ramp input
 - b) Impulse input.
- 3) Define and explain zero order and first order system with respective example.
- 4) Differentiate between analog and digital phase meter.
- 5) Define resolution and sensitivity of digital voltmeter.

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

- 1) Explain with a neat diagram working of Ramp type digital voltmeter.
- 2) Explain working of peak reading and average reading of electronic voltmeter.
- 3) With neat diagram explain the working of an electronic frequency meter.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

- 1) Explain working of touch screen display system.
- 2) Explain in brief sampling oscilloscope.

Set Q



- 3) Explain working of nonfade display system.
- 4) Draw and explain working of data acquisition system.
- 5) State the function of an attenuator in CRU.

5. Attempt **any two** :

(6×2=12)

- 1) Explain the following terms related to CRO.
 - a) Post detection acceleration.
 - b) Alt and chop mode.
 - 2) Explain working of A. F. generator with necessary diagram.
 - 3) Define Lissajous patterns and explain how it can be used for measurement of frequency and phase.
-



SLR-TJ – 410

Seat No.	
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Set	R
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**S.E. (Part – II) (CGPA) (Biomedical Engg.) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Thursday, 23-11-2017
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 : **(1×14=14)**
- 1) Complex waveform are most accurately measured with an _____ voltmeter.
a) Peak responding b) Average
c) FET d) rms
 - 2) Precision is defined as _____
a) Reliability b) Uncertainty
c) Repeatability d) Accuracy
 - 3) Mercury in glass thermometer is an example of _____ order instrument.
a) Zero b) First c) Second d) Infinite
 - 4) The range of the measure and variable for which an instrument is designed to measure linearly is called the _____
a) Span b) Linearity c) Occurancy d) Calibration
 - 5) In _____ recorder data can be recorded indefinite times.
a) Laser b) Potentiometer
c) Magnetic d) Strip chart
 - 6) The amplitude read on CRO set of 1V/div is 1.5cm 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

P.T.O.



Seat No.	
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**S.E. (Part – II) (CGPA) (Biomedical Engg.) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Thursday, 23-11-2017

Marks : 56

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

SECTION – I

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

- 1) Explain the requirements of analog type multimeter.
- 2) Explain response of system for following inputs :
 - a) Ramp input
 - b) Impulse input.
- 3) Define and explain zero order and first order system with respective example.
- 4) Differentiate between analog and digital phase meter.
- 5) Define resolution and sensitivity of digital voltmeter.

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

- 1) Explain with a neat diagram working of Ramp type digital voltmeter.
- 2) Explain working of peak reading and average reading of electronic voltmeter.
- 3) With neat diagram explain the working of an electronic frequency meter.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

- 1) Explain working of touch screen display system.
- 2) Explain in brief sampling oscilloscope.

Set R



- 3) Explain working of nonfade display system.
- 4) Draw and explain working of data acquisition system.
- 5) State the function of an attenuator in CRU.

5. Attempt **any two** :

(6×2=12)

- 1) Explain the following terms related to CRO.
 - a) Post detection acceleration.
 - b) Alt and chop mode.
 - 2) Explain working of A. F. generator with necessary diagram.
 - 3) Define Lissajous patterns and explain how it can be used for measurement of frequency and phase.
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SLR-TJ – 410

Seat No.	
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Set	S
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**S.E. (Part – II) (CGPA) (Biomedical Engg.) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Thursday, 23-11-2017
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 :

(1×14=14)

- 1) The amplitude read on CRO set of 1V/div is 1.5cm 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) The multichannel DAS has a single A/D converter preceded by a _____
a) Demultiplexer b) Amplifier
c) Multiplexer d) Filter
- 3) The signal generator is called _____
a) Oscillator b) Amplifier
c) Comparator d) Diode shaping circuit
- 4) A time base selector basically consists of _____
a) LC oscillator b) RC oscillator
c) Crystal oscillator d) Wein bridge oscillator
- 5) Schmitt trigger used in digital measurement time converts into input to _____
a) Square wave b) Sine wave
c) Pulses d) Sawtooth wave

P.T.O.



Seat No.	
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**S.E. (Part – II) (CGPA) (Biomedical Engg.) Examination, 2017
ELECTRONIC INSTRUMENTATION**

Day and Date : Thursday, 23-11-2017

Marks : 56

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

SECTION – I

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

- 1) Explain the requirements of analog type multimeter.
- 2) Explain response of system for following inputs :
 - a) Ramp input
 - b) Impulse input.
- 3) Define and explain zero order and first order system with respective example.
- 4) Differentiate between analog and digital phase meter.
- 5) Define resolution and sensitivity of digital voltmeter.

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

- 1) Explain with a neat diagram working of Ramp type digital voltmeter.
- 2) Explain working of peak reading and average reading of electronic voltmeter.
- 3) With neat diagram explain the working of an electronic frequency meter.

SECTION – II

4. Attempt **any 4** : **(4×4=16)**

- 1) Explain working of touch screen display system.
- 2) Explain in brief sampling oscilloscope.

Set S



- 3) Explain working of nonfade display system.
- 4) Draw and explain working of data acquisition system.
- 5) State the function of an attenuator in CRU.

5. Attempt **any two** :

(6×2=12)

- 1) Explain the following terms related to CRO.
 - a) Post detection acceleration.
 - b) Alt and chop mode.
 - 2) Explain working of A. F. generator with necessary diagram.
 - 3) Define Lissajous patterns and explain how it can be used for measurement of frequency and phase.
-



SLR-TJ – 411

Seat No.	
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Set **P**

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

Day and Date : Friday, 24-11-2017
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

(14x1=14)

1. Choose the correct answer.

- 1) A positive AND gate is also negative
a) NAND gate b) NOR gate c) AND gate d) OR gate
- 2) Two cross coupled NAND gates make
a) SR latch b) RS flip flop
c) D flip flop d) Master slave flip flop
- 3) A five variable k-map needs _____ squares.
a) 32 b) 33 c) 34 d) 35
- 4) Addition of – 6 and – 13 is
a) 11101101 b) 11101010 c) 11101110 d) 11111010
- 5) Gray to binary conversion can be implemented with
a) AND b) XOR c) NAND d) NOR
- 6) One input NOR and NAND gate behaves like a
a) converter b) inverter c) reflector d) differentiator
- 7) Which of the following is minimum error code ?
a) octal b) gray c) binary d) excess 3
- 8) A latch is _____ sensitive.
a) both level and edge b) edge
c) level d) none
- 9) _____ logic family provide maximum power dissipation.
a) TTL b) CMOS c) ECL d) JFET
- 10) $X + X.Y = ?$
a) 1 b) 0 c) X d) Y

P.T.O.



- 11) A half adder is a _____ circuit.
a) combinational b) sequential c) both a and b d) none
- 12) The code used for labelling the cells of a k map is
a) 8-4-2-1 binary b) hexadecimal
c) gray d) octal
- 13) The parity of the binary number 11011001 is
a) even b) odd c) unknown d) decimal
- 14) Change in state occurs during
a) pulse transition b) outputs c) clock pulse d) inputs
-



Seat No.	
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**S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2017
DIGITAL DESIGN**

Day and Date : Friday, 24-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

1) Realise and design circuit for the logic equation

a) $Y = \bar{A}. B + A. \bar{B}$

b) $Y = ABC + A\bar{B} + B\bar{C}$

2) Perform following arithmetics :

a) add 0101 and 1111

b) subtract 1011 – 0110

c) multiply 1001 by 1101

d) divide 1110101 by 1001

3) Define following characteristics of logic families.

a) Speed of operation

b) Figure of merit

4) Minimize the four variable logic function using k-map.

$$f(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$$

5) Explain race around condition of SR flip flop and state solution to overcome it.

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

1) Explain working of master-slave J-K flip flop using NAND gate.

2) Design 32 : 1 multiplexer using two 16 : 1 multiplexer and OR gate along with its truth table.

3) Design gray to binary code converter using k-map and ExOR gate.

Set P



SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Explain any four specifications of digital to analog converters.
 - 2) Describe working of half adder circuit with its truth table.
 - 3) Draw and explain working of Bipolar RAM cell.
 - 4) Define modulus of the counter and differentiate between synchronous and asynchronous counter.
 - 5) Solve following :
 - a) $(3F)_{16} - (5C)_{16}$
 - b) $(23)_8 + (67)_8$
5. Attempt **any two** questions : **(6×2=12)**
- 1) Explain working of successive approximation method for AID conversion with neat figure.
 - 2) Draw and explain working of full adder logic design with truth table.
 - 3) Design divide by 5 ripple counter using flip flop. Also show its timing waveform for Q outputs.
-



SLR-TJ – 411

Seat No.	
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Set	Q
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**S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2017
DIGITAL DESIGN**

Day and Date : Friday, 24-11-2017
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) A latch is _____ sensitive.
a) both level and edge b) edge
c) level d) none
- 2) _____ logic family provide maximum power dissipation.
a) TTL b) CMOS c) ECL d) JFET
- 3) $X + X.Y = ?$
a) 1 b) 0 c) X d) Y
- 4) A half adder is a _____ circuit.
a) combinational b) sequential c) both a and b d) none
- 5) The code used for labelling the cells of a k map is
a) 8-4-2-1 binary b) hexadecimal
c) gray d) octal
- 6) The parity of the binary number 11011001 is
a) even b) odd c) unknown d) decimal
- 7) Change in state occurs during
a) pulse transition b) outputs c) clock pulse d) inputs
- 8) A positive AND gate is also negative
a) NAND gate b) NOR gate c) AND gate d) OR gate

P.T.O.



- 9) Two cross coupled NAND gates make
- a) SR latch
 - b) RS flip flop
 - c) D flip flop
 - d) Master slave flip flop
- 10) A five variable k-map needs _____ squares.
- a) 32
 - b) 33
 - c) 34
 - d) 35
- 11) Addition of –6 and – 13 is
- a) 11101101
 - b) 11101010
 - c) 11101110
 - d) 11111010
- 12) Gray to binary conversion can be implemented with
- a) AND
 - b) XOR
 - c) NAND
 - d) NOR
- 13) One input NOR and NAND gate behaves like a
- a) converter
 - b) inverter
 - c) reflector
 - d) differentiator
- 14) Which of the following is minimum error code ?
- a) octal
 - b) gray
 - c) binary
 - d) excess 3
-



Seat No.	
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**S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2017
DIGITAL DESIGN**

Day and Date : Friday, 24-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

1) Realise and design circuit for the logic equation

a) $Y = \bar{A}. B + A. \bar{B}$

b) $Y = ABC + A\bar{B} + B\bar{C}$

2) Perform following arithmetics :

a) add 0101 and 1111

b) subtract 1011 – 0110

c) multiply 1001 by 1101

d) divide 1110101 by 1001

3) Define following characteristics of logic families.

a) Speed of operation

b) Figure of merit

4) Minimize the four variable logic function using k-map.

$$f(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$$

5) Explain race around condition of SR flip flop and state solution to overcome it.

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

1) Explain working of master-slave J-K flip flop using NAND gate.

2) Design 32 : 1 multiplexer using two 16 : 1 multiplexer and OR gate along with its truth table.

3) Design gray to binary code converter using k-map and ExOR gate.

Set Q



SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Explain any four specifications of digital to analog converters.
 - 2) Describe working of half adder circuit with its truth table.
 - 3) Draw and explain working of Bipolar RAM cell.
 - 4) Define modulus of the counter and differentiate between synchronous and asynchronous counter.
 - 5) Solve following :
 - a) $(3F)_{16} - (5C)_{16}$
 - b) $(23)_8 + (67)_8$
5. Attempt **any two** questions : **(6×2=12)**
- 1) Explain working of successive approximation method for A/D conversion with neat figure.
 - 2) Draw and explain working of full adder logic design with truth table.
 - 3) Design divide by 5 ripple counter using flip flop. Also show its timing waveform for Q outputs.
-



SLR-TJ – 411

Seat
No.

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Set

R

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

Day and Date : Friday, 24-11-2017

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

(14×1=14)

1. Choose the correct answer.

- 1) Gray to binary conversion can be implemented with
 - a) AND
 - b) XOR
 - c) NAND
 - d) NOR
- 2) One input NOR and NAND gate behaves like a
 - a) converter
 - b) inverter
 - c) reflector
 - d) differentiator
- 3) Which of the following is minimum error code ?
 - a) octal
 - b) gray
 - c) binary
 - d) excess 3
- 4) A latch is _____ sensitive.
 - a) both level and edge
 - b) edge
 - c) level
 - d) none
- 5) _____ logic family provide maximum power dissipation.
 - a) TTL
 - b) CMOS
 - c) ECL
 - d) JFET
- 6) $X + X.Y = ?$
 - a) 1
 - b) 0
 - c) X
 - d) Y
- 7) A half adder is a _____ circuit.
 - a) combinational
 - b) sequential
 - c) both a and b
 - d) none
- 8) The code used for labelling the cells of a k map is
 - a) 8-4-2-1 binary
 - b) hexadecimal
 - c) gray
 - d) octal

P.T.O.



- 9) The parity of the binary number 11011001 is
a) even b) odd c) unknown d) decimal
- 10) Change in state occurs during
a) pulse transition b) outputs c) clock pulse d) inputs
- 11) A positive AND gate is also negative
a) NAND gate b) NOR gate c) AND gate d) OR gate
- 12) Two cross coupled NAND gates make
a) SR latch b) RS flip flop
c) D flip flop d) Master slave flip flop
- 13) A five variable k-map needs _____ squares.
a) 32 b) 33 c) 34 d) 35
- 14) Addition of -6 and -13 is
a) 11101101 b) 11101010 c) 11101110 d) 11111010
-



Seat No.	
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**S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2017
DIGITAL DESIGN**

Day and Date : Friday, 24-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

1) Realise and design circuit for the logic equation

a) $Y = \bar{A}. B + A. \bar{B}$

b) $Y = ABC + A\bar{B} + B\bar{C}$

2) Perform following arithmetics :

a) add 0101 and 1111

b) subtract 1011 – 0110

c) multiply 1001 by 1101

d) divide 1110101 by 1001

3) Define following characteristics of logic families.

a) Speed of operation

b) Figure of merit

4) Minimize the four variable logic function using k-map.

$$f(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$$

5) Explain race around condition of SR flip flop and state solution to overcome it.

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

1) Explain working of master-slave J-K flip flop using NAND gate.

2) Design 32 : 1 multiplexer using two 16 : 1 multiplexer and OR gate along with its truth table.

3) Design gray to binary code converter using k-map and ExOR gate.

Set R



SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Explain any four specifications of digital to analog converters.
 - 2) Describe working of half adder circuit with its truth table.
 - 3) Draw and explain working of Bipolar RAM cell.
 - 4) Define modulus of the counter and differentiate between synchronous and asynchronous counter.
 - 5) Solve following :
 - a) $(3F)_{16} - (5C)_{16}$
 - b) $(23)_8 + (67)_8$
5. Attempt **any two** questions : **(6×2=12)**
- 1) Explain working of successive approximation method for AID conversion with neat figure.
 - 2) Draw and explain working of full adder logic design with truth table.
 - 3) Design divide by 5 ripple counter using flip flop. Also show its timing waveform for Q outputs.
-



SLR-TJ – 411

Seat
No.

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Set

S

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

Day and Date : Friday, 24-11-2017

Max. Marks : 70

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

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer.

(14×1=14)

1) $X + X.Y = ?$

- a) 1 b) 0 c) X d) Y

2) A half adder is a _____ circuit.

- a) combinational b) sequential c) both a and b d) none

3) The code used for labelling the cells of a k map is

- a) 8-4-2-1 binary b) hexadecimal
c) gray d) octal

4) The parity of the binary number 11011001 is

- a) even b) odd c) unknown d) decimal

5) Change in state occurs during

- a) pulse transition b) outputs c) clock pulse d) inputs

6) A positive AND gate is also negative

- a) NAND gate b) NOR gate c) AND gate d) OR gate

7) Two cross coupled NAND gates make

- a) SR latch b) RS flip flop
c) D flip flop d) Master slave flip flop

8) A five variable k-map needs _____ squares.

- a) 32 b) 33 c) 34 d) 35

P.T.O.



- 9) Addition of -6 and -13 is
a) 11101101 b) 11101010 c) 11101110 d) 11111010
- 10) Gray to binary conversion can be implemented with
a) AND b) XOR c) NAND d) NOR
- 11) One input NOR and NAND gate behaves like a
a) converter b) inverter c) reflector d) differentiator
- 12) Which of the following is minimum error code ?
a) octal b) gray c) binary d) excess 3
- 13) A latch is _____ sensitive.
a) both level and edge b) edge
c) level d) none
- 14) _____ logic family provide maximum power dissipation.
a) TTL b) CMOS c) ECL d) JFET
-



Seat No.	
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**S.E. (Part – II) (Biomedical Engg.) (CGPA) Examination, 2017
DIGITAL DESIGN**

Day and Date : Friday, 24-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

1) Realise and design circuit for the logic equation

a) $Y = \bar{A}. B + A. \bar{B}$

b) $Y = ABC + A\bar{B} + B\bar{C}$

2) Perform following arithmetics :

a) add 0101 and 1111

b) subtract 1011 – 0110

c) multiply 1001 by 1101

d) divide 1110101 by 1001

3) Define following characteristics of logic families.

a) Speed of operation

b) Figure of merit

4) Minimize the four variable logic function using k-map.

$$f(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$$

5) Explain race around condition of SR flip flop and state solution to overcome it.

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

1) Explain working of master-slave J-K flip flop using NAND gate.

2) Design 32 : 1 multiplexer using two 16 : 1 multiplexer and OR gate along with its truth table.

3) Design gray to binary code converter using k-map and ExOR gate.

Set S



SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Explain any four specifications of digital to analog converters.
 - 2) Describe working of half adder circuit with its truth table.
 - 3) Draw and explain working of Bipolar RAM cell.
 - 4) Define modulus of the counter and differentiate between synchronous and asynchronous counter.
 - 5) Solve following :
 - a) $(3F)_{16} - (5C)_{16}$
 - b) $(23)_8 + (67)_8$
5. Attempt **any two** questions : **(6×2=12)**
- 1) Explain working of successive approximation method for A/D conversion with neat figure.
 - 2) Draw and explain working of full adder logic design with truth table.
 - 3) Design divide by 5 ripple counter using flip flop. Also show its timing waveform for Q outputs.
-



SLR-TJ – 412

Seat No.	
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Set

P

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

Day and Date : Saturday, 25-11-2017
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 alternatives :

- 1) An amplifier is said to suffer from distortion when its output is
 - a) low
 - b) different from its input
 - c) noisy
 - d) larger than its input
- 2) If 2 stages of a cascaded amplifier have decibel gains of 60 and then overall gain is
 - a) 120
 - b) 1800
 - c) 2
 - d) 0.5
- 3) Wein bridge oscillator uses _____ feedback.
 - a) negative
 - b) positive
 - c) both
 - d) none
- 4) To generate 1 MHz signal, the most suitable circuit is _____ oscillator.
 - a) Wein bridge
 - b) Phase shift
 - c) Colpitt's
 - d) None
- 5) A transistor amplifier with 85% efficiency is likely to be _____ class.
 - a) A
 - b) B
 - c) C
 - d) AB
- 6) Current mirror is used to eliminate the _____ distortion.
 - a) cross
 - b) linear
 - c) push
 - d) crossover
- 7) The negative feedback in an amplifier
 - a) reduces the voltage gain
 - b) increase the voltage gain
 - c) doesn't effect the voltage gain
 - d) none

P.T.O.



- 8) Working of two class B amplifiers together is _____ operation.
a) Pull b) Push c) Push pull d) None of the above
- 9) The common mode gain of opamp is
a) very high b) very low c) unity d) none
- 10) If $A_{DM} = 3500$ and $A_{CM} = 0.35$, the CMRR is
a) 1225 b) 10,000 c) 80 dB d) a) and c)
- 11) The value of emitter capacitor CE in a multistage amplifier is about
a) $1\mu\text{F}$ b) 100pF c) $0.01\mu\text{F}$ d) $50\mu\text{F}$
- 12) Op-amps used as high and low pass filters circuit employ _____ configuration.
a) non inverting b) comparator c) open loop d) inverting
- 13) The output impedance of an ideal op-amp is
a) zero b) 50Ω c) 100Ω d) infinite
- 14) 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.
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Seat No.	
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II**

Day and Date : Saturday, 25-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

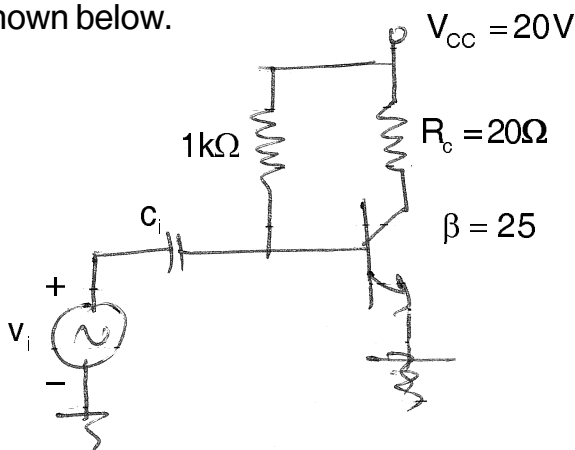
SECTION – I

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

- 1) State and prove Barkhausen's criteria for sustained oscillations.
- 2) Explain the advantages of class AB power amplifier over class B power amplifier with suitable waveform.
- 3) Calculate the efficiency of a class B amplifier for supply voltage of $V_{CC} = 24 V$ with peak voltage output of a) $V_{L(P)} = 22 V$ b) $V_{L(P)} = 6 V$.
- 4) Differentiate between various classes of amplifier based on operating cycle, position on Q point and efficiency.
- 5) Explain advantages and disadvantages of negative feedback on performance of amplifier.

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

- 1) Explain the working of Colpitt's oscillator with neat diagram, also derive expression for frequency of sustained oscillations.
- 2) Calculate input power, output power and efficiency of the amplifier circuit shown below.



- 3) Write a short note on :
- 1) Series-shunt configuration
 - 2) Shunt-series configuration
 - 3) Shunt-shunt configuration.

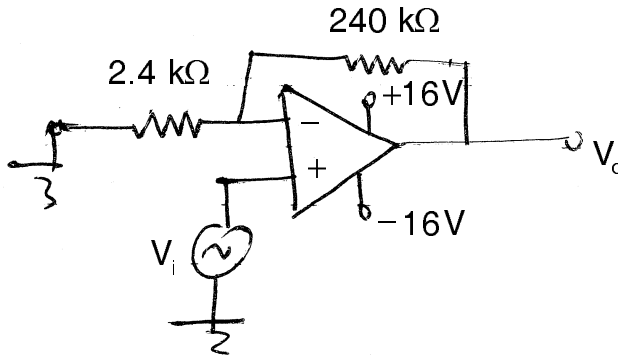


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

- 1) State and explain different characteristics of practical op-amp.
- 2) Draw block diagram of operational amplifier and explain each block in short.
- 3) Calculate the output voltage for given circuit for an input of $120 \mu\text{V}$.

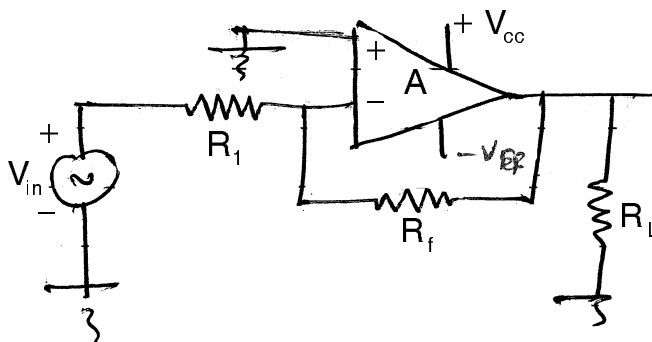


- 4) Differentiate between designing of instrumentation amplifier and its parameter for ECG, EMG and EEG filters.
- 5) Explain concept of virtual ground in op-amp.

5. Attempt **any 2** questions :

(6×2=12)

- 1) With help of circuit diagram and waveforms explain working of integrator and differentiator circuit using op-amp circuit.
- 2) Explain working of Schmitt trigger circuit using neat circuit and waveform diagram.
- 3) For the inverting amplifier shown below $R_1 = 470 \Omega$, $R_f = 4.7 \text{ k}\Omega$. Calculate values of A_F , R_{iF} , R_{oF} , F_F .





SLR-TJ – 412

Seat No.	
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Set

Q

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

Day and Date : Saturday, 25-11-2017
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 alternatives :

- 1) Working of two class B amplifiers together is _____ operation.
a) Pull b) Push c) Push pull d) None of the above
- 2) The common mode gain of opamp is
a) very high b) very low c) unity d) none
- 3) If $A_{DM} = 3500$ and $A_{CM} = 0.35$, the CMRR is
a) 1225 b) 10,000 c) 80 dB d) a) and c)
- 4) The value of emitter capacitor CE in a multistage amplifier is about
a) $1\mu F$ b) 100 pF c) $0.01\mu F$ d) $50\mu F$
- 5) Op-amps used as high and low pass filters circuit employ _____ configuration.
a) non inverting b) comparator c) open loop d) inverting
- 6) The output impedance of an ideal op-amp is
a) zero b) 50Ω c) 100Ω d) infinite
- 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) An amplifier is said to suffer from distortion when its output is
a) low b) different from its input
c) noisy d) larger than its input

P.T.O.



- 9) If 2 stages of a cascaded amplifier have decibel gains of 60 and then overall gain is
a) 120 b) 1800 c) 2 d) 0.5
- 10) Wein bridge oscillator uses _____ feedback.
a) negative b) positive c) both d) none
- 11) To generate 1 MHz signal, the most suitable circuit is _____ oscillator.
a) Wein bridge b) Phase shift c) Colpitt's d) None
- 12) A transistor amplifier with 85% efficiency is likely to be _____ class.
a) A b) B c) C d) AB
- 13) Current mirror is used to eliminate the _____ distortion.
a) cross b) linear c) push d) crossover
- 14) The negative feedback in an amplifier
a) reduces the voltage gain b) increase the voltage gain
c) doesn't effect the voltage gain d) none
-



Seat No.	
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II**

Day and Date : Saturday, 25-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

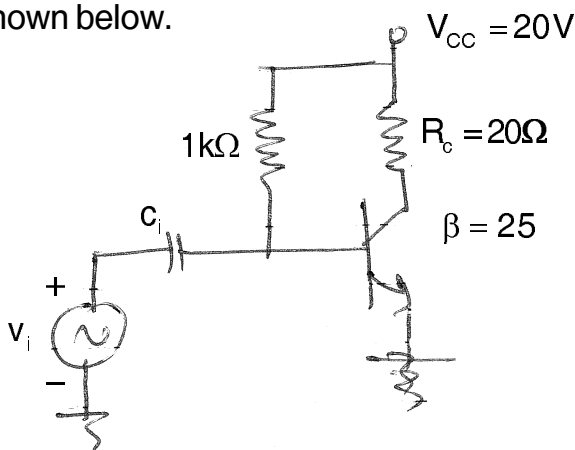
SECTION – I

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

- 1) State and prove Barkhausen's criteria for sustained oscillations.
- 2) Explain the advantages of class AB power amplifier over class B power amplifier with suitable waveform.
- 3) Calculate the efficiency of a class B amplifier for supply voltage of $V_{CC} = 24 V$ with peak voltage output of a) $V_{L(P)} = 22 V$ b) $V_{L(P)} = 6 V$.
- 4) Differentiate between various classes of amplifier based on operating cycle, position on Q point and efficiency.
- 5) Explain advantages and disadvantages of negative feedback on performance of amplifier.

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

- 1) Explain the working of Colpitt's oscillator with neat diagram, also derive expression for frequency of sustained oscillations.
- 2) Calculate input power, output power and efficiency of the amplifier circuit shown below.



- 3) Write a short note on :
- 1) Series-shunt configuration
 - 2) Shunt-series configuration
 - 3) Shunt-shunt configuration.

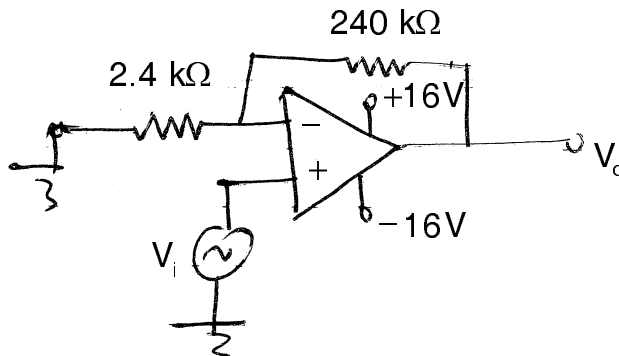


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

- 1) State and explain different characteristics of practical op-amp.
- 2) Draw block diagram of operational amplifier and explain each block in short.
- 3) Calculate the output voltage for given circuit for an input of $120 \mu\text{V}$.

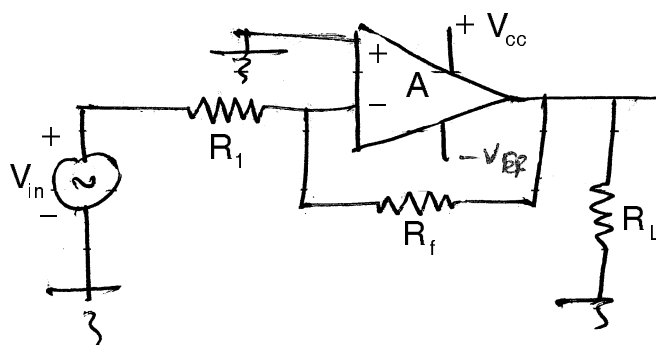


- 4) Differentiate between designing of instrumentation amplifier and its parameter for ECG, EMG and EEG filters.
- 5) Explain concept of virtual ground in op-amp.

5. Attempt **any 2** questions :

(6×2=12)

- 1) With help of circuit diagram and waveforms explain working of integrator and differentiator circuit using op-amp circuit.
- 2) Explain working of Schmitt trigger circuit using neat circuit and waveform diagram.
- 3) For the inverting amplifier shown below $R_1 = 470 \Omega$, $R_f = 4.7 \text{ k}\Omega$. Calculate values of A_F , R_{iF} , R_{oF} , F_F .





SLR-TJ – 412

Seat No.	
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Set **R**

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

Day and Date : Saturday, 25-11-2017
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 alternatives :

- 1) A transistor amplifier with 85% efficiency is likely to be _____ class.
a) A b) B c) C d) AB
- 2) Current mirror is used to eliminate the _____ distortion.
a) cross b) linear c) push d) crossover
- 3) The negative feedback in an amplifier
a) reduces the voltage gain b) increase the voltage gain
c) doesn't effect the voltage gain d) none
- 4) Working of two class B amplifiers together is _____ operation.
a) Pull b) Push c) Push pull d) None of the above
- 5) The common mode gain of opamp is
a) very high b) very low c) unity d) none
- 6) If $A_{DM} = 3500$ and $A_{CM} = 0.35$, the CMRR is
a) 1225 b) 10,000 c) 80 dB d) a) and c)
- 7) The value of emitter capacitor CE in a multistage amplifier is about
a) $1\mu F$ b) 100 pF c) $0.01\mu F$ d) $50\mu F$
- 8) Op-amps used as high and low pass filters circuit employ _____ configuration.
a) non inverting b) comparator c) open loop d) inverting

P.T.O.



- 9) The output impedance of an ideal op-amp is
a) zero b) 50Ω c) 100Ω d) infinite
- 10) 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.
- 11) An amplifier is said to suffer from distortion when its output is
a) low b) different from its input
c) noisy d) larger than its input
- 12) If 2 stages of a cascaded amplifier have decibel gains of 60 and then overall gain is
a) 120 b) 1800 c) 2 d) 0.5
- 13) Wein bridge oscillator uses _____ feedback.
a) negative b) positive c) both d) none
- 14) To generate 1 MHz signal, the most suitable circuit is _____ oscillator.
a) Wein bridge b) Phase shift c) Colpitt's d) None
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Seat No.	
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II**

Day and Date : Saturday, 25-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

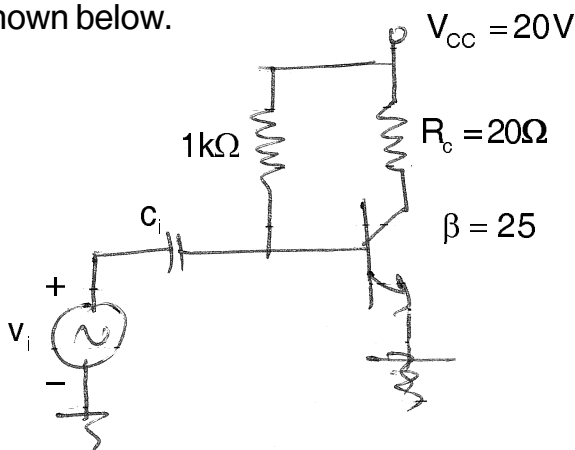
SECTION – I

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

- 1) State and prove Barkhausen's criteria for sustained oscillations.
- 2) Explain the advantages of class AB power amplifier over class B power amplifier with suitable waveform.
- 3) Calculate the efficiency of a class B amplifier for supply voltage of $V_{CC} = 24 V$ with peak voltage output of a) $V_{L(P)} = 22 V$ b) $V_{L(P)} = 6 V$.
- 4) Differentiate between various classes of amplifier based on operating cycle, position on Q point and efficiency.
- 5) Explain advantages and disadvantages of negative feedback on performance of amplifier.

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

- 1) Explain the working of Colpitt's oscillator with neat diagram, also derive expression for frequency of sustained oscillations.
- 2) Calculate input power, output power and efficiency of the amplifier circuit shown below.



- 3) Write a short note on :
- 1) Series-shunt configuration
 - 2) Shunt-series configuration
 - 3) Shunt-shunt configuration.

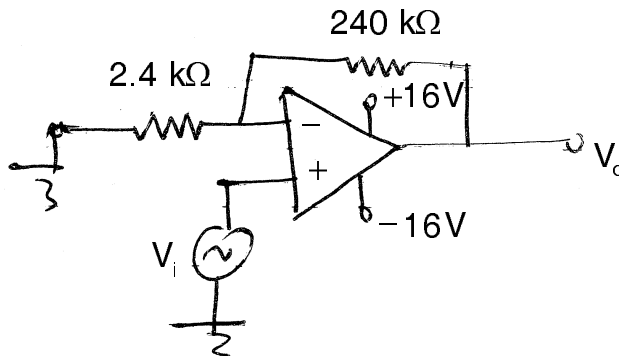


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

- 1) State and explain different characteristics of practical op-amp.
- 2) Draw block diagram of operational amplifier and explain each block in short.
- 3) Calculate the output voltage for given circuit for an input of $120 \mu\text{V}$.

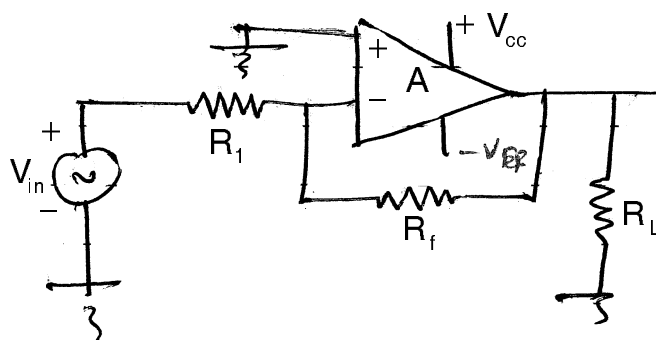


- 4) Differentiate between designing of instrumentation amplifier and its parameter for ECG, EMG and EEG filters.
- 5) Explain concept of virtual ground in op-amp.

5. Attempt **any 2** questions :

(6×2=12)

- 1) With help of circuit diagram and waveforms explain working of integrator and differentiator circuit using op-amp circuit.
- 2) Explain working of Schmitt trigger circuit using neat circuit and waveform diagram.
- 3) For the inverting amplifier shown below $R_1 = 470 \Omega$, $R_f = 4.7 \text{ k}\Omega$. Calculate values of A_F , R_{iF} , R_{oF} , F_F .





SLR-TJ – 412

Seat No.	
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S

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

Day and Date : Saturday, 25-11-2017
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 alternatives :

- 1) If $A_{DM} = 3500$ and $A_{CM} = 0.35$, the CMRR is
a) 1225 b) 10,000 c) 80 dB d) a) and c)
- 2) The value of emitter capacitor CE in a multistage amplifier is about
a) $1\mu F$ b) 100 pF c) $0.01\mu F$ d) $50\mu F$
- 3) Op-amps used as high and low pass filters circuit employ _____ configuration.
a) non inverting b) comparator c) open loop d) inverting
- 4) The output impedance of an ideal op-amp is
a) zero b) 50Ω c) 100Ω d) infinite
- 5) 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.
- 6) An amplifier is said to suffer from distortion when its output is
a) low b) different from its input
c) noisy d) larger than its input
- 7) If 2 stages of a cascaded amplifier have decibel gains of 60 and then overall gain is
a) 120 b) 1800 c) 2 d) 0.5

P.T.O.



- 8) Wein bridge oscillator uses _____ feedback.
a) negative b) positive c) both d) none
- 9) To generate 1 MHz signal, the most suitable circuit is _____ oscillator.
a) Wein bridge b) Phase shift c) Colpitt's d) None
- 10) A transistor amplifier with 85% efficiency is likely to be _____ class.
a) A b) B c) C d) AB
- 11) Current mirror is used to eliminate the _____ distortion.
a) cross b) linear c) push d) crossover
- 12) The negative feedback in an amplifier
a) reduces the voltage gain b) increase the voltage gain
c) doesn't effect the voltage gain d) none
- 13) Working of two class B amplifiers together is _____ operation.
a) Pull b) Push c) Push pull d) None of the above
- 14) The common mode gain of opamp is
a) very high b) very low c) unity d) none
-



Seat No.	
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**S.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN – II**

Day and Date : Saturday, 25-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

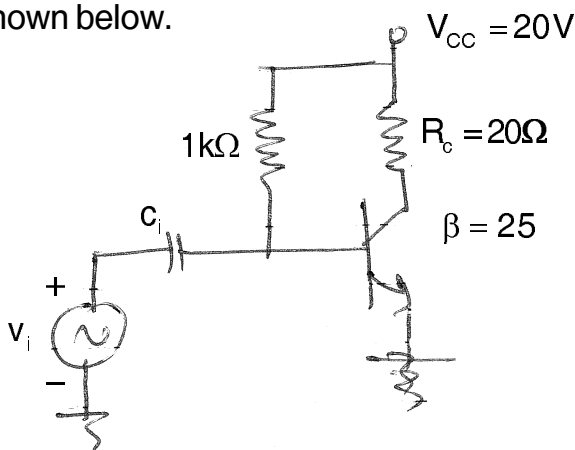
SECTION – I

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

- 1) State and prove Barkhausen's criteria for sustained oscillations.
- 2) Explain the advantages of class AB power amplifier over class B power amplifier with suitable waveform.
- 3) Calculate the efficiency of a class B amplifier for supply voltage of $V_{CC} = 24 V$ with peak voltage output of a) $V_{L(P)} = 22 V$ b) $V_{L(P)} = 6 V$.
- 4) Differentiate between various classes of amplifier based on operating cycle, position on Q point and efficiency.
- 5) Explain advantages and disadvantages of negative feedback on performance of amplifier.

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

- 1) Explain the working of Colpitt's oscillator with neat diagram, also derive expression for frequency of sustained oscillations.
- 2) Calculate input power, output power and efficiency of the amplifier circuit shown below.



- 3) Write a short note on :
- 1) Series-shunt configuration
 - 2) Shunt-series configuration
 - 3) Shunt-shunt configuration.

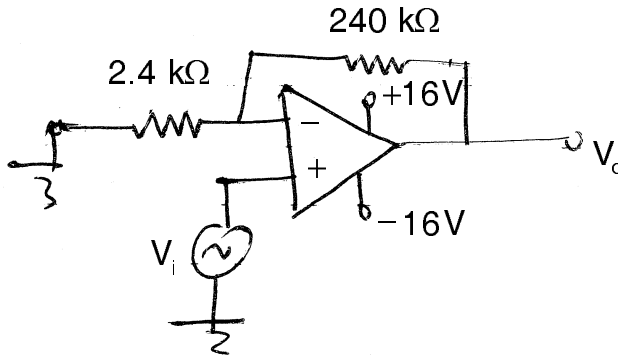


SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

- 1) State and explain different characteristics of practical op-amp.
- 2) Draw block diagram of operational amplifier and explain each block in short.
- 3) Calculate the output voltage for given circuit for an input of $120 \mu\text{V}$.

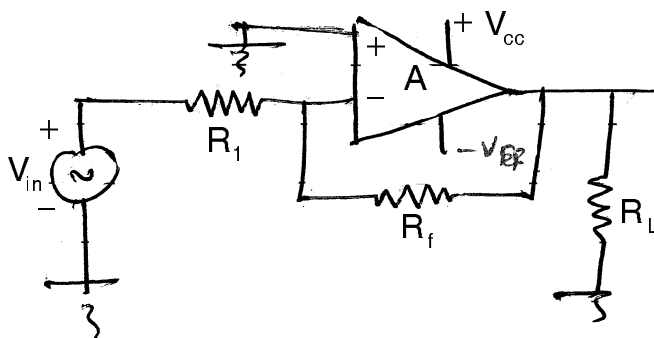


- 4) Differentiate between designing of instrumentation amplifier and its parameter for ECG, EMG and EEG filters.
- 5) Explain concept of virtual ground in op-amp.

5. Attempt **any 2** questions :

(6×2=12)

- 1) With help of circuit diagram and waveforms explain working of integrator and differentiator circuit using op-amp circuit.
- 2) Explain working of Schmitt trigger circuit using neat circuit and waveform diagram.
- 3) For the inverting amplifier shown below $R_1 = 470 \Omega$, $R_f = 4.7 \text{ k}\Omega$. Calculate values of A_F , R_{iF} , R_{oF} , F_F .





SLR-TJ – 413

Seat No.	
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T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I

Day and Date : Wednesday, 29-11-2017

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.**
3) Figures to the **right** indicate **full** marks.
4) **Assume** suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

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

- 1) _____ are optical systems that provide better isolation of spectral energy than optical filters.
a) Lens
b) Monochromators
c) Gratings
d) Collimators
- 2) A colorimetric determination measure energetic spectrum ranges from _____ nm.
a) 400-700 b) 1000-2300 c) 500-750 d) 250-550
- 3) A normal Ph of the extracellular fluid lies in the range of _____
a) 7 – 9 b) 7.5 – 8.5 c) 6 – 7.5 d) 7.35 – 7.45
- 4) The glass electrode exhibits a _____ electrical resistance in the range of 100 – 1000 M Ohm.
a) High b) Low c) Light d) Moderate
- 5) The partial pressure in the _____ indicated the extent of oxygen exchange between the lungs and the blood.
a) WBC b) RBC c) Insulin d) Plasma
- 6) _____ conduction is the transmission of sound through the external and middle wear to the internal ear.
a) Bone b) Air c) Muscle d) Hearing

P.T.O.



- 7) A pure tone audiometer consist of an _____ for having a precise control on the frequency of oscillations.
- a) Amplifier b) Filter c) Oscillator d) Audio amplifier
- 8) The _____ provides a positive force for transporting respiratory gases into an apneic patient.
- a) Spirometer b) Blood gas analyzer
c) Oxygenators d) Ventilator
- 9) The main function of a ventilator is to ventilate _____ in a manner as close as natural respiration.
- a) Heart b) Thoracic cavity
c) Lungs d) Cavity
- 10) _____ noise is a noise containing all frequencies in the audible spectrum at approximately equal intensities.
- 11) A _____ is an instrument that isolates monochromatic radiation in efficient manner than photometers.
- a) Flame photo meter b) Colorimeter
c) ELISA d) Spectrophotometer
- 12) Pulse oximetry is based upon the arterial oxygen _____ determinations using 2 wavelengths.
- a) Collection b) Deposition
c) Saturation d) Reduction
- 13) Doppler shift is a non invasive technique to measure blood _____ in a vessel.
- a) Velocity b) Acceleration
c) Viscosity d) Volume
- 14) The presence of indicator in the peripheral artery is detected by a _____ transducer.
- a) Photoelectric b) Photovoltaic
c) Photo emissive d) Photodiode
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Wednesday, 29-11-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) State and explain Beer Lambert's law.
 - 2) Draw and explain schematic diagram and working of colorimeter.
 - 3) Draw and explain working of any one type of blood cell counter.
 - 4) Explain working of spectrophotometer. Mention its any 2 applications.
 - 5) Explain the principle and working of ELISA reader machine.
3. Attempt **any 2** questions : **(6×2=12)**
- 1) Explain the working of complete blood gas analyzer.
 - 2) Draw and explain working of electromagnetic blood flow meter.
 - 3) Explain working of impedance plethysmography with necessary diagram.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the principle of pulse oximetry.
 - 2) Define various lung volume and capacities with necessary diagram.
 - 3) Explain the concept of masking in audiometry.
 - 4) List and explain various modes of ventilator.
 - 5) Explain various transducers used in audiometry.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Draw and explain working of anesthesia machine in short.
 - 2) Explain working of evoked response audiometry.
 - 3) Explain working of pulmonary function analyzer.



SLR-TJ – 413

Seat No.	
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Set	Q
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Wednesday, 29-11-2017
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) Figures to the **right** indicate **full** marks.
4) **Assume** suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**
- 1) The _____ provides a positive force for transporting respiratory gases into an apneic patient.
a) Spirometer
b) Blood gas analyzer
c) Oxygenators
d) Ventilator
 - 2) The main function of a ventilator is to ventilate _____ in a manner as close as natural respiration.
a) Heart
b) Thoracic cavity
c) Lungs
d) Cavity
 - 3) _____ noise is a noise containing all frequencies in the audible spectrum at approximately equal intensities.
 - 4) A _____ is an instrument that isolates monochromatic radiation in efficient manner than photometers.
a) Flame photo meter
b) Colorimeter
c) ELISA
d) Spectrophotometer
 - 5) Pulse oximetry is based upon the arterial oxygen _____ determinations using 2 wavelengths.
a) Collection
b) Deposition
c) Saturation
d) Reduction

P.T.O.



- 6) Doppler shift is a non invasive technique to measure blood _____ in a vessel.
- a) Velocity b) Acceleration
c) Viscosity d) Volume
- 7) The presence of indicator in the peripheral artery is detected by a _____ transducer.
- a) Photoelectric b) Photovoltaic
c) Photo emissive d) Photodiode
- 8) _____ are optical systems that provide better isolation of spectral energy than optical filters.
- a) Lens b) Monochromators
c) Gratings d) Collimators
- 9) A colorimetric determination measure energetic spectrum ranges from _____ nm.
- a) 400-700 b) 1000-2300 c) 500-750 d) 250-550
- 10) A normal Ph of the extracellular fluid lies in the range of _____
- a) 7 – 9 b) 7.5 – 8.5 c) 6 – 7.5 d) 7.35 – 7.45
- 11) The glass electrode exhibits a _____ electrical resistance in the range of 100 – 1000 M Ohm.
- a) High b) Low c) Light d) Moderate
- 12) The partial pressure in the _____ indicated the extent of oxygen exchange between the lungs and the blood.
- a) WBC b) RBC c) Insulin d) Plasma
- 13) _____ conduction is the transmission of sound through the external and middle wear to the internal ear.
- a) Bone b) Air c) Muscle d) Hearing
- 14) A pure tone audiometer consist of an _____ for having a precise control on the frequency of oscillations.
- a) Amplifier b) Filter c) Oscillator d) Audio amplifier
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Wednesday, 29-11-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) State and explain Beer Lambert's law.
 - 2) Draw and explain schematic diagram and working of colorimeter.
 - 3) Draw and explain working of any one type of blood cell counter.
 - 4) Explain working of spectrophotometer. Mention its any 2 applications.
 - 5) Explain the principle and working of ELISA reader machine.
3. Attempt **any 2** questions : **(6×2=12)**
- 1) Explain the working of complete blood gas analyzer.
 - 2) Draw and explain working of electromagnetic blood flow meter.
 - 3) Explain working of impedance plethysmography with necessary diagram.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the principle of pulse oximetry.
 - 2) Define various lung volume and capacities with necessary diagram.
 - 3) Explain the concept of masking in audiometry.
 - 4) List and explain various modes of ventilator.
 - 5) Explain various transducers used in audiometry.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Draw and explain working of anesthesia machine in short.
 - 2) Explain working of evoked response audiometry.
 - 3) Explain working of pulmonary function analyzer.



SLR-TJ – 413

Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Wednesday, 29-11-2017
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) Figures to the **right** indicate **full** marks.
4) **Assume** suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**
- 1) The partial pressure in the _____ indicated the extent of oxygen exchange between the lungs and the blood.
a) WBC b) RBC c) Insulin d) Plasma
 - 2) _____ conduction is the transmission of sound through the external and middle ear to the internal ear.
a) Bone b) Air c) Muscle d) Hearing
 - 3) A pure tone audiometer consist of an _____ for having a precise control on the frequency of oscillations.
a) Amplifier b) Filter c) Oscillator d) Audio amplifier
 - 4) The _____ provides a positive force for transporting respiratory gases into an apneic patient.
a) Spirometer b) Blood gas analyzer
c) Oxygenators d) Ventilator
 - 5) The main function of a ventilator is to ventilate _____ in a manner as close as natural respiration.
a) Heart b) Thoracic cavity
c) Lungs d) Cavity

P.T.O.



- 6) _____ noise is a noise containing all frequencies in the audible spectrum at approximately equal intensities.
- 7) A _____ is an instrument that isolates monochromatic radiation in efficient manner than photometers.
- a) Flame photo meter b) Colorimeter
c) ELISA d) Spectrophotometer
- 8) Pulse oximetry is based upon the arterial oxygen _____ determinations using 2 wavelengths.
- a) Collection b) Deposition
c) Saturation d) Reduction
- 9) Doppler shift is a non invasive technique to measure blood _____ in a vessel.
- a) Velocity b) Acceleration
c) Viscosity d) Volume
- 10) The presence of indicator in the peripheral artery is detected by a _____ transducer.
- a) Photoelectric b) Photovoltaic
c) Photo emissive d) Photodiode
- 11) _____ are optical systems that provide better isolation of spectral energy than optical filters.
- a) Lens b) Monochromators
c) Gratings d) Collimators
- 12) A colorimetric determination measure energetic spectrum ranges from _____ nm.
- a) 400-700 b) 1000-2300 c) 500-750 d) 250-550
- 13) A normal Ph of the extracellular fluid lies in the range of _____
- a) 7 – 9 b) 7.5 – 8.5 c) 6 – 7.5 d) 7.35 – 7.45
- 14) The glass electrode exhibits a _____ electrical resistance in the range of 100 – 1000 M Ohm.
- a) High b) Low c) Light d) Moderate
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Wednesday, 29-11-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) State and explain Beer Lambert's law.
 - 2) Draw and explain schematic diagram and working of colorimeter.
 - 3) Draw and explain working of any one type of blood cell counter.
 - 4) Explain working of spectrophotometer. Mention its any 2 applications.
 - 5) Explain the principle and working of ELISA reader machine.
3. Attempt **any 2** questions : **(6×2=12)**
- 1) Explain the working of complete blood gas analyzer.
 - 2) Draw and explain working of electromagnetic blood flow meter.
 - 3) Explain working of impedance plethysmography with necessary diagram.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the principle of pulse oximetry.
 - 2) Define various lung volume and capacities with necessary diagram.
 - 3) Explain the concept of masking in audiometry.
 - 4) List and explain various modes of ventilator.
 - 5) Explain various transducers used in audiometry.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Draw and explain working of anesthesia machine in short.
 - 2) Explain working of evoked response audiometry.
 - 3) Explain working of pulmonary function analyzer.



SLR-TJ – 413

Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Wednesday, 29-11-2017
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) Figures to the **right** indicate **full** marks.
4) **Assume** suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**
- 1) _____ noise is a noise containing all frequencies in the audible spectrum at approximately equal intensities.
 - 2) A _____ is an instrument that isolates monochromatic radiation in efficient manner than photometers.
 - a) Flame photo meter
 - b) Colorimeter
 - c) ELISA
 - d) Spectrophotometer
 - 3) Pulse oximetry is based upon the arterial oxygen _____ determinations using 2 wavelengths.
 - a) Collection
 - b) Deposition
 - c) Saturation
 - d) Reduction
 - 4) Doppler shift is a non invasive technique to measure blood _____ in a vessel.
 - a) Velocity
 - b) Acceleration
 - c) Viscosity
 - d) Volume
 - 5) The presence of indicator in the peripheral artery is detected by a _____ transducer.
 - a) Photoelectric
 - b) Photovoltaic
 - c) Photo emissive
 - d) Photodiode

P.T.O.



- 6) _____ are optical systems that provide better isolation of spectral energy than optical filters.
- a) Lens
b) Monochromators
c) Gratings
d) Collimators
- 7) A colorimetric determination measure energetic spectrum ranges from _____ nm.
- a) 400-700
b) 1000-2300
c) 500-750
d) 250-550
- 8) A normal Ph of the extracellular fluid lies in the range of _____
- a) 7 – 9
b) 7.5 – 8.5
c) 6 – 7.5
d) 7.35 – 7.45
- 9) The glass electrode exhibits a _____ electrical resistance in the range of 100 – 1000 M Ohm.
- a) High
b) Low
c) Light
d) Moderate
- 10) The partial pressure in the _____ indicated the extent of oxygen exchange between the lungs and the blood.
- a) WBC
b) RBC
c) Insulin
d) Plasma
- 11) _____ conduction is the transmission of sound through the external and middle wear to the internal ear.
- a) Bone
b) Air
c) Muscle
d) Hearing
- 12) A pure tone audiometer consist of an _____ for having a precise control on the frequency of oscillations.
- a) Amplifier
b) Filter
c) Oscillator
d) Audio amplifier
- 13) The _____ provides a positive force for transporting respiratory gases into an apneic patient.
- a) Spirometer
b) Blood gas analyzer
c) Oxygenators
d) Ventilator
- 14) The main function of a ventilator is to ventilate _____ in a manner as close as natural respiration.
- a) Heart
b) Thoracic cavity
c) Lungs
d) Cavity
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – I**

Day and Date : Wednesday, 29-11-2017

Marks : 56

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

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

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) State and explain Beer Lambert's law.
 - 2) Draw and explain schematic diagram and working of colorimeter.
 - 3) Draw and explain working of any one type of blood cell counter.
 - 4) Explain working of spectrophotometer. Mention its any 2 applications.
 - 5) Explain the principle and working of ELISA reader machine.
3. Attempt **any 2** questions : **(6×2=12)**
- 1) Explain the working of complete blood gas analyzer.
 - 2) Draw and explain working of electromagnetic blood flow meter.
 - 3) Explain working of impedance plethysmography with necessary diagram.

SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the principle of pulse oximetry.
 - 2) Define various lung volume and capacities with necessary diagram.
 - 3) Explain the concept of masking in audiometry.
 - 4) List and explain various modes of ventilator.
 - 5) Explain various transducers used in audiometry.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Draw and explain working of anesthesia machine in short.
 - 2) Explain working of evoked response audiometry.
 - 3) Explain working of pulmonary function analyzer.



SLR-TJ – 414

Seat No.	
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELING AND SIMULATION**

Day and Date : Saturday, 2-12-2017
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 unit for the product from the Nernst equation.
a) mV b) mA c) Coulombs d) Ion/sec
- 2) _____ is the most important factor in setting the resting membrane potential.
a) K⁺ concentration gradient b) Cl⁻ ion concentration
c) Na⁺ permeability d) Active transport
- 3) Ciliary muscles of eye controls the
a) lens movement b) lens curvature and focal length
c) pupil d) retina
- 4) Regional temperature difference within an animal is obtained by
a) vasodilatation b) vasoconstriction
c) both a) and b) d) vasocirculation
- 5) Increase muscle contraction along with increase rate of heat production is called
a) shivering b) non shivering c) overlapping d) osmogenesis
- 6) _____ equation defines cell membrane current.
a) Nernst b) Donnan c) Goldman d) Cable
- 7) _____ occurs due to lack of dopamine.
a) stretch reflex b) shivering c) parkinson d) diffusion

P.T.O.



- 8) _____ relationship define relation between diffusion and drift.
a) Ohm's b) Faraday's c) Einstein d) Donnan
- 9) _____ are simplified representation of objects.
a) Images b) Models c) Simulation d) Validation
- 10) _____ transport induces conformational change in protein.
a) Simple diffusion b) Active transport
c) Faciliated diffusion d) Ion driven active transport
- 11) The fibers in muscle spindle
a) cannot contract
b) are innervated by gamma motor fibers
c) maintain tension on spindle receptor
d) b) and c)
- 12) An active transport occurs
a) into cell b) out of cell
c) both into and out of cell d) across cell
- 13) Goldman equation is also called as _____ equation.
a) constant field b) variable field
c) constant permeability d) none of above
- 14) Diffusion of ions always takes place from _____ to _____ concentrations.
a) Higher – Lower b) Lower – Higher
c) Higher – Stable d) Stable – Lower
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Seat No.	
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELING AND SIMULATION**

Day and Date : Saturday, 2-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Draw and explain electrical equivalent model of biological membrane in short.
- 2) Derive Nernst equation and mention its significance.
- 3) Define the term “Modeling” and list its various steps.
- 4) Derive Donnan’s equilibrium equation and mention its significance.
- 5) Describe modeling of cardiovascular system.

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

1) A squid Giant axon has following ratio of permeabilities and concentration :

Ion	Cytoplasm mM	ECF in mM	Permeability ratio
Na ⁺	50	400	0.05
K ⁺	400	30	1
Cl ⁻	51	550	0.55

Consider $\frac{KT}{q} = 25.3$ mV, calculate :

- a) Nernst potential for Na⁺ and K⁺ ions.
 - b) Membrane potential V_m for axon.
- 2) Describe Hudgkin-Huxlery conduction equation and mention its application.
- 3) Write a short note on :
- a) Goldman equation’s significance and expression.
 - b) Cable equation’s significance and expression.



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Draw and explain model of drug delivery system.
 - 2) Explain validity criteria for eye movement model.
 - 3) Explain the role of spindle receptor and golgi tendon organ in modeling of neuro muscular system.
 - 4) Describe thermoregulatory mechanism with necessary diagram.
 - 5) Write a note of symptoms and effects of Parkinson's syndrome.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Describe thermoregulatory plant model with neat diagram.
 - 2) Write a short note on :
 - a) Pharmacokinetics
 - b) Stretch reflex.
 - 3) Explain four types of eye movements and name the type of muscles responsible for eye movements.
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SLR-TJ – 414

Seat No.	
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Set	Q
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELING AND SIMULATION**

Day and Date : Saturday, 2-12-2017
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) _____ relationship define relation between diffusion and drift.
a) Ohm's b) Faraday's c) Einstein d) Donnan
- 2) _____ are simplified representation of objects.
a) Images b) Models c) Simulation d) Validation
- 3) _____ transport induces conformational change in protein.
a) Simple diffusion b) Active transport
c) Faciliated diffusion d) Ion driven active transport
- 4) The fibers in muscle spindle
a) cannot contract
b) are innervated by gamma motor fibers
c) maintain tension on spindle receptor
d) b) and c)
- 5) An active transport occurs
a) into cell b) out of cell
c) both into and out of cell d) across cell
- 6) Goldman equation is also called as _____ equation.
a) constant field b) variable field
c) constant permeability d) none of above

P.T.O.



- 7) Diffusion of ions always takes place from _____ to _____ concentrations.
- a) Higher – Lower
 - b) Lower – Higher
 - c) Higher – Stable
 - d) Stable – Lower
- 8) _____ is the unit for the product from the Nernst equation.
- a) mV
 - b) mA
 - c) Coulombs
 - d) Ion/sec
- 9) _____ is the most important factor in setting the resting membrane potential.
- a) K^+ concentration gradient
 - b) Cl^- ion concentration
 - c) Na^+ permeability
 - d) Active transport
- 10) Ciliary muscles of eye controls the
- a) lens movement
 - b) lens curvature and focal length
 - c) pupil
 - d) retina
- 11) Regional temperature difference within an animal is obtained by
- a) vasodilatation
 - b) vasoconstriction
 - c) both a) and b)
 - d) vasocirculation
- 12) Increase muscle contraction along with increase rate of heat production is called
- a) shivering
 - b) non shivering
 - c) overlapping
 - d) osmogenesis
- 13) _____ equation defines cell membrane current.
- a) Nernst
 - b) Donnan
 - c) Goldman
 - d) Cable
- 14) _____ occurs due to lack of dopamine.
- a) stretch reflex
 - b) shivering
 - c) parkinson
 - d) diffusion
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Seat No.	
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELING AND SIMULATION**

Day and Date : Saturday, 2-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Draw and explain electrical equivalent model of biological membrane in short.
- 2) Derive Nernst equation and mention its significance.
- 3) Define the term “Modeling” and list its various steps.
- 4) Derive Donnan’s equilibrium equation and mention its significance.
- 5) Describe modeling of cardiovascular system.

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

1) A squid Giant axon has following ratio of permeabilities and concentration :

Ion	Cytoplasm mM	ECF in mM	Permeability ratio
Na ⁺	50	400	0.05
K ⁺	400	30	1
Cl ⁻	51	550	0.55

Consider $\frac{KT}{q} = 25.3$ mV, calculate :

- a) Nernst potential for Na⁺ and K⁺ ions.
 - b) Membrane potential V_m for axon.
- 2) Describe Hodgkin-Huxley conduction equation and mention its application.
- 3) Write a short note on :
- a) Goldman equation’s significance and expression.
 - b) Cable equation’s significance and expression.



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Draw and explain model of drug delivery system.
 - 2) Explain validity criteria for eye movement model.
 - 3) Explain the role of spindle receptor and golgi tendon organ in modeling of neuro muscular system.
 - 4) Describe thermoregulatory mechanism with necessary diagram.
 - 5) Write a note of symptoms and effects of Parkinson's syndrome.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Describe thermoregulatory plant model with neat diagram.
 - 2) Write a short note on :
 - a) Pharmacokinetics
 - b) Stretch reflex.
 - 3) Explain four types of eye movements and name the type of muscles responsible for eye movements.
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SLR-TJ – 414

Seat No.	
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Set **R**

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

Day and Date : Saturday, 2-12-2017
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)**
- Increase muscle contraction along with increase rate of heat production is called
a) shivering b) non shivering c) overlapping d) osmogenesis
 - _____ equation defines cell membrane current.
a) Nernst b) Donnan c) Goldman d) Cable
 - _____ occurs due to lack of dopamine.
a) stretch reflex b) shivering c) parkinson d) diffusion
 - _____ relationship define relation between diffusion and drift.
a) Ohm's b) Faraday's c) Einstein d) Donnan
 - _____ are simplified representation of objects.
a) Images b) Models c) Simulation d) Validation
 - _____ transport induces conformational change in protein.
a) Simple diffusion b) Active transport
c) Faciliated diffusion d) Ion driven active transport
 - The fibers in muscle spindle
a) cannot contract
b) are innervated by gamma motor fibers
c) maintain tension on spindle receptor
d) b) and c)

P.T.O.



- 8) An active transport occurs
- a) into cell
 - b) out of cell
 - c) both into and out of cell
 - d) across cell
- 9) Goldman equation is also called as _____ equation.
- a) constant field
 - b) variable field
 - c) constant permeability
 - d) none of above
- 10) Diffusion of ions always takes place from _____ to _____ concentrations.
- a) Higher – Lower
 - b) Lower – Higher
 - c) Higher – Stable
 - d) Stable – Lower
- 11) _____ is the unit for the product from the Nernst equation.
- a) mV
 - b) mA
 - c) Coulombs
 - d) Ion/sec
- 12) _____ is the most important factor in setting the resting membrane potential.
- a) K^+ concentration gradient
 - b) Cl^- ion concentration
 - c) Na^+ permeability
 - d) Active transport
- 13) Ciliary muscles of eye controls the
- a) lens movement
 - b) lens curvature and focal length
 - c) pupil
 - d) retina
- 14) Regional temperature difference with in an animal is obtained by
- a) vasodilatation
 - b) vasoconstriction
 - c) both a) and b)
 - d) vasocirculation
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Seat No.	
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELING AND SIMULATION**

Day and Date : Saturday, 2-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Draw and explain electrical equivalent model of biological membrane in short.
- 2) Derive Nernst equation and mention its significance.
- 3) Define the term “Modeling” and list its various steps.
- 4) Derive Donnan’s equilibrium equation and mention its significance.
- 5) Describe modeling of cardiovascular system.

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

1) A squid Giant axon has following ratio of permeabilities and concentration :

Ion	Cytoplasm mM	ECF in mM	Permeability ratio
Na ⁺	50	400	0.05
K ⁺	400	30	1
Cl ⁻	51	550	0.55

Consider $\frac{KT}{q} = 25.3$ mV, calculate :

- a) Nernst potential for Na⁺ and K⁺ ions.
 - b) Membrane potential V_m for axon.
- 2) Describe Hodgkin-Huxley conduction equation and mention its application.
- 3) Write a short note on :
- a) Goldman equation’s significance and expression.
 - b) Cable equation’s significance and expression.



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Draw and explain model of drug delivery system.
 - 2) Explain validity criteria for eye movement model.
 - 3) Explain the role of spindle receptor and golgi tendon organ in modeling of neuro muscular system.
 - 4) Describe thermoregulatory mechanism with necessary diagram.
 - 5) Write a note of symptoms and effects of Parkinson's syndrome.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Describe thermoregulatory plant model with neat diagram.
 - 2) Write a short note on :
 - a) Pharmacokinetics
 - b) Stretch reflex.
 - 3) Explain four types of eye movements and name the type of muscles responsible for eye movements.
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SLR-TJ – 414

Seat No.	
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELING AND SIMULATION**

Day and Date : Saturday, 2-12-2017
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) _____ transport induces conformational change in protein.
 - a) Simple diffusion
 - b) Active transport
 - c) Facilitated diffusion
 - d) Ion driven active transport
- 2) The fibers in muscle spindle
 - a) cannot contract
 - b) are innervated by gamma motor fibers
 - c) maintain tension on spindle receptor
 - d) b) and c)
- 3) An active transport occurs
 - a) into cell
 - b) out of cell
 - c) both into and out of cell
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- 4) Goldman equation is also called as _____ equation.
 - a) constant field
 - b) variable field
 - c) constant permeability
 - d) none of above
- 5) Diffusion of ions always takes place from _____ to _____ concentrations.
 - a) Higher – Lower
 - b) Lower – Higher
 - c) Higher – Stable
 - d) Stable – Lower
- 6) _____ is the unit for the product from the Nernst equation.
 - a) mV
 - b) mA
 - c) Coulombs
 - d) Ion/sec

P.T.O.



- 7) _____ is the most important factor in setting the resting membrane potential.
- a) K^+ concentration gradient b) Cl^- ion concentration
c) Na^+ permeability d) Active transport
- 8) Ciliary muscles of eye controls the
- a) lens movement b) lens curvature and focal length
c) pupil d) retina
- 9) Regional temperature difference within an animal is obtained by
- a) vasodilatation b) vasoconstriction
c) both a) and b) d) vasocirculation
- 10) Increase muscle contraction along with increase rate of heat production is called
- a) shivering b) non shivering c) overlapping d) osmogenesis
- 11) _____ equation defines cell membrane current.
- a) Nernst b) Donnan c) Goldman d) Cable
- 12) _____ occurs due to lack of dopamine.
- a) stretch reflex b) shivering c) parkinson d) diffusion
- 13) _____ relationship define relation between diffusion and drift.
- a) Ohm's b) Faraday's c) Einstein d) Donnan
- 14) _____ are simplified representation of objects.
- a) Images b) Models c) Simulation d) Validation
-



Seat No.	
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**T.E. (Part – I) (Biomedical Engineering) (CGPA) Examination, 2017
BIOLOGICAL MODELING AND SIMULATION**

Day and Date : Saturday, 2-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Draw and explain electrical equivalent model of biological membrane in short.
- 2) Derive Nernst equation and mention its significance.
- 3) Define the term “Modeling” and list its various steps.
- 4) Derive Donnan’s equilibrium equation and mention its significance.
- 5) Describe modeling of cardiovascular system.

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

1) A squid Giant axon has following ratio of permeabilities and concentration :

Ion	Cytoplasm mM	ECF in mM	Permeability ratio
Na ⁺	50	400	0.05
K ⁺	400	30	1
Cl ⁻	51	550	0.55

Consider $\frac{KT}{q} = 25.3$ mV, calculate :

- a) Nernst potential for Na⁺ and K⁺ ions.
 - b) Membrane potential V_m for axon.
- 2) Describe Hudgkin-Huxlery conduction equation and mention its application.
- 3) Write a short note on :
- a) Goldman equation’s significance and expression.
 - b) Cable equation’s significance and expression.



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Draw and explain model of drug delivery system.
 - 2) Explain validity criteria for eye movement model.
 - 3) Explain the role of spindle receptor and golgi tendon organ in modeling of neuro muscular system.
 - 4) Describe thermoregulatory mechanism with necessary diagram.
 - 5) Write a note of symptoms and effects of Parkinson's syndrome.
5. Attempt **any 2** questions : **(6×2=12)**
- 1) Describe thermoregulatory plant model with neat diagram.
 - 2) Write a short note on :
 - a) Pharmacokinetics
 - b) Stretch reflex.
 - 3) Explain four types of eye movements and name the type of muscles responsible for eye movements.
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SLR-TJ – 415

Seat No.	
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Set	P
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Tuesday, 5-12-2017
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) Figures to the **right** indicate **full** marks.
4) Assume suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer.

14

- 1) Data can be written to it and it can be erased by exposing the silicon to ultraviolet light
 - a) RAM
 - b) ROM
 - c) EPROM
 - d) PROM
- 2) Registers B, C, D, E, H and L in INTEL 8085 A can hold _____ bit of data.
 - a) 8 bit
 - b) 4 bit
 - c) 2 bit
 - d) 16 bit
- 3) A PC in microprocessor
 - a) Counts the number of instructions executed at a time
 - b) Counts the number of the programs to run after starting
 - c) Counts the points to the next executable instruction
 - d) Points the present instruction being executed
- 4) The register which keeps track of the program execution and memory address of instruction which is currently being executed is _____ register.
 - a) Index
 - b) Memory address
 - c) Program counter
 - d) Instruction
- 5) The interrupt which can be temporarily ignored by the counter is known as _____ interrupt.
 - a) Vectored
 - b) Non-maskable
 - c) Maskable
 - d) Low priority

P.T.O.



Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Tuesday, 5-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Total 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) Explain the process of demultiplexing of the address and data lines in microprocessor.
 - 2) Explain the various EPROM programming methods.
 - 3) Write and explain at least four instructions related to interrupts.
 - 4) Classify and explain different semiconductor memories.
 - 5) Explain RST 7.5, RST 6.5, RST 5.5, TRAP, INTR.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain architecture of Intel 8085A.
 - 2) Explain interrupt structure of 8085 in detail.
 - 3) Write a short note on software interrupts.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain different data transfer techniques in 8051.
 - 2) What are different addressing techniques used in 8051 ?
 - 3) Draw and explain TCON register of microcontroller 8051.
 - 4) What is DPTR ? Explain with suitable example.
 - 5) Differentiate between memory mapped I/O and I/O mapped I/O.

Set P



5. Attempt **any 2** :

(6×2=12)

- 1) On the program given below comment the result after every instruction and also find the content in the accumulator.

```
ORG 0000H
MOV R5, #25H
MOV R7, #34H
MOV A, #0
ADD A, R5
ADD A, R7
ADD A, #12H
END
```

- 2) Write a short note on Special Function Registers (SFRs) of 8051.
- 3) Draw and explain interfacing diagram of DAC 0808 with 8051 microcontroller.
-



SLR-TJ – 415

Seat No.	
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Set	Q
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Tuesday, 5-12-2017
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.
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3) Figures to the **right** indicate **full** marks.
4) Assume suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer.

14

- 1) ACK indicates reception of _____ data.
a) Correct b) Incorrect c) Sufficient d) Insufficient
- 2) There are _____ address and data buses available in 8085 which are multiplexed in nature.
a) Two b) Three c) Eight d) Sixteen
- 3) Stack Pointer (SP) and Program Counter (PC) in 8085 are of _____ bits.
a) 8 b) 16 c) 32 d) 64
- 4) _____ signals are used to have access of processor and to initiate the DMA request.
a) I_O/M b) WAIT
c) ALE d) HOLD and HLDA
- 5) As compared to 16-bit microprocessor, 8 bit microprocessor are limited in
a) speed
b) directly addressable memory
c) data handling capacity
d) all of the above

P.T.O.



- 6) The maximum integer which can be stored on an 8-bit accumulator is
a) 2kB b) 200 c) 224 d) 255
- 7) INTEL 8085 A is _____ pin IC.
a) 8 b) 16 c) 32 d) 40
- 8) Data can be written to it and it can be erased by exposing the silicon to ultraviolet light
a) RAM b) ROM c) EPROM d) PROM
- 9) Registers B, C, D, E, H and L in INTEL 8085 A can hold _____ bit of data.
a) 8 bit b) 4 bit c) 2 bit d) 16 bit
- 10) A PC in microprocessor
a) Counts the number of instructions executed at a time
b) Counts the number of the programs to run after starting
c) Counts the points to the next executable instruction
d) Points the present instruction being executed
- 11) The register which keeps track of the program execution and memory address of instruction which is currently being executed is _____ register.
a) Index b) Memory address
c) Program counter d) Instruction
- 12) The interrupt which can be temporarily ignored by the counter is known as _____ interrupt.
a) Vectored b) Non-maskable
c) Maskable d) Low priority
- 13) An interrupt in which external device supplies its address as well as the interrupt request is known as _____ interrupt.
a) Vectored b) Non-maskable
c) Maskable d) Designated
- 14) _____ signal is used when a microprocessor wants to address the memory.
a) I_O/M b) Status signals
c) ALE d) HOLD and HLDA
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Tuesday, 5-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Total 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) Explain the process of demultiplexing of the address and data lines in microprocessor.
 - 2) Explain the various EPROM programming methods.
 - 3) Write and explain at least four instructions related to interrupts.
 - 4) Classify and explain different semiconductor memories.
 - 5) Explain RST 7.5, RST 6.5, RST 5.5, TRAP, INTR.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain architecture of Intel 8085A.
 - 2) Explain interrupt structure of 8085 in detail.
 - 3) Write a short note on software interrupts.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain different data transfer techniques in 8051.
 - 2) What are different addressing techniques used in 8051 ?
 - 3) Draw and explain TCON register of microcontroller 8051.
 - 4) What is DPTR ? Explain with suitable example.
 - 5) Differentiate between memory mapped I/O and I/O mapped I/O.

Set Q



5. Attempt **any 2** :

(6×2=12)

- 1) On the program given below comment the result after every instruction and also find the content in the accumulator.

```
ORG 0000H
MOV R5, #25H
MOV R7, #34H
MOV A, #0
ADD A, R5
ADD A, R7
ADD A, #12H
END
```

- 2) Write a short note on Special Function Registers (SFRs) of 8051.
- 3) Draw and explain interfacing diagram of DAC 0808 with 8051 microcontroller.
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SLR-TJ – 415

Seat No.	
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Set	R
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Tuesday, 5-12-2017
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) Figures to the **right** indicate **full** marks.
4) Assume suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer. **14**
- 1) The interrupt which can be temporarily ignored by the counter is known as _____ interrupt.
a) Vectored b) Non-maskable
c) Maskable d) Low priority
 - 2) An interrupt in which external device supplies its address as well as the interrupt request is known as _____ interrupt.
a) Vectored b) Non-maskable
c) Maskable d) Designated
 - 3) _____ signal is used when a microprocessor wants to address the memory.
a) I_O/M b) Status signals
c) ALE d) HOLD and HLDA
 - 4) ACK indicates reception of _____ data.
a) Correct b) Incorrect c) Sufficient d) Insufficient
 - 5) There are _____ address and data buses available in 8085 which are multiplexed in nature.
a) Two b) Three c) Eight d) Sixteen

P.T.O.



Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Tuesday, 5-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Total 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) Explain the process of demultiplexing of the address and data lines in microprocessor.
 - 2) Explain the various EPROM programming methods.
 - 3) Write and explain at least four instructions related to interrupts.
 - 4) Classify and explain different semiconductor memories.
 - 5) Explain RST 7.5, RST 6.5, RST 5.5, TRAP, INTR.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain architecture of Intel 8085A.
 - 2) Explain interrupt structure of 8085 in detail.
 - 3) Write a short note on software interrupts.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain different data transfer techniques in 8051.
 - 2) What are different addressing techniques used in 8051 ?
 - 3) Draw and explain TCON register of microcontroller 8051.
 - 4) What is DPTR ? Explain with suitable example.
 - 5) Differentiate between memory mapped I/O and I/O mapped I/O.

Set R



5. Attempt **any 2** :

(6×2=12)

- 1) On the program given below comment the result after every instruction and also find the content in the accumulator.

```
ORG 0000H
MOV R5, #25H
MOV R7, #34H
MOV A, #0
ADD A, R5
ADD A, R7
ADD A, #12H
END
```

- 2) Write a short note on Special Function Registers (SFRs) of 8051.
- 3) Draw and explain interfacing diagram of DAC 0808 with 8051 microcontroller.
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SLR-TJ – 415

Seat No.	
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Set	S
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Tuesday, 5-12-2017
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) Figures to the **right** indicate **full** marks.
4) Assume suitable data **wherever** required.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer. **14**
- 1) Stack Pointer (SP) and Program Counter (PC) in 8085 are of _____ bits.
a) 8 b) 16 c) 32 d) 64
 - 2) _____ signals are used to have access of processor and to initiate the DMA request.
a) I_O/M b) WAIT
c) ALE d) HOLD and HLDA
 - 3) As compared to 16-bit microprocessor, 8 bit microprocessor are limited in
a) speed
b) directly addressable memory
c) data handling capacity
d) all of the above
 - 4) The maximum integer which can be stored on an 8-bit accumulator is
a) 2kB b) 200 c) 224 d) 255
 - 5) INTEL 8085 A is _____ pin IC.
a) 8 b) 16 c) 32 d) 40

P.T.O.



- 6) Data can be written to it and it can be erased by exposing the silicon to ultraviolet light
- a) RAM b) ROM c) EPROM d) PROM
- 7) Registers B, C, D, E, H and L in INTEL 8085 A can hold _____ bit of data.
- a) 8 bit b) 4 bit c) 2 bit d) 16 bit
- 8) A PC in microprocessor
- a) Counts the number of instructions executed at a time
b) Counts the number of the programs to run after starting
c) Counts the points to the next executable instruction
d) Points the present instruction being executed
- 9) The register which keeps track of the program execution and memory address of instruction which is currently being executed is _____ register.
- a) Index b) Memory address
c) Program counter d) Instruction
- 10) The interrupt which can be temporarily ignored by the counter is known as _____ interrupt.
- a) Vectored b) Non-maskable
c) Maskable d) Low priority
- 11) An interrupt in which external device supplies its address as well as the interrupt request is known as _____ interrupt.
- a) Vectored b) Non-maskable
c) Maskable d) Designated
- 12) _____ signal is used when a microprocessor wants to address the memory.
- a) I_o/M b) Status signals
c) ALE d) HOLD and HLDA
- 13) ACK indicates reception of _____ data.
- a) Correct b) Incorrect
c) Sufficient d) Insufficient
- 14) There are _____ address and data buses available in 8085 which are multiplexed in nature.
- a) Two b) Three
c) Eight d) Sixteen



Seat No.	
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
MICROPROCESSORS AND MICROCONTROLLER**

Day and Date : Tuesday, 5-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Total 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) Explain the process of demultiplexing of the address and data lines in microprocessor.
 - 2) Explain the various EPROM programming methods.
 - 3) Write and explain at least four instructions related to interrupts.
 - 4) Classify and explain different semiconductor memories.
 - 5) Explain RST 7.5, RST 6.5, RST 5.5, TRAP, INTR.
3. Attempt **any 2** : **(6×2=12)**
- 1) Draw and explain architecture of Intel 8085A.
 - 2) Explain interrupt structure of 8085 in detail.
 - 3) Write a short note on software interrupts.

SECTION – II

4. Attempt **any four** : **(4×4=16)**
- 1) Explain different data transfer techniques in 8051.
 - 2) What are different addressing techniques used in 8051 ?
 - 3) Draw and explain TCON register of microcontroller 8051.
 - 4) What is DPTR ? Explain with suitable example.
 - 5) Differentiate between memory mapped I/O and I/O mapped I/O.

Set S



5. Attempt **any 2** :

(6×2=12)

- 1) On the program given below comment the result after every instruction and also find the content in the accumulator.

```
ORG 0000H
MOV R5, #25H
MOV R7, #34H
MOV A, #0
ADD A, R5
ADD A, R7
ADD A, #12H
END
```

- 2) Write a short note on Special Function Registers (SFRs) of 8051.
- 3) Draw and explain interfacing diagram of DAC 0808 with 8051 microcontroller.
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SLR-TJ – 416

Seat No.	
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Set	P
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T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION

Day and Date : Thursday, 7-12-2017
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 FM the frequency deviation is _____
 - a) Constant
 - b) Zero
 - c) Proportional to modulating frequency
 - d) Proportional to amplitude of modulating signal
- 2) Example of continuous wave analog modulation is _____
 - a) PCM
 - b) DM
 - c) AM
 - d) PAM
- 3) Vestigial side band signals are detected by _____
 - a) Filters
 - b) Synchronous detection
 - c) Balanced modulator
 - d) None of above
- 4) Generation of SSB SC signal is done by _____
 - a) Phase discrimination method
 - b) Frequency discrimination method
 - c) Product modulator
 - d) Both a) and b)
- 5) The maximum transmission efficiency of an AM signal is _____
 - a) 64.44%
 - b) 33.33%
 - c) 56.66%
 - d) 75.55%
- 6) The process of recovering information signal from received carrier is known as _____
 - a) Detection
 - b) Modulation
 - c) Demultiplexity
 - d) Sampling

P.T.O.



- 7) Bandwidth of an AM signal is given by _____
- a) $B = 2 W_m$
 - b) $B = (W_c + W_m) - (W_c - W_m)$
 - c) W_m
 - d) Both a) and b)
- 8) In digital transmission, the modulation technique that requires minimum bandwidth is _____
- a) Delta modulation
 - b) PCM
 - c) DPCM
 - d) PAM
- 9) In differential pulse code modulation technique the decoding is performed by _____
- a) Accumulator
 - b) Sampler
 - c) PLL
 - d) Quantizer
- 10) The noise that affects PCM is _____ noise.
- a) Transmission
 - b) Quantizing
 - c) Transit
 - d) Both a) and b)
- 11) QAM uses _____ as the dimensions.
- a) In Phase
 - b) Quadrature
 - c) Both a) and b)
 - d) None
- 12) FSK (Frequency Shift Keying) is used mostly in _____
- a) Telephony
 - b) Telegraphy
 - c) Radio transmission
 - d) None of above
- 13) ASK is a result of combination of shift keying and _____ modulation.
- a) Digital
 - b) Analog
 - c) Amplitude
 - d) None
- 14) Channel coding is used to _____
- a) Secure the channel
 - b) Minimize interference
 - c) Protect information against noise
 - d) Protect against unnecessary tapping of signal
-



Seat No.	
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T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION

Day and Date : Thursday, 7-12-2017

Marks : 56

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

SECTION – I

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

- 1) Mention the elements of communication system and describe their functionality.
- 2) Define and classify noise. Describe each type of noise with each one example.
- 3) Define amplitude modulation and modulation index with necessary figure.
- 4) A 400 watt of carrier is modulated to a depth of 75% (percent). Calculate the total power in modulated wave.
- 5) Define and differentiate between SSB and VSB.

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

- 1) Explain the generation of SSB signal using phase shift method.
- 2) List various methods of generation of frequency modulation. Explain any two of them in detail.
- 3) In an FM system, when the Audio Frequency (AF) is 500 Hz and the AF voltage is 2.4 V, the deviation is 4.8 KHz. If the AF voltage is now increased to 7.2 V, what is the new deviation ? If the AF voltage is further increased to 10 V while the AF is dropped to 200 Hz, what is the deviation ? Find the modulation index in each case.

Set P



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain generation of Differential Pulse Code Modulation (DPCM).
 - 2) Describe the generation of M ary QAM.
 - 3) State and explain sampling theorem and its significance.
 - 4) Explain convolution and binary cyclic codes with example each.
 - 5) Explain working of PAM modulation circuit.
5. Attempt **any 2** : **(6×2=12)**
- 1) Define and differentiate between PAM, PPM and PWM.
 - 2) Define quantization process and explain its types in detail.
 - 3) Write a short note on :
 - a) ASK transmission mode
 - b) Error detection and correction.
-



SLR-TJ – 416

Seat No.	
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Set	Q
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION**

Day and Date : Thursday, 7-12-2017
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 digital transmission, the modulation technique that requires minimum bandwidth is _____
 - a) Delta modulation
 - b) PCM
 - c) DPCM
 - d) PAM
- 2) In differential pulse code modulation technique the decoding is performed by _____
 - a) Accumulator
 - b) Sampler
 - c) PLL
 - d) Quantizer
- 3) The noise that affects PCM is _____ noise.
 - a) Transmission
 - b) Quantizing
 - c) Transit
 - d) Both a) and b)
- 4) QAM uses _____ as the dimensions.
 - a) In Phase
 - b) Quadrature
 - c) Both a) and b)
 - d) None
- 5) FSK (Frequency Shift Keying) is used mostly in _____
 - a) Telephony
 - b) Telegraphy
 - c) Radio transmission
 - d) None of above
- 6) ASK is a result of combination of shift keying and _____ modulation.
 - a) Digital
 - b) Analog
 - c) Amplitude
 - d) None

P.T.O.



- 7) Channel coding is used to _____
- a) Secure the channel
 - b) Minimize interference
 - c) Protect information against noise
 - d) Protect against unnecessary tapping of signal
- 8) In FM the frequency deviation is _____
- a) Constant
 - b) Zero
 - c) Proportional to modulating frequency
 - d) Proportional to amplitude of modulating signal
- 9) Example of continuous wave analog modulation is _____
- a) PCM
 - b) DM
 - c) AM
 - d) PAM
- 10) Vestigial side band signals are detected by _____
- a) Filters
 - b) Synchronous detection
 - c) Balanced modulator
 - d) None of above
- 11) Generation of SSB SC signal is done by _____
- a) Phase discrimination method
 - b) Frequency discrimination method
 - c) Product modulator
 - d) Both a) and b)
- 12) The maximum transmission efficiency of an AM signal is _____
- a) 64.44%
 - b) 33.33%
 - c) 56.66%
 - d) 75.55%
- 13) The process of recovering information signal from received carrier is known as _____
- a) Detection
 - b) Modulation
 - c) Demultiplexity
 - d) Sampling
- 14) Bandwidth of an AM signal is given by _____
- a) $B = 2 W_m$
 - b) $B = (W_c + W_m) - (W_c - W_m)$
 - c) W_m
 - d) Both a) and b)
-



Seat No.	
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T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION

Day and Date : Thursday, 7-12-2017

Marks : 56

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

SECTION – I

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

- 1) Mention the elements of communication system and describe their functionality.
- 2) Define and classify noise. Describe each type of noise with each one example.
- 3) Define amplitude modulation and modulation index with necessary figure.
- 4) A 400 watt of carrier is modulated to a depth of 75% (percent). Calculate the total power in modulated wave.
- 5) Define and differentiate between SSB and VSB.

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

- 1) Explain the generation of SSB signal using phase shift method.
- 2) List various methods of generation of frequency modulation. Explain any two of them in detail.
- 3) In an FM system, when the Audio Frequency (AF) is 500 Hz and the AF voltage is 2.4 V, the deviation is 4.8 KHz. If the AF voltage is now increased to 7.2 V, what is the new deviation ? If the AF voltage is further increased to 10 V while the AF is dropped to 200 Hz, what is the deviation ? Find the modulation index in each Lau.

Set Q



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain generation of Differential Pulse Code Modulation (DPCM).
 - 2) Describe the generation of M ary QAM.
 - 3) State and explain sampling theorem and its significance.
 - 4) Explain convolution and binary cyclic codes with example each.
 - 5) Explain working of PAM modulation circuit.
5. Attempt **any 2** : **(6×2=12)**
- 1) Define and differentiate between PAM, PPM and PWM.
 - 2) Define quantization process and explain its types in detail.
 - 3) Write a short note on :
 - a) ASK transmission mode
 - b) Error detection and correction.
-



SLR-TJ – 416

Seat No.	
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Set	R
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T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION

Day and Date : Thursday, 7-12-2017
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 maximum transmission efficiency of an AM signal is _____
a) 64.44% b) 33.33% c) 56.66% d) 75.55%
 - 2) The process of recovering information signal from received carrier is known as _____
a) Detection b) Modulation c) Demultiplexity d) Sampling
 - 3) Bandwidth of an AM signal is given by _____
a) $B = 2 W_m$ b) $B = (W_c + W_m) - (W_c - W_m)$
c) W_m d) Both a) and b)
 - 4) In digital transmission, the modulation technique that requires minimum bandwidth is _____
a) Delta modulation b) PCM
c) DPCM d) PAM
 - 5) In differential pulse code modulation technique the decoding is performed by _____
a) Accumulator b) Sampler c) PLL d) Quantizer
 - 6) The noise that affects PCM is _____ noise.
a) Transmission b) Quantizing c) Transit d) Both a) and b)

P.T.O.



- 7) QAM uses _____ as the dimensions.
 - a) In Phase
 - b) Quadrature
 - c) Both a) and b)
 - d) None
 - 8) FSK (Frequency Shift Keying) is used mostly in _____.
 - a) Telephony
 - b) Telegraphy
 - c) Radio transmission
 - d) None of above
 - 9) ASK is a result of combination of shift keying and _____ modulation.
 - a) Digital
 - b) Analog
 - c) Amplitude
 - d) None
 - 10) Channel coding is used to _____.
 - a) Secure the channel
 - b) Minimize interference
 - c) Protect information against noise
 - d) Protect against unnecessary tapping of signal
 - 11) In FM the frequency deviation is _____.
 - a) Constant
 - b) Zero
 - c) Proportional to modulating frequency
 - d) Proportional to amplitude of modulating signal
 - 12) Example of continuous wave analog modulation is _____.
 - a) PCM
 - b) DM
 - c) AM
 - d) PAM
 - 13) Vestigial side band signals are detected by _____.
 - a) Filters
 - b) Synchronous detection
 - c) Balanced modulator
 - d) None of above
 - 14) Generation of SSB SC signal is done by _____.
 - a) Phase discrimination method
 - b) Frequency discrimination method
 - c) Product modulator
 - d) Both a) and b)
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Seat No.	
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T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION

Day and Date : Thursday, 7-12-2017

Marks : 56

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

SECTION – I

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

- 1) Mention the elements of communication system and describe their functionality.
- 2) Define and classify noise. Describe each type of noise with each one example.
- 3) Define amplitude modulation and modulation index with necessary figure.
- 4) A 400 watt of carrier is modulated to a depth of 75% (percent). Calculate the total power in modulated wave.
- 5) Define and differentiate between SSB and VSB.

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

- 1) Explain the generation of SSB signal using phase shift method.
- 2) List various methods of generation of frequency modulation. Explain any two of them in detail.
- 3) In an FM system, when the Audio Frequency (AF) is 500 Hz and the AF voltage is 2.4 V, the deviation is 4.8 KHz. If the AF voltage is now increased to 7.2 V, what is the new deviation ? If the AF voltage is further increased to 10 V while the AF is dropped to 200 Hz, what is the deviation ? Find the modulation index in each Lau.

Set R



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain generation of Differential Pulse Code Modulation (DPCM).
 - 2) Describe the generation of M ary QAM.
 - 3) State and explain sampling theorem and its significance.
 - 4) Explain convolution and binary cyclic codes with example each.
 - 5) Explain working of PAM modulation circuit.
5. Attempt **any 2** : **(6×2=12)**
- 1) Define and differentiate between PAM, PPM and PWM.
 - 2) Define quantization process and explain its types in detail.
 - 3) Write a short note on :
 - a) ASK transmission mode
 - b) Error detection and correction.
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SLR-TJ – 416

Seat No.	
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Set	S
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**T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION**

Day and Date : Thursday, 7-12-2017
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 noise that affects PCM is _____ noise.
a) Transmission b) Quantizing c) Transit d) Both a) and b)
- 2) QAM uses _____ as the dimensions.
a) In Phase b) Quadrature c) Both a) and b) d) None
- 3) FSK (Frequency Shift Keying) is used mostly in _____.
a) Telephony b) Telegraphy
c) Radio transmission d) None of above
- 4) ASK is a result of combination of shift keying and _____ modulation.
a) Digital b) Analog c) Amplitude d) None
- 5) Channel coding is used to _____.
a) Secure the channel
b) Minimize interference
c) Protect information against noise
d) Protect against unnecessary tapping of signal
- 6) In FM the frequency deviation is _____.
a) Constant
b) Zero
c) Proportional to modulating frequency
d) Proportional to amplitude of modulating signal

P.T.O.



- 7) Example of continuous wave analog modulation is _____
a) PCM b) DM c) AM d) PAM
- 8) Vestigial side band signals are detected by _____
a) Filters b) Synchronous detection
c) Balanced modulator d) None of above
- 9) Generation of SSB SC signal is done by _____
a) Phase discrimination method
b) Frequency discrimination method
c) Product modulator
d) Both a) and b)
- 10) The maximum transmission efficiency of an AM signal is _____
a) 64.44% b) 33.33% c) 56.66% d) 75.55%
- 11) The process of recovering information signal from received carrier is known as _____
a) Detection b) Modulation c) Demultiplexity d) Sampling
- 12) Bandwidth of an AM signal is given by _____
a) $B = 2 W_m$ b) $B = (W_c + W_m) - (W_c - W_m)$
c) W_m d) Both a) and b)
- 13) In digital transmission, the modulation technique that requires minimum bandwidth is _____
a) Delta modulation b) PCM
c) DPCM d) PAM
- 14) In differential pulse code modulation technique the decoding is performed by _____
a) Accumulator b) Sampler c) PLL d) Quantizer
- _____



Seat No.	
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T.E. (Biomedical Engg.) (Part – I) (CGPA) Examination, 2017
PRINCIPLES OF COMMUNICATION

Day and Date : Thursday, 7-12-2017

Marks : 56

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

SECTION – I

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

- 1) Mention the elements of communication system and describe their functionality.
- 2) Define and classify noise. Describe each type of noise with each one example.
- 3) Define amplitude modulation and modulation index with necessary figure.
- 4) A 400 watt of carrier is modulated to a depth of 75% (percent). Calculate the total power in modulated wave.
- 5) Define and differentiate between SSB and VSB.

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

- 1) Explain the generation of SSB signal using phase shift method.
- 2) List various methods of generation of frequency modulation. Explain any two of them in detail.
- 3) In an FM system, when the Audio Frequency (AF) is 500 Hz and the AF voltage is 2.4 V, the deviation is 4.8 KHz. If the AF voltage is now increased to 7.2 V, what is the new deviation ? If the AF voltage is further increased to 10 V while the AF is dropped to 200 Hz, what is the deviation ? Find the modulation index in each case.

Set S



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain generation of Differential Pulse Code Modulation (DPCM).
 - 2) Describe the generation of M ary QAM.
 - 3) State and explain sampling theorem and its significance.
 - 4) Explain convolution and binary cyclic codes with example each.
 - 5) Explain working of PAM modulation circuit.
5. Attempt **any 2** : **(6×2=12)**
- 1) Define and differentiate between PAM, PPM and PWM.
 - 2) Define quantization process and explain its types in detail.
 - 3) Write a short note on :
 - a) ASK transmission mode
 - b) Error detection and correction.
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SLR-TJ – 417

Seat No.	
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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 : Saturday, 9-12-2017
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 :

(14×1=14)

- 1) As the signaling rate increases, width of each pulse
 - a) increases
 - b) decreases
 - c) remains unaffected
 - d) none of above
- 2) _____ is the possible range of frequency spectrum for discrete time Fourier series.
 - a) 0 to 2π
 - b) $-\pi$ to $+\pi$
 - c) both a) and b)
 - d) none of above
- 3) The type of system which are characterized by input and output quantized at certain levels are called as
 - a) analog
 - b) discrete
 - c) continuous
 - d) digital
- 4) All real time system concerned with the concept of causality are
 - a) non causal
 - b) causal
 - c) neither a) nor b)
 - d) both a) and b)
- 5) What is the value of $u[1]$, where $u(n)$ is the unit step function ?
 - a) 1
 - b) 0.5
 - c) 0
 - d) -1
- 6) _____ property is exhibited by the auto correlation function of a complex valued signal.
 - a) Commutative
 - b) Distributive
 - c) Conjugate
 - d) Associative
- 7) The nature of Fourier representation of a discrete and aperiodic signal is
 - a) Continuous and periodic
 - b) Discrete and aperiodic
 - c) Continuous and aperiodic
 - d) Discrete and periodic

P.T.O.



- 8) The convolution of $u(n)$ with $u(n - 4)$ at $n = 5$ is
a) 5 b) 2 c) 1 d) 0
- 9) The Fourier transform of a signal $x(t) = e^{2t} u(-t)$ is given by
a) $\frac{1}{2 - j\omega}$ b) $\frac{2}{1 - j\omega}$ c) $\frac{1}{2j - \omega}$ d) $\frac{2}{2j - \omega}$
- 10) Z transform converts convolution of time signals to
a) addition b) multiplication c) subtraction d) division
- 11) The Z transform of $\delta(n - m)$ is
a) z^{-n} b) z^{-m} c) $\frac{1}{z - n}$ d) $\frac{1}{z - m}$
- 12) The period of the signal $x(t) = 10 \sin (12 \pi t) + 4 \cos (18 \pi t)$ is
a) $\pi/4$ b) $1/6$ c) $1/9$ d) $1/3$
- 13) Time derivative of a unit step function $u(t)$ is
a) unit impulse b) another step function
c) unit ramp function d) a sine function
- 14) The Fourier series of a real, even periodic signal will contain only
a) cosine terms b) sine term c) even term d) odd harmonics
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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 : Saturday, 9-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Find the even and odd components for signal $x(t) = e^{-2t} \cos(t)$.
- 2) Define following terms with each example.
 - a) Periodic and aperiodic signal
 - b) Causal and non causal signal.
- 3) Find the convolution of two continuous time signals given below :
 $F(t) = e^{-t^2}$ and $g(t) = 3t^2$ for all t .
- 4) Show that the convolution of two odd functions is an even function.
- 5) State and explain sampling theorem with an example.

3. Attempt **any two** : **(6×2=12)**

- 1) Determine whether or not each of following signals is periodic and specify its fundamental period.
 - a) $x_1(t) = je^{j10t}$
 - b) $x_2(t) = e^{(-1+j)t}$
 - c) $x_3(n) = e^{j7\pi n}$
 - d) $x_4(n) = 3e^{3j\pi(n+1/2)/5}$
- 2) Define energy and power signals for continuous time and a discrete time signal. Determine whether the following signals are power or energy signals or neither.
 - a) $x(t) = A \sin t, -\infty < t < \infty$
 - b) $x(t) = e^{-a|t|}, a > 0$
- 3) Define and explain following singularity functions with necessary figure.
 - a) Unit step function
 - b) Unit impulse function.



SECTION – II

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

- 1) Derive convolution and multiplication property of Fourier transform.
- 2) Define relationship between z-transform and discrete time Fourier transform.
- 3) Determine the z transform of :
 - a) $x(n) = -u(-n - 1)$
 - b) $x(n) = u(-n)$.
- 4) Determine the z-transform and ROC of following finite duration signals
 - a) $x(n) = \{1, 2, 6, -2, 0, 3\}$
 - b) $x_2(n) = \{1, 2, 6, -2, 0, 3\}$.
- 5) Find the Fourier transform of the continuous time-signal given below :
 $x(t) = e^{-at}u(t), a > 0$.

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

- 1) Determine the inverse z-transform of given function.
 - a) $x(z) = e^z$ with ROC all z except $|z| = \infty$.
 - b) $x(z) = \log(1 + az^{-1}), |z| > |a|$.
 - 2) Find the Fourier transform of an exponential sequence with alternating sign
 $y(n) = (-1)^n a^n u(n), |a| < 1$.
 - 3) Define following properties of Discrete Fourier Transform (DFT).
 - a) Linearity.
 - b) Time shifting.
 - c) Time reversal.
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SLR-TJ – 417

Seat No.	
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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 : Saturday, 9-12-2017
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 :

(14×1=14)

- 1) The convolution of $u(n)$ with $u(n - 4)$ at $n = 5$ is
a) 5 b) 2 c) 1 d) 0
- 2) The Fourier transform of a signal $x(t) = e^{2t} u(-t)$ is given by
a) $\frac{1}{2 - j\omega}$ b) $\frac{2}{1 - j\omega}$ c) $\frac{1}{2j - \omega}$ d) $\frac{2}{2j - \omega}$
- 3) Z transform converts convolution of time signals to
a) addition b) multiplication c) subtraction d) division
- 4) The Z transform of $\delta(n - m)$ is
a) z^{-n} b) z^{-m} c) $\frac{1}{z - n}$ d) $\frac{1}{z - m}$
- 5) The period of the signal $x(t) = 10 \sin (12 \pi t) + 4 \cos (18 \pi t)$ is
a) $\pi/4$ b) $1/6$ c) $1/9$ d) $1/3$
- 6) Time derivative of a unit step function $u(t)$ is
a) unit impulse b) another step function
c) unit ramp function d) a sine function
- 7) The Fourier series of a real, even periodic signal will contain only
a) cosine terms b) sine term c) even term d) odd harmonics

P.T.O.



- 8) As the signaling rate increases, width of each pulse
- a) increases
 - b) decreases
 - c) remains unaffected
 - d) none of above
- 9) _____ is the possible range of frequency spectrum for discrete time Fourier series.
- a) 0 to 2π
 - b) $-\pi$ to $+\pi$
 - c) both a) and b)
 - d) none of above
- 10) The type of system which are characterized by input and output quantized at certain levels are called as
- a) analog
 - b) discrete
 - c) continuous
 - d) digital
- 11) All real time system concerned with the concept of causality are
- a) non causal
 - b) causal
 - c) neither a) nor b)
 - d) both a) and b)
- 12) What is the value of $u[1]$, where $u(n)$ is the unit step function ?
- a) 1
 - b) 0.5
 - c) 0
 - d) -1
- 13) _____ property is exhibited by the auto correlation function of a complex valued signal.
- a) Commutative
 - b) Distributive
 - c) Conjugate
 - d) Associative
- 14) The nature of Fourier representation of a discrete and aperiodic signal is
- a) Continuous and periodic
 - b) Discrete and aperiodic
 - c) Continuous and aperiodic
 - d) Discrete and periodic
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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 : Saturday, 9-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Find the even and odd components for signal $x(t) = e^{-2t} \cos(t)$.
- 2) Define following terms with each example.
 - a) Periodic and aperiodic signal
 - b) Causal and non causal signal.
- 3) Find the convolution of two continuous time signals given below :
 $F(t) = e^{-t^2}$ and $g(t) = 3t^2$ for all t .
- 4) Show that the convolution of two odd functions is an even function.
- 5) State and explain sampling theorem with an example.

3. Attempt **any two** : **(6×2=12)**

- 1) Determine whether or not each of following signals is periodic and specify its fundamental period.
 - a) $x_1(t) = je^{j10t}$
 - b) $x_2(t) = e^{(-1+j)t}$
 - c) $x_3(n) = e^{j7\pi n}$
 - d) $x_4(n) = 3e^{3j\pi(n+1/2)/5}$
- 2) Define energy and power signals for continuous time and a discrete time signal. Determine whether the following signals are power or energy signals or neither.
 - a) $x(t) = A \sin t, -\infty < t < \infty$
 - b) $x(t) = e^{-a|t|}, a > 0$
- 3) Define and explain following singularity functions with necessary figure.
 - a) Unit step function
 - b) Unit impulse function.



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Derive convolution and multiplication property of Fourier transform.
 - 2) Define relationship between z-transform and discrete time Fourier transform.
 - 3) Determine the z transform of :
 - a) $x(n) = -u(-n - 1)$
 - b) $x(n) = u(-n)$.
 - 4) Determine the z-transform and ROC of following finite duration signals
 - a) $x(n) = \left\{ \underset{\uparrow}{1}, 2, 6, -2, 0, 3 \right\}$
 - b) $x_2(n) = \left\{ 1; 2, \underset{\uparrow}{6}, -2, 0, 3 \right\}$.
 - 5) Find the Fourier transform of the continuous time-signal given below :
 $x(t) = e^{-at}u(t)$, $a > 0$.
5. Attempt **any two** questions : **(6×2=12)**
- 1) Determine the inverse z-transform of given function.
 - a) $x(z) = e^z$ with ROC all z except $|z| = \infty$.
 - b) $x(z) = \log(1 + az^{-1})$, $|z| > |a|$.
 - 2) Find the Fourier transform of an exponential sequence with alternating sign
 $y(n) = (-1)^n a^n u(n)$, $|a| < 1$.
 - 3) Define following properties of Discrete Fourier Transform (DFT).
 - a) Linearity.
 - b) Time shifting.
 - c) Time reversal.
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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 : Saturday, 9-12-2017
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 :

(14×1=14)

- 1) What is the value of $u[1]$, where $u(n)$ is the unit step function ?
a) 1 b) 0.5 c) 0 d) -1
- 2) _____ property is exhibited by the auto correlation function of a complex valued signal.
a) Commutative b) Distributive c) Conjugate d) Associative
- 3) The nature of Fourier representation of a discrete and aperiodic signal is
a) Continuous and periodic b) Discrete and aperiodic
c) Continuous and aperiodic d) Discrete and periodic
- 4) The convolution of $u(n)$ with $u(n - 4)$ at $n = 5$ is
a) 5 b) 2 c) 1 d) 0
- 5) The Fourier transform of a signal $x(t) = e^{2t} u(-t)$ is given by
a) $\frac{1}{2 - j\omega}$ b) $\frac{2}{1 - j\omega}$ c) $\frac{1}{2j - \omega}$ d) $\frac{2}{2j - \omega}$
- 6) Z transform converts convolution of time signals to
a) addition b) multiplication c) subtraction d) division
- 7) The Z transform of $\delta(n - m)$ is
a) z^{-n} b) z^{-m} c) $\frac{1}{z - n}$ d) $\frac{1}{z - m}$

P.T.O.



- 8) The period of the signal $x(t) = 10 \sin (12 \pi t) + 4 \cos (18 \pi t)$ is
a) $\pi/4$ b) $1/6$ c) $1/9$ d) $1/3$
- 9) Time derivative of a unit step function $u(t)$ is
a) unit impulse b) another step function
c) unit ramp function d) a sine function
- 10) The Fourier series of a real, even periodic signal will contain only
a) cosine terms b) sine term c) even term d) odd harmonics
- 11) As the signaling rate increases, width of each pulse
a) increases b) decreases
c) remains unaffected d) none of above
- 12) _____ is the possible range of frequency spectrum for discrete time Fourier series.
a) 0 to 2π b) $-\pi$ to $+\pi$ c) both a) and b) d) none of above
- 13) The type of system which are characterized by input and output quantized at certain levels are called as
a) analog b) discrete c) continuous d) digital
- 14) All real time system concerned with the concept of causality are
a) non causal b) causal
c) neither a) nor b) d) both a) and b)
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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 : Saturday, 9-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Find the even and odd components for signal $x(t) = e^{-2t} \cos(t)$.
- 2) Define following terms with each example.
 - a) Periodic and aperiodic signal
 - b) Causal and non causal signal.
- 3) Find the convolution of two continuous time signals given below :
 $F(t) = e^{-t^2}$ and $g(t) = 3t^2$ for all t .
- 4) Show that the convolution of two odd functions is an even function.
- 5) State and explain sampling theorem with an example.

3. Attempt **any two** : **(6×2=12)**

- 1) Determine whether or not each of following signals is periodic and specify its fundamental period.
 - a) $x_1(t) = je^{j10t}$
 - b) $x_2(t) = e^{(-1+j)t}$
 - c) $x_3(n) = e^{j7\pi n}$
 - d) $x_4(n) = 3e^{3j\pi(n+1/2)/5}$
- 2) Define energy and power signals for continuous time and a discrete time signal. Determine whether the following signals are power or energy signals or neither.
 - a) $x(t) = A \sin t, -\infty < t < \infty$
 - b) $x(t) = e^{-a|t|}, a > 0$
- 3) Define and explain following singularity functions with necessary figure.
 - a) Unit step function
 - b) Unit impulse function.



SECTION – II

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

- 1) Derive convolution and multiplication property of Fourier transform.
- 2) Define relationship between z-transform and discrete time Fourier transform.
- 3) Determine the z transform of :
 - a) $x(n) = -u(-n - 1)$
 - b) $x(n) = u(-n)$.
- 4) Determine the z-transform and ROC of following finite duration signals
 - a) $x(n) = \{1, 2, 6, -2, 0, 3\}$
 - b) $x_2(n) = \{1, 2, 6, -2, 0, 3\}$.
- 5) Find the Fourier transform of the continuous time-signal given below :
 $x(t) = e^{-at}u(t), a > 0$.

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

- 1) Determine the inverse z-transform of given function.
 - a) $x(z) = e^z$ with ROC all z except $|z| = \infty$.
 - b) $x(z) = \log(1 + az^{-1}), |z| > |a|$.
 - 2) Find the Fourier transform of an exponential sequence with alternating sign
 $y(n) = (-1)^n a^n u(n), |a| < 1$.
 - 3) Define following properties of Discrete Fourier Transform (DFT).
 - a) Linearity.
 - b) Time shifting.
 - c) Time reversal.
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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 : Saturday, 9-12-2017
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 :

(14×1=14)

- 1) Z transform converts convolution of time signals to
 - a) addition
 - b) multiplication
 - c) subtraction
 - d) division
- 2) The Z transform of $\delta(n - m)$ is
 - a) z^{-n}
 - b) z^{-m}
 - c) $\frac{1}{z - n}$
 - d) $\frac{1}{z - m}$
- 3) The period of the signal $x(t) = 10 \sin (12 \pi t) + 4 \cos (18 \pi t)$ is
 - a) $\pi/4$
 - b) $1/6$
 - c) $1/9$
 - d) $1/3$
- 4) Time derivative of a unit step function $u(t)$ is
 - a) unit impulse
 - b) another step function
 - c) unit ramp function
 - d) a sine function
- 5) The Fourier series of a real, even periodic signal will contain only
 - a) cosine terms
 - b) sine term
 - c) even term
 - d) odd harmonics
- 6) As the signaling rate increases, width of each pulse
 - a) increases
 - b) decreases
 - c) remains unaffected
 - d) none of above
- 7) _____ is the possible range of frequency spectrum for discrete time Fourier series.
 - a) 0 to 2π
 - b) $-\pi$ to $+\pi$
 - c) both a) and b)
 - d) none of above

P.T.O.



- 8) The type of system which are characterized by input and output quantized at certain levels are called as
a) analog b) discrete c) continuous d) digital
- 9) All real time system concerned with the concept of causality are
a) non causal b) causal
c) neither a) nor b) d) both a) and b)
- 10) What is the value of $u[1]$, where $u(n)$ is the unit step function ?
a) 1 b) 0.5 c) 0 d) -1
- 11) _____ property is exhibited by the auto correlation function of a complex valued signal.
a) Commutative b) Distributive c) Conjugate d) Associative
- 12) The nature of Fourier representation of a discrete and aperiodic signal is
a) Continuous and periodic b) Discrete and aperiodic
c) Continuous and aperiodic d) Discrete and periodic
- 13) The convolution of $u(n)$ with $u(n - 4)$ at $n = 5$ is
a) 5 b) 2 c) 1 d) 0
- 14) The Fourier transform of a signal $x(t) = e^{2t} u(-t)$ is given by
a) $\frac{1}{2 - j\omega}$ b) $\frac{2}{1 - j\omega}$ c) $\frac{1}{2j - \omega}$ d) $\frac{2}{2j - \omega}$
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**T.E. (Biomedical Engineering) (Part – I) (CGPA) Examination, 2017
SIGNALS AND SYSTEM**

Day and Date : Saturday, 9-12-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) Find the even and odd components for signal $x(t) = e^{-2t} \cos(t)$.
- 2) Define following terms with each example.
 - a) Periodic and aperiodic signal
 - b) Causal and non causal signal.
- 3) Find the convolution of two continuous time signals given below :
 $F(t) = e^{-t^2}$ and $g(t) = 3t^2$ for all t .
- 4) Show that the convolution of two odd functions is an even function.
- 5) State and explain sampling theorem with an example.

3. Attempt **any two** : **(6×2=12)**

- 1) Determine whether or not each of following signals is periodic and specify its fundamental period.
 - a) $x_1(t) = je^{j10t}$
 - b) $x_2(t) = e^{(-1+j)t}$
 - c) $x_3(n) = e^{j7\pi n}$
 - d) $x_4(n) = 3e^{3j\pi(n+1/2)/5}$
- 2) Define energy and power signals for continuous time and a discrete time signal. Determine whether the following signals are power or energy signals or neither.
 - a) $x(t) = A \sin t, -\infty < t < \infty$
 - b) $x(t) = e^{-a|t|}, a > 0$
- 3) Define and explain following singularity functions with necessary figure.
 - a) Unit step function
 - b) Unit impulse function.



SECTION – II

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

- 1) Derive convolution and multiplication property of Fourier transform.
- 2) Define relationship between z-transform and discrete time Fourier transform.
- 3) Determine the z transform of :
 - a) $x(n) = -u(-n - 1)$
 - b) $x(n) = u(-n)$.
- 4) Determine the z-transform and ROC of following finite duration signals
 - a) $x(n) = \left\{ \underset{\uparrow}{1}, 2, 6, -2, 0, 3 \right\}$
 - b) $x_2(n) = \left\{ 1; 2, \underset{\uparrow}{6}, -2, 0, 3 \right\}$.
- 5) Find the Fourier transform of the continuous time-signal given below :
 $x(t) = e^{-at}u(t), a > 0$.

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

- 1) Determine the inverse z-transform of given function.
 - a) $x(z) = e^z$ with ROC all z except $|z| = \infty$.
 - b) $x(z) = \log(1 + az^{-1}), |z| > |a|$.
 - 2) Find the Fourier transform of an exponential sequence with alternating sign
 $y(n) = (-1)^n a^n u(n), |a| < 1$.
 - 3) Define following properties of Discrete Fourier Transform (DFT).
 - a) Linearity.
 - b) Time shifting.
 - c) Time reversal.
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Seat No.	
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**T.E. (Biomedical Engineering) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Tuesday, 21-11-2017
Time : 10.00 a.m. to 1.00 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) Bioelectric measurements are basically _____ measurements.
a) High level b) Low level c) Moderate d) None
 - 2) Tracing of voltage difference at any two sites due to electrical activity of the heart is called a
a) electrode b) microelectrodes
c) lead d) ECG wave
 - 3) The heart sounds are produced by _____ events that occur during the heart cycle.
a) mechanical b) electrical c) physical 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
 - 6) The oscillometric method is based on oscillometric _____ generated in the cuff during inflation.
a) nerves b) veins c) arteries d) pulses

P.T.O.



- 7) The respiratory cycle is accomplished by changes in the _____ volume.
a) thoracic b) alimentary c) blood d) air
- 8) Cardotographs are designed to measure and record foetal _____ on a beat to beat basis.
a) pulse rate b) blood pressure
c) Hb d) heart rate
- 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 maximum current at which the subject is still capable of releasing a conductor by using muscles is called as _____ current.
a) threshold b) hold on c) let go d) leakage
- 12) The risk of producing ventricular fibrillation is related to the _____ and electrode area.
a) current density b) voltage
c) leakage current d) let go current
- 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) _____ monitors provide continuous recording of 24-72 hours of ECG wave forms.
a) Patient b) Holter c) Cardioto d) Telemedicine
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T.E. (Biomedical Engineering) (Part – II) (CGPA) Examination, 2017

BIOMEDICAL INSTRUMENTATION – II

Day and Date : Tuesday, 21-11-2017

Marks : 56

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

Instructions : 1) Figures to the **right** indicate **full** marks.

2) Assume suitable data **wherever** required.

SECTION – I

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

- 1) Explain how nerve action potential is generated with necessary diagram.
- 2) Explain the ways of measuring human body temperature.
- 3) Explain the principal and working of phonocardiography.
- 4) List various blood pressure measurement techniques and explain any one indirect method.
- 5) Design an instrumentation amplifier for amplifying EEG signal.

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

- 1) Explain using suitable diagram 12 lead ECG electrode systems.
- 2) Explain working of 10-20 electrode EEG system.
- 3) Define arrhythmia and explain working of ambulatory monitoring system.

Set P



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the concept of telemedicine with example.
 - 2) Define Micro, Macro and Leakage current with their ranges.
 - 3) Draw and explain working of ECG telemetry system.
 - 4) Discuss various effects of electric current on the human body.
 - 5) List various 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 EMG biofeedback technique.
 - 3) Explain block diagram of a typical telemedicine set up.
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SLR-TJ – 418

Seat No.	
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Set	Q
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**T.E. (Biomedical Engineering) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Tuesday, 21-11-2017
Time : 10.00 a.m. to 1.00 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) Cardiotographs are designed to measure and record foetal _____ on a beat to beat basis.
a) pulse rate
b) blood pressure
c) Hb
d) heart rate
 - 2) The foetal heart rate is computed from the foetal ECG by appropriately shaping the foetal _____ wave.
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 maximum current at which the subject is still capable of releasing a conductor by using muscles is called as _____ current.
a) threshold
b) hold on
c) let go
d) leakage
 - 5) The risk of producing ventricular fibrillation is related to the _____ and electrode area.
a) current density
b) voltage
c) leakage current
d) let go current

P.T.O.



- 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) _____ monitors provide continuous recording of 24-72 hours of ECG wave forms.
- a) Patient b) Holter c) Cardioto d) Telemedicine
- 8) Bioelectric measurements are basically _____ measurements.
- a) High level b) Low level c) Moderate d) None
- 9) Tracing of voltage difference at any two sites due to electrical activity of the heart is called a
- a) electrode b) microelectrodes
c) lead d) ECG wave
- 10) The heart sounds are produced by _____ events that occur during the heart cycle.
- a) mechanical b) electrical c) physical 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 _____ volume.
- a) thoracic b) alimentary c) blood d) air



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T.E. (Biomedical Engineering) (Part – II) (CGPA) Examination, 2017

BIOMEDICAL INSTRUMENTATION – II

Day and Date : Tuesday, 21-11-2017

Marks : 56

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

Instructions : 1) Figures to the **right** indicate **full** marks.

2) Assume suitable data **wherever** required.

SECTION – I

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

- 1) Explain how nerve action potential is generated with necessary diagram.
- 2) Explain the ways of measuring human body temperature.
- 3) Explain the principal and working of phonocardiography.
- 4) List various blood pressure measurement techniques and explain any one indirect method.
- 5) Design an instrumentation amplifier for amplifying EEG signal.

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

- 1) Explain using suitable diagram 12 lead ECG electrode systems.
- 2) Explain working of 10-20 electrode EEG system.
- 3) Define arrhythmia and explain working of ambulatory monitoring system.

Set Q



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the concept of telemedicine with example.
 - 2) Define Micro, Macro and Leakage current with their ranges.
 - 3) Draw and explain working of ECG telemetry system.
 - 4) Discuss various effects of electric current on the human body.
 - 5) List various 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 EMG biofeedback technique.
 - 3) Explain block diagram of a typical telemedicine set up.
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**T.E. (Biomedical Engineering) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Tuesday, 21-11-2017
Time : 10.00 a.m. to 1.00 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) _____ 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 _____ volume.
a) thoracic b) alimentary c) blood d) air
 - 4) Cardotographs are designed to measure and record foetal _____ on a beat to beat basis.
a) pulse rate b) blood pressure
c) Hb d) heart rate
 - 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
 - 6) In a telemedicine _____ is the primary information source.
a) records b) reports c) patients d) scans

P.T.O.



- 7) The maximum current at which the subject is still capable of releasing a conductor by using muscles is called as _____ current.
a) threshold b) hold on c) let go d) leakage
- 8) The risk of producing ventricular fibrillation is related to the _____ and electrode area.
a) current density b) voltage
c) leakage current d) let go current
- 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) _____ monitors provide continuous recording of 24-72 hours of ECG wave forms.
a) Patient b) Holter c) Cardioto d) Telemedicine
- 11) Bioelectric measurements are basically _____ measurements.
a) High level b) Low level c) Moderate d) None
- 12) Tracing of voltage difference at any two sites due to electrical activity of the heart is called a
a) electrode b) microelectrodes
c) lead d) ECG wave
- 13) The heart sounds are produced by _____ events that occur during the heart cycle.
a) mechanical b) electrical c) physical 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) (CGPA) Examination, 2017

BIOMEDICAL INSTRUMENTATION – II

Day and Date : Tuesday, 21-11-2017

Marks : 56

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

Instructions : 1) Figures to the **right** indicate **full** marks.

2) Assume suitable data **wherever** required.

SECTION – I

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

- 1) Explain how nerve action potential is generated with necessary diagram.
- 2) Explain the ways of measuring human body temperature.
- 3) Explain the principal and working of phonocardiography.
- 4) List various blood pressure measurement techniques and explain any one indirect method.
- 5) Design an instrumentation amplifier for amplifying EEG signal.

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

- 1) Explain using suitable diagram 12 lead ECG electrode systems.
- 2) Explain working of 10-20 electrode EEG system.
- 3) Define arrhythmia and explain working of ambulatory monitoring system.

Set R



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the concept of telemedicine with example.
 - 2) Define Micro, Macro and Leakage current with their ranges.
 - 3) Draw and explain working of ECG telemetry system.
 - 4) Discuss various effects of electric current on the human body.
 - 5) List various 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 EMG biofeedback technique.
 - 3) Explain block diagram of a typical telemedicine set up.
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**T.E. (Biomedical Engineering) (Part – II) (CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – II**

Day and Date : Tuesday, 21-11-2017
Time : 10.00 a.m. to 1.00 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) In a telemedicine _____ is the primary information source.
a) records b) reports c) patients d) scans
 - 2) The maximum current at which the subject is still capable of releasing a conductor by using muscles is called as _____ current.
a) threshold b) hold on c) let go d) leakage
 - 3) The risk of producing ventricular fibrillation is related to the _____ and electrode area.
a) current density b) voltage
c) leakage current d) let go current
 - 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) _____ monitors provide continuous recording of 24-72 hours of ECG wave forms.
a) Patient b) Holter c) Cardioto d) Telemedicine
 - 6) Bioelectric measurements are basically _____ measurements.
a) High level b) Low level c) Moderate d) None

P.T.O.



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T.E. (Biomedical Engineering) (Part – II) (CGPA) Examination, 2017

BIOMEDICAL INSTRUMENTATION – II

Day and Date : Tuesday, 21-11-2017

Marks : 56

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

Instructions : 1) *Figures to the **right** indicate **full** marks.*

2) *Assume suitable data **wherever** required.*

SECTION – I

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

- 1) Explain how nerve action potential is generated with necessary diagram.
- 2) Explain the ways of measuring human body temperature.
- 3) Explain the principal and working of phonocardiography.
- 4) List various blood pressure measurement techniques and explain any one indirect method.
- 5) Design an instrumentation amplifier for amplifying EEG signal.

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

- 1) Explain using suitable diagram 12 lead ECG electrode systems.
- 2) Explain working of 10-20 electrode EEG system.
- 3) Define arrhythmia and explain working of ambulatory monitoring system.

Set S



SECTION – II

4. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the concept of telemedicine with example.
 - 2) Define Micro, Macro and Leakage current with their ranges.
 - 3) Draw and explain working of ECG telemetry system.
 - 4) Discuss various effects of electric current on the human body.
 - 5) List various 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 EMG biofeedback technique.
 - 3) Explain block diagram of a typical telemedicine set up.
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Set

P

**T.E. (Part – II) (CGPA) (Biomedical Engineering) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 22-11-2017
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 answer :

(1×14=14)

- 1) Speed of ultrasound depends upon
 - a) medium
 - b) amplitude
 - c) material
 - d) wavelength
- 2) Wavelength of 2.0 MHz ultrasound waves in tissue is
 - a) $7.5 \times 10^{-4} \text{m}$
 - b) $8 \times 10^{-5} \text{m}$
 - c) $8.5 \times 10^{-6} \text{m}$
 - d) $9.2 \times 10^{-3} \text{m}$
- 3) 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 10^9m
- 4) As x-rays pass through matter, its intensity
 - a) increases
 - b) decreases
 - c) remains constant
 - d) none of above
- 5) Maximum energy, x-ray photon can have is
 - a) $\frac{e}{v}$
 - b) e
 - c) . eV
 - d) V
- 6) Change in speed of ultrasound causes
 - a) reflection
 - b) diffraction
 - c) refraction
 - d) image
- 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)

P.T.O.



- 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) Angiography uses image _____ technique.
- a) addition
 - b) multiplication
 - c) division
 - d) interpolation
- 12) In a thermograph, heat is identified by
- a) different sizes of lines on the photograph
 - b) different shapes on the photographs
 - c) different colors on the photographs
 - d) different densities on the thermograph
- 13) Scattered x-ray beams approach detector screen
- a) perpendicularly
 - b) parallel
 - c) anti parallel
 - d) at an angle
- 14) When a geometric magnification technique is used, as in mammography, it can't
- a) Increase patient exposure
 - b) Increase scattered radiation
 - c) Decrease blurring of small objects and improve visibility of detail
 - d) Require a larger receptor
-



Seat No.	
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**T.E. (Part – II) (CGPA) (Biomedical Engineering) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 22-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** questions. **(4×4=16)**
- 1) Explain following terms with reference to X rays :
 - a) Line focus principle
 - b) Saturation voltage.
 - 2) List and explain various modes of ultrasound imaging.
 - 3) Describe x ray film processing procedure.
 - 4) Draw and explain construction of ultrasound transducer.
 - 5) List various techniques of x ray interaction with matter and explain any 2 in detail.
3. Attempt **any 2** questions. **(6×2=12)**
- 1) Explain working of x ray image intensifier with neat diagram.
 - 2) Explain continuous and pulsed Doppler ultrasound system.
 - 3) Draw and explain block diagram and working of x ray machine.

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.
5. Attempt **any 2** questions. **(6×2=12)**
- 1) List various medical applications of endoscopy.
 - 2) Explain various parts of thermographic machine with necessary diagrams.
 - 3) Explain angiographic technique and mention its applications.

Set P



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Set

Q

**T.E. (Part – II) (CGPA) (Biomedical Engineering) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 22-11-2017
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 answer :

(1×14=14)

- 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) Angiography uses image _____ technique.
 - a) addition
 - b) multiplication
 - c) division
 - d) interpolation
- 5) In a thermograph, heat is identified by
 - a) different sizes of lines on the photograph
 - b) different shapes on the photographs
 - c) different colors on the photographs
 - d) different densities on the thermograph
- 6) Scattered x-ray beams approach detector screen
 - a) perpendicularly
 - b) parallel
 - c) anti parallel
 - d) at an angle

P.T.O.



- 7) When a geometric magnification technique is used, as in mammography, it can't
- Increase patient exposure
 - Increase scattered radiation
 - Decrease blurring of small objects and improve visibility of detail
 - Require a larger receptor
- 8) Speed of ultrasound depends upon
- medium
 - amplitude
 - material
 - wavelength
- 9) Wavelength of 2.0 MHz ultrasound waves in tissue is
- $7.5 \times 10^{-4} \text{m}$
 - $8 \times 10^{-5} \text{m}$
 - $8.5 \times 10^{-6} \text{m}$
 - $9.2 \times 10^{-3} \text{m}$
- 10) Wavelength of x-rays is in range
- 10^{-8} to 10^{-13}m
 - 10^{-7} to 10^{-14}m
 - 10^{-10} to 10^{-15}m
 - 10^2 to 10^9m
- 11) As x-rays pass through matter, its intensity
- increases
 - decreases
 - remains constant
 - none of above
- 12) Maximum energy, x-ray photon can have is
- $\frac{e}{V}$
 - e
 - . eV
 - V
- 13) Change in speed of ultrasound causes
- reflection
 - diffraction
 - refraction
 - image
- 14) Attenuation coefficient depends on
- frequency of x-ray photons
 - wavelength of x-ray photons
 - energy of x-ray photons
 - amplitude of x-ray photons
-



Seat No.	
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**T.E. (Part – II) (CGPA) (Biomedical Engineering) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 22-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** questions. **(4×4=16)**
- 1) Explain following terms with reference to X rays :
 - a) Line focus principle
 - b) Saturation voltage.
 - 2) List and explain various modes of ultrasound imaging.
 - 3) Describe x ray film processing procedure.
 - 4) Draw and explain construction of ultrasound transducer.
 - 5) List various techniques of x ray interaction with matter and explain any 2 in detail.
3. Attempt **any 2** questions. **(6×2=12)**
- 1) Explain working of x ray image intensifier with neat diagram.
 - 2) Explain continuous and pulsed Doppler ultrasound system.
 - 3) Draw and explain block diagram and working of x ray machine.

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.
5. Attempt **any 2** questions. **(6×2=12)**
- 1) List various medical applications of endoscopy.
 - 2) Explain various parts of thermographic machine with necessary diagrams.
 - 3) Explain angiographic technique and mention its applications.

Set Q



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Seat No.	
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Set **R**

**T.E. (Part – II) (CGPA) (Biomedical Engineering) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 22-11-2017
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 answer :

(1×14=14)

- 1) Maximum energy, x-ray photon can have is
 - a) $\frac{e}{V}$
 - b) e
 - c) . eV
 - d) V
- 2) Change in speed of ultrasound causes
 - a) reflection
 - b) diffraction
 - c) refraction
 - d) image
- 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
- 6) 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
- 7) Angiography uses image _____ technique.
 - a) addition
 - b) multiplication
 - c) division
 - d) interpolation

P.T.O.



- 8) In a thermograph, heat is identified by
- different sizes of lines on the photograph
 - different shapes on the photographs
 - different colors on the photographs
 - different densities on the thermograph
- 9) Scattered x-ray beams approach detector screen
- perpendicularly
 - parallel
 - anti parallel
 - at an angle
- 10) When a geometric magnification technique is used, as in mammography, it can't
- Increase patient exposure
 - Increase scattered radiation
 - Decrease blurring of small objects and improve visibility of detail
 - Require a larger receptor
- 11) Speed of ultrasound depends upon
- medium
 - amplitude
 - material
 - wavelength
- 12) Wavelength of 2.0 MHz ultrasound waves in tissue is
- $7.5 \times 10^{-4} \text{m}$
 - $8 \times 10^{-5} \text{m}$
 - $8.5 \times 10^{-6} \text{m}$
 - $9.2 \times 10^{-3} \text{m}$
- 13) Wavelength of x-rays is in range
- 10^{-8} to 10^{-13}m
 - 10^{-7} to 10^{-14}m
 - 10^{-10} to 10^{-15}m
 - 10^2 to 10^9m
- 14) As x-rays pass through matter, its intensity
- increases
 - decreases
 - remains constant
 - none of above
-



Seat No.	
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**T.E. (Part – II) (CGPA) (Biomedical Engineering) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 22-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** questions. **(4×4=16)**
- 1) Explain following terms with reference to X rays :
 - a) Line focus principle
 - b) Saturation voltage.
 - 2) List and explain various modes of ultrasound imaging.
 - 3) Describe x ray film processing procedure.
 - 4) Draw and explain construction of ultrasound transducer.
 - 5) List various techniques of x ray interaction with matter and explain any 2 in detail.
3. Attempt **any 2** questions. **(6×2=12)**
- 1) Explain working of x ray image intensifier with neat diagram.
 - 2) Explain continuous and pulsed Doppler ultrasound system.
 - 3) Draw and explain block diagram and working of x ray machine.

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.
5. Attempt **any 2** questions. **(6×2=12)**
- 1) List various medical applications of endoscopy.
 - 2) Explain various parts of thermographic machine with necessary diagrams.
 - 3) Explain angiographic technique and mention its applications.

Set R



SLR-TJ – 419

Seat No.	
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Set

S

**T.E. (Part – II) (CGPA) (Biomedical Engineering) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 22-11-2017
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 answer :

(1×14=14)

- 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) Angiography uses image _____ technique.
 - a) addition
 - b) multiplication
 - c) division
 - d) interpolation
- 3) In a thermograph, heat is identified by
 - a) different sizes of lines on the photograph
 - b) different shapes on the photographs
 - c) different colors on the photographs
 - d) different densities on the thermograph
- 4) Scattered x-ray beams approach detector screen
 - a) perpendicularly
 - b) parallel
 - c) anti parallel
 - d) at an angle
- 5) When a geometric magnification technique is used, as in mammography, it can't
 - a) Increase patient exposure
 - b) Increase scattered radiation
 - c) Decrease blurring of small objects and improve visibility of detail
 - d) Require a larger receptor
- 6) Speed of ultrasound depends upon
 - a) medium
 - b) amplitude
 - c) material
 - d) wavelength
- 7) Wavelength of 2.0 MHz ultrasound waves in tissue is
 - a) $7.5 \times 10^{-4} \text{m}$
 - b) $8 \times 10^{-5} \text{m}$
 - c) $8.5 \times 10^{-6} \text{m}$
 - d) $9.2 \times 10^{-3} \text{m}$

P.T.O.



- 8) 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
- 9) As x-rays pass through matter, its intensity
a) increases b) decreases
c) remains constant d) none of above
- 10) Maximum energy, x-ray photon can have is
a) $\frac{e}{V}$ b) e c) . eV d) V
- 11) Change in speed of ultrasound causes
a) reflection b) diffraction c) refraction d) image
- 12) 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
- 13) 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)
- 14) 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
-



Seat No.	
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**T.E. (Part – II) (CGPA) (Biomedical Engineering) Examination, 2017
MEDICAL IMAGING – I**

Day and Date : Wednesday, 22-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** questions. **(4×4=16)**
- 1) Explain following terms with reference to X rays :
 - a) Line focus principle
 - b) Saturation voltage.
 - 2) List and explain various modes of ultrasound imaging.
 - 3) Describe x ray film processing procedure.
 - 4) Draw and explain construction of ultrasound transducer.
 - 5) List various techniques of x ray interaction with matter and explain any 2 in detail.
3. Attempt **any 2** questions. **(6×2=12)**
- 1) Explain working of x ray image intensifier with neat diagram.
 - 2) Explain continuous and pulsed Doppler ultrasound system.
 - 3) Draw and explain block diagram and working of x ray machine.

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.
5. Attempt **any 2** questions. **(6×2=12)**
- 1) List various medical applications of endoscopy.
 - 2) Explain various parts of thermographic machine with necessary diagrams.
 - 3) Explain angiographic technique and mention its applications.

Set S



SLR-TJ – 420

Seat No.	
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Set	P
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T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
CONTROL SYSTEMS

Day and Date : Thursday, 23-11-2017
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 : **(14×1=14)**

- 1) In block diagram representation the lines connecting the blocks known as
 - a) Branches
 - b) Nodes
 - c) Datums
 - d) Sources
- 2) The signal flow graph is applicable for system
 - a) Causal
 - b) Invertible
 - c) Linear time invariant
 - d) Dynamic
- 3) Parabolic input signal is represented by
 - a) Position
 - b) Force
 - c) Velocity
 - d) Acceleration
- 4) The steady state error of the systems depends on
 - a) Order
 - b) Type
 - c) Size
 - d) Proto type
- 5) Value of steady state error in closed loop control system is
 - a) Zero
 - b) Unity
 - c) Infinity
 - d) Unpredictable

P.T.O.



6) For the transfer function shown zero of the system lie

$$G(s) = \frac{5s - 1}{s^2 + 5s + 4}$$

- a) $s = -1$ and $s = -\frac{1}{4}$ b) $s = -4$ and $s = -1$
c) $\frac{1}{5}$ d) $s = -\frac{1}{5}$

7) 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

8) The nature of bandwidth for a good control system is

- a) Large b) Small
c) Medium d) All above

9) The nature of root locus about the real axis is

- a) Asymmetric b) Symmetric
c) Exponential d) Decaying

10) For Nyquist contour, the size of radius is

- a) 25 b) 0 c) 1 d) ∞

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) With the use of _____ element mechanical translational systems are obtained.

- a) Mass b) Spring c) Dashpot d) All above



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Thursday, 23-11-2017
Time : 10.00 a.m. to 1.00 p.m.

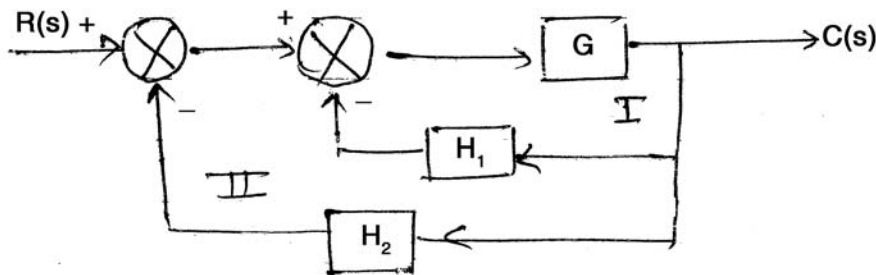
Marks : 56

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

SECTION – I

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

1) Using block diagram reduction technique find $C(s)/R(s)$ of given Figure



- 2) Define signal flow graph and list its properties and need.
- 3) Determine the stability of following system using Rouths criterion

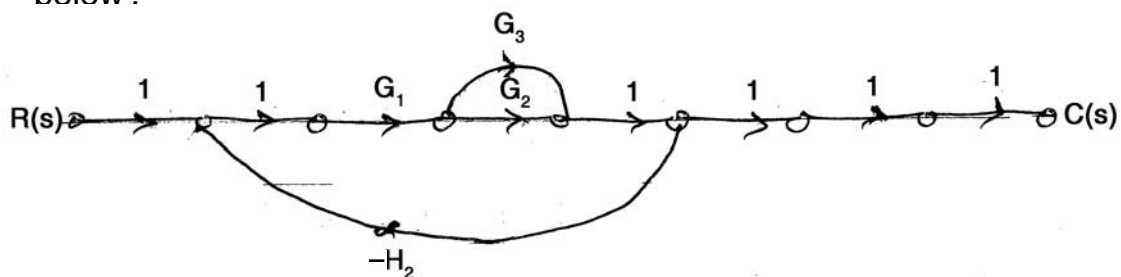
a) $G(s) H(s) = \frac{1}{(s + 2)(s + 4)}$

b) $G(s) H(s) = \frac{9}{s^2(s + 2)}$

- 4) Describe following rules for block diagram reduction technique
 - a) Moving a takeoff point after a block
 - b) Elimination of feedback loop
- 5) Explain working of gear trains system with necessary figure.

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

1) Using Mason's gain formula obtain $C(s)/R(s)$ for the signal flow graph shown below :





- 2) Utilize the Routh table to determine the number of roots of following polynomials, also comment on stability
 - a) $s^5 + 2s^4 + 3s^3 + 6s^2 + 10s + 15$
 - b) $s^5 + 6s^4 + 15s^3 + 30s^2 + 44s + 24$
- 3) Draw and explain various time response specifications of second order systems.

SECTION – II

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

- 1) Define and differentiate between polar plots and bode plots.
- 2) Calculate the angle of asymptotes and the centroid for the system having

$$G(s) H(s) = \frac{K(s + 3)}{s(s + 2)(s + 4)(s + 5)}$$

- 3) Determine the frequency domain specifications for a second order system with unity feedback and

$$G(s) = \frac{225}{s(s + 6)}$$

- 4) Define following terms :
 - a) Gain margin
 - b) Phase margin

- 5) Find the polar plot of $G(s) = \frac{8}{s(s + 1)}$

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

- 1) A unity feedback control system has,

$$G(s) = \frac{40}{[s(s + 2)(s + 5)]}$$

Draw the bode plot. Find GM and PM.

- 2) If “ $s = -0.85$ ” lies on the root locus of a system having,

$$G(s) H(s) = \frac{K}{s(s + 1)(s + 3)}$$

Find the value of ‘K’ using magnitude condition comment on result.

- 3) Write a note on :
 - a) Level compensating network
 - b) Lag compensating network.



SLR-TJ – 420

Seat No.	
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Set	Q
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T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
CONTROL SYSTEMS

Day and Date : Thursday, 23-11-2017
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 :

(14×1=14)

- 1) The nature of bandwidth for a good control system is
 - a) Large
 - b) Small
 - c) Medium
 - d) All above
- 2) The nature of root locus about the real axis is
 - a) Asymmetric
 - b) Symmetric
 - c) Exponential
 - d) Decaying
- 3) For Nyquist contour, the size of radius is
 - a) 25
 - b) 0
 - c) 1
 - d) ∞
- 4) If the constant 'k' is positive then its contribution on the phase plot will be
 - a) 0°
 - b) 45°
 - c) 90°
 - d) 180°
- 5) The system is said to be marginally stable, if gain margin is
 - a) 0
 - b) 1
 - c) $+\infty$
 - d) None of above
- 6) 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

P.T.O.



- 7) With the use of _____ element mechanical translational systems are obtained.
- a) Mass b) Spring c) Dashpot d) All above
- 8) In block diagram representation the lines connecting the blocks known as
- a) Branches b) Nodes
c) Datums d) Sources
- 9) The signal flow graph is applicable for system
- a) Causal b) Invertible
c) Linear time invariant d) Dynamic
- 10) Parabolic input signal is represented by
- a) Position b) Force
c) Velocity d) Acceleration
- 11) The steady state error of the systems depends on
- a) Order b) Type
c) Size d) Proto type
- 12) Value of steady state error in closed loop control system is
- a) Zero b) Unity
c) Infinity d) Unpredictable
- 13) For the transfer function shown zero of the system lie
- $$G(s) = \frac{5s - 1}{s^2 + 5s + 4}$$
- a) $s = -1$ and $s = -\frac{1}{4}$ b) $s = -4$ and $s = -1$
c) $\frac{1}{5}$ d) $s = -\frac{1}{5}$
- 14) 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
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Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Thursday, 23-11-2017
Time : 10.00 a.m. to 1.00 p.m.

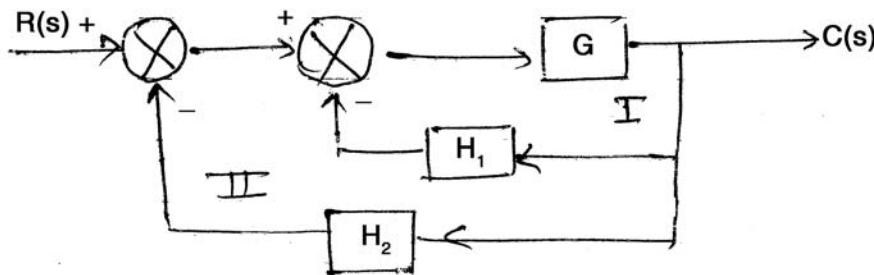
Marks : 56

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

SECTION – I

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

1) Using block diagram reduction technique find $C(s)/R(s)$ of given Figure



- 2) Define signal flow graph and list its properties and need.
- 3) Determine the stability of following system using Rouths criterion

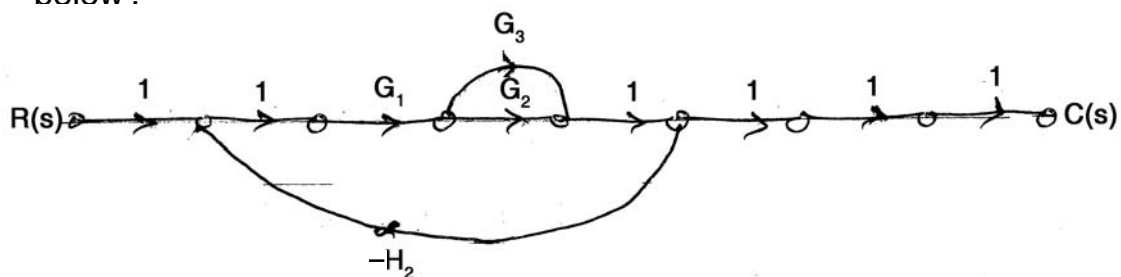
a) $G(s) H(s) = \frac{1}{(s + 2)(s + 4)}$

b) $G(s) H(s) = \frac{9}{s^2(s + 2)}$

- 4) Describe following rules for block diagram reduction technique
 - a) Moving a takeoff point after a block
 - b) Elimination of feedback loop
- 5) Explain working of gear trains system with necessary figure.

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

1) Using Mason's gain formula obtain $C(s)/R(s)$ for the signal flow graph shown below :



Set Q



- 2) Utilize the Routh table to determine the number of roots of following polynomials, also comment on stability
- $s^5 + 2s^4 + 3s^3 + 6s^2 + 10s + 15$
 - $s^5 + 6s^4 + 15s^3 + 30s^2 + 44s + 24$
- 3) Draw and explain various time response specifications of second order systems.

SECTION – II

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

- Define and differentiate between polar plots and bode plots.
- Calculate the angle of asymptotes and the centroid for the system having

$$G(s) H(s) = \frac{K(s+3)}{s(s+2)(s+4)(s+5)}$$

- Determine the frequency domain specifications for a second order system with unity feedback and

$$G(s) = \frac{225}{s(s+6)}$$

- Define following terms :
 - Gain margin
 - Phase margin

- Find the polar plot of $G(s) = \frac{8}{s(s+1)}$

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

- A unity feedback control system has,

$$G(s) = \frac{40}{[s(s+2)(s+5)]}$$

Draw the bode plot. Find GM and PM.

- If “ $s = -0.85$ ” lies on the root locus of a system having,

$$G(s) H(s) = \frac{K}{s(s+1)(s+3)}$$

Find the value of ‘K’ using magnitude condition comment on result.

- Write a note on :
 - Level compensating network
 - Lag compensating network.



SLR-TJ – 420

Seat No.	
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Set	R
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T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
CONTROL SYSTEMS

Day and Date : Thursday, 23-11-2017
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 :

(14×1=14)

1) Value of steady state error in closed loop control system is

- a) Zero
b) Unity
c) Infinity
d) Unpredictable

2) For the transfer function shown zero of the system lie

$$G(s) = \frac{5s - 1}{s^2 + 5s + 4}$$

- a) $s = -1$ and $s = -\frac{1}{4}$
b) $s = -4$ and $s = -1$
c) $\frac{1}{5}$
d) $s = -\frac{1}{5}$

3) 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

4) The nature of bandwidth for a good control system is

- a) Large
b) Small
c) Medium
d) All above

P.T.O.



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Thursday, 23-11-2017
Time : 10.00 a.m. to 1.00 p.m.

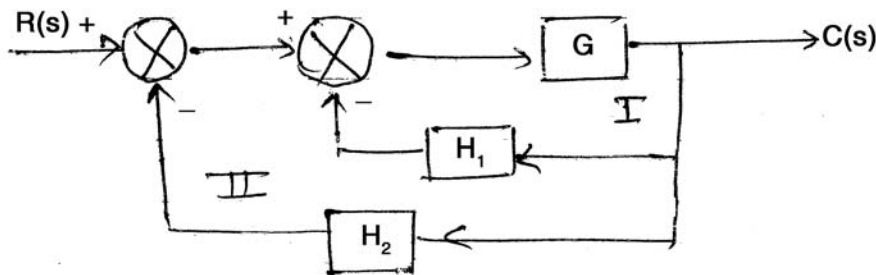
Marks : 56

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

SECTION – I

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

1) Using block diagram reduction technique find $C(s)/R(s)$ of given Figure



- 2) Define signal flow graph and list its properties and need.
- 3) Determine the stability of following system using Rouths criterion

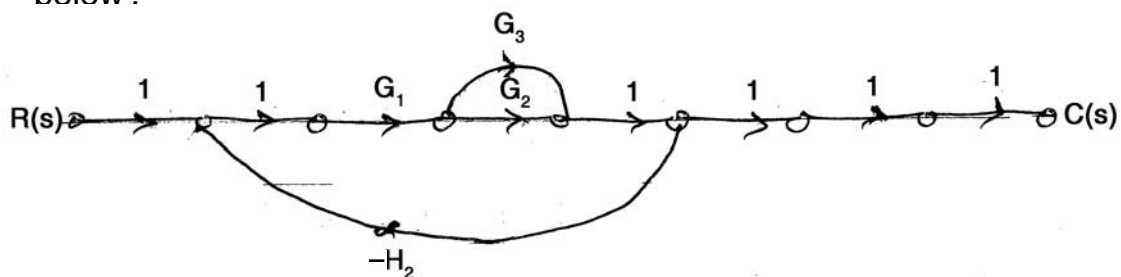
a) $G(s) H(s) = \frac{1}{(s + 2)(s + 4)}$

b) $G(s) H(s) = \frac{9}{s^2(s + 2)}$

- 4) Describe following rules for block diagram reduction technique
 - a) Moving a takeoff point after a block
 - b) Elimination of feedback loop
- 5) Explain working of gear trains system with necessary figure.

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

1) Using Mason's gain formula obtain $C(s)/R(s)$ for the signal flow graph shown below :



Set R



- 2) Utilize the Routh table to determine the number of roots of following polynomials, also comment on stability
 - a) $s^5 + 2s^4 + 3s^3 + 6s^2 + 10s + 15$
 - b) $s^5 + 6s^4 + 15s^3 + 30s^2 + 44s + 24$
- 3) Draw and explain various time response specifications of second order systems.

SECTION – II

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

- 1) Define and differentiate between polar plots and bode plots.
- 2) Calculate the angle of asymptotes and the centroid for the system having

$$G(s) H(s) = \frac{K(s+3)}{s(s+2)(s+4)(s+5)}$$

- 3) Determine the frequency domain specifications for a second order system with unity feedback and

$$G(s) = \frac{225}{s(s+6)}$$

- 4) Define following terms :
 - a) Gain margin
 - b) Phase margin

- 5) Find the polar plot of $G(s) = \frac{8}{s(s+1)}$

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

- 1) A unity feedback control system has,

$$G(s) = \frac{40}{[s(s+2)(s+5)]}$$

Draw the bode plot. Find GM and PM.

- 2) If “ $s = -0.85$ ” lies on the root locus of a system having,

$$G(s) H(s) = \frac{K}{s(s+1)(s+3)}$$

Find the value of ‘K’ using magnitude condition comment on result.

- 3) Write a note on :
 - a) Level compensating network
 - b) Lag compensating network.



SLR-TJ – 420

Seat No.	
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Set	S
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Thursday, 23-11-2017
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 : **(14×1=14)**

- 1) For Nyquist contour, the size of radius is
a) 25 b) 0 c) 1 d) ∞
- 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) With the use of _____ element mechanical translational systems are obtained.
a) Mass b) Spring c) Dashpot d) All above
- 6) In block diagram representation the lines connecting the blocks known as
a) Branches b) Nodes
c) Datums d) Sources

P.T.O.



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
CONTROL SYSTEMS**

Day and Date : Thursday, 23-11-2017
Time : 10.00 a.m. to 1.00 p.m.

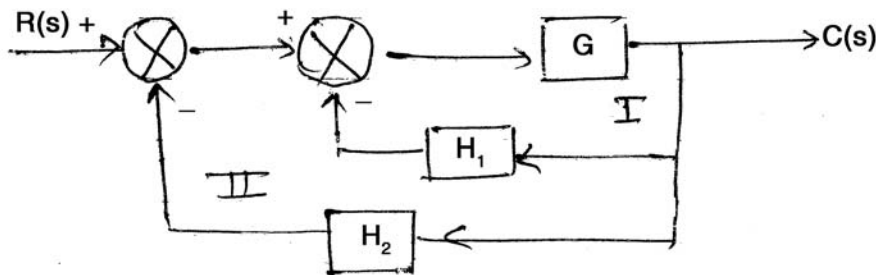
Marks : 56

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

SECTION – I

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

1) Using block diagram reduction technique find $C(s)/R(s)$ of given Figure



- 2) Define signal flow graph and list its properties and need.
- 3) Determine the stability of following system using Rouths criterion

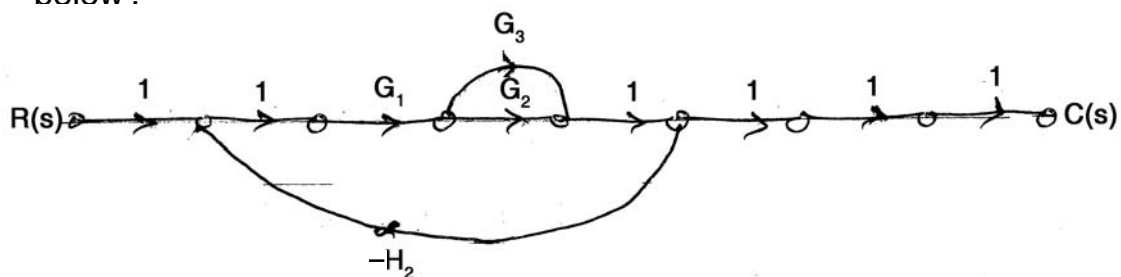
a) $G(s) H(s) = \frac{1}{(s + 2)(s + 4)}$

b) $G(s) H(s) = \frac{9}{s^2(s + 2)}$

- 4) Describe following rules for block diagram reduction technique
 - a) Moving a takeoff point after a block
 - b) Elimination of feedback loop
- 5) Explain working of gear trains system with necessary figure.

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

1) Using Mason's gain formula obtain $C(s)/R(s)$ for the signal flow graph shown below :





- 2) Utilize the Routh table to determine the number of roots of following polynomials, also comment on stability
 - a) $s^5 + 2s^4 + 3s^3 + 6s^2 + 10s + 15$
 - b) $s^5 + 6s^4 + 15s^3 + 30s^2 + 44s + 24$
- 3) Draw and explain various time response specifications of second order systems.

SECTION – II

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

- 1) Define and differentiate between polar plots and bode plots.
- 2) Calculate the angle of asymptotes and the centroid for the system having

$$G(s) H(s) = \frac{K(s + 3)}{s(s + 2)(s + 4)(s + 5)}$$

- 3) Determine the frequency domain specifications for a second order system with unity feedback and

$$G(s) = \frac{225}{s(s + 6)}$$

- 4) Define following terms :
 - a) Gain margin
 - b) Phase margin

- 5) Find the polar plot of $G(s) = \frac{8}{s(s + 1)}$

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

- 1) A unity feedback control system has,

$$G(s) = \frac{40}{[s(s + 2)(s + 5)]}$$

Draw the bode plot. Find GM and PM.

- 2) If “ $s = -0.85$ ” lies on the root locus of a system having,

$$G(s) H(s) = \frac{K}{s(s + 1)(s + 3)}$$

Find the value of ‘K’ using magnitude condition comment on result.

- 3) Write a note on :
 - a) Level compensating network
 - b) Lag compensating network.



SLR-TJ – 421

Seat No.	
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Set	P
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Friday, 24-11-2017
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 :

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 _____
 - a) Periodic convolution
 - b) Aperiodic convolution
 - c) Correlation
 - d) Circular convolution
- 4) Forward and inverse Fourier transform exists for samples having Values _____
 - a) Integers
 - b) Infinite
 - c) Finite
 - d) Discrete
- 5) For the calculation of N-point DFT, Radix-2 FFT algorithm repeats _____ stages.
 - a) $2(N\log_2 N)$
 - b) $(N\log_2 N)^2/2$
 - c) $(N\log_2 N)/2$ stages
 - d) $(\log_2 N/2N)$
- 6) _____ system filters exhibit their dependency upon the system design for stability response ?
 - a) FIR
 - b) IIR
 - c) Both a) and b)
 - d) None

P.T.O.



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Friday, 24-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) State the shifting property of DFT.
- 2) Compute N point DFT of $x(n) = 3\delta(n)$.
- 3) Determine the DFT of the given sequence,

$$x(n) = \begin{cases} 1/5, & \text{for } -1 \leq n \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

- 4) Compare direct form I and direct form II realisations of IIR systems.
- 5) Realise the following causal linear phase FIR system function

$$H(Z) = \frac{2}{3} + Z^{-1} + \frac{2}{3}Z^{-2}.$$

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

- 1) Determine the direct forms I and II realisations for a third order IIR transfer function

$$H(z) = \frac{0.28z^2 + 0.319z + 0.04}{0.5z^3 + 0.3z^2 + 0.17z - 0.2}$$

- 2) Compute the DFT's of the sequence $x(n) = \cos \frac{n\pi}{2}$, where $N = 4$ using DIFFFT algorithm.
- 3) Find the linear convolution through circular convolution of $x_1(n)$ and $x_2(n)$
 $x_1(n) = \delta(n) + \delta(n-1) + \delta(n-2)$
 $x_2(n) = 2\delta(n) - \delta(n-1) + 2\delta(n-2)$



SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

1) The length of FIR filter is 13. If the filter has a linear phase show that

$$\sum_{n=0}^{M-1/2} h(n) \sin w(\tau - n) = 0.$$

2) What is an IIR filter ? Compare its characteristic with a FIR filter.

3) Explain how noise cancellation is done using Adaptive filters.

4) Consider a single weight adaptive filter shown and write LMS algorithm for updating the weight W.

5) For the analog transfer function, $H(s) = \frac{1}{(s+1)(s+2)}$, determine H(z) using impulse invariant technique. Assume T = 1 second.

5. Attempt **any two** question :

(6×2=12)

1) Convert the given analog filter with system function $H(s) = \frac{s+0.1}{(s+0.1)^2 + g}$

into digital IIR filter using bilinear transformation with $W_r = \frac{\pi}{4}$.

2) List the three well known methods into design techniques for FIR filters and explain any one in detail.

3) Explain following terms in short :

a) Adaptive noise cancellation

b) Adaptive equalisation.



SLR-TJ – 421

Seat No.	
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Set	Q
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Friday, 24-11-2017
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 :

14

- 1) _____ is the operating level of sampling rate for the subfilters involved in polyphase filters.
 - a) Low
 - b) Moderate
 - c) High
 - d) None
- 2) The S-plane and Z-plane are related as _____
 - a) $Z = e^{ST}$
 - b) $Z = e^{2ST}$
 - c) $Z = 2e^{ST}$
 - d) $Z = e^{ST/2}$
- 3) _____ is an method for implementing an FIR system.
 - a) Direct form
 - b) Cascade form
 - c) Lattice form
 - d) All of above
- 4) The realization of FIR filter by frequency sampling realization can be viewed as cascade of _____ filters.
 - a) 2
 - b) 3
 - c) 4
 - d) 6
- 5) IIR digital filters are of following nature _____
 - a) Recursive
 - b) Non recursive
 - c) Reversive
 - d) Non reversive

P.T.O.



- 6) A causal and stable IIR filter has _____
- a) Linear phase
 - b) No linear phase
 - c) Linear amplitude
 - d) No amplitude
- 7) _____ of the IIR filter design is antialiasing method.
- a) Aliasing
 - b) Warping
 - c) Prewarping
 - d) Antialiasing
- 8) DFT is applied to _____
- a) Infinite sequence
 - b) Finite discrete sequence
 - c) Continuous infinite signals
 - d) Continuous finite sequence
- 9) The basic properties of DFT includes _____
- a) Linearity
 - b) Periodicity
 - c) Summation
 - d) Circular symmetry
- 10) Giving one period of periodic convolution is called _____
- a) Periodic convolution
 - b) Aperiodic convolution
 - c) Correlation
 - d) Circular convolution
- 11) Forward and inverse Fourier transform exists for samples having Values _____
- a) Integers
 - b) Infinite
 - c) Finite
 - d) Discrete
- 12) For the calculation of N-point DFT, Radix-2 FFT algorithm repeats _____ stages.
- a) $2(N \log_2 N)$
 - b) $(N \log_2 N)^2 / 2$
 - c) $(N \log_2 N) / 2$ stages
 - d) $(\log N / 2N)$
- 13) _____ system filters exhibit their dependency upon the system design for stability response ?
- a) FIR
 - b) IIR
 - c) Both a) and b)
 - d) None
- 14) In cascade form of realization _____ bits should be used to represent the FIR filters coefficient.
- a) 5 to 10
 - b) 12 to 14
 - c) 20 to 24
 - d) 28 to 40
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Friday, 24-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) State the shifting property of DFT.
- 2) Compute N point DFT of $x(n) = 3\delta(n)$.
- 3) Determine the DFT of the given sequence,

$$x(n) = \begin{cases} 1/5, & \text{for } -1 \leq n \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

- 4) Compare direct form I and direct form II realisations of IIR systems.
- 5) Realise the following causal linear phase FIR system function

$$H(Z) = \frac{2}{3} + Z^{-1} + \frac{2}{3}Z^{-2}.$$

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

- 1) Determine the direct forms I and II realisations for a third order IIR transfer function

$$H(z) = \frac{0.28z^2 + 0.319z + 0.04}{0.5z^3 + 0.3z^2 + 0.17z - 0.2}$$

- 2) Compute the DFT's of the sequence $x(n) = \cos \frac{n\pi}{2}$, where $N = 4$ using DIFFFT algorithm.
- 3) Find the linear convolution through circular convolution of $x_1(n)$ and $x_2(n)$
 $x_1(n) = \delta(n) + \delta(n-1) + \delta(n-2)$
 $x_2(n) = 2\delta(n) - \delta(n-1) + 2\delta(n-2)$



SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

1) The length of FIR filter is 13. If the filter has a linear phase show that

$$\sum_{n=0}^{M-1/2} h(n) \sin w(\tau - n) = 0.$$

2) What is an IIR filter ? Compare its characteristic with a FIR filter.

3) Explain how noise cancellation is done using Adaptive filters.

4) Consider a single weight adaptive filter shown and write LMS algorithm for updating the weight W.

5) For the analog transfer function, $H(s) = \frac{1}{(s+1)(s+2)}$, determine H(z) using impulse invariant technique. Assume T = 1 second.

5. Attempt **any two** question :

(6×2=12)

1) Convert the given analog filter with system function $H(s) = \frac{s+0.1}{(s+0.1)^2 + g}$

into digital IIR filter using bilinear transformation with $W_r = \frac{\pi}{4}$.

2) List the three well known methods into design techniques for FIR filters and explain any one in detail.

3) Explain following terms in short :

a) Adaptive noise cancellation

b) Adaptive equalisation.



SLR-TJ – 421

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Set	R
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T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING

Day and Date : Friday, 24-11-2017
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 :

14

- For the calculation of N-point DFT, Radix-2 FFT algorithm repeats _____ stages.
 - $2(N\log_2 N)$
 - $(N\log_2 N)^2/2$
 - $(N\log_2 N)/2$ stages
 - $(\log_2 N)/2N$
- _____ system filters exhibit their dependency upon the system design for stability response ?
 - FIR
 - IIR
 - Both a) and b)
 - None
- In cascade form of realization _____ bits should be used to represent the FIR filters coefficient.
 - 5 to 10
 - 12 to 14
 - 20 to 24
 - 28 to 40
- _____ is the operating level of sampling rate for the subfilters involved in polyphase filters.
 - Low
 - Moderate
 - High
 - None
- The S-plane and Z-plane are related as _____.
 - $Z = e^{ST}$
 - $Z = e^{2ST}$
 - $Z = 2e^{ST}$
 - $Z = e^{ST/2}$

P.T.O.



- 6) _____ is an method for implementing an FIR system.
- a) Direct form
 - b) Cascade form
 - c) Lattice form
 - d) All of above
- 7) The realization of FIR filter by frequency sampling realization can be viewed as cascade of _____ filters.
- a) 2
 - b) 3
 - c) 4
 - d) 6
- 8) IIR digital filters are of following nature _____
- a) Recursive
 - b) Non recursive
 - c) Reversive
 - d) Non reversive
- 9) A causal and stable IIR filter has _____
- a) Linear phase
 - b) No linear phase
 - c) Linear amplitude
 - d) No amplitude
- 10) _____ of the IIR filter design is antialiasing method.
- a) Aliasing
 - b) Warping
 - c) Prewarping
 - d) Antialiasing
- 11) DFT is applied to _____
- a) Infinite sequence
 - b) Finite discrete sequence
 - c) Continuous infinite signals
 - d) Continuous finite sequence
- 12) The basic properties of DFT includes _____
- a) Linearity
 - b) Periodicity
 - c) Summation
 - d) Circular symmetry
- 13) Giving one period of periodic convolution is called _____
- a) Periodic convolution
 - b) Aperiodic convolution
 - c) Correlation
 - d) Circular convolution
- 14) Forward and inverse Fourier transform exists for samples having Values _____
- a) Integers
 - b) Infinite
 - c) Finite
 - d) Discrete
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Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Friday, 24-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) State the shifting property of DFT.
- 2) Compute N point DFT of $x(n) = 3\delta(n)$.
- 3) Determine the DFT of the given sequence,

$$x(n) = \begin{cases} 1/5, & \text{for } -1 \leq n \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

- 4) Compare direct form I and direct form II realisations of IIR systems.
- 5) Realise the following causal linear phase FIR system function

$$H(Z) = \frac{2}{3} + Z^{-1} + \frac{2}{3}Z^{-2}.$$

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

- 1) Determine the direct forms I and II realisations for a third order IIR transfer function

$$H(z) = \frac{0.28z^2 + 0.319z + 0.04}{0.5z^3 + 0.3z^2 + 0.17z - 0.2}$$

- 2) Compute the DFT's of the sequence $x(n) = \cos \frac{n\pi}{2}$, where $N = 4$ using DIFFFT algorithm.
- 3) Find the linear convolution through circular convolution of $x_1(n)$ and $x_2(n)$
 $x_1(n) = \delta(n) + \delta(n-1) + \delta(n-2)$
 $x_2(n) = 2\delta(n) - \delta(n-1) + 2\delta(n-2)$



SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

1) The length of FIR filter is 13. If the filter has a linear phase show that

$$\sum_{n=0}^{M-1/2} h(n) \sin w(\tau - n) = 0.$$

2) What is an IIR filter ? Compare its characteristic with a FIR filter.

3) Explain how noise cancellation is done using Adaptive filters.

4) Consider a single weight adaptive filter shown and write LMS algorithm for updating the weight W.

5) For the analog transfer function, $H(s) = \frac{1}{(s+1)(s+2)}$, determine H(z) using impulse invariant technique. Assume T = 1 second.

5. Attempt **any two** question :

(6×2=12)

1) Convert the given analog filter with system function $H(s) = \frac{s+0.1}{(s+0.1)^2 + g}$

into digital IIR filter using bilinear transformation with $W_r = \frac{\pi}{4}$.

2) List the three well known methods into design techniques for FIR filters and explain any one in detail.

3) Explain following terms in short :

a) Adaptive noise cancellation

b) Adaptive equalisation.



SLR-TJ – 421

Seat No.	
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Set	S
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T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING

Day and Date : Friday, 24-11-2017
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 :

14

- 1) _____ is an method for implementing an FIR system.
 - a) Direct form
 - b) Cascade form
 - c) Lattice form
 - d) All of above
- 2) The realization of FIR filter by frequency sampling realization can be viewed as cascade of _____ filters.
 - a) 2
 - b) 3
 - c) 4
 - d) 6
- 3) IIR digital filters are of following nature _____
 - a) Recursive
 - b) Non recursive
 - c) Reversive
 - d) Non reversive
- 4) A causal and stable IIR filter has _____
 - a) Linear phase
 - b) No linear phase
 - c) Linear amplitude
 - d) No amplitude
- 5) _____ of the IIR filter design is antialiasing method.
 - a) Aliasing
 - b) Warping
 - c) Prewarping
 - d) Antialiasing

P.T.O.



- 6) DFT is applied to _____
- a) Infinite sequence b) Finite discrete sequence
c) Continuous infinite signals d) Continuous finite sequence
- 7) The basic properties of DFT includes _____
- a) Linearity b) Periodicity
c) Summation d) Circular symmetry
- 8) Giving one period of periodic convolution is called _____
- a) Periodic convolution b) Aperiodic convolution
c) Correlation d) Circular convolution
- 9) Forward and inverse Fourier transform exists for samples having Values _____
- a) Integers b) Infinite
c) Finite d) Discrete
- 10) For the calculation of N-point DFT, Radix-2 FFT algorithm repeats _____ stages.
- a) $2(N\log_2 N)$ b) $(N\log_2 N)^2/2$
c) $(N\log_2 N)/2$ stages d) $(\log_2 N/2N)$
- 11) _____ system filters exhibit their dependency upon the system design for stability response ?
- a) FIR b) IIR
c) Both a) and b) d) None
- 12) In cascade form of realization _____ bits should be used to represent the FIR filters coefficient.
- a) 5 to 10 b) 12 to 14
c) 20 to 24 d) 28 to 40
- 13) _____ is the operating level of sampling rate for the subfilters involved in polyphase filters.
- a) Low b) Moderate
c) High d) None
- 14) The S-plane and Z-plane are related as _____
- a) $Z = e^{ST}$ b) $Z = e^{2ST}$
c) $Z = 2e^{ST}$ d) $Z = e^{ST/2}$
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) (CGPA) Examination, 2017
DIGITAL SIGNAL PROCESSING**

Day and Date : Friday, 24-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

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

- 1) State the shifting property of DFT.
- 2) Compute N point DFT of $x(n) = 3\delta(n)$.
- 3) Determine the DFT of the given sequence,

$$x(n) = \begin{cases} 1/5, & \text{for } -1 \leq n \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

- 4) Compare direct form I and direct form II realisations of IIR systems.
- 5) Realise the following causal linear phase FIR system function

$$H(Z) = \frac{2}{3} + Z^{-1} + \frac{2}{3}Z^{-2}.$$

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

- 1) Determine the direct forms I and II realisations for a third order IIR transfer function

$$H(z) = \frac{0.28z^2 + 0.319z + 0.04}{0.5z^3 + 0.3z^2 + 0.17z - 0.2}$$

- 2) Compute the DFT's of the sequence $x(n) = \cos \frac{n\pi}{2}$, where $N = 4$ using DIFFFT algorithm.
- 3) Find the linear convolution through circular convolution of $x_1(n)$ and $x_2(n)$
 $x_1(n) = \delta(n) + \delta(n-1) + \delta(n-2)$
 $x_2(n) = 2\delta(n) - \delta(n-1) + 2\delta(n-2)$



SECTION – II

4. Attempt **any 4** questions :

(4×4=16)

1) The length of FIR filter is 13. If the filter has a linear phase show that

$$\sum_{n=0}^{M-1/2} h(n) \sin w(\tau - n) = 0.$$

2) What is an IIR filter ? Compare its characteristic with a FIR filter.

3) Explain how noise cancellation is done using Adaptive filters.

4) Consider a single weight adaptive filter shown and write LMS algorithm for updating the weight W.

5) For the analog transfer function, $H(s) = \frac{1}{(s+1)(s+2)}$, determine H(z) using impulse invariant technique. Assume T = 1 second.

5. Attempt **any two** question :

(6×2=12)

1) Convert the given analog filter with system function $H(s) = \frac{s+0.1}{(s+0.1)^2 + g}$

into digital IIR filter using bilinear transformation with $W_r = \frac{\pi}{4}$.

2) List the three well known methods into design techniques for FIR filters and explain any one in detail.

3) Explain following terms in short :

a) Adaptive noise cancellation

b) Adaptive equalisation.



SLR-TJ – 422

Seat No.	
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Set

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**T.E. (Biomedical Engg.) (Part – II) Examination, 2017
EMBEDDED SYSTEM (CGPA)**

Day and Date : Saturday, 25-11-2017
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 answer :

(14×1=14)

- 1) I2C is the master
 - a) SPI
 - b) CAN
 - c) Protocol
 - d) None of the above
- 2) _____ mode is a special version of user mode that allows full read-write access to the CPSV.
 - a) Supervisor
 - b) System
 - c) Undefined
 - d) Abort
- 3) In ARM _____ exception is having the highest priority.
 - a) Reset
 - b) Supervisor
 - c) System
 - d) Interrupt request
- 4) A _____ is a situation in which two tasks are each unknowingly waiting for resources.
 - a) priority inversion
 - b) deadlock
 - c) pending
 - d) dormant
- 5) _____ is a half-duplex communication protocol.
 - a) SPI
 - b) I2C
 - c) CAN
 - d) All of the above
- 6) A communication protocol specifies
 - a) the ways of communication of signals on 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

P.T.O.



- 7) Inter process communication can be done through
- a) Mails
 - b) Messages
 - c) System calls
 - d) Traps
- 8) _____ software allows the system activities to be divided into multiples independent elements called tasks.
- a) Kernel
 - b) Shell
 - c) Processor
 - d) Device driver
- 9) _____ is the μ C/OS – II services is used to delete task.
- a) OSTask Create ()
 - b) OSTask Del ()
 - c) OSTask Resume ()
 - d) OSSemTask ()
- 10) μ COS – II can manage upto _____ tasks.
- a) 20
 - b) 64
 - c) 128
 - d) 256
- 11) For real time operating system, interrupt latency should be
- a) minimal
 - b) zero
 - c) maximum
 - d) dependent on the scheduling
- 12) RISC stands for
- a) Restricted Instruction Sequencing Computer
 - b) Restricted Instruction Sequential Compiler
 - c) Reduced Instruction Set Computer
 - d) Reduced Induction Set Computer
- 13) In ARM7 core architecture register _____ is used as stack pointer.
- a) R 12
 - b) R 13
 - c) R 14
 - d) R 15
- 14) In ARM 7 TDMI-S, T Stands for
- a) Transfer
 - b) Transmission
 - c) Thumb
 - d) Telecommunication
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) Examination, 2017
EMBEDDED SYSTEM (CGPA)**

Day and Date : Saturday, 25-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Describe various addressing modes in ARM processor.
 - 2) Explain the communication protocol I2C in detail.
 - 3) Define and differentiate between RISC and CISC architecture.
 - 4) List and describe various communication protocols used in embedded system.
 - 5) With help of block diagram explain working of PLL.
3. Attempt **any two** : **(6×2=12)**
- 1) Define and describe concept of direct memory access in detail.
 - 2) Explain three types of instruction sets in RAM with each two instructions in detail.
 - 3) Explain the concept of interrupt controller for LPC 2148.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) List the types of priority based Kernels and describe any one with example.
 - 2) Explain embedded communication using CAN and Ethernet.
 - 3) Explain GSM module with AT commands and state its importance in embedded communication.
 - 4) Explain concept of RTOS porting in embedded.
 - 5) Define RTOS and differentiate between soft and hard real time system with examples.

Set P



5. Attempt **any two** questions :

(6×2=12)

- 1) Describe various inter-task/process communication tools like mailbox and messages queue used in RTOS environment with example.
 - 2) Define task and the states of task. Describe the characteristic of each task state with block diagram of task control block.
 - 3) List and explain various features of Micro OS-II system.
-



SLR-TJ – 422

Seat No.	
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Set

Q

**T.E. (Biomedical Engg.) (Part – II) Examination, 2017
EMBEDDED SYSTEM (CGPA)**

Day and Date : Saturday, 25-11-2017
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 answer : **(14×1=14)**

- 1) _____ software allows the system activities to be divided into multiples independent elements called tasks.
 - a) Kernel
 - b) Shell
 - c) Processor
 - d) Device driver
- 2) _____ is the μ C/OS – II services is used to delete task.
 - a) OSTask Create ()
 - b) OSTask Del ()
 - c) OSTask Resume ()
 - d) OSSemTask ()
- 3) μ COS– II can manage upto _____ tasks.
 - a) 20
 - b) 64
 - c) 128
 - d) 256
- 4) For real time operating system, interrupt latency should be
 - a) minimal
 - b) zero
 - c) maximum
 - d) dependent on the scheduling
- 5) RISC stands for
 - a) Restricted Instruction Sequencing Computer
 - b) Restricted Instruction Sequential Compiler
 - c) Reduced Instruction Set Computer
 - d) Reduced Induction Set Computer
- 6) In ARM7 core architecture register _____ is used as stack pointer.
 - a) R 12
 - b) R 13
 - c) R 14
 - d) R 15

P.T.O.



- 7) In ARM 7 TDMI-S, T Stands for
a) Transfer
b) Transmission
c) Thumb
d) Telecommunication
- 8) I2C is the master
a) SPI
b) CAN
c) Protocol
d) None of the above
- 9) _____ mode is a special version of user mode that allows full read-write access to the CPSV.
a) Supervisor
b) System
c) Undefined
d) Abort
- 10) In ARM _____ exception is having the highest priority.
a) Reset
b) Supervisor
c) System
d) Interrupt request
- 11) A _____ is a situation in which two tasks are each unknowingly waiting for resources.
a) priority inversion
b) deadlock
c) pending
d) dormant
- 12) _____ is a half-duplex communication protocol.
a) SPI
b) I2C
c) CAN
d) All of the above
- 13) A communication protocol specifies
a) the ways of communication of signals on 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
- 14) Inter process communication can be done through
a) Mails
b) Messages
c) System calls
d) Traps
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) Examination, 2017
EMBEDDED SYSTEM (CGPA)**

Day and Date : Saturday, 25-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Describe various addressing modes in ARM processor.
 - 2) Explain the communication protocol I2C in detail.
 - 3) Define and differentiate between RISC and CISC architecture.
 - 4) List and describe various communication protocols used in embedded system.
 - 5) With help of block diagram explain working of PLL.
3. Attempt **any two** : **(6×2=12)**
- 1) Define and describe concept of direct memory access in detail.
 - 2) Explain three types of instruction sets in RAM with each two instructions in detail.
 - 3) Explain the concept of interrupt controller for LPC 2148.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) List the types of priority based Kernels and describe any one with example.
 - 2) Explain embedded communication using CAN and Ethernet.
 - 3) Explain GSM module with AT commands and state its importance in embedded communication.
 - 4) Explain concept of RTOS porting in embedded.
 - 5) Define RTOS and differentiate between soft and hard real time system with examples.

Set Q



5. Attempt **any two** questions :

(6×2=12)

- 1) Describe various inter-task/process communication tools like mailbox and messages queue used in RTOS environment with example.
 - 2) Define task and the states of task. Describe the characteristic of each task state with block diagram of task control block.
 - 3) List and explain various features of Micro OS-II system.
-



- 7) For real time operating system, interrupt latency should be
- a) minimal
 - b) zero
 - c) maximum
 - 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) R 12
 - b) R 13
 - c) R 14
 - d) R 15
- 10) In ARM 7 TDMI-S, T Stands for
- a) Transfer
 - b) Transmission
 - c) Thumb
 - d) Telecommunication
- 11) I2C is the master
- a) SPI
 - b) CAN
 - c) Protocol
 - d) None of the above
- 12) _____ mode is a special version of user mode that allows full read-write access to the CPSV.
- a) Supervisor
 - b) System
 - c) Undefined
 - d) Abort
- 13) In ARM ____ exception is having the highest priority.
- a) Reset
 - b) Supervisor
 - c) System
 - d) Interrupt request
- 14) A _____ is a situation in which two tasks are each unknowingly waiting for resources.
- a) priority inversion
 - b) deadlock
 - c) pending
 - d) dormant
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) Examination, 2017
EMBEDDED SYSTEM (CGPA)**

Day and Date : Saturday, 25-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Describe various addressing modes in ARM processor.
 - 2) Explain the communication protocol I2C in detail.
 - 3) Define and differentiate between RISC and CISC architecture.
 - 4) List and describe various communication protocols used in embedded system.
 - 5) With help of block diagram explain working of PLL.
3. Attempt **any two** : **(6×2=12)**
- 1) Define and describe concept of direct memory access in detail.
 - 2) Explain three types of instruction sets in RAM with each two instructions in detail.
 - 3) Explain the concept of interrupt controller for LPC 2148.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) List the types of priority based Kernels and describe any one with example.
 - 2) Explain embedded communication using CAN and Ethernet.
 - 3) Explain GSM module with AT commands and state its importance in embedded communication.
 - 4) Explain concept of RTOS porting in embedded.
 - 5) Define RTOS and differentiate between soft and hard real time system with examples.

Set R



5. Attempt **any two** questions :

(6×2=12)

- 1) Describe various inter-task/process communication tools like mailbox and messages queue used in RTOS environment with example.
 - 2) Define task and the states of task. Describe the characteristic of each task state with block diagram of task control block.
 - 3) List and explain various features of Micro OS-II system.
-



SLR-TJ – 422

Seat No.	
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Set

S

**T.E. (Biomedical Engg.) (Part – II) Examination, 2017
EMBEDDED SYSTEM (CGPA)**

Day and Date : Saturday, 25-11-2017
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 answer :

(14×1=14)

- 1) μ COS – II can manage upto ____ tasks.
 - a) 20
 - b) 64
 - c) 128
 - d) 256
- 2) For real time operating system, interrupt latency should be
 - a) minimal
 - b) zero
 - c) maximum
 - d) dependent on the scheduling
- 3) RISC stands for
 - a) Restricted Instruction Sequencing Computer
 - b) Restricted Instruction Sequential Compiler
 - c) Reduced Instruction Set Computer
 - d) Reduced Induction Set Computer
- 4) In ARM7 core architecture register ____ is used as stack pointer.
 - a) R 12
 - b) R 13
 - c) R 14
 - d) R 15
- 5) In ARM 7 TDMI-S, T Stands for
 - a) Transfer
 - b) Transmission
 - c) Thumb
 - d) Telecommunication
- 6) I2C is the master
 - a) SPI
 - b) CAN
 - c) Protocol
 - d) None of the above

P.T.O.



- 7) _____ mode is a special version of user mode that allows full read-write access to the CPSV.
- a) Supervisor
 - b) System
 - c) Undefined
 - d) Abort
- 8) In ARM _____ exception is having the highest priority.
- a) Reset
 - b) Supervisor
 - c) System
 - d) Interrupt request
- 9) A _____ is a situation in which two tasks are each unknowingly waiting for resources.
- a) priority inversion
 - b) deadlock
 - c) pending
 - d) dormant
- 10) _____ is a half-duplex communication protocol.
- a) SPI
 - b) I2C
 - c) CAN
 - d) All of the above
- 11) A communication protocol specifies
- a) the ways of communication of signals on 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
- 12) Inter process communication can be done through
- a) Mails
 - b) Messages
 - c) System calls
 - d) Traps
- 13) _____ software allows the system activities to be divided into multiples independent elements called tasks.
- a) Kernel
 - b) Shell
 - c) Processor
 - d) Device driver
- 14) _____ is the μ C/OS – II services is used to delete task.
- a) OSTask Create ()
 - b) OSTask Del ()
 - c) OSTask Resume ()
 - d) OSSemTask ()
-



Seat No.	
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**T.E. (Biomedical Engg.) (Part – II) Examination, 2017
EMBEDDED SYSTEM (CGPA)**

Day and Date : Saturday, 25-11-2017
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any four** questions : **(4×4=16)**
- 1) Describe various addressing modes in ARM processor.
 - 2) Explain the communication protocol I2C in detail.
 - 3) Define and differentiate between RISC and CISC architecture.
 - 4) List and describe various communication protocols used in embedded system.
 - 5) With help of block diagram explain working of PLL.
3. Attempt **any two** : **(6×2=12)**
- 1) Define and describe concept of direct memory access in detail.
 - 2) Explain three types of instruction sets in RAM with each two instructions in detail.
 - 3) Explain the concept of interrupt controller for LPC 2148.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) List the types of priority based Kernels and describe any one with example.
 - 2) Explain embedded communication using CAN and Ethernet.
 - 3) Explain GSM module with AT commands and state its importance in embedded communication.
 - 4) Explain concept of RTOS porting in embedded.
 - 5) Define RTOS and differentiate between soft and hard real time system with examples.

Set S



5. Attempt **any two** questions :

(6×2=12)

- 1) Describe various inter-task/process communication tools like mailbox and messages queue used in RTOS environment with example.
 - 2) Define task and the states of task. Describe the characteristic of each task state with block diagram of task control block.
 - 3) List and explain various features of Micro OS-II system.
-



- 9) The SPET technique uses a _____ to record images at a series of angles around the patient.
- a) rectilinear scanner b) gamma camera
c) multiscanner d) multicrystal camera
- 10) The isotopes of radioactive elements are usually produced
- a) reactor b) cyclotron
c) radio pharmaceutical d) pulse analyzer
- 11) _____ expresses the intensity of an gamma ray beam.
- a) Dose b) Exposure c) Slice d) Specificity
- 12) _____ is the radiation energy absorbed per unit mass of absorbing material.
- a) Exposure b) Absorbed dose
c) Incident radiation d) Exposure rate
- 13) _____ describes both absorption and scattering of radiation.
- a) Resolution b) Specificity c) Attenuation d) Exposure
- 14) A _____ is used to improve the spatial resolution of a gamma camera.
- a) grids b) digital camera
c) scanner d) collimator
-



Seat No.	
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
NUCLEAR MEDICINE**

Day and Date : Tuesday, 28-11-2017

Marks : 56

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

SECTION – I

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

- 1) Derive the relationship between the decay constant and the half life.
- 2) The half life of ^{99m}Tc is 6 hours. After how much time will $\frac{1}{16}$ th of radioisotope remain ?
- 3) With the help of diagram explain photo electric effect and Compton effect of radiation.
- 4) List various types of detectors and explain working of any one of it.
- 5) Explain process of gamma ray spectrometry.

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

- 1) Explain construction, working of all types of collimators.
- 2) Draw and explain working of gamma counting system for invivo measurements.
- 3) Explain working of kidney uptake monitory system and compare it with thyroid uptake monitoring system.

SECTION – II

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

- 1) Define and differentiate between single and double isotope methods.
- 2) Explain working of liquid scintillation system.
- 3) Define and explain internal and external radiation hazards.
- 4) Explain various quality control function of PET or SPET.
- 5) Explain back projection technique for image reconstruction of PET scan.

Set P



5. Attempt **any 2** questions :

(6×2=12)

- 1) Explain various biological effects of radiation exposure.
 - 2) With the help of diagram explain principles, working and application of PET system.
 - 3) Explain working of RIA system and mention its any 2 applications.
-



SLR-TJ – 423

Seat No.	
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Set	Q
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
NUCLEAR MEDICINE**

Day and Date : Tuesday, 28-11-2017
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) PET is an imaging modality for obtaining _____ cross sectional images.
a) invitro b) invivo c) planer d) linear
- 2) The SPET technique uses a _____ to record images at a series of angles around the patient.
a) rectilinear scanner b) gamma camera
c) multiscanner d) multicrystal camera
- 3) The isotopes of radioactive elements are usually produced
a) reactor b) cyclotron
c) radio pharmaceutical d) pulse analyzer
- 4) _____ expresses the intensity of an gamma ray beam.
a) Dose b) Exposure c) Slice d) Specificity
- 5) _____ is the radiation energy absorbed per unit mass of absorbing material.
a) Exposure b) Absorbed dose
c) Incident radiation d) Exposure rate
- 6) _____ describes both absorption and scattering of radiation.
a) Resolution b) Specificity c) Attenuation d) Exposure
- 7) A _____ is used to improve the spatial resolution of a gamma camera.
a) grids b) digital camera
c) scanner d) collimator
- 8) Radioactive decay is a _____ process.
a) random b) nonspontaneous
c) regular d) massive

P.T.O.



Seat No.	
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
NUCLEAR MEDICINE**

Day and Date : Tuesday, 28-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Derive the relationship between the decay constant and the half life.
- 2) The half life of ^{99m}Tc is 6 hours. After how much time will $\frac{1}{16}$ th of radioisotope remain ?
- 3) With the help of diagram explain photo electric effect and Compton effect of radiation.
- 4) List various types of detectors and explain working of any one of it.
- 5) Explain process of gamma ray spectrometry.

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

- 1) Explain construction, working of all types of collimators.
- 2) Draw and explain working of gamma counting system for invivo measurements.
- 3) Explain working of kidney uptake monitory system and compare it with thyroid uptake monitoring system.

SECTION – II

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

- 1) Define and differentiate between single and double isotope methods.
- 2) Explain working of liquid scintillation system.
- 3) Define and explain internal and external radiation hazards.
- 4) Explain various quality control function of PET or SPET.
- 5) Explain back projection technique for image reconstruction of PET scan.

Set Q



5. Attempt **any 2** questions :

(6×2=12)

- 1) Explain various biological effects of radiation exposure.
 - 2) With the help of diagram explain principles, working and application of PET system.
 - 3) Explain working of RIA system and mention its any 2 applications.
-



Seat No.	
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
NUCLEAR MEDICINE**

Day and Date : Tuesday, 28-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Derive the relationship between the decay constant and the half life.
- 2) The half life of ^{99m}Tc is 6 hours. After how much time will $\frac{1}{16}$ th of radioisotope remain ?
- 3) With the help of diagram explain photo electric effect and Compton effect of radiation.
- 4) List various types of detectors and explain working of any one of it.
- 5) Explain process of gamma ray spectrometry.

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

- 1) Explain construction, working of all types of collimators.
- 2) Draw and explain working of gamma counting system for invivo measurements.
- 3) Explain working of kidney uptake monitory system and compare it with thyroid uptake monitoring system.

SECTION – II

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

- 1) Define and differentiate between single and double isotope methods.
- 2) Explain working of liquid scintillation system.
- 3) Define and explain internal and external radiation hazards.
- 4) Explain various quality control function of PET or SPET.
- 5) Explain back projection technique for image reconstruction of PET scan.

Set R



5. Attempt **any 2** questions :

(6×2=12)

- 1) Explain various biological effects of radiation exposure.
 - 2) With the help of diagram explain principles, working and application of PET system.
 - 3) Explain working of RIA system and mention its any 2 applications.
-



SLR-TJ – 423

Seat No.	
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Set	S
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
NUCLEAR MEDICINE**

Day and Date : Tuesday, 28-11-2017
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) The isotopes of radioactive elements are usually produced
 - a) reactor
 - b) cyclotron
 - c) radio pharmaceutical
 - d) pulse analyzer
- 2) _____ expresses the intensity of an gamma ray beam.
 - a) Dose
 - b) Exposure
 - c) Slice
 - d) Specificity
- 3) _____ is the radiation energy absorbed per unit mass of absorbing material.
 - a) Exposure
 - b) Absorbed dose
 - c) Incident radiation
 - d) Exposure rate
- 4) _____ describes both absorption and scattering of radiation.
 - a) Resolution
 - b) Specificity
 - c) Attenuation
 - d) Exposure
- 5) A _____ is used to improve the spatial resolution of a gamma camera.
 - a) grids
 - b) digital camera
 - c) scanner
 - d) collimator
- 6) Radioactive decay is a _____ process.
 - a) random
 - b) nonspontaneous
 - c) regular
 - d) massive
- 7) In gamma emission change in nucleon number is
 - a) zero
 - b) definite
 - c) increase by 1
 - d) decrease by one
- 8) The _____ is a stationary imaging device for the organ of interest.
 - a) rectilinear scanner
 - b) pulse height analyzer
 - c) scintillation detector
 - d) gamma camera

P.T.O.



- 9) A scintillator is a _____ substance which produces minute flashes of light in the visible range.
a) magnetic b) crystalline c) gaseous d) diffused
- 10) Gamma particles constitute _____ radiation that travels at the speed of light.
a) ultraviolet b) infrared
c) electromagnetic d) e light
- 11) The half life of a radioactive isotope is given by $t^{1/2} = \frac{\ln 2}{\lambda}$ = _____
a) $\frac{\lambda}{0.693}$ b) $\frac{0.693}{\lambda}$ c) $\frac{2 \times 10^5}{\lambda}$ d) $\frac{\lambda}{2 \times 10^5}$
- 12) SPECT cameras detect only _____ that produce a cascaded emission of single photons.
a) single image b) slice of image c) radio nuclides d) 3D image
- 13) PET is an imaging modality for obtaining _____ cross sectional images.
a) invitro b) invivo c) planer d) linear
- 14) The SPET technique uses a _____ to record images at a series of angles around the patient.
a) rectilinear scanner b) gamma camera
c) multiscanner d) multicrystal camera
-



Seat No.	
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
NUCLEAR MEDICINE**

Day and Date : Tuesday, 28-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Derive the relationship between the decay constant and the half life.
- 2) The half life of ^{99m}Tc is 6 hours. After how much time will $\frac{1}{16}$ th of radioisotope remain ?
- 3) With the help of diagram explain photo electric effect and Compton effect of radiation.
- 4) List various types of detectors and explain working of any one of it.
- 5) Explain process of gamma ray spectrometry.

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

- 1) Explain construction, working of all types of collimators.
- 2) Draw and explain working of gamma counting system for invivo measurements.
- 3) Explain working of kidney uptake monitory system and compare it with thyroid uptake monitoring system.

SECTION – II

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

- 1) Define and differentiate between single and double isotope methods.
- 2) Explain working of liquid scintillation system.
- 3) Define and explain internal and external radiation hazards.
- 4) Explain various quality control function of PET or SPET.
- 5) Explain back projection technique for image reconstruction of PET scan.

Set S



5. Attempt **any 2** questions :

(6×2=12)

- 1) Explain various biological effects of radiation exposure.
 - 2) With the help of diagram explain principles, working and application of PET system.
 - 3) Explain working of RIA system and mention its any 2 applications.
-



SLR-TJ – 424

Seat No.	
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Set	P
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Thursday, 30-11-2017
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 :

(1×14=14)

- 1) Prospects of medical informatics includes
 - a) Medical informatics
 - b) Introduction of health care informatics
 - c) Introduction of digital knowledge system
 - d) All the above
- 2) DICOM stands for
 - a) Digital Image Compression
 - b) Digital Image Communication
 - c) Data Integration Communication
 - d) None
- 3) In complete functionality of occur because of
 - a) Lack of computer awareness
 - b) Unavailability of components
 - c) Disconnection in network
 - d) All of above
- 4) Among these which is not type of knowledge in expert system.
 - a) Declarative knowledge
 - b) Procedural knowledge
 - c) Heuristic knowledge
 - d) Standard knowledge
- 5) Diet for the patient is given in
 - a) Diet planning module
 - b) Procedure module
 - c) Patient care module
 - d) None
- 6) One voxel contain _____ number.
 - a) two 8-bit
 - b) four 8-bit
 - c) two 16-bit
 - d) four 16-bit

P.T.O.



- 7) Birth and death records are maintained in
- a) Indoor ward module
 - b) Personal registration module
 - c) General information module
 - d) Central registration module
- 8) The _____ is the heart of hospital.
- a) Radiology
 - b) Clinical laboratory
 - c) Pathology
 - d) Pharmacy
- 9) Tele-education consists of _____ education.
- a) Both real-time videoconferencing as well as non real time video conferencing
 - b) Only real-time videoconferencing
 - c) Only non real-time
 - d) None
- 10) CAME helps to
- a) Manage information
 - b) Support patient care decision
 - c) Selection of treatment
 - d) All above
- 11) CAPE stands
- a) Computer-Assisted Patient Education
 - b) Computer-Assisted Program Event
 - c) Communication According Program Event
 - d) None
- 12) Robotics and image guided surgery are based on _____ of the patient.
- a) 2-D images
 - b) 1-D image
 - c) 3-D image
 - d) All above
- 13) The real-time imaging shows _____ changes occurring during the operation.
- a) Cell
 - b) Muscle
 - c) Tissue
 - d) None
- 14) Store and forward technology is used in
- a) Tele-surgery
 - b) Tele-education
 - c) Tele-medicine
 - d) None
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Seat No.	
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Thursday, 30-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any three** questions : **(3×4=12)**
- 1) What are the different standard organizations of MI ? Also explain their functions.
 - 2) What are the needs and capabilities for HIMS ?
 - 3) Explain the functions of patient case module of HIMS ?
 - 4) Explain in detail volume image data file.
3. Attempt **any two** questions : **(2×8=16)**
- 1) Explain the applications of surgical simulator in :
 - i) Computer aided plastic surgery
 - ii) Orthopedic
 - 2) What is HIMS ? List advantages of HIMS.
 - 3) Write a short note on :
 - i) Online learning in MI
 - ii) Pharmacy module of HIMS.

SECTION – II

4. Attempt **any three** questions : **(3×4=12)**
- 1) Explain in detail the applications of ES in Drug therapy.
 - 2) What is telemedicine ? Explain applications of telemedicine pediatric.
 - 3) What is CAPE ? Why should doctor consider CAPE into their practice ?
 - 4) Explain different development tools used in CPR.



5. Attempt **any two** questions :

(2×8=16)

- 1) How telemedicine is reliable and cost effective ? Explain in detail.
 - 2) Why tele-surgery is need ? Explain in detail. Also write the advantages of tele-surgery.
 - 3) What is CAME ? Write different types of educational software are used. Explain any one of them.
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Seat No.	
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Set	Q
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Thursday, 30-11-2017
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 :

(1×14=14)

- 1) The _____ is the heart of hospital.
 - a) Radiology
 - b) Clinical laboratory
 - c) Pathology
 - d) Pharmacy
- 2) Tele-education consists of _____ education.
 - a) Both real-time videoconferencing as well as non real time video conferencing
 - b) Only real-time videoconferencing
 - c) Only non real-time
 - d) None
- 3) CAME helps to
 - a) Manage information
 - b) Support patient care decision
 - c) Selection of treatment
 - d) All above
- 4) CAPE stands
 - a) Computer-Assisted Patient Education
 - b) Computer-Assisted Program Event
 - c) Communication According Program Event
 - d) None
- 5) Robotics and image guided surgery are based on _____ of the patient.
 - a) 2-D images
 - b) 1-D image
 - c) 3-D image
 - d) All above

P.T.O.



- 6) The real-time imaging shows _____ changes occurring during the operation.
- a) Cell b) Muscle c) Tissue d) None
- 7) Store and forward technology is used in
- a) Tele-surgery b) Tele-education
c) Tele-medicine d) None
- 8) Prospects of medical informatics includes
- a) Medical informatics
b) Introduction of health care informatics
c) Introduction of digital knowledge system
d) All the above
- 9) DICOM stands for
- a) Digital Image Compression b) Digital Image Communication
c) Data Integration Communication d) None
- 10) In complete functionality of occur because of
- a) Lack of computer awareness b) Unavailability of components
c) Disconnection in network d) All of above
- 11) Among these which is not type of knowledge in expert system.
- a) Declarative knowledge b) Procedural knowledge
c) Heuristic knowledge d) Standard knowledge
- 12) Diet for the patient is given in
- a) Diet planning module b) Procedure module
c) Patient care module d) None
- 13) One voxel contain _____ number.
- a) two 8-bit b) four 8-bit c) two 16-bit d) four 16-bit
- 14) Birth and death records are maintain in
- a) Indoor ward module b) Personal registration module
c) General information module d) Central registration module
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Thursday, 30-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any three** questions : **(3×4=12)**
- 1) What are the different standard organizations of MI ? Also explain their functions.
 - 2) What are the needs and capabilities for HIMS ?
 - 3) Explain the functions of patient case module of HIMS ?
 - 4) Explain in detail volume image data file.
3. Attempt **any two** questions : **(2×8=16)**
- 1) Explain the applications of surgical simulator in :
 - i) Computer aided plastic surgery
 - ii) Orthopedic
 - 2) What is HIMS ? List advantages of HIMS.
 - 3) Write a short note on :
 - i) Online learning in MI
 - ii) Pharmacy module of HIMS.

SECTION – II

4. Attempt **any three** questions : **(3×4=12)**
- 1) Explain in detail the applications of ES in Drug therapy.
 - 2) What is telemedicine ? Explain applications of telemedicine pediatric.
 - 3) What is CAPE ? Why should doctor consider CAPE into their practice ?
 - 4) Explain different development tools used in CPR.



5. Attempt **any two** questions :

(2×8=16)

- 1) How telemedicine is reliable and cost effective ? Explain in detail.
 - 2) Why tele-surgery is need ? Explain in detail. Also write the advantages of tele-surgery.
 - 3) What is CAME ? Write different types of educational software are used. Explain any one of them.
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SLR-TJ – 424

Seat No.	
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Set	R
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Thursday, 30-11-2017
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 :

(1×14=14)

- 1) Diet for the patient is given in
 - a) Diet planning module
 - b) Procedure module
 - c) Patient care module
 - d) None
- 2) One voxel contain _____ number.
 - a) two 8-bit
 - b) four 8-bit
 - c) two 16-bit
 - d) four 16-bit
- 3) Birth and death records are maintain in
 - a) Indoor ward module
 - b) Personal registration module
 - c) General information module
 - d) Central registration module
- 4) The _____ is the heart of hospital.
 - a) Radiology
 - b) Clinical laboratory
 - c) Pathology
 - d) Pharmacy
- 5) Tele-education consists of _____ education.
 - a) Both real-time videoconferencing as well as non real time video conferencing
 - b) Only real-time videoconferencing
 - c) Only non real-time
 - d) None
- 6) CAME helps to
 - a) Manage information
 - b) Support patient care decision
 - c) Selection of treatment
 - d) All above

P.T.O.



- 7) CAPE stands
- a) Computer-Assisted Patient Education
 - b) Computer-Assisted Program Event
 - c) Communication According Program Event
 - d) None
- 8) Robotics and image guided surgery are based on _____ of the patient.
- a) 2-D images b) 1-D image c) 3-D image d) All above
- 9) The real-time imaging shows _____ changes occurring during the operation.
- a) Cell b) Muscle c) Tissue d) None
- 10) Store and forward technology is used in
- a) Tele-surgery b) Tele-education
 - c) Tele-medicine d) None
- 11) Prospects of medical informatics includes
- a) Medical informatics
 - b) Introduction of health care informatics
 - c) Introduction of digital knowledge system
 - d) All the above
- 12) DICOM stands for
- a) Digital Image Compression b) Digital Image Communication
 - c) Data Integration Communication d) None
- 13) In complete functionality of occur because of
- a) Lack of computer awareness b) Unavailability of components
 - c) Disconnection in network d) All of above
- 14) Among these which is not type of knowledge in expert system.
- a) Declarative knowledge b) Procedural knowledge
 - c) Heuristic knowledge d) Standard knowledge
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Thursday, 30-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any three** questions : **(3×4=12)**
- 1) What are the different standard organizations of MI ? Also explain their functions.
 - 2) What are the needs and capabilities for HIMS ?
 - 3) Explain the functions of patient case module of HIMS ?
 - 4) Explain in detail volume image data file.
3. Attempt **any two** questions : **(2×8=16)**
- 1) Explain the applications of surgical simulator in :
 - i) Computer aided plastic surgery
 - ii) Orthopedic
 - 2) What is HIMS ? List advantages of HIMS.
 - 3) Write a short note on :
 - i) Online learning in MI
 - ii) Pharmacy module of HIMS.

SECTION – II

4. Attempt **any three** questions : **(3×4=12)**
- 1) Explain in detail the applications of ES in Drug therapy.
 - 2) What is telemedicine ? Explain applications of telemedicine pediatric.
 - 3) What is CAPE ? Why should doctor consider CAPE into their practice ?
 - 4) Explain different development tools used in CPR.

Set R



5. Attempt **any two** questions :

(2×8=16)

- 1) How telemedicine is reliable and cost effective ? Explain in detail.
 - 2) Why tele-surgery is need ? Explain in detail. Also write the advantages of tele-surgery.
 - 3) What is CAME ? Write different types of educational software are used. Explain any one of them.
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Thursday, 30-11-2017
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 :

(1×14=14)

- 1) CAME helps to
 - a) Manage information
 - b) Support patient care decision
 - c) Selection of treatment
 - d) All above
- 2) CAPE stands
 - a) Computer-Assisted Patient Education
 - b) Computer-Assisted Program Event
 - c) Communication According Program Event
 - d) None
- 3) Robotics and image guided surgery are based on _____ of the patient.
 - a) 2-D images
 - b) 1-D image
 - c) 3-D image
 - d) All above
- 4) The real-time imaging shows _____ changes occurring during the operation.
 - a) Cell
 - b) Muscle
 - c) Tissue
 - d) None
- 5) Store and forward technology is used in
 - a) Tele-surgery
 - b) Tele-education
 - c) Tele-medicine
 - d) None
- 6) Prospects of medical informatics includes
 - a) Medical informatics
 - b) Introduction of health care informatics
 - c) Introduction of digital knowledge system
 - d) All the above

P.T.O.



- 7) DICOM stands for
a) Digital Image Compression b) Digital Image Communication
c) Data Integration Communication d) None
- 8) In complete functionality of occur because of
a) Lack of computer awareness b) Unavailability of components
c) Disconnection in network d) All of above
- 9) Among these which is not type of knowledge in expert system.
a) Declarative knowledge b) Procedural knowledge
c) Heuristic knowledge d) Standard knowledge
- 10) Diet for the patient is given in
a) Diet planning module b) Procedure module
c) Patient care module d) None
- 11) One voxel contain _____ number.
a) two 8-bit b) four 8-bit c) two 16-bit d) four 16-bit
- 12) Birth and death records are maintain in
a) Indoor ward module b) Personal registration module
c) General information module d) Central registration module
- 13) The _____ is the heart of hospital.
a) Radiology b) Clinical laboratory
c) Pathology d) Pharmacy
- 14) Tele-education consists of _____ education.
a) Both real-time videoconferencing as well as non real time video conferencing
b) Only real-time videoconferencing
c) Only non real-time
d) None
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Seat No.	
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
MEDICAL INFORMATICS**

Day and Date : Thursday, 30-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any three** questions : **(3×4=12)**
- 1) What are the different standard organizations of MI ? Also explain their functions.
 - 2) What are the needs and capabilities for HIMS ?
 - 3) Explain the functions of patient case module of HIMS ?
 - 4) Explain in detail volume image data file.
3. Attempt **any two** questions : **(2×8=16)**
- 1) Explain the applications of surgical simulator in :
 - i) Computer aided plastic surgery
 - ii) Orthopedic
 - 2) What is HIMS ? List advantages of HIMS.
 - 3) Write a short note on :
 - i) Online learning in MI
 - ii) Pharmacy module of HIMS.

SECTION – II

4. Attempt **any three** questions : **(3×4=12)**
- 1) Explain in detail the applications of ES in Drug therapy.
 - 2) What is telemedicine ? Explain applications of telemedicine pediatric.
 - 3) What is CAPE ? Why should doctor consider CAPE into their practice ?
 - 4) Explain different development tools used in CPR.



5. Attempt **any two** questions :

(2×8=16)

- 1) How telemedicine is reliable and cost effective ? Explain in detail.
 - 2) Why tele-surgery is need ? Explain in detail. Also write the advantages of tele-surgery.
 - 3) What is CAME ? Write different types of educational software are used. Explain any one of them.
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SLR-TJ – 425

Seat No.	
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Set

P

**B.E. (Part – I) (Biomedical Engg.) (New CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Monday, 4-12-2017
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) Surgical diathermy machine consists of a _____ power oscillator.
 - a) Low frequency
 - b) High voltage
 - c) High frequency
 - d) Medium frequency
- 2) Ultrasonic generators are constructed on _____ effect.
 - a) Faraday's
 - b) Piezoelectric
 - c) Magnetic
 - d) Electromagnet
- 3) The _____ dialyzer consists of a tube made up of the semipermeable membrane material wound into a coil.
 - a) Parallel plate
 - b) Hollow fibre
 - c) Coil
 - d) None of the above
- 4) Heart block occurs whenever the conduction system fails to transmit the _____ impulses from the atria to the ventricles properly.
 - a) Signal
 - b) Pulse
 - c) Fibrillation
 - d) Pacing
- 5) A condition in which the necessary synchronism is lost is known as
 - a) Fibrillation
 - b) Heart block
 - c) Heart attack
 - d) Tachycardia
- 6) _____ current is a sequence of pulses with a defined shape and current intensity.
 - a) Surging
 - b) Faradic
 - c) Galvanic
 - d) Exponential
- 7) Haemodialysis removes _____ other than harmful wastes.
 - a) Protein
 - b) Salt
 - c) Insulin
 - d) Glycogen

P.T.O.



- 8) Ventricular fibrillation is a serious cardiac emergency resulting from asynchronous _____ of the heart muscles.
a) Relaxation b) Polarization c) Cycle d) Contraction
- 9) In a defibrillation approximately _____ volts is initially applied to the patient.
a) 4000 b) 400 c) 40 d) 4
- 10) An external pacemaker may apply upto _____ pulses through 50 cm² electrode on the chest.
a) 80 mA b) 8 A c) 40 mA d) 100 mA
- 11) The hazards associated with electrosurgery units in burns caused by excess _____ at a rate other than that of which it is to be prevent.
a) Intensity b) High frequency
c) Current d) Current density
- 12) In _____ coagulation electric arcs intentionally generated between the electrode and tissue.
a) Spray b) Soft c) Forced d) Spark
- 13) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amount of solutes.
a) Drift b) Osmosis c) Ultrafiltration d) Diffusion
- 14) _____ is the clinical state resulting from renal failure.
a) Uremia b) Chronic renal failure
c) Kidney failure d) None of the above
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Seat No.	
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**B.E. (Part – I) (Biomedical Engg.) (New CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Monday, 4-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Explain how bipolar mode is different from unipolar mode in ESU.
- 2) Explain theory behind circus motion theory.
- 3) What is the effect of heat on human body ? Explain how it helps in relieving pain.
- 4) Compare between ultrasonic diathermy with short wave diathermy with reference to its application technique, principle and specification.
- 5) Explain the ICHD codes and mention its significance.

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

- 1) Explain the working of BICOAG mode of operation in solid state diathermy with neat circuit diagram.
- 2) With help of block diagram and waveforms explain working of nerve muscle simulate.
- 3) Draw and explain working of external pacemaker.

SECTION – II

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

- 1) List all types of LASER's and explain working of any one in detail.
- 2) Draw and explain blood leak defector circuit used in dialysis machine.

Set P



- 3) Explain the basic principle of haemodialysis.
- 4) Draw and explain circuit diagram function of heart rate variability machine.
- 5) Explain various types of dialyzers of dialysis machine.

5. Attempt **any two** questions :

(6×2=12)

- 1) With the help of block diagram explain working of dialysis machine.
 - 2) Explain with the help of circuit diagram the INST mode of defibrillation.
 - 3) Draw and explain working of temperature controller circuit used in Hemodialysis machine.
-



SLR-TJ – 425

Seat No.	
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Set **Q**

**B.E. (Part – I) (Biomedical Engg.) (New CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Monday, 4-12-2017
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) Ventricular fibrillation is a serious cardiac emergency resulting from asynchronous _____ of the heart muscles.
a) Relaxation b) Polarization c) Cycle d) Contraction
- 2) In a defibrillation approximately _____ volts is initially applied to the patient.
a) 4000 b) 400 c) 40 d) 4
- 3) An external pacemaker may apply upto _____ pulses through 50 cm² electrode on the chest.
a) 80 mA b) 8 A c) 40 mA d) 100 mA
- 4) The hazards associated with electrosurgery units in burns caused by excess _____ at a rate other than that of which it is to be prevent.
a) Intensity b) High frequency
c) Current d) Current density
- 5) In _____ coagulation electric arcs intentionally generated between the electrode and tissue.
a) Spray b) Soft c) Forced d) Spark
- 6) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amount of solutes.
a) Drift b) Osmosis c) Ultrafiltration d) Diffusion
- 7) _____ is the clinical state resulting from renal failure.
a) Uremia b) Chronic renal failure
c) Kidney failure d) None of the above

P.T.O.



- 8) Surgical diathermy machine consists of a _____ power oscillator.
- a) Low frequency b) High voltage
c) High frequency d) Medium frequency
- 9) Ultrasonic generators are constructed on _____ effect.
- a) Faraday's b) Piezoelectric
c) Magnetic d) Electromagnet
- 10) The _____ dialyzer consists of a tube made up of the semipermeable membrane material wound into a coil.
- a) Parallel plate b) Hollow fibre
c) Coil d) None of the above
- 11) Heart block occurs whenever the conduction system fails to transmit the _____ impulses from the atria to the ventricles properly.
- a) Signal b) Pulse c) Fibrillation d) Pacing
- 12) A condition in which the necessary synchronism is lost is known as
- a) Fibrillation b) Heart block c) Heart attack d) Tachycardia
- 13) _____ current is a sequence of pulses with a defined shape and current intensity.
- a) Surging b) Faradic c) Galvanic d) Exponential
- 14) Haemodialysis removes _____ other than harmful wastes.
- a) Protein b) Salt c) Insulin d) Glycogen
-



Seat No.	
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**B.E. (Part – I) (Biomedical Engg.) (New CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Monday, 4-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Explain how bipolar mode is different from unipolar mode in ESU.
- 2) Explain theory behind circus motion theory.
- 3) What is the effect of heat on human body ? Explain how it helps in relieving pain.
- 4) Compare between ultrasonic diathermy with short wave diathermy with reference to its application technique, principle and specification.
- 5) Explain the ICHD codes and mention its significance.

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

- 1) Explain the working of BICOAG mode of operation in solid state diathermy with neat circuit diagram.
- 2) With help of block diagram and waveforms explain working of nerve muscle simulate.
- 3) Draw and explain working of external pacemaker.

SECTION – II

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

- 1) List all types of LASER's and explain working of any one in detail.
- 2) Draw and explain blood leak defector circuit used in dialysis machine.

Set Q



- 3) Explain the basic principle of haemodialysis.
- 4) Draw and explain circuit diagram function of heart rate variability machine.
- 5) Explain various types of dialyzers of dialysis machine.

5. Attempt **any two** questions :

(6×2=12)

- 1) With the help of block diagram explain working of dialysis machine.
 - 2) Explain with the help of circuit diagram the INST mode of defibrillation.
 - 3) Draw and explain working of temperature controller circuit used in Hemodialysis machine.
-



SLR-TJ – 425

Seat No.	
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Set **R**

**B.E. (Part – I) (Biomedical Engg.) (New CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Monday, 4-12-2017
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) A condition in which the necessary synchronism is lost is known as
a) Fibrillation b) Heart block c) Heart attack d) Tachycardia
- 2) _____ current is a sequence of pulses with a defined shape and current intensity.
a) Surging b) Faradic c) Galvanic d) Exponential
- 3) Haemodialysis removes _____ other than harmful wastes.
a) Protein b) Salt c) Insulin d) Glycogen
- 4) Ventricular fibrillation is a serious cardiac emergency resulting from asynchronous _____ of the heart muscles.
a) Relaxation b) Polarization c) Cycle d) Contraction
- 5) In a defibrillation approximately _____ volts is initially applied to the patient.
a) 4000 b) 400 c) 40 d) 4
- 6) An external pacemaker may apply upto _____ pulses through 50 cm² electrode on the chest.
a) 80 mA b) 8 A c) 40 mA d) 100 mA
- 7) The hazards associated with electrosurgery units in burns caused by excess _____ at a rate other than that of which it is to be prevent.
a) Intensity b) High frequency
c) Current d) Current density

P.T.O.



- 8) In _____ coagulation electric arcs intentionally generated between the electrode and tissue.
a) Spray b) Soft c) Forced d) Spark
- 9) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amount of solutes.
a) Drift b) Osmosis c) Ultrafiltration d) Diffusion
- 10) _____ is the clinical state resulting from renal failure.
a) Uremia b) Chronic renal failure
c) Kidney failure d) None of the above
- 11) Surgical diathermy machine consists of a _____ power oscillator.
a) Low frequency b) High voltage
c) High frequency d) Medium frequency
- 12) Ultrasonic generators are constructed on _____ effect.
a) Faraday's b) Piezoelectric
c) Magnetic d) Electromagnet
- 13) The _____ dialyzer consists of a tube made up of the semipermeable membrane material wound into a coil.
a) Parallel plate b) Hollow fibre
c) Coil d) None of the above
- 14) Heart block occurs whenever the conduction system fails to transmit the _____ impulses from the atria to the ventricles properly.
a) Signal b) Pulse c) Fibrillation d) Pacing
-



Seat No.	
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**B.E. (Part – I) (Biomedical Engg.) (New CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Monday, 4-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Explain how bipolar mode is different from unipolar mode in ESU.
- 2) Explain theory behind circus motion theory.
- 3) What is the effect of heat on human body ? Explain how it helps in relieving pain.
- 4) Compare between ultrasonic diathermy with short wave diathermy with reference to its application technique, principle and specification.
- 5) Explain the ICHD codes and mention its significance.

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

- 1) Explain the working of BICOAG mode of operation in solid state diathermy with neat circuit diagram.
- 2) With help of block diagram and waveforms explain working of nerve muscle simulate.
- 3) Draw and explain working of external pacemaker.

SECTION – II

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

- 1) List all types of LASER's and explain working of any one in detail.
- 2) Draw and explain blood leak defector circuit used in dialysis machine.

Set R



- 3) Explain the basic principle of haemodialysis.
- 4) Draw and explain circuit diagram function of heart rate variability machine.
- 5) Explain various types of dialyzers of dialysis machine.

5. Attempt **any two** questions :

(6×2=12)

- 1) With the help of block diagram explain working of dialysis machine.
 - 2) Explain with the help of circuit diagram the INST mode of defibrillation.
 - 3) Draw and explain working of temperature controller circuit used in Hemodialysis machine.
-



SLR-TJ – 425

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Set **S**

**B.E. (Part – I) (Biomedical Engg.) (New CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Monday, 4-12-2017
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) An external pacemaker may apply upto _____ pulses through 50 cm² electrode on the chest.
a) 80 mA b) 8 A c) 40 mA d) 100 mA
- 2) The hazards associated with electrosurgery units in burns caused by excess _____ at a rate other than that of which it is to be prevent.
a) Intensity b) High frequency
c) Current d) Current density
- 3) In _____ coagulation electric arcs intentionally generated between the electrode and tissue.
a) Spray b) Soft c) Forced d) Spark
- 4) _____ is the exchange of things dissolved in fluid across the membrane due to difference in amount of solutes.
a) Drift b) Osmosis c) Ultrafiltration d) Diffusion
- 5) _____ is the clinical state resulting from renal failure.
a) Uremia b) Chronic renal failure
c) Kidney failure d) None of the above
- 6) Surgical diathermy machine consists of a _____ power oscillator.
a) Low frequency b) High voltage
c) High frequency d) Medium frequency

P.T.O.



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**B.E. (Part – I) (Biomedical Engg.) (New CGPA) Examination, 2017
BIOMEDICAL INSTRUMENTATION – III**

Day and Date : Monday, 4-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 1) Explain how bipolar mode is different from unipolar mode in ESU.
- 2) Explain theory behind circus motion theory.
- 3) What is the effect of heat on human body ? Explain how it helps in relieving pain.
- 4) Compare between ultrasonic diathermy with short wave diathermy with reference to its application technique, principle and specification.
- 5) Explain the ICHD codes and mention its significance.

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

- 1) Explain the working of BICOAG mode of operation in solid state diathermy with neat circuit diagram.
- 2) With help of block diagram and waveforms explain working of nerve muscle simulate.
- 3) Draw and explain working of external pacemaker.

SECTION – II

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

- 1) List all types of LASER's and explain working of any one in detail.
- 2) Draw and explain blood leak defector circuit used in dialysis machine.

Set S



- 3) Explain the basic principle of haemodialysis.
- 4) Draw and explain circuit diagram function of heart rate variability machine.
- 5) Explain various types of dialyzers of dialysis machine.

5. Attempt **any two** questions :

(6×2=12)

- 1) With the help of block diagram explain working of dialysis machine.
 - 2) Explain with the help of circuit diagram the INST mode of defibrillation.
 - 3) Draw and explain working of temperature controller circuit used in Hemodialysis machine.
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

Day and Date : Wednesday, 6-12-2017
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) Digital image with intensity level in range of $[0, L - 1]$ is called
 - a) K-map
 - b) histogram
 - c) graph
 - d) truth table
- 2) GIF is an abbreviation of Graphics _____ format.
 - a) Interrelated
 - b) Interconnection
 - c) Interchange
 - d) None of the above
- 3) The process of _____ digitization is called quantization.
 - a) amplitude
 - b) wavelength
 - c) frequency
 - d) signal
- 4) The processes of edge detection are broadly classified into pattern fitting approach and _____ approach.
 - a) Character
 - b) Derivative
 - c) Algebraic
 - d) Numeric
- 5) In image compression system _____ performs compression and _____ performs complementary operation of decompression.
 - a) Decoder, encoder
 - b) Encoder, decoder
 - c) Encoder, analyzer
 - d) Decoder, analyzer
- 6) The _____ format was created to get around LZW licensing requirements.
 - a) PNG
 - b) GIF
 - c) TIFF
 - d) PDF

P.T.O.



- 7) _____ Filters belongs to order static category of filter.
a) Median b) DCT c) Low pass d) High pass
- 8) _____ of differences between images is based on the principle of subtraction.
a) Homogeneity b) Enhancement
c) Sharpening d) None of the above
- 9) _____ is the tool used in task such as zooming, shrinking, rotating etc.
a) Sampling b) Interpolation
c) Filters d) Histogram
- 10) A _____ image is digitized at sampling points.
a) random b) vertex c) contour d) continuous
- 11) Image can be _____ using low pass filtering.
a) blurred b) shrink c) zoom d) rotate
- 12) Laplace is a _____ order derivative operator.
a) zero b) one c) second d) four
- 13) What is accepting or rejecting certain frequency components called as
a) Filtering b) Eliminating
c) Slicing d) None of the above
- 14) In $M \times N$, M is a number of
a) intensity level b) colour c) rows d) columns
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

Day and Date : Wednesday, 6-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the HSI Color Model.
 - 2) Write a note on image format – Pdf.
 - 3) Describe methods of hough transform with one example.
 - 4) Explain the concept and applications of Edge linking.
 - 5) Describe working of low pass filter with an example.
3. Attempt **any two** questions : **(2×6=12)**
- 1) Explain the structure and image formation on retina of human eye.
 - 2) Explain the properties of 2D – DFT.
 - 3) Explain homomorphic filtering with the help of block diagram.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Explain arithmetic coding technique with one example.
 - 2) Write a note on – K-L Transform's concept.
 - 3) Explain boundary detection using morphological operators.
 - 4) Explain Laplacian operator for edge detection.
 - 5) Describe DCT with expressions along with applications.



5. Attempt **any two** questions :

(2×6=12)

1) Find the DFT of given image.

0	3	3	1
3	1	2	1
3	2	4	2
1	1	2	1

2) Explain following morphological operations.

- a) opening
- b) closing
- c) dilation
- d) erosion.

3) Explain any two image compression methods with applications of each.



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Set	Q
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B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Wednesday, 6-12-2017
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) _____ of differences between images is based on the principle of subtraction.
a) Homogeneity b) Enhancement
c) Sharpening d) None of the above
- 2) _____ is the tool used in task such as zooming, shrinking, rotating etc.
a) Sampling b) Interpolation
c) Filters d) Histogram
- 3) A _____ image is digitized at sampling points.
a) random b) vertex c) contour d) continuous
- 4) Image can be _____ using low pass filtering.
a) blurred b) shrink c) zoom d) rotate
- 5) Laplace is a _____ order derivative operator.
a) zero b) one c) second d) four
- 6) What is accepting or rejecting certain frequency components called as
a) Filtering b) Eliminating
c) Slicing d) None of the above
- 7) In $M*N$, M is a number of
a) intensity level b) colour c) rows d) columns

P.T.O.



- 8) Digital image with intensity level in range of $[0, L - 1]$ is called
a) K-map b) histogram c) graph d) truth table
- 9) GIF is an abbreviation of Graphics _____ format.
a) Interrelated b) Interconnection
c) Interchange d) None of the above
- 10) The process of _____ digitization is called quantization.
a) amplitude b) wavelength
c) frequency d) signal
- 11) The processes of edge detection are broadly classified into pattern fitting approach and _____ approach.
a) Character b) Derivative
c) Algebraic d) Numeric
- 12) In image compression system _____ performs compression and _____ performs complementary operation of decompression.
a) Decoder, encoder b) Encoder, decoder
c) Encoder, analyzer d) Decoder, analyzer
- 13) The _____ format was created to get around LZW licensing requirements.
a) PNG b) GIF c) TIFF d) PDF
- 14) _____ Filters belongs to order static category of filter.
a) Median b) DCT c) Low pass d) High pass
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

Day and Date : Wednesday, 6-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the HSI Color Model.
 - 2) Write a note on image format – Pdf.
 - 3) Describe methods of hough transform with one example.
 - 4) Explain the concept and applications of Edge linking.
 - 5) Describe working of low pass filter with an example.
3. Attempt **any two** questions : **(2×6=12)**
- 1) Explain the structure and image formation on retina of human eye.
 - 2) Explain the properties of 2D – DFT.
 - 3) Explain homomorphic filtering with the help of block diagram.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Explain arithmetic coding technique with one example.
 - 2) Write a note on – K-L Transform's concept.
 - 3) Explain boundary detection using morphological operators.
 - 4) Explain Laplacian operator for edge detection.
 - 5) Describe DCT with expressions along with applications.



5. Attempt **any two** questions :

(2×6=12)

1) Find the DFT of given image.

0	3	3	1
3	1	2	1
3	2	4	2
1	1	2	1

2) Explain following morphological operations.

- a) opening
- b) closing
- c) dilation
- d) erosion.

3) Explain any two image compression methods with applications of each.



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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

Day and Date : Wednesday, 6-12-2017
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) In image compression system _____ performs compression and _____ performs complementary operation of decompression.
a) Decoder, encoder b) Encoder, decoder
c) Encoder, analyzer d) Decoder, analyzer
- 2) The _____ format was created to get around LZW licensing requirements.
a) PNG b) GIF c) TIFF d) PDF
- 3) _____ Filters belongs to order static category of filter.
a) Median b) DCT c) Low pass d) High pass
- 4) _____ of differences between images is based on the principle of subtraction.
a) Homogeneity b) Enhancement
c) Sharpening d) None of the above
- 5) _____ is the tool used in task such as zooming, shrinking, rotating etc.
a) Sampling b) Interpolation
c) Filters d) Histogram
- 6) A _____ image is digitized at sampling points.
a) random b) vertex c) contour d) continuous
- 7) Image can be _____ using low pass filtering.
a) blurred b) shrink c) zoom d) rotate

P.T.O.



- 8) Laplace is a _____ order derivative operator.
a) zero b) one c) second d) four
- 9) What is accepting or rejecting certain frequency components called as
a) Filtering b) Eliminating
c) Slicing d) None of the above
- 10) In $M \times N$, M is a number of
a) intensity level b) colour c) rows d) columns
- 11) Digital image with intensity level in range of $[0, L - 1]$ is called
a) K-map b) histogram c) graph d) truth table
- 12) GIF is an abbreviation of Graphics _____ format.
a) Interrelated b) Interconnection
c) Interchange d) None of the above
- 13) The process of _____ digitization is called quantization.
a) amplitude b) wavelength
c) frequency d) signal
- 14) The processes of edge detection are broadly classified into pattern fitting approach and _____ approach.
a) Character b) Derivative
c) Algebraic d) Numeric
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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

Day and Date : Wednesday, 6-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the HSI Color Model.
 - 2) Write a note on image format – Pdf.
 - 3) Describe methods of hough transform with one example.
 - 4) Explain the concept and applications of Edge linking.
 - 5) Describe working of low pass filter with an example.
3. Attempt **any two** questions : **(2×6=12)**
- 1) Explain the structure and image formation on retina of human eye.
 - 2) Explain the properties of 2D – DFT.
 - 3) Explain homomorphic filtering with the help of block diagram.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Explain arithmetic coding technique with one example.
 - 2) Write a note on – K-L Transform's concept.
 - 3) Explain boundary detection using morphological operators.
 - 4) Explain Laplacian operator for edge detection.
 - 5) Describe DCT with expressions along with applications.



5. Attempt **any two** questions :

(2×6=12)

1) Find the DFT of given image.

0	3	3	1
3	1	2	1
3	2	4	2
1	1	2	1

2) Explain following morphological operations.

- a) opening
- b) closing
- c) dilation
- d) erosion.

3) Explain any two image compression methods with applications of each.



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Set	S
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B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING

Day and Date : Wednesday, 6-12-2017
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) A _____ image is digitized at sampling points.
a) random b) vertex c) contour d) continuous
- 2) Image can be _____ using low pass filtering.
a) blurred b) shrink c) zoom d) rotate
- 3) Laplace is a _____ order derivative operator.
a) zero b) one c) second d) four
- 4) What is accepting or rejecting certain frequency components called as
a) Filtering b) Eliminating
c) Slicing d) None of the above
- 5) In $M \times N$, M is a number of
a) intensity level b) colour c) rows d) columns
- 6) Digital image with intensity level in range of $[0, L - 1]$ is called
a) K-map b) histogram c) graph d) truth table
- 7) GIF is an abbreviation of Graphics _____ format.
a) Interrelated b) Interconnection
c) Interchange d) None of the above

P.T.O.



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**B.E. (Biomedical Engg.) (Part – I) (New CGPA) Examination, 2017
PRINCIPLES OF IMAGE PROCESSING**

Day and Date : Wednesday, 6-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any 4** questions : **(4×4=16)**
- 1) Explain the HSI Color Model.
 - 2) Write a note on image format – Pdf.
 - 3) Describe methods of hough transform with one example.
 - 4) Explain the concept and applications of Edge linking.
 - 5) Describe working of low pass filter with an example.
3. Attempt **any two** questions : **(2×6=12)**
- 1) Explain the structure and image formation on retina of human eye.
 - 2) Explain the properties of 2D – DFT.
 - 3) Explain homomorphic filtering with the help of block diagram.

SECTION – II

4. Attempt **any four** questions : **(4×4=16)**
- 1) Explain arithmetic coding technique with one example.
 - 2) Write a note on – K-L Transform's concept.
 - 3) Explain boundary detection using morphological operators.
 - 4) Explain Laplacian operator for edge detection.
 - 5) Describe DCT with expressions along with applications.



5. Attempt **any two** questions :

(2×6=12)

1) Find the DFT of given image.

0	3	3	1
3	1	2	1
3	2	4	2
1	1	2	1

2) Explain following morphological operations.

- a) opening
- b) closing
- c) dilation
- d) erosion.

3) Explain any two image compression methods with applications of each.



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Set	P
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
HOSPITAL MANAGEMENT**

Day and Date : Friday, 8-12-2017
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) The systematic evaluation of individuals with respect to their performance on the job and their potential for development is
 - a) Training
 - b) Rewarding
 - c) Performance appraisal
 - d) None
 - 2) A inner state that energizer, activates and moves or directs towards goal is
 - a) Protection
 - b) Motivation
 - c) Prevention
 - d) Direction
 - 3) Management is defined as
 - a) To forecast and plan
 - b) To organize and command
 - c) To coordinate and control
 - d) All of the above
 - 4) _____ studies the condition of soil and bearing capacity of soil.
 - a) Mechanical engineer
 - b) Civil engineer
 - c) Electrical engineer
 - d) none
 - 5) The HIS means
 - a) Hospital Information System
 - b) Hospital Integral Services
 - c) Both a) and b)
 - d) None

P.T.O.



- 6) The permission for establishment of medical college new course of study in medicine is regulated by
- a) Indian Medical Act b) Bombay Shop and Establishment Act
c) Societies Registration Act d) None
- 7) Training is a _____ term educational process.
- a) Mid b) Short c) Long d) None
- 8) _____ keeps the record and maintenance of all medical equipments.
- a) Electrical Engineer b) Civil Engineer
c) Biomedical Engineer d) None
- 9) For electrical shock prevention _____ system is important.
- a) 3-phase b) Grounding
c) Both a) and b) d) None
- 10) _____ is a quality in which one person influence others to work willingly.
- a) Motivation b) Leadership
c) Both a) and b) d) None
- 11) Before starting to build a new Hospital what is needed ?
- a) Preliminary survey b) Departmental facility
c) Civil Engineer d) None
- 12) Preliminary survey includes engaging
- a) Consultancy b) C.A. c) Banks d) All the above
- 13) Guiding principle in planning hospital are
- a) High quality patient care b) Effective community orientation
c) Economic viability d) All the above
- 14) OPD stands for
- a) Over Patient Department b) Out Patient Department
c) Both a) and b) d) None
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
HOSPITAL MANAGEMENT**

Day and Date : Friday, 8-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 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.
- 6) Write a note on Reward management.

3. Attempt **any two** questions : **(2×8=16)**

- 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.

Set P



SECTION – II

4. Attempt **any four** questions : **(3×4=12)**

- 1) List various laboratories, equipment and discuss their role in hospital management.
- 2) What is the role and need of disaster management in hospital management ?
- 3) Discuss the importance of medical records in hospital.
- 4) Explain the need and ways of infection control in hospitals.
- 5) Write a short note on medical gas management in hospitals.
- 6) Explain the role of housekeeping and dietary food services in hospitals in detail.

5. Attempt **any two** questions : **(8×2=16)**

- 1) List various equipment used in OT and ICU. Discuss maintenance procedure of any one equipment in each.
 - 2) Draw layout of OPD and OT and explain importance of each.
 - 3) Write a short note on :
 - a) Need and structure of blood bank.
 - b) Waste management functions.
-



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Set	Q
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
HOSPITAL MANAGEMENT**

Day and Date : Friday, 8-12-2017
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) _____ keeps the record and maintenance of all medical equipments.
 - a) Electrical Engineer
 - b) Civil Engineer
 - c) Biomedical Engineer
 - d) None
- 2) For electrical shock prevention _____ system is important.
 - a) 3-phase
 - b) Grounding
 - c) Both a) and b)
 - d) None
- 3) _____ is a quality in which one person influence others to work willingly.
 - a) Motivation
 - b) Leadership
 - c) Both a) and b)
 - d) None
- 4) Before starting to build a new Hospital what is needed ?
 - a) Preliminary survey
 - b) Departmental facility
 - c) Civil Engineer
 - d) None
- 5) Preliminary survey includes engaging
 - a) Consultancy
 - b) C.A.
 - c) Banks
 - d) All the above

P.T.O.



- 6) Guiding principle in planning hospital are
- a) High quality patient care
 - b) Effective community orientation
 - c) Economic viability
 - d) All the above
- 7) OPD stands for
- a) Over Patient Department
 - b) Out Patient Department
 - c) Both a) and b)
 - d) None
- 8) The systematic evaluation of individuals with respect to their performance on the job and their potential for development is
- a) Training
 - b) Rewarding
 - c) Performance appraisal
 - d) None
- 9) A inner state that energizer, activates and moves or directs towards goal is
- a) Protection
 - b) Motivation
 - c) Prevention
 - d) Direction
- 10) Management is defined as
- a) To forecast and plan
 - b) To organize and command
 - c) To coordinate and control
 - d) All of the above
- 11) _____ studies the condition of soil and bearing capacity of soil.
- a) Mechanical engineer
 - b) Civil engineer
 - c) Electrical engineer
 - d) none
- 12) The HIS means
- a) Hospital Information System
 - b) Hospital Integral Services
 - c) Both a) and b)
 - d) None
- 13) The permission for establishment of medical college new course of study in medicine is regulated by
- a) Indian Medical Act
 - b) Bombay Shop and Establishment Act
 - c) Societies Registration Act
 - d) None
- 14) Training is a _____ term educational process.
- a) Mid
 - b) Short
 - c) Long
 - d) None
-



Seat No.	
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
HOSPITAL MANAGEMENT**

Day and Date : Friday, 8-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 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.
- 6) Write a note on Reward management.

3. Attempt **any two** questions : **(2×8=16)**

- 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.

Set Q



SECTION – II

4. Attempt **any four** questions : **(3×4=12)**

- 1) List various laboratories, equipment and discuss their role in hospital management.
- 2) What is the role and need of disaster management in hospital management ?
- 3) Discuss the importance of medical records in hospital.
- 4) Explain the need and ways of infection control in hospitals.
- 5) Write a short note on medical gas management in hospitals.
- 6) Explain the role of housekeeping and dietary food services in hospitals in detail.

5. Attempt **any two** questions : **(8×2=16)**

- 1) List various equipment used in OT and ICU. Discuss maintenance procedure of any one equipment in each.
 - 2) Draw layout of OPD and OT and explain importance of each.
 - 3) Write a short note on :
 - a) Need and structure of blood bank.
 - b) Waste management functions.
-



SLR-TJ – 427

Seat No.	
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Set	R
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
HOSPITAL MANAGEMENT**

Day and Date : Friday, 8-12-2017
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) The HIS means
 - a) Hospital Information System
 - b) Hospital Integral Services
 - c) Both a) and b)
 - d) None
- 2) The permission for establishment of medical college new course of study in medicine is regulated by
 - a) Indian Medical Act
 - b) Bombay Shop and Establishment Act
 - c) Societies Registration Act
 - d) None
- 3) Training is a _____ term educational process.
 - a) Mid
 - b) Short
 - c) Long
 - d) None
- 4) _____ keeps the record and maintenance of all medical equipments.
 - a) Electrical Engineer
 - b) Civil Engineer
 - c) Biomedical Engineer
 - d) None
- 5) For electrical shock prevention _____ system is important.
 - a) 3-phase
 - b) Grounding
 - c) Both a) and b)
 - d) None

P.T.O.



Seat No.	
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
HOSPITAL MANAGEMENT**

Day and Date : Friday, 8-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 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.
- 6) Write a note on Reward management.

3. Attempt **any two** questions : **(2×8=16)**

- 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.

Set R



SECTION – II

4. Attempt **any four** questions : **(3×4=12)**

- 1) List various laboratories, equipment and discuss their role in hospital management.
- 2) What is the role and need of disaster management in hospital management ?
- 3) Discuss the importance of medical records in hospital.
- 4) Explain the need and ways of infection control in hospitals.
- 5) Write a short note on medical gas management in hospitals.
- 6) Explain the role of housekeeping and dietary food services in hospitals in detail.

5. Attempt **any two** questions : **(8×2=16)**

- 1) List various equipment used in OT and ICU. Discuss maintenance procedure of any one equipment in each.
 - 2) Draw layout of OPD and OT and explain importance of each.
 - 3) Write a short note on :
 - a) Need and structure of blood bank.
 - b) Waste management functions.
-



- 5) OPD stands for
- a) Over Patient Department
 - b) Out Patient Department
 - c) Both a) and b)
 - d) None
- 6) The systematic evaluation of individuals with respect to their performance on the job and their potential for development is
- a) Training
 - b) Rewarding
 - c) Performance appraisal
 - d) None
- 7) A inner state that energizer, activates and moves or directs towards goal is
- a) Protection
 - b) Motivation
 - c) Prevention
 - d) Direction
- 8) Management is defined as
- a) To forecast and plan
 - b) To organize and command
 - c) To coordinate and control
 - d) All of the above
- 9) _____ studies the condition of soil and bearing capacity of soil.
- a) Mechanical engineer
 - b) Civil engineer
 - c) Electrical engineer
 - d) none
- 10) The HIS means
- a) Hospital Information System
 - b) Hospital Integral Services
 - c) Both a) and b)
 - d) None
- 11) The permission for establishment of medical college new course of study in medicine is regulated by
- a) Indian Medical Act
 - b) Bombay Shop and Establishment Act
 - c) Societies Registration Act
 - d) None
- 12) Training is a _____ term educational process.
- a) Mid
 - b) Short
 - c) Long
 - d) None
- 13) _____ keeps the record and maintenance of all medical equipments.
- a) Electrical Engineer
 - b) Civil Engineer
 - c) Biomedical Engineer
 - d) None
- 14) For electrical shock prevention _____ system is important.
- a) 3-phase
 - b) Grounding
 - c) Both a) and b)
 - d) None
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Seat No.	
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**B.E. (Part – I) (Biomedical) (New CGPA) Examination, 2017
HOSPITAL MANAGEMENT**

Day and Date : Friday, 8-12-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

SECTION – I

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

- 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.
- 6) Write a note on Reward management.

3. Attempt **any two** questions : **(2×8=16)**

- 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.

Set S



SECTION – II

4. Attempt **any four** questions : **(3×4=12)**

- 1) List various laboratories, equipment and discuss their role in hospital management.
- 2) What is the role and need of disaster management in hospital management ?
- 3) Discuss the importance of medical records in hospital.
- 4) Explain the need and ways of infection control in hospitals.
- 5) Write a short note on medical gas management in hospitals.
- 6) Explain the role of housekeeping and dietary food services in hospitals in detail.

5. Attempt **any two** questions : **(8×2=16)**

- 1) List various equipment used in OT and ICU. Discuss maintenance procedure of any one equipment in each.
 - 2) Draw layout of OPD and OT and explain importance of each.
 - 3) Write a short note on :
 - a) Need and structure of blood bank.
 - b) Waste management functions.
-



SLR-TJ – 428

Seat No.	
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Set	P
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**B.E. (Biomedical Engineering) (Part – II) (New) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 21-11-2017
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) A pixel is defined as
 - a) portion of CRT displaying image
 - b) a volume element
 - c) a picture element
 - d) miniature image
- 2) A mathematical technique that involve the estimation of an unknown valve from valves or either side of it is known as
 - a) Filtering
 - b) Interpolation
 - c) Convolution
 - d) Summation
- 3) Pixel is representing issues is the average attenuation coefficients greater than that of water which of the types of valves ?
 - a) Extremely small
 - b) Positive
 - c) Negative
 - d) None of the above
- 4) _____ is not commonly used as a CT scintillation detector.
 - a) Ceramic rare earth
 - b) Silver halide
 - c) Bismuth germinate
 - d) Cadmium tungstate
- 5) _____ is the primary interaction between X-ray photons and tissues during CT examiner.
 - a) Bremsstrahlung effect
 - b) Characteristic effect
 - c) Compton effect
 - d) Coherent scatter
- 6) The best modality to image the spinal nervous system is
 - a) Myelography
 - b) CT scan
 - c) MRI
 - d) MRS
- 7) The presence of noise in a medical image will generally
 - a) Produce artifacts
 - b) Produce blurring
 - c) Reduce visibility of flow contrast
 - d) Produce image distortion

P.T.O.



- 8) _____ modality does not use a form of ionizing radiation.
a) Radiography b) CT c) PET d) MRI
- 9) Resolution is the characteristic that is not directly proportional to
a) Image noise b) Image blurring
c) Unsharpness d) Visibility of anatomical detail
- 10) The order of imaging methods (from worst to best) with respect to visibility of details (resolution) is
a) Gamma camera CT b) Ultrasound, radiography
c) Gamma camera MRI d) Radiography, MRI
- 11) The value of a CT number (in Hounsfield unit) is determined by
a) Matrix size b) Slice thickness c) kV d) Tissue density
- 12) The most accurate investigation for assessing ventricular function is
a) Multislice CT b) Nuclear scan c) MRI d) MRS
- 13) Phosphorous-32 emits
a) β -particles b) Alpha particles c) X-rays d) Neutron
- 14) _____ has maximum ionization potential.
a) Electron b) Proton c) Helium ion d) Gamma
- 15) _____ imaging technique gives maximum radiation exposure to the patient.
a) Chest X-ray b) CT c) MRI d) Bone scan
- 16) The MR imaging in multiple sclerosis shows lesion in
a) White matter b) Gray matter c) Thalamus d) Basal ganglia
- 17) An accurate CT scanner is capable of spatial resolution of upto _____ lp/mm.
a) 10 b) 20 c) 100 d) 20
- 18) Process by 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) 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
- 20) 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
-



Seat No.	
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**B.E. (Biomedical Engineering) (Part – II) (New) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
- 1) Explain principle and working of spiral CT.
 - 2) What is the CT number of bone whose attenuation coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.190 (magnification constant 1000).
 - 3) List various types of CT detectors and explain any one of it in detail.
 - 4) Discuss various artifacts that occur in CT imaging.
 - 5) Explain water suppression techniques and mention its significance.
3. Attempt **any two** questions : **(10×2=20)**
- 1) Describe four generations of CT with suitable diagrams. Discuss the advantage of spiral CT over conventional CT.
 - 2) Explain the principle and working of Magnetic Resonance Spectroscopy. Mention its any two clinical application.
 - 3) Explain following techniques with their advantages in image processing :
 - a) Iteration method
 - b) Fourier transform.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Explain spin echo technique in MRI.
 - 2) Explain working of MDCT imaging.
 - 3) Define image contrast and resolution term of image processing.
 - 4) Define and explain working of electrical impedance tomography in short.
 - 5) Discuss various types of magnets used in MRI imaging modality.
5. Attempt **any two** question : **(10×2=20)**
- 1) Explain basic principle and working of MRI with necessary diagram.
 - 2) List various hybrid imaging modalities and explain any one of it in detail. Also mention their advantages.
 - 3) Explain the need and procedure for CT angiography in detail.

Set P



SLR-TJ – 428

Seat No.	
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Set	Q
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**B.E. (Biomedical Engineering) (Part – II) (New) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 21-11-2017
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) The MR imaging in multiple sclerosis shows lesion in
a) White matter b) Gray matter c) Thalamus d) Basal ganglia
 - 2) An accurate CT scanner is capable of spatial resolution of upto _____ lp/mm.
a) 10 b) 20 c) 100 d) 20
 - 3) Process by which electrons are produced at cathod of CT X-ray tube is called as
a) Rectification b) Anode heel effect
c) Thermionic emission d) Isotropic emission
 - 4) 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
 - 5) 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
 - 6) A pixel is defined as
a) portion of CRT displaying image b) a volume element
c) a picture element d) miniature image
 - 7) A mathematical technique that involve the estimation of an unknown valve from valves or either side of it is known as
a) Filtering b) Interpolation c) Convolution d) Summation
 - 8) Pixel is representing issues is the average attenuation coefficients greater than that of water which of the types of valves ?
a) Extremely small b) Positive c) Negative d) None of the above

P.T.O.



- 9) _____ is not commonly used as a CT scintillation detector.
a) Ceramic rare earth b) Silver halide
c) Bismuth germinate d) Cadmium tungstate
- 10) _____ is the primary interaction between X-ray photons and tissues during CT examiner.
a) Bremsstrahlung effect b) Characteristic effect
c) Compton effect d) Coherent scatter
- 11) The best modality to image the spinal nervous system is
a) Myelography b) CT scan c) MRI d) MRS
- 12) The presence of noise in a medical image will generally
a) Produce artifacts
b) Produce blurring
c) Reduce visibility of flow contrast
d) Produce image distortion
- 13) _____ modality does not use a form of ionizing radiation.
a) Radiography b) CT c) PET d) MRI
- 14) Resolution is the characteristic that is not directly proportional to
a) Image noise b) Image blurring
c) Unsharpness d) Visibility of anatomical detail
- 15) The order of imaging methods (from worst to best) with respect to visibility of details (resolution) is
a) Gamma camera CT b) Ultrasound, radiography
c) Gamma camera MRI d) Radiography, MRI
- 16) The value of a CT number (in Hounsfield unit) is determined by
a) Matrix size b) Slice thickness c) kV d) Tissue density
- 17) The most accurate investigation for assessing ventricular function is
a) Multislice CT b) Nuclear scan c) MRI d) MRS
- 18) Phosphorous-32 emits
a) β -particles b) Alpha particles c) X-rays d) Neutron
- 19) _____ has maximum ionization potential.
a) Electron b) Proton c) Helium ion d) Gamma
- 20) _____ imaging technique gives maximum radiation exposure to the patient.
a) Chest X-ray b) CT c) MRI d) Bone scan
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Seat No.	
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**B.E. (Biomedical Engineering) (Part – II) (New) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
- 1) Explain principle and working of spiral CT.
 - 2) What is the CT number of bone whose attenuation coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.190 (magnification constant 1000).
 - 3) List various types of CT detectors and explain any one of it in detail.
 - 4) Discuss various artifacts that occur in CT imaging.
 - 5) Explain water suppression techniques and mention its significance.
3. Attempt **any two** questions : **(10×2=20)**
- 1) Describe four generations of CT with suitable diagrams. Discuss the advantage of spiral CT over conventional CT.
 - 2) Explain the principle and working of Magnetic Resonance Spectroscopy. Mention its any two clinical application.
 - 3) Explain following techniques with their advantages in image processing :
 - a) Iteration method
 - b) Fourier transform.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Explain spin echo technique in MRI.
 - 2) Explain working of MDCT imaging.
 - 3) Define image contrast and resolution term of image processing.
 - 4) Define and explain working of electrical impedance tomography in short.
 - 5) Discuss various types of magnets used in MRI imaging modality.
5. Attempt **any two** question : **(10×2=20)**
- 1) Explain basic principle and working of MRI with necessary diagram.
 - 2) List various hybrid imaging modalities and explain any one of it in detail. Also mention their advantages.
 - 3) Explain the need and procedure for CT angiography in detail.

Set Q



SLR-TJ – 428

Seat No.	
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Set	R
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**B.E. (Biomedical Engineering) (Part – II) (New) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 21-11-2017
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) The value of a CT number (in Hounsfield unit) is determined by
a) Matrix size b) Slice thickness c) kV d) Tissue density
- 2) The most accurate investigation for assessing ventricular function is
a) Multislice CT b) Nuclear scan c) MRI d) MRS
- 3) Phosphorous-32 emits
a) β -particles b) Alpha particles c) X-rays d) Neutron
- 4) _____ has maximum ionization potential.
a) Electron b) Proton c) Helium ion d) Gamma
- 5) _____ imaging technique gives maximum radiation exposure to the patient.
a) Chest X-ray b) CT c) MRI d) Bone scan
- 6) The MR imaging in multiple sclerosis shows lesion in
a) White matter b) Gray matter c) Thalamus d) Basal ganglia
- 7) An accurate CT scanner is capable of spatial resolution of upto _____ lp/mm.
a) 10 b) 20 c) 100 d) 20
- 8) Process by 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
- 9) 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

P.T.O.



- 10) 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
- 11) A pixel is defined as
 - a) portion of CRT displaying image
 - b) a volume element
 - c) a picture element
 - d) miniature image
- 12) A mathematical technique that involve the estimation of an unknown value from values on either side of it is known as
 - a) Filtering
 - b) Interpolation
 - c) Convolution
 - d) Summation
- 13) Pixel representing tissues with average attenuation coefficients greater than that of water is of which type?
 - a) Extremely small
 - b) Positive
 - c) Negative
 - d) None of the above
- 14) _____ is not commonly used as a CT scintillation detector.
 - a) Ceramic rare earth
 - b) Silver halide
 - c) Bismuth germinate
 - d) Cadmium tungstate
- 15) _____ is the primary interaction between X-ray photons and tissues during CT examination.
 - a) Bremsstrahlung effect
 - b) Characteristic effect
 - c) Compton effect
 - d) Coherent scatter
- 16) The best modality to image the spinal nervous system is
 - a) Myelography
 - b) CT scan
 - c) MRI
 - d) MRS
- 17) The presence of noise in a medical image will generally
 - a) Produce artifacts
 - b) Produce blurring
 - c) Reduce visibility of flow contrast
 - d) Produce image distortion
- 18) _____ modality does not use a form of ionizing radiation.
 - a) Radiography
 - b) CT
 - c) PET
 - d) MRI
- 19) Resolution is the characteristic that is not directly proportional to
 - a) Image noise
 - b) Image blurring
 - c) Unsharpness
 - d) Visibility of anatomical detail
- 20) The order of imaging methods (from worst to best) with respect to visibility of details (resolution) is
 - a) Gamma camera CT
 - b) Ultrasound, radiography
 - c) Gamma camera MRI
 - d) Radiography, MRI



Seat No.	
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**B.E. (Biomedical Engineering) (Part – II) (New) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
- 1) Explain principle and working of spiral CT.
 - 2) What is the CT number of bone whose attenuation coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.190 (magnification constant 1000).
 - 3) List various types of CT detectors and explain any one of it in detail.
 - 4) Discuss various artifacts that occur in CT imaging.
 - 5) Explain water suppression techniques and mention its significance.
3. Attempt **any two** questions : **(10×2=20)**
- 1) Describe four generations of CT with suitable diagrams. Discuss the advantage of spiral CT over conventional CT.
 - 2) Explain the principle and working of Magnetic Resonance Spectroscopy. Mention its any two clinical application.
 - 3) Explain following techniques with their advantages in image processing :
 - a) Iteration method
 - b) Fourier transform.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Explain spin echo technique in MRI.
 - 2) Explain working of MDCT imaging.
 - 3) Define image contrast and resolution term of image processing.
 - 4) Define and explain working of electrical impedance tomography in short.
 - 5) Discuss various types of magnets used in MRI imaging modality.
5. Attempt **any two** question : **(10×2=20)**
- 1) Explain basic principle and working of MRI with necessary diagram.
 - 2) List various hybrid imaging modalities and explain any one of it in detail. Also mention their advantages.
 - 3) Explain the need and procedure for CT angiography in detail.

Set R



SLR-TJ – 428

Seat No.	
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Set	S
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**B.E. (Biomedical Engineering) (Part – II) (New) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 21-11-2017
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) The best modality to image the spinal nervous system is
a) Myelography b) CT scan c) MRI d) MRS
 - 2) The presence of noise in a medical image will generally
a) Produce artifacts
b) Produce blurring
c) Reduce visibility of flow contrast
d) Produce image distortion
 - 3) _____ modality does not use a form of ionizing radiation.
a) Radiography b) CT c) PET d) MRI
 - 4) Resolution is the characteristic that is not directly proportional to
a) Image noise b) Image blurring
c) Unsharpness d) Visibility of anatomical detail
 - 5) The order of imaging methods (from worst to best) with respect to visibility of details (resolution) is
a) Gamma camera CT b) Ultrasound, radiography
c) Gamma camera MRI d) Radiography, MRI
 - 6) The value of a CT number (in Hounsfield unit) is determined by
a) Matrix size b) Slice thickness c) kV d) Tissue density
 - 7) The most accurate investigation for assessing ventricular function is
a) Multislice CT b) Nuclear scan c) MRI d) MRS
 - 8) Phosphorous-32 emits
a) β -particles b) Alpha particles c) X-rays d) Neutron

P.T.O.



- 9) _____ has maximum ionization potential.
a) Electron b) Proton c) Helium ion d) Gamma
- 10) _____ imaging technique gives maximum radiation exposure to the patient.
a) Chest X-ray b) CT c) MRI d) Bone scan
- 11) The MR imaging in multiple sclerosis shows lesion in
a) White matter b) Gray matter c) Thalamus d) Basal ganglia
- 12) An accurate CT scanner is capable of spatial resolution of upto _____ lp/mm.
a) 10 b) 20 c) 100 d) 20
- 13) Process by which electrons are produced at cathod of CT X-ray tube is called as
a) Rectification b) Anode heel effect
c) Thermionic emission d) Isotropic emission
- 14) 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
- 15) 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
- 16) A pixel is defined as
a) portion of CRT displaying image b) a volume element
c) a picture element d) miniature image
- 17) A mathematical technique that involve the estimation of an unknown valve from valves or either side of it is known as
a) Filtering b) Interpolation c) Convolution d) Summation
- 18) Pixel is representing issues is the average attenuation coefficients greater than that of water which of the types of valves ?
a) Extremely small b) Positive c) Negative d) None of the above
- 19) _____ is not commonly used as a CT scintillation detector.
a) Ceramic rare earth b) Silver halide
c) Bismuth germinate d) Cadmium tungstate
- 20) _____ is the primary interaction between X-ray photons and tissues during CT examiner.
a) Bremsstrahlung effect b) Characteristic effect
c) Compton effect d) Coherent scatter
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Seat No.	
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**B.E. (Biomedical Engineering) (Part – II) (New) Examination, 2017
MEDICAL IMAGING – II**

Day and Date : Tuesday, 21-11-2017
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

SECTION – I

2. Attempt **any four** questions : **(4×5=20)**
- 1) Explain principle and working of spiral CT.
 - 2) What is the CT number of bone whose attenuation coefficient is 0.40 cm^{-1} and attenuation coefficient of water is 0.190 (magnification constant 1000).
 - 3) List various types of CT detectors and explain any one of it in detail.
 - 4) Discuss various artifacts that occur in CT imaging.
 - 5) Explain water suppression techniques and mention its significance.
3. Attempt **any two** questions : **(10×2=20)**
- 1) Describe four generations of CT with suitable diagrams. Discuss the advantage of spiral CT over conventional CT.
 - 2) Explain the principle and working of Magnetic Resonance Spectroscopy. Mention its any two clinical application.
 - 3) Explain following techniques with their advantages in image processing :
 - a) Iteration method
 - b) Fourier transform.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Explain spin echo technique in MRI.
 - 2) Explain working of MDCT imaging.
 - 3) Define image contrast and resolution term of image processing.
 - 4) Define and explain working of electrical impedance tomography in short.
 - 5) Discuss various types of magnets used in MRI imaging modality.
5. Attempt **any two** question : **(10×2=20)**
- 1) Explain basic principle and working of MRI with necessary diagram.
 - 2) List various hybrid imaging modalities and explain any one of it in detail. Also mention their advantages.
 - 3) Explain the need and procedure for CT angiography in detail.

Set S



SLR-TJ – 429

Seat No.	
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P

**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION MAINTENANCE AND SERVICING**

Day and Date : Wednesday, 22-11-2017
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 : **(1×20=20)**
- 1) Sphygmomanometer is used to measure
a) O₂ b) CO₂ c) Heat rate d) Blood Pressure
 - 2) Voltages in x-rays in measured in
a) Milliamp b) KVP c) Millivolt d) KV
 - 3) Spirometer is used to measure
a) Lung capacity b) Lung passage
c) Lung weight d) Air
 - 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
 - 8) ECG machine is used to monitor
a) Lung activity b) Heart activity c) Brain activity d) Muscle activity

P.T.O.



- 9) Flow meter is used to measure
- a) Small diameter tubes
 - b) Large diameter tubes
 - c) Medium diameter tubes
 - d) None
- 10) NICU stand for
- a) Neonatal Intensive Care Unit
 - b) Nephro Intensive Care Unit
 - c) Neuro Intensive Care Unit
 - d) None
- 11) Non-invasive device used to measure oxygen saturation of patients' blood
- a) Spirometer
 - b) Pulse recorder
 - c) Pulse oximeter
 - d) Pulse stabilizer
- 12) X-ray _____ ratings are done in current.
- a) Tube
 - b) Gantry
 - c) Frequency
 - d) Collimator
- 13) _____ machine is used to remove unwanted fluid from body cavities.
- a) Defibrillator
 - b) Ventilators
 - c) Suction machines
 - d) Anesthesia machine
- 14) The flow transducer on _____ side measures the gas flow to the patient.
- a) expiration
 - b) a) and c)
 - c) inspiration
 - d) None
- 15) _____ is a mode of synchrony ventilator.
- a) CT
 - b) Cm/s/cm
 - c) CPAP
 - d) None
- 16) In blood flow measurement flow rate " $Q=V A$ " where A stands for
- a) Acceleration
 - b) Constant
 - c) Amplitude
 - d) Area of cross section
- 17) _____ works at QRS values.
- a) Cardioverter
 - b) Defibrillator
 - c) Pacemaker
 - d) Heart lung machine
- 18) QCI is the
- a) Quality and Certified Implementation
 - b) Quality Control and Implementation
 - c) Quality Council of India
 - d) None
- 19) Battery used in patient monitoring systems is of
- a) 3 volts
 - b) 6 volts
 - c) 9 volts
 - d) 12 volts
- 20) CPAP stands for
- a) Coronary Positive Airway Pressure
 - b) Continuous Pulmonary Airway Pressure
 - c) Continuous Positive Airway Pressure
 - d) Cardiac Positive Airway Pressure



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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION MAINTENANCE AND SERVICING**

Day and Date : Wednesday, 22-11-2017
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) Use legible handwriting, use **blue/black** only.
4) Draw diagrams/sketches **wherever** necessary.

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
- 1) Discuss the factor to be considered during installation of any medical equipment in a hospital.
 - 2) Explain gas pipe lining systems in hospital.
 - 3) What care should be taken before the installation of biomedical equipment ?
 - 4) Draw a labelled diagram of a bed side patient monitoring with all its specifications.
 - 5) Write a short note x-ray machine with detailed specifications.
3. Answer **any two** of the following questions : **(2×10=20)**
- 1) Discuss about the installation of medical equipment's in physiotherapy.
 - 2) Explain installation and maintenance procedure of any two muscle equipment's.
 - 3) Explain the any two surgical instruments in detail.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
- 1) Differentiate between PC mode and timed mode.
 - 2) Explain the functions of MRI machine.
 - 3) What is an defibrillators and explains its function ?
 - 4) Define and differentiate between CMC and AMC in detail.
 - 5) Explain trouble shooting method in ICU.
5. Answer **any two** of the following questions : **(2×10=20)**
- 1) Explain the operation theater equipment's in detail.
 - 2) Discuss the pre installation techniques of the auto analyzer in detail.
 - 3) Calibration of ECG, EMG, EEG in details.



SLR-TJ – 429

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Set **Q**

**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION MAINTENANCE AND SERVICING**

Day and Date : Wednesday, 22-11-2017
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 :

(1×20=20)

- 1) In blood flow measurement flow rate " $Q=V A$ " where A stands for
 - a) Acceleration
 - b) Constant
 - c) Amplitude
 - d) Area of cross section
- 2) _____ works at QRS values.
 - a) Cardioverter
 - b) Defibrillator
 - c) Pacemaker
 - d) Heart lung machine
- 3) QCI is the
 - a) Quality and Certified Implementation
 - b) Quality Control and Implementation
 - c) Quality Council of India
 - d) None
- 4) Battery used in patient monitoring systems is of
 - a) 3 volts
 - b) 6 volts
 - c) 9 volts
 - d) 12 volts
- 5) CPAP stands for
 - a) Coronary Positive Airway Pressure
 - b) Continuous Pulmonary Airway Pressure
 - c) Continuous Positive Airway Pressure
 - d) Cardiac Positive Airway Pressure

P.T.O.



- 6) Sphygmomanometer is used to measure
a) O₂ b) CO₂ c) Heat rate d) Blood Pressure
- 7) Voltages in x-rays in measured in
a) Milliamp b) KVP c) Millivolt d) KV
- 8) Spirometer is used to measure
a) Lung capacity b) Lung passage
c) Lung weight d) Air
- 9) 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
- 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
- 14) Flow meter is used to measure
a) Small diameter tubes b) Large diameter tubes
c) Medium diameter tubes d) None
- 15) NICU stand for
a) Neonatal Intensive Care Unit b) Nephro Intensive Care Unit
c) Neuro Intensive Care Unit d) None
- 16) Non-invasive device used to measure oxygen saturation of patients' blood
a) Spirometer b) Pulse recorder
c) Pulse oximeter d) Pulse stabilizer
- 17) X-ray _____ ratings are done in current.
a) Tube b) Gantry c) Frequency d) Collimator
- 18) _____ machine is used to remove unwanted fluid from body cavities.
a) Defibrillator b) Ventilators
c) Suction machines d) Anesthesia machine
- 19) The flow transducer on _____ side measures the gas flow to the patient.
a) expiration b) a) and c) c) inspiration d) None
- 20) _____ is a mode of synchrony ventilator.
a) CT b) Cm/s/cm c) CPAP d) None



Seat No.	
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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION MAINTENANCE AND SERVICING**

Day and Date : Wednesday, 22-11-2017
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) Use legible handwriting, use **blue/black** only.
4) Draw diagrams/sketches **wherever** necessary.

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
- 1) Discuss the factor to be considered during installation of any medical equipment in a hospital.
 - 2) Explain gas pipe lining systems in hospital.
 - 3) What care should be taken before the installation of biomedical equipment ?
 - 4) Draw a labelled diagram of a bed side patient monitoring with all its specifications.
 - 5) Write a short note x-ray machine with detailed specifications.
3. Answer **any two** of the following questions : **(2×10=20)**
- 1) Discuss about the installation of medical equipment's in physiotherapy.
 - 2) Explain installation and maintenance procedure of any two muscle equipment's.
 - 3) Explain the any two surgical instruments in detail.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
- 1) Differentiate between PC mode and timed mode.
 - 2) Explain the functions of MRI machine.
 - 3) What is an defibrillators and explains its function ?
 - 4) Define and differentiate between CMC and AMC in detail.
 - 5) Explain trouble shooting method in ICU.
5. Answer **any two** of the following questions : **(2×10=20)**
- 1) Explain the operation theater equipment's in detail.
 - 2) Discuss the pre installation techniques of the auto analyzer in detail.
 - 3) Calibration of ECG, EMG, EEG in details.



SLR-TJ – 429

Seat No.	
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Set **R**

**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION MAINTENANCE AND SERVICING**

Day and Date : Wednesday, 22-11-2017
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 : **(1×20=20)**
- 1) Non-invasive device used to measure oxygen saturation of patients' blood
 - a) Spirometer
 - b) Pulse recorder
 - c) Pulse oximeter
 - d) Pulse stabilizer
 - 2) X-ray _____ ratings are done in current.
 - a) Tube
 - b) Gantry
 - c) Frequency
 - d) Collimator
 - 3) _____ machine is used to remove unwanted fluid from body cavities.
 - a) Defibrillator
 - b) Ventilators
 - c) Suction machines
 - d) Anesthesia machine
 - 4) The flow transducer on _____ side measures the gas flow to the patient.
 - a) expiration
 - b) a) and c)
 - c) inspiration
 - d) None
 - 5) _____ is a mode of synchrony ventilator.
 - a) CT
 - b) Cm/s/cm
 - c) CPAP
 - d) None
 - 6) In blood flow measurement flow rate " $Q=V A$ " where A stands for
 - a) Acceleration
 - b) Constant
 - c) Amplitude
 - d) Area of cross section
 - 7) _____ works at QRS values.
 - a) Cardioverter
 - b) Defibrillator
 - c) Pacemaker
 - d) Heart lung machine

P.T.O.



- 8) QCI is the
a) Quality and Certified Implementation
b) Quality Control and Implementation
c) Quality Council of India
d) None
- 9) Battery used in patient monitoring systems is of
a) 3 volts b) 6 volts c) 9 volts d) 12 volts
- 10) CPAP stands for
a) Coronary Positive Airway Pressure
b) Continuous Pulmonary Airway Pressure
c) Continuous Positive Airway Pressure
d) Cardiac Positive Airway Pressure
- 11) Sphygmomanometer is used to measure
a) O₂ b) CO₂ c) Heart rate d) Blood Pressure
- 12) Voltages in x-rays are measured in
a) Milliamp b) KVP c) Millivolt d) KV
- 13) Spirometer is used to measure
a) Lung capacity b) Lung passage
c) Lung weight d) Air
- 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) NICU stand for
a) Neonatal Intensive Care Unit b) Nephro Intensive Care Unit
c) Neuro Intensive Care Unit d) None
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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION MAINTENANCE AND SERVICING**

Day and Date : Wednesday, 22-11-2017
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) Use legible handwriting, use **blue/black** only.
4) Draw diagrams/sketches **wherever** necessary.

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
- 1) Discuss the factor to be considered during installation of any medical equipment in a hospital.
 - 2) Explain gas pipe lining systems in hospital.
 - 3) What care should be taken before the installation of biomedical equipment ?
 - 4) Draw a labelled diagram of a bed side patient monitoring with all its specifications.
 - 5) Write a short note x-ray machine with detailed specifications.
3. Answer **any two** of the following questions : **(2×10=20)**
- 1) Discuss about the installation of medical equipment's in physiotherapy.
 - 2) Explain installation and maintenance procedure of any two muscle equipment's.
 - 3) Explain the any two surgical instruments in detail.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
- 1) Differentiate between PC mode and timed mode.
 - 2) Explain the functions of MRI machine.
 - 3) What is an defibrillators and explains its function ?
 - 4) Define and differentiate between CMC and AMC in detail.
 - 5) Explain trouble shooting method in ICU.
5. Answer **any two** of the following questions : **(2×10=20)**
- 1) Explain the operation theater equipment's in detail.
 - 2) Discuss the pre installation techniques of the auto analyzer in detail.
 - 3) Calibration of ECG, EMG, EEG in details.



SLR-TJ – 429

Seat No.	
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Set

S

**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION MAINTENANCE AND SERVICING**

Day and Date : Wednesday, 22-11-2017
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 :

(1×20=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) NICU stand for
 - a) Neonatal Intensive Care Unit
 - b) Nephro Intensive Care Unit
 - c) Neuro Intensive Care Unit
 - d) None
- 6) Non-invasive device used to measure oxygen saturation of patients' blood
 - a) Spirometer
 - b) Pulse recorder
 - c) Pulse oximeter
 - d) Pulse stabilizer
- 7) X-ray _____ ratings are done in current.
 - a) Tube
 - b) Gantry
 - c) Frequency
 - d) Collimator

P.T.O.



Seat No.	
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**B.E. (Part – II) (Biomedical Engineering) Examination, 2017
INSTALLATION MAINTENANCE AND SERVICING**

Day and Date : Wednesday, 22-11-2017
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) Use legible handwriting, use **blue/black** only.
4) Draw diagrams/sketches **wherever** necessary.

SECTION – I

2. Answer **any four** of the following questions : **(4×5=20)**
- 1) Discuss the factor to be considered during installation of any medical equipment in a hospital.
 - 2) Explain gas pipe lining systems in hospital.
 - 3) What care should be taken before the installation of biomedical equipment ?
 - 4) Draw a labelled diagram of a bed side patient monitoring with all its specifications.
 - 5) Write a short note x-ray machine with detailed specifications.
3. Answer **any two** of the following questions : **(2×10=20)**
- 1) Discuss about the installation of medical equipment's in physiotherapy.
 - 2) Explain installation and maintenance procedure of any two muscle equipment's.
 - 3) Explain the any two surgical instruments in detail.

SECTION – II

4. Answer **any four** of the following questions : **(4×5=20)**
- 1) Differentiate between PC mode and timed mode.
 - 2) Explain the functions of MRI machine.
 - 3) What is an defibrillators and explains its function ?
 - 4) Define and differentiate between CMC and AMC in detail.
 - 5) Explain trouble shooting method in ICU.
5. Answer **any two** of the following questions : **(2×10=20)**
- 1) Explain the operation theater equipment's in detail.
 - 2) Discuss the pre installation techniques of the auto analyzer in detail.
 - 3) Calibration of ECG, EMG, EEG in details.



SLR-TJ – 430

Seat
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Set

P

**B.E. (Part – II) (Biomedical Engg.) Examination, 2017
BIOMEDICAL MICROSYSTEM**

Day and Date : Thursday, 23-11-2017

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. Fill in the blanks :

- 1) Any engineering system that performs electrical and _____ functions is called MEMS.
a) Physical b) Mechanical c) Chemical d) Micro
- 2) _____ are types of micro actuators.
a) Microvalves b) Optical sensors
c) Pressure sensors d) Chemical sensors
- 3) Single crystal _____ is most widely used substrate material for MEMS.
a) Ge b) Na c) Si d) Cl
- 4) _____ is ideal material for sensors because of its extreme dimensional stability.
a) Ge b) Na c) Si d) Quartz
- 5) Process of removing photoresist material is called
a) lithography b) stripping c) diffusion d) oxidation
- 6) Silicon substrates are commercially available in the form of
a) wafers b) cubes c) plates d) crystal
- 7) Photolithography defines _____ of selective etching to work.
a) structures b) shapes c) dimensions d) patterns
- 8) In _____ process thin films are formed by depositing the gaseous phase material directly on the surface.
a) PVD b) CVD
c) Photolithography d) None of above
- 9) _____ is used commonly for depositing metal films.
a) Electroplating b) PVD c) CVD d) Sputtering

P.T.O.



- 10) Adhesive bonding is used to bond silicon to other materials using
a) PVD b) CVD c) Resin d) Epoxies
- 11) Micromachining is the basic technology for fabrication of micro components of size _____ micrometer
a) 1 to 500 b) 1 to 1000 c) 1 to 50 d) 50 to 500
- 12) _____ is the branch of nanotechnology concerned with nanofabrication.
a) Micromachining b) Nanolithography
c) PVD d) CVD
- 13) _____ are radiation sensitive materials that usually consist of photo sensitive compound.
a) Photoresists b) Photodiode c) Photovalve d) Microvalves
- 14) _____ is the most common photoresist for X-ray lithography.
a) Si b) Ge c) PMMA d) NaCl
- 15) _____ is the material for electroplating the mould in LIGA process.
a) Ni b) Ge c) Si d) PMMA
- 16) _____ can be used to construct sensor for sensing radiant signal from gamma rays to infrared.
a) Ni b) Si c) Ge d) PMMA
- 17) _____ is one of the example of smart sensor.
a) Optical sensor b) Chemical sensor
c) Piezo electric d) None of the above
- 18) _____ are simple drug containers that allow temporary storage of drug.
a) Nano technology b) Chemical storage
c) Microreservoirs d) Micropumps
- 19) Passive micropumps includes mechanism utilizing _____ reservoirs.
a) diffusion b) drift c) osmosis d) filtration
- 20) _____ is the efficient way to copy or amplify small segments of DNA or RNA.
a) PCR b) Lithography c) Biosensing d) Osmosis
-



Seat No.	
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**B.E. (Part – II) (Biomedical Engg.) Examination, 2017
BIOMEDICAL MICROSYSTEM**

Day and Date : Thursday, 23-11-2017

Marks : 80

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**
- 1) List various implantable devices and explain any one.
 - 2) Define PVD and CVD in short.
 - 3) Explain various steps of photolithography with necessary figures.
 - 4) Define and compare photolithography and soft lithography with one example.
 - 5) List materials for MEMS and give any 5 properties of silicon.
3. Attempt **any two** : **(2×10=20)**
- 1) Define and explain process of Nanolithography.
 - 2) Explain CVD. Explain any two techniques of CVD in detail.
 - 3) Explain LIGA process in detail with necessary figures.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Draw and explain block diagram of biosensor.
 - 2) List and define various types of micro needles.
 - 3) Define biosensing principle and explain smart sensor.
 - 4) Define and differentiate between intelligent and integrated sensors.
 - 5) Draw and explain function of micro pumps.
5. Attempt **any two** : **(2×10=20)**
- 1) Explain drug delivery microsystem packaging with advantages. Explain any one in detail.
 - 2) What is the difference between IC packaging and MEMS packaging ? Explain MEMS packaging in detail.
 - 3) Define PCR and explain its working in detail.



SLR-TJ – 430

Seat No.	
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Set **Q**

**B.E. (Part – II) (Biomedical Engg.) Examination, 2017
BIOMEDICAL MICROSYSYTEM**

Day and Date : Thursday, 23-11-2017
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. Fill in the blanks :

- 1) _____ can be used to construct sensor for sensing radiant signal from gamma rays to infrared.
a) Ni b) Si c) Ge d) PMMA
- 2) _____ is one of the example of smart sensor.
a) Optical sensor b) Chemical sensor
c) Piezo electric d) None of the above
- 3) _____ are simple drug containers that allow temporary storage of drug.
a) Nano technology b) Chemical storage
c) Microreservoirs d) Micropumps
- 4) Passive micropumps includes mechanism utilizing _____ reservoirs.
a) diffusion b) drift c) osmosis d) filtration
- 5) _____ is the efficient way to copy or amplify small segments of DNA or RNA.
a) PCR b) Lithography c) Biosensing d) Osmosis
- 6) Any engineering system that performs electrical and _____ functions is called MEMS.
a) Physical b) Mechanical c) Chemical d) Micro
- 7) _____ are types of micro actuators.
a) Microvalves b) Optical sensors
c) Pressure sensors d) Chemical sensors
- 8) Single crystal _____ is most widely used substrate material for MEMS.
a) Ge b) Na c) Si d) Cl

P.T.O.



- 9) _____ is ideal material for sensors because of its extreme dimensional stability.
a) Ge b) Na c) Si d) Quartz
- 10) Process of removing photoresist material is called
a) lithography b) stripping c) diffusion d) oxidation
- 11) Silicon substrates are commercially available in the form of
a) wafers b) cubes c) plates d) crystal
- 12) Photolithography defines _____ of selective etching to work.
a) structures b) shapes c) dimensions d) patterns
- 13) In _____ process thin films are formed by depositing the gaseous phase material directly on the surface.
a) PVD b) CVD
c) Photolithography d) None of above
- 14) _____ is used commonly for depositing metal films.
a) Electroplating b) PVD c) CVD d) Sputtering
- 15) Adhesive bonding is used to bond silicon to other materials using
a) PVD b) CVD c) Resin d) Epoxies
- 16) Micromachining is the basic technology for fabrication of micro components of size _____ micrometer
a) 1 to 500 b) 1 to 1000 c) 1 to 50 d) 50 to 500
- 17) _____ is the branch of nanotechnology concerned with nanofabrication.
a) Micromachining b) Nanolithography
c) PVD d) CVD
- 18) _____ are radiation sensitive materials that usually consist of photo sensitive compound.
a) Photoresists b) Photodiode c) Photovalve d) Microvalves
- 19) _____ is the most common photoresist for X-ray lithography.
a) Si b) Ge c) PMMA d) NaCl
- 20) _____ is the material for electroplating the mould in LIGA process.
a) Ni b) Ge c) Si d) PMMA
-



Seat No.	
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**B.E. (Part – II) (Biomedical Engg.) Examination, 2017
BIOMEDICAL MICROSYSTEM**

Day and Date : Thursday, 23-11-2017

Marks : 80

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**
- 1) List various implantable devices and explain any one.
 - 2) Define PVD and CVD in short.
 - 3) Explain various steps of photolithography with necessary figures.
 - 4) Define and compare photolithography and soft lithography with one example.
 - 5) List materials for MEMS and give any 5 properties of silicon.
3. Attempt **any two** : **(2×10=20)**
- 1) Define and explain process of Nanolithography.
 - 2) Explain CVD. Explain any two techniques of CVD in detail.
 - 3) Explain LIGA process in detail with necessary figures.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Draw and explain block diagram of biosensor.
 - 2) List and define various types of micro needles.
 - 3) Define biosensing principle and explain smart sensor.
 - 4) Define and differentiate between intelligent and integrated sensors.
 - 5) Draw and explain function of micro pumps.
5. Attempt **any two** : **(2×10=20)**
- 1) Explain drug delivery microsystem packaging with advantages. Explain any one in detail.
 - 2) What is the difference between IC packaging and MEMS packaging ? Explain MEMS packaging in detail.
 - 3) Define PCR and explain its working in detail.



SLR-TJ – 430

Seat No.	
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Set

R

**B.E. (Part – II) (Biomedical Engg.) Examination, 2017
BIOMEDICAL MICROSYSTEM**

Day and Date : Thursday, 23-11-2017
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. Fill in the blanks :

- 1) Micromachining is the basic technology for fabrication of micro components of size _____ micrometer
a) 1 to 500 b) 1 to 1000 c) 1 to 50 d) 50 to 500
- 2) _____ is the branch of nanotechnology concerned with nanofabrication.
a) Micromachining b) Nanolithography
c) PVD d) CVD
- 3) _____ are radiation sensitive materials that usually consist of photo sensitive compound.
a) Photoresists b) Photodiode c) Photovalve d) Microvalves
- 4) _____ is the most common photoresist for X-ray lithography.
a) Si b) Ge c) PMMA d) NaCl
- 5) _____ is the material for electroplating the mould in LIGA process.
a) Ni b) Ge c) Si d) PMMA
- 6) _____ can be used to construct sensor for sensing radiant signal from gamma rays to infrared.
a) Ni b) Si c) Ge d) PMMA
- 7) _____ is one of the example of smart sensor.
a) Optical sensor b) Chemical sensor
c) Piezo electric d) None of the above
- 8) _____ are simple drug containers that allow temporary storage of drug.
a) Nano technology b) Chemical storage
c) Microreservoirs d) Micropumps

P.T.O.



- 9) Passive micropumps includes mechanism utilizing _____ reservoirs.
a) diffusion b) drift c) osmosis d) filtration
- 10) _____ is the efficient way to copy or amplify small segments of DNA or RNA.
a) PCR b) Lithography c) Biosensing d) Osmosis
- 11) Any engineering system that performs electrical and _____ functions is called MEMS.
a) Physical b) Mechanical c) Chemical d) Micro
- 12) _____ are types of micro actuators.
a) Microvalves b) Optical sensors
c) Pressure sensors d) Chemical sensors
- 13) Single crystal _____ is most widely used substrate material for MEMS.
a) Ge b) Na c) Si d) Cl
- 14) _____ is ideal material for sensors because of its extreme dimensional stability.
a) Ge b) Na c) Si d) Quartz
- 15) Process of removing photoresist material is called
a) lithography b) stripping c) diffusion d) oxidation
- 16) Silicon substrates are commercially available in the form of
a) wafers b) cubes c) plates d) crystal
- 17) Photolithography defines _____ of selective etching to work.
a) structures b) shapes c) dimensions d) patterns
- 18) In _____ process thin films are formed by depositing the gaseous phase material directly on the surface.
a) PVD b) CVD
c) Photolithography d) None of above
- 19) _____ is used commonly for depositing metal films.
a) Electroplating b) PVD c) CVD d) Sputtering
- 20) Adhesive bonding is used to bond silicon to other materials using
a) PVD b) CVD c) Resin d) Epoxies
-



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**B.E. (Part – II) (Biomedical Engg.) Examination, 2017
BIOMEDICAL MICROSYSTEM**

Day and Date : Thursday, 23-11-2017

Marks : 80

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**
- 1) List various implantable devices and explain any one.
 - 2) Define PVD and CVD in short.
 - 3) Explain various steps of photolithography with necessary figures.
 - 4) Define and compare photolithography and soft lithography with one example.
 - 5) List materials for MEMS and give any 5 properties of silicon.
3. Attempt **any two** : **(2×10=20)**
- 1) Define and explain process of Nanolithography.
 - 2) Explain CVD. Explain any two techniques of CVD in detail.
 - 3) Explain LIGA process in detail with necessary figures.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Draw and explain block diagram of biosensor.
 - 2) List and define various types of micro needles.
 - 3) Define biosensing principle and explain smart sensor.
 - 4) Define and differentiate between intelligent and integrated sensors.
 - 5) Draw and explain function of micro pumps.
5. Attempt **any two** : **(2×10=20)**
- 1) Explain drug delivery microsystem packaging with advantages. Explain any one in detail.
 - 2) What is the difference between IC packaging and MEMS packaging ? Explain MEMS packaging in detail.
 - 3) Define PCR and explain its working in detail.



SLR-TJ – 430

Seat No.	
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Set **S**

**B.E. (Part – II) (Biomedical Engg.) Examination, 2017
BIOMEDICAL MICROSYSTEM**

Day and Date : Thursday, 23-11-2017

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. Fill in the blanks :

- 1) Silicon substrates are commercially available in the form of
a) wafers b) cubes c) plates d) crystal
- 2) Photolithography defines _____ of selective etching to work.
a) structures b) shapes c) dimensions d) patterns
- 3) In _____ process thin films are formed by depositing the gaseous phase material directly on the surface.
a) PVD b) CVD
c) Photolithography d) None of above
- 4) _____ is used commonly for depositing metal films.
a) Electroplating b) PVD c) CVD d) Sputtering
- 5) Adhesive bonding is used to bond silicon to other materials using
a) PVD b) CVD c) Resin d) Epoxies
- 6) Micromachining is the basic technology for fabrication of micro components of size _____ micrometer
a) 1 to 500 b) 1 to 1000 c) 1 to 50 d) 50 to 500
- 7) _____ is the branch of nanotechnology concerned with nanofabrication.
a) Micromachining b) Nanolithography
c) PVD d) CVD
- 8) _____ are radiation sensitive materials that usually consist of photo sensitive compound.
a) Photoresists b) Photodiode c) Photovalve d) Microvalves

P.T.O.



- 9) _____ is the most common photoresist for X-ray lithography.
a) Si b) Ge c) PMMA d) NaCl
- 10) _____ is the material for electroplating the mould in LIGA process.
a) Ni b) Ge c) Si d) PMMA
- 11) _____ can be used to construct sensor for sensing radiant signal from gamma rays to infrared.
a) Ni b) Si c) Ge d) PMMA
- 12) _____ is one of the example of smart sensor.
a) Optical sensor b) Chemical sensor
c) Piezo electric d) None of the above
- 13) _____ are simple drug containers that allow temporary storage of drug.
a) Nano technology b) Chemical storage
c) Microreservoirs d) Micropumps
- 14) Passive micropumps includes mechanism utilizing _____ reservoirs.
a) diffusion b) drift c) osmosis d) filtration
- 15) _____ is the efficient way to copy or amplify small segments of DNA or RNA.
a) PCR b) Lithography c) Biosensing d) Osmosis
- 16) Any engineering system that performs electrical and _____ functions is called MEMS.
a) Physical b) Mechanical c) Chemical d) Micro
- 17) _____ are types of micro actuators.
a) Microvalves b) Optical sensors
c) Pressure sensors d) Chemical sensors
- 18) Single crystal _____ is most widely used substrate material for MEMS.
a) Ge b) Na c) Si d) Cl
- 19) _____ is ideal material for sensors because of its extreme dimensional stability.
a) Ge b) Na c) Si d) Quartz
- 20) Process of removing photoresist material is called
a) lithography b) stripping c) diffusion d) oxidation
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Seat No.	
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**B.E. (Part – II) (Biomedical Engg.) Examination, 2017
BIOMEDICAL MICROSYSTEM**

Day and Date : Thursday, 23-11-2017

Marks : 80

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

SECTION – I

2. Attempt **any four** : **(4×5=20)**
- 1) List various implantable devices and explain any one.
 - 2) Define PVD and CVD in short.
 - 3) Explain various steps of photolithography with necessary figures.
 - 4) Define and compare photolithography and soft lithography with one example.
 - 5) List materials for MEMS and give any 5 properties of silicon.
3. Attempt **any two** : **(2×10=20)**
- 1) Define and explain process of Nanolithography.
 - 2) Explain CVD. Explain any two techniques of CVD in detail.
 - 3) Explain LIGA process in detail with necessary figures.

SECTION – II

4. Attempt **any four** : **(4×5=20)**
- 1) Draw and explain block diagram of biosensor.
 - 2) List and define various types of micro needles.
 - 3) Define biosensing principle and explain smart sensor.
 - 4) Define and differentiate between intelligent and integrated sensors.
 - 5) Draw and explain function of micro pumps.
5. Attempt **any two** : **(2×10=20)**
- 1) Explain drug delivery microsystem packaging with advantages. Explain any one in detail.
 - 2) What is the difference between IC packaging and MEMS packaging ? Explain MEMS packaging in detail.
 - 3) Define PCR and explain its working in detail.



SLR-TJ – 431

Seat No.	
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Set	P
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Friday, 24-11-2017
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 four principal types of tissues are _____
 - a) Muscle, nervous, skeletal, connective
 - b) Epithelial, skeletal, connective, reticular
 - c) Connective, skeletal, epithelial, nervous
 - d) Epithelial, connective, muscle, nervous
- 2) What are the three basic components of connective tissue ?
 - a) Ground substance, cells and fibers
 - b) Cartilage, intercellular matrix and serum
 - c) Cells, protein fibers and ground substance
 - d) Collagen, elastin and reticular fibers
- 3) Mesenchyme
 - a) Gives rise to all other connective tissues
 - b) Is the first connective tissue to emerge in the embryo
 - c) Persists as stem cells in some adult connective tissues
 - d) All of the above
- 4) Which term describes a band of dense regular connective tissue that attaches two bones ?
 - a) Aponeurosis b) Tendon c) Ligament d) Capsule
- 5) The two types of cells in nervous tissue are _____
 - a) Dendrites and axons b) Nerve processes and nerve fibers
 - c) Satellite cells and neurons d) Neurons and glial cells
- 6) The gel of the extracellular matrix is composed mostly of water and
 - a) Proteoglycans b) Collagen c) Keratin d) Reticular fibers
- 7) Stem cells are capable of
 - a) Self-renewal b) Potency c) Both a) and b) d) None of above

P.T.O.



- 8) In a developing embryo, stem cells can differentiate into
 - a) Ectoderm
 - b) Endoderm
 - c) Mesoderm
 - d) All of above
 - 9) Which of the following are potential therapeutic uses of embryonic stem cells ?
 - a) Regenerate cells of the immune system
 - b) Repair damage to heart muscle after a heart attack
 - c) Replace neurons after an accident
 - d) All of the above are potential therapeutic uses of embryonic stem cells
 - 10) Which of the following is not a source for stem cells ?
 - a) Certain adult tissues
 - b) Umbilical cord blood
 - c) Early embryos
 - d) Sperm and eggs
 - 11) What is the most common source of embryos for stem cell harvest ?
 - a) Unused sperm frozen in sperm banks
 - b) Cells cultured in petri dishes
 - c) Embryos removed from animals
 - d) Unused embryos from fertility clinics
 - 12) What is a disadvantage of adult stem cells over embryonic stem cells ?
 - a) They are much smaller and therefore difficult to maneuver
 - b) They grow too fast
 - c) They are difficult to locate
 - d) There is no disadvantage; the two types of cells are identical
 - 13) Stem cells that differentiate into only one type of cell are described as _____
 - a) Unipotent
 - b) Multipotent
 - c) Pluripotent
 - d) Totipotent
 - 14) Blood cells are produced in hemopoietic tissue found in
 - a) Yellow bone marrow
 - b) Thymus
 - c) Red bone marrow
 - d) Spleen
 - 15) The only type of cell seen in a tendon is
 - a) Muscle fibers
 - b) Reticular cells
 - c) Collagenous cells
 - d) Fibroblasts
 - 16) Tendons and ligaments contain the protein
 - a) Keratin
 - b) Fibrin
 - c) Linin
 - d) Collagen
 - 17) Nervous tissue consists of predominantly of two cell types
 - a) Neurons and fibroblasts
 - b) Chondrocytes
 - c) Neurons and neuroglia
 - d) Smooth muscle and glandular epithelium
 - 18) A unipolar neuron is characterized by the presence of
 - a) One dendrite
 - b) Two dendrites
 - c) Many dendrites
 - d) No dendrites
 - 19) What is the functional filtration unit in the kidney ?
 - a) Renal tubule
 - b) Renal corpuscle
 - c) Nephron
 - d) Glomerulus
 - 20) Components of a nephron include
 - a) A renal corpuscle
 - b) Proximal and distal convoluted tubules
 - c) A nephron loop
 - d) All of the above
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Seat No.	
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B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING

Day and Date : Friday, 24-11-2017

Marks : 80

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

SECTION – I

II. Solve **any four** : **(4×5=20)**

- 1) Explain briefly about the reconstruction of connective tissue with diagram.
- 2) Explain muscle contraction mechanism of muscle with diagram.
- 3) Explain aging of the cell.
- 4) Explain about the injury and repair of skeletal muscle.
- 5) What are basic criteria of a scaffold used for tissue engineering ? Give two common examples of scaffolds constructed from natural materials. State three major component of ECM.

III. Solve **any two** : **(2×10=20)**

- 1) Define tissue engineering, its methods and basic principles and consideration for tissue engineering.
- 2) What is bioreactor ? Why cell seeding is important in bioreactor ? Explain the working of two example of bioreactor with diagram.
- 3) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.



SECTION – II

IV. Solve **any four** :**(4×5=20)**

- 1) With help of suitable diagram explain the process of differentiation of stem cells into cell lines.
- 2) Why embryonic cells are important ? What are source of the embryonic cells ?
- 3) Describe the function of kidney and working mechanism of nephron with diagram.
- 4) Explain the active usage of channels properties of nervous system.
- 5) Explain about the directed motile response for in-vivo.

V. Solve **any two** :**(2×10=20)**

- 1) What are the defining characteristics of stem cells ? Describe the adult and embryonic.
 - 2) Explain about the delivery of neuro-active molecules for the nervous system.
 - 3) What are the metabolic requirements of cells ? Discuss with a neat diagram for tissue engineering.
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SLR-TJ – 431

Seat No.	
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Set	Q
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Friday, 24-11-2017
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) Tendons and ligaments contain the protein
a) Keratin b) Fibrin c) Linin d) Collagen
- 2) Nervous tissue consists of predominantly of two cell types
a) Neurons and fibroblasts b) Chondrocytes
c) Neurons and neuroglia d) Smooth muscle and glandular epithelium
- 3) A unipolar neuron is characterized by the presence of
a) One dendrite b) Two dendrites c) Many dendrites d) No dendrites
- 4) What is the functional filtration unit in the kidney ?
a) Renal tubule b) Renal corpuscle
c) Nephron d) Glomerulus
- 5) Components of a nephron include
a) A renal corpuscle b) Proximal and distal convoluted tubules
c) A nephron loop d) All of the above
- 6) The four principal types of tissues are _____
a) Muscle, nervous, skeletal, connective
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- 7) What are the three basic components of connective tissue ?
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c) Cells, protein fibers and ground substance
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P.T.O.



- 8) Mesenchyme
- Gives rise to all other connective tissues
 - Is the first connective tissue to emerge in the embryo
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 - All of the above
- 9) Which term describes a band of dense regular connective tissue that attaches two bones ?
- Aponeurosis
 - Tendon
 - Ligament
 - Capsule
- 10) The two types of cells in nervous tissue are _____
- Dendrites and axons
 - Nerve processes and nerve fibers
 - Satellite cells and neurons
 - Neurons and glial cells
- 11) The gel of the extracellular matrix is composed mostly of water and
- Proteoglycans
 - Collagen
 - Keratin
 - Reticular fibers
- 12) Stem cells are capable of
- Self-renewal
 - Potency
 - Both a) and b)
 - None of above
- 13) In a developing embryo, stem cells can differentiate into
- Ectoderm
 - Endoderm
 - Mesoderm
 - All of above
- 14) Which of the following are potential therapeutic uses of embryonic stem cells ?
- Regenerate cells of the immune system
 - Repair damage to heart muscle after a heart attack
 - Replace neurons after an accident
 - All of the above are potential therapeutic uses of embryonic stem cells
- 15) Which of the following is not a source for stem cells ?
- Certain adult tissues
 - Umbilical cord blood
 - Early embryos
 - Sperm and eggs
- 16) What is the most common source of embryos for stem cell harvest ?
- Unused sperm frozen in sperm banks
 - Cells cultured in petri dishes
 - Embryos removed from animals
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- 17) What is a disadvantage of adult stem cells over embryonic stem cells ?
- They are much smaller and therefore difficult to maneuver
 - They grow too fast
 - They are difficult to locate
 - There is no disadvantage; the two types of cells are identical
- 18) Stem cells that differentiate into only one type of cell are described as _____
- Unipotent
 - Multipotent
 - Pluripotent
 - Totipotent
- 19) Blood cells are produced in hemopoietic tissue found in
- Yellow bone marrow
 - Thymus
 - Red bone marrow
 - Spleen
- 20) The only type of cell seen in a tendon is
- Muscle fibers
 - Reticular cells
 - Collagenous cells
 - Fibroblasts



Seat No.	
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B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING

Day and Date : Friday, 24-11-2017

Marks : 80

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

SECTION – I

II. Solve **any four** : **(4×5=20)**

- 1) Explain briefly about the reconstruction of connective tissue with diagram.
- 2) Explain muscle contraction mechanism of muscle with diagram.
- 3) Explain aging of the cell.
- 4) Explain about the injury and repair of skeletal muscle.
- 5) What are basic criteria of a scaffold used for tissue engineering ? Give two common examples of scaffolds constructed from natural materials. State three major component of ECM.

III. Solve **any two** : **(2×10=20)**

- 1) Define tissue engineering, its methods and basic principles and consideration for tissue engineering.
- 2) What is bioreactor ? Why cell seeding is important in bioreactor ? Explain the working of two example of bioreactor with diagram.
- 3) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.



SECTION – II

IV. Solve **any four** :**(4×5=20)**

- 1) With help of suitable diagram explain the process of differentiation of stem cells into cell lines.
- 2) Why embryonic cells are important ? What are source of the embryonic cells ?
- 3) Describe the function of kidney and working mechanism of nephron with diagram.
- 4) Explain the active usage of channels properties of nervous system.
- 5) Explain about the directed motile response for in-vivo.

V. Solve **any two** :**(2×10=20)**

- 1) What are the defining characteristics of stem cells ? Describe the adult and embryonic.
 - 2) Explain about the delivery of neuro-active molecules for the nervous system.
 - 3) What are the metabolic requirements of cells ? Discuss with a neat diagram for tissue engineering.
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SLR-TJ – 431

Seat No.	
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Friday, 24-11-2017
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) What is the most common source of embryos for stem cell harvest ?
 - a) Unused sperm frozen in sperm banks
 - b) Cells cultured in petri dishes
 - c) Embryos removed from animals
 - d) Unused embryos from fertility clinics
- 2) What is a disadvantage of adult stem cells over embryonic stem cells ?
 - a) They are much smaller and therefore difficult to maneuver
 - b) They grow too fast
 - c) They are difficult to locate
 - d) There is no disadvantage; the two types of cells are identical
- 3) Stem cells that differentiate into only one type of cell are described as _____
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 - b) Multipotent
 - c) Pluripotent
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- 4) Blood cells are produced in hemopoietic tissue found in
 - a) Yellow bone marrow
 - b) Thymus
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- 5) The only type of cell seen in a tendon is
 - a) Muscle fibers
 - b) Reticular cells
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- 6) Tendons and ligaments contain the protein
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 - c) Linin
 - d) Collagen
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 - d) Smooth muscle and glandular epithelium
- 8) A unipolar neuron is characterized by the presence of
 - a) One dendrite
 - b) Two dendrites
 - c) Many dendrites
 - d) No dendrites

P.T.O.



- 9) What is the functional filtration unit in the kidney ?
- a) Renal tubule
 - b) Renal corpuscle
 - c) Nephron
 - d) Glomerulus
- 10) Components of a nephron include
- a) A renal corpuscle
 - b) Proximal and distal convoluted tubules
 - c) A nephron loop
 - d) All of the above
- 11) The four principal types of tissues are _____
- a) Muscle, nervous, skeletal, connective
 - b) Epithelial, skeletal, connective, reticular
 - c) Connective, skeletal, epithelial, nervous
 - d) Epithelial, connective, muscle, nervous
- 12) What are the three basic components of connective tissue ?
- a) Ground substance, cells and fibers
 - b) Cartilage, intercellular matrix and serum
 - c) Cells, protein fibers and ground substance
 - d) Collagen, elastin and reticular fibers
- 13) Mesenchyme
- a) Gives rise to all other connective tissues
 - b) Is the first connective tissue to emerge in the embryo
 - c) Persists as stem cells in some adult connective tissues
 - d) All of the above
- 14) Which term describes a band of dense regular connective tissue that attaches two bones ?
- a) Aponeurosis
 - b) Tendon
 - c) Ligament
 - d) Capsule
- 15) The two types of cells in nervous tissue are _____
- a) Dendrites and axons
 - b) Nerve processes and nerve fibers
 - c) Satellite cells and neurons
 - d) Neurons and glial cells
- 16) The gel of the extracellular matrix is composed mostly of water and
- a) Proteoglycans
 - b) Collagen
 - c) Keratin
 - d) Reticular fibers
- 17) Stem cells are capable of
- a) Self-renewal
 - b) Potency
 - c) Both a) and b)
 - d) None of above
- 18) In a developing embryo, stem cells can differentiate into
- a) Ectoderm
 - b) Endoderm
 - c) Mesoderm
 - d) All of above
- 19) Which of the following are potential therapeutic uses of embryonic stem cells ?
- a) Regenerate cells of the immune system
 - b) Repair damage to heart muscle after a heart attack
 - c) Replace neurons after an accident
 - d) All of the above are potential therapeutic uses of embryonic stem cells
- 20) Which of the following is not a source for stem cells ?
- a) Certain adult tissues
 - b) Umbilical cord blood
 - c) Early embryos
 - d) Sperm and eggs



Seat No.	
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B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING

Day and Date : Friday, 24-11-2017

Marks : 80

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

SECTION – I

II. Solve **any four** : **(4×5=20)**

- 1) Explain briefly about the reconstruction of connective tissue with diagram.
- 2) Explain muscle contraction mechanism of muscle with diagram.
- 3) Explain aging of the cell.
- 4) Explain about the injury and repair of skeletal muscle.
- 5) What are basic criteria of a scaffold used for tissue engineering ? Give two common examples of scaffolds constructed from natural materials. State three major component of ECM.

III. Solve **any two** : **(2×10=20)**

- 1) Define tissue engineering, its methods and basic principles and consideration for tissue engineering.
- 2) What is bioreactor ? Why cell seeding is important in bioreactor ? Explain the working of two example of bioreactor with diagram.
- 3) What is bone marrow transplantation ? Explain autologous and allogeneic bone marrow transplantation.



SECTION – II

IV. Solve **any four** :**(4×5=20)**

- 1) With help of suitable diagram explain the process of differentiation of stem cells into cell lines.
- 2) Why embryonic cells are important ? What are source of the embryonic cells ?
- 3) Describe the function of kidney and working mechanism of nephron with diagram.
- 4) Explain the active usage of channels properties of nervous system.
- 5) Explain about the directed motile response for in-vivo.

V. Solve **any two** :**(2×10=20)**

- 1) What are the defining characteristics of stem cells ? Describe the adult and embryonic.
 - 2) Explain about the delivery of neuro-active molecules for the nervous system.
 - 3) What are the metabolic requirements of cells ? Discuss with a neat diagram for tissue engineering.
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SLR-TJ – 431

Seat No.	
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**B.E. (Biomedical Engg.) (Part – II) Examination, 2017
TISSUE ENGINEERING**

Day and Date : Friday, 24-11-2017
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 gel of the extracellular matrix is composed mostly of water and
a) Proteoglycans b) Collagen c) Keratin d) Reticular fibers
- 2) Stem cells are capable of
a) Self-renewal b) Potency c) Both a) and b) d) None of above
- 3) In a developing embryo, stem cells can differentiate into
a) Ectoderm b) Endoderm c) Mesoderm d) All of above
- 4) Which of the following are potential therapeutic uses of embryonic stem cells ?
a) Regenerate cells of the immune system
b) Repair damage to heart muscle after a heart attack
c) Replace neurons after an accident
d) All of the above are potential therapeutic uses of embryonic stem cells
- 5) Which of the following is not a source for stem cells ?
a) Certain adult tissues b) Umbilical cord blood
c) Early embryos d) Sperm and eggs
- 6) What is the most common source of embryos for stem cell harvest ?
a) Unused sperm frozen in sperm banks
b) Cells cultured in petri dishes
c) Embryos removed from animals
d) Unused embryos from fertility clinics
- 7) What is a disadvantage of adult stem cells over embryonic stem cells ?
a) They are much smaller and therefore difficult to maneuver
b) They grow too fast
c) They are difficult to locate
d) There is no disadvantage; the two types of cells are identical
- 8) Stem cells that differentiate into only one type of cell are described as _____
a) Unipotent b) Multipotent c) Pluripotent d) Totipotent

P.T.O.



- 9) Blood cells are produced in hemopoietic tissue found in
a) Yellow bone marrow b) Thymus
c) Red bone marrow d) Spleen
- 10) The only type of cell seen in a tendon is
a) Muscle fibers b) Reticular cells
c) Collagenous cells d) Fibroblasts
- 11) Tendons and ligaments contain the protein
a) Keratin b) Fibrin c) Linin d) Collagen
- 12) Nervous tissue consists of predominantly of two cell types
a) Neurons and fibroblasts b) Chondrocytes
c) Neurons and neuroglia d) Smooth muscle and glandular epithelium
- 13) A unipolar neuron is characterized by the presence of
a) One dendrite b) Two dendrites c) Many dendrites d) No dendrites
- 14) What is the functional filtration unit in the kidney ?
a) Renal tubule b) Renal corpuscle
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