

Seat No.	
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S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Saturday, 07-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four **16**

- Find Laplace transform of $\left\{ e^{-4t} \int_0^t t \cdot \sin 3t dt \right\}$
- Find Laplace transform of $\left\{ \frac{t \cdot \sinh at}{2a} \right\}$.
- Find Laplace transform of $\left\{ \frac{1 - \cos t}{t^2} \right\}$.
- Find Laplace transform of $\{ e^{-3t} \sin^2 t \}$
- Find K such that the function $f(z) = e^x \cos y + i e^x \sin ky$ is analytic.

Q.3 Attempt any two **12**

- Solve by using $L.T. \frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t} \sin t$ and $y(0) = 0, y'(0) = 1$.
- Find $L^{-1} \left\{ \frac{1}{(s+1)(s^2+1)} \right\}$ by convolution theorem.
- Find $\oint \frac{z^2+1}{z-2} dz$ where C is contour (circle)
 - $|Z - 2| = 1$
 - $|Z| = 1$

Section – II

Q.4 Attempt any four **16**

- Obtain Fourier series of $f(x) = (x^2) -\pi \leq x \leq \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$
- Find Half Range Fourier Series for $f(x) = x, 0 < x < 2$ hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \dots$
- Find Half Range Fourier series of $f(x) = x(2 - x)$ in $0 < x < 2$
- Find $\oint_C \log z dz$ where C is the circle $|Z| = 1$
- Evaluate $\int_C (z + z^2) dz$, where 'C' is the upper arc of circle $|z| = 1$

Q.5 Attempt any two **12**

- Find Fourier Series for $f(x) = x^3$ in the range $(-\pi, \pi)$.
- Find Fourier Series for $f(x) = 4 - x^2$ in the range $(0, 2)$.
- Find the Bilinear Transformation which maps the points $Z = -1, 0, 1$ on to the pts. $W = 0, i, 3i$

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 2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) $L\{t^2 f(t)\}$ is _____.
 - a) $\frac{d}{ds}[f(s)]$
 - b) $\frac{-d^2}{ds^2}[f(s)]$
 - c) $\frac{d}{ds}[f(s)]^2$
 - d) $\frac{d^2}{ds^2}[f(s)]$
- 2) $L^{-1}\left\{\frac{2s^3+13s}{(s^2+3)(s^2+4)}\right\}$ is _____.
 - a) $\cos 3t + \cos 2t$
 - b) $\cos 3t - \cos 2t$
 - c) $\sin 3t - \sin 2t$
 - d) $\sin 3t + \sin 2t$
- 3) If $f(z) = u + iv$ is an Analytic function then $f'(z) =$ _____.
 - a) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial x}$
 - b) $\frac{\partial u}{\partial x} + i \frac{\partial v}{\partial x}$
 - c) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial y}$
 - d) None
- 4) If the function $2x + x^2 + \alpha y^2$ is to be Harmonic then value of α _____.
 - a) -1
 - b) 1
 - c) 2
 - d) None
- 5) The value of $\int_0^{1+i} z^2 dz$ along $y = x$ is _____.
 - a) $\frac{2}{3}(-1 + i)$
 - b) $\frac{2}{3}(-1 - i)$
 - c) $\frac{2}{3}(1 + i)$
 - d) None
- 6) The fixed points of mapping $w = \frac{3z+4}{z+5}$ are _____.
 - a) 2, 2
 - b) 2, -2
 - c) -2, 2
 - d) None
- 7) The _____ is Analytic function.
 - a) $f(z) = \sin z$
 - b) $f(z) = z$
 - c) $f(z) = \text{Im}(z)$
 - d) $R(iz)$
- 8) The period of $|\sin x|$ is _____.
 - a) 0
 - b) 2π
 - c) π
 - d) None

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Section – I**Q.2 Attempt any four** **16**

- a) Find Laplace transform of $\left\{ e^{-4t} \int_0^t t \cdot \sin 3t dt \right\}$
- b) Find Laplace transform of $\left\{ \frac{t \cdot \sinh at}{2a} \right\}$.
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- e) Find K such that the function $f(z) = e^x \cos y + i e^x \sin ky$ is analytic.

Q.3 Attempt any two **12**

- a) Solve by using $L.T. \frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t} \sin t$ and $y(0) = 0, y'(0) = 1$.
- b) Find $L^{-1} \left\{ \frac{1}{(s+1)(s^2+1)} \right\}$ by convolution theorem.
- c) Find $\oint \frac{z^2+1}{z-2} dz$ where C is contour (circle)
 - i) $|Z - 2| = 1$
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Section – II**Q.4 Attempt any four** **16**

- a) Obtain Fourier series of $f(x) = (x^2) -\pi \leq x \leq \pi$ hence show that

$$\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$$
- b) Find Half Range Fourier Series for $f(x) = x, 0 < x < 2$ hence show that

$$\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \dots$$
- c) Find Half Range Fourier series of $f(x) = x(2 - x)$ in $0 < x < 2$
- d) Find $\oint_C \log z dz$ where C is the circle $|Z| = 1$
- e) Evaluate $\int_C (z + z^2) dz$, where 'C' is the upper arc of circle $|z| = 1$

Q.5 Attempt any two **12**

- a) Find Fourier Series for $f(x) = x^3$ in the range $(-\pi, \pi)$.
- b) Find Fourier Series for $f(x) = 4 - x^2$ in the range $(0, 2)$.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Fourier Series Expansion of an odd function has only _____ terms.
 - a) Sine terms
 - b) Cosine terms
 - c) Both sine and cosine
 - d) None
- 2) L.T. of $\int_0^{\infty} e^{-t} \sin t \, dt$ is _____.
 - a) 1
 - b) $\frac{1}{2}$
 - c) 0
 - d) 2
- 3) $L^{-1}\{\tan^{-1}(s)\} =$ _____.
 - a) $\frac{\cos t}{t}$
 - b) $-t \cos t$
 - c) $\frac{-\sin t}{t}$
 - d) $t \sin t$
- 4) $L\{t^2 f(t)\}$ is _____.
 - a) $\frac{d}{ds}[f(s)]$
 - b) $\frac{-d^2}{ds^2}[f(s)]$
 - c) $\frac{d}{ds}[f(s)]^2$
 - d) $\frac{d^2}{ds^2}[f(s)]$
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 - a) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial x}$
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 - c) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial y}$
 - d) None
- 7) If the function $2x + x^2 + \alpha y^2$ is to be Harmonic then value of α _____.
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- e) Find K such that the function $f(z) = e^x \cos y + i e^x \sin ky$ is analytic.

Q.3 Attempt any two **12**

- a) Solve by using $L.T. \frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t} \sin t$ and $y(0) = 0, y'(0) = 1$.
- b) Find $L^{-1} \left\{ \frac{1}{(s+1)(s^2+1)} \right\}$ by convolution theorem.
- c) Find $\oint \frac{z^2+1}{z-2} dz$ where C is contour (circle)
 - i) $|Z - 2| = 1$
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Section – II

Q.4 Attempt any four **16**

- a) Obtain Fourier series of $f(x) = (x^2) -\pi \leq x \leq \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$
- b) Find Half Range Fourier Series for $f(x) = x, 0 < x < 2$ hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \dots$
- c) Find Half Range Fourier series of $f(x) = x(2 - x)$ in $0 < x < 2$
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) If $f(z) = u + iv$ is an Analytic function then $f'(z) = \underline{\hspace{2cm}}$.
 - a) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial x}$
 - b) $\frac{\partial u}{\partial x} + i \frac{\partial v}{\partial x}$
 - c) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial y}$
 - d) None
- 2) If the function $2x + x^2 + \alpha y^2$ is to be Harmonic then value of α _____.
 - a) -1
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- 3) The value of $\int_0^{1+i} z^2 dz$ along $y = x$ is _____.
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 - c) $f(z) = \text{Im}(z)$
 - d) $R(iz)$
- 6) The period of $|\sin x|$ is _____.
 - a) 0
 - b) 2π
 - c) π
 - d) None
- 7) In fourier series $f(x) = x$ for $(-\pi, \pi)$ which terms are absent _____.
 - a) Sine terms
 - b) Cosine terms
 - c) Neither of terms
 - d) None
- 8) If $f(x) = x^2$ in $(-\pi, \pi)$, then Fourier series of $f(x)$ contains _____.
 - a) Only sine terms
 - b) Only cosine terms
 - c) Both sine and cosine terms
 - d) None

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Section – II

Q.4 Attempt any four **16**

- a) Obtain Fourier series of $f(x) = (x^2) -\pi \leq x \leq \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$
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S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Kidneys in human body are placed against back side wall of _____ cavity.
 - a) venal
 - b) Abdominal
 - c) vertebral
 - d) glomerulus
- 2) Oxygen and carbon dioxide are exchanged in the lungs and through all cell membranes by _____.
 - a) active transport
 - b) Diffusion
 - c) filtration
 - d) Osmosis
- 3) Conduction velocity is maximum in _____.
 - a) SA node
 - b) AV node
 - c) Right ventricle
 - d) Purkinje fibers
- 4) Insulin facilitates glucose uptake in _____.
 - a) Kidney tubule
 - b) Brain
 - c) RBC
 - d) Skeletal muscle
- 5) _____ is an example of long bone.
 - a) Sternum
 - b) Femur
 - c) Carpal
 - d) Patella
- 6) The saliva helps in the digestion of _____.
 - a) proteins
 - b) Fats
 - c) fibers
 - d) Starch
- 7) There are approximately _____ muscles in human body.
 - a) 206
 - b) 360
 - c) 500
 - d) 700
- 8) _____ is essential for blood clotting.
 - a) RBC
 - b) WBC
 - c) Blood platelets
 - d) Lymph
- 9) Visual area is located in _____ lobe.
 - a) Frontal
 - b) Parietal
 - c) Temporal
 - d) Occipital
- 10) The organ of corti is concerned with _____.
 - a) Hearing
 - b) Seeing
 - c) Tasting
 - d) Balancing

- 11) _____ organ receives only oxygenated blood.
- | | |
|-----------|----------|
| a) Lung | b) Liver |
| c) Spleen | d) Gill |
- 12) Sella turcica is _____.
- | | |
|------------------------|--------------------------|
| a) covering of ovary | b) covering of testis |
| c) depression in skull | d) part of temporal bone |
- 13) Most of the fat digestion occurs in _____.
- | | |
|-------------|--------------------|
| a) vectum | b) Stomach |
| c) Duodenum | d) small intestine |
- 14) The largest gland in human body is _____.
- | | |
|----------|-----------------|
| a) lung | b) Pancreas |
| c) Liver | d) gall bladder |

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Section – I

- Q.2 Attempt any four questions. 16**
- a) Classify epithelial tissues and state their functions.
 - b) Explain the composition of blood.
 - c) Explain anatomy of liver and state its any two functions.
 - d) Differentiate between systemic and pulmonary circulation.
 - e) Explain various steps of blood coagulation.
- Q.3 Attempt any two questions. 12**
- a) Explain generation of action potential with neat diagram.
 - b) Explain the mechanism of respiration.
 - c) Draw ECG waveform explaining it along with a note on bipolar lead configuration.

Section – II

- Q.4 Attempt any four questions. 16**
- a) Explain with a neat diagram structure of spinal cord.
 - b) Define reflex arc and mention any two examples of it.
 - c) Explain structure and function of lens of eye.
 - d) List endocrine glands and state their functions.
 - e) Draw and explain various lobes of cerebrum in detail.
- Q.5 Attempt any two questions. 12**
- a) Explain process of formation of urine.
 - b) Explain structure of ear with neat diagram.
 - c) List main actions of androgens, estrogens and progesterone.

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- 3) The organ of corti is concerned with _____.
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- 4) _____ organ receives only oxygenated blood.
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 - d) Purkinje fibers

- 11) Insulin facilitates glucose uptake in _____.
- | | |
|------------------|--------------------|
| a) Kidney tubule | b) Brain |
| c) RBC | d) Skeletal muscle |
- 12) _____ is an example of long bone.
- | | |
|------------|------------|
| a) Sternum | b) Femur |
| c) Carpal | d) Patella |
- 13) The saliva helps in the digestion of _____.
- | | |
|-------------|-----------|
| a) proteins | b) Fats |
| c) fibers | d) Starch |
- 14) There are approximately _____ muscles in human body.
- | | |
|--------|--------|
| a) 206 | b) 360 |
| c) 500 | d) 700 |

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 - a) RBC
 - b) WBC
 - c) Blood platelets
 - d) Lymph
- 5) Visual area is located in _____ lobe.
 - a) Frontal
 - b) Parietal
 - c) Temporal
 - d) Occipital
- 6) The organ of corti is concerned with _____.
 - a) Hearing
 - b) Seeing
 - c) Tasting
 - d) Balancing
- 7) _____ organ receives only oxygenated blood.
 - a) Lung
 - b) Liver
 - c) Spleen
 - d) Gill
- 8) Sella turcica is _____.
 - a) covering of ovary
 - b) covering of testis
 - c) depression in skull
 - d) part of temporal bone
- 9) Most of the fat digestion occurs in _____.
 - a) vectum
 - b) Stomach
 - c) Duodenum
 - d) small intestine
- 10) The largest gland in human body is _____.
 - a) lung
 - b) Pancreas
 - c) Liver
 - d) gall bladder
- 11) Kidneys in human body are placed against back side wall of _____ cavity.
 - a) venal
 - b) Abdominal
 - c) vertebral
 - d) glomerulus

- 12) Oxygen and carbon dioxide are exchanged in the lungs and through all cell membranes by _____.
- | | |
|---------------------|--------------|
| a) active transport | b) Diffusion |
| c) filtration | d) Osmosis |
- 13) Conduction velocity is maximum in _____.
- | | |
|--------------------|--------------------|
| a) SA node | b) AV node |
| c) Right ventricle | d) Purkinje fibers |
- 14) Insulin facilitates glucose uptake in _____.
- | | |
|------------------|--------------------|
| a) Kidney tubule | b) Brain |
| c) RBC | d) Skeletal muscle |

Seat No.	
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S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four questions. 16**
- a) Classify epithelial tissues and state their functions.
 - b) Explain the composition of blood.
 - c) Explain anatomy of liver and state its any two functions.
 - d) Differentiate between systemic and pulmonary circulation.
 - e) Explain various steps of blood coagulation.
- Q.3 Attempt any two questions. 12**
- a) Explain generation of action potential with neat diagram.
 - b) Explain the mechanism of respiration.
 - c) Draw ECG waveform explaining it along with a note on bipolar lead configuration.

Section – II

- Q.4 Attempt any four questions. 16**
- a) Explain with a neat diagram structure of spinal cord.
 - b) Define reflex arc and mention any two examples of it.
 - c) Explain structure and function of lens of eye.
 - d) List endocrine glands and state their functions.
 - e) Draw and explain various lobes of cerebrum in detail.
- Q.5 Attempt any two questions. 12**
- a) Explain process of formation of urine.
 - b) Explain structure of ear with neat diagram.
 - c) List main actions of androgens, estrogens and progesterone.

- 11) The saliva helps in the digestion of _____.
- | | |
|-------------|-----------|
| a) proteins | b) Fats |
| c) fibers | d) Starch |
- 12) There are approximately _____ muscles in human body.
- | | |
|--------|--------|
| a) 206 | b) 360 |
| c) 500 | d) 700 |
- 13) _____ is essential for blood clotting.
- | | |
|--------------------|----------|
| a) RBC | b) WBC |
| c) Blood platelets | d) Lymph |
- 14) Visual area is located in _____ lobe.
- | | |
|-------------|--------------|
| a) Frontal | b) Parietal |
| c) Temporal | d) Occipital |

Seat No.	
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Set **S**

S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four questions. 16**
- a) Classify epithelial tissues and state their functions.
 - b) Explain the composition of blood.
 - c) Explain anatomy of liver and state its any two functions.
 - d) Differentiate between systemic and pulmonary circulation.
 - e) Explain various steps of blood coagulation.
- Q.3 Attempt any two questions. 12**
- a) Explain generation of action potential with neat diagram.
 - b) Explain the mechanism of respiration.
 - c) Draw ECG waveform explaining it along with a note on bipolar lead configuration.

Section – II

- Q.4 Attempt any four questions. 16**
- a) Explain with a neat diagram structure of spinal cord.
 - b) Define reflex arc and mention any two examples of it.
 - c) Explain structure and function of lens of eye.
 - d) List endocrine glands and state their functions.
 - e) Draw and explain various lobes of cerebrum in detail.
- Q.5 Attempt any two questions. 12**
- a) Explain process of formation of urine.
 - b) Explain structure of ear with neat diagram.
 - c) List main actions of androgens, estrogens and progesterone.

Seat No.	
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S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) What is the effect of high pressure on the molecular weight of the polymer product formed?
 - a) Increases
 - b) Decreases
 - c) No change
 - d) Cannot be determined
- 2) Composite biomaterial used in _____.
 - a) Dental filling
 - b) Bone particle
 - c) Both a and b
 - d) None
- 3) Crystal structure means _____.
 - a) Random alignment of unit cells
 - b) Periodic alignment of unit cells
 - c) Ductile materials
 - d) Brittle material
- 4) Bioglass is /an _____.
 - a) Inert ceramic
 - b) Bioactive ceramic
 - c) Composite
 - d) Crystalline polymer
- 5) The hardest biological material is _____.
 - a) Dentin
 - b) Enamel
 - c) Gum
 - d) Bone
- 6) Strength of a material is its _____.
 - a) Surface Property
 - b) Chemical Property
 - c) Biological Property
 - d) Mechanical Property
- 7) Which of the following polymers can have strong intermolecular forces?
 - a) Nylon
 - b) Polystyrene
 - c) Rubber
 - d) None
- 8) Natural rubber become brittle below _____ and soft after _____.
 - a) 100°C, 500°C
 - b) 10°C, 500°C
 - c) 10°C, 50°C
 - d) None
- 9) Chrane Tanning process completed in _____.
 - a) 5 to 16 days
 - b) 5 to 16 weeks
 - c) 5 to 16 hrs
 - d) 5 to 16 months

- 10) Which of the following is not a characteristic property of ceramic material?
- | | |
|-------------------------------|-----------------------------|
| a) High temperature stability | b) High mechanical strength |
| c) Low elongation | d) Low hardness |
- 11) Hydroxyapatite has _____ biocompatibility.
- | | |
|--------------|---------|
| a) Less | b) Zero |
| c) Excellent | d) None |
- 12) Major ingredients of traditional ceramics _____.
- | | |
|-------------|--------------|
| a) Silica | b) Clay |
| c) Feldspar | d) All above |
- 13) In which of the following application ceramic biomaterial is used?
- | | |
|-------------------|---------------------|
| a) Bone graft | b) Artificial knees |
| c) Hip prostheses | d) All above |
- 14) CaP has been used in the form _____.
- | | |
|---------------------|---------------------|
| a) Artificial heart | b) Artificial teeth |
| c) Artificial Bone | d) None |

Seat No.	
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Set **P**

S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four** **16**
- a) Explain the effects of Ni and Cr on austenitic phase of stainless steel.
 - b) Explain in detail the use of silicon rubber.
 - c) Define composite. What are importance of composite biomaterials? Classify composite biomaterials.
 - d) Write properties and salient features of hydroxyapatite.
 - e) What is bioglass? Give composition and biomedical application of bioglass.

- Q.3 Answer any two** **12**
- a) What are hydrogels? Give the application of hydrogel.
 - b) Describe possible biomedical uses of ceramics. Give advantages and disadvantages of ceramic implant.
 - c) Classify and explain different polymer according to their physical properties? Mention their properties and application in biomedical of any four polymers.

Section – II

- Q.4 Answer any four** **16**
- a) Give different types of implants having soft tissue application.
 - b) What are biodegradable polymers give examples to each.
 - c) Explain use of wood and binding material in prosthetics and orthotic devices in brief.
 - d) Describe briefly the surface properties affecting biomaterials.
 - e) Explain advantages and disadvantages of thermosetting resins.

- Q.5 Answer any two** **12**
- a) List different types of rubber used in orthopedics. Explain each in detail with their property and drawbacks.
 - b) List the different types of techniques used for surface analysis. Explain Scanning Electron Microscopy (SEM) technique in detail.
 - c) Explain the following
 - 1) Copper and its alloy used in prosthetics and orthotics
 - 2) What is tissue? List the basic criteria for tissue replacement.

- 11) Bioglass is /an _____.
a) Inert ceramic
b) Bioactive ceramic
c) Composite
d) Crystalline polymer
- 12) The hardest biological material is _____.
a) Dentin
b) Enamel
c) Gum
d) Bone
- 13) Strength of a material is its _____.
a) Surface Property
b) Chemical Property
c) Biological Property
d) Mechanical Property
- 14) Which of the following polymers can have strong intermolecular forces?
a) Nylon
b) Polystyrene
c) Rubber
d) None

Seat No.	
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Set **Q**

S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four** **16**
- a) Explain the effects of Ni and Cr on austenitic phase of stainless steel.
 - b) Explain in detail the use of silicon rubber.
 - c) Define composite. What are importance of composite biomaterials? Classify composite biomaterials.
 - d) Write properties and salient features of hydroxyapatite.
 - e) What is bioglass? Give composition and biomedical application of bioglass.

- Q.3 Answer any two** **12**
- a) What are hydrogels? Give the application of hydrogel.
 - b) Describe possible biomedical uses of ceramics. Give advantages and disadvantages of ceramic implant.
 - c) Classify and explain different polymer according to their physical properties? Mention their properties and application in biomedical of any four polymers.

Section – II

- Q.4 Answer any four** **16**
- a) Give different types of implants having soft tissue application.
 - b) What are biodegradable polymers give examples to each.
 - c) Explain use of wood and binding material in prosthetics and orthotic devices in brief.
 - d) Describe briefly the surface properties affecting biomaterials.
 - e) Explain advantages and disadvantages of thermosetting resins.

- Q.5 Answer any two** **12**
- a) List different types of rubber used in orthopedics. Explain each in detail with their property and drawbacks.
 - b) List the different types of techniques used for surface analysis. Explain Scanning Electron Microscopy (SEM) technique in detail.
 - c) Explain the following
 - 1) Copper and its alloy used in prosthetics and orthotics
 - 2) What is tissue? List the basic criteria for tissue replacement.

Seat No.	
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Set

R

S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four** **16**
- a) Explain the effects of Ni and Cr on austenitic phase of stainless steel.
 - b) Explain in detail the use of silicon rubber.
 - c) Define composite. What are importance of composite biomaterials? Classify composite biomaterials.
 - d) Write properties and salient features of hydroxyapatite.
 - e) What is bioglass? Give composition and biomedical application of bioglass.

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- a) What are hydrogels? Give the application of hydrogel.
 - b) Describe possible biomedical uses of ceramics. Give advantages and disadvantages of ceramic implant.
 - c) Classify and explain different polymer according to their physical properties? Mention their properties and application in biomedical of any four polymers.

Section – II

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 - e) Explain advantages and disadvantages of thermosetting resins.

- Q.5 Answer any two** **12**
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 - c) Explain the following
 - 1) Copper and its alloy used in prosthetics and orthotics
 - 2) What is tissue? List the basic criteria for tissue replacement.

Seat No.	
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S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which of the following is not a characteristic property of ceramic material?
 - a) High temperature stability
 - b) High mechanical strength
 - c) Low elongation
 - d) Low hardness
- 2) Hydroxyapatite has _____ biocompatibility.
 - a) Less
 - b) Zero
 - c) Excellent
 - d) None
- 3) Major ingredients of traditional ceramics _____.
 - a) Silica
 - b) Clay
 - c) Feldspar
 - d) All above
- 4) In which of the following application ceramic biomaterial is used?
 - a) Bone graft
 - b) Artificial knees
 - c) Hip prostheses
 - d) All above
- 5) CaP has been used in the form _____.
 - a) Artificial heart
 - b) Artificial teeth
 - c) Artificial Bone
 - d) None
- 6) What is the effect of high pressure on the molecular weight of the polymer product formed?
 - a) Increases
 - b) Decreases
 - c) No change
 - d) Cannot be determined
- 7) Composite biomaterial used in _____.
 - a) Dental filling
 - b) Bone particle
 - c) Both a and b
 - d) None
- 8) Crystal structure means _____.
 - a) Random alignment of unit cells
 - b) Periodic alignment of unit cells
 - c) Ductile materials
 - d) Brittle material
- 9) Bioglass is /an _____.
 - a) Inert ceramic
 - b) Bioactive ceramic
 - c) Composite
 - d) Crystalline polymer

- 10) The hardest biological material is _____.
 - a) Dentin
 - b) Enamel
 - c) Gum
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- 11) Strength of a material is its _____.
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- 12) Which of the following polymers can have strong intermolecular forces?
 - a) Nylon
 - b) Polystyrene
 - c) Rubber
 - d) None
- 13) Natural rubber become brittle below _____ and soft after _____.
 - a) 100⁰C, 500⁰C
 - b) 10⁰C, 500⁰C
 - c) 10⁰C, 50⁰C
 - d) None
- 14) Chrane Tanning process completed in _____.
 - a) 5 to 16 days
 - b) 5 to 16 weeks
 - c) 5 to 16 hrs
 - d) 5 to 16 months

Seat No.	
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Set **S**

S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four** **16**
- a) Explain the effects of Ni and Cr on austenitic phase of stainless steel.
 - b) Explain in detail the use of silicon rubber.
 - c) Define composite. What are importance of composite biomaterials? Classify composite biomaterials.
 - d) Write properties and salient features of hydroxyapatite.
 - e) What is bioglass? Give composition and biomedical application of bioglass.

- Q.3 Answer any two** **12**
- a) What are hydrogels? Give the application of hydrogel.
 - b) Describe possible biomedical uses of ceramics. Give advantages and disadvantages of ceramic implant.
 - c) Classify and explain different polymer according to their physical properties? Mention their properties and application in biomedical of any four polymers.

Section – II

- Q.4 Answer any four** **16**
- a) Give different types of implants having soft tissue application.
 - b) What are biodegradable polymers give examples to each.
 - c) Explain use of wood and binding material in prosthetics and orthotic devices in brief.
 - d) Describe briefly the surface properties affecting biomaterials.
 - e) Explain advantages and disadvantages of thermosetting resins.

- Q.5 Answer any two** **12**
- a) List different types of rubber used in orthopedics. Explain each in detail with their property and drawbacks.
 - b) List the different types of techniques used for surface analysis. Explain Scanning Electron Microscopy (SEM) technique in detail.
 - c) Explain the following
 - 1) Copper and its alloy used in prosthetics and orthotics
 - 2) What is tissue? List the basic criteria for tissue replacement.

Seat
No.

S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) In a CE configuration an emitter resistor is used for _____.
a) stabilization
b) ac signal bypass
c) collector bias
d) higher gain
- 2) A transistor may be used as switching device or as a _____.
a) Fixed resistor
b) Turning device
c) Rectifier
d) Variable resistor
- 3) The Q point on a loadline may be used to determine _____.
a) V_C
b) V_{CC}
c) V_B
d) I_C
- 4) Voltage regulators keep a constant _____ output voltage when the input or load varies within limits.
a) dc
b) Ac
c) sinusoidal
d) Ripple
- 5) The current gain for a common base configuration where $I_E = 4.2 \text{ mA}$ and $I_C = 4.0 \text{ mA}$ is _____.
a) 16.80
b) 1.05
c) 0.20
d) 0.95
- 6) The voltage regulation of a power supply having $V_{NL} = 50\text{V}$ and $V_{FL} = 48\text{V}$ is _____.
a) 4.17%
b) 5.2%
c) 6.2%
d) 7.1%
- 7) A crystal diode has forward resistance of the order of _____.
a) $k\Omega$
b) Ω
c) $M\Omega$
d) None of these
- 8) The reverse current of diode is of a order of _____.
a) KA
b) mA
c) μA
d) A
- 9) The gate of a JFET's is _____ biased.
a) reverse
b) forward
c) reverse as well as forward
d) downward
- 10) A JFET has _____ power gain.
a) small
b) very high
c) very small
d) none of a above

- 11) The pinch-off voltage of a JFET is about _____.
- | | |
|--------|---------|
| a) 5V | b) 0.6V |
| c) 15V | d) 25V |
- 12) When the input signal reduces the channel size, the process is called _____.
- | | |
|----------------|-------------------------|
| a) enhancement | b) substrate connecting |
| c) gate charge | d) depletion |
- 13) A monostable multivibrator has $R = 120\Omega$ and time delay $T = 1000$ ms, value of capacitor is _____.
- | | |
|---------------|----------------|
| a) $0.9\mu f$ | b) $1.32\mu f$ |
| c) $7.5\mu f$ | d) $2.49\mu f$ |
- 14) A stable multivibrator opening at 150^{th} has a discharge time of 2.5 m. Duty cycle of the circuit will be _____.
- | | |
|-----------|----------|
| a) 50% | b) 75% |
| c) 95.99% | d) 37.5% |

Seat No.	
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S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

SECTION I

- Q.2 Attempt any Four:** **16**
- Describe thermal runaway and stability factor of a BJT.
 - Explain line regulation and ripple rejection for regulated power supply.
 - Determine forward bias voltage applied to a silicon diode to cause a forward current of 10 mA and reverse saturation current $I_0 = 25 \times 10^{-7}$ A at a room temperature.
 - Differentiate between Schottky diode and p - n diode.
 - List various application of diode and explain any 2 of it.
- Q.3 Attempt any Two:** **12**
- For a regulated dc power supply the output voltage changes in the range of $12v \pm 0.2v$ when the ac line voltage fluctuates in the range of $230v \pm 10\%$. Calculate the source regulation and % source regulation.
 - Design a fixed bias circuit using silicon transistor having $h_{FE} = 100, V_{CC} = 12$ V, $V_{LE} = 6$ V, $I_C = 3$ mA, $V_{BE} = 0.7$ V
 - List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

- Q.4 Attempt Any Four:** **16**
- How does the FET behave for small and large values of V_{DS} ?
 - Derive the relationship between trans conductance, drain resistance and amplification factor of a JFET.
 - Determine the value of resistor R_D and R_S for a self biased P-channel JFET having the following parameter $V_P = 5$ V, $I_{DSS} = 12$ mA, $V_{DD} = 12$ V, $I_D = 5$ mA and $V_{DS} = 6$ V
 - Describe working of BJT as a switch with necessary diagram.
 - With the help of waveforms explain working of monostable and astable multivibrator circuits

Q.5 Attempt Any Two.

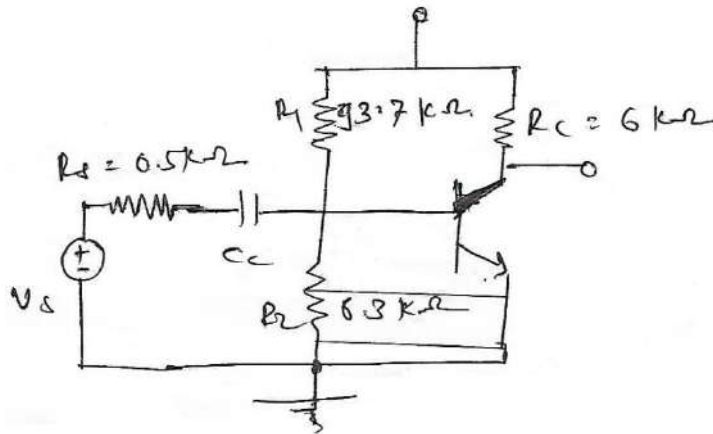
a) Write construction and working of

- 1) GTO
- 2) IGBT

b) Determine the small signal voltage gain, input resistance and output resistance for circuit given below.

Assume transistor parameters are

$$\beta = 100, V_{BE} = 0.7V, V_A = 100V$$



c) List various biasing of JFET configuration and describe working of any one with necessary diagram.

Seat No.	
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Set	Q
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**S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I**

Day & Date: Saturday, 14-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The reverse current of diode is of a order of _____.
 - a) KA b) mA
 - c) μA d) A

- 2) The gate of a JFET's is _____ biased.
 - a) reverse b) forward
 - c) reverse as well as forward d) downward

- 3) A JFET has _____ power gain.
 - a) small b) very high
 - c) very small d) none of a above

- 4) The pinch-off voltage of a JFET is about _____.
 - a) 5V b) 0.6V
 - c) 15V d) 25V

- 5) When the input signal reduces the channel size, the process is called _____.
 - a) enhancement b) substrate connecting
 - c) gate charge d) depletion

- 6) A monostable multivibrator has $R = 120\Omega$ and time delay $T = 1000$ ms, value of capacitor is _____.
 - a) $0.9\mu f$ b) $1.32\mu f$
 - c) $7.5\mu f$ d) $2.49\mu f$

- 7) A stable multivibrator opening at 150^{th} has a discharge time of 2.5 m. Duty cycle of the circuit will be _____.
 - a) 50% b) 75%
 - c) 95.99% d) 37.5%

- 8) In a CE configuration an emitter resistor is used for _____.
 - a) stabilization b) ac signal bypass
 - c) collector bias d) higher gain

- 9) A transistor may be used as switching device or as a _____.
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- 10) The Q point on a loadline may be used to determine _____.
 - a) V_C b) V_{CC}
 - c) V_B d) I_C

- 11) Voltage regulators keep a constant _____ output voltage when the input or load varies within limits.
- | | |
|---------------|-----------|
| a) Dc | b) Ac |
| c) sinusoidal | d) Ripple |
- 12) The current gain for a common base configuration where $I_E = 4.2 \text{ mA}$ and $I_C = 4.0 \text{ mA}$ is _____.
- | | |
|----------|---------|
| a) 16.80 | b) 1.05 |
| c) 0.20 | d) 0.95 |
- 13) The voltage regulation of a power supply having $V_{NL} = 50\text{V}$ and $V_{FL} = 48\text{V}$ is _____.
- | | |
|----------|---------|
| a) 4.17% | b) 5.2% |
| c) 6.2% | d) 7.1% |
- 14) A crystal diode has forward resistance of the order of _____.
- | | |
|---------------------|------------------|
| a) $\text{k}\Omega$ | b) Ω |
| c) $\text{M}\Omega$ | d) None of these |

Seat No.	
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Set **Q**

S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

SECTION I

- Q.2 Attempt any Four:** **16**
- Describe thermal runaway and stability factor of a BJT.
 - Explain line regulation and ripple rejection for regulated power supply.
 - Determine forward bias voltage applied to a silicon diode to cause a forward current of 10 mA and reverse saturation current $I_0 = 25 \times 10^{-7}$ A at a room temperature.
 - Differentiate between Schottky diode and p - n diode.
 - List various application of diode and explain any 2 of it.
- Q.3 Attempt any Two:** **12**
- For a regulated dc power supply the output voltage changes in the range of $12v \pm 0.2v$ when the ac line voltage fluctuates in the range of $230v \pm 10\%$. Calculate the source regulation and % source regulation.
 - Design a fixed bias circuit using silicon transistor having $h_{FE} = 100, V_{CC} = 12$ V, $V_{LE} = 6$ V, $I_C = 3$ mA, $V_{BE} = 0.7$ V
 - List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

- Q.4 Attempt Any Four:** **16**
- How does the FET behave for small and large values of V_{DS} ?
 - Derive the relationship between trans conductance, drain resistance and amplification factor of a JFET.
 - Determine the value of resistor R_D and R_S for a self biased P-channel JFET having the following parameter $V_P = 5$ V, $I_{DSS} = 12$ mA, $V_{DD} = 12$ V, $I_D = 5$ mA and $V_{DS} = 6$ V
 - Describe working of BJT as a switch with necessary diagram.
 - With the help of waveforms explain working of monostable and astable multivibrator circuits

Q.5 Attempt Any Two.

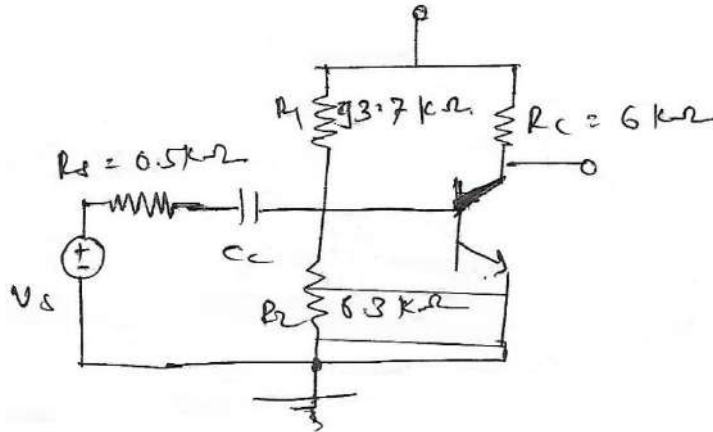
a) Write construction and working of

- 1) GTO
- 2) IGBT

b) Determine the small signal voltage gain, input resistance and output resistance for circuit given below.

Assume transistor parameters are

$$\beta = 100, V_{BE} = 0.7V, V_A = 100V$$



c) List various biasing of JFET configuration and describe working of any one with necessary diagram.

- 10) A stable multivibrator opening at 150^{th} has a discharge time of 2.5 m. Duty cycle of the circuit will be _____.
- a) 50%
 - b) 75%
 - c) 95.99%
 - d) 37.5%
- 11) In a CE configuration an emitter resistor is used for _____.
- a) stabilization
 - b) ac signal bypass
 - c) collector bias
 - d) higher gain
- 12) A transistor may be used as switching device or as a _____.
- a) Fixed resistor
 - b) Turning device
 - c) Rectifier
 - d) Variable resistor
- 13) The Q point on a loadline may be used to determine _____.
- a) V_C
 - b) V_{CC}
 - c) V_B
 - d) I_C
- 14) Voltage regulators keep a constant _____ output voltage when the input or load varies within limits.
- a) dc
 - b) Ac
 - c) sinusoidal
 - d) Ripple

Seat No.	
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Set **R**

S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

SECTION I

- Q.2 Attempt any Four:** **16**
- Describe thermal runaway and stability factor of a BJT.
 - Explain line regulation and ripple rejection for regulated power supply.
 - Determine forward bias voltage applied to a silicon diode to cause a forward current of 10 mA and reverse saturation current $I_0 = 25 \times 10^{-7}$ A at a room temperature.
 - Differentiate between Schottky diode and p - n diode.
 - List various application of diode and explain any 2 of it.
- Q.3 Attempt any Two:** **12**
- For a regulated dc power supply the output voltage changes in the range of $12v \pm 0.2v$ when the ac line voltage fluctuates in the range of $230v \pm 10\%$. Calculate the source regulation and % source regulation.
 - Design a fixed bias circuit using silicon transistor having $h_{FE} = 100, V_{CC} = 12$ V, $V_{LE} = 6$ V, $I_C = 3$ mA, $V_{BE} = 0.7$ V
 - List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

- Q.4 Attempt Any Four:** **16**
- How does the FET behave for small and large values of V_{DS} ?
 - Derive the relationship between trans conductance, drain resistance and amplification factor of a JFET.
 - Determine the value of resistor R_D and R_S for a self biased P-channel JFET having the following parameter $V_P = 5$ V, $I_{DSS} = 12$ mA, $V_{DD} = 12$ V, $I_D = 5$ mA and $V_{DS} = 6$ V
 - Describe working of BJT as a switch with necessary diagram.
 - With the help of waveforms explain working of monostable and astable multivibrator circuits

Q.5 Attempt Any Two.

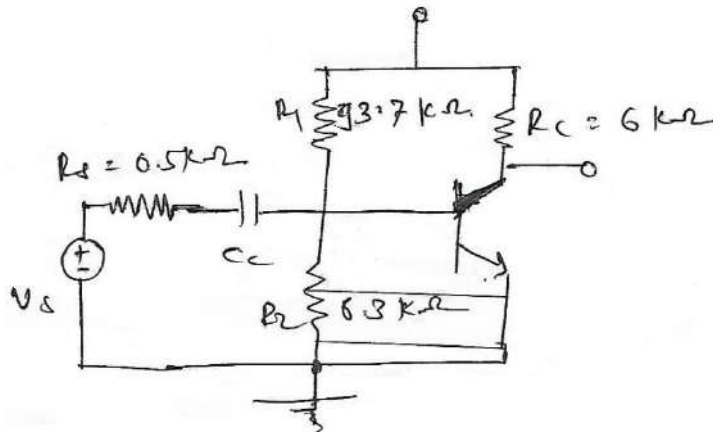
a) Write construction and working of

- 1) GTO
- 2) IGBT

b) Determine the small signal voltage gain, input resistance and output resistance for circuit given below.

Assume transistor parameters are

$$\beta = 100, V_{BE} = 0.7V, V_A = 100V$$



c) List various biasing of JFET configuration and describe working of any one with necessary diagram.

Seat No.	
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Set	S
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S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) A JFET has _____ power gain.

a) small	b) very high
c) very small	d) none of a above
- 2) The pinch-off voltage of a JFET is about _____.

a) 5V	b) 0.6V
c) 15V	d) 25V
- 3) When the input signal reduces the channel size, the process is called _____.

a) enhancement	b) substrate connecting
c) gate charge	d) depletion
- 4) A monostable multivibrator has $R = 120\Omega$ and time delay $T = 1000$ ms, value of capacitor is _____.

a) $0.9\mu f$	b) $1.32\mu f$
c) $7.5\mu f$	d) $2.49\mu f$
- 5) A stable multivibrator opening at 150^{th} has a discharge time of 2.5 m. Duty cycle of the circuit will be _____.

a) 50%	b) 75%
c) 95.99%	d) 37.5%
- 6) In a CE configuration an emitter resistor is used for _____.

a) stabilization	b) ac signal bypass
c) collector bias	d) higher gain
- 7) A transistor may be used as switching device or as a _____.

a) Fixed resistor	b) Turning device
c) Rectifier	d) Variable resistor
- 8) The Q point on a loadline may be used to determine _____.

a) V_C	b) V_{CC}
c) V_B	d) I_C
- 9) Voltage regulators keep a constant _____ output voltage when the input or load varies within limits.

a) dc	b) Ac
c) sinusoidal	d) Ripple

- 10) The current gain for a common base configuration where $I_E = 4.2 \text{ mA}$ and $I_C = 4.0 \text{ mA}$ is _____.
- | | |
|----------|---------|
| a) 16.80 | b) 1.05 |
| c) 0.20 | d) 0.95 |
- 11) The voltage regulation of a power supply having $V_{NL} = 50\text{V}$ and $V_{FL} = 48\text{V}$ is _____.
- | | |
|----------|---------|
| a) 4.17% | b) 5.2% |
| c) 6.2% | d) 7.1% |
- 12) A crystal diode has forward resistance of the order of _____.
- | | |
|---------------------|------------------|
| a) $\text{k}\Omega$ | b) Ω |
| c) $\text{M}\Omega$ | d) None of these |
- 13) The reverse current of diode is of a order of _____.
- | | |
|------------------|-------|
| a) KA | b) mA |
| c) μA | d) A |
- 14) The gate of a JFET's is _____ biased.
- | | |
|-------------------------------|-------------|
| a) reverse | b) forward |
| c) reverse as well as forward | d) downward |

Seat No.	
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Set **S**

S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

SECTION I

- Q.2 Attempt any Four:** **16**
- Describe thermal runaway and stability factor of a BJT.
 - Explain line regulation and ripple rejection for regulated power supply.
 - Determine forward bias voltage applied to a silicon diode to cause a forward current of 10 mA and reverse saturation current $I_0 = 25 \times 10^{-7}$ A at a room temperature.
 - Differentiate between Schottky diode and p - n diode.
 - List various application of diode and explain any 2 of it.
- Q.3 Attempt any Two:** **12**
- For a regulated dc power supply the output voltage changes in the range of $12v \pm 0.2v$ when the ac line voltage fluctuates in the range of $230v \pm 10\%$. Calculate the source regulation and % source regulation.
 - Design a fixed bias circuit using silicon transistor having $h_{FE} = 100, V_{CC} = 12 V, V_{LE} = 6 V, I_C = 3mA, V_{BE} = 0.7 V$
 - List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

- Q.4 Attempt Any Four:** **16**
- How does the FET behave for small and large values of V_{DS} ?
 - Derive the relationship between trans conductance, drain resistance and amplification factor of a JFET.
 - Determine the value of resistor R_D and R_S for a self biased P-channel JFET having the following parameter $V_P = 5V, I_{DSS} = 12mA, V_{DD} = 12V, I_D = 5 mA$ and $V_{DS} = 6V$
 - Describe working of BJT as a switch with necessary diagram.
 - With the help of waveforms explain working of monostable and astable multivibrator circuits

Q.5 Attempt Any Two.

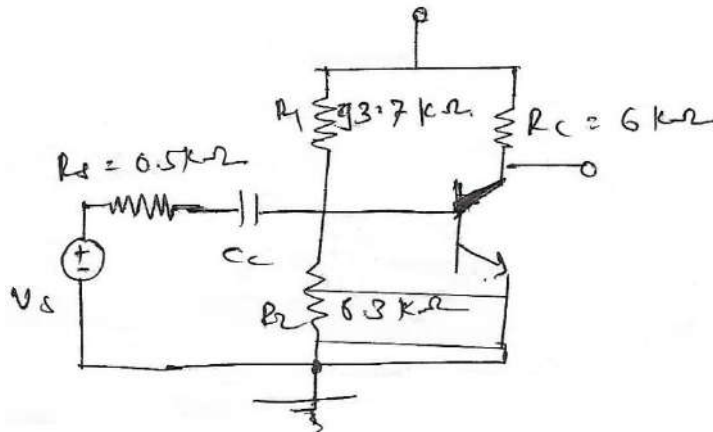
a) Write construction and working of

- 1) GTO
- 2) IGBT

b) Determine the small signal voltage gain, input resistance and output resistance for circuit given below.

Assume transistor parameters are

$$\beta = 100, V_{BE} = 0.7V, V_A = 100V$$



c) List various biasing of JFET configuration and describe working of any one with necessary diagram.

Seat No.	
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Set	P
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S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS

Day & Date: Tuesday, 17-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) If an ac signal generator drives a series RLC circuit, then the circuit undergoes resonance only due to variation in _____.
 - a) supply voltage
 - b) series resistance
 - c) supply frequency
 - d) phase angle
- 2) _____ among the following condition is true at the resonance.
 - a) $X_c > X_L$
 - b) $X_c = X_L$
 - c) $X_c < X_L$
 - d) None of above
- 3) The connecting of energy source at the port of network known as _____.
 - a) driving point
 - b) transfer point
 - c) Q point
 - d) resonance point
- 4) _____ represents the precise condition of reciprocity for transmission parameters.
 - a) $AB - CD = 1$
 - b) $AD - BC = 1$
 - c) $AC - BD = 1$
 - d) $AA' - CD = 1$
- 5) _____ acts as an independent variables in Y- parameter.
 - a) current
 - b) power
 - c) Voltage
 - d) energy
- 6) The bandwidth in a _____ filter equal the critical frequency.
 - a) low pass
 - b) high pass
 - c) band pass
 - d) band stop
- 7) _____ theorems applicable for both linear and nonlinear circuits.
 - a) Superposition
 - b) Thevenin's
 - c) Norton's
 - d) None of these
- 8) The critical frequency is defined as the point at which the response drops _____ from the pass band.
 - a) -20 dB
 - b) -3 dB
 - c) -6 dB
 - d) -40 dB

- 9) A low pass filter has a cut off frequency of 1.23 KHz. The bandwidth of filter will be _____ KHz.
- a) 2.46
 - b) 1.23
 - c) 644
 - d) 1.44
- 10) Norton's current is equal to the current passing through the _____ circuited output terminal.
- a) short
 - b) open
 - c) closed
 - d) broken
- 11) The impedances Z_1 and Z_2 are said to be inverse if _____.
- a) $Z_1 Z_2 = R_o$
 - b) $Z_1 + Z_2 = R_o$
 - c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_o$
 - d) $Z_1 Z_2 = R_o^2$
- 12) In an RC circuit when the switch is closed, the response _____.
- a) do not vary with time
 - b) decays with time
 - c) rises with time
 - d) rises with frequency
- 13) Bandwidth of a series resonance circuit is defined as the range frequency over which circuit current is equal to or greater than _____ of maximum current.
- a) 70.7%
 - b) 60%
 - c) 75%
 - d) 11%
- 14) Kirchoff's current law states that the algebraic sum of _____ meeting at a junction or node in an electric circuits is zero.
- a) Voltages
 - b) energies
 - c) Potentials
 - d) currents

Seat No.	
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Set	P
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**S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS**

Day & Date: Tuesday, 17-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

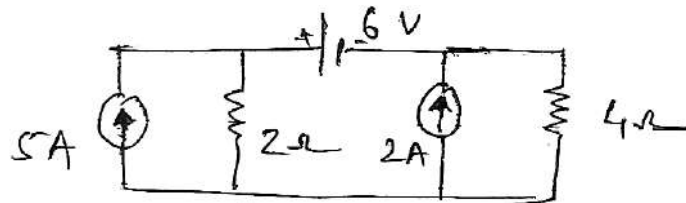
- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section - I

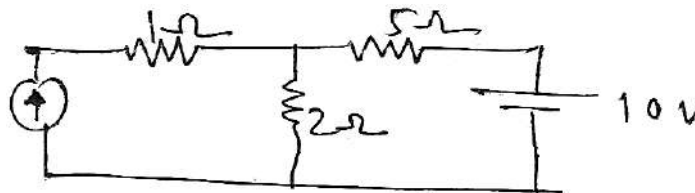
Q.2 Attempt any four questions.

16

- a) By using source transformation find current in 4Ω resistor in a given circuit



- b) Using Mesh analysis, find the current through 2Ω resistor in given circuit

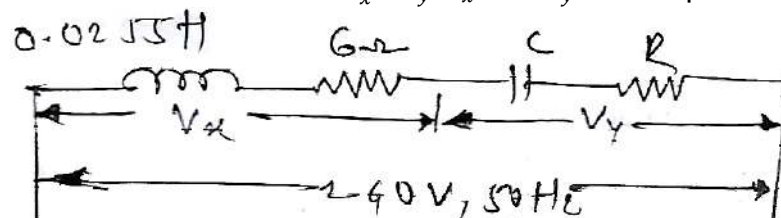


- c) State and prove maximum power transfer theorem.
d) In an RLC series circuit the voltage across the resistor, inductor and capacitor are 10V, 15V and 10V respectively. Calculate the supply voltage.
e) A parallel circuit consists of a $2.5\ \mu\text{f}$ of capacitor and a coil whose resistance and inductance are $15\ \Omega$ and $260\ \text{mH}$ respectively. Determine
1) Resonant frequency
2) Q factor of the circuit at resonance

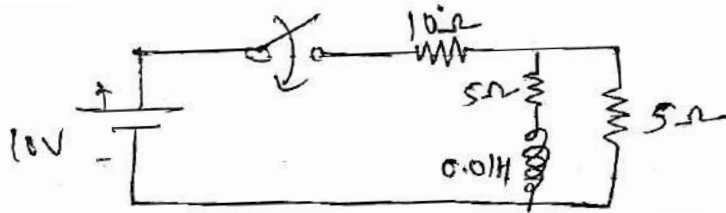
Q.3 Attempt any two questions.

12

- a) Find the values of R and C so that $V_x = 2.3V_y$. V_x and V_y are in quadrature.



- b) In the given network determine currents $i_1(t)$ and $i_2(t)$ when the switch is closed at $t=0$.



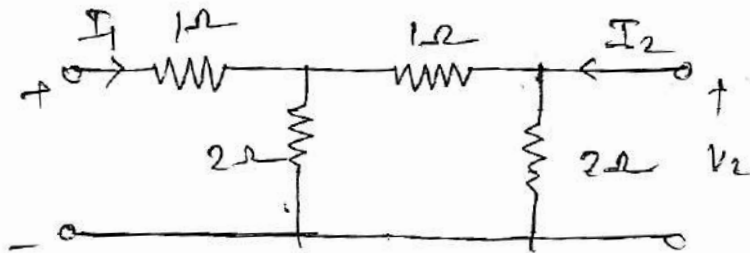
- c) State Thevenin's theorem and Norton's theorem and differentiate both theorem

Section – II

Q.4 Attempt any four questions.

16

- Prove condition for reciprocity of transmission parameter.
- Describe working of low pass and band pass filter with waveform.
- Define the concept of frequency attenuation and describe working of T type attenuation.
- Find Z parameter for network shown below

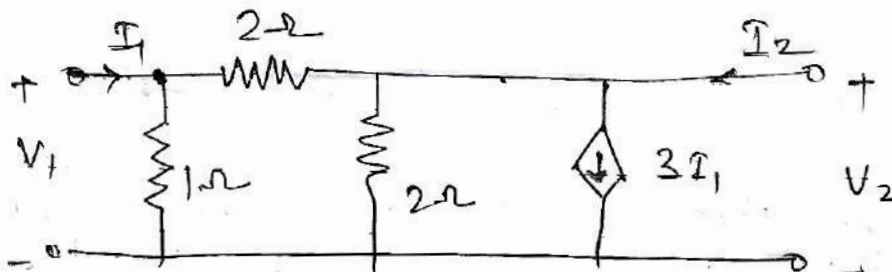


- e) Explain various effects of pole and zeros on circuit performance.

Q.5 Attempt any two questions.

12

- Prove the following relation.
 - Z parameters in terms of Y parameter
 - Z parameters in terms of h parameter
- Determine Y and Z parameter for the network shown



c) **Write short note.**

- Working of bridged T type attenuation
- Notch filtering using RCA circuits

Seat No.	
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S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS

Day & Date: Tuesday, 17-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The critical frequency is defined as the point at which the response drops _____ from the pass band.
 - a) -20 dB
 - b) -3 dB
 - c) -6 dB
 - d) -40 dB
- 2) A low pass filter has a cut off frequency of 1.23 KHz. The bandwidth of filter will be _____ KHz.
 - a) 2.46
 - b) 1.23
 - c) 644
 - d) 1.44
- 3) Norton's current is equal to the current passing through the _____ circuited output terminal.
 - a) short
 - b) open
 - c) closed
 - d) broken
- 4) The impedances Z_1 and Z_2 are said to be inverse if _____.
 - a) $Z_1 Z_2 = R_o$
 - b) $Z_1 + Z_2 = R_o$
 - c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_o$
 - d) $Z_1 Z_2 = R_o^2$
- 5) In an RC circuit when the switch is closed, the response _____.
 - a) do not vary with time
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- 6) Bandwidth of a series resonance circuit is defined as the range frequency over which circuit current is equal to or greater than _____ of maximum current.
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 - d) 11%
- 7) Kirchoff's current law states that the algebraic sum of _____ meeting at a junction or node in an electric circuit is zero.
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 - b) energies
 - c) potentials
 - d) currents
- 8) If an ac signal generator drives a series RLC circuit, then the circuit undergoes resonance only due to variation in _____.
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 - b) series resistance
 - c) supply frequency
 - d) phase angle

- 9) _____ among the following condition is true at the resonance.
- | | |
|----------------|------------------|
| a) $X_c > X_L$ | b) $X_c = X_L$ |
| c) $X_c < X_L$ | d) None of above |
- 10) The connecting of energy source at the port of network known as _____.
- | | |
|------------------|--------------------|
| a) driving point | b) transfer point |
| c) Q point | d) resonance point |
- 11) _____ represents the precise condition of reciprocity for transmission parameters.
- | | |
|------------------|-------------------|
| a) $AB - CD = 1$ | b) $AD - BC = 1$ |
| c) $AC - BD = 1$ | d) $AA' - CD = 1$ |
- 12) _____ acts as an independent variables in Y- parameter.
- | | |
|------------|-----------|
| a) current | b) power |
| c) voltage | d) energy |
- 13) The bandwidth in a _____ filter equal the critical frequency.
- | | |
|--------------|--------------|
| a) low pass | b) high pass |
| c) band pass | d) band stop |
- 14) _____ theorems applicable for both linear and nonlinear circuits.
- | | |
|------------------|------------------|
| a) Superposition | b) Thevenin's |
| c) Norton's | d) None of these |

Seat No.	
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Set	Q
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**S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS**

Day & Date: Tuesday, 17-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

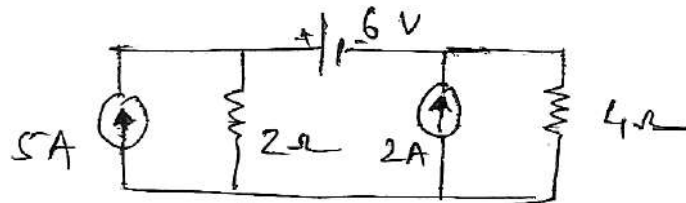
Instructions: 1) All questions are compulsory.
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Section - I

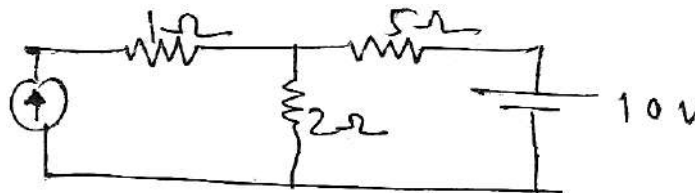
Q.2 Attempt any four questions.

16

a) By using source transformation find current in 4Ω resistor in a given circuit



b) Using Mesh analysis, find the current through 2Ω resistor in given circuit

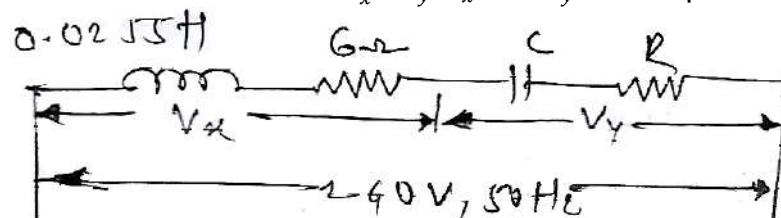


- c) State and prove maximum power transfer theorem.
- d) In an RLC series circuit the voltage across the resistor, inductor and capacitor are 10V, 15V and 10V respectively. Calculate the supply voltage.
- e) A parallel circuit consists of a $2.5\ \mu\text{f}$ of capacitor and a coil whose resistance and inductance are $15\ \Omega$ and $260\ \text{mH}$ respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

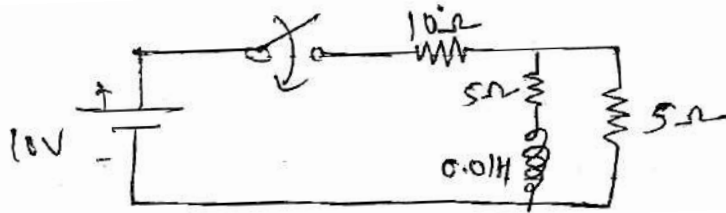
Q.3 Attempt any two questions.

12

a) Find the values of R and C so that $V_x = 2.3V_y$. V_x and V_y are in quadrature.



- b) In the given network determine currents $i_1(t)$ and $i_2(t)$ when the switch is closed at $t=0$.



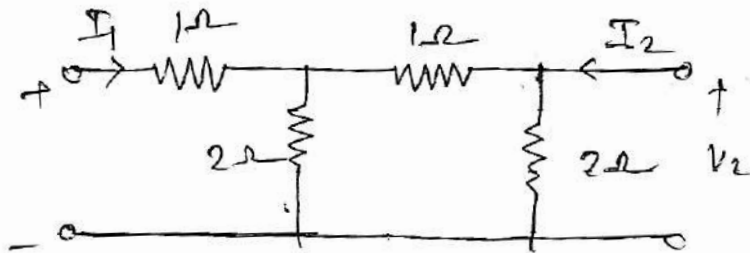
- c) State Thevenin's theorem and Norton's theorem and differentiate both theorem

Section – II

Q.4 Attempt any four questions.

16

- Prove condition for reciprocity of transmission parameter.
- Describe working of low pass and band pass filter with waveform.
- Define the concept of frequency attenuation and describe working of T type Attenuation.
- Find Z parameter for network shown below

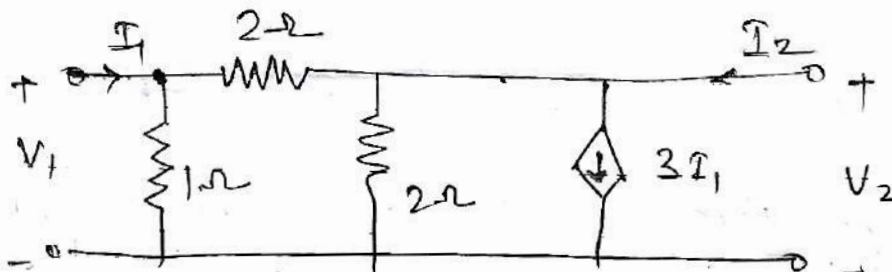


- e) Explain various effects of pole and zeros on circuit performance.

Q.5 Attempt any two questions.

12

- Prove the following relation.
 - Z parameters in terms of Y parameter
 - Z parameters in terms of h parameter
- Determine Y and Z parameter for the network shown



c) **Write short note.**

- Working of bridged T type attenuation
- Notch filtering using RCA circuits

Seat No.	
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S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS

Day & Date: Tuesday, 17-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) _____ acts as an independent variables in Y- parameter.
 - a) current
 - b) power
 - c) voltage
 - d) energy
- 2) The bandwidth in a _____ filter equal the critical frequency.
 - a) low pass
 - b) high pass
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 - b) $Z_1 + Z_2 = R_o$
 - c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_o$
 - d) $Z_1 Z_2 = R_o^2$
- 8) In an RC circuit when the switch is closed, the response _____.
 - a) do not vary with time
 - b) decays with time
 - c) rises with time
 - d) rises with frequency
- 9) Bandwidth of a series resonance circuit is defined as the range frequency over which circuit current is equal to or greater than _____ of maximum current.
 - a) 70.7%
 - b) 60%
 - c) 75%
 - d) 11%

- 10) Kirchoff's current law states that the algebraic sum of _____ meeting at a junction or node in an electric circuits in zero.
- a) voltages
 - b) energies
 - c) potentials
 - d) currents
- 11) If an ac signal generator drives a series RLC circuit, then the circuit undergoes resonance only due to variation in _____.
- a) supply voltage
 - b) series resistance
 - c) supply frequency
 - d) phase angle
- 12) _____ among the following condition is true at the resonance.
- a) $X_c > X_L$
 - b) $X_c = X_L$
 - c) $X_c < X_L$
 - d) None of above
- 13) The connecting of energy source at the port of network known as _____.
- a) driving point
 - b) transfer point
 - c) Q point
 - d) resonance point
- 14) _____ represents the precise condition of reciprocity for transmission parameters.
- a) $AB - CD = 1$
 - b) $AD - BC = 1$
 - c) $AC - BD = 1$
 - d) $AA' - CD = 1$

Seat No.	
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Set	R
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**S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS**

Day & Date: Tuesday, 17-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

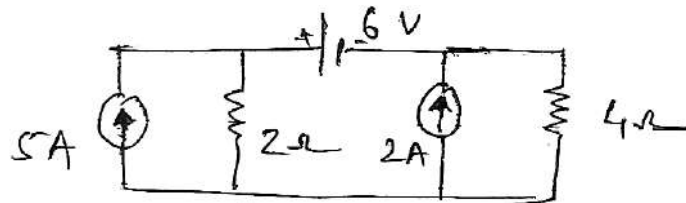
Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section - I

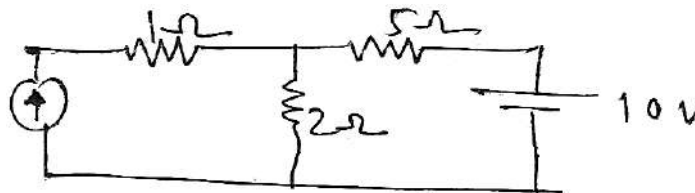
Q.2 Attempt any four questions.

16

a) By using source transformation find current in 4Ω resistor in a given circuit



b) Using Mesh analysis, find the current through 2Ω resistor in given circuit

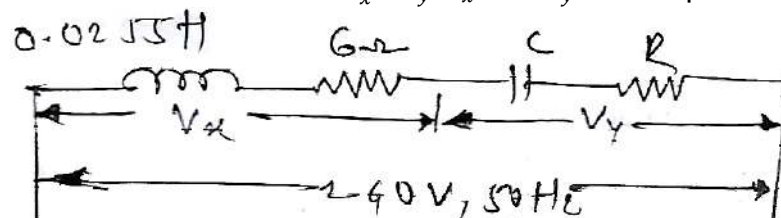


- c) State and prove maximum power transfer theorem.
- d) In an RLC series circuit the voltage across the resistor, inductor and capacitor are 10V, 15V and 10V respectively. Calculate the supply voltage.
- e) A parallel circuit consists of a $2.5\ \mu\text{f}$ of capacitor and a coil whose resistance and inductance are $15\ \Omega$ and $260\ \text{mH}$ respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

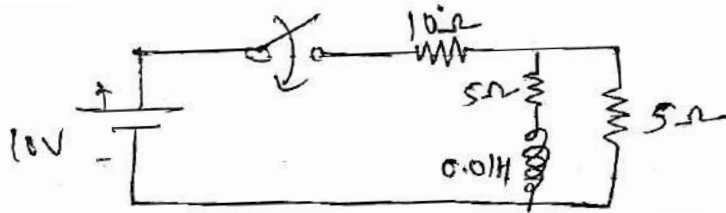
Q.3 Attempt any two questions.

12

a) Find the values of R and C so that $V_x = 2.3V_y$. V_x and V_y are in quadrature.



- b) In the given network determine currents $i_1(t)$ and $i_2(t)$ when the switch is closed at $t=0$.



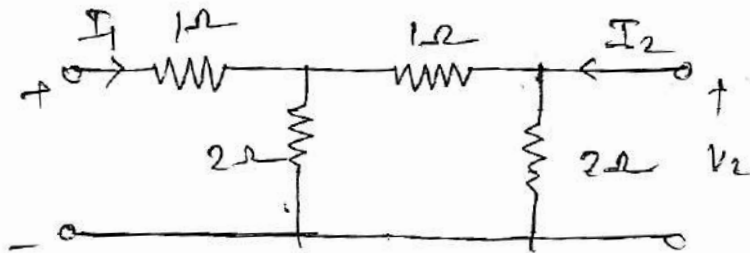
- c) State Thevenin's theorem and Norton's theorem and differentiate both theorem

Section – II

Q.4 Attempt any four questions.

16

- Prove condition for reciprocity of transmission parameter.
- Describe working of low pass and band pass filter with waveform.
- Define the concept of frequency attenuation and describe working of T type Attenuation.
- Find Z parameter for network shown below

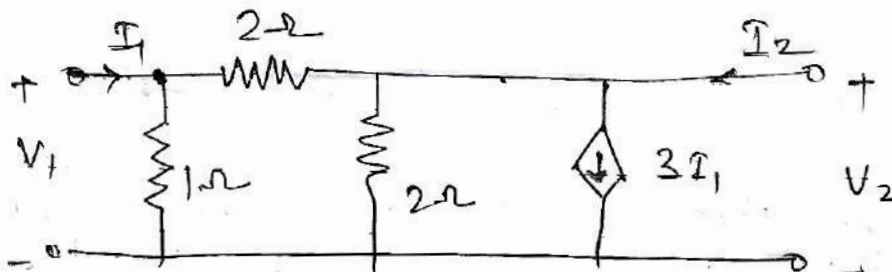


- e) Explain various effects of pole and zeros on circuit performance.

Q.5 Attempt any two questions.

12

- Prove the following relation.
 - Z parameters in terms of Y parameter
 - Z parameters in terms of h parameter
- Determine Y and Z parameter for the network shown



c) **Write short note.**

- Working of bridged T type attenuation
- Notch filtering using RCA circuits

Seat No.	
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S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS

Day & Date: Tuesday, 17-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Norton's current is equal to the current passing through the _____ circuited output terminal.
 - a) short
 - b) open
 - c) closed
 - d) broken
- 2) The impedances Z_1 and Z_2 are said to be inverse if _____.
 - a) $Z_1 Z_2 = R_o$
 - b) $Z_1 + Z_2 = R_o$
 - c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_o$
 - d) $Z_1 Z_2 = R_o^2$
- 3) In an RC circuit when the switch is closed, the response _____.
 - a) do not vary with time
 - b) decays with time
 - c) rises with time
 - d) rises with frequency
- 4) Bandwidth of a series resonance circuit is defined as the range frequency over which circuit current is equal to or greater than _____ of maximum current.
 - a) 70.7%
 - b) 60%
 - c) 75%
 - d) 11%
- 5) Kirchoff's current law states that the algebraic sum of _____ meeting at a junction or node in an electric circuits is zero.
 - a) voltages
 - b) energies
 - c) potentials
 - d) currents
- 6) If an ac signal generator drives a series RLC circuit, then the circuit undergoes resonance only due to variation in _____.
 - a) supply voltage
 - b) series resistance
 - c) supply frequency
 - d) phase angle
- 7) _____ among the following condition is true at the resonance.
 - a) $X_c > X_L$
 - b) $X_c = X_L$
 - c) $X_c < X_L$
 - d) None of above
- 8) The connecting of energy source at the port of network known as _____.
 - a) driving point
 - b) transfer point
 - c) Q point
 - d) resonance point

- 9) _____ represents the precise condition of reciprocity for transmission parameters.
- | | |
|------------------|-------------------|
| a) $AB - CD = 1$ | b) $AD - BC = 1$ |
| c) $AC - BD = 1$ | d) $AA' - CD = 1$ |
- 10) _____ acts as an independent variables in Y- parameter.
- | | |
|------------|-----------|
| a) current | b) power |
| c) voltage | d) energy |
- 11) The bandwidth in a _____ filter equal the critical frequency.
- | | |
|--------------|--------------|
| a) low pass | b) high pass |
| c) band pass | d) band stop |
- 12) _____ theorems applicable for both linear and nonlinear circuits.
- | | |
|------------------|------------------|
| a) Superposition | b) Thevenin's |
| c) Norton's | d) None of these |
- 13) The critical frequency is defined as the point at which the response drops _____ from the pass band.
- | | |
|-----------|-----------|
| a) -20 dB | b) -3 dB |
| c) -6 dB | d) -40 dB |
- 14) A low pass filter has a cut off frequency of 1.23 KHz. The bandwidth of filter will be _____ KHz.
- | | |
|---------|---------|
| a) 2.46 | b) 1.23 |
| c) 644 | d) 1.44 |

Seat No.	
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Set	S
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**S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS**

Day & Date: Tuesday, 17-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

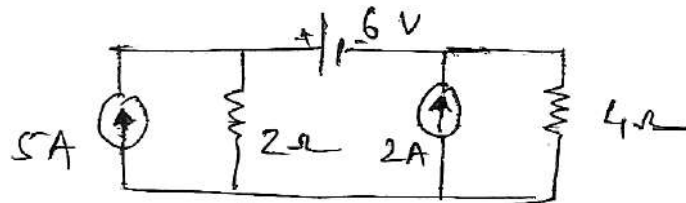
- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section - I

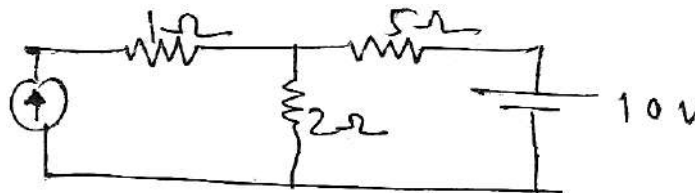
Q.2 Attempt any four questions.

16

- a) By using source transformation find current in 4Ω resistor in a given circuit



- b) Using Mesh analysis, find the current through 2Ω resistor in given circuit

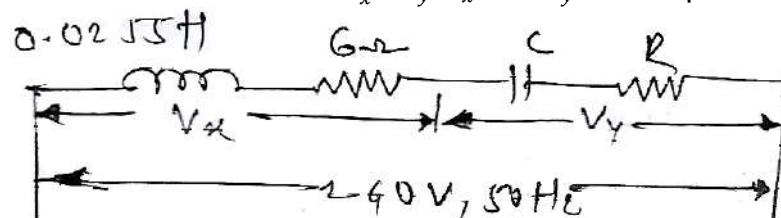


- c) State and prove maximum power transfer theorem.
d) In an RLC series circuit the voltage across the resistor, inductor and capacitor are 10V, 15V and 10V respectively. Calculate the supply voltage.
e) A parallel circuit consists of a $2.5\ \mu\text{f}$ of capacitor and a coil whose resistance and inductance are $15\ \Omega$ and $260\ \text{mH}$ respectively. Determine
1) Resonant frequency
2) Q factor of the circuit at resonance

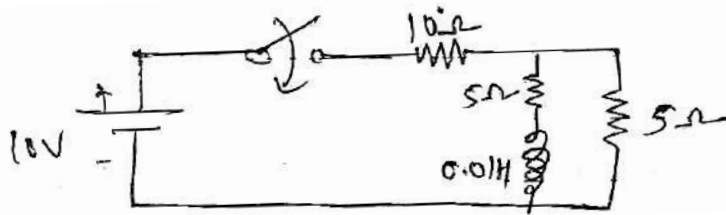
Q.3 Attempt any two questions.

12

- a) Find the values of R and C so that $V_x = 2.3V_y$. V_x and V_y are in quadrature.



- b) In the given network determine currents $i_1(t)$ and $i_2(t)$ when the switch is closed at $t=0$.



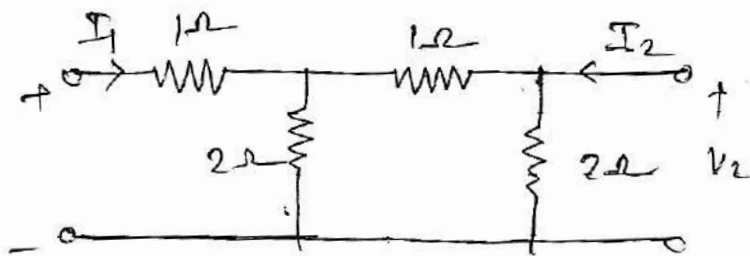
- c) State Thevenin's theorem and Norton's theorem and differentiate both theorem

Section – II

Q.4 Attempt any four questions.

16

- Prove condition for reciprocity of transmission parameter.
- Describe working of low pass and band pass filter with waveform.
- Define the concept of frequency attenuation and describe working of T type Attenuation.
- Find Z parameter for network shown below

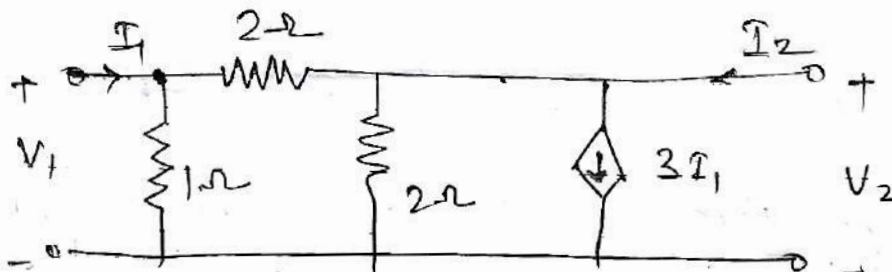


- e) Explain various effects of pole and zeros on circuit performance.

Q.5 Attempt any two questions.

12

- Prove the following relation.
 - Z parameters in terms of Y parameter
 - Z parameters in terms of h parameter
- Determine Y and Z parameter for the network shown



c) **Write short note.**

- Working of bridged T type attenuation
- Notch filtering using RCA circuits

Seat No.	
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Set **P**

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) If the displacement is measured with strain gauge then the number of strain gauge normally required are _____.
 - a) One
 - b) Two
 - c) Three
 - d) Four
- 2) A capacitive pressure sensor has a typical measurement uncertainty of _____.
 - a) $\pm 0.2\%$
 - b) $\pm 0.4\%$
 - c) $\pm 0.1\%$
 - d) $\pm 0.8\%$
- 3) Smallest change which a sensor can detect is _____.
 - a) Resolution
 - b) Accuracy
 - c) Precision
 - d) Scale
- 4) _____ of the following is not a piezo electric sensor.
 - a) PZT
 - b) Roscelle salt
 - c) Quartz
 - d) None of the mentioned
- 5) _____ of the following has the widest range of temperature measurement.
 - a) RTD
 - b) Thermocouple
 - c) Thermistor
 - d) Mercury thermometer
- 6) Optical fiber sensors are electrically _____.
 - a) active
 - b) passive
 - c) active as well as passive
 - d) cannot be determined
- 7) The biological response of the biosensor is determined by _____.
 - a) biocatalytic membrane
 - b) Physio-chemical membrane
 - c) Chemical membrane
 - d) artificial membrane
- 8) _____ refers to the degree of repeatability of a measurement.
 - a) Accuracy
 - b) Precision
 - c) Resolution
 - d) Sensitivity
- 9) Change in signal over long period of time is called _____.
 - a) noise
 - b) offset
 - c) hysteresis
 - d) drift
- 10) Ability of the sensor to repeat a measurement when put back in the same environment is called _____.
 - a) Conformance
 - b) Saturation
 - c) Repeatability
 - d) Threshold

- 11) _____ of the following is not a static property.
- | | |
|-----------------------|---------------|
| a) Repeatability | b) Hysteresis |
| c) Frequency response | d) Saturation |
- 12) Transducers employed in the bulk of enzyme electrodes use of the _____ principles.
- | | |
|-----------------|-----------------|
| a) Amperometric | b) Optical |
| c) Magnetic | d) Colorimetric |
- 13) _____ of the following transducers must be used for dissolved oxygen analyser.
- | | |
|----------------------------|-----------------------|
| a) Potentiometric | b) Polarographic |
| c) Ion-selective electrode | d) Optical transducer |
- 14) Oxygen content can be controlled by adding which of the following materials with water?
- | | |
|--------------------|-------------------|
| a) Acidic solution | b) Basic solution |
| c) Iodine | d) Hydrazine |

Seat No.	
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Set

P

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four** **16**
- a) Define and explain accuracy and resolution.
 - b) Explain structure and applications of needle and wire electrodes for measurement of bio potential.
 - c) With the help of an example, explain in detail the second order instrument characteristics.
 - d) Explain with a neat diagram any one application of piezoelectric transducer.
 - e) Explain electrode electrolyte interface concept.
- Q.3 Attempt any two.** **12**
- a) Draw and explain concept of half-cell potential and polarization concept of any electrode.
 - b) Explain construction and working of LVDT and mention its application.
 - c) Explain the typical current versus voltage characteristics of thermistors.

Section – II

- Q.4 Attempt any four** **16**
- a) What is meant by biosensor? Give classification of biosensor.
 - b) Explain construction and working of pCO₂ electrode in detail.
 - c) Explain capacitance microphone sensor with necessary diagram.
 - d) Explain blood gas and acid-base physiology.
 - e) Explain working of fiber optic temperature transducer.
- Q.5 Attempt any two** **12**
- a) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
 - b) Distinguish between potentiometric and amperometric sensors. Explain one example of amperometric sensor.
 - c) Define radiation sensor and explain it with any one example and application.

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ refers to the degree of repeatability of a measurement.
 - a) Accuracy
 - b) Precision
 - c) Resolution
 - d) Sensitivity
- 2) Change in signal over long period of time is called _____.
 - a) noise
 - b) offset
 - c) hysteresis
 - d) drift
- 3) Ability of the sensor to repeat a measurement when put back in the same environment is called _____.
 - a) Conformance
 - b) Saturation
 - c) Repeatability
 - d) Threshold
- 4) _____ of the following is not a static property.
 - a) Repeatability
 - b) Hysteresis
 - c) Frequency response
 - d) Saturation
- 5) Transducers employed in the bulk of enzyme electrodes use of the _____ principles.
 - a) Amperometric
 - b) Optical
 - c) Magnetic
 - d) Colorimetric
- 6) _____ of the following transducers must be used for dissolved oxygen analyser.
 - a) Potentiometric
 - b) Polarographic
 - c) Ion-selective electrode
 - d) Optical transducer
- 7) Oxygen content can be controlled by adding which of the following materials with water?
 - a) Acidic solution
 - b) Basic solution
 - c) Iodine
 - d) Hydrazine
- 8) If the displacement is measured with strain gauge then the number of strain gauge normally required are _____.
 - a) One
 - b) Two
 - c) Three
 - d) Four

Seat No.	
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Set

Q

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four** **16**
- a) Define and explain accuracy and resolution.
 - b) Explain structure and applications of needle and wire electrodes for measurement of bio potential.
 - c) With the help of an example, explain in detail the second order instrument characteristics.
 - d) Explain with a neat diagram any one application of piezoelectric transducer.
 - e) Explain electrode electrolyte interface concept.
- Q.3 Attempt any two.** **12**
- a) Draw and explain concept of half-cell potential and polarization concept of any electrode.
 - b) Explain construction and working of LVDT and mention its application.
 - c) Explain the typical current versus voltage characteristics of thermistors.

Section – II

- Q.4 Attempt any four** **16**
- a) What is meant by biosensor? Give classification of biosensor.
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- a) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
 - b) Distinguish between potentiometric and amperometric sensors. Explain one example of amperometric sensor.
 - c) Define radiation sensor and explain it with any one example and application.

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ of the following has the widest range of temperature measurement.
 - a) RTD
 - b) Thermocouple
 - c) Thermistor
 - d) Mercury thermometer
- 2) Optical fiber sensors are electrically _____.
 - a) active
 - b) passive
 - c) active as well as passive
 - d) cannot be determined
- 3) The biological response of the biosensor is determined by _____.
 - a) biocatalytic membrane
 - b) Physio-chemical membrane
 - c) Chemical membrane
 - d) artificial membrane
- 4) _____ refers to the degree of repeatability of a measurement.
 - a) Accuracy
 - b) Precision
 - c) Resolution
 - d) Sensitivity
- 5) Change in signal over long period of time is called _____.
 - a) noise
 - b) offset
 - c) hysteresis
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- 6) Ability of the sensor to repeat a measurement when put back in the same environment is called _____.
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- 11) If the displacement is measured with strain gauge then the number of strain gauge normally required are _____.
- a) One
 - b) Two
 - c) Three
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- 12) A capacitive pressure sensor has a typical measurement uncertainty of _____.
- a) $\pm 0.2\%$
 - b) $\pm 0.4\%$
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- 14) _____ of the following is not a piezo electric sensor.
- a) PZT
 - b) Roscelle salt
 - c) Quartz
 - d) None of the mentioned

Seat No.	
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R

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four** **16**
- a) Define and explain accuracy and resolution.
 - b) Explain structure and applications of needle and wire electrodes for measurement of bio potential.
 - c) With the help of an example, explain in detail the second order instrument characteristics.
 - d) Explain with a neat diagram any one application of piezoelectric transducer.
 - e) Explain electrode electrolyte interface concept.

- Q.3 Attempt any two.** **12**
- a) Draw and explain concept of half-cell potential and polarization concept of any electrode.
 - b) Explain construction and working of LVDT and mention its application.
 - c) Explain the typical current versus voltage characteristics of thermistors.

Section – II

- Q.4 Attempt any four** **16**
- a) What is meant by biosensor? Give classification of biosensor.
 - b) Explain construction and working of pCO₂ electrode in detail.
 - c) Explain capacitance microphone sensor with necessary diagram.
 - d) Explain blood gas and acid-base physiology.
 - e) Explain working of fiber optic temperature transducer.

- Q.5 Attempt any two** **12**
- a) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
 - b) Distinguish between potentiometric and amperometric sensors. Explain one example of amperometric sensor.
 - c) Define radiation sensor and explain it with any one example and application.

- 9) _____ of the following is not a piezo electric sensor.
- | | |
|-----------|--------------------------|
| a) PZT | b) Roscelle salt |
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|------------------------------|-------------------------|
| a) active | b) passive |
| c) active as well as passive | d) cannot be determined |
- 12) The biological response of the biosensor is determined by _____.
- | | |
|--------------------------|-----------------------------|
| a) biocatalytic membrane | b) Physio-chemical membrane |
| c) Chemical membrane | d) artificial membrane |
- 13) _____ refers to the degree of repeatability of a measurement.
- | | |
|---------------|----------------|
| a) Accuracy | b) Precision |
| c) Resolution | d) Sensitivity |
- 14) Change in signal over long period of time is called _____.
- | | |
|---------------|-----------|
| a) noise | b) offset |
| c) hysteresis | d) drift |

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four** **16**
- a) Define and explain accuracy and resolution.
 - b) Explain structure and applications of needle and wire electrodes for measurement of bio potential.
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- Q.3 Attempt any two.** **12**
- a) Draw and explain concept of half-cell potential and polarization concept of any electrode.
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Section – II

- Q.4 Attempt any four** **16**
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Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETICS AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ is branch of mechanism that describe the cause of bio mechanism.
 - a) Physics
 - b) Chemistry
 - c) Informatics
 - d) Kinematics
- 2) Instrumented walkway record timings of _____.
 - a) Goniometer
 - b) Footswitch
 - c) Gait
 - d) None
- 3) Antalgic hip gait is related to which of the following _____.
 - a) Wadding gait
 - b) Trendeleberg gait
 - c) Painful hip gait
 - d) Short leg gait
- 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 above
- 6) The movements around ball and socket joints are _____.
 - a) Flexion and extension
 - b) Rotation and circumduction
 - c) Hyper extension
 - d) All above
- 7) Which of the following is example of biaxial joint?
 - a) Hinge
 - b) Pivot
 - c) Both a and b
 - d) None
- 8) Sideward curvature of the spine is called _____.
 - a) Knock knee
 - b) Kyphosis
 - c) Scoliosis
 - d) Lordosis
- 9) The trim lines of a ground reaction ankle foot orthosis should be anterior to the malleoli to serve as a _____.
 - a) Dorsiflexion assist
 - b) Plantarflexion assist
 - c) Dorsiflexion stop
 - d) Plantarflexion stop

- 10) When the counter of the shoe fits too tightly on a SACH foot which of the following problems can result _____.
- a) Posterior lean of pylon
 - b) Less compression of the heel
 - c) Decrease in push off resistance
 - d) Decrease in external rotation of the foot
- 11) The selection of thorax is made up of _____.
- a) Cartilage
 - b) Bone
 - c) Both a and b
 - d) None
- 12) Zygomatic bone is present in _____.
- a) Upper extremities
 - b) Lower extremities
 - c) Vertebral column
 - d) Skull
- 13) A short statured patient brought to orthopedics OPD with a x- ray showing flattened vertebra with beak. The probable diagnosis is _____.
- a) Achondroplasia
 - b) Ochronosis
 - c) Eosinophilic granuloma
 - d) Calve's disease
- 14) Which of the following is responsible for limiting the range of movements?
- a) Tendons
 - b) Ligaments
 - c) Both a and b
 - d) Muscle fibers

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Set **P**

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETICS AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

- Q.2 Attempt any four of the following questions. 16**
- a) Explain in detail the biomechanics of skin with neat figure.
 - b) Explain the types of movements and their importance in functioning of joints.
 - c) Define force system of classify and explain different types of force systems.
 - d) Write a short note on Jaipur foot.
 - e) Explain different types of forces transmitted by joints.
- Q.3 Attempt any two of the following questions. 12**
- a) Explain the following.
 - 1) Equilibrium of force system
 - 2) Stress relaxation and creep
 - b) Explain in detail SACH foot with a neat figure.
 - c) With the help of neat diagram explain the gait cycle.

Section – II

- Q.4 Attempt any four of the following questions. 16**
- a) Define prosthesis and orthosis. And also explain how they different to each other.
 - b) What are levers and explain its types.
 - c) Explain in detail below knee prosthetic system with neat diagram.
 - d) Explain the working of terminal devices in detail.
 - e) Explain in detail KAFO with suitable diagram.
- Q.5 Attempt any two of the following questions. 12**
- a) Discuss the various spinal orthosis using a neat sketch and stating the principle used in the design.
 - b) Explain patient rehabilitation concept and how it helps the patient.
 - c) Write a short note on:
 - 1) Principle of three point pressure
 - 2) Position of anatomical axis

- 9) Instrumented walkway record timings of _____.
- a) Goniometer
 - b) Footswitch
 - c) Gait
 - d) None
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- 13) The movements around ball and socket joints are _____.
- a) Flexion and extension
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- 14) Which of the following is example of biaxial joint?
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 - c) Both a and b
 - d) None

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Set **Q**

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
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BIO MEDICAL PROSTHETICS AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
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Max. Marks: 56

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- a) Explain in detail the biomechanics of skin with neat figure.
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 - 1) Equilibrium of force system
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 - 2) Position of anatomical axis

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

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- 4) Sideward curvature of the spine is called _____.
 - a) Knock knee
 - b) Kyphosis
 - c) Scoliosis
 - d) Lordosis
- 5) The trim lines of a ground reaction ankle foot orthosis should be anterior to the malleoli to serve as a _____.
 - a) Dorsiflexion assist
 - b) Plantarflexion assist
 - c) Dorsiflexion stop
 - d) Plantarflexion stop
- 6) When the counter of the shoe fits too tightly on a SACH foot which of the following problems can result _____.
 - a) Posterior lean of pylon
 - b) Less compression of the heel
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 - d) Decrease in external rotation of the foot
- 7) The selection of thorax is made up of _____.
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 - b) Bone
 - c) Both a and b
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- 8) Zygomatic bone is present in _____.
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 - b) Lower extremities
 - c) Vertebral column
 - d) Skull

- 9) A short statured patient brought to orthopedics OPD with a x- ray showing flattened vertebra with beak. The probable diagnosis is _____.
- a) Achondroplasia b) Ochronosis
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- 10) Which of the following is responsible for limiting the range of movements?
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- 11) _____ is branch of mechanism that describe the cause of bio mechanism.
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- 12) Instrumented walkway record timings of _____.
- a) Goniometer b) Footswitch
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c) Painful hip gait d) Short leg gait
- 14) Neck joint is an example of _____.
- a) Pivot joint b) Hinge joint
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETICS AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

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 - Explain different types of forces transmitted by joints.
- Q.3 Attempt any two of the following questions. 12**
- Explain the following.
 - Equilibrium of force system
 - Stress relaxation and creep
 - Explain in detail SACH foot with a neat figure.
 - With the help of neat diagram explain the gait cycle.

Section – II

- Q.4 Attempt any four of the following questions. 16**
- Define prosthesis and orthosis. And also explain how they different to each other.
 - What are levers and explain its types.
 - Explain in detail below knee prosthetic system with neat diagram.
 - Explain the working of terminal devices in detail.
 - Explain in detail KAFO with suitable diagram.
- Q.5 Attempt any two of the following questions. 12**
- Discuss the various spinal orthosis using a neat sketch and stating the principle used in the design.
 - Explain patient rehabilitation concept and how it helps the patient.
 - Write a short note on:
 - Principle of three point pressure
 - Position of anatomical axis

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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETICS AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) When the counter of the shoe fits too tightly on a SACH foot which of the following problems can result _____.
 a) Posterior lean of pylon
 b) Less compression of the heel
 c) Decrease in push off resistance
 d) Decrease in external rotation of the foot
- 2) The selection of thorax is made up of _____.
 a) Cartilage
 b) Bone
 c) Both a and b
 d) None
- 3) Zygomatic bone is present in _____.
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 b) Trendeleberg gait
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- 9) Neck joint is an example of _____.
- a) Pivot joint
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 - d) Condylloid joint
- 10) In which type of lever the force is in between weight and fulcrum?
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 - b) Rotation and circumduction
 - c) Hyper extension
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- 12) Which of the following is example of biaxial joint?
- a) Hinge
 - b) Pivot
 - c) Both a and b
 - d) None
- 13) Sideward curvature of the spine is called _____.
- a) Knock knee
 - b) Kyphosis
 - c) Scoliosis
 - d) Lordosis
- 14) The trim lines of a ground reaction ankle foot orthosis should be anterior to the malleoli to serve as a _____.
- a) Dorsiflexion assist
 - b) Plantarflexion assist
 - c) Dorsiflexion stop
 - d) Plantarflexion stop

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Set **S**

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETICS AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
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Section – I

- Q.2 Attempt any four of the following questions. 16**
- Explain in detail the biomechanics of skin with neat figure.
 - Explain the types of movements and their importance in functioning of joints.
 - Define force system of classify and explain different types of force systems.
 - Write a short note on Jaipur foot.
 - Explain different types of forces transmitted by joints.
- Q.3 Attempt any two of the following questions. 12**
- Explain the following.
 - Equilibrium of force system
 - Stress relaxation and creep
 - Explain in detail SACH foot with a neat figure.
 - With the help of neat diagram explain the gait cycle.

Section – II

- Q.4 Attempt any four of the following questions. 16**
- Define prosthesis and orthosis. And also explain how they different to each other.
 - What are levers and explain its types.
 - Explain in detail below knee prosthetic system with neat diagram.
 - Explain the working of terminal devices in detail.
 - Explain in detail KAFO with suitable diagram.
- Q.5 Attempt any two of the following questions. 12**
- Discuss the various spinal orthosis using a neat sketch and stating the principle used in the design.
 - Explain patient rehabilitation concept and how it helps the patient.
 - Write a short note on:
 - Principle of three point pressure
 - Position of anatomical axis

Seat No.	
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Set **P**

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
 2) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) A ____ device prevents the oscillation of the moving system and enables the latter to reach its final position quickly.
 - a) deflecting
 - b) Controlling
 - c) damping
 - d) all of the above
- 2) A moving-coil permanent-magnet instrument can be used as ____ by using a low resistance shunt.
 - a) ammeter
 - b) Voltmeter
 - c) flux-meter
 - d) ballistic galvanometer
- 3) An rms reading voltmeter can accurately measure voltages of _____.
 - a) Sine waveforms
 - b) Square waveforms
 - c) Saw tooth waveforms
 - d) All of these
- 4) The measurement range of digital voltmeter is _____.
 - a) 1V to 1MV
 - b) 1V to 1kV
 - c) 1kV to 1MV
 - d) 100 kV to 100MV
- 5) In a ramp type DVM, the multivibrator determines the rate at which the _____.
 - a) Clock pulses are generated
 - b) Measurement cycles are initiated
 - c) It oscillates
 - d) Its amplitude varies
- 6) Q meter is used to measure the properties of _____.
 - a) Inductive coils
 - b) Non inductive coils
 - c) Capacitive coils
 - d) Both (a) and (c)
- 7) In liquid crystal displays, the liquid crystal exhibits properties of _____.
 - a) Liquid
 - b) Solids
 - c) Gases
 - d) Both (a) and (b)
- 8) The basic difference between square wave and pulse generator is their _____.
 - a) Waveforms shape
 - b) Duty cycles
 - c) Frequency range
 - d) Cost
- 9) In function generator, the output waveform of integrator is _____.
 - a) Sinusoidal
 - b) Square
 - c) Triangular
 - d) Saw-tooth

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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four. 16

- a) Differentiate between analog phase meter and digital phase meter.
- b) What are the factors involved in a selection of voltmeter.
- c) Define accuracy, precision and sensitivity with suitable example.
- d) Define types of errors and methods of minimization.
- e) Explain working of analog phase meter.

Q.3 Attempt any two. 12

- a) Describe working of R-2R ladder DAC.
- b) Write a short note on:
 - 1) True RMS responding voltmeter
 - 2) Average responding voltmeter
- c) Explain the working of successive approximation type digital voltmeter.

Section – II

Q.4 Attempt any four. 16

- a) Differentiate between dual beam and dual trace oscilloscope.
- b) Why delay lines are required in CRO?
- c) Explain the significance of three and half digit display.
- d) Explain use of CRO in tracing diode and transistor characteristics.
- e) Write a short note on:
 - 1) LCD display system
 - 2) Touch screen display system

Q.5 Attempt any two. 12

- a) What is Lissajous pattern? How it is useful in frequency and phase measurement?
- b) With the help of neat diagram explain working of function generator.
- c) Explain working of multichannel data acquisition system and explain its applications.

- 9) A moving-coil permanent-magnet instrument can be used as _____ by using a low resistance shunt.
- a) ammeter
 - b) Voltmeter
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- 10) An rms reading voltmeter can accurately measure voltages of _____.
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 - b) Measurement cycles are initiated
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 - d) Its amplitude varies
- 13) Q meter is used to measure the properties of _____.
- a) Inductive coils
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- 14) In liquid crystal displays, the liquid crystal exhibits properties of _____.
- a) Liquid
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
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ELECTRONICS INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019

Max. Marks: 56

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- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any four. 16**
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Section – II

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- a) Differentiate between dual beam and dual trace oscilloscope.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

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 a) Liquid b) Solids
 c) Gases d) Both (a) and (b)
- 4) The basic difference between square wave and pulse generator is their _____.
 a) Waveforms shape b) Duty cycles
 c) Frequency range d) Cost
- 5) In function generator, the output waveform of integrator is _____.
 a) Sinusoidal b) Square
 c) Triangular d) Saw-tooth
- 6) A voltmeter connected across a resistor gives a value of 65 V but the expected value of resistor was 68 V. Then the absolute error and the relative accuracy of the measurement will be _____.
 a) 3.2%, 96.8% b) 3.8%, 96.2%
 c) 4%, 96% d) 4.4%, 95.59%
- 7) For an instrument the degree of repeatability or reproducibility in measurements is alternative way of expressing its _____.
 a) Precision b) Accuracy
 c) Sensitivity d) Linearity
- 8) The zero drift is measured in units of _____.
 a) Volts-°C b) Volts /°c
 c) °c/volts d) (volts)²/°c
- 9) The difference between the measured value and the true value is known as _____.
 a) Relative error b) Random error
 c) Absolute error d) Systematic error

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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
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ELECTRONICS INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019
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Section – I

Q.2 Attempt any four. 16

- a) Differentiate between analog phase meter and digital phase meter.
- b) What are the factors involved in a selection of voltmeter.
- c) Define accuracy, precision and sensitivity with suitable example.
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- e) Explain working of analog phase meter.

Q.3 Attempt any two. 12

- a) Describe working of R-2R ladder DAC.
- b) Write a short note on:
 - 1) True RMS responding voltmeter
 - 2) Average responding voltmeter
- c) Explain the working of successive approximation type digital voltmeter.

Section – II

Q.4 Attempt any four. 16

- a) Differentiate between dual beam and dual trace oscilloscope.
- b) Why delay lines are required in CRO?
- c) Explain the significance of three and half digit display.
- d) Explain use of CRO in tracing diode and transistor characteristics.
- e) Write a short note on:
 - 1) LCD display system
 - 2) Touch screen display system

Q.5 Attempt any two. 12

- a) What is Lissajous pattern? How it is useful in frequency and phase measurement?
- b) With the help of neat diagram explain working of function generator.
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
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ELECTRONICS INSTRUMENTATIONS

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 - 2) Touch screen display system
- Q.5 Attempt any two. 12**
- a) What is Lissajous pattern? How it is useful in frequency and phase measurement?
 - b) With the help of neat diagram explain working of function generator.
 - c) Explain working of multichannel data acquisition system and explain its applications.

- 10) Dynamic shift registers are made up of _____
- a) Dynamic Hip flops
 - b) MOS inverters
 - c) MOS-NAND gates
 - d) CMOS inverters
- 11) The basic memory element in a digital circuit _____.
- a) Consists of a NAND gate
 - b) Consists of a NOR gate
 - c) Is a flip flop
 - d) Is a shift register
- 12) In a master slave J-K flip flop, $J = K = 1$. The state Q_{n+1} of the flip flop after the clock pulse will be _____.
- a) 0
 - b) 1
 - c) Q_n
 - d) \bar{Q}_n
- 13) A TTL circuit acts as a current sink in the _____.
- a) Low State
 - b) High state
 - c) High impedance state
 - d) None of these
- 14) The logic family with both logic levels negative is _____.
- a) TTL
 - b) ECL
 - c) CMOS
 - d) MOS

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Perform the following addition in Xs - 3 code.
 - 1) $37+28$
 - 2) $247.6+359.4$
- b) Convert the following number into Gray number.
 - 1) $(3A7)_{16}$
 - 2) $(652)_{10}$
- c) Show that $A \oplus B = A\bar{B} + \bar{A}B$ and constant the correspondingly logic diagram.
- d) With the help of a neat diagram explain working of 2 input TTL NAND gate.
- e) Distinguish between half adder and full adder in detail.

Q.3 Attempt any two. **12**

- a) Derive the Boolean expression for a two input Ex-OR gate to realize with two input NAND gates without using complemented variables and draw the circuits.
- b) Show that
 - 1) $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$
 - 2) $A\bar{B}C + B + B\bar{D} + AB\bar{D} = B + C$
- c) With the help of a neat circuit diagram explain working of :
 - 1) MOS inverter
 - 2) 2 Input MOS NAND gate

Section – II

Q.4 Attempt any four **16**

- a) Define and differentiate synchronous and asynchronous counter.
- b) Define following types of memories.
 - 1) ROM
 - 2) RAM
 - 3) EPROM
 - 4) Volatile
- c) Distinguish between combinational and sequential logic circuits.
- d) With the help of neat diagram, explain working of following types of shift registers
 - 1) Parallel in-serial out
 - 2) Bidirectional
- e) Using 4×1 MUX implement following logic function.

$$F(A, B, C) = \sum m(1, 2, 4, 7)$$

Q.5 Attempt any two.

- a) Draw and explain working of full adder using 3-line to 8-line decoder.
- b) Design a 3-bit up/down counter which counts up when the control signal $m = 1$ and counts down when $m = 0$
- c) With the help of neat diagram, explain the working of Master-Slave J-K flip flop.

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) _____ select lines are contained in a multiplexer with 1024 inputs and one output.

a) 512	b) 258
c) 64	d) 10
- 2) Parallel adders are _____.

a) Combinational logic circuits	b) sequential logic circuits
c) both (a) and (b)	d) None of the above
- 3) Dynamic shift registers are made up of _____.

a) Dynamic Hip flops	b) MOS inverters
c) MOS-NAND gates	d) CMOS inverters
- 4) The basic memory element in a digital circuit _____.

a) Consists of a NAND gate	b) Consists of a NOR gate
c) Is a flip flop	d) Is a shift register
- 5) In a master slave J-K flip flop, $J = K = 1$. The state Q_{n+1} of the flip flop after the clock pulse will be _____.

a) 0	b) 1
c) Q_n	d) \bar{Q}_n
- 6) A TTL circuit acts as a current sink in the _____.

a) Low State	b) High state
c) High impedance state	d) None of these
- 7) The logic family with both logic levels negative is _____.

a) TTL	b) ECL
c) CMOS	d) MOS
- 8) A binary number with 'n' bits all of which are 1s has the value _____.

a) $n^2 - 1$	b) 2^n
c) $2^{(n-1)}$	d) $2^n - 1$
- 9) If $(A2C)_{16} = (x)_8$, then 'x' is give by _____.

a) 7054	b) 6054
c) 5154	d) 5054

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
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Max. Marks: 56

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 - 2) $(652)_{10}$
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- d) With the help of a neat diagram explain working of 2 input TTL NAND gate.
- e) Distinguish between half adder and full adder in detail.

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- a) Derive the Boolean expression for a two input Ex-OR gate to realize with two input NAND gates without using complemented variables and draw the circuits.
- b) Show that
 - 1) $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$
 - 2) $A\bar{B}C + B + B\bar{D} + AB\bar{D} = B + C$
- c) With the help of a neat circuit diagram explain working of :
 - 1) MOS inverter
 - 2) 2 Input MOS NAND gate

Section – II

Q.4 Attempt any four **16**

- a) Define and differentiate synchronous and asynchronous counter.
- b) Define following types of memories.
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- d) With the help of neat diagram, explain working of following types of shift registers
 - 1) Parallel in-serial out
 - 2) Bidirectional
- e) Using 4×1 MUX implement following logic function.

$$F(A, B, C) = \sum m(1, 2, 4, 7)$$

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- a) Draw and explain working of full adder using 3-line to 8-line decoder.
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- c) With the help of neat diagram, explain the working of Master-Slave J-K flip flop.

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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
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- d) With the help of a neat diagram explain working of 2 input TTL NAND gate.
- e) Distinguish between half adder and full adder in detail.

Q.3 Attempt any two. **12**

- a) Derive the Boolean expression for a two input Ex-OR gate to realize with two input NAND gates without using complemented variables and draw the circuits.
- b) Show that
 - 1) $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$
 - 2) $A\bar{B}C + B + B\bar{D} + AB\bar{D} = B + C$
- c) With the help of a neat circuit diagram explain working of :
 - 1) MOS inverter
 - 2) 2 Input MOS NAND gate

Section – II

Q.4 Attempt any four **16**

- a) Define and differentiate synchronous and asynchronous counter.
- b) Define following types of memories.
 - 1) ROM
 - 2) RAM
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- c) Distinguish between combinational and sequential logic circuits.
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$$F(A, B, C) = \sum m(1, 2, 4, 7)$$

Q.5 Attempt any two.

- a) Draw and explain working of full adder using 3-line to 8-line decoder.
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- c) With the help of neat diagram, explain the working of Master-Slave J-K flip flop.

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) Dynamic shift registers are made up of _____.
 a) Dynamic Hip flops b) MOS inverters
 c) MOS-NAND gates d) CMOS inverters
- 2) The basic memory element in a digital circuit _____.
 a) Consists of a NAND gate b) Consists of a NOR gate
 c) Is a flip flop d) Is a shift register
- 3) In a master slave J-K flip flop, $J = K = 1$. The state Q_{n+1} of the flip flop after the clock pulse will be _____.
 a) 0 b) 1
 c) Q_n d) \bar{Q}_n
- 4) A TTL circuit acts as a current sink in the _____.
 a) Low State b) High state
 c) High impedance state d) None of these
- 5) The logic family with both logic levels negative is _____.
 a) TTL b) ECL
 c) CMOS d) MOS
- 6) A binary number with 'n' bits all of which are 1s has the value _____.
 a) $n^2 - 1$ b) 2^n
 c) $2^{(n-1)}$ d) $2^n - 1$
- 7) If $(A2C)_{16} = (x)_8$, then 'x' is give by _____.
 a) 7054 b) 6054
 c) 5154 d) 5054
- 8) The number of parity bits in a 12 bit Hamming code is _____.
 a) 4 b) 5
 c) 6 d) 8
- 9) For mathematical operations, the code must be _____.
 a) Sequential b) Cyclic
 c) Self complimentary d) Unit distance

- 10) The logic operation $AB + \bar{A}\bar{B}$ can be implemented by giving the input A and B to a two input _____.
- | | |
|--------------|---------------|
| a) NOR gate | b) NAND gate |
| c) X-OR gate | d) X-NOR gate |
- 11) The code used for labeling cells of the k-map is _____.
- | | |
|----------------|----------------|
| a) Natural B'D | b) Hexadecimal |
| c) Gray | d) Octal |
- 12) A ' n ' variable k-map can have _____.
- | | |
|----------------|-------------------|
| a) n^2 cells | b) 2^n cells |
| c) n^n cell | d) n^{2n} cells |
- 13) _____ select lines are contained in a multiplexer with 1024 inputs and one output.
- | | |
|--------|--------|
| a) 512 | b) 258 |
| c) 64 | d) 10 |
- 14) Parallel adders are _____.
- | | |
|---------------------------------|------------------------------|
| a) Combinational logic circuits | b) sequential logic circuits |
| c) both (a) and (b) | d) None of the above |

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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Attempt any four. **16**

- a) Perform the following addition in Xs - 3 code.
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 - 2) $247.6+359.4$
- b) Convert the following number into Gray number.
 - 1) $(3A7)_{16}$
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- c) Show that $A \oplus B = A\bar{B} + \bar{A}B$ and constant the correspondingly logic diagram.
- d) With the help of a neat diagram explain working of 2 input TTL NAND gate.
- e) Distinguish between half adder and full adder in detail.

Q.3 Attempt any two. **12**

- a) Derive the Boolean expression for a two input Ex-OR gate to realize with two input NAND gates without using complemented variables and draw the circuits.
- b) Show that
 - 1) $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$
 - 2) $A\bar{B}C + B + B\bar{D} + AB\bar{D} = B + C$
- c) With the help of a neat circuit diagram explain working of :
 - 1) MOS inverter
 - 2) 2 Input MOS NAND gate

Section – II

Q.4 Attempt any four **16**

- a) Define and differentiate synchronous and asynchronous counter.
- b) Define following types of memories.
 - 1) ROM
 - 2) RAM
 - 3) EPROM
 - 4) Volatile
- c) Distinguish between combinational and sequential logic circuits.
- d) With the help of neat diagram, explain working of following types of shift registers
 - 1) Parallel in-serial out
 - 2) Bidirectional
- e) Using 4×1 MUX implement following logic function.

$$F(A, B, C) = \sum m(1, 2, 4, 7)$$

Q.5 Attempt any two.

- a)** Draw and explain working of full adder using 3-line to 8-line decoder.
- b)** Design a 3-bit up/down counter which counts up when the control signal $m = 1$ and counts down when $m = 0$
- c)** With the help of neat diagram, explain the working of Master-Slave J-K flip flop.

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II

Day & Date: Wednesday, 27-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Unity gain frequency is the _____ frequency possible where the gain equals 1.
 - a) varying
 - b) fixed
 - c) stable
 - d) maximum
- 2) The output voltage of differentiate is equal to _____ instantaneous rate of change of input voltage with respect to time.
 - a) RC time constant
 - b) Feedback resister
 - c) Slew Rate
 - d) Delay time
- 3) In open loop configuration op – amp output levels are _____ at \pm vs at.
 - a) noing
 - b) moving
 - c) fixed
 - d) none of the above
- 4) Supply voltage rejection ratio is the ratio of change in input _____ voltage to change in supply voltage.
 - a) offset
 - b) common
 - c) differential
 - d) gain
- 5) The algebraic difference between the currents into the inverting and non inverting terminals op - amp is called _____.
 - a) Input bias current
 - b) Input off set current
 - c) CMRR
 - d) slew rate
- 6) The bandwidth of open loop op - amp is very small, hence it can't be used for AC application at _____ frequency.
 - a) high
 - b) cutoff
 - c) medium
 - d) low
- 7) Class A power amplifier circuit can be constructed using _____ circuit.
 - a) Fixed bias
 - b) Class B
 - c) Class AB
 - d) None of the above
- 8) Emitter follower is used as _____ amplifier to match high impedance source with low impedance load.
 - a) Darlington
 - b) cascode
 - c) buffer
 - d) push pull

- 9) Hartley oscillator consists of positive feedback formed by L_1L_2 and class _____ amplifier.
- | | |
|-------|--------------|
| a) A | b) B |
| c) AB | d) Push pull |
- 10) Stability factor 'S' is defined as the ratio of the change in collector current to change in _____ leakage current.
- | | |
|-------------------------|----------------------|
| a) collector to base | b) base to collector |
| c) collector to emitter | d) emitter to base |
- 11) Class 'C' amplifier gives greater power efficiency of the order _____.
- | | |
|--------|--------|
| a) 50% | b) 75% |
| c) 25% | d) 85% |
- 12) _____ is the maximum rate of change of output voltage per unit time of an op - amp.
- | | |
|-------------------|--------------|
| a) Offset voltage | b) CMRR |
| c) Input bias | d) Slew rate |
- 13) Cross over distortion can be avoided by operating class B amplifier in class _____ mode.
- | | |
|------|--------------|
| a) A | b) AB |
| c) C | d) Push pull |
- 14) Ground always sinks the current and virtual ground sinks the current as well as _____ of current.
- | | |
|------------|---------------|
| a) sources | b) references |
| c) neutral | d) none |

Seat No.	
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**S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II**

Day & Date: Wednesday, 27-11-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

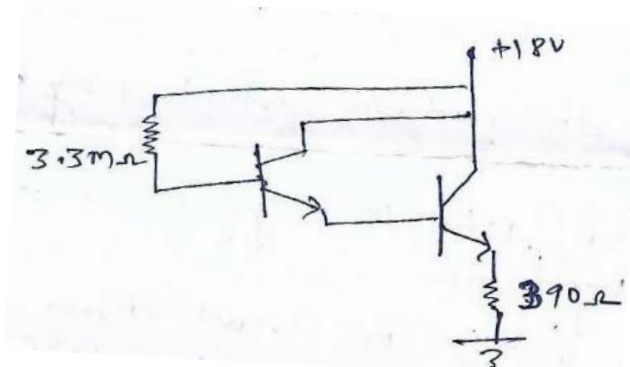
Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

16

- Define and differentiate between RC coupled and direct coupled amplifier.
- Explain role of following circuit components in RC coupled amplifier with necessary diagram.
 - Emitter bypass capacitor (C_E)
 - Resistance R_E and R_C
- Calculate the DC bias voltage and currents in given circuit.



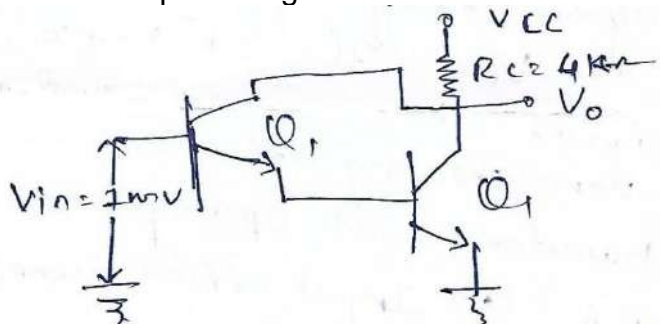
B.D = 8000
V_{BE} = 1.6v

- Calculate the efficiency of class B amplifier for a supply voltage of $V_{CC} = 24V$ with peak output voltage of.
 - $V_L(p) = 22v$
 - $V_L(p) = 6v$

Q.3 Attempt any two questions.

12

- Find the output voltage of the circuit shown below.



$h_{fe} = 100$
 $h_{ie} = 1ks$

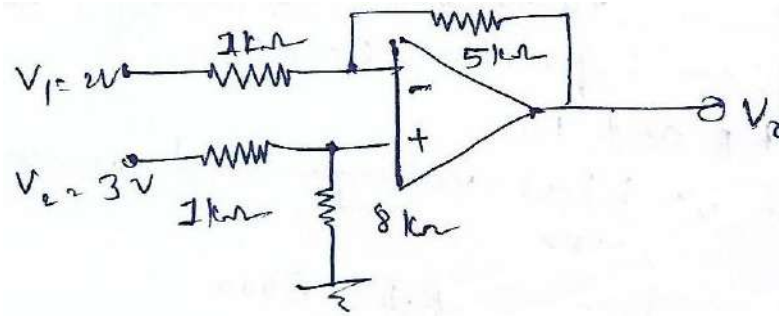
- Define harmonic distortion and cross over distorted and explain working of class AB power amplifier.
- Explain working of RC phase shift and crystal oscillator with output waveforms.

Section – II

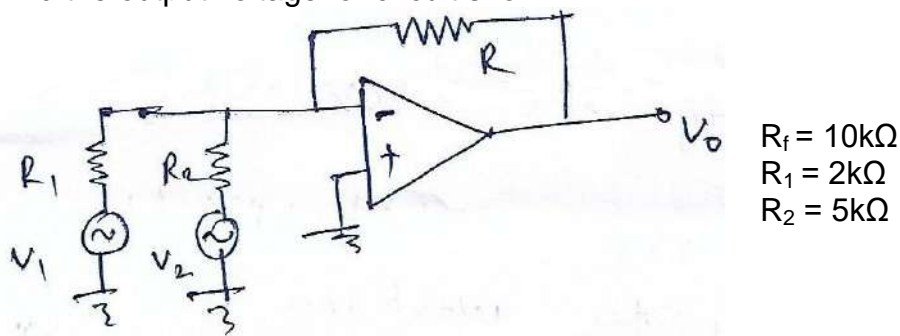
Q.4 Attempt any four questions.

16

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate V_o for the circuit shown in figure.



- c) Explain working of differentiator circuit using op - amp and draw its waveforms.
- d) Explain working of Schmitt trigger and define significance of hysteresis.
- e) Find the output voltage for circuit shown.



Q.5 Attempt any two questions.

12

- a) Design a circuit diagram using op - amp to provide the output voltage V_o as , $V_o = -2 (3V_1 + 4V_2 + 2V_3)$
- b) With the help of circuit diagram and waveform explain working of zero crossing detector.
- c) Define following characteristic of op - amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II

Day & Date: Wednesday, 27-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Emitter follower is used as _____ amplifier to match high impedance source with low impedance load.

a) Darlington	b) cascode
c) buffer	d) push pull
- 2) Hartley oscillator consists of positive feedback formed by L_1L_2 and class _____ amplifier.

a) A	b) B
c) AB	d) Push pull
- 3) Stability factor 'S' is defined as the ratio of the change in collector current to change in _____ leakage current.

a) collector to base	b) base to collector
c) collector to emitter	d) emitter to base
- 4) Class 'C' amplifier gives greater power efficiency of the order _____.

a) 50%	b) 75%
c) 25%	d) 85%
- 5) _____ is the maximum rate of change of output voltage per unit time of an op - amp.

a) Offset voltage	b) CMRR
c) Input bias	d) Slew rate
- 6) Cross over distortion can be avoided by operating class B amplifier in class _____ mode.

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- 7) Ground always sinks the current and virtual ground sinks the current as well as _____ of current.

a) sources	b) references
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- 8) Unity gain frequency is the _____ frequency possible where the gain equals 1.

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- a) Input bias current
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- 13) The bandwidth of open loop op - amp is very small, hence it can't be used for AC application at _____ frequency.
- a) high
 - b) cutoff
 - c) medium
 - d) low
- 14) Class A power amplifier circuit can be constructed using _____ circuit.
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 - b) Class B
 - c) Class AB
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Seat No.	
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**S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II**

Day & Date: Wednesday, 27-11-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

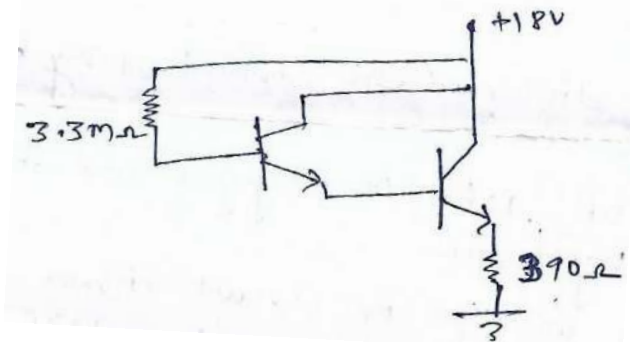
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Section – I

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16

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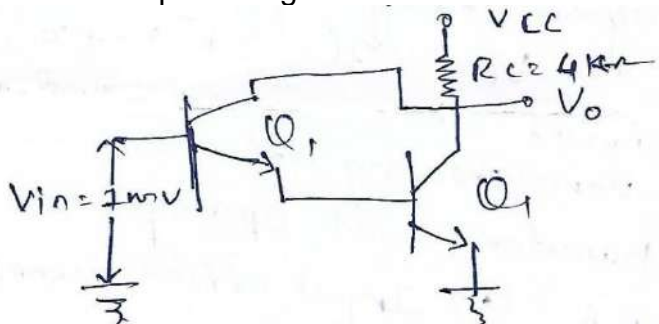
B.D = 8000
VBE = 1.6v

- Calculate the efficiency of class B amplifier for a supply voltage of $V_{cc} = 24V$ with peak output voltage of.
 - $V_L(p) = 22v$
 - $V_L(p) = 6v$

Q.3 Attempt any two questions.

12

- Find the output voltage of the circuit shown below.



$h_{fe} = 100$
 $h_{ie} = 1ks$

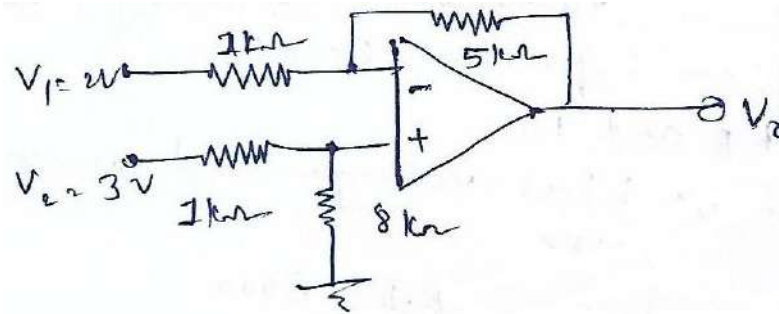
- Define harmonic distortion and cross over distorted and explain working of class AB power amplifier.
- Explain working of RC phase shift and crystal oscillator with output waveforms.

Section – II

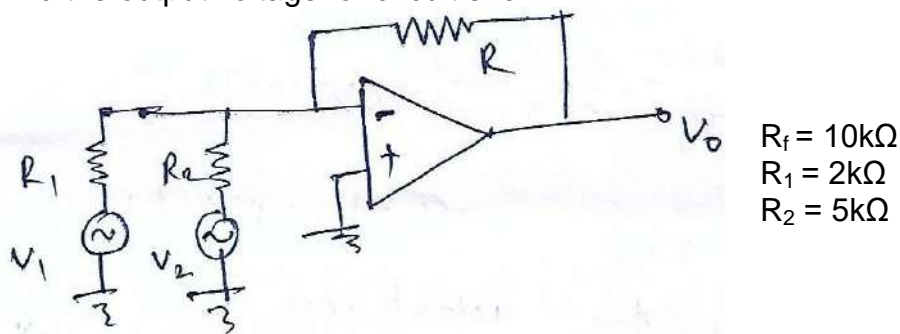
Q.4 Attempt any four questions.

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- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate V_o for the circuit shown in figure.



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- a) Design a circuit diagram using op - amp to provide the output voltage V_o as , $V_o = -2 (3V_1 + 4V_2 + 2V_3)$
- b) With the help of circuit diagram and waveform explain working of zero crossing detector.
- c) Define following characteristic of op - amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Seat No.	
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S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II

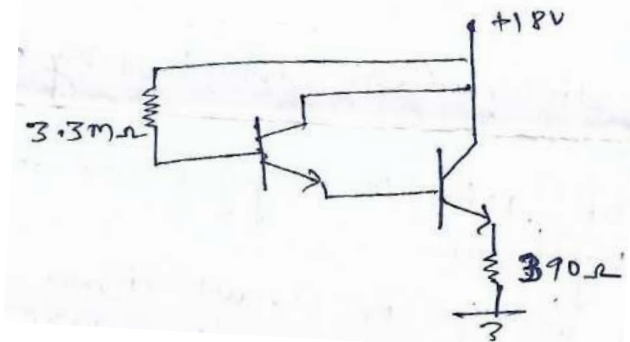
Day & Date: Wednesday, 27-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I**Q.2 Attempt any four questions.****16**

- Define and differentiate between RC coupled and direct coupled amplifier.
- Explain role of following circuit components in RC coupled amplifier with necessary diagram.
 - Emitter bypass capacitor (C_E)
 - Resistance R_E and R_C
- Calculate the DC bias voltage and currents in given circuit.

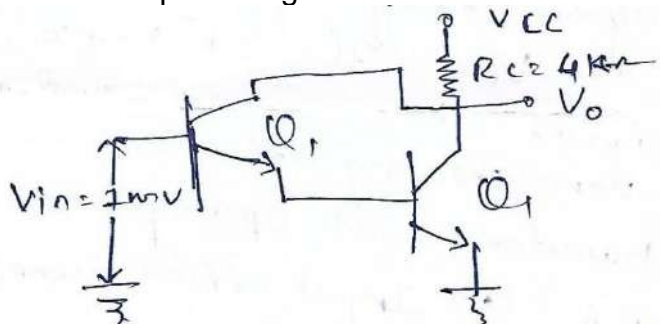


B.D = 8000
 $V_{BE} = 1.6\text{v}$

- Calculate the efficiency of class B amplifier for a supply voltage of $V_{CC} = 24\text{V}$ with peak output voltage of.
 - $V_L(p) = 22\text{v}$
 - $V_L(p) = 6\text{v}$

Q.3 Attempt any two questions.**12**

- Find the output voltage of the circuit shown below.



$h_{fe} = 100$
 $h_{ie} = 1\text{ks}$

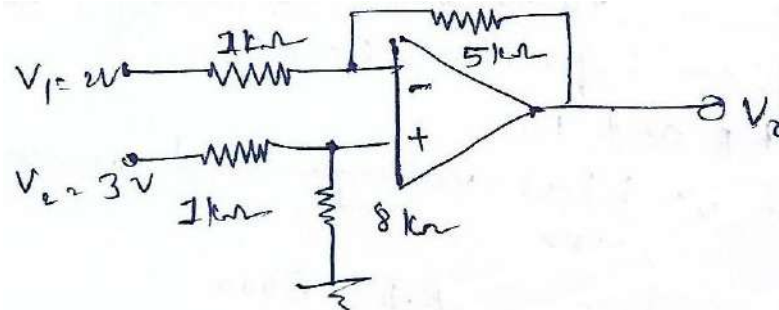
- Define harmonic distortion and cross over distorted and explain working of class AB power amplifier.
- Explain working of RC phase shift and crystal oscillator with output waveforms.

Section – II

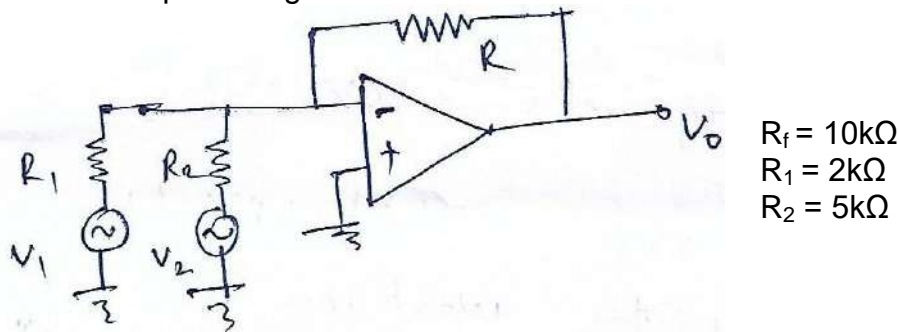
Q.4 Attempt any four questions.

16

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate V_o for the circuit shown in figure.



- c) Explain working of differentiator circuit using op - amp and draw its waveforms.
- d) Explain working of Schmitt trigger and define significance of hysteresis.
- e) Find the output voltage for circuit shown.



Q.5 Attempt any two questions.

12

- a) Design a circuit diagram using op - amp to provide the output voltage V_o as , $V_o = -2(3V_1 + 4V_2 + 2V_3)$
- b) With the help of circuit diagram and waveform explain working of zero crossing detector.
- c) Define following characteristic of op - amp.
- 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Seat No.	
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Set **S**

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II

Day & Date: Wednesday, 27-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Stability factor 'S' is defined as the ratio of the change in collector current to change in _____ leakage current.
 - a) collector to base
 - b) base to collector
 - c) collector to emitter
 - d) emitter to base
- 2) Class 'C' amplifier gives greater power efficiency of the order _____.
 - a) 50%
 - b) 75%
 - c) 25%
 - d) 85%
- 3) _____ is the maximum rate of change of output voltage per unit time of an op - amp.
 - a) Offset voltage
 - b) CMRR
 - c) Input bias
 - d) Slew rate
- 4) Cross over distortion can be avoided by operating class B amplifier in class _____ mode.
 - a) A
 - b) AB
 - c) C
 - d) Push pull
- 5) Ground always sinks the current and virtual ground sinks the current as well as _____ of current.
 - a) sources
 - b) references
 - c) neutral
 - d) none
- 6) Unity gain frequency is the _____ frequency possible where the gain equals 1.
 - a) varying
 - b) fixed
 - c) stable
 - d) maximum
- 7) The output voltage of differentiate is equal to _____ instantaneous rate of change of input voltage with respect to time.
 - a) RC time constant
 - b) Feedback resistor
 - c) Slew Rate
 - d) Delay time
- 8) In open loop configuration op – amp output levels are _____ at $\pm v_s$ at.
 - a) noing
 - b) moving
 - c) fixed
 - d) none of the above

- 9) Supply voltage rejection ratio is the ratio of change in input _____ voltage to change in supply voltage.
- a) offset
 - b) common
 - c) differential
 - d) gain
- 10) The algebraic difference between the currents into the inverting and non inverting terminals op - amp is called _____.
- a) Input bias current
 - b) Input off set current
 - c) CMRR
 - d) slew rate
- 11) The bandwidth of open loop op - amp is very small, hence it can't be used for AC application at _____ frequency.
- a) high
 - b) cutoff
 - c) medium
 - d) low
- 12) Class A power amplifier circuit can be constructed using _____ circuit.
- a) Fixed bias
 - b) Class B
 - c) Class AB
 - d) None of the above
- 13) Emitter follower is used as _____ amplifier to match high impedance source with low impedance load.
- a) Darlington
 - b) cascode
 - c) buffer
 - d) push pull
- 14) Hartley oscillator consists of positive feedback formed by L_1L_2 and class _____ amplifier.
- a) A
 - b) B
 - c) AB
 - d) Push pull

Seat
No.

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II

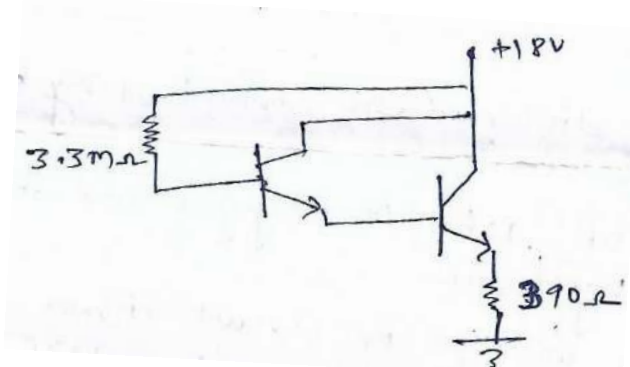
Day & Date: Wednesday, 27-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I**Q.2 Attempt any four questions.****16**

- Define and differentiate between RC coupled and direct coupled amplifier.
- Explain role of following circuit components in RC coupled amplifier with necessary diagram.
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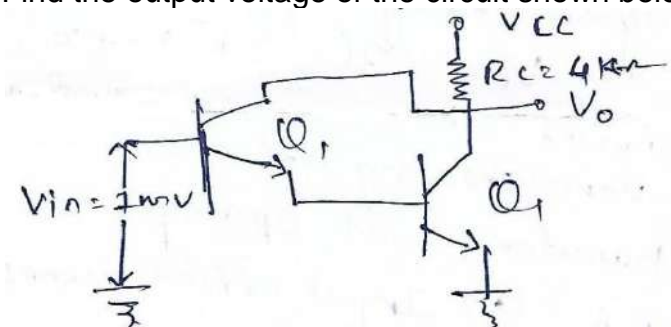


B.D = 8000
 $V_{BE} = 1.6v$

- Calculate the efficiency of class B amplifier for a supply voltage of $V_{CC} = 24V$ with peak output voltage of.
 - $V_L(p) = 22v$
 - $V_L(p) = 6v$

Q.3 Attempt any two questions.**12**

- Find the output voltage of the circuit shown below.



$h_{fe} = 100$
 $h_{ie} = 1ks$

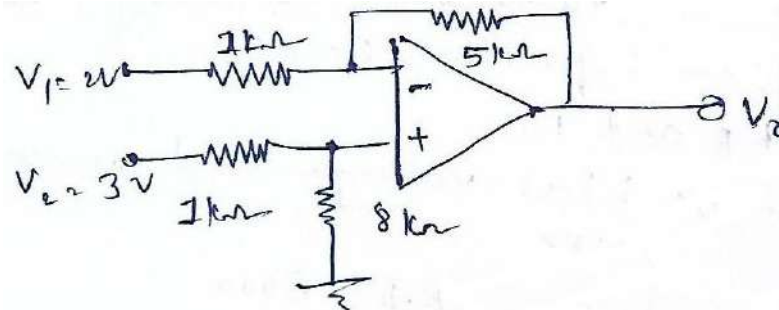
- Define harmonic distortion and cross over distorted and explain working of class AB power amplifier.
- Explain working of RC phase shift and crystal oscillator with output waveforms.

Section – II

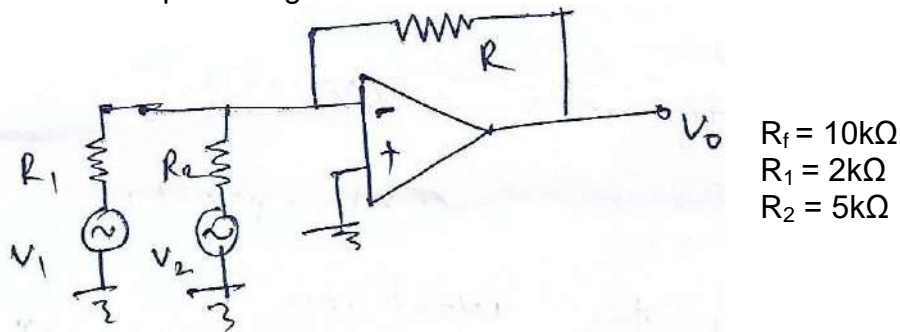
Q.4 Attempt any four questions.

16

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate V_o for the circuit shown in figure.



- c) Explain working of differentiator circuit using op - amp and draw its waveforms.
- d) Explain working of Schmitt trigger and define significance of hysteresis.
- e) Find the output voltage for circuit shown.



Q.5 Attempt any two questions.

12

- a) Design a circuit diagram using op - amp to provide the output voltage V_o as , $V_o = -2 (3V_1 + 4V_2 + 2V_3)$
- b) With the help of circuit diagram and waveform explain working of zero crossing detector.
- c) Define following characteristic of op - amp.
- 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory should be solved in first 30 minutes from answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ is the ratio of volume delivered to the pressure rise during the inspiratory phase in the lungs.
 - a) airway resistance
 - b) tidal volume
 - c) minute volume
 - d) lung compliance
- 2) The ratio of the radiant power transmitted by a sample to a radiant power incident on the sample is called _____.
 - a) absorbance
 - b) beers law
 - c) transmittance
 - d) optical density
- 3) The sounds reaching the ear are characterized by _____.
 - a) intensity
 - b) pitch
 - c) density
 - d) clarity
- 4) Diffusion measurements test the lung's ability to exchange _____ with the circulatory system.
 - a) blood
 - b) platelets
 - c) gas
 - d) RBCs
- 5) _____ are optical systems which provide better isolation of spectral energy than the optical filters.
 - a) diffraction gratings
 - b) filters
 - c) Holographic gratings
 - d) monochromatic
- 6) A colorimeter involves the measurement of color in electromagnetic spectrum of _____.
 - a) 400-700 nm
 - b) 100-300nm
 - c) 200-500nm
 - d) 250-500nm
- 7) Wavelength calibration of a spectrophotometer can be checked by using a _____ filter as a wavelength standard.
 - a) tungsten
 - b) ultraviolet
 - c) electromagnetic
 - d) holmium oxide
- 8) The partial pressure of oxygen is usually measured by _____ electrode.
 - a) Clark
 - b) polarographic
 - c) micro
 - d) NaCl

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four questions. 16**
- a) State and explain Beer Lambert's law with mathematical expression.
 - b) What are the different types of microscopes? Give their applications.
 - c) Explain construction and working of flame photometer.
 - d) Explain with a block diagram working of spectrophotometer.
 - e) Explain indicator and thermal dye dilution method of cardiac output measurement.
- Q.3 Attempt any two questions. 12**
- a) Explain working of Coulter blood cell counter.
 - b) Explain working of autoanalyzer with neat diagram.
 - c) Explain construction and working of P_{CO2} electrode.

Section – II

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- a) What is meant by positive and negative pressure ventilator?
 - b) Explain working of ear oximetry.
 - c) Explain the importance of masking in audiometry.
 - d) Define lung volume and capacities of a spriogram.
 - e) Explain any one type of oxygenator.
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- a) Explain working of heart lung machine with block diagram.
 - b) Explain the need and working of Anastasia machine.
 - c) Explain working of speech and pure tone audiometry technique.

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory should be solved in first 30 minutes from answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The partial pressure of oxygen is usually measured by _____ electrode.
 - a) Clark
 - b) polarographic
 - c) micro
 - d) NaCl
- 2) Spectrophotometers employ 6V tungsten lamp that emits radiation in the wavelength of _____.
 - a) electromagnetic
 - b) x-ray
 - c) visible
 - d) ultraviolet
- 3) $p_{CO_2} = [?] - \text{water vapour pressure} \times \frac{\%CO_2}{100}$
 - a) gradient pressure
 - b) barometric pressure
 - c) atmospheric pressure
 - d) gauge pressure
- 4) The base of each audio logical examination is the determination of the _____.
 - a) deafness
 - b) hearing loss
 - c) hearing threshold
 - d) sound intensity
- 5) If the flow of blood is in the same direction as the ultrasonic beam, then it is considered the blood is flowing _____ transducer.
 - a) towards
 - b) in between
 - c) along with
 - d) away
- 6) Doppler shift flow velocity is based on the analysis of echo signals from the _____ in the vascular structure.
 - a) platelets
 - b) erythrocytes
 - c) minerals
 - d) WBC's
- 7) Ear oximeters usually use of the transmission principle to measure the _____ saturation.
 - a) venous oxygen
 - b) pulse oxygen
 - c) capillary oxygen
 - d) arterial oxygen
- 8) _____ is the ratio of volume delivered to the pressure rise during the inspiratory phase in the lungs.
 - a) airway resistance
 - b) tidal volume
 - c) minute volume
 - d) lung compliance

Seat No.	
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Set Q

T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four questions. 16**
- a) State and explain Beer Lambert's law with mathematical expression.
 - b) What are the different types of microscopes? Give their applications.
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Section – II

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- a) What is meant by positive and negative pressure ventilator?
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- a) Explain working of heart lung machine with block diagram.
 - b) Explain the need and working of Anastasia machine.
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Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory should be solved in first 30 minutes from answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ are optical systems which provide better isolation of spectral energy than the optical filters.
 - a) diffraction gratings
 - b) filters
 - c) Holographic gratings
 - d) monochromatic
- 2) A colorimeter involves the measurement of color in electromagnetic spectrum of _____.
 - a) 400-700 nm
 - b) 100-300nm
 - c) 200-500nm
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- 3) Wavelength calibration of a spectrophotometer can be checked by using a _____ filter as a wavelength standard.
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 - b) pitch
 - c) density
 - d) clarity
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 - d) RBCs

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four questions. 16**
- a) State and explain Beer Lambert's law with mathematical expression.
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Section – II

- Q.4 Attempt any four questions. 16**
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Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory should be solved in first 30 minutes from answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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 - b) x-ray
 - c) visible
 - d) ultraviolet

Seat No.	
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Set	S
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four questions. 16**
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- a) Explain working of Coulter blood cell counter.
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Section – II

- Q.4 Attempt any four questions. 16**
- a) What is meant by positive and negative pressure ventilator?
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 - d) Define lung volume and capacities of a spriogram.
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- a) Explain working of heart lung machine with block diagram.
 - b) Explain the need and working of Anastasia machine.
 - c) Explain working of speech and pure tone audiometry technique.

Seat No.	
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Set **P**

T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
CLINICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) In _____ movements angle between eyes changes.
 - a) saccadic
 - b) smooth pursuit
 - c) vergence
 - d) vestibular
- 2) _____ movement compensated head movements.
 - a) saccadic
 - b) smooth pursuit
 - c) vergence
 - d) vestibular
- 3) One ion equation is called as _____ equation.
 - a) Donnan's
 - b) Nernst
 - c) Ohm's
 - d) Fick's
- 4) Resting state of action potential starts from _____.
 - a) -90mV
 - b) -75mV
 - c) +20mV
 - d) +35mV
- 5) Parkinson's occurs due to lack of _____.
 - a) blood
 - b) oxygen
 - c) CSF
 - d) dopamine
- 6) Stretch reflex is define as a controlling of load dynamic of _____.
 - a) muscles
 - b) cells
 - c) CNS
 - d) tissues
- 7) Einstein's relationship define relation between _____.
 - a) diffusion & drift
 - b) anion & cations
 - c) cathode & anode
 - d) model & object
- 8) Space charge neutrality is the representation of _____.
 - a) diffusion & drift
 - b) anion & cations
 - c) cathode & anode
 - d) model & object
- 9) _____ movements are very fast jump from one eye position to another.
 - a) saccadic
 - b) smooth pursuit
 - c) vergence
 - d) vestibular
- 10) In _____ movements eyes tracks moving objects.
 - a) saccadic
 - b) smooth pursuit
 - c) vergence
 - d) vestibular

- 11) _____ produces 1000 watts.
- | | |
|---------|--------------|
| a) cold | b) heat |
| c) warm | d) shivering |
- 12) Models are simplified representation of _____.
- | | |
|----------------|------------------|
| a) simulations | b) objects |
| c) systems | d) none of above |
- 13) Fick's law defines _____ process.
- | | |
|---------------|-----------------------|
| a) diffusion | b) drift |
| c) ionization | d) potential gradient |
- 14) Ohms law defines _____ process.
- | | |
|--------------|--------------|
| a) diffusion | b) drift |
| c) current | d) potential |

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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
CLINICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four questions. 16**
- a) Explain all 4 biophysics tools.
 - b) Derive Nernst equation for bivalent ion.
 - c) Draw the experimental set up for Hodgkin Huxley's model.
 - d) Explain electrical model of a biological cell membrane.
 - e) State and explain Donnan's equilibrium equation.
- Q.3 Attempt any two questions. 12**
- a) With the help of neat diagram explain voltage clamp experiment along with its results.
 - b) What is core conductor model? Derive cable equation.
 - c) Differentiate between:
 - 1) compartmental and non compartmental modeling
 - 2) lumped and distributed parameter model

Section – II

- Q.4 Attempt any four questions. 16**
- a) Explain Thermo genesis and Thermolysis processes.
 - b) Explain the structure and function of spindle receptor and Golgi tendon organ.
 - c) Using Weisthimer's eye model derives expression for displacement and velocity.
 - d) Explain various heat generation and heat transfer mechanism in human body.
 - e) Explain structure of eye muscles and mention various movement performed by them.
- Q.5 Attempt any two questions. 12**
- a) With neat diagram explain drug delivery system.
 - b) With help of block diagram explain thermoregulatory system.
 - c) Write a short note on
 - 1) Physiology of insulin glucose feedback system
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
CLINICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Space charge neutrality is the representation of _____.
a) diffusion & drift b) anion & cations
c) cathode & anode d) model & object
- 2) _____ movements are very fast jump from one eye position to another.
a) saccadic b) smooth pursuit
c) vergence d) vestibular
- 3) In _____ movements eyes tracks moving objects.
a) saccadic b) smooth pursuit
c) vergence d) vestibular
- 4) _____ produces 1000 watts.
a) cold b) heat
c) warm d) shivering
- 5) Models are simplified representation of _____.
a) simulations b) objects
c) systems d) none of above
- 6) Fick's law defines _____ process.
a) diffusion b) drift
c) ionization d) potential gradient
- 7) Ohms law defines _____ process.
a) diffusion b) drift
c) current d) potential
- 8) In _____ movements angle between eyes changes.
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c) vergence d) vestibular
- 9) _____ movement compensated head movements.
a) saccadic b) smooth pursuit
c) vergence d) vestibular
- 10) One ion equation is called as _____ equation.
a) Donnan's b) Nernst
c) Ohm's d) Fick's

- 11) Resting state of action potential starts from _____.
a) -90mV b) -75mV
c) +20mV d) +35mV
- 12) Parkinson's occurs due to lack of _____.
a) blood b) oxygen
c) CSF d) dopamine
- 13) Stretch reflex is define as a controlling of load dynamic of _____.
a) muscles b) cells
c) CNS d) tissues
- 14) Einstein's relationship define relation between _____.
a) diffusion & drift b) anion & cations
c) cathode & anode d) model & object

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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
CLINICAL MODELING & SIMULATION

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Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any four questions. 16**
- Explain all 4 biophysics tools.
 - Derive Nernst equation for bivalent ion.
 - Draw the experimental set up for Hodgkin Huxley's model.
 - Explain electrical model of a biological cell membrane.
 - State and explain Donnan's equilibrium equation.
- Q.3 Attempt any two questions. 12**
- With the help of neat diagram explain voltage clamp experiment along with its results.
 - What is core conductor model? Derive cable equation.
 - Differentiate between:
 - compartmental and non compartmental modeling
 - lumped and distributed parameter model

Section – II

- Q.4 Attempt any four questions. 16**
- Explain Thermo genesis and Thermolysis processes.
 - Explain the structure and function of spindle receptor and Golgi tendon organ.
 - Using Weisthimer's eye model derives expression for displacement and velocity.
 - Explain various heat generation and heat transfer mechanism in human body.
 - Explain structure of eye muscles and mention various movement performed by them.
- Q.5 Attempt any two questions. 12**
- With neat diagram explain drug delivery system.
 - With help of block diagram explain thermoregulatory system.
 - Write a short note on
 - Physiology of insulin glucose feedback system
 - Behavior of immune response

Seat No.	
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**T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
CLINICAL MODELING & SIMULATION**

Day & Date: Monday, 09-12-2019
Time: 02:30 PM To 05:30 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Parkinsin's occurs due to lack of _____.
a) blood
b) oxygen
c) CSF
d) dopamine
- 2) Stretch reflex is define as a controlling of load dynamic of _____.
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b) cells
c) CNS
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- 6) In _____ movements eyes tracks moving objects.
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- 9) Fick's law defines _____ process.
a) diffusion
b) drift
c) ionization
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- 10) Ohms law defines _____ process.
a) diffusion
b) drift
c) current
d) potential

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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
CLINICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any four questions. 16**
- a) Explain all 4 biophysics tools.
 - b) Derive Nernst equation for bivalent ion.
 - c) Draw the experimental set up for Hodgkin Huxley's model.
 - d) Explain electrical model of a biological cell membrane.
 - e) State and explain Donnan's equilibrium equation.
- Q.3 Attempt any two questions. 12**
- a) With the help of neat diagram explain voltage clamp experiment along with its results.
 - b) What is core conductor model? Derive cable equation.
 - c) Differentiate between:
 - 1) compartmental and non compartmental modeling
 - 2) lumped and distributed parameter model

Section – II

- Q.4 Attempt any four questions. 16**
- a) Explain Thermo genesis and Thermolysis processes.
 - b) Explain the structure and function of spindle receptor and Golgi tendon organ.
 - c) Using Weisthimer's eye model derives expression for displacement and velocity.
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- Q.5 Attempt any two questions. 12**
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 - 2) Behavior of immune response

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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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- 5) Ohms law defines _____ process.
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 - b) smooth pursuit
 - c) vergence
 - d) vestibular
- 7) _____ movement compensated head movements.
 - a) saccadic
 - b) smooth pursuit
 - c) vergence
 - d) vestibular
- 8) One ion equation is called as _____ equation.
 - a) Donnan's
 - b) Nernst
 - c) Ohm's
 - d) Fick's
- 9) Resting state of action potential starts from _____.
 - a) -90mV
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 - d) +35mV
- 10) Parkinsin's occurs due to lack of _____.
 - a) blood
 - b) oxygen
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 - d) dopamine

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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
CLINICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
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Section – I

- Q.2 Attempt any four questions. 16**
- a) Explain all 4 biophysics tools.
 - b) Derive Nernst equation for bivalent ion.
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 - b) What is core conductor model? Derive cable equation.
 - c) Differentiate between:
 - 1) compartmental and non compartmental modeling
 - 2) lumped and distributed parameter model

Section – II

- Q.4 Attempt any four questions. 16**
- a) Explain Thermo genesis and Thermolysis processes.
 - b) Explain the structure and function of spindle receptor and Golgi tendon organ.
 - c) Using Weisthimer's eye model derives expression for displacement and velocity.
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- Q.5 Attempt any two questions. 12**
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T.E. (Part - I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSOR & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) In 8085 microprocessor data Bus and address bus are multiplexed in order to _____.
 - a) Increase the speed of microprocessor
 - b) Reduce the number of pins
 - c) Connect more peripheral chips
 - d) Both a & b
- 2) Which instruction is required to rotate the content of accumulator one bit along with carry?
 - a) RLC
 - b) RAL
 - c) RRC
 - d) RAR
- 3) The content $A_{15}-A_8$ while executing IN 8-bit port address instruction _____.
 - a) Same as the content of A_7-A_{10}
 - b) Irrelevant
 - c) All bit reset
 - d) All bit set
- 4) Which of the following instruction may be used to clear the accumulator content Irrespective of its initial value?
 - a) CLR A
 - b) ORA A
 - c) SUB A
 - d) MOV A,00H
- 5) The idle mode can be terminated by _____.
 - a) PRESET
 - b) CLEAR
 - c) Interrupt
 - d) Interrupt or reset
- 6) The interrupt $\overline{INT0}$ and $\overline{INT1}$ are processed internally by flags _____.
 - a) IE0 and IE1
 - b) IE0 and IF1
 - c) IF0 and IE1
 - d) IF0 and IF1
- 7) In order to compliment the lower order nibble of the accumulator, we can _____.
 - a) ANI 0FH
 - b) XRI 0FH
 - c) ORI 0FH
 - d) CMA
- 8) Which bits plays a significant role in the selection of a bank register of PSW?
 - a) RS1
 - b) RS0
 - c) Both a and b
 - d) None

- 9) Which commands are used for addressing the off-chip data and associated codes respectively by data pointer?
- a) MOV X and MOV C b) MOV Y and MOV B
c) MOV Z and MOV A d) MOV C and MOV Y
- 10) Which bit must be set in TCON register in order to start the 'timer0' while operating in 'mode0'?
- a) TR0 b) TF0
c) IT0 d) IE0
- 11) If SM0 =1, SM1=0 then the transceiver selected is _____.
a) 8-bit synchronous b) 9- bit synchronous
c) 8-bit asynchronous d) 9-bit asynchronous
- 12) What is the address range of SFR register bank?
- a) 00H- 77H b) 40-80H
c) 80H- 7FH d) 80H- FFH
- 13) After reset, SP register is initialized to add _____.
a) 08H b) 07H
c) 06H d) None of the above
- 14) Which of the following is one byte instruction?
- a) MVI B,05H b) LDA 2500H
c) IN 01H d) MOV A, B

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T.E. (Part - I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSOR & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section I

- Q.2 Answer any Four: 16**
- Draw and compare Harvard and Von Neumann architecture of microprocessor.
 - Explain and compare memory mapped I/O and I/O mapped I/O schemes.
 - State and explain different types of data transfer techniques used in 8085 microprocessor.
 - Write a program to generate a symmetrical square wave using SOD line.
 - Explain the following instructions of 8085 microprocessor
 - LDAX
 - DAD
- Q.3 Answer any Two: 12**
- What is Microprocessor? Draw and explain the function of 8085 architecture.
 - What do you understand by vector interrupt of 8085 microprocessor? Draw and explain the interrupt structure of 8085 and also mention their priorities.
 - Write
 - Draw the timing dia of RIM instruction.
 - Write an ALP to generate Fibonacci series.

Section – II

- Q.4 Answer any Four: 16**
- Explain and compare the timer and counter of 8051 microcontroller.
 - Draw and explain PSW register of 8051 microcontroller.
 - Draw and explain about the row scanning method of identifying the key in the matrix keyboard interfacing with microcontroller.
 - Differentiate among the following instructions.
 - MOV A, @R1
 - MOV C, @A+DPTR
 - MOVX A, @R1
 - Explain in detail the memory map of the internal RAM of 8051 microcontroller.
- Q.5 Answer any Two: 12**
- Explain SBUF and TMOD register of 8051. How do you differentiate between polling and interrupts?
 - Draw and explain working operation of heartbeat sensor circuit interfacing with 8051.
 - Explain the features and operation of I/O ports of 8051. Sketch the internal circuit of port 1 and explain its operation.

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T.E. (Part - I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSOR & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which bits plays a significant role in the selection of a bank register of PSW?
 - a) RS1
 - b) RS0
 - c) Both a and b
 - d) None
- 2) Which commands are used for addressing the off-chip data and associated codes respectively by data pointer?
 - a) MOV X and MOV C
 - b) MOV Y and MOV B
 - c) MOV Z and MOV A
 - d) MOV C and MOV Y
- 3) Which bit must be set in TCON register in order to start the 'timer0' while operating in 'mode0'?
 - a) TR0
 - b) TF0
 - c) IT0
 - d) IE0
- 4) If SM0 =1, SM1=0 then the transceiver selected is _____.
 - a) 8-bit synchronous
 - b) 9-bit synchronous
 - c) 8-bit asynchronous
 - d) 9-bit asynchronous
- 5) What is the address range of SFR register bank?
 - a) 00H- 77H
 - b) 40-80H
 - c) 80H- 7FH
 - d) 80H- FFH
- 6) After reset, SP register is initialized to add _____.
 - a) 08H
 - b) 07H
 - c) 06H
 - d) None of the above
- 7) Which of the following is one byte instruction?
 - a) MVI B,05H
 - b) LDA 2500H
 - c) IN 01H
 - d) MOV A, B
- 8) In 8085 microprocessor data Bus and address bus are multiplexed in order to _____.
 - a) Increase the speed of microprocessor
 - b) Reduce the number of pins
 - c) Connect more peripheral chips
 - d) Both a & b
- 9) Which instruction is required to rotate the content of accumulator one bit along with carry?
 - a) RLC
 - b) RAL
 - c) RRC
 - d) RAR

- 10) The content $A_{15}-A_8$ while executing IN 8-bit port address instruction _____.
a) Same as the content of A_7-A_{10} b) Irrelevant
c) All bit reset d) All bit set
- 11) Which of the following instruction may be used to clear the accumulator content Irrespective of its initial value?
a) CLR A b) ORA A
c) SUB A d) MOV A,00H
- 12) The idle mode can be terminated by _____.
a) PRESET b) CLEAR
c) Interrupt d) Interrupt or reset
- 13) The interrupt $\overline{INT0}$ and $\overline{INT1}$ are processed internally by flags _____.
a) IE0 and IE1 b) IE0 and IF1
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- 14) In order to compliment the lower order nibble of the accumulator, we can _____.
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T.E. (Part - I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSOR & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
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Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section I

Q.2 Answer any Four: **16**

- a) Draw and compare Harvard and Von Neumann architecture of microprocessor.
- b) Explain and compare memory mapped I/O and I/O mapped I/O schemes.
- c) State and explain different types of data transfer techniques used in 8085 microprocessor.
- d) Write a program to generate a symmetrical square wave using SOD line.
- e) Explain the following instructions of 8085 microprocessor
 - 1) LDAX
 - 2) DAD

Q.3 Answer any Two: **12**

- a) What is Microprocessor? Draw and explain the function of 8085 architecture.
- b) What do you understand by vector interrupt of 8085 microprocessor? Draw and explain the interrupt structure of 8085 and also mention their priorities.
- c) Write
 - 1) Draw the timing dia of RIM instruction.
 - 2) Write an ALP to generate Fibonacci series.

Section – II

Q.4 Answer any Four: **16**

- a) Explain and compare the timer and counter of 8051 microcontroller.
- b) Draw and explain PSW register of 8051 microcontroller.
- c) Draw and explain about the row scanning method of identifying the key in the matrix keyboard interfacing with microcontroller.
- d) Differentiate among the following instructions.
 - 1) MOV A, @R1
 - 2) MOV C, @A+DPTR
 - 3) MOVX A, @R1
- e) Explain in detail the memory map of the internal RAM of 8051 microcontroller.

Q.5 Answer any Two: **12**

- a) Explain SBUF and TMOD register of 8051. How do you differentiate between polling and interrupts?
- b) Draw and explain working operation of heartbeat sensor circuit interfacing with 8051.
- c) Explain the features and operation of I/O ports of 8051. Sketch the internal circuit of port 1 and explain its operation.

Seat No.	
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T.E. (Part - I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The idle mode can be terminated by _____.

a) PRESET	b) CLEAR
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a) IE0 and IE1	b) IE0 and IF1
c) IF0 and IE1	d) IF0 and IF1
- 3) In order to compliment the lower order nibble of the accumulator, we can _____.

a) ANI 0FH	b) XRI 0FH
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- 4) Which bits plays a significant role in the selection of a bank register of PSW?

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a) 00H- 77H	b) 40-80H
c) 80H- 7FH	d) 80H- FFH
- 9) After reset, SP register is initialized to add _____.

a) 08H	b) 07H
c) 06H	d) None of the above
- 10) Which of the following is one byte instruction?

a) MVI B,05H	b) LDA 2500H
c) IN 01H	d) MOV A, B

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T.E. (Part - I) (CBCS) Examination Nov/Dec-2019
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MICROPROCESSOR & MICROCONTROLLER

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- a) Explain and compare the timer and counter of 8051 microcontroller.
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Seat No.	
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T.E. (Part - I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSOR & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which bit must be set in TCON register in order to start the 'timer0' while operating in 'mode0'?

a) TR0	b) TF0
c) IT0	d) IE0
- 2) If SM0 =1, SM1=0 then the transceiver selected is _____.

a) 8-bit synchronous	b) 9-bit synchronous
c) 8-bit asynchronous	d) 9-bit asynchronous
- 3) What is the address range of SFR register bank?

a) 00H- 77H	b) 40-80H
c) 80H- 7FH	d) 80H- FFH
- 4) After reset, SP register is initialized to add _____.

a) 08H	b) 07H
c) 06H	d) None of the above
- 5) Which of the following is one byte instruction?

a) MVI B,05H	b) LDA 2500H
c) IN 01H	d) MOV A, B
- 6) In 8085 microprocessor data Bus and address bus are multiplexed in order to _____.
 - a) Increase the speed of microprocessor
 - b) Reduce the number of pins
 - c) Connect more peripheral chips
 - d) Both a & b
- 7) Which instruction is required to rotate the content of accumulator one bit along with carry?

a) RLC	b) RAL
c) RRC	d) RAR
- 8) The content $A_{15}-A_8$ while executing IN 8-bit port address instruction _____.

a) Same as the content of A_7-A_{10}	b) Irrelevant
c) All bit reset	d) All bit set
- 9) Which of the following instruction may be used to clear the accumulator content Irrespective of its initial value?

a) CLR A	b) ORA A
c) SUB A	d) MOV A,00H

Seat No.	
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T.E. (Part - I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSOR & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section I

- Q.2 Answer any Four: 16**
- a) Draw and compare Harvard and Von Neumann architecture of microprocessor.
 - b) Explain and compare memory mapped I/O and I/O mapped I/O schemes.
 - c) State and explain different types of data transfer techniques used in 8085 microprocessor.
 - d) Write a program to generate a symmetrical square wave using SOD line.
 - e) Explain the following instructions of 8085 microprocessor
 - 1) LDAX
 - 2) DAD
- Q.3 Answer any Two: 12**
- a) What is Microprocessor? Draw and explain the function of 8085 architecture.
 - b) What do you understand by vector interrupt of 8085 microprocessor? Draw and explain the interrupt structure of 8085 and also mention their priorities.
 - c) Write
 - 1) Draw the timing dia of RIM instruction.
 - 2) Write an ALP to generate Fibonacci series.

Section – II

- Q.4 Answer any Four: 16**
- a) Explain and compare the timer and counter of 8051 microcontroller.
 - b) Draw and explain PSW register of 8051 microcontroller.
 - c) Draw and explain about the row scanning method of identifying the key in the matrix keyboard interfacing with microcontroller.
 - d) Differentiate among the following instructions.
 - 1) MOV A, @R1
 - 2) MOV C, @A+DPTR
 - 3) MOVX A, @R1
 - e) Explain in detail the memory map of the internal RAM of 8051 microcontroller.
- Q.5 Answer any Two: 12**
- a) Explain SBUF and TMOD register of 8051. How do you differentiate between polling and interrupts?
 - b) Draw and explain working operation of heartbeat sensor circuit interfacing with 8051.
 - c) Explain the features and operation of I/O ports of 8051. Sketch the internal circuit of port 1 and explain its operation.

Seat No.	
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Set **P**

T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATIONS

Day & Date: Friday, 13-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Wired channels are _____.
 - a) Lossy
 - b) Lossless
 - c) Lossy & Lossless
 - d) None of the above
- 2) Transmission media used in low frequency band are _____.
 - a) Air
 - b) Water
 - c) Copper cable
 - d) All of the above
- 3) Flat top sampling of low pass signals _____.
 - a) Gives rise to aperture effect
 - b) Implies over sampling
 - c) Leads to aliasing
 - d) Introduces delay distortion
- 4) In a delta modulation system, granular noise occurs when the _____.
 - a) Modulating signal increases rapidly
 - b) Pulse rate decreases
 - c) Pulse amplitude decreases
 - d) Modulating signal remains constant
- 5) A PAM signal can be detected using _____.
 - a) Low pass filter
 - b) High pass filter
 - c) Band pass filter
 - d) All pass filter
- 6) A PWM signal can be generated by _____.
 - a) An astable multi vibrator
 - b) A monostable multi vibrator
 - c) Integrating a PPM signal
 - d) Differentiating a PPM signal
- 7) PCM includes the process of _____.
 - a) Amplitude discretization
 - b) Time discretization
 - c) Amplitude & Time discretization
 - d) None of the mentioned
- 8) Modulation process corresponds to _____ the amplitude, frequency or phase.
 - a) Switching
 - b) Keying
 - c) Switching or keying
 - d) None of the mentioned

- 9) Time division multiplexing uses _____.
a) High pass filter b) Commutator
c) High pass filter & Commutator d) None of the mentioned
- 10) In TDM, at the receiver end, _____ filter is used.
a) Low pass b) High pass
c) Band pass d) Band stop
- 11) The coherent modulation techniques are _____.
a) PSK b) FSK
c) ASK d) All of the mentioned
- 12) The real part of a sinusoid carrier wave is called as _____.
a) Inphase b) Quadrature
c) Inphase & Quadrature d) None of the mentioned
- 13) The term heterodyning refers to _____.
a) Frequency conversion
b) Frequency mixing
c) Frequency conversion & mixing
d) None of the mentioned
- 14) Wavelength and antenna size are related as _____.
a) $\lambda/2$ b) $\lambda/4$
c) 2λ d) 4λ

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATIONS

Day & Date: Friday, 13-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four. **16**

- a) Define noise factor and noise figure and mention their significance in communication system.
- b) Define AM and derive equation for it.
- c) A certain transmitter radiates 9kW with the carrier unmodulated and 15.225kW when the carrier is sinusoidal modulated. Calculate the modulation index. If another sine wave is simultaneously transmitted with modulation index 0.3, determine the total radiated power.
- d) Explain Pre-emphasis and De-emphasis with necessary diagram.
- e) Derive expression for the instantaneous value of an FM voltage and define the modulation index.

Q.3 Attempt any two. **12**

- a) Explain indirect method for FM generation in detail.
- b) Draw and explain block diagram of SSB generation using phase shift method to generate LSB.
- c) Explain working of high level modulated AM transmitter.

Section – II

Q.4 Attempt any four. **16**

- a) Explain generation and working of PAM in detail.
- b) Define and explain working of TDM and FDM.
- c) Explain PWM generation process with waveform.
- d) Explain working of ASK and PFSK.
- e) Define and explain Hamming codes and Look up table decoding with an example.

Q.5 Attempt any two. **12**

- a) Explain working of PCM -TDM system.
- b) Explain sampling theorem and its types in detail.
- c) Define and compare direct and indirect method of PTM generation.

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATIONS

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Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Modulation process corresponds to _____ the amplitude, frequency or phase.
 - a) Switching
 - b) Keying
 - c) Switching or keying
 - d) None of the mentioned
- 2) Time division multiplexing uses _____.
 - a) High pass filter
 - b) Commutator
 - c) High pass filter & Commutator
 - d) None of the mentioned
- 3) In TDM, at the receiver end, _____ filter is used.
 - a) Low pass
 - b) High pass
 - c) Band pass
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- 4) The coherent modulation techniques are _____.
 - a) PSK
 - b) FSK
 - c) ASK
 - d) All of the mentioned
- 5) The real part of a sinusoid carrier wave is called as _____.
 - a) Inphase
 - b) Quadrature
 - c) Inphase & Quadrature
 - d) None of the mentioned
- 6) The term heterodyning refers to _____.
 - a) Frequency conversion
 - b) Frequency mixing
 - c) Frequency conversion & mixing
 - d) None of the mentioned
- 7) Wavelength and antenna size are related as _____.
 - a) $\lambda/2$
 - b) $\lambda/4$
 - c) 2λ
 - d) 4λ
- 8) Wired channels are _____.
 - a) Lossy
 - b) Lossless
 - c) Lossy & Lossless
 - d) None of the above
- 9) Transmission media used in low frequency band are _____.
 - a) Air
 - b) Water
 - c) Copper cable
 - d) All of the above

- 10) Flat top sampling of low pass signals _____.
a) Gives rise to aperture effect b) Implies over sampling
c) Leads to aliasing d) Introduces delay distortion
- 11) In a delta modulation system, granular noise occurs when the _____.
a) Modulating signal increases rapidly
b) Pulse rate decreases
c) Pulse amplitude decreases
d) Modulating signal remains constant
- 12) A PAM signal can be detected using _____.
a) Low pass filter b) High pass filter
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- 13) A PWM signal can be generated by _____.
a) An astable multi vibrator b) A monostable multi vibrator
c) Integrating a PPM signal d) Differentiating a PPM signal
- 14) PCM includes the process of _____.
a) Amplitude discretization
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATIONS

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- b) Define AM and derive equation for it.
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- d) Explain Pre-emphasis and De-emphasis with necessary diagram.
- e) Derive expression for the instantaneous value of an FM voltage and define the modulation index.

Q.3 Attempt any two. 12

- a) Explain indirect method for FM generation in detail.
- b) Draw and explain block diagram of SSB generation using phase shift method to generate LSB.
- c) Explain working of high level modulated AM transmitter.

Section – II

Q.4 Attempt any four. 16

- a) Explain generation and working of PAM in detail.
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Q.5 Attempt any two. 12

- a) Explain working of PCM -TDM system.
- b) Explain sampling theorem and its types in detail.
- c) Define and compare direct and indirect method of PTM generation.

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Set **R**

T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATIONS

Day & Date: Friday, 13-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATIONS

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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATIONS

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Seat No.	
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Set	S
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATIONS

Day & Date: Friday, 13-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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Section – I

Q.2 Attempt any four. 16

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- d) Explain Pre-emphasis and De-emphasis with necessary diagram.
- e) Derive expression for the instantaneous value of an FM voltage and define the modulation index.

Q.3 Attempt any two. 12

- a) Explain indirect method for FM generation in detail.
- b) Draw and explain block diagram of SSB generation using phase shift method to generate LSB.
- c) Explain working of high level modulated AM transmitter.

Section – II

Q.4 Attempt any four. 16

- a) Explain generation and working of PAM in detail.
- b) Define and explain working of TDM and FDM.
- c) Explain PWM generation process with waveform.
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Q.5 Attempt any two. 12

- a) Explain working of PCM -TDM system.
- b) Explain sampling theorem and its types in detail.
- c) Define and compare direct and indirect method of PTM generation.

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEMS

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) If “n” tends to infinity, _____ is the accumulator function a stable one.
 - a) The function is marginally stable.
 - b) The function is stable
 - c) The function is unstable
 - d) None of the mentioned
- 2) The function $y[n] = y[n-1] + x[n]$ _____ in nature.
 - a) It is stable
 - b) It is unstable
 - c) Both stable and unstable
 - d) None of the mentioned
- 3) Discrete-time signals are _____.
 - a) Continuous in amplitude and continuous in time
 - b) Continuous in amplitude and discrete in time
 - c) Discrete in amplitude and discrete in time
 - d) Discrete in amplitude and continuous in time
- 4) _____ properties does a Continuous time unit Impulse function follow.
 - a) Shifting, sampling, differentiation, multiplication
 - b) Multiplication, sampling, shifting
 - c) Shifting, multiplication, differentiation
 - d) Sampling only
- 5) What is the area under a doublet function is _____.
 - a) Unity
 - b) Negative
 - c) Zero
 - d) Positive
- 6) _____ are the properties of continuous time Fourier series.
 - a) Linearity, time shifting
 - b) Linearity, time shifting, frequency shifting
 - c) Linearity, time shifting, frequency shifting, time reversal, time scaling, periodic convolution
 - d) Linearity, time shifting, frequency shifting, time reversal, time scaling, periodic convolution multiplication, differentiation.

- 7) _____ is the period of the signal when it is time shifted.
- Changes according to the situation.
 - Different in different situation.
 - Remains the same.
 - Takes the shifted value.
- 8) _____ is the full form of BIBO.
- Boundary input Boundary Output.
 - Boundary Input Bounded Output.
 - Bonded Input Bonded Output.
 - Bounded Input, Bounded Output.
- 9) The type of systems which are characterized by input and the output quantized at certain levels are called as _____.
- Analog
 - Discrete
 - Continuous
 - Digital
- 10) The type of systems which are characterized by input and the output capable of taking any value in a particular set of values are called as _____.
- Analog
 - Discrete
 - Digital
 - Continuous
- 11) An example of a discrete set of information/system is _____.
- The trajectory of the Sun
 - Data on a CD.
 - Universe time scale
 - Movement of water through a pipe
- 12) A time invariant system is a system whose output _____.
- Increases with a delay in input
 - Decreases with a delay in input
 - Remains same with a delay in input
 - Vanishes with a delay in input
- 13) Real time instruments like oscilloscopes be time invariant _____.
- Yes
 - Sometimes
 - Never
 - They have no relation with time
- 14) Flat-top sampling of low pass signals _____.
- Give rise to aperture effect
 - Implies over sampling
 - Lead to aliasing
 - Introduces delay distortion

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEMS

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Solve any four. **16**

- a) State sampling theorem. What is ant-aliasing filter?
- b) What are the properties of frequency response $H(e^{j\omega})$ of an LTI system?
- c) Find the fundamental period T of the following continuous-time signals,
 - 1) $x(t) = je^{j5t}$
 - 2) $\text{sine } 50\pi t$
 - 3) $20 \cos\left(10\pi t + \frac{\pi}{6}\right)$
 - 4) je^{j7t}
- d) What are different types of representation of discrete-time signal?
- e) Define following terms.
 - 1) continuous-time
 - 2) Discrete-time
 - 3) Digital signal
 - 4) liner signal.

Q.3 Solve any two. **12**

- a) Define energy & power signals. Consider a continuous time signal.
 $x(t) = \delta(t + 2) - \delta(t - 2)$.
 Calculate the value E_{∞} for the signaly $(t) = \int_{-\infty}^t x(t)dt$.
- b) Find whether the following are periodic or not.
 - 1) $\cos 0.1\pi n$
 - 2) $e^{j6\pi n}$
 - 3) $\sin\left(\frac{6\pi}{7}n + 1\right)$
- c) If the Nyquist rate of a signal $x(t)$ is Ω_0 , then what is the Nyquest rate of the following signals.
 - 1) $x(t) - x(t - 1)$
 - 2) $x(t) \cos \Omega_0 t$.

Section – II

Q.4 Solve any four. **16**

- a) State & prove time convolution & time multiplication properties of Fourier transform.
- b) State properties of Region of Convergence (ROC).
- c) Prove the property of time reversal of inverse z-transform.
- d) Prove the property of convolution of inverse z-transform.

e) Using z-transform, find the convolution of two sequences.

1) $x_1(n) = \{1, 2, -1, 0, 3\}$

2) $x_2(n) = \{1, 2, -1\}$

Q.5 Solve any two.

12

a) Find the Fourier transform of $x(t) = 5 \sin^2(3t)$.

b) Explain analysis of Linear Time Invariant systems by z-transform.

c) State the properties of z-transform.

Seat No.	
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Set **Q**

T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEMS

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) _____ is the full form of BIBO.
 - a) Boundary input Boundary Output.
 - b) Boundary Input Bounded Output.
 - c) Bonded Input Bonded Output.
 - d) Bounded Input, Bounded Output.
- 2) The type of systems which are characterized by input and the output quantized at certain levels are called as _____.
 - a) Analog
 - b) Discrete
 - c) Continuous
 - d) Digital
- 3) The type of systems which are characterized by input and the output capable of taking any value in a particular set of values are called as _____.
 - a) Analog
 - b) Discrete
 - c) Digital
 - d) Continuous
- 4) An example of a discrete set of information/system is _____.
 - a) The trajectory of the Sun
 - b) Data on a CD.
 - c) Universe time scale
 - d) Movement of water through a pipe
- 5) A time invariant system is a system whose output _____.
 - a) Increases with a delay in input
 - b) Decreases with a delay in input
 - c) Remains same with a delay in input
 - d) Vanishes with a delay in input
- 6) Real time instruments like oscilloscopes be time invariant _____.
 - a) Yes
 - b) Sometimes
 - c) Never
 - d) They have no relation with time
- 7) Flat-top sampling of low pass signals _____.
 - a) Give rise to aperture effect
 - b) Implies over sampling
 - c) Lead to aliasing
 - d) Introduces delay distortion

- 8) If “n” tends to infinity, _____ is the accumulator function a stable one.
- The function is marginally stable.
 - The function is stable
 - The function is unstable
 - None of the mentioned
- 9) The function $y[n] = y[n-1] + x[n]$ _____ in nature.
- It is stable
 - It is unstable
 - Both stable and unstable
 - None of the mentioned
- 10) Discrete-time signals are _____.
- Continuous in amplitude and continuous in time
 - Continuous in amplitude and discrete in time
 - Discrete in amplitude and discrete in time
 - Discrete in amplitude and continuous in time
- 11) _____ properties does a Continuous time unit Impulse function follow.
- Shifting, sampling, differentiation, multiplication
 - Multiplication, sampling, shifting
 - Shifting, multiplication, differentiation
 - Sampling only
- 12) What is the area under a doublet function is _____.
- Unity
 - Negative
 - Zero
 - Positive
- 13) _____ are the properties of continuous time Fourier series.
- Linearity, time shifting
 - Linearity, time shifting, frequency shifting
 - Linearity, time shifting, frequency shifting, time reversal, time scaling, periodic convolution
 - Linearity, time shifting, frequency shifting, time reversal, time scaling, periodic convolution multiplication, differentiation.
- 14) _____ is the period of the signal when it is time shifted.
- Changes according to the situation.
 - Different in different situation.
 - Remains the same.
 - Takes the shifted value.

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEMS

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Solve any four. **16**

- a) State sampling theorem. What is ant-aliasing filter?
- b) What are the properties of frequency response $H(e^{j\omega})$ of an LTI system?
- c) Find the fundamental period T of the following continuous-time signals,
 - 1) $x(t) = je^{j5t}$
 - 2) $\text{sine } 50\pi t$
 - 3) $20 \cos\left(10\pi t + \frac{\pi}{6}\right)$
 - 4) je^{j7t}
- d) What are different types of representation of discrete-time signal?
- e) Define following terms.
 - 1) continuous-time
 - 2) Discrete-time
 - 3) Digital signal
 - 4) liner signal.

Q.3 Solve any two. **12**

- a) Define energy & power signals. Consider a continuous time signal.
 $x(t) = \delta(t + 2) - \delta(t - 2)$.
 Calculate the value E_{∞} for the signaly $(t) = \int_{-\infty}^t x(t)dt$.
- b) Find whether the following are periodic or not.
 - 1) $\cos 0.1\pi n$
 - 2) $e^{j6\pi n}$
 - 3) $\sin\left(\frac{6\pi}{7}n + 1\right)$
- c) If the Nyquist rate of a signal $x(t)$ is Ω_0 , then what is the Nyquest rate of the following signals.
 - 1) $x(t) - x(t - 1)$
 - 2) $x(t) \cos \Omega_0 t$.

Section – II

Q.4 Solve any four. **16**

- a) State & prove time convolution & time multiplication properties of Fourier transform.
- b) State properties of Region of Convergence (ROC).
- c) Prove the property of time reversal of inverse z-transform.
- d) Prove the property of convolution of inverse z-transform.

e) Using z-transform, find the convolution of two sequences.

1) $x_1(n) = \{1, 2, -1, 0, 3\}$

2) $x_2(n) = \{1, 2, -1\}$

Q.5 Solve any two.

12

a) Find the Fourier transform of $x(t) = 5 \sin^2(3t)$.

b) Explain analysis of Linear Time Invariant systems by z-transform.

c) State the properties of z-transform.

- 7) An example of a discrete set of information/system is _____.
a) The trajectory of the Sun
b) Data on a CD.
c) Universe time scale
d) Movement of water through a pipe
- 8) A time invariant system is a system whose output _____.
a) Increases with a delay in input
b) Decreases with a delay in input
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d) Vanishes with a delay in input
- 9) Real time instruments like oscilloscopes be time invariant _____.
a) Yes
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c) Never
d) They have no relation with time
- 10) Flat-top sampling of low pass signals _____.
a) Give rise to aperture effect
b) Implies over sampling
c) Lead to aliasing
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a) Shifting, sampling, differentiation, multiplication
b) Multiplication, sampling, shifting
c) Shifting, multiplication, differentiation
d) Sampling only

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEMS

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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 3) Assume suitable data if necessary.

Section – I

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- a) State sampling theorem. What is ant-aliasing filter?
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Q.3 Solve any two. **12**

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 - 2) $e^{j6\pi n}$
 - 3) $\sin\left(\frac{6\pi}{7}n + 1\right)$
- c) If the Nyquist rate of a signal $x(t)$ is Ω_0 , then what is the Nyquest rate of the following signals.
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Section – II

Q.4 Solve any four. **16**

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 - Different in different situation.
 - Remains the same.
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- 13) _____ is the full form of BIBO.
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 - Bonded Input Bonded Output.
 - Bounded Input, Bounded Output.
- 14) The type of systems which are characterized by input and the output quantized at certain levels are called as _____.
- Analog
 - Discrete
 - Continuous
 - Digital

Seat No.	
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T.E. (Part – I) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEMS

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Solve any four. **16**

- a) State sampling theorem. What is ant-aliasing filter?
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 - 3) Digital signal
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- b) Find whether the following are periodic or not.
 - 1) $\cos 0.1\pi n$
 - 2) $e^{j6\pi n}$
 - 3) $\sin\left(\frac{6\pi}{7}n + 1\right)$
- c) If the Nyquist rate of a signal $x(t)$ is Ω_0 , then what is the Nyquest rate of the following signals.
 - 1) $x(t) - x(t - 1)$
 - 2) $x(t) \cos \Omega_0 t$.

Section – II

Q.4 Solve any four. **16**

- a) State & prove time convolution & time multiplication properties of Fourier transform.
- b) State properties of Region of Convergence (ROC).
- c) Prove the property of time reversal of inverse z-transform.
- d) Prove the property of convolution of inverse z-transform.

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Q.5 Solve any two.

12

a) Find the Fourier transform of $x(t) = 5 \sin^2(3t)$.

b) Explain analysis of Linear Time Invariant systems by z-transform.

c) State the properties of z-transform.

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No 1 is compulsory.
 2) Figures to the right indicate full marks
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) Each time the heart muscle contracts, blood are ejected from _____ and pulse pressure is transmitted.
 - a) Atrium
 - b) Ventricles
 - c) Tricuspid valve
 - d) Bicuspid valve
- 2) The _____ technique operates on the principle of occluding deflation of cuff from above level of systolic pressure.
 - a) Sphygmomanometer
 - b) Riva rocci
 - c) Oscillometric
 - d) Rheographic
- 3) The respiratory cycle is accompanied by changes in _____ volume.
 - a) Thoracic
 - b) tidal
 - c) Lung
 - d) Respiratory
- 4) Ventricular fibrillation is detected usually by _____ analysis.
 - a) amplitude
 - b) pulse domain
 - c) flow
 - d) frequency domain
- 5) The _____ valve prevents backward flow of blood from right ventricle to right atrium.
 - a) bicuspid
 - b) tricuspid
 - c) mitral
 - d) aortic
- 6) PR interval has a time period equal to _____ seconds.
 - a) 0.12 to 0.20
 - b) 0.06 to 0.10
 - c) 0.18 to 0.30
 - d) 0.35 to 0.40
- 7) The electrode from which no active potential comes in is called _____ electrode.
 - a) active
 - b) passive
 - c) reference
 - d) point
- 8) The skeletal system is made up of about _____ bones.
 - a) 206
 - b) 226
 - c) 100
 - d) 216
- 9) The nail and hair are also special type of _____.
 - a) tissues
 - b) skins
 - c) organs
 - d) bones

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four question. 16**
- a) Define resting potential and action potential with necessary diagram.
 - b) Define and explain leakage current and macro current.
 - c) Draw heart sounds waves and define their significances.
 - d) Explain procedure of blood pressure measurement using sphygmomanometer.
 - e) Explain types of electrodes along with 10-20 electrode system of EEG measurement.
- Q.3 Attempt any two questions. 12**
- a) Explain the Einthoven triangle 12 lead system of ECG machine.
 - b) Explain working of evoked potential type EEG machine.
 - c) Define arrhythmia and explain working of ambulatory monitoring system.

Section – II

- Q.4 Attempt any four question. 16**
- a) Explain pH measurement technique and mention its medical applications.
 - b) Differentiate between direct and indirect blood pressure measurement technique.
 - c) Explain principle and working of plethysmographic method for pulse rate measurement.
 - d) Draw and explain working of Rheographic method of indirect blood pressure measurement.
 - e) Which precautions that has to be taken to minimize electric hazards.
- Q.5 Attempt any two question. 12**
- a) Draw and explain working of ultrasound transmitter and receiver for fetal heart rate measurement.
 - b) Draw and explain block diagram baby incubator and infant warmer.
 - c) Explain block diagram and working of ambulatory monitoring system.

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No 1 is compulsory.
 2) Figures to the right indicate full marks
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) The skeletal system is made up of about _____ bones.
 - a) 206
 - b) 226
 - c) 100
 - d) 216
- 2) The nail and hair are also special type of _____.
 - a) tissues
 - b) skins
 - c) organs
 - d) bones
- 3) The unit used for nerve conduction velocity measurement is _____.
 - a) m/s
 - b) cm/s
 - c) volts/sec
 - d) km/s
- 4) The fourth heart sound is called _____ sound.
 - a) ventricle heart
 - b) aortic
 - c) atrial
 - d) pulmonary
- 5) The normal fetal heart rate range is considered to be between _____ beats per minute.
 - a) 100-200
 - b) 150-190
 - c) 120-150
 - d) 120-160
- 6) The normal amplitude of 'R' wave is approximately _____ mV, when measured at the surface of the body.
 - a) 5
 - b) 0.5
 - c) 1
 - d) 1.5
- 7) The EEG waveform has voltage range around _____ mV.
 - a) 5 to 100
 - b) 10 to 1000
 - c) 50 to 100
 - d) 0.5 to 10
- 8) Each time the heart muscle contracts, blood are ejected from _____ and pulse pressure is transmitted.
 - a) Atrium
 - b) Ventricles
 - c) Tricuspid valve
 - d) Bicuspid valve
- 9) The _____ technique operates on the principle of occluding deflation of cuff from above level of systolic pressure.
 - a) Sphygmomanometer
 - b) Riva rocci
 - c) Oscillometric
 - d) Rheographic

- 10) The respiratory cycle is accompanied by changes in _____ volume.
- | | |
|-------------|----------------|
| a) Thoracic | b) Tidal |
| c) Lung | d) Respiratory |
- 11) Ventricular fibrillation is detected usually by _____ analysis.
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|--------------|---------------------|
| a) amplitude | b) pulse domain |
| c) flow | d) frequency domain |
- 12) The _____ valve prevents backward flow of blood from right ventricle to right atrium.
- | | |
|-------------|--------------|
| a) bicuspid | b) Tricuspid |
| c) mitral | d) Aortic |
- 13) PR interval has a time period equal to _____ seconds.
- | | |
|-----------------|-----------------|
| a) 0.12 to 0.20 | b) 0.06 to 0.10 |
| c) 0.18 to 0.30 | d) 0.35 to 0.40 |
- 14) The electrode from which no active potential comes in is called _____ electrode.
- | | |
|--------------|------------|
| a) active | b) Passive |
| c) reference | d) Point |

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four question. 16**
- a) Define resting potential and action potential with necessary diagram.
 - b) Define and explain leakage current and macro current.
 - c) Draw heart sounds waves and define their significances.
 - d) Explain procedure of blood pressure measurement using sphygmomanometer.
 - e) Explain types of electrodes along with 10-20 electrode system of EEG measurement.
- Q.3 Attempt any two questions. 12**
- a) Explain the Einthoven triangle 12 lead system of ECG machine.
 - b) Explain working of evoked potential type EEG machine.
 - c) Define arrhythmia and explain working of ambulatory monitoring system.

Section – II

- Q.4 Attempt any four question. 16**
- a) Explain pH measurement technique and mention its medical applications.
 - b) Differentiate between direct and indirect blood pressure measurement technique.
 - c) Explain principle and working of plethysmographic method for pulse rate measurement.
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- a) Draw and explain working of ultrasound transmitter and receiver for fetal heart rate measurement.
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 - c) Explain block diagram and working of ambulatory monitoring system.

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No 1 is compulsory.
 2) Figures to the right indicate full marks
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) The _____ valve prevents backward flow of blood from right ventricle to right atrium.

a) bicuspid	b) tricuspid
c) mitral	d) aortic
- 2) PR interval has a time period equal to _____ seconds.

a) 0.12 to 0.20	b) 0.06 to 0.10
c) 0.18 to 0.30	d) 0.35 to 0.40
- 3) The electrode from which no active potential comes in is called _____ electrode.

a) active	b) passive
c) reference	d) point
- 4) The skeletal system is made up of about _____ bones.

a) 206	b) 226
c) 100	d) 216
- 5) The nail and hair are also special type of _____.

a) tissues	b) skins
c) organs	d) bones
- 6) The unit used for nerve conduction velocity measurement is _____.

a) m/s	b) cm/s
c) volts/sec	d) km/s
- 7) The fourth heart sound is called _____ sound.

a) ventricle heart	b) aortic
c) atrial	d) pulmonary
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a) 5	b) 0.5
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any four question. 16**
- a) Define resting potential and action potential with necessary diagram.
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Section – II

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|--------|--------|
| a) 206 | b) 226 |
| c) 100 | d) 216 |
- 14) The nail and hair are also special type of _____.
- | | |
|------------|----------|
| a) tissues | b) skins |
| c) organs | d) bones |

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION - II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL SIGNAL PROCESSING

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) In cascade form of realization, _____ bits should be used to represent the FIR filter coefficients in order to avoid the quantization effect on filter coefficients.

a) 5 to 10	b) 12 to 14
c) 20 to 24	d) 28 to 40
- 2) For the calculation of N- point DFT, Radix -2 FFT algorithm repeats _____.

a) $2(N \log_2 N)$ stages	b) $(N \log_2 N)^2/2$ stages
c) $(N \log_2 N)/2$ stages	d) $(N \log_2(2 N))/2$ stages
- 3) If the filter has anti-symmetric unit sample response with M even, then the value of $Q(\omega)$ IS _____.

a) $\cos(\omega/2)$	b) $\sin(\omega/2)$
c) 1	d) $\sin\omega$
- 4) The scaling of a sequence $x[n]$ by a factor α is given by _____.

a) $y[n] = \alpha [x[n]]^2$	b) $y[n] = \alpha x[n^2]$
c) $y[n] = \alpha x[n]$	d) $y[n] = x[n]x[-n]$
- 5) DFT is applied to _____.

a) Infinite sequences	b) Finite discrete sequences
c) Continuous infinite signals	d) Continuous finite sequences
- 6) In FIR filters, _____ parameters remains unaffected by the quantization effect.

a) Magnitude Response	b) Phase Characteristics
c) Both a and b	d) None of the above
- 7) For a linear phase filter, if Z_1 is zero then _____ would be the value of Z_1^{-1} or $1/Z_1$.

a) Zero	b) Unity
c) Infinity	d) Unpredictable
- 8) DFT is applied to _____.

a) Infinite sequences	b) Finite discrete sequences
c) Continuous infinite signals	d) Continuous finite sequences

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T.E. (Part – II) (New)(CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL SIGNAL PROCESSING

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any four of the following questions. 16

- Derive circular convolution of two finite duration sequence.
 $X_1(n) = \{1, -1, -2, 3, -1\}$, $X_2(n) = \{1, 2, 3\}$
- Derive the Parseval's energy relation. State the significance of it.
- Compute DFT of given sequence $X(n) = \sin \frac{nx}{2}$ using decimation in time algorithm.
- Show and compare computational complexity is reduced if 32 point DFT is computed using Radix – 2 DIT FFT algorithm.
- Explain the relation between DTFT and DFT.

Q.3 Attempt any two of the following questions. 12

- Determine the length 4 sequence from its DFT.
 $X(K) = \{4, 1, -j, -2, 1 + j\}$
- Find DFT of two real sequence using only one FFT flow graph.
- With the help of neat diagram describe frequency sampling realization of FIR filters.

Section – II

Q.4 Attempt any four of the following questions. 16

- Design IIR digital filter using impulse invariance method for given system function of analog filter.

$$H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}$$
- Derive the mapping formula for bilinear transformation method.
- Prove that a linear phase FIR filter having antisymmetric coefficient cannot be a high pass filter.
- Explain how adaptive filters and signal processing techniques helps in analysis of heart rate variability measurement.
- Using Trapezoidal rule of integration show that $S = \frac{2(1-Z^{-1})}{T(1+Z^{-1})}$

Q.5 Attempt any two of the following questions. 12

- The transfer function of analog filter is , $H(s) = \frac{3}{(s+2)(s+3)}$ with $T_s = 0.1 \text{ sec}$.
 Design digital IIR filter using Bilinear transformation method.
- Write a short note on:
 - LMS algorithm.
 - Adaptive noise cancelling
- Draw and explain various types of windows used in designing FIR filters.

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No.

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL SIGNAL PROCESSING

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.

14

- 1) DFT is applied to _____.
 a) Infinite sequences b) Finite discrete sequences
 c) Continuous infinite signals d) Continuous finite sequences
- 2) In Overlap-Add Method with linear convolution of a discrete-time signal of length L and a discrete-time signal of length M, for a length N, zero padding should be of length _____.
 a) $L, M > N$ b) $L, M = N$
 c) $L, M < N$ d) $L, M < N^2$
- 3) The nonlinear difference equations are solved using _____.
 a) Iterative method b) Cobweb model
 c) Phase diagram d) Power series method
- 4) The error in the filter output that results from rounding or truncating calculations within the filter is called _____.
 a) Coefficient quantization error b) Adder overflow limit cycle
 c) Round off noise d) Limit cycles
- 5) In FIR filter design, _____ parameters is/are separately controlled by using Kaiser window.
 a) Order of filter (M) b) Transition width of main lobe
 c) Both a and b d) None of the above
- 6) In Gibb's phenomenon, the ringing effect is predominantly present near the _____.
 a) band gap b) band edge
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- 7) _____ filters exhibit their dependency upon the system design for the stability purpose.
 a) FIR b) IIR
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- 8) In cascade form of realization, _____ bits should be used to represent the FIR filter coefficients in order to avoid the quantization effect on filter coefficients.
 a) 5 to 10 b) 12 to 14
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- 9) For the calculation of N- point DFT, Radix -2 FFT algorithm repeats ____.
- a) $2(N \log_2 N)$ stages b) $(N \log_2 N)^2/2$ stages
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- 10) If the filter has anti-symmetric unit sample response with M even, then the value of $Q(\omega)$ IS _____.
- a) $\cos(\omega/2)$ b) $\sin(\omega/2)$
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- 11) The scaling of a sequence $x[n]$ by a factor α is given by _____.
- a) $y[n] = \alpha [x[n]]^2$ b) $y[n] = \alpha x[n^2]$
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- 14) For a linear phase filter, if Z_1 is zero then _____ would be the value of Z_1^{-1} or $1/Z_1$.
- a) Zero b) Unity
c) Infinity d) Unpredictable

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T.E. (Part – II) (New)(CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL SIGNAL PROCESSING

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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Section – I

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- Derive circular convolution of two finite duration sequence.
 $X_1(n) = \{1, -1, -2, 3, -1\}$, $X_2(n) = \{1, 2, 3\}$
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- Determine the length 4 sequence from its DFT.
 $X(K) = \{4, 1, -j, -2, 1 + j\}$
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- With the help of neat diagram describe frequency sampling realization of FIR filters.

Section – II

Q.4 Attempt any four of the following questions. 16

- Design IIR digital filter using impulse invariance method for given system function of analog filter.

$$H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}$$
- Derive the mapping formula for bilinear transformation method.
- Prove that a linear phase FIR filter having antisymmetric coefficient cannot be a high pass filter.
- Explain how adaptive filters and signal processing techniques helps in analysis of heart rate variability measurement.
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Q.5 Attempt any two of the following questions. 12

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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL SIGNAL PROCESSING

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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T.E. (Part – II) (New)(CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL SIGNAL PROCESSING

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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL SIGNAL PROCESSING

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T.E. (Part – II) (New)(CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL SIGNAL PROCESSING

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- Write a short note on:
 - LMS algorithm.
 - Adaptive noise cancelling
- Draw and explain various types of windows used in designing FIR filters.

- 9) In CT scan X ray source and detectors are mounted _____ each other in a rigid gantry.
- | | |
|-------------|-------------|
| a) opposite | b) diagonal |
| c) parallel | d) series |
- 10) Grids are placed between the patients and _____ for absorbing scattered radiation.
- | | |
|---------------|------------------|
| a) collimator | b) Patient table |
| c) film | d) power supply |
- 11) Heel effect states that the intensity of Xray beam is not _____ throughout all portions of the beam.
- | | |
|------------|-------------|
| a) uniform | b) Standard |
| c) small | d) Large |
- 12) Ultrasound travels at a velocity of about _____ in the soft tissues of the body.
- | | |
|--------------|-------------|
| a) 155 m/s | b) 1500 m/s |
| c) 15000 m/s | d) 1155 m/s |
- 13) The _____ factor of a ultrasound transducer determines its frequency characteristics.
- | | |
|--------------|--------------|
| a) Intensity | b) Impedance |
| c) radiation | d) Q |
- 14) *Depth of penetration* =
$$\frac{\text{Velocity of sound in the medium} \times \text{---}}{2}$$
- | | |
|---------------|---------|
| a) Intensity | b) Q |
| c) absorption | d) Time |

Seat No.	
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Set	P
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T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Monday, 25-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four of the following questions. 16**
- a) Define continuous wave and pulsed wave Doppler ultrasound techniques.
 - b) Define characteristic impedance of ultrasound waves and mention it's any 4 characteristics.
 - c) Explain working of X ray image intensifier.
 - d) Draw and explain construction of ultrasound transducer.
 - e) Explain types and construction of various X ray anodes.
- Q.3 Attempt any two of the following questions. 12**
- a) Explain various types of X rays film development techniques along with beam limiting devices.
 - b) Explain the working of dual and triple field intensifier with their medical applications.
 - c) Write a short note on:
 - i) A,B and M mode of ultrasound
 - ii) production of X rays

Section – II

- Q.4 Attempt any four of the following questions. 16**
- a) Differentiate between computed radiography and digital radiography.
 - b) Explain the working digital mammography and mention its applications.
 - c) Explain the basic physics behind thermograph technique.
 - d) List various medical applications of endoscopy equipment.
 - e) Explain working of gas filled detector and mention its significance.
- Q.5 Attempt any two of the following questions. 12**
- a) List various medical applications of endoscopy.
 - b) Explain block diagram and working of thermographic machine.
 - c) Define CT number and describe second and fourth generation of CT scans.

Seat No.	
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T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Monday, 25-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.

14

- 1) The CT number of a tissue indicates _____ of that tissue.
 - a) adsorption
 - b) radiation
 - c) scattering
 - d) absorption
- 2) In CT scan X ray source and detectors are mounted _____ each other in a rigid gantry.
 - a) opposite
 - b) diagonal
 - c) parallel
 - d) series
- 3) Grids are placed between the patients and _____ for absorbing scattered radiation.
 - a) collimator
 - b) Patient table
 - c) film
 - d) power supply
- 4) Heel effect states that the intensity of Xray beam is not _____ throughout all portions of the beam.
 - a) uniform
 - b) Standard
 - c) small
 - d) Large
- 5) Ultrasound travels at a velocity of about _____ in the soft tissues of the body.
 - a) 155 m/s
 - b) 1500 m/s
 - c) 15000 m/s
 - d) 1155 m/s
- 6) The _____ factor of a ultrasound transducer determines its frequency characteristics.
 - a) Intensity
 - b) Impedance
 - c) radiation
 - d) Q
- 7) $Depth\ of\ penetration = \frac{Velocity\ of\ sound\ in\ the\ medium \times \dots}{2}$
 - a) Intensity
 - b) Q
 - c) absorption
 - d) Time
- 8) The infrared region of the electromagnetic spectrum is usually taken as _____.
 - a) 0.77
 - b) 0.80
 - c) 1000
 - d) 1.5

Seat No.	
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Set

Q

T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Monday, 25-11-2019
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Section – I

- Q.2 Attempt any four of the following questions. 16**
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 - b) Define characteristic impedance of ultrasound waves and mention its any 4 characteristics.
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 - d) Draw and explain construction of ultrasound transducer.
 - e) Explain types and construction of various X ray anodes.
- Q.3 Attempt any two of the following questions. 12**
- a) Explain various types of X rays film development techniques along with beam limiting devices.
 - b) Explain the working of dual and triple field intensifier with their medical applications.
 - c) Write a short note on:
 - i) A,B and M mode of ultrasound
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Section – II

- Q.4 Attempt any four of the following questions. 16**
- a) Differentiate between computed radiography and digital radiography.
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 - d) List various medical applications of endoscopy equipment.
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Set **R**

T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) _____ is the smallest detectable contrast for a given detail size that can be shown by the imaging system with different intensity.

a) Dynamic range	b) MTF
c) DQE	d) Contrast resolution
- 2) B scanning of _____ objects gives 2 D images that allows assessment of size.

a) dynamic	b) static
c) real time	d) parallel
- 3) Characteristic impedance is the specific impedance of a medium is defined as the product of _____ of the medium with the velocity of sound.

a) intensity	b) resolution
c) density	d) wavelength
- 4) The CT number of a tissue indicates _____ of that tissue.

a) adsorption	b) radiation
c) scattering	d) absorption
- 5) In CT scan X ray source and detectors are mounted _____ each other in a rigid gantry.

a) opposite	b) diagonal
c) parallel	d) series
- 6) Grids are placed between the patients and _____ for absorbing scattered radiation.

a) collimator	b) Patient table
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- 9) The _____ factor of a ultrasound transducer determines its frequency characteristics.
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| a) Intensity | b) Impedance |
| c) radiation | d) Q |
- 10) *Depth of penetration* = $\frac{\text{Velocity of sound in the medium} \times \text{---}}{2}$
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|---------------|---------|
| a) Intensity | b) Q |
| c) absorption | d) Time |
- 11) The infrared region of the electromagnetic spectrum is usually taken as _____.
- | | |
|---------|---------|
| a) 0.77 | b) 0.80 |
| c) 1000 | d) 1.5 |
- 12) _____ expresses incident energy of X ray radiation.
- | | |
|-------------|--------|
| a) REM | b) Rad |
| c) Rontegen | d) KeV |
- 13) The Xray in medical diagnostics region have wavelength of the order of _____.
- | | |
|-----------------|----------------|
| a) $10^{-10}m$ | b) $10^{-12}m$ |
| c) $10^{-16}am$ | d) $10^{10}cm$ |
- 14) The dynamic range of a detector is the range from minimum to maximum radiation _____.
- | | |
|---------------|-------------|
| a) Intensity | b) Contrast |
| c) resolution | d) Exposure |

Seat No.	
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Set

R

T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Monday, 25-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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Section – I

- Q.2 Attempt any four of the following questions. 16**
- a) Define continuous wave and pulsed wave Doppler ultrasound techniques.
 - b) Define characteristic impedance of ultrasound waves and mention it's any 4 characteristics.
 - c) Explain working of X ray image intensifier.
 - d) Draw and explain construction of ultrasound transducer.
 - e) Explain types and construction of various X ray anodes.
- Q.3 Attempt any two of the following questions. 12**
- a) Explain various types of X rays film development techniques along with beam limiting devices.
 - b) Explain the working of dual and triple field intensifier with their medical applications.
 - c) Write a short note on:
 - i) A,B and M mode of ultrasound
 - ii) production of X rays

Section – II

- Q.4 Attempt any four of the following questions. 16**
- a) Differentiate between computed radiography and digital radiography.
 - b) Explain the working digital mammography and mention its applications.
 - c) Explain the basic physics behind thermograph technique.
 - d) List various medical applications of endoscopy equipment.
 - e) Explain working of gas filled detector and mention its significance.
- Q.5 Attempt any two of the following questions. 12**
- a) List various medical applications of endoscopy.
 - b) Explain block diagram and working of thermographic machine.
 - c) Define CT number and describe second and fourth generation of CT scans.

Seat No.	
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T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Monday, 25-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) Grids are placed between the patients and _____ for absorbing scattered radiation.

a) collimator	b) Patient table
c) film	d) power supply
- 2) Heel effect states that the intensity of Xray beam is not _____ throughout all portions of the beam.

a) uniform	b) Standard
c) small	d) Large
- 3) Ultrasound travels at a velocity of about _____ in the soft tissues of the body.

a) 155 m/s	b) 1500 m/s
c) 15000 m/s	d) 1155 m/s
- 4) The _____ factor of a ultrasound transducer determines its frequency characteristics.

a) Intensity	b) Impedance
c) radiation	d) Q
- 5) $Depth\ of\ penetration = \frac{Velocity\ of\ sound\ in\ the\ medium \times \dots}{2}$

a) Intensity	b) Q
c) absorption	d) Time
- 6) The infrared region of the electromagnetic spectrum is usually taken as _____.

a) 0.77	b) 0.80
c) 1000	d) 1.5
- 7) _____ expresses incident energy of X ray radiation.

a) REM	b) Rad
c) Rontegen	d) KeV
- 8) The Xray in medical diagnostics region have wavelength of the order of _____.

a) $10^{-10}m$	b) $10^{-12}m$
c) $10^{-16}am$	d) $10^{10}cm$

Seat No.	
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Set

S

T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Monday, 25-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

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- a) Define continuous wave and pulsed wave Doppler ultrasound techniques.
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 - b) Explain the working of dual and triple field intensifier with their medical applications.
 - c) Write a short note on:
 - i) A,B and M mode of ultrasound
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Section – II

- Q.4 Attempt any four of the following questions. 16**
- a) Differentiate between computed radiography and digital radiography.
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Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
FEEDBACK CONTROL SYSTEM

Day & Date: Tuesday, 26-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Root locus specifies the movement of closed loop poles especially when the gain of systems _____.
 - a) Remains constant
 - b) Exhibit variations
 - c) Gives zero feedback
 - d) Gives infinite poles
- 2) _____ condition is used to verify the existence of a particular point on the root locus.
 - a) Amplitude
 - b) Frequency
 - c) Magnitude
 - d) Angle
- 3) The magnitude & phase relationship between _____ input and the steady state output is called as frequency domain.
 - a) Step
 - b) Ramp
 - c) Sinusoidal
 - d) Parabolic
- 4) _____ is the value of steady state error in closed loop control systems.
 - a) Zero
 - b) Unity
 - c) Infinity
 - d) Unpredictable
- 5) Associative law for summing point is applicable only to those summing points which are _____ connected to each other.
 - a) Directly
 - b) Indirectly
 - c) Orthogonally
 - d) Diagonally
- 6) In a signal flow graph method, _____ is an overall transfer function of a system obtained.
 - a) Poisson's equation
 - b) Block diagram reduction rules
 - c) Mason's equation
 - d) Lagrange's equation
- 7) Type 0 systems are unsuitable _____.
 - a) For ramp inputs
 - b) If the input is parabolic in nature
 - c) Both a and b
 - d) None of the above
- 8) In accordance to relative stability, the settling time exhibits inversely proportional nature to _____ parts of roots.
 - a) Real positive
 - b) Real negative
 - c) Imaginary positive
 - d) Imaginary negative

Seat No.	
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**T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
FEEDBACK CONTROL SYSTEM**

Day & Date: Tuesday, 26-11-2019
Time: 10:00 AM To 01:00 PM

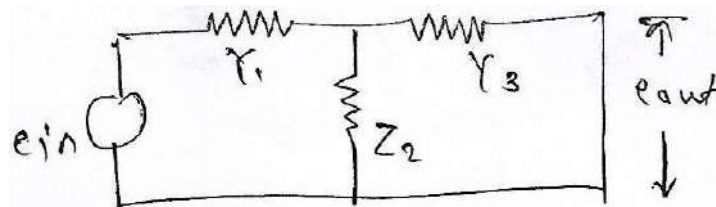
Max. Marks: 56

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Section – I

Q.2 Attempt any four questions. 16

- Differentiate between translational system and rotational system with an example.
- Construct a signal flow graph for simple given electrical network.

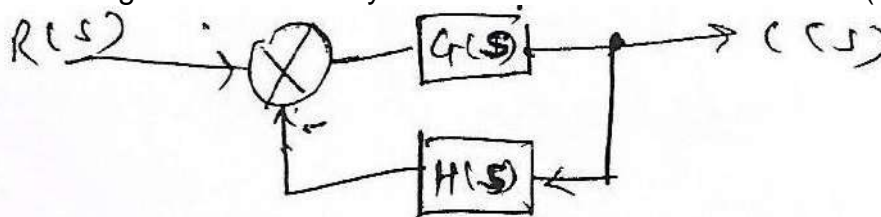


- Find the impulse response of following system

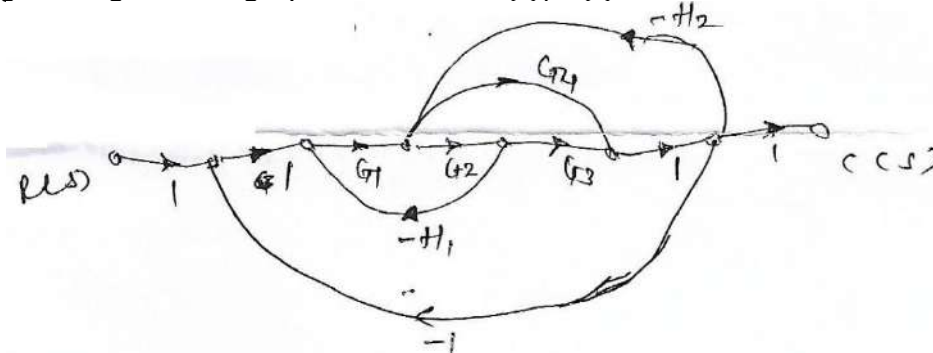
$$\frac{C(s)}{R(s)} = \frac{6(s+3)}{(s+8)(s^2+4s+8)}$$
- Explain Mason's gain formula with an example.
- With the help of diagram define various time response specification.

Q.3 Attempt any two questions. 12

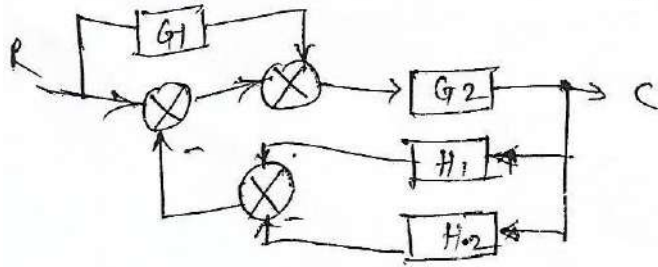
- For given a negative feedback system evaluate the error function $E(S) / R(S)$



- For given signal flow graph determine $Y(s)/X(s)$ transfer function.



c) Obtain the transfer function C/R for given block diagram.

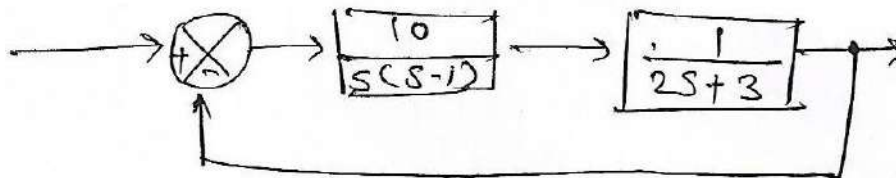


Section - II

Q.4 Attempt any four questions.

16

- a) With the help of neat diagram explain working of tachogenerators.
- b) State and explain Routh Hurwitz stability criterion.
- c) For given system find whether the system is stable a not:



- d) List the steps for drawing Bode plots.
- e) Define and differentiate between gain margin and phase margin.

Q.5 Attempt any two questions.

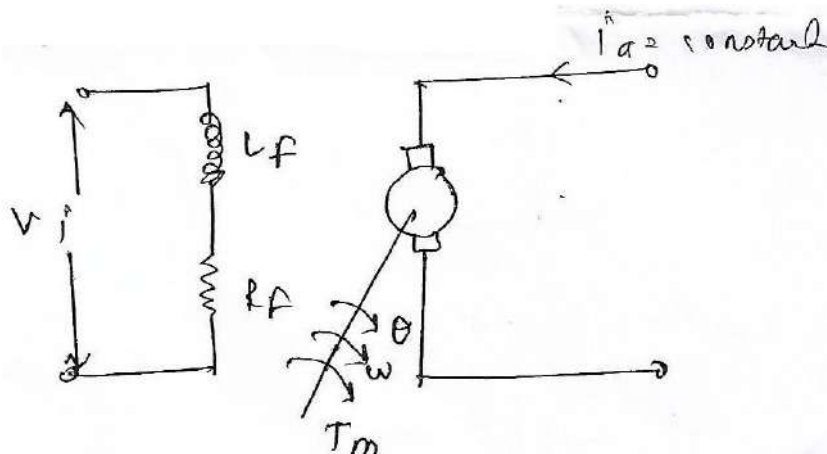
12

- a) The characteristic equation of a control system is $s^4 + ks^3 + 2s^2 + s + 3 = 0$. Show that for no value of 'k' the system is stable.
- b) The open loop transfer function of system is given by

$$G(s).H(s) = \frac{k(s + 12)}{s^2(s + 20)}$$

Sketch voot focus for the system.

- c) Calculate state model of a field controlled motor as shows below:



Seat No.	
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Set **Q**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
FEEDBACK CONTROL SYSTEM

Day & Date: Tuesday, 26-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) In accordance to relative stability, the settling time exhibits inversely proportional nature to _____ parts of roots.
 - a) Real positive
 - b) Real negative
 - c) Imaginary positive
 - d) Imaginary negative
- 2) In Routh array, if zero is found in the first column, then by which term it needs to be replaced?
 - a) δ
 - b) η
 - c) σ
 - d) ε
- 3) _____ point on root locus specifies the meeting or collision of two poles.
 - a) Centroid
 - b) Break away Point
 - c) Stability point
 - d) Anti-break point
- 4) If a pole is located at origin, it get represented on the magnitude plot As _____.
 - a) $-10 \log(\omega) \text{Db}$
 - b) $-20 \log(\omega) \text{DB}$
 - c) $-40 \log(\omega) \text{dB}$
 - d) $-60 \log(\omega) \text{dB}$
- 5) _____ among the following are the elements of rotational motion.
 - a) Mass, Spring, Friction
 - b) Inertia, Damper, Spring
 - c) Work, Energy, Power
 - d) Force, Pressure, Viscosity
- 6) In signal flow graph, the product of all _____ gains while going through a forward path is known as 'Path gain'.
 - a) Branch
 - b) Path
 - c) Node
 - d) Loop
- 7) The system is said to be marginally stable, if gain margin is _____.
 - a) 0
 - b) 1
 - c) $+\infty$
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Seat No.	
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Set	Q
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**T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
FEEDBACK CONTROL SYSTEM**

Day & Date: Tuesday, 26-11-2019
Time: 10:00 AM To 01:00 PM

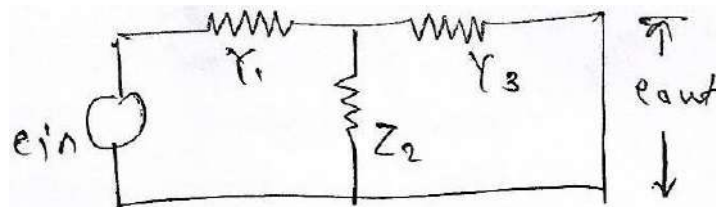
Max. Marks: 56

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Section – I

Q.2 Attempt any four questions. **16**

- Differentiate between translational system and rotational system with an example.
- Construct a signal flow graph for simple given electrical network.

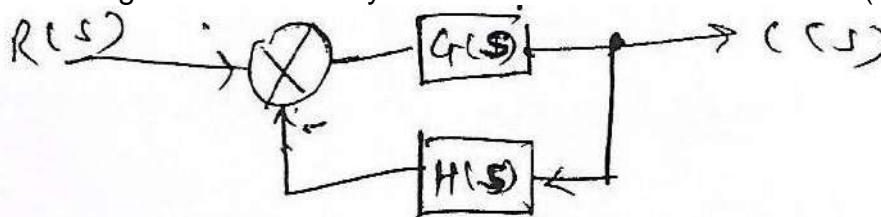


- Find the impulse response of following system

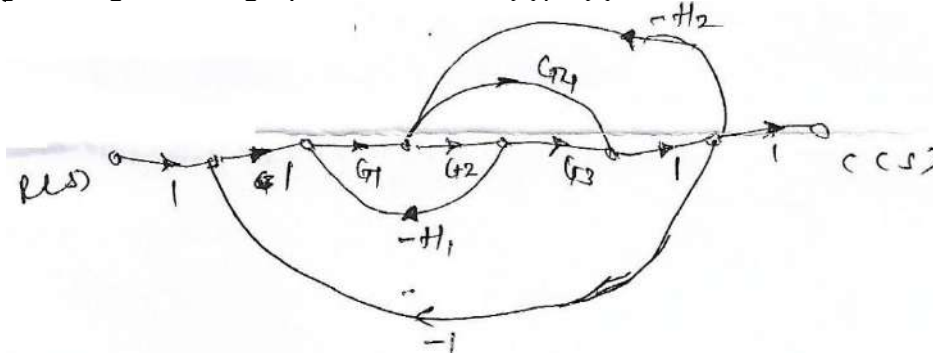
$$\frac{C(s)}{R(s)} = \frac{6(s+3)}{(s+8)(s^2+4s+8)}$$
- Explain Mason's gain formula with an example.
- With the help of diagram define various time response specification.

Q.3 Attempt any two questions. **12**

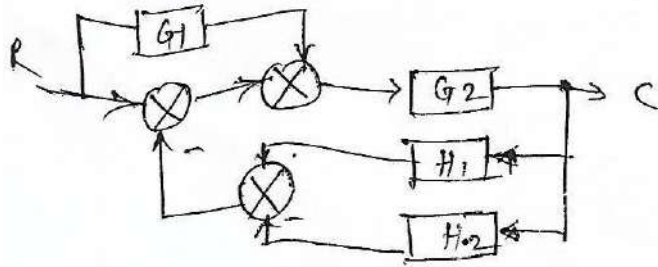
- For given a negative feedback system evaluate the error function $E(S) / R(S)$



- For given signal flow graph determine $Y(s)/X(s)$ transfer function.



- c) Obtain the transfer function C/R for given block diagram.

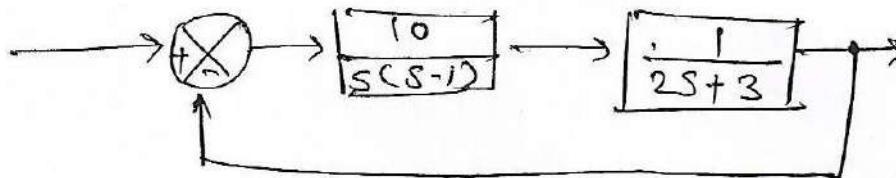


Section - II

Q.4 Attempt any four questions.

16

- With the help of neat diagram explain working of tachogenerators.
- State and explain Routh Hurwitz stability criterion.
- For given system find whether the system is stable a not:



- List the steps for drawing Bode plots.
- Define and differentiate between gain margin and phase margin.

Q.5 Attempt any two questions.

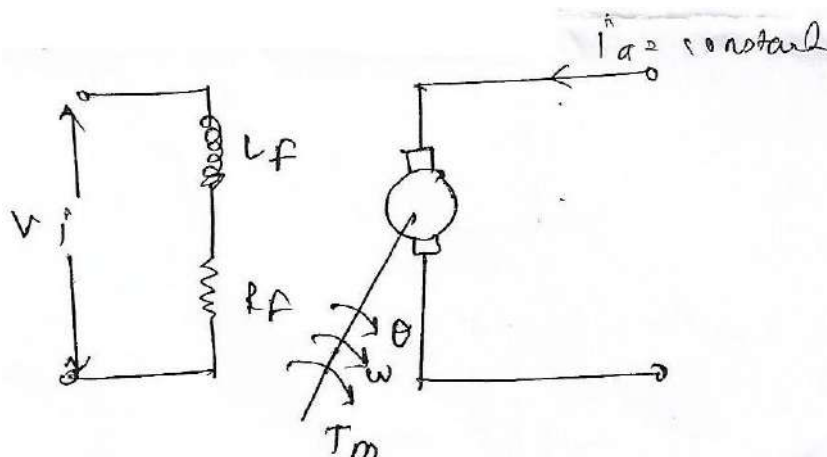
12

- The characteristic equation of a control system is $s^4 + ks^3 + 2s^2 + s + 3 = 0$. Show that for no value of 'k' the system is stable.
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$$G(s).H(s) = \frac{k(s + 12)}{s^2(s + 20)}$$

Sketch voot focus for the system.

- Calculate state model of a field controlled motor as shows below:



Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
FEEDBACK CONTROL SYSTEM

Day & Date: Tuesday, 26-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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**T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
FEEDBACK CONTROL SYSTEM**

Day & Date: Tuesday, 26-11-2019
Time: 10:00 AM To 01:00 PM

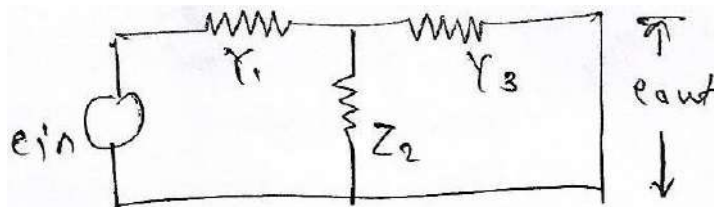
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Section – I

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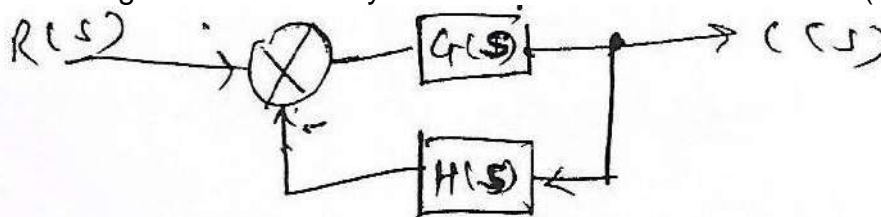


- Find the impulse response of following system

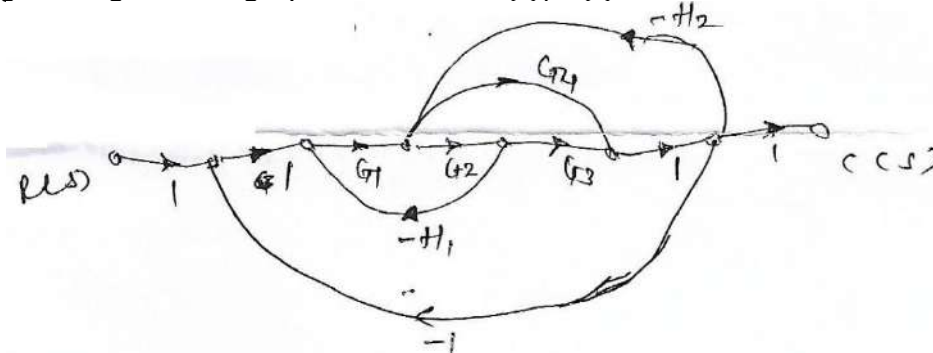
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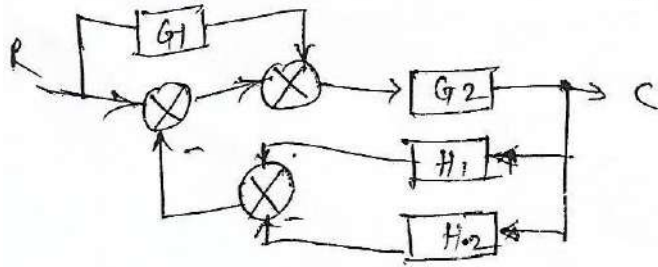
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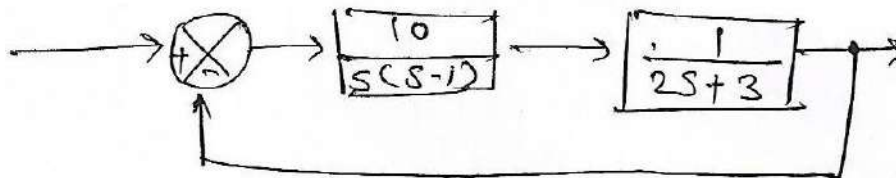


Section - II

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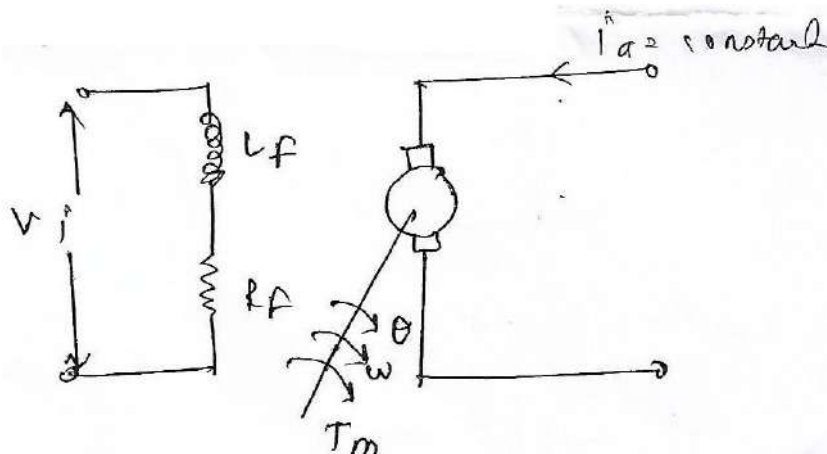
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
FEEDBACK CONTROL SYSTEM

Day & Date: Tuesday, 26-11-2019
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Duration: 30 Minutes

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**T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
FEEDBACK CONTROL SYSTEM**

Day & Date: Tuesday, 26-11-2019
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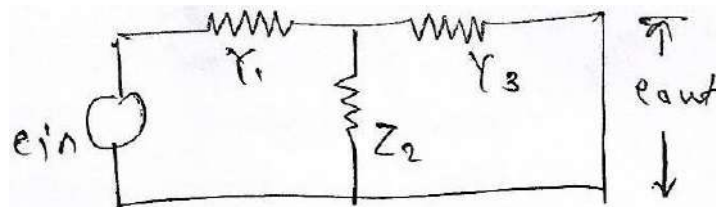
Max. Marks: 56

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Section – I

Q.2 Attempt any four questions. **16**

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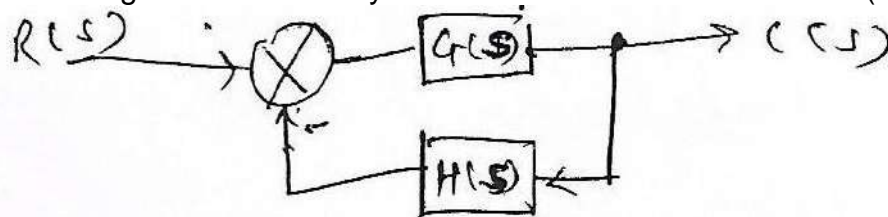


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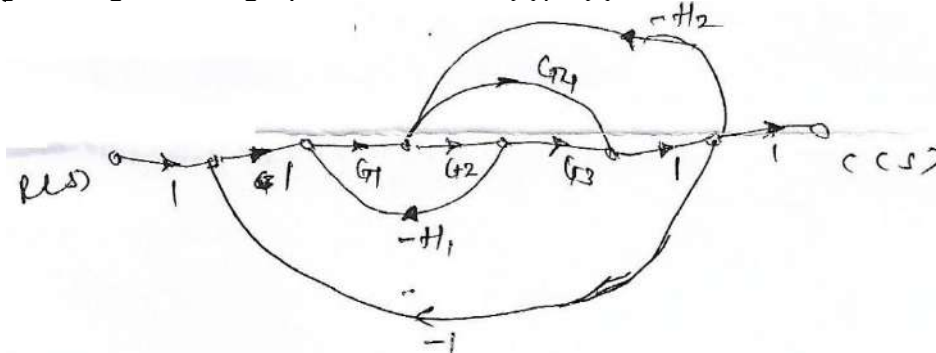
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- Explain Mason's gain formula with an example.
- With the help of diagram define various time response specification.

Q.3 Attempt any two questions. **12**

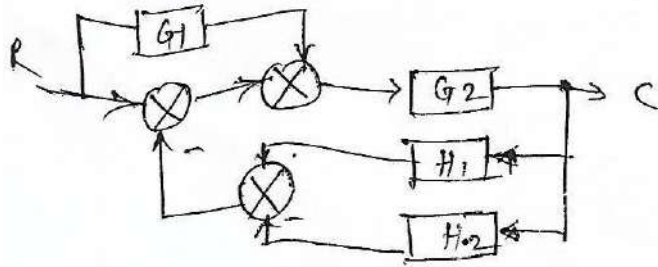
- For given a negative feedback system evaluate the error function $E(S) / R(S)$



- For given signal flow graph determine $Y(s)/X(s)$ transfer function.



- c) Obtain the transfer function C/R for given block diagram.

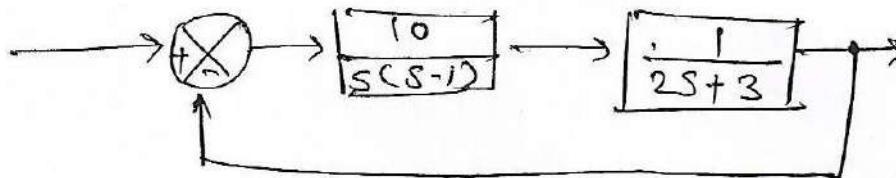


Section - II

Q.4 Attempt any four questions.

16

- With the help of neat diagram explain working of tachogenerators.
- State and explain Routh Hurwitz stability criterion.
- For given system find whether the system is stable a not:



- List the steps for drawing Bode plots.
- Define and differentiate between gain margin and phase margin.

Q.5 Attempt any two questions.

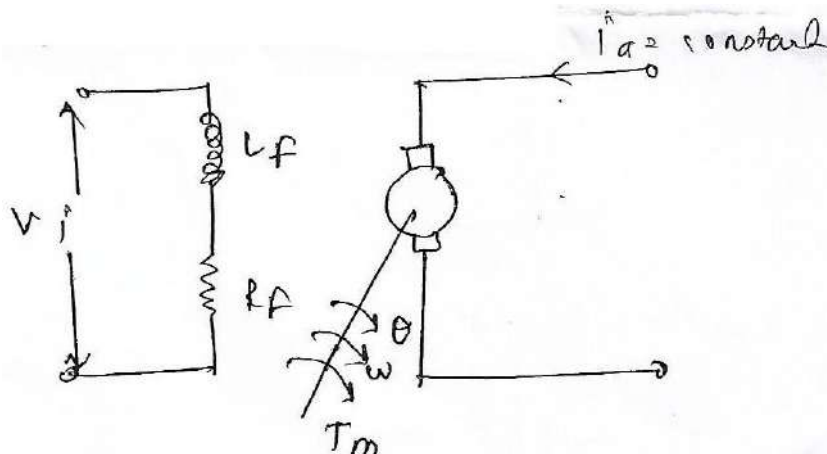
12

- The characteristic equation of a control system is $s^4 + ks^3 + 2s^2 + s + 3 = 0$. Show that for no value of 'k' the system is stable.
- The open loop transfer function of system is given by

$$G(s).H(s) = \frac{k(s + 12)}{s^2(s + 20)}$$

Sketch voot focus for the system.

- Calculate state model of a field controlled motor as shows below:



Seat No.	
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Set **P**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate maximum marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) How is the nature of instructions size in CISC processor?
 - a) Fixed
 - b) Variable
 - c) Both a and b
 - d) None
- 2) What does an IC that initiate or enable the data transfer on bus can be regarded as in accordance to the I2C protocol specifications?
 - a) Bus Master
 - b) Bus Slave
 - c) Bus Drives
 - d) Bus Data Carries
- 3) In the branch instructions of ARM, what does the mnemonic BVC imply _____.
 - a) Overflow Set
 - b) Carry Set
 - c) Carry Clear
 - d) Overflow Clear
- 4) What is the size range of the alphanumeric LCDs?
 - a) 1 to 8 characters
 - b) 8 to 80 characters
 - c) 100 to 150 characters
 - d) 250 to 400 characters
- 5) What is the directional nature of two wires SDA and SCL usually adopted in I2C bus for? carrying the information between the devices?
 - a) Unidirectional
 - b) Bidirectional
 - c) Multidirectional
 - d) None
- 6) Which of the following instructions are called Program Status Register transfer instructions?
 - a) LDR, STR
 - b) LDM, STM
 - c) MCR, MRC
 - d) MSR, MRS
- 7) Instructions used to multiply R5 contents by R4 and to store the result into R6 is called _____.
 - a) MUL R6, R5, LSL #2
 - b) MUL R6, R5, R4
 - c) MUL R6, R5, LSR #2
 - d) None
- 8) Processor must accept and process frame before next frame arrives, typically called _____.
 - a) Hard real-time system
 - b) Real-time constraints
 - c) Real-data constraints
 - d) Soft real-time system

- 9) Scheduling of tasks is a very important consideration in RTOS. Which of the following best described the best scheduling policy design?
- a) The scheduler must follow a pre-emptive policy
 - b) The scheduler must not use a pre-emptive policy option
 - c) The scheduler must not only use a pre-emptive policy options with the priority consideration
 - d) The scheduler must not use a pre-emptive policy options, but must employ priority consideration.
- 10) Time required to synchronous switch from the context of one thread to the context of another thread is called _____.
- a) Thread fly-back time
 - b) Jitter
 - c) Context switching time
 - d) None
- 11) What are the two types of semaphores?
- a) Digital semaphores and binary semaphores
 - b) Analog semaphores and octal semaphores
 - c) Counting semaphores and binary semaphores
 - d) Critical semaphores and System semaphores
- 12) Which of the following is NOT a valid deadlock prevention scheme?
- a) Release all resources before requesting a new resource
 - b) Number the resources uniquely and never request a lower numbered resources than the last one requested.
 - c) Never request a resource after releasing any resource
 - d) Request and all required resources be allocated before execution.
- 13) Consider a set of n tasks with known run times $r_1, r_2 \dots r_n$ to be run on a uniprocessor machine. Which of the following processor scheduling algorithms will result in the maximum throughput?
- a) Round-Robin
 - b) Shortest-Job-First
 - c) Highest-Response-Ratio-Next
 - d) First-Come-First-Served
- 14) What will happen if a non-recursive mutex is locked more than once?
- a) Starvation
 - b) Deadlock
 - c) Aging
 - d) Signaling

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four of the following questions. 16**
- a) Define and classify embedded system with examples.
 - b) Explain with a neat dia of ARM dataflow model.
 - c) Explain in detail bus architecture of ARM processor.
 - d) Explain load- store instruction of ARM processor with an example.
 - e) Explain in detail different modes of operation of ARM.
- Q.3 Attempt any two of the following questions. 12**
- a) Explain the CAN communication protocol with a data format.
 - b) Explain the following.
 - 1) CPRS register
 - 2) RTC
 - c) Explain the following instruction with example.
 - 1) ASR
 - 2) EOR
 - 3) MLA

Section – II

- Q.4 Attempt any four of the following questions. 16**
- a) Write and explain different types of memory devices used in embedded system also explain the selection process of memory with example.
 - b) What is kernel? Explain the architectures of kernel in detail.
 - c) Explain need and advantages of embedded C programs in embedded system.
 - d) What is RTOS? Compare conventional OS with RTOS.
 - e) Define task. Draw and Explain different states of task with fig.
- Q.5 Attempt any two of the following questions. 12**
- a) Draw and explain the interfacing of matrix keypad with embedded system also write the program for the same.
 - b) Explain with neat dia the function of DMA.
 - c) Explain the followings.
 - 1) Semaphores
 - 2) Mailbox

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate maximum marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Processor must accept and process frame before next frame arrives, typically called _____.
 - a) Hard real-time system
 - b) Real-time constraints
 - c) Real-data constraints
 - d) Soft real-time system
- 2) Scheduling of tasks is a very important consideration in RTOS. Which of the following best described the best scheduling policy design?
 - a) The scheduler must follow a pre-emptive policy
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- 5) Which of the following is NOT a valid deadlock prevention scheme?
 - a) Release all resources before requesting a new resource
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Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

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Section – II

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 - 2) Mailbox

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No.

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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- 1) What is the directional nature of two wires SDA and SCL usually adopted in I2C bus for? carrying the information between the devices?
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 - c) Multidirectional
 - d) None
- 2) Which of the following instructions are called Program Status Register transfer instructions?
 - a) LDR, STR
 - b) LDM, STM
 - c) MCR, MRC
 - d) MSR, MRS
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 - b) MUL R6, R5, R4
 - c) MUL R6, R5, LSR #2
 - d) None
- 4) Processor must accept and process frame before next frame arrives, typically called _____.
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 - c) Real-data constraints
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- a) Overflow Set
 - b) Carry Set
 - c) Carry Clear
 - d) Overflow Clear
- 14) What is the size range of the alphanumeric LCDs?
- a) 1 to 8 characters
 - b) 8 to 80 characters
 - c) 100 to 150 characters
 - d) 250 to 400 characters

Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four of the following questions. 16**
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 - 2) EOR
 - 3) MLA

Section – II

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Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

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- 4) Consider a set of n tasks with known run times r₁, r₂ ... r_n to be run on a uniprocessor machine. Which of the following processor scheduling algorithms will result in the maximum throughput?
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- 9) What is the size range of the alphanumeric LCDs?
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 - d) None
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- 12) Instructions used to multiply R5 contents by R4 and to store the result into R6 is called _____.
- a) MUL R6, R5, LSL #2
 - b) MUL R6, R5, R4
 - c) MUL R6, R5, LSR #2
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- 13) Processor must accept and process frame before next frame arrives, typically called _____.
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Seat No.	
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four of the following questions. 16**
- a) Define and classify embedded system with examples.
 - b) Explain with a neat dia of ARM dataflow model.
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 - d) Explain load- store instruction of ARM processor with an example.
 - e) Explain in detail different modes of operation of ARM.
- Q.3 Attempt any two of the following questions. 12**
- a) Explain the CAN communication protocol with a data format.
 - b) Explain the following.
 - 1) CPRS register
 - 2) RTC
 - c) Explain the following instruction with example.
 - 1) ASR
 - 2) EOR
 - 3) MLA

Section – II

- Q.4 Attempt any four of the following questions. 16**
- a) Write and explain different types of memory devices used in embedded system also explain the selection process of memory with example.
 - b) What is kernel? Explain the architectures of kernel in detail.
 - c) Explain need and advantages of embedded C programs in embedded system.
 - d) What is RTOS? Compare conventional OS with RTOS.
 - e) Define task. Draw and Explain different states of task with fig.
- Q.5 Attempt any two of the following questions. 12**
- a) Draw and explain the interfacing of matrix keypad with embedded system also write the program for the same.
 - b) Explain with neat dia the function of DMA.
 - c) Explain the followings.
 - 1) Semaphores
 - 2) Mailbox

- 10) BTR stands for _____.
- a) Bed Turnover Rate
 - b) Blood Transfer Report
 - c) Bank Transfer Report
 - d) Bed Transfer Report

Seat No.	
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Set P

**T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT**

Day & Date: Thursday, 28-11-2019
Time: 10:00 AM To 12:00 PM

Max. Marks: 40

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

Q.2 Answer any Four of the following questions. 40

- a) What is Hospital administration? Explain in detail the challenges in hospital administration.
- b) Enlist different department of hospital. Explain in detail any two departments with respect to functions, major instrument and man power requirement.
- c) Give a brief of
 - 1) waste disposal
 - 2) Sterilization of surgical tools
- d) 1) Write and explain in detail the design of radiological department in hospital.
2) Describe the classification of hospital equipment's and their maintenance planning procedure.
- e) Write a note on
 - 1) ISO and NABA certification
 - 2) WTO and its implication
- f) Define medical audit? Explain in detail the pre requisite and steps to conduct medical audit.
- g) 1) State the types, objective and function of OPD services in hospitals.
2) Write in detail about the planning and designing guidelines for hospital.

Seat No.	
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Set **Q**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Thursday, 28-11-2019
 Time: 10:00 AM To 12:00 PM

Max. Marks: 50

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes

Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

- 1) Audit gives details about _____ to account payable system.
 - a) Account balance
 - b) Transaction
 - c) Expenditure
 - d) All above
- 2) _____ details are given by management to marketing service system.
 - a) Customer
 - b) Employee
 - c) Supplier
 - d) None
- 3) A hospital required to check and understand the applicability of the standard clauses for the institution. In India, all the hospital have been certified for _____.
 - a) ISO 9000
 - b) ISO 9001
 - c) ISO 9002
 - d) ISO 9003
- 4) The total process of collecting, handling packing storage transportation and final treatment of waste is called _____.
 - a) Sewage
 - b) Disposal of hospital waste
 - c) Dustbin
 - d) None
- 5) BTR stands for _____.
 - a) Bed Turnover Rate
 - b) Blood Transfer Report
 - c) Bank Transfer Report
 - d) Bed Transfer Report
- 6) CSSD is included in _____.
 - a) Line services
 - b) Supportive services
 - c) Auxiliary services
 - d) All above
- 7) Most of the surgical equipment's are sterilizes using _____.
 - a) Dry heat
 - b) Ethylene gas
 - c) Moist heat
 - d) None
- 8) Supportive services of the hospital includes all except _____.
 - a) Pharmacy services
 - b) Laboratory services
 - c) Housekeeping services
 - d) Laundry services
- 9) As norm of planning purpose, the average number of patients expected to visit the OPD daily are _____.
 - a) 2 for every authorized bed
 - b) 5 for every authorizes bed
 - c) 10 for every authorized bed
 - d) 10 for every 100 authorized bed

Seat No.	
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Set	Q
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**T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT**

Day & Date: Thursday, 28-11-2019
Time: 10:00 AM To 12:00 PM

Max. Marks: 40

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

Q.2 Answer any Four of the following questions. 40

- a) What is Hospital administration? Explain in detail the challenges in hospital administration.
- b) Enlist different department of hospital. Explain in detail any two departments with respect to functions, major instrument and man power requirement.
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 - 1) waste disposal
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2) Write in detail about the planning and designing guidelines for hospital.

Seat No.	
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Set **R**

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Thursday, 28-11-2019
 Time: 10:00 AM To 12:00 PM

Max. Marks: 50

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 20 Minutes

Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

- 1) The total process of collecting, handling packing storage transportation and final treatment of waste is called _____.
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 b) Disposal of hospital waste
 c) Dustbin
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- 2) BTR stands for _____.
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 a) Dry heat
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 c) Moist heat
 d) None
- 5) Supportive services of the hospital includes all except _____.
 a) Pharmacy services
 b) Laboratory services
 c) Housekeeping services
 d) Laundry services
- 6) As norm of planning purpose, the average number of patients expected to visit the OPD daily are _____.
 a) 2 for every authorized bed
 b) 5 for every authorizes bed
 c) 10 for every authorized bed
 d) 10 for every 100 authorized bed
- 7) The operation theater consists of _____.
 a) 8 Zones
 b) 6 Zones
 c) 4 Zones
 d) 2 Zones
- 8) Audit gives details about _____ to account payable system.
 a) Account balance
 b) Transaction
 c) Expenditure
 d) All above
- 9) _____ details are given by management to marketing service system.
 a) Customer
 b) Employee
 c) Supplier
 d) None

- 10) A hospital required to check and understand the applicability of the standard clauses for the institution. In India, all the hospital have been certified for _____.
- | | |
|-------------|-------------|
| a) ISO 9000 | b) ISO 9001 |
| c) ISO 9002 | d) ISO 9003 |

Seat No.	
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Set	R
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Thursday, 28-11-2019
Time: 10:00 AM To 12:00 PM

Max. Marks: 40

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

Q.2 Answer any Four of the following questions. 40

- a) What is Hospital administration? Explain in detail the challenges in hospital administration.
- b) Enlist different department of hospital. Explain in detail any two departments with respect to functions, major instrument and man power requirement.
- c) Give a brief of
 - 1) waste disposal
 - 2) Sterilization of surgical tools
- d) 1) Write and explain in detail the design of radiological department in hospital.
2) Describe the classification of hospital equipment's and their maintenance planning procedure.
- e) Write a note on
 - 1) ISO and NABA certification
 - 2) WTO and its implication
- f) Define medical audit? Explain in detail the pre requisite and steps to conduct medical audit.
- g) 1) State the types, objective and function of OPD services in hospitals.
2) Write in detail about the planning and designing guidelines for hospital.

Seat No.	
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Set	S
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T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Thursday, 28-11-2019
 Time: 10:00 AM To 12:00 PM

Max. Marks: 50

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 20 Minutes

Marks: 10

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

- 1) Supportive services of the hospital includes all except _____.
 a) Pharmacy services b) Laboratory services
 c) Housekeeping services d) Laundry services
- 2) As norm of planning purpose, the average number of patients expected to visit the OPD daily are _____.
 a) 2 for every authorized bed
 b) 5 for every authorizes bed
 c) 10 for every authorized bed
 d) 10 for every 100 authorized bed
- 3) The operation theater consists of _____.
 a) 8 Zones b) 6 Zones
 c) 4 Zones d) 2 Zones
- 4) Audit gives details about _____ to account payable system.
 a) Account balance b) Transaction
 c) Expenditure d) All above
- 5) _____ details are given by management to marketing service system.
 a) Customer b) Employee
 c) Supplier d) None
- 6) A hospital required to check and understand the applicability of the standard clauses for the institution. In India, all the hospital have been certified for _____.
 a) ISO 9000 b) ISO 9001
 c) ISO 9002 d) ISO 9003
- 7) The total process of collecting, handling packing storage transportation and final treatment of waste is called _____.
 a) Sewage b) Disposal of hospital waste
 c) Dustbin d) None
- 8) BTR stands for _____.
 a) Bed Turnover Rate b) Blood Transfer Report
 c) Bank Transfer Report d) Bed Transfer Report
- 9) CSSD is included in _____.
 a) Line services b) Supportive services
 c) Auxiliary services d) All above

- 10) Most of the surgical equipment's are sterilizes using _____.
- a) Dry heat
 - b) Ethylene gas
 - c) Moist heat
 - d) None

Seat No.	
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Set S

**T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT**

Day & Date: Thursday, 28-11-2019
Time: 10:00 AM To 12:00 PM

Max. Marks: 40

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

Q.2 Answer any Four of the following questions. 40

- a) What is Hospital administration? Explain in detail the challenges in hospital administration.
- b) Enlist different department of hospital. Explain in detail any two departments with respect to functions, major instrument and man power requirement.
- c) Give a brief of
 - 1) waste disposal
 - 2) Sterilization of surgical tools
- d)
 - 1) Write and explain in detail the design of radiological department in hospital.
 - 2) Describe the classification of hospital equipment's and their maintenance planning procedure.
- e) Write a note on
 - 1) ISO and NABA certification
 - 2) WTO and its implication
- f) Define medical audit? Explain in detail the pre requisite and steps to conduct medical audit.
- g)
 - 1) State the types, objective and function of OPD services in hospitals.
 - 2) Write in detail about the planning and designing guidelines for hospital.

Seat No.	
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Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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

- 1) The foetal heart rate is computed from the foetal ECG by appropriately shaping _____ wave.

a) R	b) P
c) QRS	d) T
- 2) The _____ cycle is accomplished by changes in the thoracic volume.

a) pulse rate	b) Cardiac
c) ECG	d) Respiratory
- 3) The Doppler frequency shift is a measure of the size and direction of _____.

a) flow velocity	b) flow quantity
c) platelets flow	d) RBC's flow
- 4) In multichannel telemetry the number of _____ used is the same as the number of signals to be transmitted.

a) carriers	b) subcarriers
c) frequencies	d) signals
- 5) _____ shock is experienced by the subject by an accidental contact with the electrical wiring at any point on the surface of the body.

a) micro	b) hold on
c) gross	d) leakage
- 6) At current of the order _____ causes temporary respiratory paralysis.

a) 16 mili amp	b) 10 mili amp
c) 1 A	d) 6A
- 7) Ground resistance can be measured by passing up to 1A current through the _____.

a) neutral line	b) ground line
c) power line	d) transformer line
- 8) Einthoven postulated that at any given instant of the cardiac cycle, the electrical axis of the heart can be represented as a _____ dimensional vector.

a) Linear	b) three
c) 1	d) 2

- 9) Principle of Rheographic detection is base on detection of _____.
a) brachial artery b) arterial pulse
c) cardiac output d) respiratory rate
- 10) T wave of ECG represents electrical activity associated with _____.
a) depolarization of atria b) repolarization of atria
c) depolarization of ventricles d) repolarization of both ventricles
- 11) EEG waveform delta range varies from _____ Hz.
a) 0.5-4 b) 4-8
c) 8-13 d) 22-30
- 12) The heart sounds are produced by _____ events that occur during the cardiac cycle.
a) mechanical b) electrical
c) circulation d) chemical
- 13) The pulse pressure and waveforms are indicators for blood pressure and _____.
a) velocity b) position
c) flow d) oxygen saturation
- 14) Ventricular ectopic beats result in an abnormal _____ sequence of ECG.
a) repolarization b) depolarization
c) bradycardia d) tachycardia

Seat No.	
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Set	P
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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four questions. 16**
- a) Differentiate between action potential generation between nerve muscle and cardiac muscle.
 - b) Explain various methods of measuring human body temperature.
 - c) Define and explain various types of heart sounds with neat figures.
 - d) List various direct and indirect blood pressure measurement techniques and explain any one indirect method.
 - e) Design an instrumentation amplifier for amplifying EMG signal.
- Q.3 Attempt any two questions. 12**
- a) Explain principle of Einthoven's triangle and draw ECG waveforms for 12 leads.
 - b) Explain 10-20 electrode placement of EEG and draw various EEG wave patterns.
 - c) Explain the need and working of ambulatory monitoring system.

Section – II

- Q.4 Attempt any four questions. 16**
- a) Explain the foetal scalp pH measurement technique with its significance.
 - b) Explain the effect of various ranges of currents on human body.
 - c) Draw and explain working of ECG telemetry transmitter and receiver.
 - d) Explain block diagram and working of abdominal foetal electrocardiogram processing circuit.
 - e) Define leakage currents and explain its various types.
- Q.5 Attempt any two questions. 12**
- a) Draw and explain block diagram of ultrasonic Doppler shift based FHR measuring circuit.
 - b) Draw and explain block diagram of EMG biofeedback technique.
 - c) Explain block diagram and working of a radio telemetry capsule.

Seat No.	
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Set **Q**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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

- 1) Einthoven postulated that at any given instant of the cardiac cycle, the electrical axis of the heart can be represented as a _____ dimensional vector.
 - a) Linear
 - b) Three
 - c) 1
 - d) 2
- 2) Principle of Rheographic detection is base on detection of _____.
 - a) brachial artery
 - b) arterial pulse
 - c) cardiac output
 - d) respiratory rate
- 3) T wave of ECG represents electrical activity associated with _____.
 - a) depolarization of atria
 - b) repolarization of atria
 - c) depolarization of ventricles
 - d) repolarization of both ventricles
- 4) EEG waveform delta range varies from _____ Hz.
 - a) 0.5-4
 - b) 4-8
 - c) 8-13
 - d) 22-30
- 5) The heart sounds are produced by _____ events that occur during the cardiac cycle.
 - a) mechanical
 - b) electrical
 - c) circulation
 - d) chemical
- 6) The pulse pressure and waveforms are indicators for blood pressure and _____.
 - a) velocity
 - b) position
 - c) flow
 - d) oxygen saturation
- 7) Ventricular ectopic beats result in an abnormal _____ sequence of ECG.
 - a) repolarization
 - b) depolarization
 - c) bradycardia
 - d) tachycardia
- 8) The foetal heart rate is computed from the foetal ECG by appropriately shaping _____ wave.
 - a) R
 - b) P
 - c) QRS
 - d) T
- 9) The _____ cycle is accomplished by changes in the thoracic volume.
 - a) pulse rate
 - b) Cardiac
 - c) ECG
 - d) Respiratory

Seat No.	
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Set

Q

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four questions. 16

- a) Differentiate between action potential generation between nerve muscle and cardiac muscle.
- b) Explain various methods of measuring human body temperature.
- c) Define and explain various types of heart sounds with neat figures.
- d) List various direct and indirect blood pressure measurement techniques and explain any one indirect method.
- e) Design an instrumentation amplifier for amplifying EMG signal.

Q.3 Attempt any two questions. 12

- a) Explain principle of Einthoven's triangle and draw ECG waveforms for 12 leads.
- b) Explain 10-20 electrode placement of EEG and draw various EEG wave patterns.
- c) Explain the need and working of ambulatory monitoring system.

Section – II

Q.4 Attempt any four questions. 16

- a) Explain the foetal scalp pH measurement technique with its significance.
- b) Explain the effect of various ranges of currents on human body.
- c) Draw and explain working of ECG telemetry transmitter and receiver.
- d) Explain block diagram and working of abdominal foetal electrocardiogram processing circuit.
- e) Define leakage currents and explain its various types.

Q.5 Attempt any two questions. 12

- a) Draw and explain block diagram of ultrasonic Doppler shift based FHR measuring circuit.
- b) Draw and explain block diagram of EMG biofeedback technique.
- c) Explain block diagram and working of a radio telemetry capsule.

Seat No.	
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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) _____ shock is experienced by the subject by an accidental contact with the electrical wiring at any point on the surface of the body.
 - a) Micro
 - b) hold on
 - c) Gross
 - d) leakage
- 2) At current of the order _____ causes temporary respiratory paralysis.
 - a) 16 mili amp
 - b) 10 mili amp
 - c) 1 A
 - d) 6A
- 3) Ground resistance can be measured by passing up to 1A current through the _____.
 - a) neutral line
 - b) ground line
 - c) power line
 - d) transformer line
- 4) Einthoven postulated that at any given instant of the cardiac cycle, the electrical axis of the heart can be represented as a _____ dimensional vector.
 - a) Linear
 - b) three
 - c) 1
 - d) 2
- 5) Principle of Rheographic detection is base on detection of _____.
 - a) brachial artery
 - b) arterial pulse
 - c) cardiac output
 - d) respiratory rate
- 6) T wave of ECG represents electrical activity associated with _____.
 - a) depolarization of atria
 - b) repolarization of atria
 - c) depolarization of ventricles
 - d) repolarization of both ventricles
- 7) EEG waveform delta range varies from _____ Hz.
 - a) 0.5-4
 - b) 4-8
 - c) 8-13
 - d) 22-30
- 8) The heart sounds are produced by _____ events that occur during the cardiac cycle.
 - a) mechanical
 - b) electrical
 - c) circulation
 - d) chemical

- 9) The pulse pressure and waveforms are indicators for blood pressure and _____.
- a) velocity
 - b) position
 - c) flow
 - d) oxygen saturation
- 10) Ventricular ectopic beats result in an abnormal _____ sequence of ECG.
- a) repolarization
 - b) depolarization
 - c) bradycardia
 - d) tachycardia
- 11) The foetal heart rate is computed from the foetal ECG by appropriately shaping _____ wave.
- a) R
 - b) P
 - c) QRS
 - d) T
- 12) The _____ cycle is accomplished by changes in the thoracic volume.
- a) pulse rate
 - b) Cardiac
 - c) ECG
 - d) Respiratory
- 13) The Doppler frequency shift is a measure of the size and direction of _____.
- a) flow velocity
 - b) flow quantity
 - c) platelets flow
 - d) RBC's flow
- 14) In multichannel telemetry the number of _____ used is the same as the number of signals to be transmitted.
- a) Carriers
 - b) subcarriers
 - c) Frequencies
 - d) signals

Seat No.	
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Set

R

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four questions. 16

- a) Differentiate between action potential generation between nerve muscle and cardiac muscle.
- b) Explain various methods of measuring human body temperature.
- c) Define and explain various types of heart sounds with neat figures.
- d) List various direct and indirect blood pressure measurement techniques and explain any one indirect method.
- e) Design an instrumentation amplifier for amplifying EMG signal.

Q.3 Attempt any two questions. 12

- a) Explain principle of Einthoven's triangle and draw ECG waveforms for 12 leads.
- b) Explain 10-20 electrode placement of EEG and draw various EEG wave patterns.
- c) Explain the need and working of ambulatory monitoring system.

Section – II

Q.4 Attempt any four questions. 16

- a) Explain the foetal scalp pH measurement technique with its significance.
- b) Explain the effect of various ranges of currents on human body.
- c) Draw and explain working of ECG telemetry transmitter and receiver.
- d) Explain block diagram and working of abdominal foetal electrocardiogram processing circuit.
- e) Define leakage currents and explain its various types.

Q.5 Attempt any two questions. 12

- a) Draw and explain block diagram of ultrasonic Doppler shift based FHR measuring circuit.
- b) Draw and explain block diagram of EMG biofeedback technique.
- c) Explain block diagram and working of a radio telemetry capsule.

Seat No.	
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Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks
 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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

- 1) T wave of ECG represents electrical activity associated with _____.
 a) depolarization of atria b) repolarization of atria
 c) depolarization of ventricles d) repolarization of both ventricles
- 2) EEG waveform delta range varies from _____ Hz.
 a) 0.5-4 b) 4-8
 c) 8-13 d) 22-30
- 3) The heart sounds are produced by _____ events that occur during the cardiac cycle.
 a) Mechanical b) Electrical
 c) Circulation d) Chemical
- 4) The pulse pressure and waveforms are indicators for blood pressure and _____.
 a) Velocity b) position
 c) Flow d) oxygen saturation
- 5) Ventricular ectopic beats result in an abnormal _____ sequence of ECG.
 a) Repolarization b) depolarization
 c) Bradycardia d) tachycardia
- 6) The foetal heart rate is computed from the foetal ECG by appropriately shaping _____ wave.
 a) R b) P
 c) QRS d) T
- 7) The _____ cycle is accomplished by changes in the thoracic volume.
 a) pulse rate b) Cardiac
 c) ECG d) Respiratory
- 8) The Doppler frequency shift is a measure of the size and direction of _____.
 a) flow velocity b) flow quantity
 c) platelets flow d) RBC's flow

- 9) In multichannel telemetry the number of _____ used is the same as the number of signals to be transmitted.
- a) Carriers
 - b) Subcarriers
 - c) Frequencies
 - d) Signals
- 10) _____ shock is experienced by the subject by an accidental contact with the electrical wiring at any point on the surface of the body.
- a) Micro
 - b) hold on
 - c) Gross
 - d) leakage
- 11) At current of the order _____ causes temporary respiratory paralysis.
- a) 16 mili amp
 - b) 10 mili amp
 - c) 1 A
 - d) 6A
- 12) Ground resistance can be measured by passing up to 1A current through the _____.
- a) neutral line
 - b) ground line
 - c) power line
 - d) transformer line
- 13) Einthoven postulated that at any given instant of the cardiac cycle, the electrical axis of the heart can be represented as a _____ dimensional vector.
- a) Linear
 - b) three
 - c) 1
 - d) 2
- 14) Principle of Rheographic detection is base on detection of _____.
- a) brachial artery
 - b) arterial pulse
 - c) cardiac output
 - d) respiratory rate

Seat No.	
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Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – II

Day & Date: Friday, 22-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four questions. 16

- a) Differentiate between action potential generation between nerve muscle and cardiac muscle.
- b) Explain various methods of measuring human body temperature.
- c) Define and explain various types of heart sounds with neat figures.
- d) List various direct and indirect blood pressure measurement techniques and explain any one indirect method.
- e) Design an instrumentation amplifier for amplifying EMG signal.

Q.3 Attempt any two questions. 12

- a) Explain principle of Einthoven's triangle and draw ECG waveforms for 12 leads.
- b) Explain 10-20 electrode placement of EEG and draw various EEG wave patterns.
- c) Explain the need and working of ambulatory monitoring system.

Section – II

Q.4 Attempt any four questions. 16

- a) Explain the foetal scalp pH measurement technique with its significance.
- b) Explain the effect of various ranges of currents on human body.
- c) Draw and explain working of ECG telemetry transmitter and receiver.
- d) Explain block diagram and working of abdominal foetal electrocardiogram processing circuit.
- e) Define leakage currents and explain its various types.

Q.5 Attempt any two questions. 12

- a) Draw and explain block diagram of ultrasonic Doppler shift based FHR measuring circuit.
- b) Draw and explain block diagram of EMG biofeedback technique.
- c) Explain block diagram and working of a radio telemetry capsule.

Seat No.	
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Set **P**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory it should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) In order to estimate the total attenuation of an ultrasound pulse passing through tissue you would need to know _____.
 - a) The size of the pulse
 - b) Frequency
 - c) Type of tissue
 - d) Distance
- 2) Gradual decrease in x-ray beam intensity as it passes through material is called _____.
 - a) attenuation
 - b) decay
 - c) radioactivity
 - d) imaging
- 3) Speed of ultrasound depends upon _____.
 - a) medium
 - b) amplitude
 - c) material
 - d) wavelength
- 4) 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
- 5) If fast moving electrons rapidly decelerate, then rays produced are _____.
 - a) alpha rays
 - b) beta rays
 - c) gamma rays
 - d) x-rays
- 6) Change in speed of ultrasound causes _____.
 - a) reflection
 - b) diffraction
 - c) refraction
 - d) image
- 7) In best piezo-electric substances, maximum value of strain is about _____.
 - a) 0.5%
 - b) 0.4%
 - c) 0.3%
 - d) 0.1 %
- 8) Intensity of radiation is used for mammography is _____.
 - a) < 10keV
 - b) < 20keV
 - c) < 30keV
 - d) < 40keV
- 9) The X - Ray is recorded on a plate coated with _____.
 - a) Gold Halide
 - b) Silver Halide
 - c) Copper Halide
 - d) Iron Halide

- 10) Angiography is _____
- a) a surgical procedure
 - b) a diagnosis
 - c) an imaging technique
 - d) a disease of the nerves
- 11) The dye used in angiography is made of _____.
- a) Iodine
 - b) Phosphorus
 - c) Fluorine
 - d) Nitrogen
- 12) In a thermograph, heat is identified by _____.
- a) different sizes of lines on a photograph
 - b) different shapes on a photograph
 - c) different colors on a photograph
 - d) different images on a photograph
- 13) A medium of ultrasound waves transmission is characterized by _____.
- a) By its thickness
 - b) By its acoustic impedance
 - c) By its water content
 - d) By its density
- 14) _____ is the most common form of medical imaging, using high-energy radiation to penetrate skin and tissues but not bone.
- a) X-ray
 - b) Ultrasound
 - c) Thermography
 - d) Mamography

Seat No.	
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Set

P

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four questions. 16**
- 1) Explain any 2 methods of x rays production with necessary diagram.
 - 2) State any 3 characteristics of ultrasound and explain various modes of ultrasound imaging.
 - 3) State and explain Doppler shift principle.
 - 4) Draw and explain construction of ultrasound transducer.
 - 5) List various techniques of x ray interaction with matter and explain any 2 in detail.

- Q.3 Attempt any two questions. 12**
- 1) Explain working of x ray image intensifier with neat diagram and mention its application.
 - 2) Explain various real time ultrasound scanners and define steering and focusing.
 - 3) Describe x ray filament circuit and high voltage circuit of x-ray generator.

Section – II

- Q.4 Attempt any four questions. 16**
- 1) Explain components and working principle of endoscopy.
 - 2) Explain angiography technique with applications.
 - 3) Describe principle and applications of mammography technique.
 - 4) List and explain various components of endoscopy equipment.
 - 5) Define and differentiate between fluoroscopy and Radiography.
- Q.5 Attempt any two questions. 12**
- 1) Explain construction and various medical applications of endoscopy.
 - 2) Explain block diagram of thermographic machine
 - 3) With block diagram explain computed radiography technique and mention its applications.

Seat No.	
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Set

Q

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four questions. 16**
- 1) Explain any 2 methods of x rays production with necessary diagram.
 - 2) State any 3 characteristics of ultrasound and explain various modes of ultrasound imaging.
 - 3) State and explain Doppler shift principle.
 - 4) Draw and explain construction of ultrasound transducer.
 - 5) List various techniques of x ray interaction with matter and explain any 2 in detail.

- Q.3 Attempt any two questions. 12**
- 1) Explain working of x ray image intensifier with neat diagram and mention its application.
 - 2) Explain various real time ultrasound scanners and define steering and focusing.
 - 3) Describe x ray filament circuit and high voltage circuit of x-ray generator.

Section – II

- Q.4 Attempt any four questions. 16**
- 1) Explain components and working principle of endoscopy.
 - 2) Explain angiography technique with applications.
 - 3) Describe principle and applications of mammography technique.
 - 4) List and explain various components of endoscopy equipment.
 - 5) Define and differentiate between fluoroscopy and Radiography.
- Q.5 Attempt any two questions. 12**
- 1) Explain construction and various medical applications of endoscopy.
 - 2) Explain block diagram of thermographic machine
 - 3) With block diagram explain computed radiography technique and mention its applications.

- 10) _____ is the most common form of medical imaging, using high-energy radiation to penetrate skin and tissues but not bone.
- a) X-ray
 - b) Ultrasound
 - c) Thermography
 - d) Mamography
- 11) In order to estimate the total attenuation of an ultrasound pulse passing through tissue you would need to know _____.
- a) The size of the pulse
 - b) Frequency
 - c) Type of tissue
 - d) Distance
- 12) Gradual decrease in x-ray beam intensity as it passes through material is called _____.
- a) attenuation
 - b) decay
 - c) radioactivity
 - d) imaging
- 13) Speed of ultrasound depends upon _____.
- a) medium
 - b) amplitude
 - c) material
 - d) wavelength
- 14) Attenuation coefficient depends on _____.
- a) frequency of x-ray photons
 - b) wavelength of x-ray photons
 - c) energy of x-ray photons
 - d) amplitude of x-ray photons

Seat No.	
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Set

R

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four questions. 16

- 1) Explain any 2 methods of x rays production with necessary diagram.
- 2) State any 3 characteristics of ultrasound and explain various modes of ultrasound imaging.
- 3) State and explain Doppler shift principle.
- 4) Draw and explain construction of ultrasound transducer.
- 5) List various techniques of x ray interaction with matter and explain any 2 in detail.

Q.3 Attempt any two questions. 12

- 1) Explain working of x ray image intensifier with neat diagram and mention its application.
- 2) Explain various real time ultrasound scanners and define steering and focusing.
- 3) Describe x ray filament circuit and high voltage circuit of x-ray generator.

Section – II

Q.4 Attempt any four questions. 16

- 1) Explain components and working principle of endoscopy.
- 2) Explain angiography technique with applications.
- 3) Describe principle and applications of mammography technique.
- 4) List and explain various components of endoscopy equipment.
- 5) Define and differentiate between fluoroscopy and Radiography.

Q.5 Attempt any two questions. 12

- 1) Explain construction and various medical applications of endoscopy.
- 2) Explain block diagram of thermographic machine
- 3) With block diagram explain computed radiography technique and mention its applications.

Seat No.	
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Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory it should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Angiography is _____.
 - a) a surgical procedure
 - b) a diagnosis
 - c) an imaging technique
 - d) a disease of the nerves
- 2) The dye used in angiography is made of _____.
 - a) Iodine
 - b) Phosphorus
 - c) Fluorine
 - d) Nitrogen
- 3) In a thermograph, heat is identified by _____.
 - a) different sizes of lines on a photograph
 - b) different shapes on a photograph
 - c) different colors on a photograph
 - d) different images on a photograph
- 4) A medium of ultrasound waves transmission is characterized by _____.
 - a) By its thickness
 - b) By its acoustic impedance
 - c) By its water content
 - d) By its density
- 5) _____ is the most common form of medical imaging, using high-energy radiation to penetrate skin and tissues but not bone.
 - a) X-ray
 - b) Ultrasound
 - c) Thermography
 - d) Mamography
- 6) In order to estimate the total attenuation of an ultrasound pulse passing through tissue you would need to know _____.
 - a) The size of the pulse
 - b) Frequency
 - c) Type of tissue
 - d) Distance
- 7) Gradual decrease in x-ray beam intensity as it passes through material is called _____.
 - a) attenuation
 - b) decay
 - c) radioactivity
 - d) imaging
- 8) Speed of ultrasound depends upon _____.
 - a) medium
 - b) amplitude
 - c) material
 - d) wavelength

- 9) 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
- 10) If fast moving electrons rapidly decelerate, then rays produced are _____.
a) alpha rays b) beta rays
c) gamma rays d) x-rays
- 11) Change in speed of ultrasound causes _____.
a) reflection b) diffraction
c) refraction d) image
- 12) In best piezo-electric substances, maximum value of strain is about _____.
a) 0.5% b) 0.4%
c) 0.3% d) 0.1 %
- 13) Intensity of radiation is used for mammography is _____.
a) < 10keV b) < 20keV
c) < 30keV d) < 40keV
- 14) The X - Ray is recorded on a plate coated with _____.
a) Gold Halide b) Silver Halide
c) Copper Halide d) Iron Halide

Seat No.	
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Set **S**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – I

Day & Date: Saturday, 23-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four questions. 16

- 1) Explain any 2 methods of x rays production with necessary diagram.
- 2) State any 3 characteristics of ultrasound and explain various modes of ultrasound imaging.
- 3) State and explain Doppler shift principle.
- 4) Draw and explain construction of ultrasound transducer.
- 5) List various techniques of x ray interaction with matter and explain any 2 in detail.

Q.3 Attempt any two questions. 12

- 1) Explain working of x ray image intensifier with neat diagram and mention its application.
- 2) Explain various real time ultrasound scanners and define steering and focusing.
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Section – II

Q.4 Attempt any four questions. 16

- 1) Explain components and working principle of endoscopy.
- 2) Explain angiography technique with applications.
- 3) Describe principle and applications of mammography technique.
- 4) List and explain various components of endoscopy equipment.
- 5) Define and differentiate between fluoroscopy and Radiography.

Q.5 Attempt any two questions. 12

- 1) Explain construction and various medical applications of endoscopy.
- 2) Explain block diagram of thermographic machine
- 3) With block diagram explain computed radiography technique and mention its applications.

Seat No.	
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**T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
CONTROL SYSTEM**

Day & Date: Monday, 25-11-2019
Time: 10:00 AM To 01:00 PM

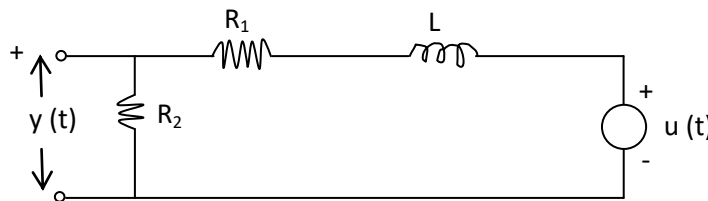
Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figure to the right indicates full marks.
3) Assume suitable data wherever required.

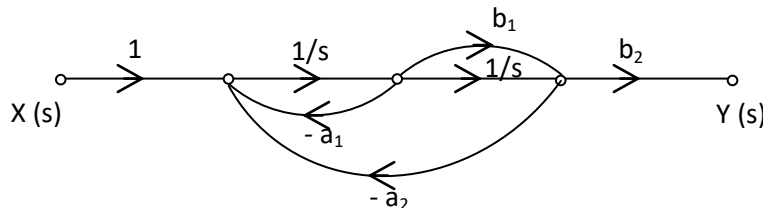
Section – I

Q.2 Attempt any four of the following questions. 16

- a) Calculate range of 'k' for the system to be stable for a unity feedback system characterized by the open loop transfer function $G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$.
- b) State and explain Mason's gain formula.
- c) Calculate the transfer function $Y(s) | U(s)$ for given electrical network.

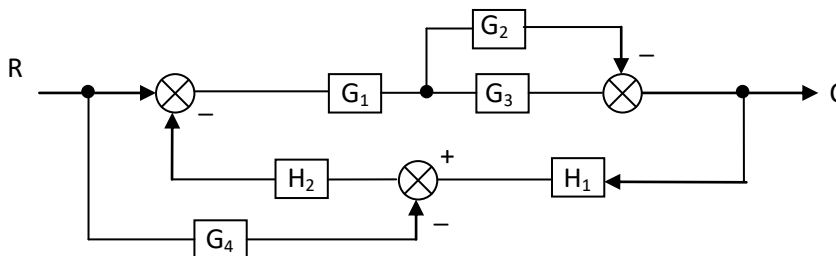


- d) Obtain the transfer function $Y(s) | X(s)$ of following signal flow graph.



Q.3 Attempt any two of the following questions. 12

- a) Derive the transfer function of given system using block diagram reduction technique.



- b) Determine the stability of following system given by.
- 1) $s^4 + 6s^3 + 23s^2 + 40s + 50 = 0$
 - 2) $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$
 - 3) $5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 200 = 0$

- c) Measurements conducted on a servomechanism show error response to be, $e(t) = 1.66 e^{-8t} \sin(6t + 37^\circ)$. where input is given a sudden unit displacement. Determine natural frequency, damping ratio and damped angular frequency.

Section – II

Q.4 Attempt any four of the following questions.

16

- a) Define and explain concept of Gain Margin and phase margin.
 b) With the help of diagram explain working of lead-log network.
 c) Derive and explain correlation between time and frequency response for second order system.
 d) Sketch the polar plots of the transfer function given below and determine whether these plots cross the real axis.

$$1) \quad G(s) = \frac{1}{(1+s)(1+2s)}$$

$$2) \quad G(s) = \frac{1}{s(s+1)(1+2s)}$$

- e) Using Nyquist criterion determine whether closed loop system having following open loop function are stable or not.

$$1) \quad G(s)H(s) = \frac{1+4s}{s^2(1+s)(1+2s)}$$

$$2) \quad G(s)H(s) = \frac{1}{s^2+100}$$

Q.5 Attempt any two of the following questions.

12

- a) The characteristic equation of a feedback control system is

$$s^4 + 3s^3 + 12s^2 + (k-16)s + k = 0$$

Sketch root locus plot for $0 \leq k < \infty$ and show that the system is conditionally stable. Determine range of gain for stable system.

- b) Draw Bode plot for given function and calculate Wgc, GM and PM.

$$G(s)H(s) = \frac{k}{s(s^2+2s+2)}$$

- c) Sketch the Nyquist plot for a system with the open loop transfer function.

$$G(s)H(s) = \frac{k(1+0.5s)(s+1)}{(1+10s)(s+1)}$$

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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
CONTROL SYSTEM

Day & Date: Monday, 25-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to right indicate full marks.
 3) Assume suitable data if necessary

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) For _____ systems are the signal flow graphs applicable.
 - a) Causal
 - b) Invertible
 - c) Linear time invariant system
 - d) Dynamic
- 2) At _____ condition of ' ξ ', resonant peak does not exist and its maximum value is considered to be unity along with zero resonant frequency.
 - a) $0 < \xi < 0.707$
 - b) $\xi > 0.707$
 - c) $\xi = 0$
 - d) $\xi = 1$
- 3) The system is said to be marginally stable, if gain margin is _____.
 - a) 0
 - b) 1
 - c) $+\infty$
 - d) None of the above
- 4) Consider the equation $S^3 + 3s^2 + 5s + 2 = 0$. Number of roots that are located in left half of s-plane _____.
 - a) Zero
 - b) Two
 - c) Three
 - d) Four
- 5) Due to an addition of pole at origin, the polar plot gets shifted by _____ at $\omega = 0$.
 - a) -45°
 - b) -60°
 - c) -90°
 - d) -180°
- 6) _____ point on root locus specifies the meeting or collision of two poles.
 - a) Centroid
 - b) Break away point
 - c) Stability point
 - d) Anti-break point
- 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) If finite number of blocks are connected in series or cascade configuration, then the blocks are combined algebraically by _____.
 - a) By addition
 - b) By multiplication
 - c) By differentiation
 - d) By integration

Seat No.	
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**T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
CONTROL SYSTEM**

Day & Date: Monday, 25-11-2019
Time: 10:00 AM To 01:00 PM

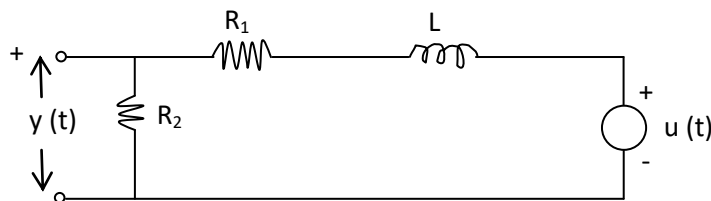
Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figure to the right indicates full marks.
3) Assume suitable data wherever required.

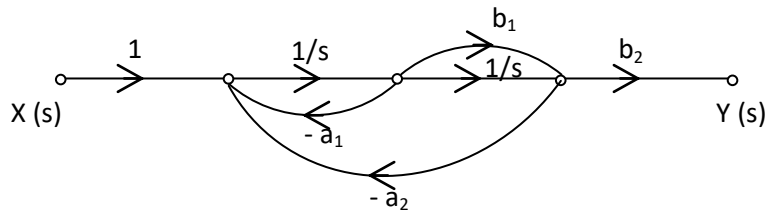
Section – I

Q.2 Attempt any four of the following questions. 16

- a) Calculate range of 'k' for the system to be stable for a unity feedback system characterized by the open loop transfer function $G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$.
- b) State and explain Mason's gain formula.
- c) Calculate the transfer function $Y(s) | U(s)$ for given electrical network.

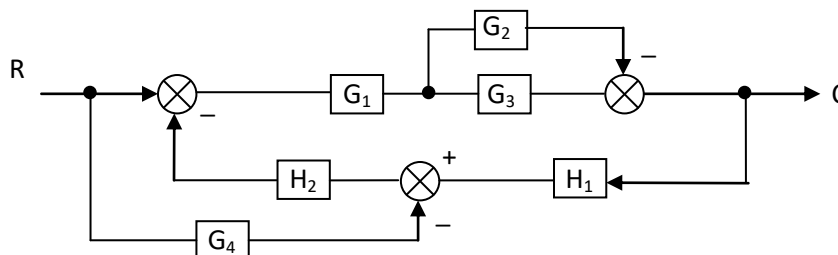


- d) Obtain the transfer function $Y(s) | X(s)$ of following signal flow graph.



Q.3 Attempt any two of the following questions. 12

- a) Derive the transfer function of given system using block diagram reduction technique.



- b) Determine the stability of following system given by.
- 1) $s^4 + 6s^3 + 23s^2 + 40s + 50 = 0$
 - 2) $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$
 - 3) $5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 200 = 0$

- c) Measurements conducted on a servomechanism show error response to be, $e(t) = 1.66 e^{-8t} \sin(6t + 37^\circ)$. where input is given a sudden unit displacement. Determine natural frequency, damping ratio and damped angular frequency.

Section – II

Q.4 Attempt any four of the following questions.

16

- a) Define and explain concept of Gain Margin and phase margin.
 b) With the help of diagram explain working of lead-log network.
 c) Derive and explain correlation between time and frequency response for second order system.
 d) Sketch the polar plots of the transfer function given below and determine whether these plots cross the real axis.

$$1) \quad G(s) = \frac{1}{(1+s)(1+2s)}$$

$$2) \quad G(s) = \frac{1}{s(s+1)(1+2s)}$$

- e) Using Nyquist criterion determine whether closed loop system having following open loop function are stable or not.

$$1) \quad G(s)H(s) = \frac{1+4s}{s^2(1+s)(1+2s)}$$

$$2) \quad G(s)H(s) = \frac{1}{s^2+100}$$

Q.5 Attempt any two of the following questions.

12

- a) The characteristic equation of a feedback control system is

$$s^4 + 3s^3 + 12s^2 + (k-16)s + k = 0$$

Sketch root locus plot for $0 \leq k < \infty$ and show that the system is conditionally stable. Determine range of gain for stable system.

- b) Draw Bode plot for given function and calculate Wgc, GM and PM.

$$G(s)H(s) = \frac{k}{s(s^2+2s+2)}$$

- c) Sketch the Nyquist plot for a system with the open loop transfer function.

$$G(s)H(s) = \frac{k(1+0.5s)(s+1)}{(1+10s)(s+1)}$$

Seat No.	
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Set **R**

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
CONTROL SYSTEM

Day & Date: Monday, 25-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to right indicate full marks.
 3) Assume suitable data if necessary

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Conventional control theory is applicable to _____ systems.
 - a) SISO
 - b) MIMO
 - c) Time varying
 - d) Non-linear
- 2) Root locus specifies the movement of closed loop poles especially when the gain of system _____.
 - a) Remains constant
 - b) Exhibit variations
 - c) Gives zero feedback
 - d) Gives infinite poles
- 3) If a system is subjected to step input, _____ type of static error coefficient performs the function of controlling steady state error.
 - a) Position
 - b) Velocity
 - c) Acceleration
 - d) Retardation
- 4) For _____ systems are the signal flow graphs applicable.
 - a) Causal
 - b) Invertible
 - c) Linear time invariant system
 - d) Dynamic
- 5) At _____ condition of ' ξ ', resonant peak does not exist and its maximum value is considered to be unity along with zero resonant frequency.
 - a) $0 < \xi < 0.707$
 - b) $\xi > 0.707$
 - c) $\xi = 0$
 - d) $\xi = 1$
- 6) The system is said to be marginally stable, if gain margin is _____.
 - a) 0
 - b) 1
 - c) $+\infty$
 - d) None of the above
- 7) Consider the equation $S^3 + 3s^2 + 5s + 2 = 0$. Number of roots that are located in left half of s-plane _____.
 - a) Zero
 - b) Two
 - c) Three
 - d) Four
- 8) Due to an addition of pole at origin, the polar plot gets shifted by _____ at $\omega = 0$.
 - a) -45°
 - b) -60°
 - c) -90°
 - d) -180°

Seat No.	
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**T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
CONTROL SYSTEM**

Day & Date: Monday, 25-11-2019
Time: 10:00 AM To 01:00 PM

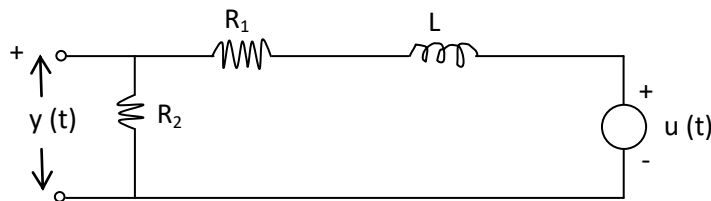
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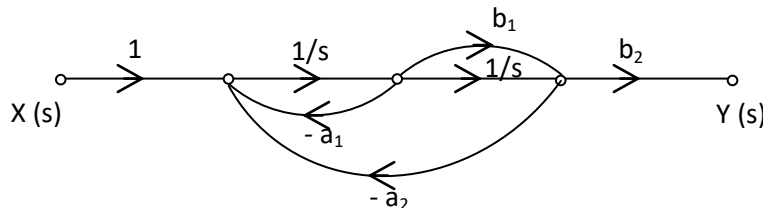
Section – I

Q.2 Attempt any four of the following questions. 16

- a) Calculate range of 'k' for the system to be stable for a unity feedback system characterized by the open loop transfer function $G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$.
- b) State and explain Mason's gain formula.
- c) Calculate the transfer function $Y(s) | U(s)$ for given electrical network.

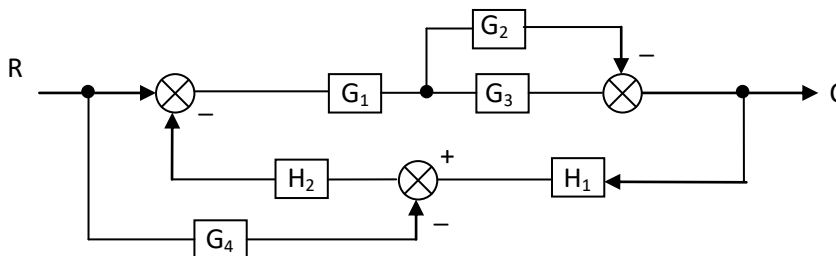


- d) Obtain the transfer function $Y(s) | X(s)$ of following signal flow graph.



Q.3 Attempt any two of the following questions. 12

- a) Derive the transfer function of given system using block diagram reduction technique.



- b) Determine the stability of following system given by.
- 1) $s^4 + 6s^3 + 23s^2 + 40s + 50 = 0$
 - 2) $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$
 - 3) $5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 200 = 0$

- c) Measurements conducted on a servomechanism show error response to be, $e(t) = 1.66 e^{-8t} \sin(6t + 37^\circ)$. where input is given a sudden unit displacement. Determine natural frequency, damping ratio and damped angular frequency.

Section – II

Q.4 Attempt any four of the following questions.

16

- a) Define and explain concept of Gain Margin and phase margin.
 b) With the help of diagram explain working of lead-log network.
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Q.5 Attempt any two of the following questions.

12

- a) The characteristic equation of a feedback control system is

$$s^4 + 3s^3 + 12s^2 + (k-16)s + k = 0$$

Sketch root locus plot for $0 \leq k < \infty$ and show that the system is conditionally stable. Determine range of gain for stable system.

- b) Draw Bode plot for given function and calculate Wgc, GM and PM.

$$G(s)H(s) = \frac{k}{s(s^2+2s+2)}$$

- c) Sketch the Nyquist plot for a system with the open loop transfer function.

$$G(s)H(s) = \frac{k(1+0.5s)(s+1)}{(1+10s)(s+1)}$$

- 9) Among the following _____ are solely responsible in determining the speed of response of control system.
- a) Poles
 - b) Zeros
 - c) Speed of input
 - d) All of the above
- 10) Conventional control theory is applicable to _____ systems.
- a) SISO
 - b) MIMO
 - c) Time varying
 - d) Non-linear
- 11) Root locus specifies the movement of closed loop poles especially when the gain of system _____.
- a) Remains constant
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Seat No.	
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**T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
CONTROL SYSTEM**

Day & Date: Monday, 25-11-2019
Time: 10:00 AM To 01:00 PM

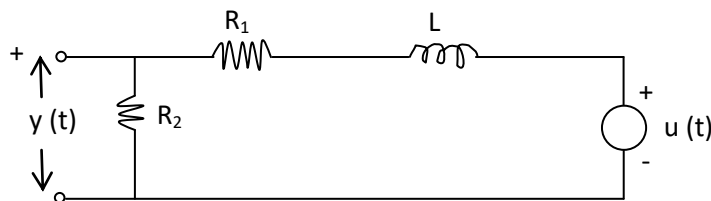
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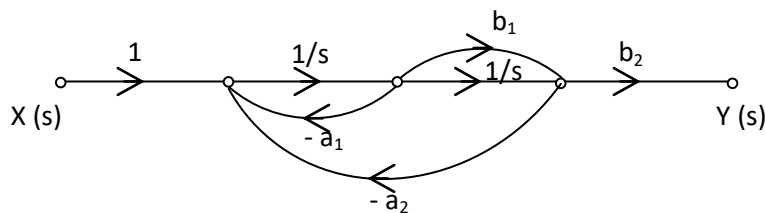
Section – I

Q.2 Attempt any four of the following questions. 16

- a) Calculate range of 'k' for the system to be stable for a unity feedback system characterized by the open loop transfer function $G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$.
- b) State and explain Mason's gain formula.
- c) Calculate the transfer function $Y(s) | U(s)$ for given electrical network.

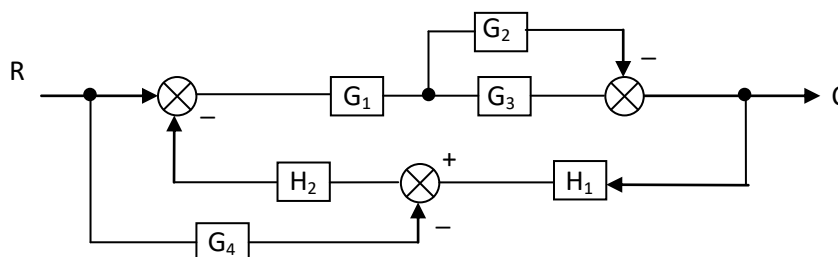


- d) Obtain the transfer function $Y(s) | X(s)$ of following signal flow graph.



Q.3 Attempt any two of the following questions. 12

- a) Derive the transfer function of given system using block diagram reduction technique.



- b) Determine the stability of following system given by.
- 1) $s^4 + 6s^3 + 23s^2 + 40s + 50 = 0$
 - 2) $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$
 - 3) $5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 200 = 0$

- c) Measurements conducted on a servomechanism show error response to be, $e(t) = 1.66 e^{-8t} \sin(6t + 37^\circ)$. where input is given a sudden unit displacement. Determine natural frequency, damping ratio and damped angular frequency.

Section – II

Q.4 Attempt any four of the following questions.

16

- a) Define and explain concept of Gain Margin and phase margin.
 b) With the help of diagram explain working of lead-log network.
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$$2) \quad G(s)H(s) = \frac{1}{s^2+100}$$

Q.5 Attempt any two of the following questions.

12

- a) The characteristic equation of a feedback control system is

$$s^4 + 3s^3 + 12s^2 + (k-16)s + k = 0$$

Sketch root locus plot for $0 \leq k < \infty$ and show that the system is conditionally stable. Determine range of gain for stable system.

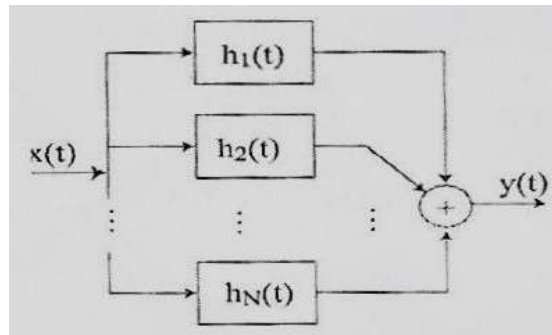
- b) Draw Bode plot for given function and calculate W_{gc} , GM and PM.

$$G(s)H(s) = \frac{k}{s(s^2+2s+2)}$$

- c) Sketch the Nyquist plot for a system with the open loop transfer function.

$$G(s)H(s) = \frac{k(1+0.5s)(s+1)}{(1+10s)(s+1)}$$

7) The structure shown below is known as _____.



- a) Parallel form structure b) Cascade structure
 c) Direct form d) None of the mentioned
- 8) If $x(n)$ and $X(k)$ are an N - point DFT pair, then $X(k+N) =$ _____.
 a) $X(-k)$ b) $-X(k)$
 c) $X(k)$ d) None of the mentioned
- 9) _____ method is used to find the inverse z -transform of a signal.
 a) Counter integration
 b) Expansion into a series of terms
 c) Partial fraction expansion
 d) All of the mentioned
- 10) If $H(z)$ is the system function of an LTI system and $H_1(z)$ is the system function of the inverse LTI system, then _____.
 a) $H(z) * H_1(z) = 1$ b) $H(z) * H_1(z) = \delta(n)$
 c) $H(z) \cdot H_1(z) = 1$ d) $H(z) \cdot H_1(z) = \delta(n)$
- 11) _____ is an method for implementing an FIR system?
 a) Direct Form b) Cascade Form
 c) Lattice structure d) All of the mention
- 12) If $x_1(n)$ and $x_2(n)$ are two real valued sequences of length N , and let $x(n)$ be a complex valued sequence defined as $x(n) = x_1(n) + jx_2(n)$, $0 \leq n \leq N - 1$, then the value of $x_1(n) =$ _____.
 a) $\frac{x(n) - x^*(n)}{2}$ b) $\frac{x(n) + x^*(n)}{2}$
 c) $\frac{x(n) - x^*(n)}{2j}$ d) $\frac{x(n) + x^*(n)}{2j}$
- 13) In this type of designing, the system function of IIR filter is expressed in _____ form.
 a) Parallel form b) Cascade form
 c) Mixed form d) Any of the mentioned
- 14) A frequency response take in frequency sampling technique is equal to _____.
 a) Zero b) One
 c) Either of them d) None of the mentioned

Seat No.	
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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL SIGNAL PROCESSING

Day & Date: Tuesday, 26-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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

Section – I

Q.2 Attempt any four of the following questions. 16

- a) Realize the system using Direct Form-I and Direct Form- II.

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$$

- b) Determine circular correlation values of the two sequences.
 $x(n) = \{1, 0, 0, 1\}$ and $h(n) = \{4, 3, 2, 1\}$
- c) State and prove the complex conjugate property of DFT.
- d) Draw the single butterfly of 2-radix DIT & DIF FFT algorithm.
- e) Determine DFT of the sequence : $x(n) = \{1, 2, 3, 4\}$

Q.3 Attempt any two of the following questions. 12

- a) Given: $x(n) = \{0, 1, 2, 3\}$, find $X(k)$ using DIT FFT algorithm.
- b) Determine linear convolution using overlap save method:
 $x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\}$ & $h(n) = \{1, 2, 3\}$
- c) Perform the circular convolution of the following two sequences:
 $X_1(n) = \{2, 1, 2, 1\}$ $X_2(n) = \{1, 2, 3, 4\}$

Section – II

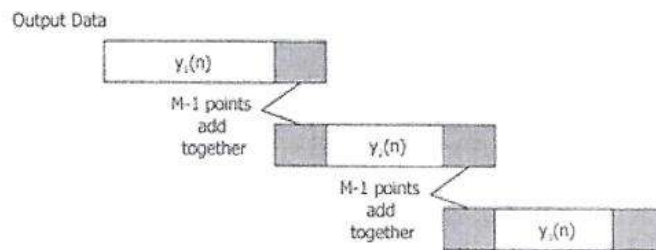
Q.4 Attempt any four of the following questions. 16

- a) Explain the concept of frequency transformation in IIR filters.
- b) Differentiate between FIR and IIR systems.
- c) Derive the magnitude response $|W(\omega)|$ of a rectangular window function?
- d) Explain frequency sampling method of designing FIR filter.
- e) Write a short note on LMS algorithm.

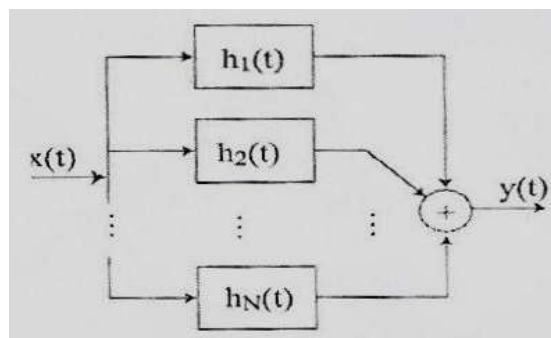
Q.5 Attempt any two of the following questions. 12

- a) Transfer function of analog filter is $h(s) = \frac{1}{(s+1)(s+3)}$. Find $H(z)$ using impulse invariance method.
- b) Write a difference between Impulse Invariance Technique (IIT) and Bilinear Transformation Technique (BLT).
- c) Design IIR Butterworth filter to satisfy following condition:
 $0.8 < |H(e^{jw})| \leq 1$, for $0 \leq w \leq 0.2\pi$, $|H(e^{jw})| \leq 0.2$, for $0.6\pi \leq w \leq \pi$
 using Bilinear Transformation Method. Assume $T = 1$ sec.

- 8) The relationship between Ω and ω is _____.
- a) Many-to-one b) One-to-many
c) One-to-one d) Many-to-many
- 9) In the bilinear transformation _____ rule is used.
- a) Simpson's rule b) Backward difference
c) Forward difference d) Trapezoidal rule
- 10) The equation for normalized frequency is _____.
- a) F/F_s b) $F.F_s$
c) F_s/F d) None of the mentioned
- 11) _____ defines the rectangular window function of length $M-1$.
- a) $w(n) = 1, n=0,1,2,\dots,M-1=0$, else where
b) $w(n) = 1, n=0,1,2,\dots,M-1=-1$, else where
c) $w(n) = 0, n=0,1,2,\dots,M-1=1$, else where
d) None of the mentioned
- 12) In _____ methods, the output sequence is considered as shown in the below diagram.



- a) Overlap save method b) Overlap add method
c) Overlap add & save method d) None of the mentioned
- 13) _____ is used in the realization of a system.
- a) Delay elements b) Multipliers
c) Adders d) All of the mentioned
- 14) The structure shown below is known as _____.



- a) Parallel form structure b) Cascade structure
c) Direct form d) None of the mentioned

Seat No.	
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**T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL SIGNAL PROCESSING**

Day & Date: Tuesday, 26-11-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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

Section – I

Q.2 Attempt any four of the following questions. 16

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$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$$

- b) Determine circular correlation values of the two sequences.
 $x(n) = \{1, 0, 0, 1\}$ and $h(n) = \{4, 3, 2, 1\}$
- c) State and prove the complex conjugate property of DFT.
- d) Draw the single butterfly of 2-radix DIT & DIF FFT algorithm.
- e) Determine DFT of the sequence : $x(n) = \{1, 2, 3, 4\}$

Q.3 Attempt any two of the following questions. 12

- a) Given: $x(n) = \{0, 1, 2, 3\}$, find $X(k)$ using DIT FFT algorithm.
- b) Determine linear convolution using overlap save method:
 $x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\}$ & $h(n) = \{1, 2, 3\}$
- c) Perform the circular convolution of the following two sequences:
 $X_1(n) = \{2, 1, 2, 1\}$ $X_2(n) = \{1, 2, 3, 4\}$

Section – II

Q.4 Attempt any four of the following questions. 16

- a) Explain the concept of frequency transformation in IIR filters.
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using Bilinear Transformation Method. Assume $T = 1$ sec.

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**T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL SIGNAL PROCESSING**

Day & Date: Tuesday, 26-11-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
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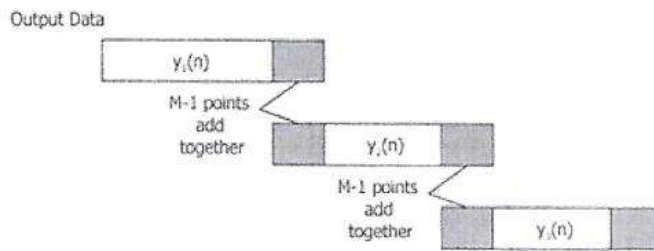
MCQ/Objective Type Questions

Duration: 30 Minutes

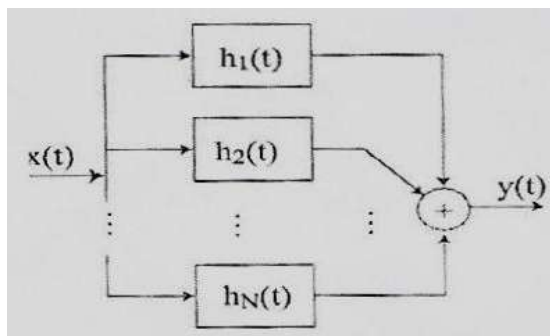
Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) In _____ methods, the output sequence is considered as shown in the below diagram.



- a) Overlap save method b) Overlap add method
c) Overlap add & save method d) None of the mentioned
- 2) _____ is used in the realization of a system.
a) Delay elements b) Multipliers
c) Adders d) All of the mentioned
- 3) The structure shown below is known as _____.



- a) Parallel form structure b) Cascade structure
c) Direct form d) None of the mentioned
- 4) If $x(n)$ and $X(k)$ are an N - point DFT pair, then $X(k+N) =$ _____.
a) $X(-k)$ b) $-X(k)$
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- 5) _____ method is used to find the inverse z-transform of a signal.
- Counter integration
 - Expansion into a series of terms
 - Partial fraction expansion
 - All of the mentioned
- 6) If $H(z)$ is the system function of an LTI system and $H_1(z)$ is the system function of the inverse LTI system, then _____.
- $H(z) \cdot H_1(z) = 1$
 - $H(z) \cdot H_1(z) = \delta(n)$
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 - $\frac{x(n) + x^*(n)}{2}$
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- 9) In this type of designing, the system function of IIR filter is expressed in _____ form.
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- 10) A frequency response take in frequency sampling technique is equal to _____.
- Zero
 - One
 - Either of them
 - None of the mentioned
- 11) The relationship between Ω and ω is _____.
- Many-to-one
 - One-to-many
 - One-to-one
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- 12) In the bilinear transformation _____ rule is used.
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 - $w(n) = 0, n=0,1,2 \dots M-1=1$, else where
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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL SIGNAL PROCESSING

Day & Date: Tuesday, 26-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.
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Section – I

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Section – II

Q.4 Attempt any four of the following questions. 16

- a) Explain the concept of frequency transformation in IIR filters.
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 using Bilinear Transformation Method. Assume $T = 1$ sec.

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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL SIGNAL PROCESSING

Day & Date: Tuesday, 26-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

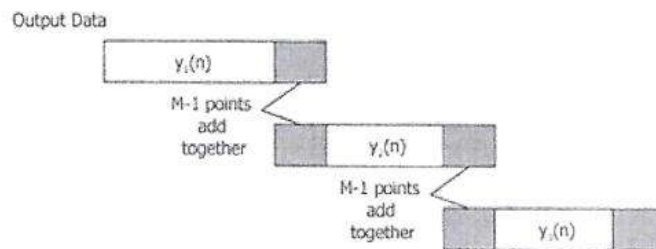
Duration: 30 Minutes

Marks: 14

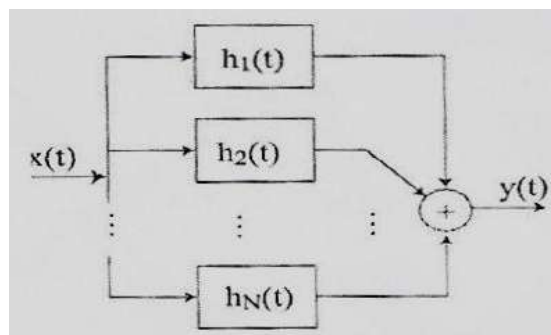
Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) If $H(z)$ is the system function of an LTI system and $H_1(z)$ is the system function of the inverse LTI system, then _____.
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- 2) _____ is a method for implementing an FIR system?
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 - a) Zero
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- Overlap save method
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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL SIGNAL PROCESSING

Day & Date: Tuesday, 26-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.
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Section – I

Q.2 Attempt any four of the following questions. 16

- a) Realize the system using Direct Form-I and Direct Form- II.

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Section – II

Q.4 Attempt any four of the following questions. 16

- a) Explain the concept of frequency transformation in IIR filters.
- b) Differentiate between FIR and IIR systems.
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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) What are the essential tight constraint/s related to the design metrics of an embedded system?
 - a) Ability to fit on a single chip
 - b) Low power consumption
 - c) Fast data processing for real time operation
 - d) All of the above

- 2) What does an IC that initiate or enable the data transfer on bus can be regarded as, in accordance to the I2C protocol specifications?
 - a) Bus master
 - b) Bus slave
 - c) Bus Driver
 - d) Bus data carries

- 3) While designing of embedded system which sub task orientation process allocates the time steps for various modules that share the similar resources?
 - a) Simulation and Validation
 - b) Integration
 - c) Hardware and software partitioning
 - d) Scheduling

- 4) In LPC2148 which among the following is/are the functions of mask registers?
 - a) Byte addressability
 - b) Reallocation to ARM local bus for faster possible I/O timing
 - c) Treating sets of port bits in the form of group without changing other bits
 - d) All of the above

- 5) Which of the following statement is true for the cache memory?
 - a) Memory unit which communicates directly with the CPU
 - b) Provide backup storage
 - c) A very high speed memory to increase the speed of the processor
 - d) Secondary Storage

- 6) How many registers are there in ARM processor?
- a) 35 registers (28 GPR and 7 SFR)
 - b) 37 register (28 GPR and 9 SFR)
 - c) 37 register (32 GPR and 6 SFR)
 - d) 35 register (30 GPR and 5 SFR)
- 7) When building, code for both ARM and THUMB states, which tool decides for each function call whether to use a BL or BLX instruction?
- a) The linker
 - b) The archiver
 - c) The compiler
 - d) The assembler
- 8) Which of the following provides a buffer between the user and the low level interfaces to the hardware?
- a) Operating system
 - b) Kernel
 - c) Software
 - d) Hardware
- 9) The Strategy of allowing processes that are logically runnable to be temporarily suspended is called _____.
- a) Preemptive scheduling
 - b) Non preemptive scheduling
 - c) Shortest job first
 - d) None
- 10) Which of the following is a part of RTOS kernel?
- a) Memory
 - b) Input
 - c) ISR
 - d) Register
- 11) Time required to synchronous switch from the context of one thread to the context of another thread is called _____.
- a) Threads fly back time
 - b) Jitter
 - c) Context switch time
 - d) None
- 12) In a _____ real time system, it is guaranteed that critical real time tasks will be completed within their deadlines.
- a) Soft
 - b) Hard
 - c) Critical
 - d) None
- 13) The code that changes the value of semaphore is _____.
- a) Remainder section code
 - b) Non critical code
 - c) Critical Section Code
 - d) None
- 14) The no. of process completed per unit time is known as _____.
- a) Output
 - b) Throughputs
 - c) Efficiency
 - d) Capacity

Seat No.	
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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Answer any four of the following questions. 16

- a) Define time to market. Explain different design challenges of embedded system.
- b) What is pipelining? Draw and pipeline operation of ARM processor with an example.
- c) Explain the following instruction of ARM7 processor
 - 1) ASR
 - 2) LDRB
- d) Explain the following.
 - 1) RTC
 - 2) USB
 - 3) Memory management
- e) Draw and explain in brief the function of SPI communication protocol.

Q.3 Answer any two of the following questions. 12

- a) Define embedded system and what are the recent trend used in embedded system? Draw and explain in detail the structure of embedded system.
- b) Explain the following.
 - 1) Different operating modes of ARM processor
 - 2) Draw and explain cpsr of ARM
- c) With a neat dia. Explain the operation of DMA and DMAC in embedded system.

Section – II

Q.4 Answer any four of the following questions. 16

- a) Explain in detail Context switching.
- b) Define RTOS? Differentiate between soft and hard real time systems with example.
- c) Draw and explain the interfacing of touch screen to embedded system.
- d) Define task / Explain with neat dia. Different types of task state.
- e) Write in detail about Ucos and its features with a suitable example.

Q.5 Answer any two of the following questions. 12

- a) Explain the following.
 - 1) Mailbox
 - 2) Pipe
 - 3) Message Queue
 - 4) Timer
- b) What is priority inversion problem? How it is overcome explain in detail.
- c) Define semaphore? With a neat fig explain the function of semaphore in embedded system.

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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which of the following provides a buffer between the user and the low level interfaces to the hardware?
 - a) Operating system
 - b) Kernel
 - c) Software
 - d) Hardware
- 2) The Strategy of allowing processes that are logically runnable to be temporarily suspended is called _____.
 - a) Preemptive scheduling
 - b) Non preemptive scheduling
 - c) Shortest job first
 - d) None
- 3) Which of the following is a part of RTOS kernel?
 - a) Memory
 - b) Input
 - c) ISR
 - d) Register
- 4) Time required to synchronous switch from the context of one thread to the context of another thread is called _____.
 - a) Threads fly back time
 - b) Jitter
 - c) Context switch time
 - d) None
- 5) In a _____ real time system, it is guaranteed that critical real time tasks will be completed within their deadlines.
 - a) Soft
 - b) Hard
 - c) Critical
 - d) None
- 6) The code that changes the value of semaphore is _____.
 - a) Remainder section code
 - b) Non critical code
 - c) Critical Section Code
 - d) None
- 7) The no. of process completed per unit time is known as _____.
 - a) Output
 - b) Throughputs
 - c) Efficiency
 - d) Capacity
- 8) What are the essential tight constraint/s related to the design metrics of an embedded system?
 - a) Ability to fit on a single chip
 - b) Low power consumption
 - c) Fast data processing for real time operation
 - d) All of the above

- 9) What does an IC that initiate or enable the data transfer on bus can be regarded as, in accordance to the I2C protocol specifications?
- a) Bus master
 - b) Bus slave
 - c) Bus Driver
 - d) Bus data carries
- 10) While designing of embedded system which sub task orientation process allocates the time steps for various modules that share the similar resources?
- a) Simulation and Validation
 - b) Integration
 - c) Hardware and software partitioning
 - d) Scheduling
- 11) In LPC2148 which among the following is/are the functions of mask registers?
- a) Byte addressability
 - b) Reallocation to ARM local bus for faster possible I/O timing
 - c) Treating sets of port bits in the form of group without changing other bits
 - d) All of the above
- 12) Which of the following statement is true for the cache memory?
- a) Memory unit which communicates directly with the CPU
 - b) Provide backup storage
 - c) A very high speed memory to increase the speed of the processor
 - d) Secondary Storage
- 13) How many registers are there in ARM processor?
- a) 35 registers (28 GPR and 7 SFR)
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 - d) 35 register (30 GPR and 5 SFR)
- 14) When building, code for both ARM and THUMB states, which tool decides for each function call whether to use a BL or BLX instruction?
- a) The linker
 - b) The archiver
 - c) The complier
 - d) The assembler

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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Answer any four of the following questions. 16

- a) Define time to market. Explain different design challenges of embedded system.
- b) What is pipelining? Draw and pipeline operation of ARM processor with an example.
- c) Explain the following instruction of ARM7 processor
 - 1) ASR
 - 2) LDRB
- d) Explain the following.
 - 1) RTC
 - 2) USB
 - 3) Memory management
- e) Draw and explain in brief the function of SPI communication protocol.

Q.3 Answer any two of the following questions. 12

- a) Define embedded system and what are the recent trend used in embedded system? Draw and explain in detail the structure of embedded system.
- b) Explain the following.
 - 1) Different operating modes of ARM processor
 - 2) Draw and explain cpsr of ARM
- c) With a neat dia. Explain the operation of DMA and DMAC in embedded system.

Section – II

Q.4 Answer any four of the following questions. 16

- a) Explain in detail Context switching.
- b) Define RTOS? Differentiate between soft and hard real time systems with example.
- c) Draw and explain the interfacing of touch screen to embedded system.
- d) Define task / Explain with neat dia. Different types of task state.
- e) Write in detail about Ucos and its features with a suitable example.

Q.5 Answer any two of the following questions. 12

- a) Explain the following.
 - 1) Mailbox
 - 2) Pipe
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- b) What is priority inversion problem? How it is overcome explain in detail.
- c) Define semaphore? With a neat fig explain the function of semaphore in embedded system.

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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which of the following statement is true for the cache memory?
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- 2) How many registers are there in ARM processor?
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 - d) The assembler
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 - d) Hardware
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 - b) Non preemptive scheduling
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- 6) Which of the following is a part of RTOS kernel?
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 - d) Register
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 - c) Context switch time
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- 8) In a _____ real time system, it is guaranteed that critical real time tasks will be completed within their deadlines.
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- 9) The code that changes the value of semaphore is _____.
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- 11) What are the essential tight constraint/s related to the design metrics of an embedded system?
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- 12) What does an IC that initiate or enable the data transfer on bus can be regarded as, in accordance to the I2C protocol specifications?
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 - c) Bus Driver
 - d) Bus data carries
- 13) While designing of embedded system which sub task orientation process allocates the time steps for various modules that share the similar resources?
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 - b) Integration
 - c) Hardware and software partitioning
 - d) Scheduling
- 14) In LPC2148 which among the following is/are the functions of mask registers?
- a) Byte addressability
 - b) Reallocation to ARM local bus for faster possible I/O timing
 - c) Treating sets of port bits in the form of group without changing other bits
 - d) All of the above

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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Answer any four of the following questions. 16

- a) Define time to market. Explain different design challenges of embedded system.
- b) What is pipelining? Draw and pipeline operation of ARM processor with an example.
- c) Explain the following instruction of ARM7 processor
 - 1) ASR
 - 2) LDRB
- d) Explain the following.
 - 1) RTC
 - 2) USB
 - 3) Memory management
- e) Draw and explain in brief the function of SPI communication protocol.

Q.3 Answer any two of the following questions. 12

- a) Define embedded system and what are the recent trend used in embedded system? Draw and explain in detail the structure of embedded system.
- b) Explain the following.
 - 1) Different operating modes of ARM processor
 - 2) Draw and explain cpsr of ARM
- c) With a neat dia. Explain the operation of DMA and DMAC in embedded system.

Section – II

Q.4 Answer any four of the following questions. 16

- a) Explain in detail Context switching.
- b) Define RTOS? Differentiate between soft and hard real time systems with example.
- c) Draw and explain the interfacing of touch screen to embedded system.
- d) Define task / Explain with neat dia. Different types of task state.
- e) Write in detail about Ucos and its features with a suitable example.

Q.5 Answer any two of the following questions. 12

- a) Explain the following.
 - 1) Mailbox
 - 2) Pipe
 - 3) Message Queue
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- b) What is priority inversion problem? How it is overcome explain in detail.
- c) Define semaphore? With a neat fig explain the function of semaphore in embedded system.

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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which of the following is a part of RTOS kernel?
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 - b) Input
 - c) ISR
 - d) Register
- 2) Time required to synchronous switch from the context of one thread to the context of another thread is called _____.
 - a) Threads fly back time
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 - c) Context switch time
 - d) None
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- 4) The code that changes the value of semaphore is _____.
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- 9) In LPC2148 which among the following is/are the functions of mask registers?
- a) Byte addressability
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- 11) How many registers are there in ARM processor?
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 - c) 37 register (32 GPR and 6 SFR)
 - d) 35 register (30 GPR and 5 SFR)
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- a) The linker
 - b) The archiver
 - c) The compiler
 - d) The assembler
- 13) Which of the following provides a buffer between the user and the low level interfaces to the hardware?
- a) Operating system
 - b) Kernel
 - c) Software
 - d) Hardware
- 14) The Strategy of allowing processes that are logically runnable to be temporarily suspended is called _____.
- a) Preemptive scheduling
 - b) Non preemptive scheduling
 - c) Shortest job first
 - d) None

Seat No.	
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T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
EMBEDDED SYSTEMS

Day & Date: Wednesday, 27-11-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Answer any four of the following questions. 16

- a) Define time to market. Explain different design challenges of embedded system.
- b) What is pipelining? Draw and pipeline operation of ARM processor with an example.
- c) Explain the following instruction of ARM7 processor
 - 1) ASR
 - 2) LDRB
- d) Explain the following.
 - 1) RTC
 - 2) USB
 - 3) Memory management
- e) Draw and explain in brief the function of SPI communication protocol.

Q.3 Answer any two of the following questions. 12

- a) Define embedded system and what are the recent trend used in embedded system? Draw and explain in detail the structure of embedded system.
- b) Explain the following.
 - 1) Different operating modes of ARM processor
 - 2) Draw and explain cpsr of ARM
- c) With a neat dia. Explain the operation of DMA and DMAC in embedded system.

Section – II

Q.4 Answer any four of the following questions. 16

- a) Explain in detail Context switching.
- b) Define RTOS? Differentiate between soft and hard real time systems with example.
- c) Draw and explain the interfacing of touch screen to embedded system.
- d) Define task / Explain with neat dia. Different types of task state.
- e) Write in detail about Ucos and its features with a suitable example.

Q.5 Answer any two of the following questions. 12

- a) Explain the following.
 - 1) Mailbox
 - 2) Pipe
 - 3) Message Queue
 - 4) Timer
- b) What is priority inversion problem? How it is overcome explain in detail.
- c) Define semaphore? With a neat fig explain the function of semaphore in embedded system.

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Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
REHABILITATION ENGINEERING

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct alternatives from the options and rewrite the sentence. 14

- 1) Rehabilitation engineering aims to improve the quality of life of people with disabilities in functional areas, such as _____.
 - a) Mobility
 - b) Communication
 - c) Hearing
 - d) All above
- 2) According to World Health Organization (WHO) classification, an example of impairment is _____.
 - a) Ischemic brain damage
 - b) weakness of one arm
 - c) loss of ability to get dressed
 - d) need for an ankle-foot orthosis to walk
- 3) Endurance training is the ability to perform _____.
 - a) High intensity repetitive exercise over prolonged period of time
 - b) Low intensity repetitive exercise over short period of time
 - c) High intensity repetitive exercise over short period of time
 - d) Low intensity repetitive exercise over prolonged period of time
- 4) Handicap is _____.
 - a) How well a teacher predicts a student will do in a given course of study
 - b) The limitation of a function, such as cognitive processing or physical or sensory abilities
 - c) A learner with exceptionalities
 - d) A condition imposed on a person with disabilities by society, the physical environment, or the person's attitude.
- 5) The following is (are) the biomedical principles in ergonomics _____.
 - a) The joints should be kept as far as possible in a neutral position
 - b) Keeping work close to the body
 - c) The lifting must occur gradually in an even manner
 - d) All above
- 6) Comfort in prosthesis, quality of gait, energy, cost are all enhanced when the amputation preserves _____ to _____ of the tibia in a transtibial amputation.
 - a) 20 - 30%
 - b) 30 - 40%
 - c) 40 - 50%
 - d) 50 - 60%

- 7) Function and prosthetic control improve as _____.
a) Length of the residual limb increases
b) Length of the residual limb decreases
c) Length of the residual limb remains same
d) None
- 8) Amputation at the transtibial level (below the knee) occur at least _____ as often as amputations at other levels.
a) Half
b) Twice
c) Three times
d) Four times
- 9) One of the most common features of neurological disorders and language deficits and are collectively known as _____.
a) Dysphasias
b) Alogias
c) Anomias
d) Aphasias
- 10) Which of the following is best choice for the prosthesis?
a) Aluminum
b) Ceramic
c) Silicon
d) None
- 11) Distributes WB to Ischial shelf component population: Tibial plateau fractures
Mid to distal femur fractures.
a) ADL Training: Elevation
b) Patellofemoral orthosis
c) Purpose of heel/ sole wedges
d) KAFO and HKAFO fracture orthosis
- 12) Less than _____ inches may be insufficient length for prosthetic control.
a) 2
b) 3
c) 4
d) 5
- 13) Recovery from aphasia is usually complete within six months of treatment.
a) True
b) False
- 14) Which plastic is commonly used in prefabricated AFOs?
a) Polypropylene
b) Polyethylene
c) Transpolysoprene
d) Polyeapriolactone

Seat No.	
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**B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
REHABILITATION ENGINEERING**

Day & Date: Saturday, 07-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

Section – I

- Q.2 Answer Any Four.** **16**
- Explain the importance of psychiatry in functional diagnosis.
 - Explain the function and its use of human components in rehabilitation.
 - Explain in detail methods of training relaxation.
 - Explain in detail gait analysis technique in therapeutic exercise.
 - Explain the function of following.
 - Corrective therapist
 - Social worker in rehabilitation team

- Q.3 Answer Any Two.** **12**
- Define Rehabilitation? List and explain in detail different types of rehabilitation.
 - Explain the following in detail.
 - Primary and secondary disabilities of rehabilitation
 - Endurance exercises
 - Explain the following.
 - Key ergonomic principles
 - Practices of rehabilitation

Section – II

- Q.4 Answer Any Four.** **16**
- Define orthotics? Classify and explain types of orthotics in rehabilitation engineering.
 - Explain in detail orthotic knee joint.
 - Write a short note on AFO and KAFO.
 - Explain different level amputation in upper limb.
 - Write and explain different types of visual aids.

- Q.5 Attempt Any Two.** **12**
- Explain the following
 - Aphasia, its types and procedure for its treatment
 - Explain the general principles of orthosis and prosthesis
 - Explain in detail the designing of prosthetic arm.
 - Explain the types of conventional hearing aids and augmentive hearing aids in detail.

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
REHABILITATION ENGINEERING

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct alternatives from the options and rewrite the sentence. 14

- 1) Amputation at the transtibial level (below the knee) occur at least _____ as often as amputations at other levels.
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- 2) One of the most common features of neurological disorders and language deficits and are collectively known as _____.
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 - b) The limitation of a function, such as cognitive processing or physical or sensory abilities
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- 12) The following is (are) the biomedical principles in ergonomics _____.
- a) The joints should be kept as far as possible in a neutral position
 - b) Keeping work close to the body
 - c) The lifting must occur gradually in an even matter
 - d) All above
- 13) Comport in prosthesis, quality of gait, energy, cost are all enhanced when the amputation preserves _____ to _____ of the tibia in a transtibial amputation.
- a) 20 - 30%
 - b) 30 - 40%
 - c) 40 - 50%
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- 14) Function and prosthetic control improve as _____.
- a) Length of the residual limb increases
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Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
REHABILITATION ENGINEERING

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Answer Any Four. 16

- a) Explain the importance of psychiatry in functional diagnosis.
- b) Explain the function and its use of human components in rehabilitation.
- c) Explain in detail methods of training relaxation.
- d) Explain in detail gait analysis technique in therapeutic exercise.
- e) Explain the function of following.
 - 1) Corrective therapist
 - 2) Social worker in rehabilitation team

Q.3 Answer Any Two. 12

- a) Define Rehabilitation? List and explain in detail different types of rehabilitation.
- b) Explain the following in detail.
 - 1) Primary and secondary disabilities of rehabilitation
 - 2) Endurance exercises
- c) Explain the following.
 - 1) Key ergonomic principles
 - 2) Practices of rehabilitation

Section – II

Q.4 Answer Any Four. 16

- a) Define orthotics? Classify and explain types of orthotics in rehabilitation engineering.
- b) Explain in detail orthotic knee joint.
- c) Write a short note on AFO and KAFO.
- d) Explain different level amputation in upper limb.
- e) Write and explain different types of visual aids.

Q.5 Attempt Any Two. 12

- a) Explain the following
 - 1) Aphasia, its types and procedure for its treatment
 - 2) Explain the general principles of orthosis and prosthesis
- b) Explain in detail the designing of prosthetic arm.
- c) Explain the types of conventional hearing aids and augmentive hearing aids in detail.

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
REHABILITATION ENGINEERING

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct alternatives from the options and rewrite the sentence. 14

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c) 40 - 50%	d) 50 - 60%
- 3) Function and prosthetic control improve as _____.
 - a) Length of the residual limb increases
 - b) Length of the residual limb decreases
 - c) Length of the residual limb remains same
 - d) None
- 4) Amputation at the transtibial level (below the knee) occur at least _____ as often as amputations at other levels.

a) Half	b) Twice
c) Three times	d) Four times
- 5) One of the most common features of neurological disorders and language deficits and are collectively known as _____.

a) Dysphasias	b) Alogias
c) Anomias	d) Aphasias
- 6) Which of the following is best choice for the prosthesis?

a) Aluminum	b) Ceramic
c) Silicon	d) None
- 7) Distributes WB to Ischial shelf component population: Tibial plateau fractures
 Mid to distal femur fractures.
 - a) ADL Training: Elevation
 - b) Patellofemoral orthosis
 - c) Purpose of heel/ sole wedges
 - d) KAFO and HKAFO fracture orthosis
- 8) Less than _____ inches may be insufficient length for prosthetic control.

a) 2	b) 3
c) 4	d) 5

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
REHABILITATION ENGINEERING

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Answer Any Four. 16

- a) Explain the importance of psychiatry in functional diagnosis.
- b) Explain the function and its use of human components in rehabilitation.
- c) Explain in detail methods of training relaxation.
- d) Explain in detail gait analysis technique in therapeutic exercise.
- e) Explain the function of following.
 - 1) Corrective therapist
 - 2) Social worker in rehabilitation team

Q.3 Answer Any Two. 12

- a) Define Rehabilitation? List and explain in detail different types of rehabilitation.
- b) Explain the following in detail.
 - 1) Primary and secondary disabilities of rehabilitation
 - 2) Endurance exercises
- c) Explain the following.
 - 1) Key ergonomic principles
 - 2) Practices of rehabilitation

Section – II

Q.4 Answer Any Four. 16

- a) Define orthotics? Classify and explain types of orthotics in rehabilitation engineering.
- b) Explain in detail orthotic knee joint.
- c) Write a short note on AFO and KAFO.
- d) Explain different level amputation in upper limb.
- e) Write and explain different types of visual aids.

Q.5 Attempt Any Two. 12

- a) Explain the following
 - 1) Aphasia, its types and procedure for its treatment
 - 2) Explain the general principles of orthosis and prosthesis
- b) Explain in detail the designing of prosthetic arm.
- c) Explain the types of conventional hearing aids and augmentive hearing aids in detail.

Seat No.	
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Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
REHABILITATION ENGINEERING

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct alternatives from the options and rewrite the sentence. 14

- 1) Which of the following is best choice for the prosthesis?
 - a) Aluminum
 - b) Ceramic
 - c) Silicon
 - d) None
- 2) Distributes WB to Ischial shelf component population: Tibial plateau fractures
 Mid to distal femur fractures.
 - a) ADL Training: Elevation
 - b) Patellofemoral orthosis
 - c) Purpose of heel/ sole wedges
 - d) KAFO and HKAFO fracture orthosis
- 3) Less than _____ inches may be insufficient length for prosthetic control.
 - a) 2
 - b) 3
 - c) 4
 - d) 5
- 4) Recovery from aphasia is usually complete within six months of treatment.
 - a) True
 - b) False
- 5) Which plastic is commonly used in prefabricated AFOs?
 - a) Polypropylene
 - b) Polyethylene
 - c) Transpolysoprene
 - d) Polyeapriolactone
- 6) Rehabilitation engineering aims to improves the quality of life of people with disabilities in functional areas, such as _____.
 - a) Mobility
 - b) Communication
 - c) Hearing
 - d) All above
- 7) According to World Health Organization (WHO) classification, an example of impairment is _____.
 - a) Ischemic brain damage
 - b) weakness of one arm
 - c) loss of ability to get dressed
 - d) need for an ankle-foot orthosis to walk
- 8) Endurance training is the ability to perform _____.
 - a) High intensity repetitive exercise over prolonged period of time
 - b) Low intensity repetitive exercise over short period of time
 - c) High intensity repetitive exercise over short period of time
 - d) Low intensity repetitive exercise over prolonged period of time

- 9) Handicap is _____.
- a) How well a teacher predicts a student will do in a given course of study
 - b) The limitation of a function, such as cognitive processing or physical or sensory abilities
 - c) A learner with exceptionalities
 - d) A condition imposed on a person with disabilities by society, the physical environment, or the person's attitude.
- 10) The following is (are) the biomedical principles in ergonomics _____.
- a) The joints should be kept as far as possible in a neutral position
 - b) Keeping work close to the body
 - c) The lifting must occur gradually in an even matter
 - d) All above
- 11) Comport in prosthesis, quality of gait, energy, cost are all enhanced when the amputation preserves _____ to _____ of the tibia in a transtibial amputation.
- a) 20 - 30%
 - b) 30 - 40%
 - c) 40 - 50%
 - d) 50 - 60%
- 12) Function and prosthetic control improve as _____.
- a) Length of the residual limb increases
 - b) Length of the residual limb decreases
 - c) Length of the residual limb remains same
 - d) None
- 13) Amputation at the transtibial level (below the knee) occur at least _____ as often as amputations at other levels.
- a) Half
 - b) Twice
 - c) Three times
 - d) Four times
- 14) One of the most common features of neurological disorders and language deficits and are collectively known as _____.
- a) Dysphasias
 - b) Alogias
 - c) Anomias
 - d) Aphasias

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
REHABILITATION ENGINEERING

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Answer Any Four.** **16**
- Explain the importance of psychiatry in functional diagnosis.
 - Explain the function and its use of human components in rehabilitation.
 - Explain in detail methods of training relaxation.
 - Explain in detail gait analysis technique in therapeutic exercise.
 - Explain the function of following.
 - Corrective therapist
 - Social worker in rehabilitation team

- Q.3 Answer Any Two.** **12**
- Define Rehabilitation? List and explain in detail different types of rehabilitation.
 - Explain the following in detail.
 - Primary and secondary disabilities of rehabilitation
 - Endurance exercises
 - Explain the following.
 - Key ergonomic principles
 - Practices of rehabilitation

Section – II

- Q.4 Answer Any Four.** **16**
- Define orthotics? Classify and explain types of orthotics in rehabilitation engineering.
 - Explain in detail orthotic knee joint.
 - Write a short note on AFO and KAFO.
 - Explain different level amputation in upper limb.
 - Write and explain different types of visual aids.

- Q.5 Attempt Any Two.** **12**
- Explain the following
 - Aphasia, its types and procedure for its treatment
 - Explain the general principles of orthosis and prosthesis
 - Explain in detail the designing of prosthetic arm.
 - Explain the types of conventional hearing aids and augmentive hearing aids in detail.

Seat No.	
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Set **P**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which of the following is the content of MI?
 - a) Patients records
 - b) Data processing
 - c) Both a and b
 - d) None
- 2) Which of the following is the function of operation theatre module?
 - a) Complication
 - b) Drug to drug interaction facilities
 - c) Pre anesthetic check up
 - d) Both a and c
- 3) Incomplete functionality of HMIS occurs because of _____.
 - a) Lack of computer awareness
 - b) Unavailability of component
 - c) Disconnection in the network
 - d) All above
- 4) Converting numeric representation of an object into visual representation is called _____.
 - a) Render
 - b) Data converter
 - c) image converter
 - d) None
- 5) In computer assisted surgery _____ provides image guidance for the surgeon.
 - a) The nurse
 - b) Patient
 - c) Helper
 - d) The computer
- 6) The resolution of the image depends upon the number of _____ in a given area.
 - a) Voxels
 - b) Bits
 - c) Pixels
 - d) Bytes
- 7) Tele education consists of _____ education through website.
 - a) Only real time video conferencing
 - b) Only non-real time education
 - c) Both a and b
 - d) None
- 8) Tele- surgery has the following characteristics _____.
 - a) Reliability
 - b) Low data error
 - c) Acceptable end to end delay
 - d) All above
- 9) BERTA is _____.
 - a) 2D volume rendering software
 - b) ID volume rendering software
 - c) Both a and b
 - d) 3D volume rendering software

- 10) Telemedicine includes _____ Via telephone /fax.
a) Video conferencing b) Digital image transmission
c) Both a and b d) None
- 11) The scan converter helps in _____ presentation directly through the video conferencing system.
a) Transmitting b) Converting
c) Receiving d) Storing
- 12) Simulation has the potential to offer for more _____ images than theoretical analysis.
a) Accurate b) Different
c) Compression d) Blurring
- 13) Visualizer provides _____ image of visible human as.
a) 2D b) 3D
c) 4D d) None
- 14) Which of the following device is medical peripheral device?
a) Video camera b) Scan converter
c) Microscope d) All above

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All question are compulsory
 2) Figures to the right indicate full marks.

Section – I

Q.2 Answer Any Four. 16

- a) What is HMIS? Write its advantages and disadvantages of HMIS.
- b) Explain the facilities of online learning software used in MI.
- c) Explain the function of radiology and blood bank module.
- d) Explain legal security and private issues in CPR.
- e) Explain different development tools of CPR.

Q.3 Answer Any Two. 12

- a) Define MI? Explain in detail scope and salient feature of MI.
- b) What is AI? Explain different materials and methods used for Expert system.
- c) Explain the following
 - 1) Diasaster management plans
 - 2) Function of internet and intranet in MI

Section – II

Q.4 Answer Any Four. 16

- a) Explain 3-D navigation system used in CAS.
- b) Explain the advantages of simulators in surgical simulation.
- c) What is telemedicine? Explain different material and methods used for telemedicine (Any two).
- d) Explain reliability and cost analysis of telemedicine.
- e) Write a note on virtual environment (VE).

Q.5 Answer any Two. 12

- a) What is CAME? Explain different education software used in CAME.
- b) Define telesurgery? Explain in detail robotic surgery.
- c) Explain the following
 - 1) Limitation of conventional surgery
 - 2) Human resources available in surgical simulation

- 11) Converting numeric representation of an object into visual representation is called _____.
- a) Render
 - b) Data converter
 - c) image converter
 - d) None
- 12) In computer assisted surgery _____ provides image guidance for the surgeon.
- a) The nurse
 - b) Patient
 - c) Helper
 - d) The computer
- 13) The resolution of the image depends upon the number of _____ in a given area.
- a) Voxels
 - b) Bits
 - c) Pixels
 - d) Bytes
- 14) Tele education consists of _____ education through website.
- a) Only real time video conferencing
 - b) Only non-real time education
 - c) Both a and b
 - d) None

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All question are compulsory
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Answer Any Four. 16**
- a) What is HMIS? Write its advantages and disadvantages of HMIS.
 - b) Explain the facilities of online learning software used in MI.
 - c) Explain the function of radiology and blood bank module.
 - d) Explain legal security and private issues in CPR.
 - e) Explain different development tools of CPR.

- Q.3 Answer Any Two. 12**
- a) Define MI? Explain in detail scope and salient feature of MI.
 - b) What is AI? Explain different materials and methods used for Expert system.
 - c) Explain the following
 - 1) Diasaster management plans
 - 2) Function of internet and intranet in MI

Section – II

- Q.4 Answer Any Four. 16**
- a) Explain 3-D navigation system used in CAS.
 - b) Explain the advantages of simulators in surgical simulation.
 - c) What is telemedicine? Explain different material and methods used for telemedicine (Any two).
 - d) Explain reliability and cost analysis of telemedicine.
 - e) Write a note on virtual environment (VE).

- Q.5 Answer any Two. 12**
- a) What is CAME? Explain different education software used in CAME.
 - b) Define telesurgery? Explain in detail robotic surgery.
 - c) Explain the following
 - 1) Limitation of conventional surgery
 - 2) Human resources available in surgical simulation

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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) In computer assisted surgery _____ provides image guidance for the surgeon.

a) The nurse	b) Patient
c) Helper	d) The computer
- 2) The resolution of the image depends upon the number of _____ in a given area.

a) Voxels	b) Bits
c) Pixels	d) Bytes
- 3) Tele education consists of _____ education through website.

a) Only real time video conferencing	b) Only non-real time education
c) Both a and b	d) None
- 4) Tele- surgery has the following characteristics _____.

a) Reliability	b) Low data error
c) Acceptable end to end delay	d) All above
- 5) BERTA is _____.

a) 2D volume rendering software	b) ID volume rendering software
c) Both a and b	d) 3D volume rendering software
- 6) Telemedicine includes _____ Via telephone /fax.

a) Video conferencing	b) Digital image transmission
c) Both a and b	d) None
- 7) The scan converter helps in _____ presentation directly through the video conferencing system.

a) Transmitting	b) Converting
c) Receiving	d) Storing
- 8) Simulation has the potential to offer for more _____ images than theoretical analysis.

a) Accurate	b) Different
c) Compression	d) Blurring

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All question are compulsory
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Answer Any Four. 16**
- a) What is HMIS? Write its advantages and disadvantages of HMIS.
 - b) Explain the facilities of online learning software used in MI.
 - c) Explain the function of radiology and blood bank module.
 - d) Explain legal security and private issues in CPR.
 - e) Explain different development tools of CPR.

- Q.3 Answer Any Two. 12**
- a) Define MI? Explain in detail scope and salient feature of MI.
 - b) What is AI? Explain different materials and methods used for Expert system.
 - c) Explain the following
 - 1) Diasaster management plans
 - 2) Function of internet and intranet in MI

Section – II

- Q.4 Answer Any Four. 16**
- a) Explain 3-D navigation system used in CAS.
 - b) Explain the advantages of simulators in surgical simulation.
 - c) What is telemedicine? Explain different material and methods used for telemedicine (Any two).
 - d) Explain reliability and cost analysis of telemedicine.
 - e) Write a note on virtual environment (VE).

- Q.5 Answer any Two. 12**
- a) What is CAME? Explain different education software used in CAME.
 - b) Define telesurgery? Explain in detail robotic surgery.
 - c) Explain the following
 - 1) Limitation of conventional surgery
 - 2) Human resources available in surgical simulation

Seat No.	
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Set **S**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Telemedicine includes _____ Via telephone /fax.
 - a) Video conferencing
 - b) Digital image transmission
 - c) Both a and b
 - d) None
- 2) The scan converter helps in _____ presentation directly through the video conferencing system.
 - a) Transmitting
 - b) Converting
 - c) Receiving
 - d) Storing
- 3) Simulation has the potential to offer for more _____ images than theoretical analysis.
 - a) Accurate
 - b) Different
 - c) Compression
 - d) Blurring
- 4) Visualizer provides _____ image of visible human as.
 - a) 2D
 - b) 3D
 - c) 4D
 - d) None
- 5) Which of the following device is medical peripheral device?
 - a) Video camera
 - b) Scan converter
 - c) Microscope
 - d) All above
- 6) Which of the following is the content of MI?
 - a) Patients records
 - b) Data processing
 - c) Both a and b
 - d) None
- 7) Which of the following is the function of operation theatre module?
 - a) Complication
 - b) Drug to drug interaction facilities
 - c) Pre anesthetic check up
 - d) Both a and c
- 8) Incomplete functionality of HMIS occurs because of _____.
 - a) Lack of computer awareness
 - b) Unavailability of component
 - c) Disconnection in the network
 - d) All above
- 9) Converting numeric representation of an object into visual representation is called _____.
 - a) Render
 - b) Data converter
 - c) image converter
 - d) None

- 10) In computer assisted surgery _____ provides image guidance for the surgeon.
- a) The nurse
 - b) Patient
 - c) Helper
 - d) The computer
- 11) The resolution of the image depends upon the number of _____ in a given area.
- a) Voxels
 - b) Bits
 - c) Pixels
 - d) Bytes
- 12) Tele education consists of _____ education through website.
- a) Only real time video conferencing
 - b) Only non-real time education
 - c) Both a and b
 - d) None
- 13) Tele- surgery has the following characteristics _____.
- a) Reliability
 - b) Low data error
 - c) Acceptable end to end delay
 - d) All above
- 14) BERTA is _____.
- a) 2D volume rendering software
 - b) ID volume rendering software
 - c) Both a and b
 - d) 3D volume rendering software

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All question are compulsory
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Answer Any Four. 16**
- a) What is HMIS? Write its advantages and disadvantages of HMIS.
 - b) Explain the facilities of online learning software used in MI.
 - c) Explain the function of radiology and blood bank module.
 - d) Explain legal security and private issues in CPR.
 - e) Explain different development tools of CPR.

- Q.3 Answer Any Two. 12**
- a) Define MI? Explain in detail scope and salient feature of MI.
 - b) What is AI? Explain different materials and methods used for Expert system.
 - c) Explain the following
 - 1) Diasaster management plans
 - 2) Function of internet and intranet in MI

Section – II

- Q.4 Answer Any Four. 16**
- a) Explain 3-D navigation system used in CAS.
 - b) Explain the advantages of simulators in surgical simulation.
 - c) What is telemedicine? Explain different material and methods used for telemedicine (Any two).
 - d) Explain reliability and cost analysis of telemedicine.
 - e) Write a note on virtual environment (VE).

- Q.5 Answer any Two. 12**
- a) What is CAME? Explain different education software used in CAME.
 - b) Define telesurgery? Explain in detail robotic surgery.
 - c) Explain the following
 - 1) Limitation of conventional surgery
 - 2) Human resources available in surgical simulation

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Ultrasonic generators are constructed on the _____ effect.
 - a) Ultrasound
 - b) Doppler
 - c) Piezo electric
 - d) none of above
- 2) The ultrasound transducer is made up of _____ crystal.
 - a) Copper
 - b) Silver
 - c) Aluminum
 - d) lead zirconate titanate
- 3) Galvanic current produces _____ effect in human body.
 - a) chemical
 - b) physiological
 - c) anatomical
 - d) physical
- 4) Faradic current is a sequence of _____ with defined shape and current density.
 - a) numbers
 - b) shocks
 - c) pulses
 - d) potentials
- 5) The frequency of surgical diathermy ranges from _____ MHz.
 - a) 1-3
 - b) 20-30
 - c) 40-80
 - d) 10-20
- 6) _____ refers to the superficial tissue destruction without affecting deep seated tissues.
 - a) Cut
 - b) Coagulation
 - c) Desiccation
 - d) Fulguration
- 7) _____ mode needs needle type of electrode in surgical unit.
 - a) Cut
 - b) Coagulation
 - c) Desiccation
 - d) Fulguration
- 8) The fluid removal during dialysis takes place due to _____ pressure gradient.
 - a) hydrostatic
 - b) drift
 - c) diffusion
 - d) ultrafiltration
- 9) Blood pump is designed to give blood flow at a rate of _____ ml/min.
 - a) 10 to 50
 - b) 50 to 350
 - c) 400 to 550
 - d) 0 to 110

Seat No.	
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Set	P
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Explain applications techniques of short wave diathermy with neat figures.
 - b) Define and differentiate between internal and external pacemaker.
 - c) List various performance aspects of implantable pacemaker.
 - d) Define Cut, Coagulation, and Desiccation and fulguration modes of surgical diathermy.
 - e) Draw and explain various output current waveforms of nerve muscle stimulator.
- Q.3 Attempt any two. 12**
- a) Discuss unipolar and bipolar modes of ESU. Draw and explain circuit of coagulation mode.
 - b) Draw circuit diagram and explain working of ultrasonic therapy unit. Mention its applications.
 - c) Draw circuit diagram and explain working of rate generator and pace pulse generator of cardiac pacemaker.

Section – II

- Q.4 Attempt any four. 16**
- a) Define and differentiate between AC and DC defibrillator.
 - b) Explain any 2 types of dialyzers with neat figures.
 - c) Explain the principle of dialysis machine.
 - d) Draw and explain circuit for monitoring conductivity of dialysate.
 - e) Explain how capacitor discharges in INST mode used in defibrillator.
- Q.5 Attempt any two. 12**
- a) Discuss principle of LASER and list various LASER techniques and explain any 2 in detail.
 - b) Draw and explain working of dialysis machine in detail and mention the precautions that has to be taken in procedure.
 - c) Explain the need and working of heart rate variability meter. Mention its applications.

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The fluid removal during dialysis takes place due to _____ pressure gradient.
 - a) hydrostatic
 - b) drift
 - c) diffusion
 - d) ultrafiltration
- 2) Blood pump is designed to give blood flow at a rate of _____ ml/min.
 - a) 10 to 50
 - b) 50 to 350
 - c) 400 to 550
 - d) 0 to 110
- 3) The interaction between the laser beam and the tissue is determined by the _____.
 - a) dose
 - b) tissue size
 - c) wavelength
 - d) velocity
- 4) Short wave diathermy has a working frequency of _____ MHz.
 - a) 27.12
 - b) 1-5
 - c) 76
 - d) 2150
- 5) The impulses originating from heart is through _____.
 - a) A-V node
 - b) S.A. node
 - c) Purkinje fibers
 - d) Bundle of his
- 6) The life of a pacemaker is determined by _____ consumption of the electronic circuit.
 - a) voltage
 - b) frequency
 - c) current
 - d) pulses
- 7) Ventricular fibrillation can be converted into efficient rhythm by applying high _____ shock to the heart.
 - a) voltage
 - b) frequency
 - c) current
 - d) energy
- 8) Ultrasonic generators are constructed on the _____ effect.
 - a) Ultrasound
 - b) Doppler
 - c) Piezo electric
 - d) none of above
- 9) The ultrasound transducer is made up of _____ crystal.
 - a) Copper
 - b) Silver
 - c) Aluminum
 - d) lead zirconate titanate

Seat No.	
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Set

Q

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four.** **16**
- a) Explain applications techniques of short wave diathermy with neat figures.
 - b) Define and differentiate between internal and external pacemaker.
 - c) List various performance aspects of implantable pacemaker.
 - d) Define Cut, Coagulation, and Desiccation and fulguration modes of surgical diathermy.
 - e) Draw and explain various output current waveforms of nerve muscle stimulator.
- Q.3 Attempt any two.** **12**
- a) Discuss unipolar and bipolar modes of ESU. Draw and explain circuit of coagulation mode.
 - b) Draw circuit diagram and explain working of ultrasonic therapy unit. Mention its applications.
 - c) Draw circuit diagram and explain working of rate generator and pace pulse generator of cardiac pacemaker.

Section – II

- Q.4 Attempt any four.** **16**
- a) Define and differentiate between AC and DC defibrillator.
 - b) Explain any 2 types of dialyzers with neat figures.
 - c) Explain the principle of dialysis machine.
 - d) Draw and explain circuit for monitoring conductivity of dialysate.
 - e) Explain how capacitor discharges in INST mode used in defibrillator.
- Q.5 Attempt any two.** **12**
- a) Discuss principle of LASER and list various LASER techniques and explain any 2 in detail.
 - b) Draw and explain working of dialysis machine in detail and mention the precautions that has to be taken in procedure.
 - c) Explain the need and working of heart rate variability meter. Mention its applications.

Seat No.	
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Set **R**

B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The frequency of surgical diathermy ranges from _____ MHz.
 - a) 1-3
 - b) 20-30
 - c) 40-80
 - d) 10-20
- 2) _____ refers to the superficial tissue destruction without affecting deep seated tissues.
 - a) Cut
 - b) Coagulation
 - c) Desiccation
 - d) Fulguration
- 3) _____ mode needs needle type of electrode in surgical unit.
 - a) Cut
 - b) Coagulation
 - c) Desiccation
 - d) Fulguration
- 4) The fluid removal during dialysis takes place due to _____ pressure gradient.
 - a) hydrostatic
 - b) drift
 - c) diffusion
 - d) ultrafiltration
- 5) Blood pump is designed to give blood flow at a rate of _____ ml/min.
 - a) 10 to 50
 - b) 50 to 350
 - c) 400 to 550
 - d) 0 to 110
- 6) The interaction between the laser beam and the tissue is determined by the _____.
 - a) dose
 - b) tissue size
 - c) wavelength
 - d) velocity
- 7) Short wave diathermy has a working frequency of _____ MHz.
 - a) 27.12
 - b) 1-5
 - c) 76
 - d) 2150
- 8) The impulses originating from heart is through _____.
 - a) A-V node
 - b) S.A. node
 - c) Purkinje fibers
 - d) Bundle of his
- 9) The life of a pacemaker is determined by _____ consumption of the electronic circuit.
 - a) voltage
 - b) frequency
 - c) current
 - d) pulses

- 10) Ventricular fibrillation can be converted into efficient rhythm by applying high _____ shock to the heart.
- | | |
|------------|--------------|
| a) voltage | b) frequency |
| c) current | d) energy |
- 11) Ultrasonic generators are constructed on the _____ effect.
- | | |
|-------------------|------------------|
| a) Ultrasound | b) Doppler |
| c) Piezo electric | d) none of above |
- 12) The ultrasound transducer is made up of _____ crystal.
- | | |
|-------------|----------------------------|
| a) Copper | b) Silver |
| c) Aluminum | d) lead zirconate titanate |
- 13) Galvanic current produces _____ effect in human body.
- | | |
|---------------|------------------|
| a) chemical | b) physiological |
| c) anatomical | d) physical |
- 14) Faradic current is a sequence of _____ with defined shape and current density.
- | | |
|------------|---------------|
| a) numbers | b) shocks |
| c) pulses | d) potentials |

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Explain applications techniques of short wave diathermy with neat figures.
 - b) Define and differentiate between internal and external pacemaker.
 - c) List various performance aspects of implantable pacemaker.
 - d) Define Cut, Coagulation, and Desiccation and fulguration modes of surgical diathermy.
 - e) Draw and explain various output current waveforms of nerve muscle stimulator.
- Q.3 Attempt any two. 12**
- a) Discuss unipolar and bipolar modes of ESU. Draw and explain circuit of coagulation mode.
 - b) Draw circuit diagram and explain working of ultrasonic therapy unit. Mention its applications.
 - c) Draw circuit diagram and explain working of rate generator and pace pulse generator of cardiac pacemaker.

Section – II

- Q.4 Attempt any four. 16**
- a) Define and differentiate between AC and DC defibrillator.
 - b) Explain any 2 types of dialyzers with neat figures.
 - c) Explain the principle of dialysis machine.
 - d) Draw and explain circuit for monitoring conductivity of dialysate.
 - e) Explain how capacitor discharges in INST mode used in defibrillator.
- Q.5 Attempt any two. 12**
- a) Discuss principle of LASER and list various LASER techniques and explain any 2 in detail.
 - b) Draw and explain working of dialysis machine in detail and mention the precautions that has to be taken in procedure.
 - c) Explain the need and working of heart rate variability meter. Mention its applications.

Seat No.	
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Set	S
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INSTRUMENTATION III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Explain applications techniques of short wave diathermy with neat figures.
 - b) Define and differentiate between internal and external pacemaker.
 - c) List various performance aspects of implantable pacemaker.
 - d) Define Cut, Coagulation, and Desiccation and fulguration modes of surgical diathermy.
 - e) Draw and explain various output current waveforms of nerve muscle stimulator.

- Q.3 Attempt any two. 12**
- a) Discuss unipolar and bipolar modes of ESU. Draw and explain circuit of coagulation mode.
 - b) Draw circuit diagram and explain working of ultrasonic therapy unit. Mention its applications.
 - c) Draw circuit diagram and explain working of rate generator and pace pulse generator of cardiac pacemaker.

Section – II

- Q.4 Attempt any four. 16**
- a) Define and differentiate between AC and DC defibrillator.
 - b) Explain any 2 types of dialyzers with neat figures.
 - c) Explain the principle of dialysis machine.
 - d) Draw and explain circuit for monitoring conductivity of dialysate.
 - e) Explain how capacitor discharges in INST mode used in defibrillator.

- Q.5 Attempt any two. 12**
- a) Discuss principle of LASER and list various LASER techniques and explain any 2 in detail.
 - b) Draw and explain working of dialysis machine in detail and mention the precautions that has to be taken in procedure.
 - c) Explain the need and working of heart rate variability meter. Mention its applications.

Seat No.	
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Set **P**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four.** **16**
- a) Discuss the process of image formation in the eye briefly.
 - b) What is meant by spatial domain and resolution? Define governing factor.
 - c) Differentiate between point operation and neighborhood operation.
 - d) Explain working of anti aliasing filter.
 - e) Define and differentiate uniform and non uniform sampling.
- Q.3 Attempt any two.** **12**
- a) Describe in detail how Hough transform is used for boundary shape detection with an example.
 - b) Explain the mentioned basic frequency domain filters:
 - 1) Ideal low pass
 - 2) Gaussian low pass
 - c) Explain edge linking and quantization processes one example:

Section – II

- Q.4 Attempt any four.** **16**
- a) Describe opening and closing operation in detail with one example.
 - b) State and explain the difference between 2D-DST and DCT.
 - c) Derive the separability and shifting property of DFT and mention its any 2 applications.
 - d) Explain Hit & Miss Function and their role in image processing.
 - e) Explain concepts of lossy compression and feature extraction.
- Q.5 Attempt any two.** **12**
- a) Generate Harr matrix of size 4 and comment on the result.
 - b) Explain any 2 image reconstruction techniques in CT scanning with an example.
 - c) Describe image compression techniques in detail with each of example.

Seat No.	
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B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Replication of pixels is called _____.
 a) coding redundancy b) spatial redundancy
 c) temporal redundancy d) both b and c
- 2) Dynamic range of imaging system is a ratio where the upper limit is determined by _____.
 a) Saturation b) Noise
 c) Brightness d) Contrast
- 3) Transforming difference between adjacent pixels is called _____.
 a) mapping b) image compression
 c) Image watermarking d) image equalization
- 4) Shannon's theorem is also called _____.
 a) noiseless coding theorem b) noisy coding theorem
 c) coding theorem d) noiseless theorem
- 5) Shrinking of image is viewed as _____.
 a) under sampling b) over sampling
 c) critical sampling d) nyquist sampling
- 6) Gaussian noise is referred to as _____.
 a) red noise b) black noise
 c) white noise d) normal noise
- 7) Closing is used for _____.
 a) separation b) Compression
 c) decompression d) filling hole
- 8) To avoid negative values taking absolute values in lapacian image doubles _____.
 a) thickness of lines b) thinness of lines
 c) thickness of edges d) thinness of edges
- 9) Gradient magnitude images are more useful in _____.
 a) point detection b) line detection
 c) area detection d) edge detection
- 10) For noise reduction we use _____.
 a) image smoothing b) image contouring
 c) Image enhancement d) image recognition

Seat No.	
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Set **Q**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four. 16**
- a) Discuss the process of image formation in the eye briefly.
 - b) What is meant by spatial domain and resolution? Define governing factor.
 - c) Differentiate between point operation and neighborhood operation.
 - d) Explain working of anti aliasing filter.
 - e) Define and differentiate uniform and non uniform sampling.
- Q.3 Attempt any two. 12**
- a) Describe in detail how Hough transform is used for boundary shape detection with an example.
 - b) Explain the mentioned basic frequency domain filters:
 - 1) Ideal low pass
 - 2) Gaussian low pass
 - c) Explain edge linking and quantization processes one example:

Section – II

- Q.4 Attempt any four. 16**
- a) Describe opening and closing operation in detail with one example.
 - b) State and explain the difference between 2D-DST and DCT.
 - c) Derive the separability and shifting property of DFT and mention its any 2 applications.
 - d) Explain Hit & Miss Function and their role in image processing.
 - e) Explain concepts of lossy compression and feature extraction.
- Q.5 Attempt any two. 12**
- a) Generate Harr matrix of size 4 and comment on the result.
 - b) Explain any 2 image reconstruction techniques in CT scanning with an example.
 - c) Describe image compression techniques in detail with each of example.

- 11) To avoid negative values taking absolute values in lapacian image doubles _____.
a) thickness of lines b) thinness of lines
c) thickness of edges d) thinness of edges
- 12) Gradient magnitude images are more useful in _____.
a) point detection b) line detection
c) area detection d) edge detection
- 13) For noise reduction we use _____.
a) image smoothing b) image contouring
c) Image enhancement d) image recognition
- 14) Segmentation is difficult for images that are _____.
a) trivial b) non trivial
c) illuminated d) low resolution

Seat No.	
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Set **R**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four.** **16**
- a) Discuss the process of image formation in the eye briefly.
 - b) What is meant by spatial domain and resolution? Define governing factor.
 - c) Differentiate between point operation and neighborhood operation.
 - d) Explain working of anti aliasing filter.
 - e) Define and differentiate uniform and non uniform sampling.
- Q.3 Attempt any two.** **12**
- a) Describe in detail how Hough transform is used for boundary shape detection with an example.
 - b) Explain the mentioned basic frequency domain filters:
 - 1) Ideal low pass
 - 2) Gaussian low pass
 - c) Explain edge linking and quantization processes one example:

Section – II

- Q.4 Attempt any four.** **16**
- a) Describe opening and closing operation in detail with one example.
 - b) State and explain the difference between 2D-DST and DCT.
 - c) Derive the separability and shifting property of DFT and mention its any 2 applications.
 - d) Explain Hit & Miss Function and their role in image processing.
 - e) Explain concepts of lossy compression and feature extraction.
- Q.5 Attempt any two.** **12**
- a) Generate Harr matrix of size 4 and comment on the result.
 - b) Explain any 2 image reconstruction techniques in CT scanning with an example.
 - c) Describe image compression techniques in detail with each of example.

Seat No.	
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Set **S**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four. 16**
- Discuss the process of image formation in the eye briefly.
 - What is meant by spatial domain and resolution? Define governing factor.
 - Differentiate between point operation and neighborhood operation.
 - Explain working of anti aliasing filter.
 - Define and differentiate uniform and non uniform sampling.
- Q.3 Attempt any two. 12**
- Describe in detail how Hough transform is used for boundary shape detection with an example.
 - Explain the mentioned basic frequency domain filters:
 - Ideal low pass
 - Gaussian low pass
 - Explain edge linking and quantization processes one example:

Section – II

- Q.4 Attempt any four. 16**
- Describe opening and closing operation in detail with one example.
 - State and explain the difference between 2D-DST and DCT.
 - Derive the separability and shifting property of DFT and mention its any 2 applications.
 - Explain Hit & Miss Function and their role in image processing.
 - Explain concepts of lossy compression and feature extraction.
- Q.5 Attempt any two. 12**
- Generate Harr matrix of size 4 and comment on the result.
 - Explain any 2 image reconstruction techniques in CT scanning with an example.
 - Describe image compression techniques in detail with each of example.

Seat No.	
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B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The time required for the nuclide to be eliminated by biological processes or _____ depends on the physical characteristics of the nuclide and its chemical form.

a) radioactive decay	b) half life period
c) intensity	d) dose rate
- 2) The dose equivalent rate in an organ is determined from knowledge of the spatial _____ of the nuclide.

a) resolution	b) distribution
c) velocity	d) intensity
- 3) To compute the radiation dose delivered to an organ by radioactivity deposited within the organ, the _____ of the organ must be estimated.

a) blood level	b) insulin level
c) sugar level	d) mass
- 4) Various "bioassay" techniques exist to measure the actual amount of _____ material present in an Individual.

a) radioactive	b) mass
c) lead	d) Na I
- 5) In internal dose computations, an organ or volume of tissue for which the radiation dose is to be estimated is referred to as the _____ organ.

a) target	b) source
c) utilized	d) mutual
- 6) Radiations that are not absorbed locally have an absorbed fraction _____ 1.

a) greater than	b) equal to
c) less than	d) not equal to
- 7) A simplification of the MIRD approach to _____ computations has been prepared for radionuclides absorbed in specific internal organs.

a) intensity	b) dose amount
c) radiation	d) absorbed dose
- 8) Most medical radiologic exposures result in a _____ dose distribution within the patient.

a) nonuniform	b) uniform
c) irregular	d) unsaturated

- 9) The collective effective dose is defined as the _____ dose estimated for individuals in the population times the total number of individuals in the population.
- a) average
 - b) summimg
 - c) multiple
 - d) total
- 10) Both direct and reflected laser beams are _____ dangerous.
- a) absorbringly
 - b) potentially
 - c) saturately
 - d) Collectively
- 11) If a _____ laser output beam is focused on na smaller spot using a lens, it increases the _____ density at the focal point.
- a) Current
 - b) Spectrum
 - c) Resolution
 - d) Power
- 12) Personnel dosimeter is usually calibrated to estimate a dose upto at the depth of _____ mm in soft tissues.
- a) 10
 - b) 25
 - c) 0.5
 - d) 12
- 13) Radiation escaping in undesired directions the x-ray tube housing is termed _____.
- a) primary
 - b) secondary
 - c) leakage
 - d) scattered
- 14) If exposures exceed the limits for an individual by a _____ amount, the expectation of harm to that individual is small.
- a) small
 - b) medium
 - c) large
 - d) infinite

Seat No.	
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Set **P**

B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section - I

- Q.2 Attempt any Four:** **16**
- a) Explain various sources of radiofrequency radiations.
 - b) List various guidelines for radiation protection.
 - c) Explain process and need of quality assurance of radiation counters.
 - d) Explain effects of radio frequency radiation.
 - e) What is the need and significance of minimum detectable activity?
- Q.3 Attempt any Two:** **12**
- a) What are the procedures for safe operations of radiation equipments?
 - b) Explain the concept and methods of radiation protection in external beam radiotherapy.
 - c) Explain various methods of RF radiation measuring instruments.

Section - II

- Q.4 Attempt any four:** **16**
- a) Explain various biological effects and hazards of ultraviolet radiations.
 - b) Describe process of regulation to radiation protection in detail.
 - c) Explain ICRP method for personal dosimetry.
 - d) Mention classification of ultraviolet radiations.
 - e) Classify all types of LASERS and specify its various radiation hazards.
- Q.5 Attempt any two.** **12**
- a) Explain process of bioassay of radio activity and mention associated hazard and risk in radiation protection.
 - b) State various personal radiation monitoring methods and explain any one in detail.
 - c) Explain working role of MIRD method in radiation monitoring.

Seat No.	
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B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Most medical radiologic exposures result in a _____ dose distribution within the patient.

a) nonuniform	b) uniform
c) irregular	d) unsaturated
- 2) The collective effective dose is defined as the _____ dose estimated for individuals in the population times the total number of individuals in the population.

a) average	b) summimg
c) multiple	d) total
- 3) Both direct and reflected laser beams are _____ dangerous.

a) absorbringly	b) potentially
c) saturately	d) Collectively
- 4) If a _____ laser output beam is focused on na smaller spot using a lens, it increases the _____ density at the focal point.

a) Current	b) Spectrum
c) Resolution	d) Power
- 5) Personnel dosimeter is usually calibrated to estimate a dose upto at the depth of _____ mm in soft tissues.

a) 10	b) 25
c) 0.5	d) 12
- 6) Radiation escaping in undesired directions the x-ray tube housing is termed _____.

a) primary	b) secondary
c) leakage	d) scattered
- 7) If exposures exceed the limits for an individual by a _____ amount, the expectation of harm to that individual is small.

a) small	b) medium
c) large	d) infinite
- 8) The time required for the nuclide to be eliminated by biological processes or _____ depends on the physical characteristics of the nuclide and its chemical form.

a) radioactive decay	b) half life period
c) intensity	d) dose rate

- 9) The dose equivalent rate in an organ is determined from knowledge of the spatial _____ of the nuclide.
- | | |
|---------------|-----------------|
| a) resolution | b) distribution |
| c) velocity | d) intensity |
- 10) To compute the radiation dose delivered to an organ by radioactivity deposited within the organ, the _____ of the organ must be estimated.
- | | |
|----------------|------------------|
| a) blood level | b) insulin level |
| c) sugar level | d) mass |
- 11) Various "bioassay" techniques exist to measure the actual amount of _____ material present in an Individual.
- | | |
|----------------|---------|
| a) radioactive | b) mass |
| c) lead | d) Na I |
- 12) In internal dose computations, an organ or volume of tissue for which the radiation dose is to be estimated is referred to as the _____ *organ*.
- | | |
|-------------|-----------|
| a) target | b) source |
| c) utilized | d) mutual |
- 13) Radiations that are not absorbed locally have an absorbed fraction _____ 1.
- | | |
|-----------------|-----------------|
| a) greater than | b) equal to |
| c) less than | d) not equal to |
- 14) A simplification of the MIRD approach to _____ computations has been prepared for radionuclides absorbed in specific internal organs.
- | | |
|--------------|------------------|
| a) intensity | b) dose amount |
| c) radiation | d) absorbed dose |

Seat No.	
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Set	Q
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B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section - I

- Q.2 Attempt any Four:** **16**
- a) Explain various sources of radiofrequency radiations.
 - b) List various guidelines for radiation protection.
 - c) Explain process and need of quality assurance of radiation counters.
 - d) Explain effects of radio frequency radiation.
 - e) What is the need and significance of minimum detectable activity?
- Q.3 Attempt any Two:** **12**
- a) What are the procedures for safe operations of radiation equipments?
 - b) Explain the concept and methods of radiation protection in external beam radiotherapy.
 - c) Explain various methods of RF radiation measuring instruments.

Section - II

- Q.4 Attempt any four:** **16**
- a) Explain various biological effects and hazards of ultraviolet radiations.
 - b) Describe process of regulation to radiation protection in detail.
 - c) Explain ICRP method for personal dosimetry.
 - d) Mention classification of ultraviolet radiations.
 - e) Classify all types of LASERS and specify its various radiation hazards.
- Q.5 Attempt any two.** **12**
- a) Explain process of bioassay of radio activity and mention associated hazard and risk in radiation protection.
 - b) State various personal radiation monitoring methods and explain any one in detail.
 - c) Explain working role of MIRD method in radiation monitoring.

Seat No.	
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B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) In internal dose computations, an organ or volume of tissue for which the radiation dose is to be estimated is referred to as the _____ organ.
 - a) target
 - b) source
 - c) utilized
 - d) mutual
- 2) Radiations that are not absorbed locally have an absorbed fraction _____ 1.
 - a) greater than
 - b) equal to
 - c) less than
 - d) not equal to
- 3) A simplification of the MIRD approach to _____ computations has been prepared for radionuclides absorbed in specific internal organs.
 - a) intensity
 - b) dose amount
 - c) radiation
 - d) absorbed dose
- 4) Most medical radiologic exposures result in a _____ dose distribution within the patient.
 - a) nonuniform
 - b) uniform
 - c) irregular
 - d) unsaturated
- 5) The collective effective dose is defined as the _____ dose estimated for individuals in the population times the total number of individuals in the population.
 - a) average
 - b) summimg
 - c) multiple
 - d) total
- 6) Both direct and reflected laser beams are _____ dangerous.
 - a) absorbingly
 - b) potentially
 - c) saturately
 - d) Collectively
- 7) If a _____ laser output beam is focused on na smaller spot using a lens, it increases the _____ density at the focal point.
 - a) Current
 - b) Spectrum
 - c) Resolution
 - d) Power

Seat No.	
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Set **R**

B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section - I

- Q.2 Attempt any Four:** **16**
- a) Explain various sources of radiofrequency radiations.
 - b) List various guidelines for radiation protection.
 - c) Explain process and need of quality assurance of radiation counters.
 - d) Explain effects of radio frequency radiation.
 - e) What is the need and significance of minimum detectable activity?
- Q.3 Attempt any Two:** **12**
- a) What are the procedures for safe operations of radiation equipments?
 - b) Explain the concept and methods of radiation protection in external beam radiotherapy.
 - c) Explain various methods of RF radiation measuring instruments.

Section - II

- Q.4 Attempt any four:** **16**
- a) Explain various biological effects and hazards of ultraviolet radiations.
 - b) Describe process of regulation to radiation protection in detail.
 - c) Explain ICRP method for personal dosimetry.
 - d) Mention classification of ultraviolet radiations.
 - e) Classify all types of LASERS and specify its various radiation hazards.
- Q.5 Attempt any two.** **12**
- a) Explain process of bioassay of radio activity and mention associated hazard and risk in radiation protection.
 - b) State various personal radiation monitoring methods and explain any one in detail.
 - c) Explain working role of MIRD method in radiation monitoring.

Seat No.	
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B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Both direct and reflected laser beams are _____ dangerous.
 - a) absorbingly
 - b) potentially
 - c) saturately
 - d) Collectively
- 2) If a _____ laser output beam is focused on a smaller spot using a lens, it increases the _____ density at the focal point.
 - a) Current
 - b) Spectrum
 - c) Resolution
 - d) Power
- 3) Personnel dosimeter is usually calibrated to estimate a dose upto at the depth of _____ mm in soft tissues.
 - a) 10
 - b) 25
 - c) 0.5
 - d) 12
- 4) Radiation escaping in undesired directions the x-ray tube housing is termed _____.
 - a) primary
 - b) secondary
 - c) leakage
 - d) scattered
- 5) If exposures exceed the limits for an individual by a _____ amount, the expectation of harm to that individual is small.
 - a) small
 - b) medium
 - c) large
 - d) infinite
- 6) The time required for the nuclide to be eliminated by biological processes or _____ depends on the physical characteristics of the nuclide and its chemical form.
 - a) radioactive decay
 - b) half life period
 - c) intensity
 - d) dose rate
- 7) The dose equivalent rate in an organ is determined from knowledge of the spatial _____ of the nuclide.
 - a) resolution
 - b) distribution
 - c) velocity
 - d) intensity
- 8) To compute the radiation dose delivered to an organ by radioactivity deposited within the organ, the _____ of the organ must be estimated.
 - a) blood level
 - b) insulin level
 - c) sugar level
 - d) mass

- 9) Various "bioassay" techniques exist to measure the actual amount of _____ material present in an Individual.
- | | |
|----------------|---------|
| a) radioactive | b) mass |
| c) lead | d) Na I |
- 10) In internal dose computations, an organ or volume of tissue for which the radiation dose is to be estimated is referred to as the _____ organ.
- | | |
|-------------|-----------|
| a) target | b) source |
| c) utilized | d) mutual |
- 11) Radiations that are not absorbed locally have an absorbed fraction _____ 1.
- | | |
|-----------------|-----------------|
| a) greater than | b) equal to |
| c) less than | d) not equal to |
- 12) A simplification of the MIRDO approach to _____ computations has been prepared for radionuclides absorbed in specific internal organs.
- | | |
|--------------|------------------|
| a) intensity | b) dose amount |
| c) radiation | d) absorbed dose |
- 13) Most medical radiologic exposures result in a _____ dose distribution within the patient.
- | | |
|---------------|----------------|
| a) nonuniform | b) uniform |
| c) irregular | d) unsaturated |
- 14) The collective effective dose is defined as the _____ dose estimated for individuals in the population times the total number of individuals in the population.
- | | |
|-------------|------------|
| a) average | b) summimg |
| c) multiple | d) total |

Seat No.	
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Set **S**

B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any Four:** **16**
- a) Explain various sources of radiofrequency radiations.
 - b) List various guidelines for radiation protection.
 - c) Explain process and need of quality assurance of radiation counters.
 - d) Explain effects of radio frequency radiation.
 - e) What is the need and significance of minimum detectable activity?
- Q.3 Attempt any Two:** **12**
- a) What are the procedures for safe operations of radiation equipments?
 - b) Explain the concept and methods of radiation protection in external beam radiotherapy.
 - c) Explain various methods of RF radiation measuring instruments.

Section - II

- Q.4 Attempt any four:** **16**
- a) Explain various biological effects and hazards of ultraviolet radiations.
 - b) Describe process of regulation to radiation protection in detail.
 - c) Explain ICRP method for personal dosimetry.
 - d) Mention classification of ultraviolet radiations.
 - e) Classify all types of LASERS and specify its various radiation hazards.
- Q.5 Attempt any two.** **12**
- a) Explain process of bioassay of radio activity and mention associated hazard and risk in radiation protection.
 - b) State various personal radiation monitoring methods and explain any one in detail.
 - c) Explain working role of MIRD method in radiation monitoring.

Seat No.	
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B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LASERS AND OPTICAL FIBERS IN MEDICINE

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The fiber should be _____ to avoid deterioration of the optical transmission characteristics resulting from mode-coupling-induced micro-bending.
 - a) Free from irregular external pressure
 - b) Coupled with plastic
 - c) Large in diameter
 - d) Smooth and in a steady state
- 2) The ratio $r = (n_1 - n) / (n_1 + n)$ indicates _____.
 - a) Fresnel reflection
 - b) Reflection coefficient
 - c) Refraction coefficient
 - d) Angular power distribution coefficient
- 3) A _____ performs the linear conversion of the received optical signal into an electric current.

a) Receiver	b) Converter
c) Detector	d) Reflector
- 4) In Stimulated Emission, which among the following parameters of generated photon is/are? Similar to the photon of incident wave _____.
 - a) Phase
 - b) Frequency
 - c) Polarization & direction of travel
 - d) All above
- 5) In Lambertian output pattern of LED, the source is _____ bright from all directions.

a) Less	b) Equally
c) More	d) Unpredictably
- 6) The basic principle of the LASER is _____.

a) Stimulated absorption	b) Stimulated emission
c) Spontaneous absorption	d) Spontaneous emission

Seat No.	
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B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LASERS AND OPTICAL FIBERS IN MEDICINE

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any Four. 16**
- a) Give fundamental properties of light.
 - b) Explain photo thermal and photo mechanical interaction of laser tissue.
 - c) Write a note on polarizer.
 - d) Explain instrumentation for absorption in photonics.
 - e) Explain high pressure arc lamps in photonic.
- Q.3 Attempt any Two: 12**
- a) Explain in detail how laser characteristics applied to medicine and biology.
 - b) Explain the following
 - 1) Light transport inside the tissue
 - 2) Scattering and emission measurement
 - c) What is optical detector? Classify and explain in detail each of them.

Section – II

- Q.4 Attempt any four. 16**
- a) Explain the application of laser in dentistry.
 - b) Write a short note on optical coherence tomography.
 - c) Explain in vitro clinical diagnostics.
 - d) Write in detail safety procedure for use of laser.
 - e) Explain laser induced fluorescence imaging method.
- Q.5 Attempt any two. 12**
- a) Explain application of laser for tissue welding and soldering.
 - b) Explain in detail Raman spectroscopy and its imaging with a neat dia.
 - c) Explain oncological and non-oncological application of PDT.

- 9) The ratio $r = (n_1 - n) / (n_1 + n)$ indicates _____.
a) Fresnel reflection
b) Reflection coefficient
c) Refraction coefficient
d) Angular power distribution coefficient
- 10) A _____ performs the linear conversion of the received optical signal into an electric current.
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c) More
d) Unpredictably
- 13) The basic principle of the LASER is _____.
a) Stimulated absorption
b) Stimulated emission
c) Spontaneous absorption
d) Spontaneous emission
- 14) In the following given which is not property of the laser _____.
a) Intensity
b) Directional
c) Coherence
d) Non-coherent

Seat No.	
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Set **Q**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LASERS AND OPTICAL FIBERS IN MEDICINE

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any Four. 16**
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 - c) What is optical detector? Classify and explain in detail each of them.

Section – II

- Q.4 Attempt any four. 16**
- a) Explain the application of laser in dentistry.
 - b) Write a short note on optical coherence tomography.
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- Q.5 Attempt any two. 12**
- a) Explain application of laser for tissue welding and soldering.
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Seat No.	
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B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LASERS AND OPTICAL FIBERS IN MEDICINE

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) In Lambertian output pattern of LED, the source is _____ bright from all directions.
 - a) Less
 - b) Equally
 - c) More
 - d) Unpredictably
- 2) The basic principle of the LASER is _____.
 - a) Stimulated absorption
 - b) Stimulated emission
 - c) Spontaneous absorption
 - d) Spontaneous emission
- 3) In the following given which is not property of the laser _____.
 - a) Intensity
 - b) Directional
 - c) Coherence
 - d) Non-coherent
- 4) Light emitted by ordinary source of light is _____.
 - a) Coherent
 - b) Non-coherent
 - c) Monochromatic
 - d) None
- 5) The primary colours in photography are _____.
 - a) red, blue, yellow
 - b) red, yellow, green
 - c) red, blue, green
 - d) blue, yellow, green
- 6) Optical fibres are based on the phenomenon of _____.
 - a) interference
 - b) dispersion
 - c) diffraction
 - d) total internal reflection
- 7) If a light travels in a certain medium and it gets reflected off an optically denser medium with high refractive index, then it is regarded as _____.
 - a) External Reflection
 - b) Internal Reflection
 - c) Both a and b
 - d) None
- 8) The quantum efficiency of an optical detector should be high. State whether the given statement is true or false.
 - a) True
 - b) False
- 9) Which among the following is/are responsible for generating attenuation of an optical power in fiber?
 - a) Absorption
 - b) Scattering
 - c) Waveguide effect
 - d) All

- 10) Which among the following is regarded as an inelastic scattering of a photon?
- a) Kerr effect
 - b) Raman Effect
 - c) Hall effect
 - d) Miller effect
- 11) The fiber should be _____ to avoid deterioration of the optical transmission characteristics resulting from mode-coupling-induced micro-bending.
- a) Free from irregular external pressure
 - b) Coupled with plastic
 - c) Large in diameter
 - d) Smooth and in a steady state
- 12) The ratio $r = (n_1 - n) / (n_1 + n)$ indicates _____.
- a) Fresnel reflection
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 - c) Refraction coefficient
 - d) Angular power distribution coefficient
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 - b) Converter
 - c) Detector
 - d) Reflector
- 14) In Stimulated Emission, which among the following parameters of generated photon is/are? Similar to the photon of incident wave _____.
- a) Phase
 - b) Frequency
 - c) Polarization & direction of travel
 - d) All above

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B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LASERS AND OPTICAL FIBERS IN MEDICINE

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any Four. 16**
- a) Give fundamental properties of light.
 - b) Explain photo thermal and photo mechanical interaction of laser tissue.
 - c) Write a note on polarizer.
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 - e) Explain high pressure arc lamps in photonic.
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- a) Explain in detail how laser characteristics applied to medicine and biology.
 - b) Explain the following
 - 1) Light transport inside the tissue
 - 2) Scattering and emission measurement
 - c) What is optical detector? Classify and explain in detail each of them.

Section – II

- Q.4 Attempt any four. 16**
- a) Explain the application of laser in dentistry.
 - b) Write a short note on optical coherence tomography.
 - c) Explain in vitro clinical diagnostics.
 - d) Write in detail safety procedure for use of laser.
 - e) Explain laser induced fluorescence imaging method.
- Q.5 Attempt any two. 12**
- a) Explain application of laser for tissue welding and soldering.
 - b) Explain in detail Raman spectroscopy and its imaging with a neat dia.
 - c) Explain oncological and non-oncological application of PDT.

- 9) In Stimulated Emission, which among the following parameters of generated photon is/are? Similar to the photon of incident wave _____.
- a) Phase
 - b) Frequency
 - c) Polarization & direction of travel
 - d) All above
- 10) In Lambertian output pattern of LED, the source is _____ bright from all directions.
- a) Less
 - b) Equally
 - c) More
 - d) Unpredictably
- 11) The basic principle of the LASER is _____.
- a) Stimulated absorption
 - b) Stimulated emission
 - c) Spontaneous absorption
 - d) Spontaneous emission
- 12) In the following given which is not property of the laser _____.
- a) Intensity
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 - c) Coherence
 - d) Non-coherent
- 13) Light emitted by ordinary source of light is _____.
- a) Coherent
 - b) Non-coherent
 - c) Monochromatic
 - d) None
- 14) The primary colours in photography are _____.
- a) red, blue, yellow
 - b) red, yellow, green
 - c) red, blue, green
 - d) blue, yellow, green

Seat No.	
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Set **S**

B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
LASERS AND OPTICAL FIBERS IN MEDICINE

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any Four. 16**
- a) Give fundamental properties of light.
 - b) Explain photo thermal and photo mechanical interaction of laser tissue.
 - c) Write a note on polarizer.
 - d) Explain instrumentation for absorption in photonics.
 - e) Explain high pressure arc lamps in photonic.
- Q.3 Attempt any Two: 12**
- a) Explain in detail how laser characteristics applied to medicine and biology.
 - b) Explain the following
 - 1) Light transport inside the tissue
 - 2) Scattering and emission measurement
 - c) What is optical detector? Classify and explain in detail each of them.

Section – II

- Q.4 Attempt any four. 16**
- a) Explain the application of laser in dentistry.
 - b) Write a short note on optical coherence tomography.
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 - d) Write in detail safety procedure for use of laser.
 - e) Explain laser induced fluorescence imaging method.
- Q.5 Attempt any two. 12**
- a) Explain application of laser for tissue welding and soldering.
 - b) Explain in detail Raman spectroscopy and its imaging with a neat dia.
 - c) Explain oncological and non-oncological application of PDT.

Seat No.	
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Set

P

**B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering**

NEURAL NETWORK AND AI IN BIOMEDICAL ENGINEERING

Day & Date: Tuesday, 17-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) A rule-based system consists of a bunch of IF-THEN rules.
 - a) True
 - b) False
- 2) Graph used to represent semantic network is _____.
 - a) Undirected graph
 - b) Directed graph
 - c) Directed Acyclic graph (DAG)
 - d) Directed complete graph
- 3) Which of the following elements constitutes the frame structure?
 - a) Facts or Data
 - b) Procedures and default values
 - c) Frame names
 - d) Frame reference in hierarchy
- 4) Neural Networks are complex _____ with many parameters.
 - a) Linear Functions
 - b) Nonlinear Functions
 - c) Discrete Functions
 - d) Exponential Functions
- 5) A plan that describe how to take actions in levels of increasing refinement and specificity is _____.
 - a) Problem solving
 - b) Planning
 - c) Non-hierarchical plan
 - d) Hierarchical plan
- 6) What are present in the planning graph?
 - a) Sequence of levels
 - b) Literals
 - c) Variables
 - d) Heuristic estimates
- 7) What does the Bayesian network provides?
 - a) Complete description of the domain
 - b) Partial description of the domain
 - c) Complete description of the problem
 - d) None of the mentioned
- 8) A _____ is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility.
 - a) Decision tree
 - b) Graphs
 - c) Trees
 - d) Neural Networks
- 9) Which of the following is the component of learning system?
 - a) Goal
 - b) Model
 - c) Learning rules
 - d) All above

- 10) In which of the following situations might a blind search be acceptable?
- a) Real life situation
 - b) Complex game
 - c) Small search space
 - d) All above
- 11) Machine learning involves _____.
- a) Learning from a successful move
 - b) Copying the knowledge of a human to a computer
 - c) Loading numerous games and playing them regularly
 - d) Making numerous mistakes so that computer can learn
- 12) A typical database contain _____.
- a) rules, facts and relationships
 - b) only rules and relationships
 - c) simulation of human thinking
 - d) only facts
- 13) Using the knowledge of an expert in a particular field in order to duplicate it into a program is the creation of a(n) _____.
- a) Expert system
 - b) Database
 - c) Fuzzy logic system
 - d) Pattern reorganization system
- 14) Expert systems primarily started in the _____.
- a) Insurance field
 - b) Medical field
 - c) Aviation field
 - d) Library reference field

Seat No.	
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Set **P**

**B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering**

NEURAL NETWORK AND AI IN BIOMEDICAL ENGINEERING

Day & Date: Tuesday, 17-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four:-** **16**
- a) Define Neural Network? Differentiate single layer and multilayer networks.
 - b) Explain Radial Basis functions of Neural Network.
 - c) Explain adaptive resonance theory.
 - d) Explain application of supervised learning Neural Network.
 - e) Explain non linear separable sets.
- Q.3 Answer any two:-** **12**
- a) Explain the structure and feature selection network.
 - b) Distinguish between artificial intelligence and neural network models.
 - c) What is the learning of neural network? Explain types of learning strategies.

Section – II

- Q.4 Answer any four:-** **16**
- a) Differentiate forward and backward reasoning. (Forward and backward chaining)
 - b) Define the following.
 - 1) predicate calculus
 - 2) frame problem
 - 3) semantic nets
 - 4) property inheritance
 - c) Explain Bayesian network analysis.
 - d) Explain rule base searching.
 - e) Explain Meta knowledge.
- Q.5 Answer any two** **12**
- a) Explain the following
 - 1) Symbolic reasoning techniques
 - 2) Data bases and medical records
 - b) What is expert system? What are the characteristics of expert systems explain with neat dia?
 - c) Explain the following
 - 1) Blind Searching
 - 2) Rule base searching
 - 3) Search game tree
 - 4) Searching graph

Seat
No.

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**B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering**

NEURAL NETWORK AND AI IN BIOMEDICAL ENGINEERING

Day & Date: Tuesday, 17-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

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 - a) Goal
 - b) Model
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 - a) Real life situation
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- 6) Using the knowledge of an expert in a particular field in order to duplicate it into a program is the creation of a(n) _____.
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- 14) What does the Bayesian network provides?
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Seat No.	
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Set **Q**

**B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering**

NEURAL NETWORK AND AI IN BIOMEDICAL ENGINEERING

Day & Date: Tuesday, 17-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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 - b) Explain Radial Basis functions of Neural Network.
 - c) Explain adaptive resonance theory.
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 - e) Explain non linear separable sets.
- Q.3 Answer any two:-** **12**
- a) Explain the structure and feature selection network.
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Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
NEURAL NETWORK AND AI IN BIOMEDICAL ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) A plan that describe how to take actions in levels of increasing refinement and specificity is _____.
 - a) Problem solving
 - b) Planning
 - c) Non-hierarchical plan
 - d) Hierarchical plan
- 2) What are present in the planning graph?
 - a) Sequence of levels
 - b) Literals
 - c) Variables
 - d) Heuristic estimates
- 3) What does the Bayesian network provides?
 - a) Complete description of the domain
 - b) Partial description of the domain
 - c) Complete description of the problem
 - d) None of the mentioned
- 4) A _____ is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility.
 - a) Decision tree
 - b) Graphs
 - c) Trees
 - d) Neural Networks
- 5) Which of the following is the component of learning system?
 - a) Goal
 - b) Model
 - c) Learning rules
 - d) All above
- 6) In which of the following situations might a blind search be acceptable?
 - a) Real life situation
 - b) Complex game
 - c) Small search space
 - d) All above
- 7) Machine learning involves _____.
 - a) Learning from a successful move
 - b) Copying the knowledge of a human to a computer
 - c) Loading numerous games and playing them regularly
 - d) Making numerous mistakes so that computer can learn

- 8) A typical database contain _____.
a) rules, facts and relationships
b) only rules and relationships
c) simulation of human thinking
d) only facts
- 9) Using the knowledge of an expert in a particular field in order to duplicate it into a program is the creation of a(n) _____.
a) Expert system
b) Database
c) Fuzzy logic system
d) Pattern reorganization system
- 10) Expert systems primarily started in the _____.
a) Insurance field
b) Medical field
c) Aviation field
d) Library reference field
- 11) A rule-based system consists of a bunch of IF-THEN rules.
a) True
b) False
- 12) Graph used to represent semantic network is _____.
a) Undirected graph
b) Directed graph
c) Directed Acyclic graph (DAG)
d) Directed complete graph
- 13) Which of the following elements constitutes the frame structure?
a) Facts or Data
b) Procedures and default values
c) Frame names
d) Frame reference in hierarchy
- 14) Neural Networks are complex _____ with many parameters.
a) Linear Functions
b) Nonlinear Functions
c) Discrete Functions
d) Exponential Functions

Seat No.	
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Set **R**

**B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering**

NEURAL NETWORK AND AI IN BIOMEDICAL ENGINEERING

Day & Date: Tuesday, 17-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four:-** **16**
- a) Define Neural Network? Differentiate single layer and multilayer networks.
 - b) Explain Radial Basis functions of Neural Network.
 - c) Explain adaptive resonance theory.
 - d) Explain application of supervised learning Neural Network.
 - e) Explain non linear separable sets.
- Q.3 Answer any two:-** **12**
- a) Explain the structure and feature selection network.
 - b) Distinguish between artificial intelligence and neural network models.
 - c) What is the learning of neural network? Explain types of learning strategies.

Section – II

- Q.4 Answer any four:-** **16**
- a) Differentiate forward and backward reasoning. (Forward and backward chaining)
 - b) Define the following.
 - 1) predicate calculus
 - 2) frame problem
 - 3) semantic nets
 - 4) property inheritance
 - c) Explain Bayesian network analysis.
 - d) Explain rule base searching.
 - e) Explain Meta knowledge.
- Q.5 Answer any two** **12**
- a) Explain the following
 - 1) Symbolic reasoning techniques
 - 2) Data bases and medical records
 - b) What is expert system? What are the characteristics of expert systems explain with neat dia?
 - c) Explain the following
 - 1) Blind Searching
 - 2) Rule base searching
 - 3) Search game tree
 - 4) Searching graph

Seat No.	
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B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
NEURAL NETWORK AND AI IN BIOMEDICAL ENGINEERING

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) In which of the following situations might a blind search be acceptable?
 - a) Real life situation
 - b) Complex game
 - c) Small search space
 - d) All above
- 2) Machine learning involves _____.
 - a) Learning from a successful move
 - b) Copying the knowledge of a human to a computer
 - c) Loading numerous games and playing them regularly
 - d) Making numerous mistakes so that computer can learn
- 3) A typical database contain _____.
 - a) rules, facts and relationships
 - b) only rules and relationships
 - c) simulation of human thinking
 - d) only facts
- 4) Using the knowledge of an expert in a particular field in order to duplicate it into a program is the creation of a(n) _____.
 - a) Expert system
 - b) Database
 - c) Fuzzy logic system
 - d) Pattern reorganization system
- 5) Expert systems primarily started in the _____.
 - a) Insurance field
 - b) Medical field
 - c) Aviation field
 - d) Library reference field
- 6) A rule-based system consists of a bunch of IF-THEN rules.
 - a) True
 - b) False
- 7) Graph used to represent semantic network is _____.
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 - b) Directed graph
 - c) Directed Acyclic graph (DAG)
 - d) Directed complete graph
- 8) Which of the following elements constitutes the frame structure?
 - a) Facts or Data
 - b) Procedures and default values
 - c) Frame names
 - d) Frame reference in hierarchy
- 9) Neural Networks are complex _____ with many parameters.
 - a) Linear Functions
 - b) Nonlinear Functions
 - c) Discrete Functions
 - d) Exponential Functions

- 10) A plan that describe how to take actions in levels of increasing refinement and specificity is _____.
- a) Problem solving
 - b) Planning
 - c) Non-hierarchical plan
 - d) Hierarchical plan
- 11) What are present in the planning graph?
- a) Sequence of levels
 - b) Literals
 - c) Variables
 - d) Heuristic estimates
- 12) What does the Bayesian network provides?
- a) Complete description of the domain
 - b) Partial description of the domain
 - c) Complete description of the problem
 - d) None of the mentioned
- 13) A _____ is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility.
- a) Decision tree
 - b) Graphs
 - c) Trees
 - d) Neural Networks
- 14) Which of the following is the component of learning system?
- a) Goal
 - b) Model
 - c) Learning rules
 - d) All above

Seat No.	
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Set **S**

**B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering**

NEURAL NETWORK AND AI IN BIOMEDICAL ENGINEERING

Day & Date: Tuesday, 17-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four:-** **16**
- Define Neural Network? Differentiate single layer and multilayer networks.
 - Explain Radial Basis functions of Neural Network.
 - Explain adaptive resonance theory.
 - Explain application of supervised learning Neural Network.
 - Explain non linear separable sets.
- Q.3 Answer any two:-** **12**
- Explain the structure and feature selection network.
 - Distinguish between artificial intelligence and neural network models.
 - What is the learning of neural network? Explain types of learning strategies.

Section – II

- Q.4 Answer any four:-** **16**
- Differentiate forward and backward reasoning. (Forward and backward chaining)
 - Define the following.
 - predicate calculus
 - frame problem
 - semantic nets
 - property inheritance
 - Explain Bayesian network analysis.
 - Explain rule base searching.
 - Explain Meta knowledge.
- Q.5 Answer any two** **12**
- Explain the following
 - Symbolic reasoning techniques
 - Data bases and medical records
 - What is expert system? What are the characteristics of expert systems explain with neat dia?
 - Explain the following
 - Blind Searching
 - Rule base searching
 - Search game tree
 - Searching graph

Seat No.	
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B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
NUCLEAR MEDICINE

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Activity is proportional to number of _____.
 a) daughter nuclei b) decayed nuclei
 c) undecayed nuclei d) father nuclei
- 2) Radioactive decay is a _____.
 a) random process b) non-spontaneous process
 c) regular process d) massive process
- 3) In gamma emission, change in nucleon number is _____.
 a) zero b) Definite
 c) increase by 1 d) decreases by 1
- 4) Gamma camera in Nuclear Medicine is used for _____.
 a) organ imaging
 b) measuring the radioactivity
 c) monitoring the surface contamination
 d) RIA
- 5) _____ type of medical problem is not usually investigated using nuclear medicine.
 a) Cancer b) Broken bone
 c) Blood circulation d) Disorders in organs
- 6) A specific combination of protons and neutrons in a nucleus is called _____.
 a) nucleons b) Nuclide
 c) neutrino d) Nucleolus
- 7) In SI base units, 1 Bq is equal to _____.
 a) 10 disintegration per second
 b) 1.5 disintegration per second
 c) 0.01 disintegration per second
 d) 1 disintegration per second
- 8) The principal disadvantage in using a high resolution collimator on a gamma camera is that it has _____.
 a) Limited field of view b) More distortion
 c) Less scatter rejection d) Lower sensitivity

- 9) _____ of the following is not characteristic of PET.
- a) Lead collimators
 - b) Positron emitters
 - c) 511 keV photons
 - d) Absolute attenuation correction
- 10) Of the following radiations _____ would be the most desirable for radionuclide imaging?
- a) 15 keV gamma
 - b) 150 keV gamma
 - c) 150 keV beta
 - d) 1500 keV gamma
- 11) If a radioactive element has a half-life of 40 minutes, initial count rate was 1000 per minute, then how long will it take for count rate to drop to 125 per minutes?
- a) 120 minutes
 - b) 90 minutes
 - c) 30 minutes
 - d) 60 minutes
- 12) Rate of radioactive decay is proportional to _____.
- a) nature of rays
 - b) no. of electron
 - c) no. of protons
 - d) no. of unstable nuclei
- 13) The absorbed dose to tissue in a nuclear medicine procedure is _____.
- a) The concentration of radioactivity in MBq per kg
 - b) The energy absorbed per unit mass of tissue
 - c) Measured in Sieverts
 - d) Dependent on the Quality Factor for the type of radiation
- 14) Which one of the following factors has no influence on the biodistribution and tumor uptake of ^{18}F -FDG?
- a) Insulin level
 - b) Muscular exercise the day before
 - c) Ambient temperature
 - d) Body mass index

Seat No.	
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Set	P
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B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
NUCLEAR MEDICINE

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Describe various units of radioactivity.
 - b) Technimum-99 has half-life of 6 hours. If there is 300 mg of it, how much will be left in 48 hours?
 - c) Explain using suitable diagram working of solid state detector.
 - d) Explain the principle and working of multi channel pulse height analyzer.
 - e) Explain various interaction techniques of radiation with matter.
- Q.3 Attempt any two. 12**
- a) Explain working of Scintillation detector and mention its role in nuclear medicine.
 - b) Explain the construction and working of Gamma Camera system in detail.
 - c) Explain working of kidney uptake monitoring system.

Section – II

- Q.4 Attempt any four. 16**
- a) Differentiate between of single and double isotope methods.
 - b) Explain working principle of SPECT scan and mention it's any 2 medical applications.
 - c) Describe various positrons emitting radio nuclides.
 - d) Explain iteration method for image reconstruction for PET technology.
 - e) Describe various properties of ideal radiotracers used in RIA along with their advantages.
- Q.5 Attempt any two. 12**
- a) Draw and explain working of liquid scintillation counting system.
 - b) Explain working of RIA system and mention it's any 4 applications.
 - c) Describe internal and external radiation. Also mention radiation prevention techniques.

Seat No.	
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Set	Q
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B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
NUCLEAR MEDICINE

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The principal disadvantage in using a high resolution collimator on a gamma camera is that it has _____.
 - a) Limited field of view
 - b) More distortion
 - c) Less scatter rejection
 - d) Lower sensitivity
- 2) _____ of the following is not characteristic of PET.
 - a) Lead collimators
 - b) Positron emitters
 - c) 511 keV photons
 - d) Absolute attenuation correction
- 3) Of the following radiations _____ would be the most desirable for radionuclide imaging?
 - a) 15 keV gamma
 - b) 150 keV gamma
 - c) 150 keV beta
 - d) 1500 keV gamma
- 4) If a radioactive element has a half-life of 40 minutes, initial count rate was 1000 per minute, then how long will it take for count rate to drop to 125 per minutes?
 - a) 120 minutes
 - b) 90 minutes
 - c) 30 minutes
 - d) 60 minutes
- 5) Rate of radioactive decay is proportional to _____.
 - a) nature of rays
 - b) no. of electron
 - c) no. of protons
 - d) no. of unstable nuclei
- 6) The absorbed dose to tissue in a nuclear medicine procedure is _____.
 - a) The concentration of radioactivity in MBq per kg
 - b) The energy absorbed per unit mass of tissue
 - c) Measured in Sieverts
 - d) Dependent on the Quality Factor for the type of radiation
- 7) Which one of the following factors has no influence on the biodistribution and tumor uptake of ¹⁸F-FDG?
 - a) Insulin level
 - b) Muscular exercise the day before
 - c) Ambient temperature
 - d) Body mass index
- 8) Activity is proportional to number of _____.
 - a) daughter nuclei
 - b) decayed nuclei
 - c) undecayed nuclei
 - d) father nuclei

Seat No.	
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Set

Q

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
NUCLEAR MEDICINE

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any four. 16**
- a) Describe various units of radioactivity.
 - b) Technimum-99 has half-life of 6 hours. If there is 300 mg of it, how much will be left in 48 hours?
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 - d) Explain the principle and working of multi channel pulse height analyzer.
 - e) Explain various interaction techniques of radiation with matter.
- Q.3 Attempt any two. 12**
- a) Explain working of Scintillation detector and mention its role in nuclear medicine.
 - b) Explain the construction and working of Gamma Camera system in detail.
 - c) Explain working of kidney uptake monitoring system.

Section – II

- Q.4 Attempt any four. 16**
- a) Differentiate between of single and double isotope methods.
 - b) Explain working principle of SPECT scan and mention it's any 2 medical applications.
 - c) Describe various positrons emitting radio nuclides.
 - d) Explain iteration method for image reconstruction for PET technology.
 - e) Describe various properties of ideal radiotracers used in RIA along with their advantages.
- Q.5 Attempt any two. 12**
- a) Draw and explain working of liquid scintillation counting system.
 - b) Explain working of RIA system and mention it's any 4 applications.
 - c) Describe internal and external radiation. Also mention radiation prevention techniques.

Seat No.	
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B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
NUCLEAR MEDICINE

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ type of medical problem is not usually investigated using nuclear medicine.
 - a) Cancer
 - b) Broken bone
 - c) Blood circulation
 - d) Disorders in organs
- 2) A specific combination of protons and neutrons in a nucleus is called _____.
 - a) nucleons
 - b) Nuclide
 - c) neutrino
 - d) Nucleolus
- 3) In SI base units, 1 Bq is equal to _____.
 - a) 10 disintegration per second
 - b) 1.5 disintegration per second
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b) Muscular exercise the day before
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- 11) Activity is proportional to number of _____.
a) daughter nuclei
b) decayed nuclei
c) undecayed nuclei
d) father nuclei
- 12) Radioactive decay is a _____.
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b) non-spontaneous process
c) regular process
d) massive process
- 13) In gamma emission, change in nucleon number is _____.
a) zero
b) Definite
c) increase by 1
d) decreases by 1
- 14) Gamma camera in Nuclear Medicine is used for _____.
a) organ imaging
b) measuring the radioactivity
c) monitoring the surface contamination
d) RIA

Seat No.	
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B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
NUCLEAR MEDICINE

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any four. 16**
- a) Describe various units of radioactivity.
 - b) Technimum-99 has half-life of 6 hours. If there is 300 mg of it, how much will be left in 48 hours?
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 - d) Explain the principle and working of multi channel pulse height analyzer.
 - e) Explain various interaction techniques of radiation with matter.
- Q.3 Attempt any two. 12**
- a) Explain working of Scintillation detector and mention its role in nuclear medicine.
 - b) Explain the construction and working of Gamma Camera system in detail.
 - c) Explain working of kidney uptake monitoring system.

Section – II

- Q.4 Attempt any four. 16**
- a) Differentiate between of single and double isotope methods.
 - b) Explain working principle of SPECT scan and mention it's any 2 medical applications.
 - c) Describe various positrons emitting radio nuclides.
 - d) Explain iteration method for image reconstruction for PET technology.
 - e) Describe various properties of ideal radiotracers used in RIA along with their advantages.
- Q.5 Attempt any two. 12**
- a) Draw and explain working of liquid scintillation counting system.
 - b) Explain working of RIA system and mention it's any 4 applications.
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Seat No.	
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Set **S**

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
NUCLEAR MEDICINE

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Of the following radiations _____ would be the most desirable for radionuclide imaging?

a) 15 keV gamma	b) 150 keV gamma
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- 2) If a radioactive element has a half-life of 40 minutes, initial count rate was 1000 per minute, then how long will it take for count rate to drop to 125 per minutes?

a) 120 minutes	b) 90 minutes
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c) Measured in Sieverts
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- 5) Which one of the following factors has no influence on the biodistribution and tumor uptake of ¹⁸F-FDG?

a) Insulin level
b) Muscular exercise the day before
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d) Body mass index
- 6) Activity is proportional to number of _____.

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c) undecayed nuclei	d) father nuclei
- 7) Radioactive decay is a _____.

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b) More distortion
c) Less scatter rejection
d) Lower sensitivity
- 14) _____ of the following is not characteristic of PET.
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b) Positron emitters
c) 511 keV photons
d) Absolute attenuation correction

Seat No.	
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B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
NUCLEAR MEDICINE

Day & Date: Saturday, 07-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Describe various units of radioactivity.
 - b) Technimum-99 has half-life of 6 hours. If there is 300 mg of it, how much will be left in 48 hours?
 - c) Explain using suitable diagram working of solid state detector.
 - d) Explain the principle and working of multi channel pulse height analyzer.
 - e) Explain various interaction techniques of radiation with matter.
- Q.3 Attempt any two. 12**
- a) Explain working of Scintillation detector and mention its role in nuclear medicine.
 - b) Explain the construction and working of Gamma Camera system in detail.
 - c) Explain working of kidney uptake monitoring system.

Section – II

- Q.4 Attempt any four. 16**
- a) Differentiate between of single and double isotope methods.
 - b) Explain working principle of SPECT scan and mention it's any 2 medical applications.
 - c) Describe various positrons emitting radio nuclides.
 - d) Explain iteration method for image reconstruction for PET technology.
 - e) Describe various properties of ideal radiotracers used in RIA along with their advantages.
- Q.5 Attempt any two. 12**
- a) Draw and explain working of liquid scintillation counting system.
 - b) Explain working of RIA system and mention it's any 4 applications.
 - c) Describe internal and external radiation. Also mention radiation prevention techniques.

Seat No.	
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B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) HMIS is a _____ medical information system.
 - a) Computer based
 - b) Patient based
 - c) Hospital based
 - d) None of these
- 2) _____ is the heart of hospital.
 - a) Radiology
 - b) Clinical Laboratory
 - c) OPD
 - d) Indoor patient module
- 3) CST based integrated HMIS can take care _____.
 - a) Diagnosis support module
 - b) Data warehousing
 - c) Clinic support module
 - d) All above
- 4) EDI stands for _____.
 - a) Electrical Data Interchange
 - b) Electrical Device Indicator
 - c) Electric Data Interchange
 - d) Electrical Device Informer
- 5) Which of the following is not comes under strategic planning of HMIS?
 - a) Time lines
 - b) Quantity
 - c) Relevance
 - d) Education and training
- 6) The cost of telecommunication using the internet is _____.
 - a) Expensive
 - b) Not expensive
 - c) Medium expensive
 - d) Depends on distance
- 7) Surgical simulation _____ the training scores.
 - a) Decreases
 - b) Improves
 - c) Disturb
 - d) None
- 8) Public grievances and feedback function is considered in _____.
 - a) Inventory Module
 - b) Communication Module
 - c) General Information module
 - d) Administration module
- 9) CT scan image having _____.
 - a) Relatively high resolution
 - b) Excellent bony details
 - c) Long acquisition timer
 - d) Both a and b
- 10) Which of the following is a 3-D volume rendering software?
 - a) ADAM
 - b) BERTA
 - c) JAVA
 - d) ADAM and JAVA
- 11) Picture Archiving and communication system (PACS) scan handle _____.
 - a) X- Ray image
 - b) Endoscope image
 - c) MRI image
 - d) All above

- 12) One voxel contain _____ number.
- | | |
|---------------|----------------|
| a) Two 28 bit | b) Four 8-bit |
| c) Two 16-bit | d) Four 16-bit |
- 13) Tele-education consists of _____ education though website.
- a) Only real time video conferencing
 - b) Only non-real time video conferencing
 - c) Both real time and non-real time video conferencing
 - d) None of these
- 14) Robotic and image guided surgery are based on _____ images of the patients acquired by computer tomography
- | | |
|--------|----------------|
| a) 1-D | b) 2-D |
| c) 3-D | d) 2-D and 3-D |

Seat No.	
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Set	P
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B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section - I

Q.2 Answer any Four: - **16**

- a) What do you mean by online learning? Explain who it is useful MI.
- b) Write silent features of application of VE.
- c) Explain in detail the functions of pathology laboratory module.
- d) What is rendering? Explain surface based rendering in detail.
- e) Write advantages and disadvantages of application service provider (ASP).

Q.3 Answer Any Two: - **12**

- a) What is HMIS? Why HMIS fails explain in detail.
- b) List and explain in detail Human resources available in surgical simulation?
- c) Write a note on.
 - 1) Pre- requisites for HMIS
 - 2) Account Billing module of HMIS

Section – II

Q.4 Answer any Four: - **16**

- a) What is CPR? Explain the need of CPR.
- b) What is Expert System (ES)? Give their advantages and disadvantages.
- c) Explain in detail internet telemedicine.
- d) What is telesurgery? Explain need of telesurgery.
- e) Explain the operation 3-D navigation system.

Q.5 Answer any two: - **12**

- a) List and explain different patient counseling software of CAPE.
- b) Explain the application of telemedicine in.
 - 1) Continuing medical education.
 - 2) Tele radiology.
- c) What is CAS? How CAS is advantageous with conventional surgery explain with an example.

Seat No.	
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B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Public grievances and feedback function is considered in _____.
 a) Inventory Module b) Communication Module
 c) General Information module d) Administration module
- 2) CT scan image having _____.
 a) Relatively high resolution b) Excellent bony details
 c) Long acquisition timer d) Both a and b
- 3) Which of the following is a 3-D volume rendering software?
 a) ADAM b) BERTA
 c) JAVA d) ADAM and JAVA
- 4) Picture Archiving and communication system (PACS) scan handle _____.
 a) X- Ray image b) Endoscope image
 c) MRI image d) All above
- 5) One voxel contain _____ number.
 a) Two 28 bit b) Four 8-bit
 c) Two 16-bit d) Four 16-bit
- 6) Tele-education consists of _____ education through website.
 a) Only real time video conferencing
 b) Only non-real time video conferencing
 c) Both real time and non-real time video conferencing
 d) None of these
- 7) Robotic and image guided surgery are based on _____ images of the patients acquired by computer tomography
 a) 1-D b) 2-D
 c) 3-D d) 2-D and 3-D
- 8) HMIS is a _____ medical information system.
 a) Computer based b) Patient based
 c) Hospital based d) None of these
- 9) _____ is the heart of hospital.
 a) Radiology b) Clinical Laboratory
 c) OPD d) Indoor patient module
- 10) CST based integrated HMIS can take care _____.
 a) Diagnosis support module b) Data warehousing
 c) Clinic support module d) All above

- 11) EDI stands for _____.
a) Electrical Data Interchange b) Electrical Device Indicator
c) Electric Data Interchange d) Electrical Device Informer
- 12) Which of the following is not included under strategic planning of HMIS?
a) Time lines b) Quantity
c) Relevance d) Education and training
- 13) The cost of telecommunication using the internet is _____.
a) Expensive b) Not expensive
c) Medium expensive d) Depends on distance
- 14) Surgical simulation _____ the training scores.
a) Decreases b) Improves
c) Disturb d) None

Seat No.	
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Set	Q
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B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section - I

Q.2 Answer any Four: - **16**

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Section – II

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- c) What is CAS? How CAS is advantageous with conventional surgery explain with an example.

Seat No.	
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B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which of the following does not come under strategic planning of HMIS?
 - a) Time lines
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- | | |
|-------------------|------------------|
| a) Computer based | b) Patient based |
| c) Hospital based | d) None of these |
- 12) _____ is the heart of hospital.
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|--------------|--------------------------|
| a) Radiology | b) Clinical Laboratory |
| c) OPD | d) Indoor patient module |
- 13) CST based integrated HMIS can take care _____.
- | | |
|-----------------------------|---------------------|
| a) Diagnosis support module | b) Data warehousing |
| c) Clinic support module | d) All above |
- 14) EDI stands for _____.
- | | |
|--------------------------------|--------------------------------|
| a) Electrical Data Interchange | b) Electrical Device Indicator |
| c) Electric Data Interchange | d) Electrical Device Informer |

Seat No.	
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B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section - I

Q.2 Answer any Four: - **16**

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 - 2) Account Billing module of HMIS

Section – II

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- d) What is telesurgery? Explain need of telesurgery.
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Q.5 Answer any two: - **12**

- a) List and explain different patient counseling software of CAPE.
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 - 2) Tele radiology.
- c) What is CAS? How CAS is advantageous with conventional surgery explain with an example.

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B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS

Day & Date: Tuesday, 10-12-2019
 Time: 02:30 PM To 05:30 PM

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Section - I

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Section – II

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Set	P
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B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four. 16**
- a) Explain inductive and condenser method of SWD.
 - b) Explain construction and working of infrared and ultra violet lamp.
 - c) Explain in short various types of implantable pacemaker.
 - d) Compare radiation therapy and physical therapy units with reference to application techniques and technical applications.
 - e) Draw and explain various medical applications of nerve muscle stimulator.
- Q.3 Attempt any two. 12**
- a) Discuss various modes of ESU. Draw and explain circuit of CUT mode.
 - b) Draw circuit diagram and explain working of shortwave therapy unit. Mention its applications.
 - c) Draw block diagram and explain working of a multi programmable pacemaker.

Section – II

- Q.4 Attempt any four. 16**
- a) Explain the significance of monophasic and biphasic waveform.
 - b) Define diffusion, drift and explain basic principle of dialysis machine.
 - c) Explain the working of defibrillator analyzer.
 - d) Draw and explain blood leak detector circuit for dialysis unit.
 - e) Explain laser delivery system in detail?
- Q.5 Attempt any two. 12**
- a) Draw a block diagram of the defibrillator with synchronization and explain its working.
 - b) With the help of circuit diagram explain working of monitoring of conductivity of dialysate.
 - c) Explain the need and working of heart rate variability meter. Mention its applications.

Seat No.	
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Set **Q**

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The _____ frequency is independent of the electrical activity of the heart.
 - a) resonance
 - b) impulse
 - c) variable
 - d) rhythmic
- 2) Rate responsive pacemakers have _____ that automatically adjust to changes in person's physical activity.
 - a) transducers
 - b) microchips
 - c) sensors
 - d) power source
- 3) In a defibrillator an enormous voltage of _____ is initially applied to the patient.
 - a) 400V
 - b) 4000V
 - c) 1400V
 - d) 140 KV
- 4) The energy delivered to the patient from defibrillator is only _____ % of total stored energy.
 - a) 70
 - b) 71
 - c) 50
 - d) 65
- 5) Electrode gels are usually employed to reduce contact _____ of the interface of the skin.
 - a) capacitance
 - b) resistance
 - c) impedance
 - d) inductance
- 6) Short wave diathermy machine consists of 2 main circuits _____ and patient circuit.
 - a) power supply
 - b) oscillating circuit
 - c) tuning circuit
 - d) power tube circuit
- 7) The rheobase is the minimum _____ of current that will produce response to stimulus.
 - a) frequency
 - b) intensity
 - c) phase
 - d) vector
- 8) Galvanic current is preliminarily used for the treatment of _____.
 - a) atonic paralysis
 - b) severe paralysis
 - c) muscle weakness
 - d) hyperemia

- 9) The pattern of tissue _____ is affected by shortwave diathermy delivery.
- a) cell fluid heating
 - b) tissue heating
 - c) electrolytes heating
 - d) cell distraction
- 10) Accommodation is the property of a _____ unit of being able to respond less strongly to a slowly increasing current impulse.
- a) cellular
 - b) cardiac
 - c) nerve
 - d) neuromuscular
- 11) Chronic renal failure results in changes in the body _____ that occurs due to a progressive decrease in the number of functioning nephrons.
- a) CSF
 - b) blood
 - c) fluids
 - d) hormones
- 12) The overall performance of dialyzer can be compared in terms of their clearance of _____.
- a) dialysate
 - b) urea
 - c) creatinin
 - d) sodium chloride
- 13) Ultrafiltration monitor is used to monitor the amount of fluid removed from the patient with _____ pressure.
- a) negative
 - b) positive
 - c) partial
 - d) volume
- 14) For pacemaker implant a bipolar or unipolar catheter electrode is inserted through the _____ into right ventricle.
- a) aortic vein
 - b) pulmonary vein
 - c) cephalic vein
 - d) pulmonary artery

Seat No.	
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Set

Q

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four. 16**
- a) Explain inductive and condenser method of SWD.
 - b) Explain construction and working of infrared and ultra violet lamp.
 - c) Explain in short various types of implantable pacemaker.
 - d) Compare radiation therapy and physical therapy units with reference to application techniques and technical applications.
 - e) Draw and explain various medical applications of nerve muscle stimulator.
- Q.3 Attempt any two. 12**
- a) Discuss various modes of ESU. Draw and explain circuit of CUT mode.
 - b) Draw circuit diagram and explain working of shortwave therapy unit. Mention its applications.
 - c) Draw block diagram and explain working of a multi programmable pacemaker.

Section – II

- Q.4 Attempt any four. 16**
- a) Explain the significance of monophasic and biphasic waveform.
 - b) Define diffusion, drift and explain basic principle of dialysis machine.
 - c) Explain the working of defibrillator analyzer.
 - d) Draw and explain blood leak detector circuit for dialysis unit.
 - e) Explain laser delivery system in detail?
- Q.5 Attempt any two. 12**
- a) Draw a block diagram of the defibrillator with synchronization and explain its working.
 - b) With the help of circuit diagram explain working of monitoring of conductivity of dialysate.
 - c) Explain the need and working of heart rate variability meter. Mention its applications.

- 9) Short wave diathermy machine consists of 2 main circuits _____ and patient circuit.
- a) power supply
 - b) oscillating circuit
 - c) tuning circuit
 - d) power tube circuit
- 10) The rheobase is the minimum _____ of current that will produce response to stimulus.
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 - b) intensity
 - c) phase
 - d) vector
- 11) Galvanic current is preliminarily used for the treatment of _____.
- a) atonic paralysis
 - b) severe paralysis
 - c) muscle weakness
 - d) hyperemia
- 12) The pattern of tissue _____ is affected by shortwave diathermy delivery.
- a) cell fluid heating
 - b) tissue heating
 - c) electrolytes heating
 - d) cell distraction
- 13) Accommodation is the property of a _____ unit of being able to respond less strongly to a slowly increasing current impulse.
- a) cellular
 - b) cardiac
 - c) nerve
 - d) neuromuscular
- 14) Chronic renal failure results in changes in the body _____ that occurs due to a progressive decrease in the number of functioning nephrons.
- a) CSF
 - b) blood
 - c) fluids
 - d) hormones

Seat No.	
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Set

R

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four.** **16**
- a) Explain inductive and condenser method of SWD.
 - b) Explain construction and working of infrared and ultra violet lamp.
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 - d) Compare radiation therapy and physical therapy units with reference to application techniques and technical applications.
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- Q.3 Attempt any two.** **12**
- a) Discuss various modes of ESU. Draw and explain circuit of CUT mode.
 - b) Draw circuit diagram and explain working of shortwave therapy unit. Mention its applications.
 - c) Draw block diagram and explain working of a multi programmable pacemaker.

Section – II

- Q.4 Attempt any four.** **16**
- a) Explain the significance of monophasic and biphasic waveform.
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- Q.5 Attempt any two.** **12**
- a) Draw a block diagram of the defibrillator with synchronization and explain its working.
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Seat No.	
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Set **S**

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) In a defibrillator an enormous voltage of _____ is initially applied to the patient.

a) 400V	b) 4000V
c) 1400V	d) 140 KV
- 2) The energy delivered to the patient from defibrillator is only _____ % of total stored energy.

a) 70	b) 71
c) 50	d) 65
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a) capacitance	b) resistance
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a) frequency	b) intensity
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- 6) Galvanic current is preliminarily used for the treatment of _____.

a) atonic paralysis	b) severe paralysis
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- 7) The pattern of tissue _____ is affected by shortwave diathermy delivery.

a) cell fluid heating	b) tissue heating
c) electrolytes heating	d) cell distraction
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a) cellular	b) cardiac
c) nerve	d) neuromuscular

- 9) Chronic renal failure results in changes in the body _____ that occurs due to a progressive decrease in the number of functioning nephrons.
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- a) negative
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 - c) partial
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- 12) For pacemaker implant a bipolar or unipolar catheter electrode is inserted through the _____ into right ventricle.
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- 13) The _____ frequency is independent of the electrical activity of the heart.
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 - d) rhythmic
- 14) Rate responsive pacemakers have _____ that automatically adjust to changes in person's physical activity.
- a) transducers
 - b) microchips
 - c) sensors
 - d) power source

Seat No.	
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Set **S**

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL INSTRUMENTATION – III

Day & Date: Thursday, 12-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any four. 16**
- a) Explain inductive and condenser method of SWD.
 - b) Explain construction and working of infrared and ultra violet lamp.
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- a) Discuss various modes of ESU. Draw and explain circuit of CUT mode.
 - b) Draw circuit diagram and explain working of shortwave therapy unit. Mention its applications.
 - c) Draw block diagram and explain working of a multi programmable pacemaker.

Section – II

- Q.4 Attempt any four. 16**
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- Q.5 Attempt any two. 12**
- a) Draw a block diagram of the defibrillator with synchronization and explain its working.
 - b) With the help of circuit diagram explain working of monitoring of conductivity of dialysate.
 - c) Explain the need and working of heart rate variability meter. Mention its applications.

Seat No.	
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Set **P**

B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Explain the human visual system in accordance with the processing of the image.
- b) Explain the steps involved in homomorphism filtering with the help of block diagram.
- c) Differentiate between point operation and neighborhood operation.
- d) What effect would setting to zero the lower order bit planes have on the histogram of an image in general?
- e) State any 3 properties of 2D-DFT.

Q.3 Attempt any two. **12**

- a) Describe in detail how Hough transform is used for boundary shape detection with an example.
- b) Explain the basic frequency domain filters:
 - 1) Ideal low pass
 - 2) Butterworth low pass
- c) Explain following image enhancement techniques in spatial domain with the help of transformation graphs:
 - 1) Contrast stretching
 - 2) Grey level slicing

Section - II

Q.4 Attempt any four. **16**

- a) Explain Hadamard transform and write its matrix for $N=8$.
- b) State and explain the difference between 2D-DFT and DCT.
- c) Explain moments and explain its significance in image processing.
- d) Explain Hit & Miss Function and their role in image processing.
- e) Define following terms:
 - 1) Lossy compression
 - 2) Skeletonization

Q.5 Attempt any two. **12**

- a) Explain arithmetic coding in detail with an example.
- b) Explain following morphological operations with the help of examples:
 - 1) Dilation
 - 2) Erosion
- c) Explain various image compression techniques in detail with each of example.

- 11) For noise reduction we use _____.
a) Image smoothing b) Image contouring
c) Image enhancement d) Image recognition
- 12) Computation of derivatives in segmentation is also called _____.
a) Spatial filtering b) Frequency filtering
c) Low pass filtering d) High pass filtering
- 13) Blurring attenuate the _____.
a) Pixels b) Points
c) Cross gradient d) Intensity
- 14) Sobel is better than prewitt in image _____.
a) sharpening b) blurring
c) smoothing d) contrast

Seat No.	
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Set **Q**

B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Explain the human visual system in accordance with the processing of the image.
- b) Explain the steps involved in homomorphism filtering with the help of block diagram.
- c) Differentiate between point operation and neighborhood operation.
- d) What effect would setting to zero the lower order bit planes have on the histogram of an image in general?
- e) State any 3 properties of 2D-DFT.

Q.3 Attempt any two. **12**

- a) Describe in detail how Hough transform is used for boundary shape detection with an example.
- b) Explain the basic frequency domain filters:
 - 1) Ideal low pass
 - 2) Butterworth low pass
- c) Explain following image enhancement techniques in spatial domain with the help of transformation graphs:
 - 1) Contrast stretching
 - 2) Grey level slicing

Section - II

Q.4 Attempt any four. **16**

- a) Explain Hadamard transform and write its matrix for $N=8$.
- b) State and explain the difference between 2D-DFT and DCT.
- c) Explain moments and explain its significance in image processing.
- d) Explain Hit & Miss Function and their role in image processing.
- e) Define following terms:
 - 1) Lossy compression
 - 2) Skeletonization

Q.5 Attempt any two. **12**

- a) Explain arithmetic coding in detail with an example.
- b) Explain following morphological operations with the help of examples:
 - 1) Dilation
 - 2) Erosion
- c) Explain various image compression techniques in detail with each of example.

- 11) Image can be blurred using _____.
a) Low pass filter b) Contouring
c) Erosion d) High pass filter
- 12) For line detection we use mask that is _____.
a) Gaussian b) Laplacian
c) Ideal d) Butterworth
- 13) Image having gradient pixels is called _____.
a) Sharp image b) Blur image
c) Gradient image d) Binary image
- 14) For noise reduction we use _____.
a) Image smoothing b) Image contouring
c) Image enhancement d) Image recognition

Seat No.	
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Set **R**

B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Explain the human visual system in accordance with the processing of the image.
- b) Explain the steps involved in homomorphism filtering with the help of block diagram.
- c) Differentiate between point operation and neighborhood operation.
- d) What effect would setting to zero the lower order bit planes have on the histogram of an image in general?
- e) State any 3 properties of 2D-DFT.

Q.3 Attempt any two. **12**

- a) Describe in detail how Hough transform is used for boundary shape detection with an example.
- b) Explain the basic frequency domain filters:
 - 1) Ideal low pass
 - 2) Butterworth low pass
- c) Explain following image enhancement techniques in spatial domain with the help of transformation graphs:
 - 1) Contrast stretching
 - 2) Grey level slicing

Section - II

Q.4 Attempt any four. **16**

- a) Explain Hadamard transform and write its matrix for $N=8$.
- b) State and explain the difference between 2D-DFT and DCT.
- c) Explain moments and explain its significance in image processing.
- d) Explain Hit & Miss Function and their role in image processing.
- e) Define following terms:
 - 1) Lossy compression
 - 2) Skeletonization

Q.5 Attempt any two. **12**

- a) Explain arithmetic coding in detail with an example.
- b) Explain following morphological operations with the help of examples:
 - 1) Dilation
 - 2) Erosion
- c) Explain various image compression techniques in detail with each of example.

Seat No.	
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Set **S**

B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF IMAGE PROCESSING

Day & Date: Saturday, 14-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Explain the human visual system in accordance with the processing of the image.
- b) Explain the steps involved in homomorphism filtering with the help of block diagram.
- c) Differentiate between point operation and neighborhood operation.
- d) What effect would setting to zero the lower order bit planes have on the histogram of an image in general?
- e) State any 3 properties of 2D-DFT.

Q.3 Attempt any two. **12**

- a) Describe in detail how Hough transform is used for boundary shape detection with an example.
- b) Explain the basic frequency domain filters:
 - 1) Ideal low pass
 - 2) Butterworth low pass
- c) Explain following image enhancement techniques in spatial domain with the help of transformation graphs:
 - 1) Contrast stretching
 - 2) Grey level slicing

Section - II

Q.4 Attempt any four. **16**

- a) Explain Hadamard transform and write its matrix for $N=8$.
- b) State and explain the difference between 2D-DFT and DCT.
- c) Explain moments and explain its significance in image processing.
- d) Explain Hit & Miss Function and their role in image processing.
- e) Define following terms:
 - 1) Lossy compression
 - 2) Skeletonization

Q.5 Attempt any two. **12**

- a) Explain arithmetic coding in detail with an example.
- b) Explain following morphological operations with the help of examples:
 - 1) Dilation
 - 2) Erosion
- c) Explain various image compression techniques in detail with each of example.

Seat No.	
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**B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT**

Day & Date: Tuesday, 17-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Prevention of disease provided by _____.
 - a) Public health services
 - b) Personal health services
 - c) Environmental health services
 - d) None
- 2) The area required for CSSD department of hospital is _____.
 - a) 12-18 sq ft
 - b) 8-10 sq ft
 - c) 8-25 sq ft
 - d) 10-15 sq ft
- 3) Ancillary accommodation includes _____.
 - a) Reception room and registration of patient
 - b) Radiology
 - c) Laundry and waste room
 - d) None
- 4) Microbiology and Hematology are the division of _____.
 - a) Radiology dept
 - b) Pharmacy dept
 - c) ICU dept
 - d) Hospital Laboratory
- 5) The temperature range provided in the ethylene oxide sterilizers is _____.
 - a) 49 to 63°C and 30 to 37.8°C
 - b) 4 to 6°C and 30 to 37.8°C
 - c) 50 to 80°C and 20 to 30.2°C
 - d) None
- 6) In which category the head nurse act as resources allocate _____.
 - a) Inter personal role
 - b) Leadership role
 - c) Informational role
 - d) Decisional role
- 7) Which of the following documents used by the head nurse to communicate information about patient has sudden hemocharge to another head nurse in the next shift?
 - a) Kardex record
 - b) Assignment record
 - c) Shift report
 - d) Incident Report

- 8) The effective air changer in operation theater the best of the following is _____.
- a) High turbulence displacement air flow
 - b) Low turbulence displacement airflow
 - c) Mechanical extract of air
 - d) Low to high displacement airflow
- 9) How is dry sterilization is done _____.
- a) In autoclave
 - b) In oven
 - c) In magnetic Vibrator
 - d) In hot plate
- 10) Supportive services of the hospital includes all except.
- a) Pharmacy Services
 - b) Laboratory Services
 - c) Housekeeping services
 - d) Laundry services
- 11) Which of the following is best suited for walls and ceiling of Operation Theater?
- a) Ceramic Tiles
 - b) Terrazo Tiles
 - c) Glaze Tiles
 - d) In situ mosaic finish
- 12) Medical records documents serves as _____.
- a) A legal documents
 - b) A scientific document
 - c) Both a and b
 - d) None
- 13) Which of the following comes under clinical service?
- a) CSSD
 - b) Medical Record
 - c) ICU
 - d) Radiology
- 14) Pathological waste is the category of _____.
- a) Type 1 waste
 - b) Type 2 waste
 - c) Type 3 waste
 - d) Type 4 waste

Seat No.	
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Set **P**

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four. 16**
- a) What is leadership and explain characteristics of leadership styles.
 - b) Explain in detail the role of hospital administrator.
 - c) Explain in detail hospital budgeting processing steps.
 - d) Explain in detail the planning of radiology department in hospital.
 - e) What are indices for measuring the efficiency of the hospital?

- Q.3 Attempt any two. 12**
- a) Discuss and explain in detail the planning and their inter relationship of following department
 - 1) OPD and Causality
 - 2) Inpatient services and OT
 - b) Explain in detail the role of civil engineering dept, for planning the hospital.
 - c) Explain in detail the role, skill required, responsibilities and functions of CEO for effective hospital management.

Section-II

- Q.4 Attempt any four. 16**
- a) Explain in detail functional planning of laboratory services.
 - b) Explain in detail cell need and function of air conditioning system in ancillary service of hospital.
 - c) Explain function and roles of nursing services in hospital.
 - d) Briefly explain the role and importance of medical record in hospital.
 - e) Explain about disaster management of auxiliary service in hospital.

- Q.5 Attempt any two. 12**
- a) Define outpatient services? Explain planning and importance of outpatient services in hospital.
 - b) Explain functions policies and procedures of CSSD department with neat flowchart of CSSD.
 - c) Write a short note on:
 - 1) Medical gas used in hospital
 - 2) Waste management in hospital

Seat No.	
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Set **Q**

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The effective air changer in operation theater the best of the following is _____.
 - a) High turbulence displacement air flow
 - b) Low turbulence displacement airflow
 - c) Mechanical extract of air
 - d) Low to high displacement airflow
- 2) How is dry sterilization is done _____.
 - a) In autoclave
 - b) In oven
 - c) In magnetic Vibrator
 - d) In hot plate
- 3) Supportive services of the hospital includes all except.
 - a) Pharmacy Services
 - b) Laboratory Services
 - c) Housekeeping services
 - d) Laundry services
- 4) Which of the following is best suited for walls and ceiling of Operation Theater?
 - a) Ceramic Tiles
 - b) Terrazo Tiles
 - c) Glaze Tiles
 - d) In situ mosaic finish
- 5) Medical records documents serves as _____.
 - a) A legal documents
 - b) A scientific document
 - c) Both a and b
 - d) None
- 6) Which of the following comes under clinical service?
 - a) CSSD
 - b) Medical Record
 - c) ICU
 - d) Radiology
- 7) Pathological waste is the category of _____.
 - a) Type 1 waste
 - b) Type 2 waste
 - c) Type 3 waste
 - d) Type 4 waste
- 8) Prevention of disease provided by _____.
 - a) Public health services
 - b) Personal health services
 - c) Environmental health services
 - d) None
- 9) The area required for CSSD department of hospital is _____.
 - a) 12-18 sq ft
 - b) 8-10 sq ft
 - c) 8-25 sq ft
 - d) 10-15 sq ft

- 10) Ancillary accomodation includes _____.
- a) Reception room and registration of patient
 - b) Radiology
 - c) Laundry and waste room
 - d) None
- 11) Microbiology and Heamatology are the division of _____.
- a) Radiology dept
 - b) Pharmacy dept
 - c) ICU dept
 - d) Hospital Laboratory
- 12) The temperature range provided in the ethylene oxide sterilizers is _____.
- a) 49 to 63⁰C and 30 to 37.8⁰C
 - b) 4 to 6⁰C and 30 to 37.8⁰C
 - c) 50 to 80⁰C and 20 to 30.2⁰C
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- 13) In which category the head nurse act as resources allocate _____.
- a) Inter personal role
 - b) Leadership role
 - c) Informational role
 - d) Decisional role
- 14) Which of the following documents used by the head nurse to communicate information about patient has sudden hemocharge to another head nurse in the next shift?
- a) Kardex record
 - b) Assignment record
 - c) Shift report
 - d) Incident Report

Seat No.	
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Set

Q

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. 16

- a) What is leadership and explain characteristics of leadership styles.
- b) Explain in detail the role of hospital administrator.
- c) Explain in detail hospital budgeting processing steps.
- d) Explain in detail the planning of radiology department in hospital.
- e) What are indices for measuring the efficiency of the hospital?

Q.3 Attempt any two. 12

- a) Discuss and explain in detail the planning and their inter relationship of following department
 - 1) OPD and Causality
 - 2) Inpatient services and OT
- b) Explain in detail the role of civil engineering dept, for planning the hospital.
- c) Explain in detail the role, skill required, responsibilities and functions of CEO for effective hospital management.

Section-II

Q.4 Attempt any four. 16

- a) Explain in detail functional planning of laboratory services.
- b) Explain in detail cell need and function of air conditioning system in ancillary service of hospital.
- c) Explain function and roles of nursing services in hospital.
- d) Briefly explain the role and importance of medical record in hospital.
- e) Explain about disaster management of auxiliary service in hospital.

Q.5 Attempt any two. 12

- a) Define outpatient services? Explain planning and importance of outpatient services in hospital.
- b) Explain functions policies and procedures of CSSD department with neat flowchart of CSSD.
- c) Write a short note on:
 - 1) Medical gas used in hospital
 - 2) Waste management in hospital

Seat No.	
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Set **R**

**B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT**

Day & Date: Tuesday, 17-12-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The temperature range provided in the ethylene oxide sterilizers is _____.
 - a) 49 to 63°C and 30 to 37.8°C
 - b) 4 to 6°C and 30 to 37.8°C
 - c) 50 to 80°C and 20 to 30.2°C
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- 2) In which category the head nurse act as resources allocate _____.
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 - c) Informational role
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- 3) Which of the following documents used by the head nurse to communicate information about patient has sudden hemocharge to another head nurse in the next shift?
 - a) Kardex record
 - b) Assignment record
 - c) Shift report
 - d) Incident Report
- 4) The effective air changer in operation theater the best of the following is _____.
 - a) High turbulence displacement air flow
 - b) Low turbulence displacement airflow
 - c) Mechanical extract of air
 - d) Low to high displacement airflow
- 5) How is dry sterilization is done _____.
 - a) In autoclave
 - b) In oven
 - c) In magnetic Vibrator
 - d) In hot plate
- 6) Supportive services of the hospital includes all except.
 - a) Pharmacy Services
 - b) Laboratory Services
 - c) Housekeeping services
 - d) Laundry services
- 7) Which of the following is best suited for walls and ceiling of Operation Theater?
 - a) Ceramic Tiles
 - b) Terrazo Tiles
 - c) Glaze Tiles
 - d) In situ mosaic finish
- 8) Medical records documents serves as _____.
 - a) A legal documents
 - b) A scientific document
 - c) Both a and b
 - d) None

Seat No.	
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Set **R**

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four. 16**
- a) What is leadership and explain characteristics of leadership styles.
 - b) Explain in detail the role of hospital administrator.
 - c) Explain in detail hospital budgeting processing steps.
 - d) Explain in detail the planning of radiology department in hospital.
 - e) What are indices for measuring the efficiency of the hospital?
- Q.3 Attempt any two. 12**
- a) Discuss and explain in detail the planning and their inter relationship of following department
 - 1) OPD and Causality
 - 2) Inpatient services and OT
 - b) Explain in detail the role of civil engineering dept, for planning the hospital.
 - c) Explain in detail the role, skill required, responsibilities and functions of CEO for effective hospital management.

Section-II

- Q.4 Attempt any four. 16**
- a) Explain in detail functional planning of laboratory services.
 - b) Explain in detail cell need and function of air conditioning system in ancillary service of hospital.
 - c) Explain function and roles of nursing services in hospital.
 - d) Briefly explain the role and importance of medical record in hospital.
 - e) Explain about disaster management of auxiliary service in hospital.
- Q.5 Attempt any two. 12**
- a) Define outpatient services? Explain planning and importance of outpatient services in hospital.
 - b) Explain functions policies and procedures of CSSD department with neat flowchart of CSSD.
 - c) Write a short note on:
 - 1) Medical gas used in hospital
 - 2) Waste management in hospital

Seat No.	
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B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Supportive services of the hospital includes all except.
 - a) Pharmacy Services
 - b) Laboratory Services
 - c) Housekeeping services
 - d) Laundry services
- 2) Which of the following is best suited for walls and ceiling of Operation Theater?
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- 3) Medical records documents serves as _____.
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 - d) None
- 4) Which of the following comes under clinical service?
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 - c) ICU
 - d) Radiology
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 - b) Type 2 waste
 - c) Type 3 waste
 - d) Type 4 waste
- 6) Prevention of disease provided by _____.
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- 7) The area required for CSSD department of hospital is _____.
 - a) 12-18 sq ft
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- 9) Microbiology and Heamatology are the division of _____.
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 - d) Hospital Laboratory

- 10) The temperature range provided in the ethylene oxide sterilizers is _____.
- a) 49 to 63⁰C and 30 to 37.8⁰C
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 - c) 50 to 80⁰C and 20 to 30.2⁰C
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- 11) In which category the head nurse act as resources allocate _____.
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 - c) Informational role
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- 12) Which of the following documents used by the head nurse to communicate information about patient has sudden hemocharge to another head nurse in the next shift?
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 - b) Assignment record
 - c) Shift report
 - d) Incident Report
- 13) The effective air changer in operation theater the best of the following is _____.
- a) High turbulence displacement air flow
 - b) Low turbulence displacement airflow
 - c) Mechanical extract of air
 - d) Low to high displacement airflow
- 14) How is dry sterilization is done _____.
- a) In autoclave
 - b) In oven
 - c) In magnetic Vibrator
 - d) In hot plate

Seat No.	
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Set **S**

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
HOSPITAL MANAGEMENT

Day & Date: Tuesday, 17-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. 16

- a) What is leadership and explain characteristics of leadership styles.
- b) Explain in detail the role of hospital administrator.
- c) Explain in detail hospital budgeting processing steps.
- d) Explain in detail the planning of radiology department in hospital.
- e) What are indices for measuring the efficiency of the hospital?

Q.3 Attempt any two. 12

- a) Discuss and explain in detail the planning and their inter relationship of following department
 - 1) OPD and Causality
 - 2) Inpatient services and OT
- b) Explain in detail the role of civil engineering dept, for planning the hospital.
- c) Explain in detail the role, skill required, responsibilities and functions of CEO for effective hospital management.

Section-II

Q.4 Attempt any four. 16

- a) Explain in detail functional planning of laboratory services.
- b) Explain in detail cell need and function of air conditioning system in ancillary service of hospital.
- c) Explain function and roles of nursing services in hospital.
- d) Briefly explain the role and importance of medical record in hospital.
- e) Explain about disaster management of auxiliary service in hospital.

Q.5 Attempt any two. 12

- a) Define outpatient services? Explain planning and importance of outpatient services in hospital.
- b) Explain functions policies and procedures of CSSD department with neat flowchart of CSSD.
- c) Write a short note on:
 - 1) Medical gas used in hospital
 - 2) Waste management in hospital

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING - II

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q.1 is compulsory; it should be solved in first 30 minutes in Answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) The 'filter' in filtered back projection refers to _____.
 - a) Bowtie filter between the beam and patient
 - b) Conversion between attenuation and Hounsfield units
 - c) Conversion between fan-beam and parallel geometry
 - d) Fix for the blurring inherent to backprojection
- 2) The main advantage of iterative reconstruction techniques versus filtered backprojection is _____.
 - a) Better depiction of bone detail
 - b) Does not require specification of reconstruction kernel or filter
 - c) Better handling of noisy images
 - d) Faster reconstruction
- 3) Decreasing kV in CT is advantageous because _____.
 - a) X-ray penetration improves
 - b) Tissue contrast improves
 - c) Scan times are reduced
 - d) Metal streak artifacts are improved
- 4) In the presence of a uniform magnetic field, hydrogen protons _____.
 - a) Line up along the field and rotate around its axis
 - b) Line up along the field and precess around its axis
 - c) Remain oriented mostly randomly and precess around the field axis
 - d) Are not affected by the magnetic field
- 5) A spin echo is formed by _____.
 - a) Reversing the direction of BO
 - b) Flipping proton direction by a radiofrequency pulse
 - c) Applying a negative magnetic field gradient
 - d) none of above
- 6) Spatial localization in MRI primarily relies on _____.
 - a) Distance to the receiving coil
 - b) Distance from the transmission coil
 - c) Varying magnetic field across the patient
 - d) Tomographic reconstruction
- 7) If a signal is undersampled, aliasing will result and cause _____.
 - a) Amplitude misregistration
 - b) Frequency misregistration
 - c) Phase misregistration
 - d) Poor resolution

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – II

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt Any Four **16**

- a) Explain construction and working of any two types of CT detectors.
- b) Define:
 - i) CT artifacts
 - ii) Randon transform
- c) Compare second and third generations of CT scanners with appropriate diagram.
- d) Explain different types of pulse sequences used in MRS.
- e) List and state the purpose of measuring different types of metabolites in MRS.

Q.3 Attempt Any Two **12**

- a) Describe slip ring technology in spiral CT.
- b) Explain the significance and working of Magnetic Resonance Spectroscopy. Mention it's any 2 clinical applications.
- c) Explain following reconstruction techniques with their specializations:
 - i) Filtered back projection
 - ii) Fourier transforms

Section – II

Q.4 Attempt Any Four **16**

- a) Explain working of superconductive magnets and state its advantages.
- b) Explain working of MDCT imaging.
- c) Define image contrast and resolution terms image processing.
- d) Define and explain working of Electrical Impedance Tomography in short.
- e) Derive the Larmor equation and state the importance of Larmor frequency.

Q.5 Attempt Any Two **12**

- a) Explain phase and frequency encoding in MRI with diagrams.
- b) List and differentiate Hybrid Imaging modalities and describe PET/CT modality.
- c) Explain the process and applications of CT angiography in detail.

- 9) The main advantage of iterative reconstruction techniques versus filtered backprojection is _____.
- a) Better depiction of bone detail
 - b) Does not require specification of reconstruction kernel or filter
 - c) Better handling of noisy images
 - d) Faster reconstruction
- 10) Decreasing kV in CT is advantageous because _____.
- a) X-ray penetration improves
 - b) Tissue contrast improves
 - c) Scan times are reduced
 - d) Metal streak artifacts are improved
- 11) In the presence of a uniform magnetic field, hydrogen protons _____.
- a) Line up along the field and rotate around its axis
 - b) Line up along the field and precess around its axis
 - c) Remain oriented mostly randomly and precess around the field axis
 - d) Are not affected by the magnetic field
- 12) A spin echo is formed by _____.
- a) Reversing the direction of BO
 - b) Flipping proton direction by a radiofrequency pulse
 - c) Applying a negative magnetic field gradient
 - d) none of above
- 13) Spatial localization in MRI primarily relies on _____.
- a) Distance to the receiving coil
 - b) Distance from the transmission coil
 - c) Varying magnetic field across the patient
 - d) Tomographic reconstruction
- 14) If a signal is undersampled, aliasing will result and cause _____.
- a) Amplitude misregistration
 - b) Frequency misregistration
 - c) Phase misregistration
 - d) Poor resolution

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – II

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt Any Four **16**

- a) Explain construction and working of any two types of CT detectors.
- b) Define:
 - i) CT artifacts
 - ii) Randon transform
- c) Compare second and third generations of CT scanners with appropriate diagram.
- d) Explain different types of pulse sequences used in MRS.
- e) List and state the purpose of measuring different types of metabolites in MRS.

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- a) Describe slip ring technology in spiral CT.
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Section – II

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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – II

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q.1 is compulsory; it should be solved in first 30 minutes in Answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) A spin echo is formed by _____.
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- 3) If a signal is undersampled, aliasing will result and cause _____.

a) Amplitude misregistration	b) Frequency misregistration
c) Phase misregistration	d) Poor resolution
- 4) In MR imaging, matrix size determines _____.

a) Field of view	b) Aliasing
c) Resolution	d) Bandwidth
- 5) SNR in MRI is improved by increasing _____.

a) Resolution	b) Bandwidth
c) Gradient strength	d) Acquisition time
- 6) The MR imaging parameter that determines how much T1 (longitudinal) recovery is allowed to occur is the _____.

a) TR	b) None of these
c) Bandwidth	d) number of excitation
- 7) Protons in different molecules differ in all of the following ways except _____.

a) T1	b) T2
c) Gyromagnetic ratio	d) Precession frequency
- 8) Turns ratio for a C.T. is _____.

a) $n = N_p/N_s$	b) $n = N_s/N_p$
c) $n = 1/N_p$	d) $n = N_s$
- 9) _____ of the following substances are used to coat the walls of a CT scan room for radiation shielding.

a) Tungsten	b) Glass
c) Lead	d) Iron

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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – II

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Section – II

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- a) Explain working of superconductive magnets and state its advantages.
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 - d) $n = N_s$
- 4) _____ of the following substances are used to coat the walls of a CT scan room for radiation shielding.
 - a) Tungsten
 - b) Glass
 - c) Lead
 - d) Iron
- 5) The windings of a C.T. are _____.
 - a) tied together
 - b) Shorted
 - c) wound over one another
 - d) Grounded
- 6) The 'filter' in filtered back projection refers to _____.
 - a) Bowtie filter between the beam and patient
 - b) Conversion between attenuation and Hounsfield units
 - c) Conversion between fan-beam and parallel geometry
 - d) Fix for the blurring inherent to backprojection
- 7) The main advantage of iterative reconstruction techniques versus filtered backprojection is _____.
 - a) Better depiction of bone detail
 - b) Does not require specification of reconstruction kernel or filter
 - c) Better handling of noisy images
 - d) Faster reconstruction
- 8) Decreasing kV in CT is advantageous because _____.
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c) Phase misregistration d) Poor resolution
- 13) In MR imaging, matrix size determines _____.
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL IMAGING – II

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- c) Compare second and third generations of CT scanners with appropriate diagram.
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- e) List and state the purpose of measuring different types of metabolites in MRS.

Q.3 Attempt Any Two **12**

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- b) Explain the significance and working of Magnetic Resonance Spectroscopy. Mention it's any 2 clinical applications.
- c) Explain following reconstruction techniques with their specializations:
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 - ii) Fourier transforms

Section – II

Q.4 Attempt Any Four **16**

- a) Explain working of superconductive magnets and state its advantages.
- b) Explain working of MDCT imaging.
- c) Define image contrast and resolution terms image processing.
- d) Define and explain working of Electrical Impedance Tomography in short.
- e) Derive the Larmor equation and state the importance of Larmor frequency.

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- a) Explain phase and frequency encoding in MRI with diagrams.
- b) List and differentiate Hybrid Imaging modalities and describe PET/CT modality.
- c) Explain the process and applications of CT angiography in detail.

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B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
INSTALLATION, MAINTENANCE AND SERVICING

Day & Date: Saturday,23-11-2019
 Time: 02.30 PM To 05.30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.

14

- 1) Phonocardiography is listening to _____.
 - a) Arm muscle sound
 - b) Lung sound
 - c) Heart sound
 - d) Respirating tract sound
- 2) Total productive maintenance aims at _____.
 - a) Less idle time
 - b) Increase in productivity
 - c) Zero down time
 - d) None
- 3) Equipment history cards are means to record _____.
 - a) The way equipment behaves
 - b) Total down time of the equipment
 - c) The rate at which different components wear off
 - d) All the above
- 4) AMC stands for _____.
 - a) Annual Machine Calibration
 - b) Annual Maintenance Contract
 - c) Atomic Mass Calibration
 - d) Autonomous Machine Calibration
- 5) What is the thickness of the lead jacket that is maintained for X-ray procedures?
 - a) 0.25 mm
 - b) 2.5 mm
 - c) 25 mm
 - d) 250 mm
- 6) The following is not a classification of maintenance _____.
 - a) Corrective maintenance
 - b) Timely maintenance
 - c) Scheduled maintenance
 - d) Preventive maintenance
- 7) What color code is used for a person suffering from cardiac arrest?
 - a) Red
 - b) Blue
 - c) Black
 - d) Green
- 8) Which authority sets the standards for hospitals in India?
 - a) NABH
 - b) NBRI
 - c) CBI
 - d) DRDO

Seat No.	
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Set **P**

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
INSTALLATION, MAINTENANCE AND SERVICING

Day & Date: Saturday,23-11-2019
 Time: 02.30 PM To 05.30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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SECTION I

Q.2 Attempt any four of the following questions. 16

- a) Explain in detail the importance of biomedical engg in the hospital.
- b) Describe tools and aids for servicing and maintenance of biomedical equipment's.
- c) Explain installation techniques for pulse Oximeter.
- d) Write in detail preventive maintenance and calibration checks of medical equipment's.
- e) Write benefits and scopes of medical equipment's insurance.

Q.3 Attempt any two of the following questions. 12

- a) Explain the various jobs carries out by application specialist biomedical engg. (Any two specialist).
- b) List and explain precautions to be taken while installing the medical equipment in hospital.
- c) Explain the following maintenance
 - i) CMC
 - ii) AMC

SECTION II

Q.4 Attempt any four of the following questions. 16

- a) Write in detail the need installation of medical gas in hospital.
- b) Written detail the installation of X ray machine.
- c) Write and explain need of NABH certification for hospital.
- d) Explain in brief rules of installing radiology equipment's in radiology department.
- e) Explain in detail the performance test and calibration of any of the cardiac equipment's while installing in cardiac dept.

Q.5 Attempt any two of the following questions. 12

- a) Explain the requirement of design procedure for installing OT equipment's with specification.
- c) Define and explain installation procedure of ICU and ICCU units.
- d) Explain test used for optimum performance of ECG machine.

Seat No.	
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**B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
INSTALLATION, MAINTENANCE AND SERVICING**

Day & Date: Saturday, 23-11-2019
Time: 02.30 PM To 05.30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) Which authority sets the standards for hospitals in India?
 - a) NABH
 - b) NBRI
 - c) CBI
 - d) DRDO
- 2) What should be the minimum distance maintained when performing an X-ray with the help of a portable X-ray?
 - a) 0.5m
 - b) 5.0m
 - c) 50m
 - d) 500m
- 3) _____ are routinely used for the measurement of Lithium, Sodium and Potassium in body.
 - a) Spectrophotometer
 - b) Colorimeter
 - c) Flame photometer
 - d) Centrifuge
- 4) In ICU room should be at least _____ sq. feet with free movable space.
 - a) 120
 - b) 100
 - c) 200
 - d) 240
- 5) What is the value of gap voltage maintained in ECG?
 - a) 1 to 10V
 - b) 4 to 40V
 - c) 0.4 to 4V
 - d) 14 to 400V
- 6) Glass electrodes are suitable for measurement in the range of P^H _____.
 - a) 0-110
 - b) 11-100
 - c) 0-11
 - d) None
- 7) The goal in designing medical gas and vacuum system is _____.
 - a) To provide a safe system
 - b) To provide a sufficient flow of gas or vacuum
 - c) To provide the required pressure
 - d) All above
- 8) Phonocardiography is listening to _____.
 - a) Arm muscle sound
 - b) Lung sound
 - c) Heart sound
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- 9) Total productive maintenance aims at _____.
- a) Less idle time
 - b) Increase in productivity
 - c) Zero down time
 - d) None
- 10) Equipment history cards are means to record _____.
- a) The way equipment behaves
 - b) Total down time of the equipment
 - c) The rate at which different components wear off
 - d) All the above
- 11) AMC stands for _____.
- a) Annual Machine Calibration
 - b) Annual Maintenance Contract
 - c) Atomic Mass Calibration
 - d) Autonomous Machine Calibration
- 12) What is the thickness of the lead jacket that is maintained for X-ray procedures?
- a) 0.25 mm
 - b) 2.5 mm
 - c) 25 mm
 - d) 250 mm
- 13) The following is not a classification of maintenance _____.
- a) Corrective maintenance
 - b) Timely maintenance
 - c) Scheduled maintenance
 - d) Preventive maintenance
- 14) What color code is used for a person suffering from cardiac arrest?
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Seat No.	
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Set Q

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
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INSTALLATION, MAINTENANCE AND SERVICING

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- d) Write in detail preventive maintenance and calibration checks of medical equipment's.
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- a) Explain the various jobs carries out by application specialist biomedical engg. (Any two specialist).
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SECTION II

Q.4 Attempt any four of the following questions. 16

- a) Write in detail the need installation of medical gas in hospital.
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- e) Explain in detail the performance test and calibration of any of the cardiac equipment's while installing in cardiac deprt.

Q.5 Attempt any two of the following questions. 12

- a) Explain the requirement of design procedure for installing OT equipment's with specification.
- c) Define and explain installation procedure of ICU and ICCU units.
- d) Explain test used for optimum performance of ECG machine.

Seat No.	
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B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
INSTALLATION, MAINTENANCE AND SERVICING

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) What is the thickness of the lead jacket that is maintained for X-ray procedures?

a) 0.25 mm	b) 2.5 mm
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- 4) Which authority sets the standards for hospitals in India?

a) NABH	b) NBRI
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- 5) What should be the minimum distance maintained when performing an X-ray with the help of a portable X-ray?

a) 0.5m	b) 5.0m
c) 50m	d) 500m
- 6) _____ are routinely used for the measurement of Lithium, Sodium and Potassium in body.

a) Spectrophotometer	b) Colorimeter
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- 7) In ICU room should be at least _____ sq. feet with free movable space.

a) 120	b) 100
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Set

R

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
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- c) Explain installation techniques for pulse Oximeter.
- d) Write in detail preventive maintenance and calibration checks of medical equipment's.
- e) Write benefits and scopes of medical equipment's insurance.

Q.3 Attempt any two of the following questions. 12

- a) Explain the various jobs carries out by application specialist biomedical engg. (Any two specialist).
- b) List and explain precautions to be taken while installing the medical equipment in hospital.
- c) Explain the following maintenance
 - i) CMC
 - ii) AMC

SECTION II

Q.4 Attempt any four of the following questions. 16

- a) Write in detail the need installation of medical gas in hospital.
- b) Written detail the installation of X ray machine.
- c) Write and explain need of NABH certification for hospital.
- d) Explain in brief rules of installing radiology equipment's in radiology department.
- e) Explain in detail the performance test and calibration of any of the cardiac equipment's while installing in cardiac dept.

Q.5 Attempt any two of the following questions. 12

- a) Explain the requirement of design procedure for installing OT equipment's with specification.
- c) Define and explain installation procedure of ICU and ICCU units.
- d) Explain test used for optimum performance of ECG machine.

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL MICROSYSTEMS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
 2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which micromachining process would be most likely used to construct high aspect ratio micro channels and chambers within a silicon or glass substrate.

a) Bulk	b) Surface
c) PMMA	d) LIGA
- 2) Silicon dioxide is thin film used in many application. This film is used for which of the following layer.
 - a) Structural and piezoresistive layer
 - b) Sacrificial and masking layer
 - c) Masking and piezoresistive layer
 - d) Electrical and environmental isolation
- 3) The popular method of designating crystal planes and orientations is _____.

a) Czochralski	b) Miller Indices
c) Etching	d) LIGA
- 4) Lithography is used for _____.
 - a) Farming resist layers on the substrate
 - b) Cutting tool
 - c) Farming electric bonds
 - d) None
- 5) Which of the following material are expensive for the fabrication technique?

a) Silicon	b) Glass
c) Polymer	d) Both a and b
- 6) Synchrotron radiation is to LIGA _____ is to bulk and surface micromachining.

a) Electromagnetic radiation	b) Microwave
c) Ultraviolet light	d) Infrared light
- 7) PCR stands _____.
 - a) Polymerase chain reaction
 - b) Polymer Chain Repeater
 - c) Polynucleotide Chain Reaction
 - d) None

- 8) Micro valves typically operate _____ and have a _____ operational life time than micro scale valve.
- a) Slower, Shorter b) Faster, Shorter
c) Faster, Longer d) Slower, Longer
- 9) Which of the following is an example of drug delivery micro system?
- a) Antibiotic administration b) Pain medication
c) Both a and b d) None
- 10) $\text{Si (Solid)} + \text{O}_2 \text{ (gas)} \rightarrow \text{SiO}_2 \text{ (Solid)}$ In which deposition process does this reaction occurs.
- a) Silicon Nitride CVD
b) Wet Oxidation of Silicon Dioxide
c) Dry Oxidation of Silicon Dioxide
d) Spin-on of photoresists
- 11) The optical sensors is based on _____ principle.
- a) Quantum efficiency b) piezoelectric effect
c) Both a and b d) None
- 12) A micro array is an ordered array of microscopic elements on a planer substrate that allows the specific binding of _____.
- a) Gene or gene products b) Whole genome
c) Both a and b d) None
- 13) Micro bio sensors are based on _____.
- a) Ions effects b) Ion sensitive field effect transistor
c) Piezoelectric effect d) Magnetic effect
- 14) The power consumption of micro valve is typically _____.
- a) 0.1 – 2.0 W b) 0.1 to 0.2 W
c) 0.1 – 0.2 W d) None

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL MICROSYSTEMS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Answer any Four. 16**
- a) Discuss the steps involve in fabrication of MEMS.
 - b) Explain the annealing process.
 - c) Explain the process of chemical vapor deposition (CVD) with necessary dia.
 - d) What is LIGA? Explain its major fabrication steps in detail.
 - e) Enlist different types of etching processes and explain any one on detail.
- Q.3 Answer Any Two. 12**
- a) Explain in detail various material used for fabrication of MEMS devices starting their properties and application.
 - b) Explain in detail various processes used for doping in BioMEMS.
 - c) Explain the following.
 - 1) Imprinting or hot embossing
 - 2) Process of curing

Section – II

- Q.4 Answer any Four. 16**
- a) Draw and explain the elements of Micro Total Analysis Systems (Micro TAS).
 - b) Write a note on Nano patterning.
 - c) Explain in detail PCR.
 - d) List and explain different types packaging technologies used for micro system packaging.
 - e) Explain genetic screening.
- Q.5 Answer Any Two. 12**
- a) Explain in detail Bio sensing principles and sensing methods.
 - b) Explain in detail physical sensor and its classification.
 - c) Write and explain in detail micro surgical tools and micro needles.

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL MICROSYSTEMS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Micro valves typically operate _____ and have a _____ operational life time than micro scale valve.
 - a) Slower, Shorter
 - b) Faster, Shorter
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 - d) Slower, Longer
- 2) Which of the following is an example of drug delivery micro system?
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 - b) Pain medication
 - c) Both a and b
 - d) None
- 3) $\text{Si (Solid) + O}_2 \text{ (gas)} \rightarrow \text{SiO}_2 \text{ (Solid)}$ In which deposition process does this reaction occurs.
 - a) Silicon Nitride CVD
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- 4) The optical sensors is based on _____ principle.
 - a) Quantum efficiency
 - b) piezoelectric effect
 - c) Both a and b
 - d) None
- 5) A micro array is an ordered array of microscopic elements on a planer substrate that allows the specific binding of _____.
 - a) Gene or gene products
 - b) Whole genome
 - c) Both a and b
 - d) None
- 6) Micro bio sensors are based on _____.
 - a) Ions effects
 - b) Ion sensitive field effect transistor
 - c) Piezoelectric effect
 - d) Magnetic effect
- 7) The power consumption of micro valve is typically _____.
 - a) 0.1 – 2.0 W
 - b) 0.1 to 0.2 W
 - c) 0.1 – 0.2 W
 - d) None
- 8) Which micromachining process would be most likely used to construct high aspect ratio micro channels and chambers within a silicon or glass substrate.
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- 9) Silicon dioxide is thin film used in many application. This film is used for which of the following layer.
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 - b) Polymer Chain Repeater
 - c) Polynucleotide Chain Reaction
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL MICROSYSTEMS

Day & Date: Monday, 25-11-2019

Max. Marks: 56

Time: 02:30 PM To 05:30 PM

- Instructions:** 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Answer any Four. 16**
- a) Discuss the steps involve in fabrication of MEMS.
 - b) Explain the annealing process.
 - c) Explain the process of chemical vapor deposition (CVD) with necessary dia.
 - d) What is LIGA? Explain its major fabrication steps in detail.
 - e) Enlist different types of etching processes and explain any one on detail.
- Q.3 Answer Any Two. 12**
- a) Explain in detail various material used for fabrication of MEMS devices starting their properties and application.
 - b) Explain in detail various processes used for doping in BioMEMS.
 - c) Explain the following.
 - 1) Imprinting or hot embossing
 - 2) Process of curing

Section – II

- Q.4 Answer any Four. 16**
- a) Draw and explain the elements of Micro Total Analysis Systems (Micro TAS).
 - b) Write a note on Nano patterning.
 - c) Explain in detail PCR.
 - d) List and explain different types packaging technologies used for micro system packaging.
 - e) Explain genetic screening.
- Q.5 Answer Any Two. 12**
- a) Explain in detail Bio sensing principles and sensing methods.
 - b) Explain in detail physical sensor and its classification.
 - c) Write and explain in detail micro surgical tools and micro needles.

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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL MICROSYSTEMS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Which of the following material are expensive for the fabrication technique?
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- 8) A micro array is an ordered array of microscopic elements on a planer substrate that allows the specific binding of _____.
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 - c) Both a and b
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL MICROSYSTEMS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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Section – I

- Q.2 Answer any Four. 16**
- a) Discuss the steps involve in fabrication of MEMS.
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 - c) Explain the following.
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Section – II

- Q.4 Answer any Four. 16**
- a) Draw and explain the elements of Micro Total Analysis Systems (Micro TAS).
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- a) Explain in detail Bio sensing principles and sensing methods.
 - b) Explain in detail physical sensor and its classification.
 - c) Write and explain in detail micro surgical tools and micro needles.

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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL MICROSYSTEMS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

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 - d) Electrical and environmental isolation

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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMEDICAL MICROSYSTEMS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Answer any Four. 16**
- a) Discuss the steps involve in fabrication of MEMS.
 - b) Explain the annealing process.
 - c) Explain the process of chemical vapor deposition (CVD) with necessary dia.
 - d) What is LIGA? Explain its major fabrication steps in detail.
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 - b) Explain in detail various processes used for doping in BioMEMS.
 - c) Explain the following.
 - 1) Imprinting or hot embossing
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Section – II

- Q.4 Answer any Four. 16**
- a) Draw and explain the elements of Micro Total Analysis Systems (Micro TAS).
 - b) Write a note on Nano patterning.
 - c) Explain in detail PCR.
 - d) List and explain different types packaging technologies used for micro system packaging.
 - e) Explain genetic screening.
- Q.5 Answer Any Two. 12**
- a) Explain in detail Bio sensing principles and sensing methods.
 - b) Explain in detail physical sensor and its classification.
 - c) Write and explain in detail micro surgical tools and micro needles.

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TISSUE ENGINEERING

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.

14

- 1) A blastocyte is _____.
 - a) A very early stage of embryo
 - b) A type of stem cell
 - c) Part of the blood system
 - d) A type brain cell
- 2) The human body is composed of _____ cells
 - a) Less than 10^{13}
 - b) Greater than 10^{13}
 - c) Less than 100^{13}
 - d) Greater than 100^{13}
- 3) The embryonic stem cells were said to self renew _____ of developmental potential.
 - a) With some subsequent loss
 - b) Without any subsequent loss
 - c) With some subsequent gain
 - d) Without any subsequent gain
- 4) In adult erythropoietin is produced _____ by specialize interstitial cell in the kidney.
 - a) Greater than 90%
 - b) Less than 90%
 - c) Equal to 90%
 - d) None
- 5) The normal human liver contains approximately _____ hepatocytes /mL.
 - a) 10
 - b) 10^8
 - c) 100^8
 - d) 1000^8
- 6) Hydraulic pressure as well as the hydraulic permeability of the glomerular capillary bed is at least _____ and _____ of magnitude higher respectively.
 - a) Two times, Three order
 - b) Three times, Two order
 - c) Two times, Two order
 - d) None
- 7) The _____ was the first solid organ.
 - a) Bone
 - b) Kidney
 - c) Skeletal
 - d) Lung

- 8) Hematopoietic cells have a close structural and functional relationship with _____ cell.
- a) Stem
 - b) Adult
 - c) Aging
 - d) Stromal
- 9) The Cell polymer system can be used for following tissue engg. Application
- a) Liver
 - b) Intestine
 - c) Bone
 - d) All above
- 10) Restorable guidance channels need to retain their mechanical integrity over
- a) 4 to 12 days
 - b) 4 to 12 weeks
 - c) 4 to 12 Months
 - d) None
- 11) Which of the following modes are used to delivery of neuroactive molecules to the nerverous system?
- a) Slow-release polymer system
 - b) Pumps
 - c) Both a and b
 - d) None
- 12) Which of the following decreases in length during the contraction of a skeletal muscle?
- a) A band of the sarcomere
 - b) I band of the sarcomere
 - c) Thick filaments
 - d) Thin Filaments
- 13) The sarcomeres is the basic unit of _____.
- a) Contractions
 - b) Gene therapy
 - c) Nerve regeneration
 - d) None
- 14) The reabsorption of which of the following ions is increased by the presence of aldosterone In the distal tubule of the kidney.
- a) Sodium
 - b) Phosphate
 - c) Calcium
 - d) Potassium

Seat No.	
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Set

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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TISSUE ENGINEERING

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four. 16**
- a) Explain the reconstruction of epithelial and endothelial tissues.
 - b) Explain support of cultured cell lines. Explain stereotypic culture against monolayer culture.
 - c) Explain stress effects on gene regulation.
 - d) Explain embryonic stem cell and control of stem cell development.
 - e) Define the following and describe how they may be obtained for TE purpose
 - 1) Autologous adult tissue cells
 - 2) Induced pluripotent stem cell

- Q.3 Answer any two. 12**
- a) Explain basic principles and consideration in tissue.
 - b) Explain mechanism of shear stress induced gene regulation.
 - c) Explain aging and other types of stem cells.

Section – II

- Q.4 Answer any four. 16**
- a) Explain challenges for scale up and recapitulation in hematopoietic system.
 - b) Explain in vitro neural circuits and biosensors used in tissue engg. of nervous system.
 - c) Explain reconstructive surgery of whole skeletal muscles.
 - d) Explain bioartificial glomerulus in the construction of bioartificial kidney.
 - e) Explain in vitro cartilage repair.
- Q.5 Answer any two. 12**
- a) Explain different methods of hepatocytes transplantation system.
 - b) Explain myoblast transfer and gene therapy in tissue engineering of skeletal muscle.
 - c) Explain fundamental based tissue engg. formulation in tissue engg. of kidney.

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TISSUE ENGINEERING

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) Hematopoietic cells have a close structural and functional relationship with _____ cell.

a) Stem	b) Adult
c) Aging	d) Stromal
- 2) The Cell polymer system can be used for following tissue engg. Application

a) Liver	b) Intestine
c) Bone	d) All above
- 3) Restorable guidance channels need to retain their mechanical integrity over

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- 12) The normal human liver contains approximately _____ hepatocytes /mL.
- a) 10 b) 10^8
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- 13) Hydraulic pressure as well as the hydraulic permeability of the glomerular capillary bed is at least _____ and _____ of magnitude higher respectively.
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c) Two times, Two order d) None
- 14) The _____ was the first solid organ.
- a) Bone b) Kidney
c) Skeletal d) Lung

Seat No.	
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Set

Q

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TISSUE ENGINEERING

Day & Date: Tuesday, 26-11-2019
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Section – II

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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TISSUE ENGINEERING

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) The normal human liver contains approximately _____ hepatocytes /mL.

a) 10	b) 10^8
c) 100^8	d) 1000^8
- 2) Hydraulic pressure as well as the hydraulic permeability of the glomerular capillary bed is at least _____ and _____ of magnitude higher respectively.

a) Two times, Three order	b) Three times, Two order
c) Two times, Two order	d) None
- 3) The _____ was the first solid organ.

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- 6) Restorable guidance channels need to retain their mechanical integrity over

a) 4 to 12 days	b) 4 to 12 weeks
c) 4 to 12 Months	d) None
- 7) Which of the following modes are used to delivery of neuroactive molecules to the nerverous system?

a) Slow-release polymer system	b) Pumps
c) Both a and b	d) None
- 8) Which of the following decreases in length during the contraction of a skeletal muscle?

a) A band of the sarcomere	b) I band of the sarcomere
c) Thick filaments	d) Thin Filaments

Seat No.	
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Set

R

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TISSUE ENGINEERING

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four. 16**
- a) Explain the reconstruction of epithelial and endothelial tissues.
 - b) Explain support of cultured cell lines. Explain stereotypic culture against monolayer culture.
 - c) Explain stress effects on gene regulation.
 - d) Explain embryonic stem cell and control of stem cell development.
 - e) Define the following and describe how they may be obtained for TE purpose
 - 1) Autologous adult tissue cells
 - 2) Induced pluripotent stem cell

- Q.3 Answer any two. 12**
- a) Explain basic principles and consideration in tissue.
 - b) Explain mechanism of shear stress induced gene regulation.
 - c) Explain aging and other types of stem cells.

Section – II

- Q.4 Answer any four. 16**
- a) Explain challenges for scale up and recapitulation in hematopoietic system.
 - b) Explain in vitro neural circuits and biosensors used in tissue engg. of nervous system.
 - c) Explain reconstructive surgery of whole skeletal muscles.
 - d) Explain bioartificial glomerulus in the construction of bioartificial kidney.
 - e) Explain in vitro cartilage repair.
- Q.5 Answer any two. 12**
- a) Explain different methods of hepatocytes transplantation system.
 - b) Explain myoblast transfer and gene therapy in tissue engineering of skeletal muscle.
 - c) Explain fundamental based tissue engg. formulation in tissue engg. of kidney.

Seat No.	
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B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TISSUE ENGINEERING

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) Restorable guidance channels need to retain their mechanical integrity over

a) 4 to 12 days	b) 4 to 12 weeks
c) 4 to 12 Months	d) None
- 2) Which of the following modes are used to delivery of neuroactive molecules to the nerverous system?

a) Slow-release polymer system	b) Pumps
c) Both a and b	d) None
- 3) Which of the following decreases in length during the contraction of a skeletal muscle?

a) A band of the sarcomere	b) I band of the sarcomere
c) Thick filaments	d) Thin Filaments
- 4) The sarcomeres is the basic unit of _____.

a) Contractions	b) Gene therapy
c) Nerve regeneration	d) None
- 5) The reabsorption of which of the following ions is increased by the presence of aldosterone In the distal tubule of the kidney.

a) Sodium	b) Phosphate
c) Calcium	d) Potassium
- 6) A blastocyte is _____.

a) A very early stage of embryo	b) A type of stem cell
c) Part of the blood system	d) A type brain cell
- 7) The human body is composed of _____ cells

a) Less than 10^{13}	b) Greater than 10^{13}
c) Less than 100^{13}	d) Greater than 100^{13}
- 8) The embryonic stem cells were said to self renew _____ of developmental potential.

a) With some subsequent loss
b) Without any subsequent loss
c) With some subsequent gain
d) Without any subsequent gain

- 9) In adult erythropoietin is produced _____ by specialize interstitial cell in the kidney.
- a) Greater than 90% b) Less than 90%
c) Equal to 90% d) None
- 10) The normal human liver contains approximately _____ hepatocytes /mL.
- a) 10 b) 10^8
c) 100^8 d) 1000^8
- 11) Hydraulic pressure as well as the hydraulic permeability of the glomerular capillary bed is at least _____ and _____ of magnitude higher respectively.
- a) Two times, Three order b) Three times, Two order
c) Two times, Two order d) None
- 12) The _____ was the first solid organ.
- a) Bone b) Kidney
c) Skeletal d) Lung
- 13) Hematopoietic cells have a close structural and functional relationship with _____ cell.
- a) Stem b) Adult
c) Aging d) Stromal
- 14) The Cell polymer system can be used for following tissue engg. Application
- a) Liver b) Intestine
c) Bone d) All above

Seat No.	
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Set **S**

B.E. (Part – II) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TISSUE ENGINEERING

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Answer any four. 16**
- a) Explain the reconstruction of epithelial and endothelial tissues.
 - b) Explain support of cultured cell lines. Explain stereotypic culture against monolayer culture.
 - c) Explain stress effects on gene regulation.
 - d) Explain embryonic stem cell and control of stem cell development.
 - e) Define the following and describe how they may be obtained for TE purpose
 - 1) Autologous adult tissue cells
 - 2) Induced pluripotent stem cell

- Q.3 Answer any two. 12**
- a) Explain basic principles and consideration in tissue.
 - b) Explain mechanism of shear stress induced gene regulation.
 - c) Explain aging and other types of stem cells.

Section – II

- Q.4 Answer any four. 16**
- a) Explain challenges for scale up and recapitulation in hematopoietic system.
 - b) Explain in vitro neural circuits and biosensors used in tissue engg. of nervous system.
 - c) Explain reconstructive surgery of whole skeletal muscles.
 - d) Explain bioartificial glomerulus in the construction of bioartificial kidney.
 - e) Explain in vitro cartilage repair.
- Q.5 Answer any two. 12**
- a) Explain different methods of hepatocytes transplantation system.
 - b) Explain myoblast transfer and gene therapy in tissue engineering of skeletal muscle.
 - c) Explain fundamental based tissue engg. formulation in tissue engg. of kidney.

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Saturday, 07-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four **16**

- a) Find Laplace transform of $\left\{ e^{-4t} \int_0^t t \cdot \sin 3t dt \right\}$
- b) Find Laplace transform of $\left\{ \frac{t \cdot \sinh at}{2a} \right\}$.
- c) Find Laplace transform of $\left\{ \frac{1 - \cos t}{t^2} \right\}$.
- d) Find Laplace transform of $\{e^{-3t} \sin^2 t\}$
- e) Find K such that the function $f(z) = e^x \cos y + ie^x \sin ky$ is analytic.

Q.3 Attempt any two **12**

- a) Solve by using $L.T. \frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t} \sin t$ and $y(0) = 0, y'(0) = 1$.
- b) Find $L^{-1} \left\{ \frac{1}{(s+1)(s^2+1)} \right\}$ by convolution theorem.
- c) Find $\oint \frac{z^2+1}{z-2} dz$ where C is contour (circle)
 - i) $|Z - 2| = 1$
 - ii) $|Z| = 1$

Section – II

Q.4 Attempt any four **16**

- a) Obtain Fourier series of $f(x) = (x^2) -\pi \leq x \leq \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$
- b) Find Half Range Fourier Series for $f(x) = x, 0 < x < 2$ hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \dots$
- c) Find Half Range Fourier series of $f(x) = x(2 - x)$ in $0 < x < 2$
- d) Find $\oint_C \log z dz$ where C is the circle $|Z| = 1$
- e) Evaluate $\int_C (z + z^2) dz$, where 'C' is the upper arc of circle $|z| = 1$

Q.5 Attempt any two **12**

- a) Find Fourier Series for $f(x) = x^3$ in the range $(-\pi, \pi)$.
- b) Find Fourier Series for $f(x) = 4 - x^2$ in the range $(0, 2)$.
- c) Find the Bilinear Transformation which maps the points $Z = -1, 0, 1$ on to the pts. $W = 0, i, 3i$

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Saturday, 07-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) $L\{t^2 f(t)\}$ is _____.
 - a) $\frac{d}{ds}[f(s)]$
 - b) $\frac{-d^2}{ds^2}[f(s)]$
 - c) $\frac{d}{ds}[f(s)]^2$
 - d) $\frac{d^2}{ds^2}[f(s)]$
- 2) $L^{-1}\left\{\frac{2s^3+13s}{(s^2+3)(s^2+4)}\right\}$ is _____.
 - a) $\cos 3t + \cos 2t$
 - b) $\cos 3t - \cos 2t$
 - c) $\sin 3t - \sin 2t$
 - d) $\sin 3t + \sin 2t$
- 3) If $f(z) = u + iv$ is an Analytic function then $f'(z) =$ _____.
 - a) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial x}$
 - b) $\frac{\partial u}{\partial x} + i \frac{\partial v}{\partial x}$
 - c) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial y}$
 - d) None
- 4) If the function $2x + x^2 + \alpha y^2$ is to be Harmonic then value of α _____.
 - a) -1
 - b) 1
 - c) 2
 - d) None
- 5) The value of $\int_0^{1+i} z^2 dz$ along $y = x$ is _____.
 - a) $\frac{2}{3}(-1 + i)$
 - b) $\frac{2}{3}(-1 - i)$
 - c) $\frac{2}{3}(1 + i)$
 - d) None
- 6) The fixed points of mapping $w = \frac{3z+4}{z+5}$ are _____.
 - a) 2, 2
 - b) 2, -2
 - c) -2, 2
 - d) None
- 7) The _____ is Analytic function.
 - a) $f(z) = \sin z$
 - b) $f(z) = z$
 - c) $f(z) = \text{Im}(z)$
 - d) $R(iz)$
- 8) The period of $|\sin x|$ is _____.
 - a) 0
 - b) 2π
 - c) π
 - d) None

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Saturday, 07-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four **16**

- Find Laplace transform of $\left\{ e^{-4t} \int_0^t t \cdot \sin 3t dt \right\}$
- Find Laplace transform of $\left\{ \frac{t \cdot \sinh at}{2a} \right\}$.
- Find Laplace transform of $\left\{ \frac{1 - \cos t}{t^2} \right\}$.
- Find Laplace transform of $\{ e^{-3t} \sin^2 t \}$
- Find K such that the function $f(z) = e^x \cos y + i e^x \sin ky$ is analytic.

Q.3 Attempt any two **12**

- Solve by using $L.T. \frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t} \sin t$ and $y(0) = 0, y'(0) = 1$.
- Find $L^{-1} \left\{ \frac{1}{(s+1)(s^2+1)} \right\}$ by convolution theorem.
- Find $\oint \frac{z^2+1}{z-2} dz$ where C is contour (circle)
 - $|Z - 2| = 1$
 - $|Z| = 1$

Section – II

Q.4 Attempt any four **16**

- Obtain Fourier series of $f(x) = (x^2) -\pi \leq x \leq \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$
- Find Half Range Fourier Series for $f(x) = x, 0 < x < 2$ hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \dots$
- Find Half Range Fourier series of $f(x) = x(2-x)$ in $0 < x < 2$
- Find $\oint_C \log z dz$ where C is the circle $|Z| = 1$
- Evaluate $\int_C (z + z^2) dz$, where 'C' is the upper arc of circle $|z| = 1$

Q.5 Attempt any two **12**

- Find Fourier Series for $f(x) = x^3$ in the range $(-\pi, \pi)$.
- Find Fourier Series for $f(x) = 4 - x^2$ in the range $(0, 2)$.
- Find the Bilinear Transformation which maps the points $Z = -1, 0, 1$ on to the pts. $W = 0, i, 3i$

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Saturday, 07-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Fourier Series Expansion of an odd function has only _____ terms.

a) Sine terms	b) Cosine terms
c) Both sine and cosine	d) None

- 2) L.T. of $\int_0^{\infty} e^{-t} \sin t \, dt$ is _____.

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

- 3) $L^{-1}\{\tan^{-1}(s)\} =$ _____.

a) $\frac{\cos t}{t}$	b) $-t \cos t$
c) $\frac{-\sin t}{t}$	d) $t \sin t$

- 4) $L\{t^2 f(t)\}$ is _____.

a) $\frac{d}{ds}[f(s)]$	b) $\frac{-d^2}{ds^2}[f(s)]$
c) $\frac{d}{ds}[f(s)]^2$	d) $\frac{d^2}{ds^2}[f(s)]$

- 5) $L^{-1}\left\{\frac{2s^3+13s}{(s^2+3)(s^2+4)}\right\}$ is _____.

a) $\cos 3t + \cos 2t$	b) $\cos 3t - \cos 2t$
c) $\sin 3t - \sin 2t$	d) $\sin 3t + \sin 2t$

- 6) If $f(z) = u + iv$ is an Analytic function then $f'(z) =$ _____.

a) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial x}$	b) $\frac{\partial u}{\partial x} + i \frac{\partial v}{\partial x}$
c) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial y}$	d) None

- 7) If the function $2x + x^2 + \alpha y^2$ is to be Harmonic then value of α _____.

a) -1	b) 1
c) 2	d) None

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Saturday, 07-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four **16**

- Find Laplace transform of $\left\{ e^{-4t} \int_0^t t \cdot \sin 3t dt \right\}$
- Find Laplace transform of $\left\{ \frac{t \cdot \sinh at}{2a} \right\}$.
- Find Laplace transform of $\left\{ \frac{1 - \cos t}{t^2} \right\}$.
- Find Laplace transform of $\{ e^{-3t} \sin^2 t \}$
- Find K such that the function $f(z) = e^x \cos y + i e^x \sin ky$ is analytic.

Q.3 Attempt any two **12**

- Solve by using $L.T. \frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t} \sin t$ and $y(0) = 0, y'(0) = 1$.
- Find $L^{-1} \left\{ \frac{1}{(s+1)(s^2+1)} \right\}$ by convolution theorem.
- Find $\oint \frac{z^2+1}{z-2} dz$ where C is contour (circle)
 - $|Z - 2| = 1$
 - $|Z| = 1$

Section – II

Q.4 Attempt any four **16**

- Obtain Fourier series of $f(x) = (x^2) -\pi \leq x \leq \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$
- Find Half Range Fourier Series for $f(x) = x, 0 < x < 2$ hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \dots$
- Find Half Range Fourier series of $f(x) = x(2-x)$ in $0 < x < 2$
- Find $\oint_C \log z dz$ where C is the circle $|Z| = 1$
- Evaluate $\int_C (z + z^2) dz$, where 'C' is the upper arc of circle $|z| = 1$

Q.5 Attempt any two **12**

- Find Fourier Series for $f(x) = x^3$ in the range $(-\pi, \pi)$.
- Find Fourier Series for $f(x) = 4 - x^2$ in the range $(0, 2)$.
- Find the Bilinear Transformation which maps the points $Z = -1, 0, 1$ on to the pts. $W = 0, i, 3i$

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Saturday, 07-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) If $f(z) = u + iv$ is an Analytic function then $f'(z) = \underline{\hspace{2cm}}$.
 - a) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial x}$
 - b) $\frac{\partial u}{\partial x} + i \frac{\partial v}{\partial x}$
 - c) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial y}$
 - d) None
- 2) If the function $2x + x^2 + \alpha y^2$ is to be Harmonic then value of α _____.
 - a) -1
 - b) 1
 - c) 2
 - d) None
- 3) The value of $\int_0^{1+i} z^2 dz$ along $y = x$ is _____.
 - a) $\frac{2}{3}(-1 + i)$
 - b) $\frac{2}{3}(-1 - i)$
 - c) $\frac{2}{3}(1 + i)$
 - d) None
- 4) The fixed points of mapping $w = \frac{3z+4}{z+5}$ are _____.
 - a) 2, 2
 - b) 2, -2
 - c) -2, 2
 - d) None
- 5) The _____ is Analytic function.
 - a) $f(z) = \sin z$
 - b) $f(z) = z$
 - c) $f(z) = \text{Im}(z)$
 - d) $R(iz)$
- 6) The period of $|\sin x|$ is _____.
 - a) 0
 - b) 2π
 - c) π
 - d) None
- 7) In fourier series $f(x) = x$ for $(-\pi, \pi)$ which terms are absent _____.
 - a) Sine terms
 - b) Cosine terms
 - c) Neither of terms
 - d) None
- 8) If $f(x) = x^2$ in $(-\pi, \pi)$, then Fourier series of $f(x)$ contains _____.
 - a) Only sine terms
 - b) Only cosine terms
 - c) Both sine and cosine terms
 - d) None

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III

Day & Date: Saturday, 07-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four **16**

- a) Find Laplace transform of $\left\{ e^{-4t} \int_0^t t \cdot \sin 3t dt \right\}$
- b) Find Laplace transform of $\left\{ \frac{t \cdot \sinh at}{2a} \right\}$.
- c) Find Laplace transform of $\left\{ \frac{1 - \cos t}{t^2} \right\}$.
- d) Find Laplace transform of $\{ e^{-3t} \sin^2 t \}$
- e) Find K such that the function $f(z) = e^x \cos y + i e^x \sin ky$ is analytic.

Q.3 Attempt any two **12**

- a) Solve by using $L.T. \frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t} \sin t$ and $y(0) = 0, y'(0) = 1$.
- b) Find $L^{-1} \left\{ \frac{1}{(s+1)(s^2+1)} \right\}$ by convolution theorem.
- c) Find $\oint \frac{z^2+1}{z-2} dz$ where C is contour (circle)
 - i) $|Z - 2| = 1$
 - ii) $|Z| = 1$

Section – II

Q.4 Attempt any four **16**

- a) Obtain Fourier series of $f(x) = (x^2) -\pi \leq x \leq \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$
- b) Find Half Range Fourier Series for $f(x) = x, 0 < x < 2$ hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \dots$
- c) Find Half Range Fourier series of $f(x) = x(2 - x)$ in $0 < x < 2$
- d) Find $\oint_C \log z dz$ where C is the circle $|Z| = 1$
- e) Evaluate $\int_C (z + z^2) dz$, where 'C' is the upper arc of circle $|z| = 1$

Q.5 Attempt any two **12**

- a) Find Fourier Series for $f(x) = x^3$ in the range $(-\pi, \pi)$.
- b) Find Fourier Series for $f(x) = 4 - x^2$ in the range $(0, 2)$.
- c) Find the Bilinear Transformation which maps the points $Z = -1, 0, 1$ on to the pts. $W = 0, i, 3i$

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Kidneys in human body are placed against back side wall of _____ cavity.
 - a) venal
 - b) Abdominal
 - c) vertebral
 - d) glomerulus
- 2) Oxygen and carbon dioxide are exchanged in the lungs and through all cell membranes by _____.
 - a) active transport
 - b) Diffusion
 - c) filtration
 - d) Osmosis
- 3) Conduction velocity is maximum in _____.
 - a) SA node
 - b) AV node
 - c) Right ventricle
 - d) Purkinje fibers
- 4) Insulin facilitates glucose uptake in _____.
 - a) Kidney tubule
 - b) Brain
 - c) RBC
 - d) Skeletal muscle
- 5) _____ is an example of long bone.
 - a) Sternum
 - b) Femur
 - c) Carpal
 - d) Patella
- 6) The saliva helps in the digestion of _____.
 - a) proteins
 - b) Fats
 - c) fibers
 - d) Starch
- 7) There are approximately _____ muscles in human body.
 - a) 206
 - b) 360
 - c) 500
 - d) 700
- 8) _____ is essential for blood clotting.
 - a) RBC
 - b) WBC
 - c) Blood platelets
 - d) Lymph
- 9) Visual area is located in _____ lobe.
 - a) Frontal
 - b) Parietal
 - c) Temporal
 - d) Occipital
- 10) The organ of corti is concerned with _____.
 - a) Hearing
 - b) Seeing
 - c) Tasting
 - d) Balancing

- 11) _____ organ receives only oxygenated blood.
- | | |
|-----------|----------|
| a) Lung | b) Liver |
| c) Spleen | d) Gill |
- 12) Sella turcica is _____.
- | | |
|------------------------|--------------------------|
| a) covering of ovary | b) covering of testis |
| c) depression in skull | d) part of temporal bone |
- 13) Most of the fat digestion occurs in _____.
- | | |
|-------------|--------------------|
| a) vectum | b) Stomach |
| c) Duodenum | d) small intestine |
- 14) The largest gland in human body is _____.
- | | |
|----------|-----------------|
| a) lung | b) Pancreas |
| c) Liver | d) gall bladder |

Seat No.	
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Set	P
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four questions. 16**
- a) Classify epithelial tissues and state their functions.
 - b) Explain the composition of blood.
 - c) Explain anatomy of liver and state its any two functions.
 - d) Differentiate between systemic and pulmonary circulation.
 - e) Explain various steps of blood coagulation.
- Q.3 Attempt any two questions. 12**
- a) Explain generation of action potential with neat diagram.
 - b) Explain the mechanism of respiration.
 - c) Draw ECG waveform explaining it along with a note on bipolar lead configuration.

Section – II

- Q.4 Attempt any four questions. 16**
- a) Explain with a neat diagram structure of spinal cord.
 - b) Define reflex arc and mention any two examples of it.
 - c) Explain structure and function of lens of eye.
 - d) List endocrine glands and state their functions.
 - e) Draw and explain various lobes of cerebrum in detail.
- Q.5 Attempt any two questions. 12**
- a) Explain process of formation of urine.
 - b) Explain structure of ear with neat diagram.
 - c) List main actions of androgens, estrogens and progesterone.

Seat No.	
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ is essential for blood clotting.
 - a) RBC
 - b) WBC
 - c) Blood platelets
 - d) Lymph
- 2) Visual area is located in _____ lobe.
 - a) Frontal
 - b) Parietal
 - c) Temporal
 - d) Occipital
- 3) The organ of corti is concerned with _____.
 - a) Hearing
 - b) Seeing
 - c) Tasting
 - d) Balancing
- 4) _____ organ receives only oxygenated blood.
 - a) Lung
 - b) Liver
 - c) Spleen
 - d) Gill
- 5) Sella turcica is _____.
 - a) covering of ovary
 - b) covering of testis
 - c) depression in skull
 - d) part of temporal bone
- 6) Most of the fat digestion occurs in _____.
 - a) vectum
 - b) Stomach
 - c) Duodenum
 - d) small intestine
- 7) The largest gland in human body is _____.
 - a) lung
 - b) Pancreas
 - c) Liver
 - d) gall bladder
- 8) Kidneys in human body are placed against back side wall of _____ cavity.
 - a) venal
 - b) Abdominal
 - c) vertebral
 - d) glomerulus
- 9) Oxygen and carbon dioxide are exchanged in the lungs and through all cell membranes by _____.
 - a) active transport
 - b) Diffusion
 - c) filtration
 - d) Osmosis
- 10) Conduction velocity is maximum in _____.
 - a) SA node
 - b) AV node
 - c) Right ventricle
 - d) Purkinje fibers

- 11) Insulin facilitates glucose uptake in _____.
- | | |
|------------------|--------------------|
| a) Kidney tubule | b) Brain |
| c) RBC | d) Skeletal muscle |
- 12) _____ is an example of long bone.
- | | |
|------------|------------|
| a) Sternum | b) Femur |
| c) Carpal | d) Patella |
- 13) The saliva helps in the digestion of _____.
- | | |
|-------------|-----------|
| a) proteins | b) Fats |
| c) fibers | d) Starch |
- 14) There are approximately _____ muscles in human body.
- | | |
|--------|--------|
| a) 206 | b) 360 |
| c) 500 | d) 700 |

Seat No.	
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Set	Q
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four questions. 16**
- a) Classify epithelial tissues and state their functions.
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- a) Explain generation of action potential with neat diagram.
 - b) Explain the mechanism of respiration.
 - c) Draw ECG waveform explaining it along with a note on bipolar lead configuration.

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- Q.4 Attempt any four questions. 16**
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- Q.5 Attempt any two questions. 12**
- a) Explain process of formation of urine.
 - b) Explain structure of ear with neat diagram.
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

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 Time: 10:00 AM To 01:00 PM

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- 11) Kidneys in human body are placed against back side wall of _____ cavity.

a) venal	b) Abdominal
c) vertebral	d) glomerulus

- 12) Oxygen and carbon dioxide are exchanged in the lungs and through all cell membranes by _____.
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|---------------------|--------------|
| a) active transport | b) Diffusion |
| c) filtration | d) Osmosis |
- 13) Conduction velocity is maximum in _____.
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|--------------------|--------------------|
| a) SA node | b) AV node |
| c) Right ventricle | d) Purkinje fibers |
- 14) Insulin facilitates glucose uptake in _____.
- | | |
|------------------|--------------------|
| a) Kidney tubule | b) Brain |
| c) RBC | d) Skeletal muscle |

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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

- Q.2 Attempt any four questions. 16**
- a) Classify epithelial tissues and state their functions.
 - b) Explain the composition of blood.
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- Q.3 Attempt any two questions. 12**
- a) Explain generation of action potential with neat diagram.
 - b) Explain the mechanism of respiration.
 - c) Draw ECG waveform explaining it along with a note on bipolar lead configuration.

Section – II

- Q.4 Attempt any four questions. 16**
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 - d) List endocrine glands and state their functions.
 - e) Draw and explain various lobes of cerebrum in detail.
- Q.5 Attempt any two questions. 12**
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 - b) Explain structure of ear with neat diagram.
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|-------------|--------------|
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio – Medical Engineering
HUMAN ANATOMY AND PHYSIOLOGY

Day & Date: Tuesday, 10-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

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Section – II

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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) What is the effect of high pressure on the molecular weight of the polymer product formed?
 - a) Increases
 - b) Decreases
 - c) No change
 - d) Cannot be determined
- 2) Composite biomaterial used in _____.
 - a) Dental filling
 - b) Bone particle
 - c) Both a and b
 - d) None
- 3) Crystal structure means _____.
 - a) Random alignment of unit cells
 - b) Periodic alignment of unit cells
 - c) Ductile materials
 - d) Brittle material
- 4) Bioglass is /an _____.
 - a) Inert ceramic
 - b) Bioactive ceramic
 - c) Composite
 - d) Crystalline polymer
- 5) The hardest biological material is _____.
 - a) Dentin
 - b) Enamel
 - c) Gum
 - d) Bone
- 6) Strength of a material is its _____.
 - a) Surface Property
 - b) Chemical Property
 - c) Biological Property
 - d) Mechanical Property
- 7) Which of the following polymers can have strong intermolecular forces?
 - a) Nylon
 - b) Polystyrene
 - c) Rubber
 - d) None
- 8) Natural rubber become brittle below _____ and soft after _____.
 - a) 100°C, 500°C
 - b) 10°C, 500°C
 - c) 10°C, 50°C
 - d) None
- 9) Chrane Tanning process completed in _____.
 - a) 5 to 16 days
 - b) 5 to 16 weeks
 - c) 5 to 16 hrs
 - d) 5 to 16 months

- 10) Which of the following is not a characteristic property of ceramic material?
- a) High temperature stability
 - b) High mechanical strength
 - c) Low elongation
 - d) Low hardness
- 11) Hydroxyapatite has _____ biocompatibility.
- a) Less
 - b) Zero
 - c) Excellent
 - d) None
- 12) Major ingredients of traditional ceramics _____.
- a) Silica
 - b) Clay
 - c) Feldspar
 - d) All above
- 13) In which of the following application ceramic biomaterial is used?
- a) Bone graft
 - b) Artificial knees
 - c) Hip prostheses
 - d) All above
- 14) CaP has been used in the form _____.
- a) Artificial heart
 - b) Artificial teeth
 - c) Artificial Bone
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2 Answer any four** **16**
- a) Explain the effects of Ni and Cr on austenitic phase of stainless steel.
 - b) Explain in detail the use of silicon rubber.
 - c) Define composite. What are importance of composite biomaterials? Classify composite biomaterials.
 - d) Write properties and salient features of hydroxyapatite.
 - e) What is bioglass? Give composition and biomedical application of bioglass.

- Q.3 Answer any two** **12**
- a) What are hydrogels? Give the application of hydrogel.
 - b) Describe possible biomedical uses of ceramics. Give advantages and disadvantages of ceramic implant.
 - c) Classify and explain different polymer according to their physical properties? Mention their properties and application in biomedical of any four polymers.

Section – II

- Q.4 Answer any four** **16**
- a) Give different types of implants having soft tissue application.
 - b) What are biodegradable polymers give examples to each.
 - c) Explain use of wood and binding material in prosthetics and orthotic devices in brief.
 - d) Describe briefly the surface properties affecting biomaterials.
 - e) Explain advantages and disadvantages of thermosetting resins.

- Q.5 Answer any two** **12**
- a) List different types of rubber used in orthopedics. Explain each in detail with their property and drawbacks.
 - b) List the different types of techniques used for surface analysis. Explain Scanning Electron Microscopy (SEM) technique in detail.
 - c) Explain the following
 - 1) Copper and its alloy used in prosthetics and orthotics
 - 2) What is tissue? List the basic criteria for tissue replacement.

- 11) Bioglass is /an _____.
a) Inert ceramic
b) Bioactive ceramic
c) Composite
d) Crystalline polymer
- 12) The hardest biological material is _____.
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Q

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

- Q.2 Answer any four** **16**
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S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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- 8) Crystal structure means _____.
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- 9) Bioglass is /an _____.
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 - c) Composite
 - d) Crystalline polymer

Seat No.	
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Set **S**

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOMATERIALS

Day & Date: Thursday, 12-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – II

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Seat No.	
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Set **P**

S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

SECTION I

- Q.2 Attempt any Four:** **16**
- Describe thermal runaway and stability factor of a BJT.
 - Explain line regulation and ripple rejection for regulated power supply.
 - Determine forward bias voltage applied to a silicon diode to cause a forward current of 10 mA and reverse saturation current $I_0 = 25 \times 10^{-7}$ A at a room temperature.
 - Differentiate between Schottky diode and p - n diode.
 - List various application of diode and explain any 2 of it.
- Q.3 Attempt any Two:** **12**
- For a regulated dc power supply the output voltage changes in the range of $12v \pm 0.2v$ when the ac line voltage fluctuates in the range of $230v \pm 10\%$. Calculate the source regulation and % source regulation.
 - Design a fixed bias circuit using silicon transistor having $h_{FE} = 100, V_{CC} = 12$ V, $V_{LE} = 6$ V, $I_C = 3$ mA, $V_{BE} = 0.7$ V
 - List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

- Q.4 Attempt Any Four:** **16**
- How does the FET behave for small and large values of V_{DS} ?
 - Derive the relationship between trans conductance, drain resistance and amplification factor of a JFET.
 - Determine the value of resistor R_D and R_S for a self biased P-channel JFET having the following parameter $V_P = 5$ V, $I_{DSS} = 12$ mA, $V_{DD} = 12$ V, $I_D = 5$ mA and $V_{DS} = 6$ V
 - Describe working of BJT as a switch with necessary diagram.
 - With the help of waveforms explain working of monostable and astable multivibrator circuits

Q.5 Attempt Any Two.

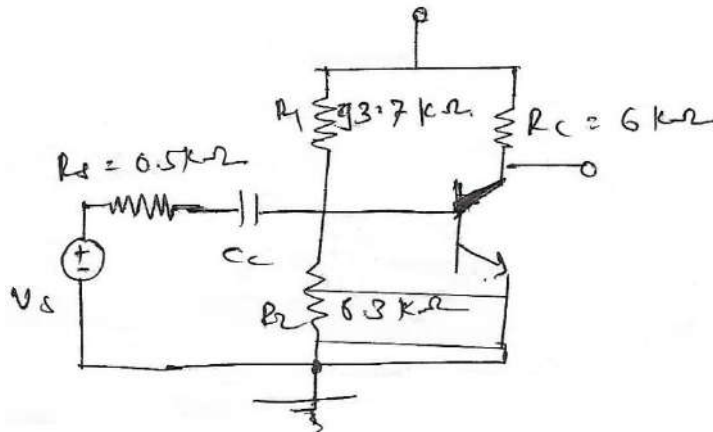
a) Write construction and working of

- 1) GTO
- 2) IGBT

b) Determine the small signal voltage gain, input resistance and output resistance for circuit given below.

Assume transistor parameters are

$$\beta = 100, V_{BE} = 0.7V, V_A = 100V$$



c) List various biasing of JFET configuration and describe working of any one with necessary diagram.

Seat No.	
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Set **Q**

S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

SECTION I

- Q.2 Attempt any Four:** **16**
- Describe thermal runaway and stability factor of a BJT.
 - Explain line regulation and ripple rejection for regulated power supply.
 - Determine forward bias voltage applied to a silicon diode to cause a forward current of 10 mA and reverse saturation current $I_0 = 25 \times 10^{-7}$ A at a room temperature.
 - Differentiate between Schottky diode and p - n diode.
 - List various application of diode and explain any 2 of it.
- Q.3 Attempt any Two:** **12**
- For a regulated dc power supply the output voltage changes in the range of $12v \pm 0.2v$ when the ac line voltage fluctuates in the range of $230v \pm 10\%$. Calculate the source regulation and % source regulation.
 - Design a fixed bias circuit using silicon transistor having $h_{FE} = 100, V_{CC} = 12 V, V_{LE} = 6 V, I_C = 3mA, V_{BE} = 0.7 V$
 - List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

- Q.4 Attempt Any Four:** **16**
- How does the FET behave for small and large values of V_{DS} ?
 - Derive the relationship between trans conductance, drain resistance and amplification factor of a JFET.
 - Determine the value of resistor R_D and R_S for a self biased P-channel JFET having the following parameter $V_P = 5V, I_{DSS} = 12mA, V_{DD} = 12V, I_D = 5 mA$ and $V_{DS} = 6V$
 - Describe working of BJT as a switch with necessary diagram.
 - With the help of waveforms explain working of monostable and astable multivibrator circuits

Q.5 Attempt Any Two.

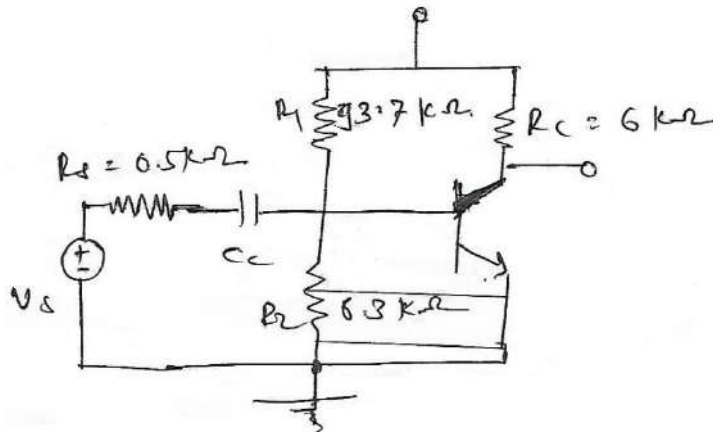
a) Write construction and working of

- 1) GTO
- 2) IGBT

b) Determine the small signal voltage gain, input resistance and output resistance for circuit given below.

Assume transistor parameters are

$$\beta = 100, V_{BE} = 0.7V, V_A = 100V$$



c) List various biasing of JFET configuration and describe working of any one with necessary diagram.

Seat No.	
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Set **R**

S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

SECTION I

Q.2 Attempt any Four: **16**

- a) Describe thermal runaway and stability factor of a BJT.
- b) Explain line regulation and ripple rejection for regulated power supply.
- c) Determine forward bias voltage applied to a silicon diode to cause a forward current of 10 mA and reverse saturation current $I_0 = 25 \times 10^{-7}$ A at a room temperature.
- d) Differentiate between Schottky diode and p - n diode.
- e) List various application of diode and explain any 2 of it.

Q.3 Attempt any Two: **12**

- a) For a regulated dc power supply the output voltage changes in the range of $12v \pm 0.2v$ when the ac line voltage fluctuates in the range of $230v \pm 10\%$. Calculate the source regulation and % source regulation.
- b) Design a fixed bias circuit using silicon transistor having $h_{FE} = 100, V_{CC} = 12 V, V_{LE} = 6 V, I_C = 3mA, V_{BE} = 0.7 V$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four: **16**

- a) How does the FET behave for small and large values of V_{DS} ?
- b) Derive the relationship between trans conductance, drain resistance and amplification factor of a JFET.
- c) Determine the value of resistor R_D and R_S for a self biased P-channel JFET having the following parameter $V_P = 5V, I_{DSS} = 12mA, V_{DD} = 12V, I_D = 5 mA$ and $V_{DS} = 6V$
- d) Describe working of BJT as a switch with necessary diagram.
- e) With the help of waveforms explain working of monostable and astable multivibrator circuits

Q.5 Attempt Any Two.

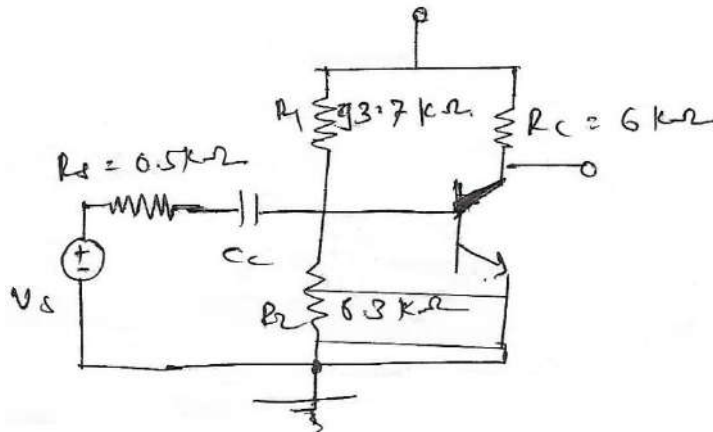
a) Write construction and working of

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b) Determine the small signal voltage gain, input resistance and output resistance for circuit given below.

Assume transistor parameters are

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c) List various biasing of JFET configuration and describe working of any one with necessary diagram.

Seat No.	
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S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.
 2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) A JFET has _____ power gain.
 - a) small
 - b) very high
 - c) very small
 - d) none of a above
- 2) The pinch-off voltage of a JFET is about _____.
 - a) 5V
 - b) 0.6V
 - c) 15V
 - d) 25V
- 3) When the input signal reduces the channel size, the process is called _____.
 - a) enhancement
 - b) substrate connecting
 - c) gate charge
 - d) depletion
- 4) A monostable multivibrator has $R = 120\Omega$ and time delay $T = 1000$ ms, value of capacitor is _____.
 - a) $0.9\mu f$
 - b) $1.32\mu f$
 - c) $7.5\mu f$
 - d) $2.49\mu f$
- 5) A stable multivibrator opening at 150^{th} has a discharge time of 2.5 m. Duty cycle of the circuit will be _____.
 - a) 50%
 - b) 75%
 - c) 95.99%
 - d) 37.5%
- 6) In a CE configuration an emitter resistor is used for _____.
 - a) stabilization
 - b) ac signal bypass
 - c) collector bias
 - d) higher gain
- 7) A transistor may be used as switching device or as a _____.
 - a) Fixed resistor
 - b) Turning device
 - c) Rectifier
 - d) Variable resistor
- 8) The Q point on a loadline may be used to determine _____.
 - a) V_C
 - b) V_{CC}
 - c) V_B
 - d) I_C
- 9) Voltage regulators keep a constant _____ output voltage when the input or load varies within limits.
 - a) dc
 - b) Ac
 - c) sinusoidal
 - d) Ripple

Seat No.	
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S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

Day & Date: Saturday, 14-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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

SECTION I

- Q.2 Attempt any Four:** **16**
- Describe thermal runaway and stability factor of a BJT.
 - Explain line regulation and ripple rejection for regulated power supply.
 - Determine forward bias voltage applied to a silicon diode to cause a forward current of 10 mA and reverse saturation current $I_0 = 25 \times 10^{-7}$ A at a room temperature.
 - Differentiate between Schottky diode and p - n diode.
 - List various application of diode and explain any 2 of it.
- Q.3 Attempt any Two:** **12**
- For a regulated dc power supply the output voltage changes in the range of $12v \pm 0.2v$ when the ac line voltage fluctuates in the range of $230v \pm 10\%$. Calculate the source regulation and % source regulation.
 - Design a fixed bias circuit using silicon transistor having $h_{FE} = 100, V_{CC} = 12 V, V_{LE} = 6 V, I_C = 3mA, V_{BE} = 0.7 V$
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Section – II

- Q.4 Attempt Any Four:** **16**
- How does the FET behave for small and large values of V_{DS} ?
 - Derive the relationship between trans conductance, drain resistance and amplification factor of a JFET.
 - Determine the value of resistor R_D and R_S for a self biased P-channel JFET having the following parameter $V_P = 5V, I_{DSS} = 12mA, V_{DD} = 12V, I_D = 5 mA$ and $V_{DS} = 6V$
 - Describe working of BJT as a switch with necessary diagram.
 - With the help of waveforms explain working of monostable and astable multivibrator circuits

Q.5 Attempt Any Two.

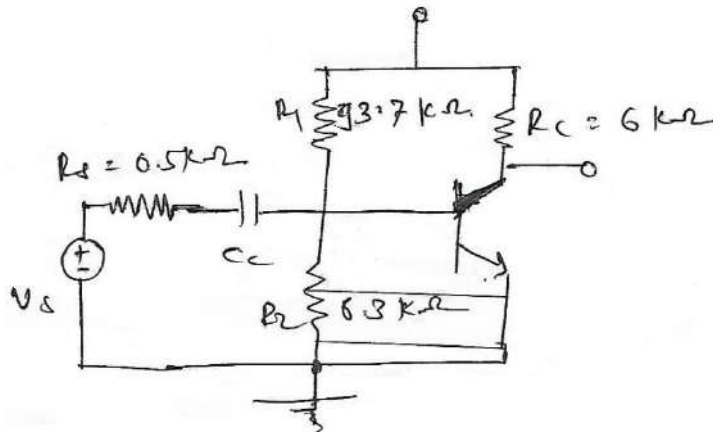
a) Write construction and working of

- 1) GTO
- 2) IGBT

b) Determine the small signal voltage gain, input resistance and output resistance for circuit given below.

Assume transistor parameters are

$$\beta = 100, V_{BE} = 0.7V, V_A = 100V$$



c) List various biasing of JFET configuration and describe working of any one with necessary diagram.

Seat No.	
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Set	P
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**S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS**

Day & Date: Tuesday, 17-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

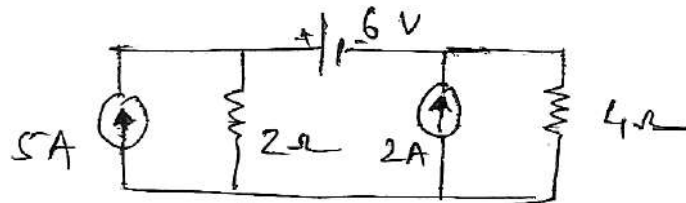
- Instructions:** 1) All questions are compulsory.
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Section - I

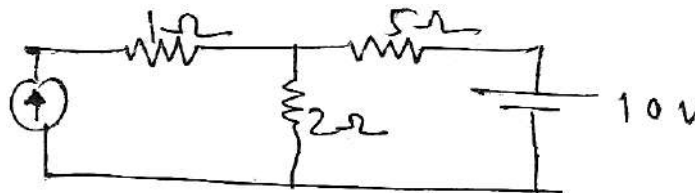
Q.2 Attempt any four questions.

16

- a) By using source transformation find current in 4Ω resistor in a given circuit



- b) Using Mesh analysis, find the current through 2Ω resistor in given circuit

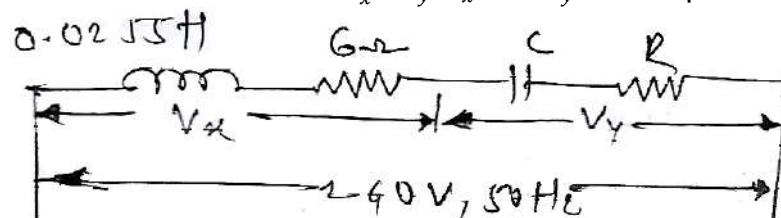


- c) State and prove maximum power transfer theorem.
d) In an RLC series circuit the voltage across the resistor, inductor and capacitor are 10V, 15V and 10V respectively. Calculate the supply voltage.
e) A parallel circuit consists of a $2.5\ \mu\text{f}$ of capacitor and a coil whose resistance and inductance are $15\ \Omega$ and $260\ \text{mH}$ respectively. Determine
1) Resonant frequency
2) Q factor of the circuit at resonance

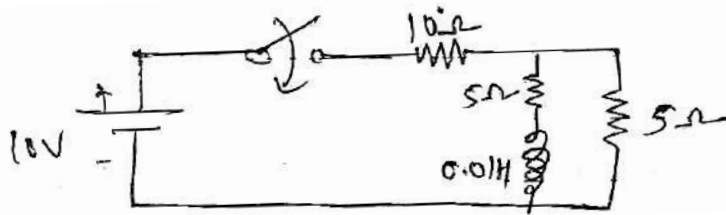
Q.3 Attempt any two questions.

12

- a) Find the values of R and C so that $V_x = 2.3V_y$. V_x and V_y are in quadrature.



- b) In the given network determine currents $i_1(t)$ and $i_2(t)$ when the switch is closed at $t=0$.



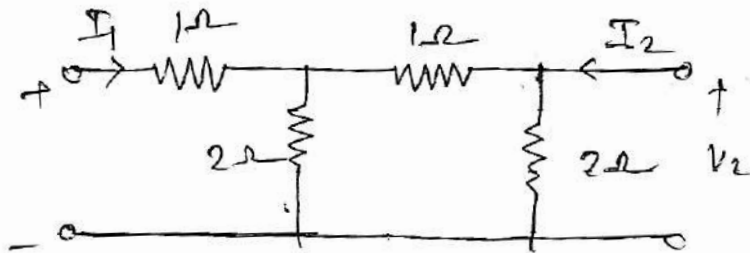
- c) State Thevenin's theorem and Norton's theorem and differentiate both theorem

Section – II

Q.4 Attempt any four questions.

16

- Prove condition for reciprocity of transmission parameter.
- Describe working of low pass and band pass filter with waveform.
- Define the concept of frequency attenuation and describe working of T type attenuation.
- Find Z parameter for network shown below

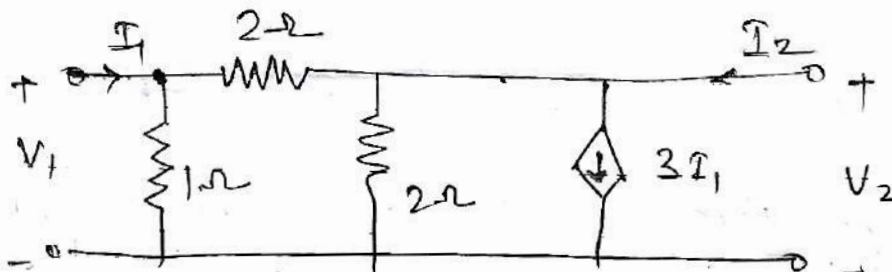


- e) Explain various effects of pole and zeros on circuit performance.

Q.5 Attempt any two questions.

12

- Prove the following relation.
 - Z parameters in terms of Y parameter
 - Z parameters in terms of h parameter
- Determine Y and Z parameter for the network shown



c) **Write short note.**

- Working of bridged T type attenuation
- Notch filtering using RCA circuits

Seat No.	
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S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS

Day & Date: Tuesday, 17-12-2019
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The critical frequency is defined as the point at which the response drops _____ from the pass band.

a) -20 dB	b) -3 dB
c) -6 dB	d) -40 dB
- 2) A low pass filter has a cut off frequency of 1.23 KHz. The bandwidth of filter will be _____ KHz.

a) 2.46	b) 1.23
c) 644	d) 1.44
- 3) Norton's current is equal to the current passing through the _____ circuited output terminal.

a) short	b) open
c) closed	d) broken
- 4) The impedances Z_1 and Z_2 are said to be inverse if _____.

a) $Z_1 Z_2 = R_o$	b) $Z_1 + Z_2 = R_o$
c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_o$	d) $Z_1 Z_2 = R_o^2$
- 5) In an RC circuit when the switch is closed, the response _____.

a) do not vary with time	b) decays with time
c) rises with time	d) rises with frequency
- 6) Bandwidth of a series resonance circuit is defined as the range frequency over which circuit current is equal to or greater than _____ of maximum current.

a) 70.7%	b) 60%
c) 75%	d) 11%
- 7) Kirchoff's current law states that the algebraic sum of _____ meeting at a junction or node in an electric circuits is zero.

a) voltages	b) energies
c) potentials	d) currents
- 8) If an ac signal generator drives a series RLC circuit, then the circuit undergoes resonance only due to variation in _____.

a) supply voltage	b) series resistance
c) supply frequency	d) phase angle

Seat No.	
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Set	Q
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**S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS**

Day & Date: Tuesday, 17-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

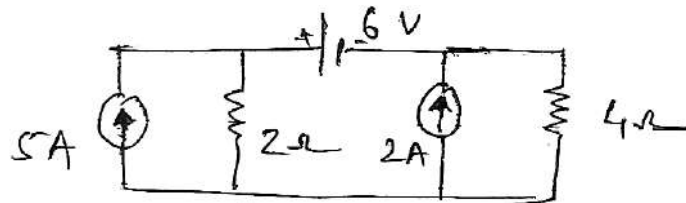
Instructions: 1) All questions are compulsory.
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Section - I

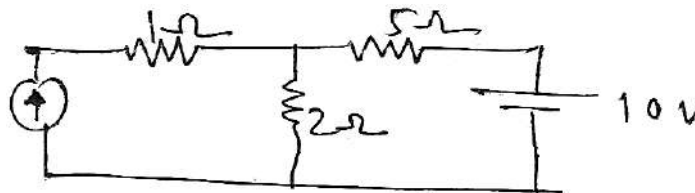
Q.2 Attempt any four questions.

16

a) By using source transformation find current in 4Ω resistor in a given circuit



b) Using Mesh analysis, find the current through 2Ω resistor in given circuit

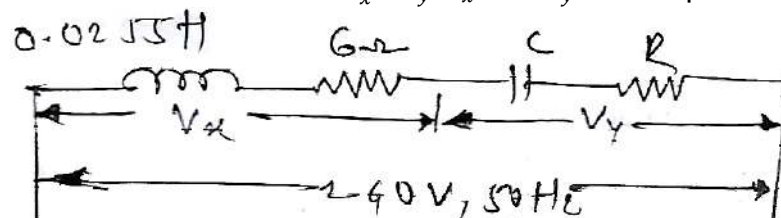


- c) State and prove maximum power transfer theorem.
- d) In an RLC series circuit the voltage across the resistor, inductor and capacitor are 10V, 15V and 10V respectively. Calculate the supply voltage.
- e) A parallel circuit consists of a $2.5 \mu\text{f}$ of capacitor and a coil whose resistance and inductance are 15Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

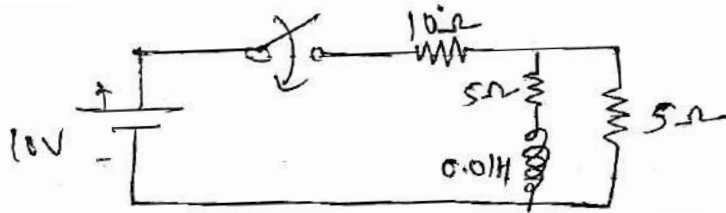
Q.3 Attempt any two questions.

12

a) Find the values of R and C so that $V_x = 2.3V_y$. V_x and V_y are in quadrature.



- b) In the given network determine currents $i_1(t)$ and $i_2(t)$ when the switch is closed at $t=0$.



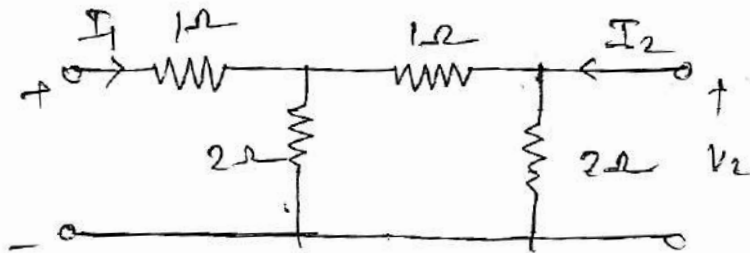
- c) State Thevenin's theorem and Norton's theorem and differentiate both theorem

Section – II

Q.4 Attempt any four questions.

16

- Prove condition for reciprocity of transmission parameter.
- Describe working of low pass and band pass filter with waveform.
- Define the concept of frequency attenuation and describe working of T type Attenuation.
- Find Z parameter for network shown below

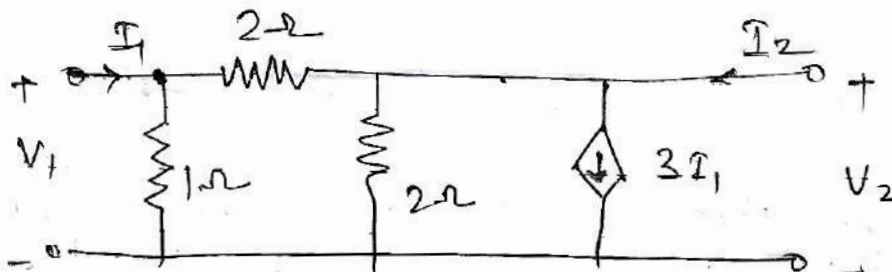


- e) Explain various effects of pole and zeros on circuit performance.

Q.5 Attempt any two questions.

12

- Prove the following relation.
 - Z parameters in terms of Y parameter
 - Z parameters in terms of h parameter
- Determine Y and Z parameter for the network shown



c) **Write short note.**

- Working of bridged T type attenuation
- Notch filtering using RCA circuits

Seat No.	
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S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS

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Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book Page No.3
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) _____ acts as an independent variables in Y- parameter.
 - a) current
 - b) power
 - c) voltage
 - d) energy
- 2) The bandwidth in a _____ filter equal the critical frequency.
 - a) low pass
 - b) high pass
 - c) band pass
 - d) band stop
- 3) _____ theorems applicable for both linear and nonlinear circuits.
 - a) Superposition
 - b) Thevenin's
 - c) Norton's
 - d) None of these
- 4) The critical frequency is defined as the point at which the response drops _____ from the pass band.
 - a) -20 dB
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 - c) -6 dB
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- 5) A low pass filter has a cut off frequency of 1.23 KHz. The bandwidth of filter will be _____ KHz.
 - a) 2.46
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- 6) Norton's current is equal to the current passing through the _____ circuited output terminal.
 - a) short
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- 7) The impedances Z_1 and Z_2 are said to be inverse if _____.
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- 8) In an RC circuit when the switch is closed, the response _____.
 - a) do not vary with time
 - b) decays with time
 - c) rises with time
 - d) rises with frequency
- 9) Bandwidth of a series resonance circuit is defined as the range frequency over which circuit current is equal to or greater than _____ of maximum current.
 - a) 70.7%
 - b) 60%
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Seat No.	
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Set	R
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**S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS**

Day & Date: Tuesday, 17-12-2019
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

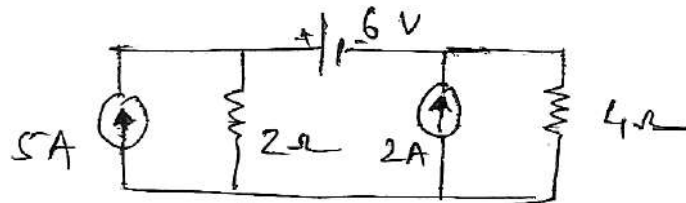
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Section - I

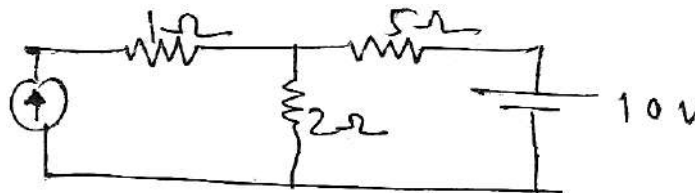
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16

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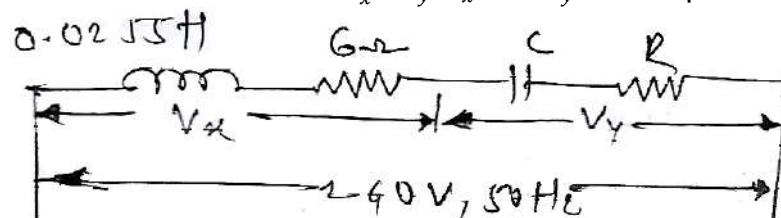


- c) State and prove maximum power transfer theorem.
- d) In an RLC series circuit the voltage across the resistor, inductor and capacitor are 10V, 15V and 10V respectively. Calculate the supply voltage.
- e) A parallel circuit consists of a $2.5\ \mu\text{f}$ of capacitor and a coil whose resistance and inductance are $15\ \Omega$ and $260\ \text{mH}$ respectively. Determine
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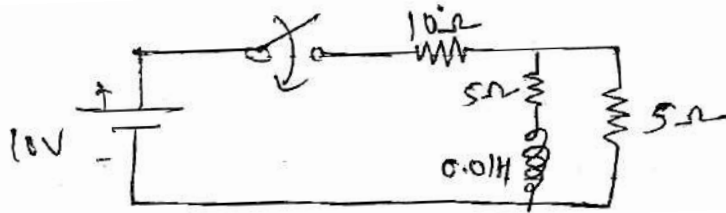
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a) Find the values of R and C so that $V_x = 2.3V_y$. V_x and V_y are in quadrature.



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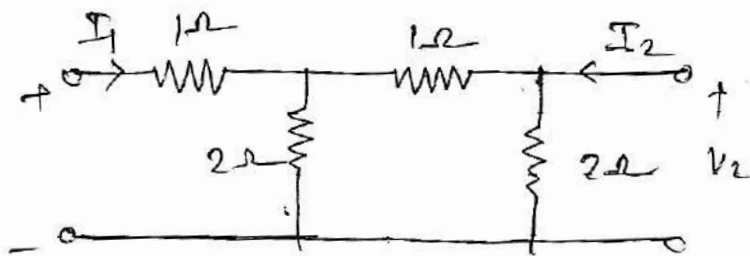
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Section – II

Q.4 Attempt any four questions.

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- Prove condition for reciprocity of transmission parameter.
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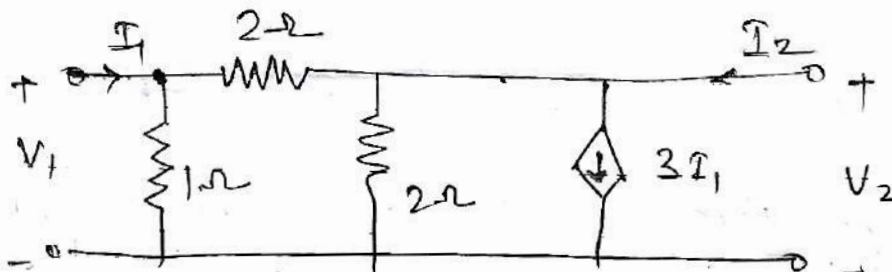


- e) Explain various effects of pole and zeros on circuit performance.

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- Prove the following relation.
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c) **Write short note.**

- Working of bridged T type attenuation
- Notch filtering using RCA circuits

Seat No.	
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S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
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LINEAR CIRCUIT ANALYSIS

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Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Norton's current is equal to the current passing through the _____ circuited output terminal.
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 - a) 70.7%
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- 5) Kirchoff's current law states that the algebraic sum of _____ meeting at a junction or node in an electric circuits is zero.
 - a) voltages
 - b) energies
 - c) potentials
 - d) currents
- 6) If an ac signal generator drives a series RLC circuit, then the circuit undergoes resonance only due to variation in _____.
 - a) supply voltage
 - b) series resistance
 - c) supply frequency
 - d) phase angle
- 7) _____ among the following condition is true at the resonance.
 - a) $X_c > X_L$
 - b) $X_c = X_L$
 - c) $X_c < X_L$
 - d) None of above
- 8) The connecting of energy source at the port of network known as _____.
 - a) driving point
 - b) transfer point
 - c) Q point
 - d) resonance point

Seat No.	
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**S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
LINEAR CIRCUIT ANALYSIS**

Day & Date: Tuesday, 17-12-2019
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Max. Marks: 56

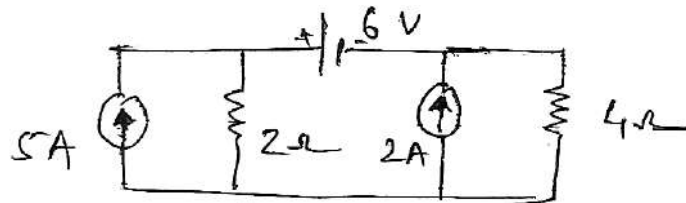
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Section - I

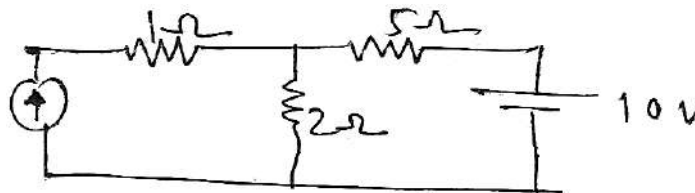
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16

a) By using source transformation find current in 4Ω resistor in a given circuit



b) Using Mesh analysis, find the current through 2Ω resistor in given circuit

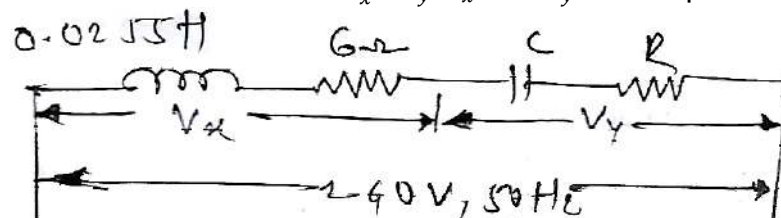


- c) State and prove maximum power transfer theorem.
- d) In an RLC series circuit the voltage across the resistor, inductor and capacitor are 10V, 15V and 10V respectively. Calculate the supply voltage.
- e) A parallel circuit consists of a $2.5\ \mu\text{f}$ of capacitor and a coil whose resistance and inductance are $15\ \Omega$ and $260\ \text{mH}$ respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

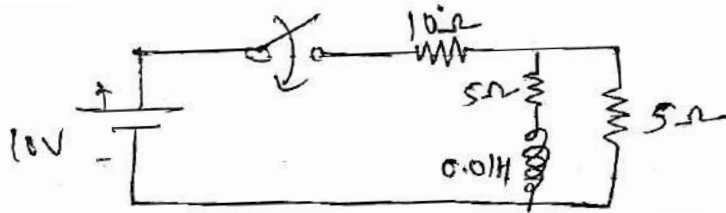
Q.3 Attempt any two questions.

12

a) Find the values of R and C so that $V_x = 2.3V_y$. V_x and V_y are in quadrature.



- b) In the given network determine currents $i_1(t)$ and $i_2(t)$ when the switch is closed at $t=0$.



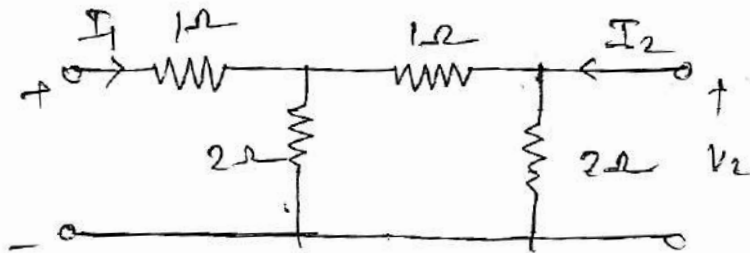
- c) State Thevenin's theorem and Norton's theorem and differentiate both theorem

Section – II

Q.4 Attempt any four questions.

16

- Prove condition for reciprocity of transmission parameter.
- Describe working of low pass and band pass filter with waveform.
- Define the concept of frequency attenuation and describe working of T type Attenuation.
- Find Z parameter for network shown below

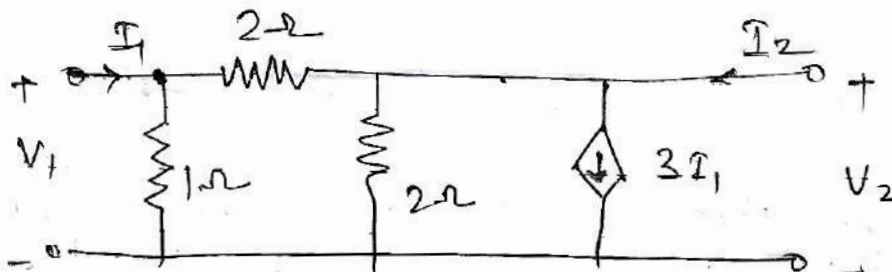


- e) Explain various effects of pole and zeros on circuit performance.

Q.5 Attempt any two questions.

12

- Prove the following relation.
 - Z parameters in terms of Y parameter
 - Z parameters in terms of h parameter
- Determine Y and Z parameter for the network shown



c) **Write short note.**

- Working of bridged T type attenuation
- Notch filtering using RCA circuits

- 11) _____ of the following is not a static property.
- a) Repeatability
 - b) Hysteresis
 - c) Frequency response
 - d) Saturation
- 12) Transducers employed in the bulk of enzyme electrodes use of the _____ principles.
- a) Amperometric
 - b) Optical
 - c) Magnetic
 - d) Colorimetric
- 13) _____ of the following transducers must be used for dissolved oxygen analyser.
- a) Potentiometric
 - b) Polarographic
 - c) Ion-selective electrode
 - d) Optical transducer
- 14) Oxygen content can be controlled by adding which of the following materials with water?
- a) Acidic solution
 - b) Basic solution
 - c) Iodine
 - d) Hydrazine

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

- Q.2 Attempt any four** **16**
- a) Define and explain accuracy and resolution.
 - b) Explain structure and applications of needle and wire electrodes for measurement of bio potential.
 - c) With the help of an example, explain in detail the second order instrument characteristics.
 - d) Explain with a neat diagram any one application of piezoelectric transducer.
 - e) Explain electrode electrolyte interface concept.
- Q.3 Attempt any two.** **12**
- a) Draw and explain concept of half-cell potential and polarization concept of any electrode.
 - b) Explain construction and working of LVDT and mention its application.
 - c) Explain the typical current versus voltage characteristics of thermistors.

Section – II

- Q.4 Attempt any four** **16**
- a) What is meant by biosensor? Give classification of biosensor.
 - b) Explain construction and working of pCO₂ electrode in detail.
 - c) Explain capacitance microphone sensor with necessary diagram.
 - d) Explain blood gas and acid-base physiology.
 - e) Explain working of fiber optic temperature transducer.
- Q.5 Attempt any two** **12**
- a) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
 - b) Distinguish between potentiometric and amperometric sensors. Explain one example of amperometric sensor.
 - c) Define radiation sensor and explain it with any one example and application.

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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ refers to the degree of repeatability of a measurement.
 - a) Accuracy
 - b) Precision
 - c) Resolution
 - d) Sensitivity
- 2) Change in signal over long period of time is called _____.
 - a) noise
 - b) offset
 - c) hysteresis
 - d) drift
- 3) Ability of the sensor to repeat a measurement when put back in the same environment is called _____.
 - a) Conformance
 - b) Saturation
 - c) Repeatability
 - d) Threshold
- 4) _____ of the following is not a static property.
 - a) Repeatability
 - b) Hysteresis
 - c) Frequency response
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- 5) Transducers employed in the bulk of enzyme electrodes use of the _____ principles.
 - a) Amperometric
 - b) Optical
 - c) Magnetic
 - d) Colorimetric
- 6) _____ of the following transducers must be used for dissolved oxygen analyser.
 - a) Potentiometric
 - b) Polarographic
 - c) Ion-selective electrode
 - d) Optical transducer
- 7) Oxygen content can be controlled by adding which of the following materials with water?
 - a) Acidic solution
 - b) Basic solution
 - c) Iodine
 - d) Hydrazine
- 8) If the displacement is measured with strain gauge then the number of strain gauge normally required are _____.
 - a) One
 - b) Two
 - c) Three
 - d) Four

Seat No.	
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Q

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

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 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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Section – I

- Q.2 Attempt any four** **16**
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 - b) Explain structure and applications of needle and wire electrodes for measurement of bio potential.
 - c) With the help of an example, explain in detail the second order instrument characteristics.
 - d) Explain with a neat diagram any one application of piezoelectric transducer.
 - e) Explain electrode electrolyte interface concept.

- Q.3 Attempt any two.** **12**
- a) Draw and explain concept of half-cell potential and polarization concept of any electrode.
 - b) Explain construction and working of LVDT and mention its application.
 - c) Explain the typical current versus voltage characteristics of thermistors.

Section – II

- Q.4 Attempt any four** **16**
- a) What is meant by biosensor? Give classification of biosensor.
 - b) Explain construction and working of pCO₂ electrode in detail.
 - c) Explain capacitance microphone sensor with necessary diagram.
 - d) Explain blood gas and acid-base physiology.
 - e) Explain working of fiber optic temperature transducer.

- Q.5 Attempt any two** **12**
- a) Define the concept of Immune sensor. Explain with a neat diagram the working of any one immune sensor.
 - b) Distinguish between potentiometric and amperometric sensors. Explain one example of amperometric sensor.
 - c) Define radiation sensor and explain it with any one example and application.

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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

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Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ of the following has the widest range of temperature measurement.
 - a) RTD
 - b) Thermocouple
 - c) Thermistor
 - d) Mercury thermometer
- 2) Optical fiber sensors are electrically _____.
 - a) active
 - b) passive
 - c) active as well as passive
 - d) cannot be determined
- 3) The biological response of the biosensor is determined by _____.
 - a) biocatalytic membrane
 - b) Physio-chemical membrane
 - c) Chemical membrane
 - d) artificial membrane
- 4) _____ refers to the degree of repeatability of a measurement.
 - a) Accuracy
 - b) Precision
 - c) Resolution
 - d) Sensitivity
- 5) Change in signal over long period of time is called _____.
 - a) noise
 - b) offset
 - c) hysteresis
 - d) drift
- 6) Ability of the sensor to repeat a measurement when put back in the same environment is called _____.
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- 10) Oxygen content can be controlled by adding which of the following materials with water?
- a) Acidic solution
 - b) Basic solution
 - c) Iodine
 - d) Hydrazine
- 11) If the displacement is measured with strain gauge then the number of strain gauge normally required are _____.
- a) One
 - b) Two
 - c) Three
 - d) Four
- 12) A capacitive pressure sensor has a typical measurement uncertainty of _____.
- a) $\pm 0.2\%$
 - b) $\pm 0.4\%$
 - c) $\pm 0.1\%$
 - d) $\pm 0.8\%$
- 13) Smallest change which a sensor can detect is _____.
- a) Resolution
 - b) Accuracy
 - c) Precision
 - d) Scale
- 14) _____ of the following is not a piezo electric sensor.
- a) PZT
 - b) Roscelle salt
 - c) Quartz
 - d) None of the mentioned

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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
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Max. Marks: 56

Instructions: 1) All questions are compulsory.
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- Q.2 Attempt any four** **16**
- a) Define and explain accuracy and resolution.
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- 14) Change in signal over long period of time is called _____.
- a) noise
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
TRANSDUCERS IN BIOMEDICAL INSTRUMENTATION

Day & Date: Friday, 22-11-2019
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETIC AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ is branch of mechanism that describe the cause of bio mechanism.

a) Physics	b) Chemistry
c) Informatics	d) Kinematics
- 2) Instrumented walkway record timings of _____.

a) Goniometer	b) Footswitch
c) Gait	d) None
- 3) Antalgic hip gait is related to which of the following _____.

a) Wadding gait	b) Trendeleberg gait
c) Painful hip gait	d) Short leg gait
- 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 above
- 6) The movements around ball and socket joints are _____.

a) Flexion and extension	b) Rotation and circumduction
c) Hyper extension	d) All above
- 7) Which of the following is example of biaxial joint?

a) Hinge	b) Pivot
c) Both a and b	d) None
- 8) Sideward curvature of the spine is called _____.

a) Knock knee	b) Kyphosis
c) Scoliosis	d) Lordosis
- 9) The trim lines of a ground reaction ankle foot orthosis should be anterior to the malleoli to serve as a _____.

a) Dorsiflexion assist	b) Plantarflexion assist
c) Dorsiflexion stop	d) Plantarflexion stop

- 10) When the counter of the shoe fits too tightly on a SACH foot which of the following problems can result _____.
- a) Posterior lean of pylon
 - b) Less compression of the heel
 - c) Decrease in push off resistance
 - d) Decrease in external rotation of the foot
- 11) The selection of thorax is made up of _____.
- a) Cartilage
 - b) Bone
 - c) Both a and b
 - d) None
- 12) Zygomatic bone is present in _____.
- a) Upper extremities
 - b) Lower extremities
 - c) Vertebral column
 - d) Skull
- 13) A short statured patient brought to orthopedics OPD with a x- ray showing flattened vertebra with beak. The probable diagnosis is _____.
- a) Achondroplasia
 - b) Ochronosis
 - c) Eosinophilic granuloma
 - d) Calve's disease
- 14) Which of the following is responsible for limiting the range of movements?
- a) Tendons
 - b) Ligaments
 - c) Both a and b
 - d) Muscle fibers

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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETIC AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any four of the following questions. 16**
- a) Explain in detail the biomechanics of skin with neat figure.
 - b) Explain the types of movements and their importance in functioning of joints.
 - c) Define force system of classify and explain different types of force systems.
 - d) Write a short note on Jaipur foot.
 - e) Explain different types of forces transmitted by joints.
- Q.3 Attempt any two of the following questions. 12**
- a) Explain the following.
 - 1) Equilibrium of force system
 - 2) Stress relaxation and creep
 - b) Explain in detail SACH foot with a neat figure.
 - c) With the help of neat diagram explain the gait cycle.

Section – II

- Q.4 Attempt any four of the following questions. 16**
- a) Define prosthesis and orthosis. And also explain how they different to each other.
 - b) What are levers and explain its types.
 - c) Explain in detail below knee prosthetic system with neat diagram.
 - d) Explain the working of terminal devices in detail.
 - e) Explain in detail KAFO with suitable diagram.
- Q.5 Attempt any two of the following questions. 12**
- a) Discuss the various spinal orthosis using a neat sketch and stating the principle used in the design.
 - b) Explain patient rehabilitation concept and how it helps the patient.
 - c) Write a short note on:
 - 1) Principle of three point pressure
 - 2) Position of anatomical axis

- 9) Instrumented walkway record timings of _____.
- a) Goniometer
 - b) Footswitch
 - c) Gait
 - d) None
- 10) Antalgic hip gait is related to which of the following _____.
- a) Waddling gait
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 - d) None

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Set **Q**

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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Set

R

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETIC AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
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 - b) Explain in detail SACH foot with a neat figure.
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 3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) When the counter of the shoe fits too tightly on a SACH foot which of the following problems can result _____.
 - a) Posterior lean of pylon
 - b) Less compression of the heel
 - c) Decrease in push off resistance
 - d) Decrease in external rotation of the foot
- 2) The selection of thorax is made up of _____.
 - a) Cartilage
 - b) Bone
 - c) Both a and b
 - d) None
- 3) Zygomatic bone is present in _____.
 - a) Upper extremities
 - b) Lower extremities
 - c) Vertebral column
 - d) Skull
- 4) A short statured patient brought to orthopedics OPD with a x- ray showing flattened vertebra with beak. The probable diagnosis is _____.
 - a) Achondroplasia
 - b) Ochronosis
 - c) Eosinophilic granuloma
 - d) Calve's disease
- 5) Which of the following is responsible for limiting the range of movements?
 - a) Tendons
 - b) Ligaments
 - c) Both a and b
 - d) Muscle fibers
- 6) _____ is branch of mechanism that describe the cause of bio mechanism.
 - a) Physics
 - b) Chemistry
 - c) Informatics
 - d) Kinematics
- 7) Instrumented walkway record timings of _____.
 - a) Goniometer
 - b) Footswitch
 - c) Gait
 - d) None
- 8) Antalgic hip gait is related to which of the following _____.
 - a) Wadding gait
 - b) Trendeleberg gait
 - c) Painful hip gait
 - d) Short leg gait

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL PROSTHETIC AND ORTHOTICS

Day & Date: Saturday, 23-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

- Q.2 Attempt any four of the following questions. 16**
- Explain in detail the biomechanics of skin with neat figure.
 - Explain the types of movements and their importance in functioning of joints.
 - Define force system of classify and explain different types of force systems.
 - Write a short note on Jaipur foot.
 - Explain different types of forces transmitted by joints.
- Q.3 Attempt any two of the following questions. 12**
- Explain the following.
 - Equilibrium of force system
 - Stress relaxation and creep
 - Explain in detail SACH foot with a neat figure.
 - With the help of neat diagram explain the gait cycle.

Section – II

- Q.4 Attempt any four of the following questions. 16**
- Define prosthesis and orthosis. And also explain how they different to each other.
 - What are levers and explain its types.
 - Explain in detail below knee prosthetic system with neat diagram.
 - Explain the working of terminal devices in detail.
 - Explain in detail KAFO with suitable diagram.
- Q.5 Attempt any two of the following questions. 12**
- Discuss the various spinal orthosis using a neat sketch and stating the principle used in the design.
 - Explain patient rehabilitation concept and how it helps the patient.
 - Write a short note on:
 - Principle of three point pressure
 - Position of anatomical axis

Seat No.	
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Set **P**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
 2) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) A ____ device prevents the oscillation of the moving system and enables the latter to reach its final position quickly.
 - a) deflecting
 - b) Controlling
 - c) damping
 - d) all of the above
- 2) A moving-coil permanent-magnet instrument can be used as ____ by using a low resistance shunt.
 - a) ammeter
 - b) Voltmeter
 - c) flux-meter
 - d) ballistic galvanometer
- 3) An rms reading voltmeter can accurately measure voltages of _____.
 - a) Sine waveforms
 - b) Square waveforms
 - c) Saw tooth waveforms
 - d) All of these
- 4) The measurement range of digital voltmeter is _____.
 - a) 1V to 1MV
 - b) 1V to 1kV
 - c) 1kV to 1MV
 - d) 100 kV to 100MV
- 5) In a ramp type DVM, the multivibrator determines the rate at which the _____.
 - a) Clock pulses are generated
 - b) Measurement cycles are initiated
 - c) It oscillates
 - d) Its amplitude varies
- 6) Q meter is used to measure the properties of _____.
 - a) Inductive coils
 - b) Non inductive coils
 - c) Capacitive coils
 - d) Both (a) and (c)
- 7) In liquid crystal displays, the liquid crystal exhibits properties of _____.
 - a) Liquid
 - b) Solids
 - c) Gases
 - d) Both (a) and (b)
- 8) The basic difference between square wave and pulse generator is their _____.
 - a) Waveforms shape
 - b) Duty cycles
 - c) Frequency range
 - d) Cost
- 9) In function generator, the output waveform of integrator is _____.
 - a) Sinusoidal
 - b) Square
 - c) Triangular
 - d) Saw-tooth

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four. 16

- a) Differentiate between analog phase meter and digital phase meter.
- b) What are the factors involved in a selection of voltmeter.
- c) Define accuracy, precision and sensitivity with suitable example.
- d) Define types of errors and methods of minimization.
- e) Explain working of analog phase meter.

Q.3 Attempt any two. 12

- a) Describe working of R-2R ladder DAC.
- b) Write a short note on:
 - 1) True RMS responding voltmeter
 - 2) Average responding voltmeter
- c) Explain the working of successive approximation type digital voltmeter.

Section – II

Q.4 Attempt any four. 16

- a) Differentiate between dual beam and dual trace oscilloscope.
- b) Why delay lines are required in CRO?
- c) Explain the significance of three and half digit display.
- d) Explain use of CRO in tracing diode and transistor characteristics.
- e) Write a short note on:
 - 1) LCD display system
 - 2) Touch screen display system

Q.5 Attempt any two. 12

- a) What is Lissajous pattern? How it is useful in frequency and phase measurement?
- b) With the help of neat diagram explain working of function generator.
- c) Explain working of multichannel data acquisition system and explain its applications.

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
 2) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The basic difference between square wave and pulse generator is their _____.
 a) Waveforms shape b) Duty cycles
 c) Frequency range d) Cost
- 2) In function generator, the output waveform of integrator is _____.
 a) Sinusoidal b) Square
 c) Triangular d) Saw-tooth
- 3) A voltmeter connected across a resistor gives a value of 65 V but the expected value of resistor was 68 V. Then the absolute error and the relative accuracy of the measurement will be _____.
 a) 3.2%, 96.8% b) 3.8%, 96.2%
 c) 4%, 96% d) 4.4%, 95.59%
- 4) For an instrument the degree of repeatability or reproducibility in measurements is alternative way of expressing its _____.
 a) Precision b) Accuracy
 c) Sensitivity d) Linearity
- 5) The zero drift is measured in units of _____.
 a) Volts-°C b) Volts /°c
 c) °c/volts d) (volts)²/°c
- 6) The difference between the measured value and the true value is known as _____.
 a) Relative error b) Random error
 c) Absolute error d) Systematic error
- 7) If the control springs of PMMC instrument is made up of large moment of inertia, then it can be used as _____.
 a) Ammeter b) Fluxmeter
 c) Ballistic galvanometer d) Wattmeter
- 8) A ____ device prevents the oscillation of the moving system and enables the latter to reach its final position quickly.
 a) deflecting b) Controlling
 c) damping d) all of the above

- 9) A moving-coil permanent-magnet instrument can be used as _____ by using a low resistance shunt.
- a) ammeter
 - b) Voltmeter
 - c) flux-meter
 - d) ballistic galvanometer
- 10) An rms reading voltmeter can accurately measure voltages of _____.
- a) Sine waveforms
 - b) Square waveforms
 - c) Saw tooth waveforms
 - d) All of these
- 11) The measurement range of digital voltmeter is _____.
- a) 1V to 1MV
 - b) 1V to 1kV
 - c) 1kV to 1MV
 - d) 100 kV to 100MV
- 12) In a ramp type DVM, the multivibrator determines the rate at which the _____.
- a) Clock pulses are generated
 - b) Measurement cycles are initiated
 - c) It oscillates
 - d) Its amplitude varies
- 13) Q meter is used to measure the properties of _____.
- a) Inductive coils
 - b) Non inductive coils
 - c) Capacitive coils
 - d) Both (a) and (c)
- 14) In liquid crystal displays, the liquid crystal exhibits properties of _____.
- a) Liquid
 - b) Solids
 - c) Gases
 - d) Both (a) and (b)

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019

Max. Marks: 56

Time: 02:30 PM To 05:30 PM

- Instructions:** 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Differentiate between analog phase meter and digital phase meter.
 - b) What are the factors involved in a selection of voltmeter.
 - c) Define accuracy, precision and sensitivity with suitable example.
 - d) Define types of errors and methods of minimization.
 - e) Explain working of analog phase meter.
- Q.3 Attempt any two. 12**
- a) Describe working of R-2R ladder DAC.
 - b) Write a short note on:
 - 1) True RMS responding voltmeter
 - 2) Average responding voltmeter
 - c) Explain the working of successive approximation type digital voltmeter.

Section – II

- Q.4 Attempt any four. 16**
- a) Differentiate between dual beam and dual trace oscilloscope.
 - b) Why delay lines are required in CRO?
 - c) Explain the significance of three and half digit display.
 - d) Explain use of CRO in tracing diode and transistor characteristics.
 - e) Write a short note on:
 - 1) LCD display system
 - 2) Touch screen display system
- Q.5 Attempt any two. 12**
- a) What is Lissajous pattern? How it is useful in frequency and phase measurement?
 - b) With the help of neat diagram explain working of function generator.
 - c) Explain working of multichannel data acquisition system and explain its applications.

Seat No.	
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Set

R

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.
 2) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) In a ramp type DVM, the multivibrator determines the rate at which the _____.
 a) Clock pulses are generated b) Measurement cycles are initiated
 c) It oscillates d) Its amplitude varies
- 2) Q meter is used to measure the properties of _____.
 a) Inductive coils b) Non inductive coils
 c) Capacitive coils d) Both (a) and (c)
- 3) In liquid crystal displays, the liquid crystal exhibits properties of _____.
 a) Liquid b) Solids
 c) Gases d) Both (a) and (b)
- 4) The basic difference between square wave and pulse generator is their _____.
 a) Waveforms shape b) Duty cycles
 c) Frequency range d) Cost
- 5) In function generator, the output waveform of integrator is _____.
 a) Sinusoidal b) Square
 c) Triangular d) Saw-tooth
- 6) A voltmeter connected across a resistor gives a value of 65 V but the expected value of resistor was 68 V. Then the absolute error and the relative accuracy of the measurement will be _____.
 a) 3.2%, 96.8% b) 3.8%, 96.2%
 c) 4%, 96% d) 4.4%, 95.59%
- 7) For an instrument the degree of repeatability or reproducibility in measurements is alternative way of expressing its _____.
 a) Precision b) Accuracy
 c) Sensitivity d) Linearity
- 8) The zero drift is measured in units of _____.
 a) Volts-°C b) Volts /°c
 c) °c/volts d) (volts)²/°c
- 9) The difference between the measured value and the true value is known as _____.
 a) Relative error b) Random error
 c) Absolute error d) Systematic error

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four. 16

- a) Differentiate between analog phase meter and digital phase meter.
- b) What are the factors involved in a selection of voltmeter.
- c) Define accuracy, precision and sensitivity with suitable example.
- d) Define types of errors and methods of minimization.
- e) Explain working of analog phase meter.

Q.3 Attempt any two. 12

- a) Describe working of R-2R ladder DAC.
- b) Write a short note on:
 - 1) True RMS responding voltmeter
 - 2) Average responding voltmeter
- c) Explain the working of successive approximation type digital voltmeter.

Section – II

Q.4 Attempt any four. 16

- a) Differentiate between dual beam and dual trace oscilloscope.
- b) Why delay lines are required in CRO?
- c) Explain the significance of three and half digit display.
- d) Explain use of CRO in tracing diode and transistor characteristics.
- e) Write a short note on:
 - 1) LCD display system
 - 2) Touch screen display system

Q.5 Attempt any two. 12

- a) What is Lissajous pattern? How it is useful in frequency and phase measurement?
- b) With the help of neat diagram explain working of function generator.
- c) Explain working of multichannel data acquisition system and explain its applications.

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC INSTRUMENTATIONS

Day & Date: Monday, 25-11-2019

Max. Marks: 56

Time: 02:30 PM To 05:30 PM

- Instructions:** 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Differentiate between analog phase meter and digital phase meter.
 - b) What are the factors involved in a selection of voltmeter.
 - c) Define accuracy, precision and sensitivity with suitable example.
 - d) Define types of errors and methods of minimization.
 - e) Explain working of analog phase meter.
- Q.3 Attempt any two. 12**
- a) Describe working of R-2R ladder DAC.
 - b) Write a short note on:
 - 1) True RMS responding voltmeter
 - 2) Average responding voltmeter
 - c) Explain the working of successive approximation type digital voltmeter.

Section – II

- Q.4 Attempt any four. 16**
- a) Differentiate between dual beam and dual trace oscilloscope.
 - b) Why delay lines are required in CRO?
 - c) Explain the significance of three and half digit display.
 - d) Explain use of CRO in tracing diode and transistor characteristics.
 - e) Write a short note on:
 - 1) LCD display system
 - 2) Touch screen display system
- Q.5 Attempt any two. 12**
- a) What is Lissajous pattern? How it is useful in frequency and phase measurement?
 - b) With the help of neat diagram explain working of function generator.
 - c) Explain working of multichannel data acquisition system and explain its applications.

- 10) Dynamic shift registers are made up of _____
- a) Dynamic Hip flops b) MOS inverters
c) MOS-NAND gates d) CMOS inverters
- 11) The basic memory element in a digital circuit _____.
- a) Consists of a NAND gate b) Consists of a NOR gate
c) Is a flip flop d) Is a shift register
- 12) In a master slave J-K flip flop, $J = K = 1$. The state Q_{n+1} of the flip flop after the clock pulse will be _____.
- a) 0 b) 1
c) Q_n d) \bar{Q}_n
- 13) A TTL circuit acts as a current sink in the _____.
- a) Low State b) High state
c) High impedance state d) None of these
- 14) The logic family with both logic levels negative is _____.
- a) TTL b) ECL
c) CMOS d) MOS

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Perform the following addition in Xs - 3 code.
 - 1) $37+28$
 - 2) $247.6+359.4$
- b) Convert the following number into Gray number.
 - 1) $(3A7)_{16}$
 - 2) $(652)_{10}$
- c) Show that $A \oplus B = A\bar{B} + \bar{A}B$ and constant the correspondingly logic diagram.
- d) With the help of a neat diagram explain working of 2 input TTL NAND gate.
- e) Distinguish between half adder and full adder in detail.

Q.3 Attempt any two. **12**

- a) Derive the Boolean expression for a two input Ex-OR gate to realize with two input NAND gates without using complemented variables and draw the circuits.
- b) Show that
 - 1) $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$
 - 2) $A\bar{B}C + B + B\bar{D} + AB\bar{D} = B + C$
- c) With the help of a neat circuit diagram explain working of :
 - 1) MOS inverter
 - 2) 2 Input MOS NAND gate

Section – II

Q.4 Attempt any four **16**

- a) Define and differentiate synchronous and asynchronous counter.
- b) Define following types of memories.
 - 1) ROM
 - 2) RAM
 - 3) EPROM
 - 4) Volatile
- c) Distinguish between combinational and sequential logic circuits.
- d) With the help of neat diagram, explain working of following types of shift registers
 - 1) Parallel in-serial out
 - 2) Bidirectional
- e) Using 4×1 MUX implement following logic function.

$$F(A, B, C) = \sum m(1, 2, 4, 7)$$

Q.5 Attempt any two.

- a)** Draw and explain working of full adder using 3-line to 8-line decoder.
- b)** Design a 3-bit up/down counter which counts up when the control signal $m = 1$ and counts down when $m = 0$
- c)** With the help of neat diagram, explain the working of Master-Slave J-K flip flop.

Seat No.	
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Set	Q
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**S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN**

Day & Date: Tuesday, 26-11-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) _____ select lines are contained in a multiplexer with 1024 inputs and one output.

a) 512	b) 258
c) 64	d) 10
- 2) Parallel adders are _____.

a) Combinational logic circuits	b) sequential logic circuits
c) both (a) and (b)	d) None of the above
- 3) Dynamic shift registers are made up of _____.

a) Dynamic Hip flops	b) MOS inverters
c) MOS-NAND gates	d) CMOS inverters
- 4) The basic memory element in a digital circuit _____.

a) Consists of a NAND gate	b) Consists of a NOR gate
c) Is a flip flop	d) Is a shift register
- 5) In a master slave J-K flip flop, $J = K = 1$. The state Q_{n+1} of the flip flop after the clock pulse will be _____.

a) 0	b) 1
c) Q_n	d) \bar{Q}_n
- 6) A TTL circuit acts as a current sink in the _____.

a) Low State	b) High state
c) High impedance state	d) None of these
- 7) The logic family with both logic levels negative is _____.

a) TTL	b) ECL
c) CMOS	d) MOS
- 8) A binary number with 'n' bits all of which are 1s has the value _____.

a) $n^2 - 1$	b) 2^n
c) $2^{(n-1)}$	d) $2^n - 1$
- 9) If $(A2C)_{16} = (x)_8$, then 'x' is give by _____.

a) 7054	b) 6054
c) 5154	d) 5054

Seat No.	
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Set	Q
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Perform the following addition in Xs - 3 code.
 - 1) $37+28$
 - 2) $247.6+359.4$
- b) Convert the following number into Gray number.
 - 1) $(3A7)_{16}$
 - 2) $(652)_{10}$
- c) Show that $A \oplus B = A\bar{B} + \bar{A}B$ and constant the correspondingly logic diagram.
- d) With the help of a neat diagram explain working of 2 input TTL NAND gate.
- e) Distinguish between half adder and full adder in detail.

Q.3 Attempt any two. **12**

- a) Derive the Boolean expression for a two input Ex-OR gate to realize with two input NAND gates without using complemented variables and draw the circuits.
- b) Show that
 - 1) $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$
 - 2) $A\bar{B}C + B + B\bar{D} + AB\bar{D} = B + C$
- c) With the help of a neat circuit diagram explain working of :
 - 1) MOS inverter
 - 2) 2 Input MOS NAND gate

Section – II

Q.4 Attempt any four **16**

- a) Define and differentiate synchronous and asynchronous counter.
- b) Define following types of memories.
 - 1) ROM
 - 2) RAM
 - 3) EPROM
 - 4) Volatile
- c) Distinguish between combinational and sequential logic circuits.
- d) With the help of neat diagram, explain working of following types of shift registers
 - 1) Parallel in-serial out
 - 2) Bidirectional
- e) Using 4×1 MUX implement following logic function.

$$F(A, B, C) = \sum m(1, 2, 4, 7)$$

Q.5 Attempt any two.

- a) Draw and explain working of full adder using 3-line to 8-line decoder.
- b) Design a 3-bit up/down counter which counts up when the control signal $m = 1$ and counts down when $m = 0$
- c) With the help of neat diagram, explain the working of Master-Slave J-K flip flop.

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Perform the following addition in Xs - 3 code.
 - 1) $37+28$
 - 2) $247.6+359.4$
- b) Convert the following number into Gray number.
 - 1) $(3A7)_{16}$
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- c) Show that $A \oplus B = A\bar{B} + \bar{A}B$ and constant the correspondingly logic diagram.
- d) With the help of a neat diagram explain working of 2 input TTL NAND gate.
- e) Distinguish between half adder and full adder in detail.

Q.3 Attempt any two. **12**

- a) Derive the Boolean expression for a two input Ex-OR gate to realize with two input NAND gates without using complemented variables and draw the circuits.
- b) Show that
 - 1) $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$
 - 2) $A\bar{B}C + B + B\bar{D} + AB\bar{D} = B + C$
- c) With the help of a neat circuit diagram explain working of :
 - 1) MOS inverter
 - 2) 2 Input MOS NAND gate

Section – II

Q.4 Attempt any four **16**

- a) Define and differentiate synchronous and asynchronous counter.
- b) Define following types of memories.
 - 1) ROM
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 - 3) EPROM
 - 4) Volatile
- c) Distinguish between combinational and sequential logic circuits.
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$$F(A, B, C) = \sum m(1, 2, 4, 7)$$

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- a)** Draw and explain working of full adder using 3-line to 8-line decoder.
- b)** Design a 3-bit up/down counter which counts up when the control signal $m = 1$ and counts down when $m = 0$
- c)** With the help of neat diagram, explain the working of Master-Slave J-K flip flop.

Seat No.	
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**S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN**

Day & Date: Tuesday, 26-11-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) Dynamic shift registers are made up of _____.
 a) Dynamic Hip flops b) MOS inverters
 c) MOS-NAND gates d) CMOS inverters
- 2) The basic memory element in a digital circuit _____.
 a) Consists of a NAND gate b) Consists of a NOR gate
 c) Is a flip flop d) Is a shift register
- 3) In a master slave J-K flip flop, $J = K = 1$. The state Q_{n+1} of the flip flop after the clock pulse will be _____.
 a) 0 b) 1
 c) Q_n d) \bar{Q}_n
- 4) A TTL circuit acts as a current sink in the _____.
 a) Low State b) High state
 c) High impedance state d) None of these
- 5) The logic family with both logic levels negative is _____.
 a) TTL b) ECL
 c) CMOS d) MOS
- 6) A binary number with 'n' bits all of which are 1s has the value _____.
 a) $n^2 - 1$ b) 2^n
 c) $2^{(n-1)}$ d) $2^n - 1$
- 7) If $(A2C)_{16} = (x)_8$, then 'x' is give by _____.
 a) 7054 b) 6054
 c) 5154 d) 5054
- 8) The number of parity bits in a 12 bit Hamming code is _____.
 a) 4 b) 5
 c) 6 d) 8
- 9) For mathematical operations, the code must be _____.
 a) Sequential b) Cyclic
 c) Self complimentary d) Unit distance

- 10) The logic operation $AB + \bar{A}\bar{B}$ can be implemented by giving the input A and B to a two input _____.
- | | |
|--------------|---------------|
| a) NOR gate | b) NAND gate |
| c) X-OR gate | d) X-NOR gate |
- 11) The code used for labeling cells of the k-map is _____.
- | | |
|----------------|----------------|
| a) Natural B'D | b) Hexadecimal |
| c) Gray | d) Octal |
- 12) A ' n ' variable k-map can have _____.
- | | |
|----------------|-------------------|
| a) n^2 cells | b) 2^n cells |
| c) n^n cell | d) n^{2n} cells |
- 13) _____ select lines are contained in a multiplexer with 1024 inputs and one output.
- | | |
|--------|--------|
| a) 512 | b) 258 |
| c) 64 | d) 10 |
- 14) Parallel adders are _____.
- | | |
|---------------------------------|------------------------------|
| a) Combinational logic circuits | b) sequential logic circuits |
| c) both (a) and (b) | d) None of the above |

Seat No.	
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Set	S
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
DIGITAL DESIGN

Day & Date: Tuesday, 26-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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

Section – I

Q.2 Attempt any four. **16**

- a) Perform the following addition in Xs - 3 code.
 - 1) $37+28$
 - 2) $247.6+359.4$
- b) Convert the following number into Gray number.
 - 1) $(3A7)_{16}$
 - 2) $(652)_{10}$
- c) Show that $A \oplus B = A\bar{B} + \bar{A}B$ and constant the correspondingly logic diagram.
- d) With the help of a neat diagram explain working of 2 input TTL NAND gate.
- e) Distinguish between half adder and full adder in detail.

Q.3 Attempt any two. **12**

- a) Derive the Boolean expression for a two input Ex-OR gate to realize with two input NAND gates without using complemented variables and draw the circuits.
- b) Show that
 - 1) $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$
 - 2) $A\bar{B}C + B + B\bar{D} + AB\bar{D} = B + C$
- c) With the help of a neat circuit diagram explain working of :
 - 1) MOS inverter
 - 2) 2 Input MOS NAND gate

Section – II

Q.4 Attempt any four **16**

- a) Define and differentiate synchronous and asynchronous counter.
- b) Define following types of memories.
 - 1) ROM
 - 2) RAM
 - 3) EPROM
 - 4) Volatile
- c) Distinguish between combinational and sequential logic circuits.
- d) With the help of neat diagram, explain working of following types of shift registers
 - 1) Parallel in-serial out
 - 2) Bidirectional
- e) Using 4×1 MUX implement following logic function.

$$F(A, B, C) = \sum m(1, 2, 4, 7)$$

Q.5 Attempt any two.

- a)** Draw and explain working of full adder using 3-line to 8-line decoder.
- b)** Design a 3-bit up/down counter which counts up when the control signal $m = 1$ and counts down when $m = 0$
- c)** With the help of neat diagram, explain the working of Master-Slave J-K flip flop.

Seat No.	
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S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II

Day & Date: Wednesday, 27-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Unity gain frequency is the _____ frequency possible where the gain equals 1.
 - a) varying
 - b) fixed
 - c) stable
 - d) maximum
- 2) The output voltage of differentiate is equal to _____ instantaneous rate of change of input voltage with respect to time.
 - a) RC time constant
 - b) Feedback resister
 - c) Slew Rate
 - d) Delay time
- 3) In open loop configuration op – amp output levels are _____ at \pm vs at.
 - a) noing
 - b) moving
 - c) fixed
 - d) none of the above
- 4) Supply voltage rejection ratio is the ratio of change in input _____ voltage to change in supply voltage.
 - a) offset
 - b) common
 - c) differential
 - d) gain
- 5) The algebraic difference between the currents into the inverting and non inverting terminals op - amp is called _____.
 - a) Input bias current
 - b) Input off set current
 - c) CMRR
 - d) slew rate
- 6) The bandwidth of open loop op - amp is very small, hence it can't be used for AC application at _____ frequency.
 - a) high
 - b) cutoff
 - c) medium
 - d) low
- 7) Class A power amplifier circuit can be constructed using _____ circuit.
 - a) Fixed bias
 - b) Class B
 - c) Class AB
 - d) None of the above
- 8) Emitter follower is used as _____ amplifier to match high impedance source with low impedance load.
 - a) Darlington
 - b) cascode
 - c) buffer
 - d) push pull

Seat No.	
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**S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II**

Day & Date: Wednesday, 27-11-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

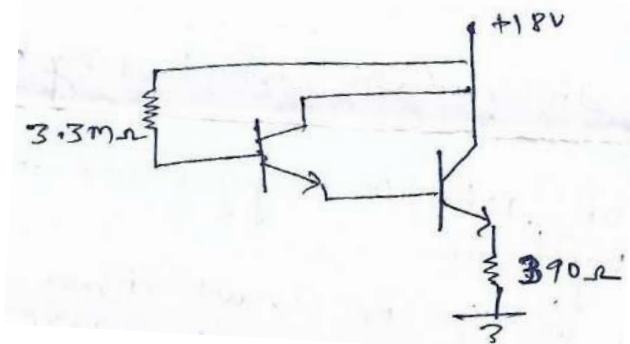
Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

16

- Define and differentiate between RC coupled and direct coupled amplifier.
- Explain role of following circuit components in RC coupled amplifier with necessary diagram.
 - Emitter bypass capacitor (C_E)
 - Resistance R_E and R_C
- Calculate the DC bias voltage and currents in given circuit.



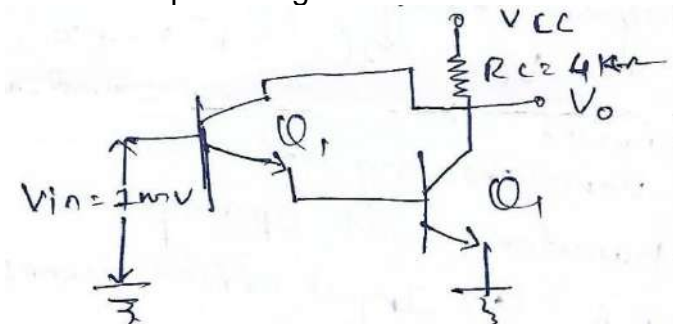
B.D = 8000
VBE = 1.6v

- Calculate the efficiency of class B amplifier for a supply voltage of $V_{CC} = 24V$ with peak output voltage of.
 - $V_L(p) = 22v$
 - $V_L(p) = 6v$

Q.3 Attempt any two questions.

12

- Find the output voltage of the circuit shown below.



$h_{fe} = 100$
 $h_{ie} = 1ks$

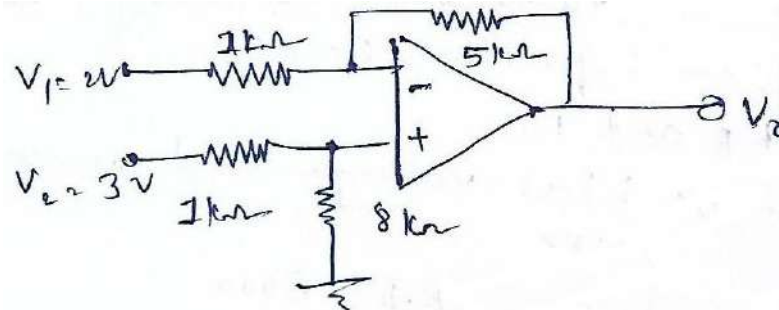
- Define harmonic distortion and cross over distorted and explain working of class AB power amplifier.
- Explain working of RC phase shift and crystal oscillator with output waveforms.

Section – II

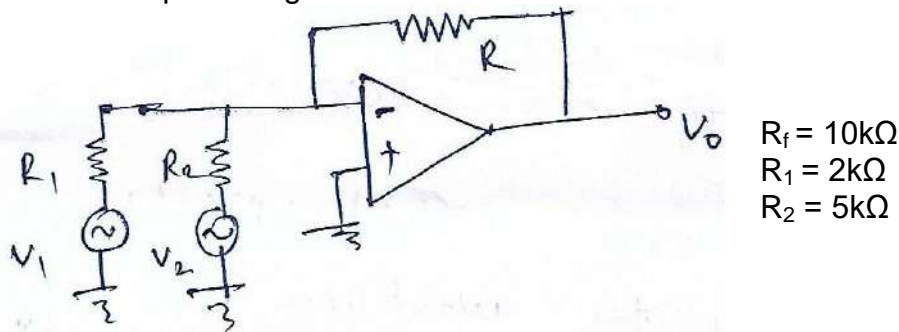
Q.4 Attempt any four questions.

16

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate V_o for the circuit shown in figure.



- c) Explain working of differentiator circuit using op - amp and draw its waveforms.
- d) Explain working of Schmitt trigger and define significance of hysteresis.
- e) Find the output voltage for circuit shown.



Q.5 Attempt any two questions.

12

- a) Design a circuit diagram using op - amp to provide the output voltage V_o as , $V_o = -2(3V_1 + 4V_2 + 2V_3)$
- b) With the help of circuit diagram and waveform explain working of zero crossing detector.
- c) Define following characteristic of op - amp.
- 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Seat No.	
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Set **Q**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II

Day & Date: Wednesday, 27-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Emitter follower is used as _____ amplifier to match high impedance source with low impedance load.

a) Darlington	b) cascode
c) buffer	d) push pull
- 2) Hartley oscillator consists of positive feedback formed by L_1L_2 and class _____ amplifier.

a) A	b) B
c) AB	d) Push pull
- 3) Stability factor 'S' is defined as the ratio of the change in collector current to change in _____ leakage current.

a) collector to base	b) base to collector
c) collector to emitter	d) emitter to base
- 4) Class 'C' amplifier gives greater power efficiency of the order _____.

a) 50%	b) 75%
c) 25%	d) 85%
- 5) _____ is the maximum rate of change of output voltage per unit time of an op - amp.

a) Offset voltage	b) CMRR
c) Input bias	d) Slew rate
- 6) Cross over distortion can be avoided by operating class B amplifier in class _____ mode.

a) A	b) AB
c) C	d) Push pull
- 7) Ground always sinks the current and virtual ground sinks the current as well as _____ of current.

a) sources	b) references
c) neutral	d) none
- 8) Unity gain frequency is the _____ frequency possible where the gain equals 1.

a) varying	b) fixed
c) stable	d) maximum

- 9) The output voltage of differentiate is equal to _____ instantaneous rate of change of input voltage with respect to time.
- a) RC time constant b) Feedback resistor
c) Slew Rate d) Delay time
- 10) In open loop configuration op – amp output levels are _____ at \pm vs at.
- a) noing b) moving
c) fixed d) none of the above
- 11) Supply voltage rejection ratio is the ratio of change in input _____ voltage to change in supply voltage.
- a) offset b) common
c) differential d) gain
- 12) The algebraic difference between the currents into the inverting and non inverting terminals op - amp is called _____.
- a) Input bias current b) Input off set current
c) CMRR d) slew rate
- 13) The bandwidth of open loop op - amp is very small, hence it can't be used for AC application at _____ frequency.
- a) high b) cutoff
c) medium d) low
- 14) Class A power amplifier circuit can be constructed using _____ circuit.
- a) Fixed bias b) Class B
c) Class AB d) None of the above

Seat No.	
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**S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II**

Day & Date: Wednesday, 27-11-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

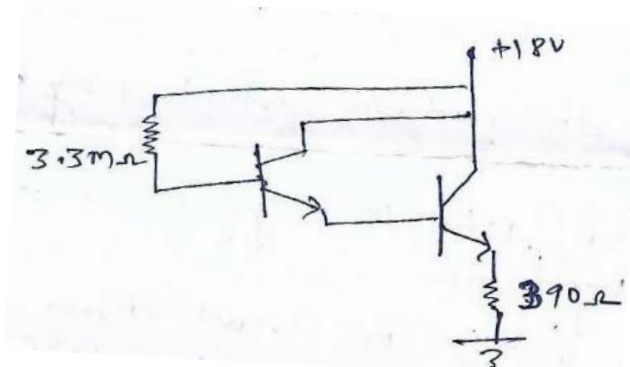
Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

16

- Define and differentiate between RC coupled and direct coupled amplifier.
- Explain role of following circuit components in RC coupled amplifier with necessary diagram.
 - Emitter bypass capacitor (C_E)
 - Resistance R_E and R_C
- Calculate the DC bias voltage and currents in given circuit.



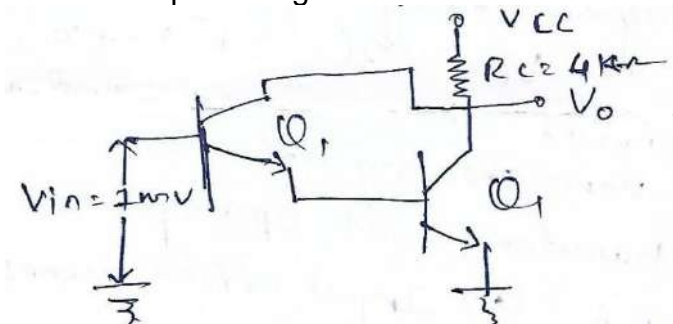
B.D = 8000
VBE = 1.6v

- Calculate the efficiency of class B amplifier for a supply voltage of $V_{CC} = 24V$ with peak output voltage of.
 - $V_L(p) = 22v$
 - $V_L(p) = 6v$

Q.3 Attempt any two questions.

12

- Find the output voltage of the circuit shown below.



$h_{fe} = 100$
 $h_{ie} = 1ks$

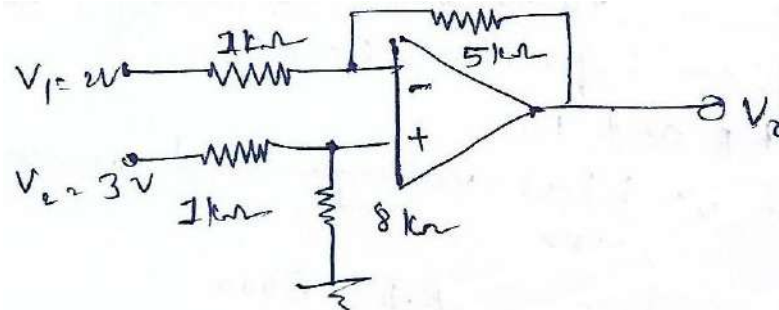
- Define harmonic distortion and cross over distorted and explain working of class AB power amplifier.
- Explain working of RC phase shift and crystal oscillator with output waveforms.

Section – II

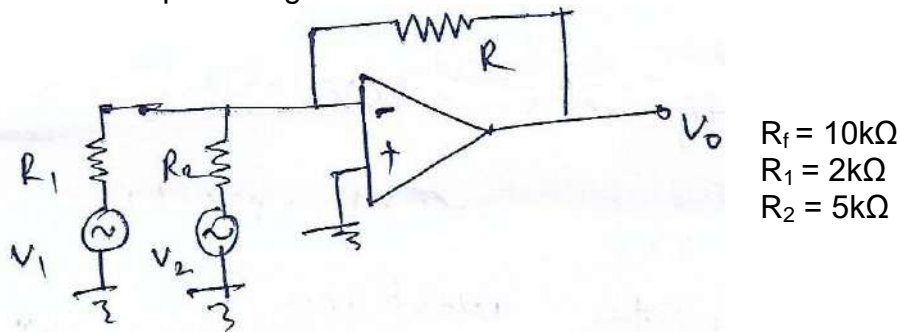
Q.4 Attempt any four questions.

16

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate V_o for the circuit shown in figure.



- c) Explain working of differentiator circuit using op - amp and draw its waveforms.
- d) Explain working of Schmitt trigger and define significance of hysteresis.
- e) Find the output voltage for circuit shown.



Q.5 Attempt any two questions.

12

- a) Design a circuit diagram using op - amp to provide the output voltage V_o as , $V_o = -2 (3V_1 + 4V_2 + 2V_3)$
- b) With the help of circuit diagram and waveform explain working of zero crossing detector.
- c) Define following characteristic of op - amp.
- 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Seat No.	
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**S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II**

Day & Date: Wednesday, 27-11-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

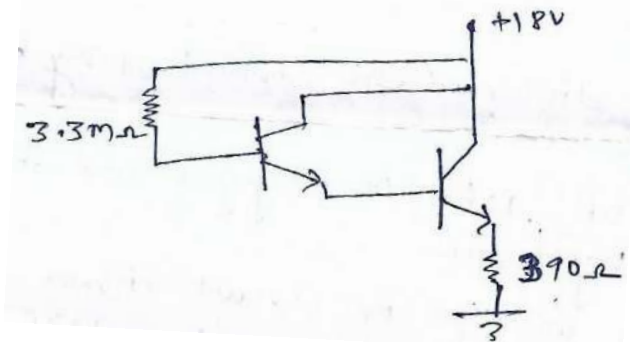
Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

16

- a) Define and differentiate between RC coupled and direct coupled amplifier.
- b) Explain role of following circuit components in RC coupled amplifier with necessary diagram.
 - 1) Emitter bypass capacitor (C_E)
 - 2) Resistance R_E and R_C
- c) Calculate the DC bias voltage and currents in given circuit.



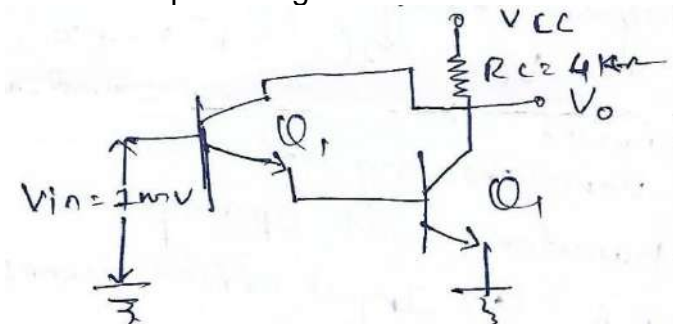
B.D = 8000
VBE = 1.6v

- d) Calculate the efficiency of class B amplifier for a supply voltage of $V_{CC} = 24V$ with peak output voltage of.
 - 1) $V_L(p) = 22v$
 - 2) $V_L(p) = 6v$

Q.3 Attempt any two questions.

12

- a) Find the output voltage of the circuit shown below.



$h_{fe} = 100$
 $h_{ie} = 1ks$

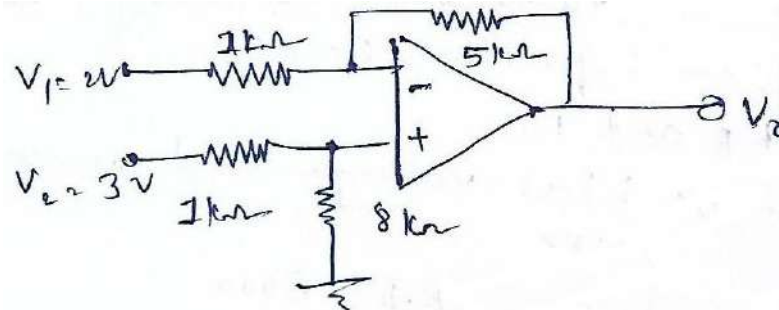
- b) Define harmonic distortion and cross over distorted and explain working of class AB power amplifier.
- c) Explain working of RC phase shift and crystal oscillator with output waveforms.

Section – II

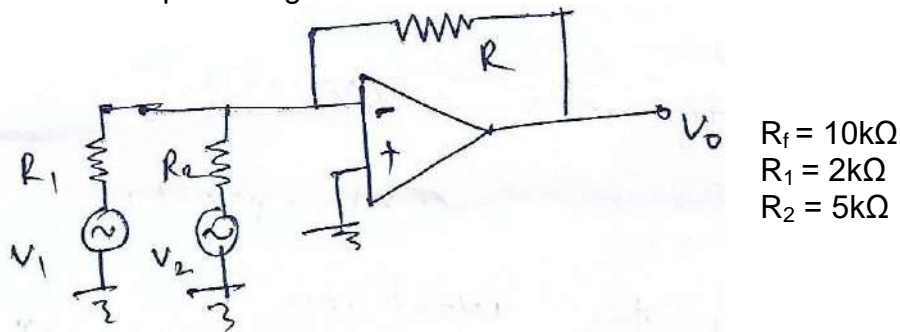
Q.4 Attempt any four questions.

16

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate V_o for the circuit shown in figure.



- c) Explain working of differentiator circuit using op - amp and draw its waveforms.
- d) Explain working of Schmitt trigger and define significance of hysteresis.
- e) Find the output voltage for circuit shown.



Q.5 Attempt any two questions.

12

- a) Design a circuit diagram using op - amp to provide the output voltage V_o as , $V_o = -2 (3V_1 + 4V_2 + 2V_3)$
- b) With the help of circuit diagram and waveform explain working of zero crossing detector.
- c) Define following characteristic of op - amp.
- 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Seat No.	
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Set **S**

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II

Day & Date: Wednesday, 27-11-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Stability factor 'S' is defined as the ratio of the change in collector current to change in _____ leakage current.
 - a) collector to base
 - b) base to collector
 - c) collector to emitter
 - d) emitter to base
- 2) Class 'C' amplifier gives greater power efficiency of the order _____.
 - a) 50%
 - b) 75%
 - c) 25%
 - d) 85%
- 3) _____ is the maximum rate of change of output voltage per unit time of an op - amp.
 - a) Offset voltage
 - b) CMRR
 - c) Input bias
 - d) Slew rate
- 4) Cross over distortion can be avoided by operating class B amplifier in class _____ mode.
 - a) A
 - b) AB
 - c) C
 - d) Push pull
- 5) Ground always sinks the current and virtual ground sinks the current as well as _____ of current.
 - a) sources
 - b) references
 - c) neutral
 - d) none
- 6) Unity gain frequency is the _____ frequency possible where the gain equals 1.
 - a) varying
 - b) fixed
 - c) stable
 - d) maximum
- 7) The output voltage of differentiate is equal to _____ instantaneous rate of change of input voltage with respect to time.
 - a) RC time constant
 - b) Feedback resistor
 - c) Slew Rate
 - d) Delay time
- 8) In open loop configuration op – amp output levels are _____ at $\pm v_s$ at.
 - a) noing
 - b) moving
 - c) fixed
 - d) none of the above

- 9) Supply voltage rejection ratio is the ratio of change in input _____ voltage to change in supply voltage.
- a) offset
 - b) common
 - c) differential
 - d) gain
- 10) The algebraic difference between the currents into the inverting and non inverting terminals op - amp is called _____.
- a) Input bias current
 - b) Input off set current
 - c) CMRR
 - d) slew rate
- 11) The bandwidth of open loop op - amp is very small, hence it can't be used for AC application at _____ frequency.
- a) high
 - b) cutoff
 - c) medium
 - d) low
- 12) Class A power amplifier circuit can be constructed using _____ circuit.
- a) Fixed bias
 - b) Class B
 - c) Class AB
 - d) None of the above
- 13) Emitter follower is used as _____ amplifier to match high impedance source with low impedance load.
- a) Darlington
 - b) cascode
 - c) buffer
 - d) push pull
- 14) Hartley oscillator consists of positive feedback formed by L_1L_2 and class _____ amplifier.
- a) A
 - b) B
 - c) AB
 - d) Push pull

Seat No.	
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**S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II**

Day & Date: Wednesday, 27-11-2019
Time: 02:30 PM To 05:30 PM

Max. Marks: 56

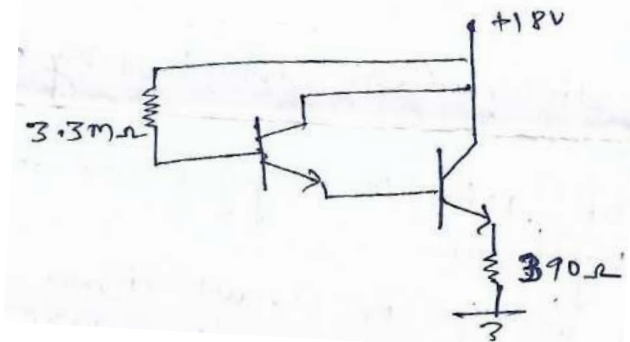
Instructions: 1) All questions are compulsory.
2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

16

- Define and differentiate between RC coupled and direct coupled amplifier.
- Explain role of following circuit components in RC coupled amplifier with necessary diagram.
 - Emitter bypass capacitor (C_E)
 - Resistance R_E and R_C
- Calculate the DC bias voltage and currents in given circuit.



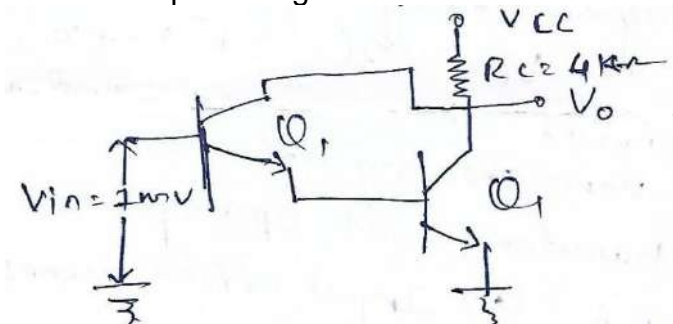
B.D = 8000
VBE = 1.6v

- Calculate the efficiency of class B amplifier for a supply voltage of $V_{CC} = 24V$ with peak output voltage of.
 - $V_L(p) = 22v$
 - $V_L(p) = 6v$

Q.3 Attempt any two questions.

12

- Find the output voltage of the circuit shown below.



$h_{fe} = 100$
 $h_{ie} = 1ks$

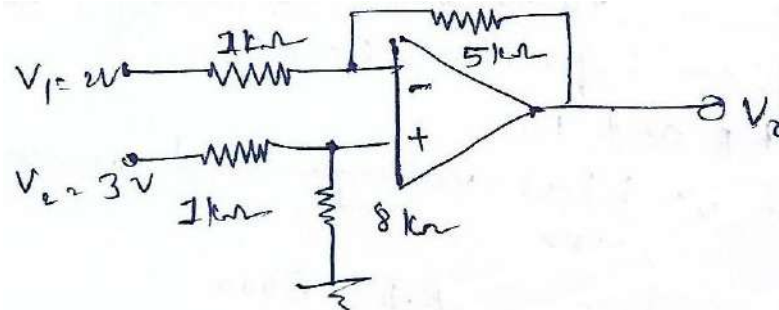
- Define harmonic distortion and cross over distorted and explain working of class AB power amplifier.
- Explain working of RC phase shift and crystal oscillator with output waveforms.

Section – II

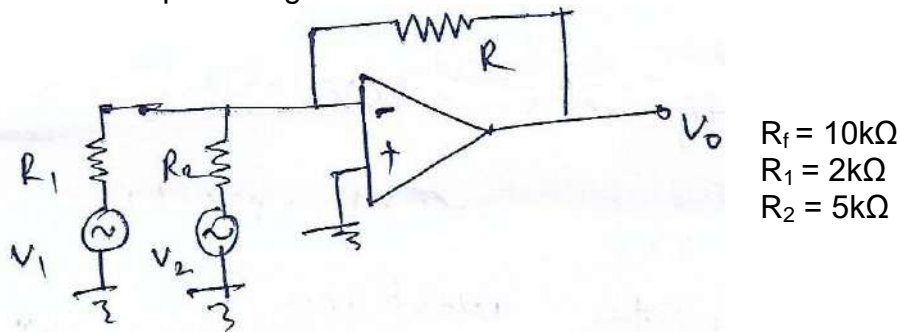
Q.4 Attempt any four questions.

16

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate V_o for the circuit shown in figure.



- c) Explain working of differentiator circuit using op - amp and draw its waveforms.
- d) Explain working of Schmitt trigger and define significance of hysteresis.
- e) Find the output voltage for circuit shown.



Q.5 Attempt any two questions.

12

- a) Design a circuit diagram using op - amp to provide the output voltage V_o as , $V_o = -2(3V_1 + 4V_2 + 2V_3)$
- b) With the help of circuit diagram and waveform explain working of zero crossing detector.
- c) Define following characteristic of op - amp.
- 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL INSTRUMENTATION – I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The buffer of pH measurement is stored at temperature between _____ degree Celsius.

a) 18 to 25	b) 19 to 25
c) 20 to 35	d) 15 to 20
- 2) The base of each audio logical examination is the determination of the hearing _____.

a) intensity	b) density
c) threshold	d) loss
- 3) _____ noise is a noise containing all frequencies in the audible spectrum at approximately equal intensities.

a) narrow band	b) shot
c) white	d) saw tooth
- 4) The bubble oxygenator has a sponge-like filter and reservoir to enable gaseous bubbles to be removed from the _____ before it is pumped back to the body.

a) oxygenated blood	b) deoxygenated blood
c) lungs	d) respiratory track
- 5) The _____ of the patient' lungs is the ratio of volume delivered to the pressure rise during the inspiratory phase in the lungs.

a) mean airway pressure	b) airway resistance
c) tidal volume	d) compliance
- 6) Membrane oxygenators consist of a series of fine tubes which allow _____ of oxygen and carbon dioxide between the blood flowing through them

a) diffusion	b) concentration
c) collection	d) drifting
- 7) ELISA separates some component of the analytical reaction mixture by _____ certain components onto a solid phase which is physically immobilized.

a) refracting	b) adsorbing
c) absorbing	d) reserving

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL INSTRUMENTATION – I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Draw and explain working of pH electrode and mention application of pH meter.
 - b) Explain the optical ray diagram of spectrophotometer.
 - c) Explain the principle and working of impedance plethysmography.
 - d) State and explain BEER Lamberts law.
 - e) Explain working of ELISA reader and mention its any 2 applications.

- Q.3 Attempt any two. 12**
- a) Explain the protein separation technique using electrophoresis.
 - b) With the help of block diagram explain the working of complete blood gas analyzer.
 - c) Explain the principle and working of electromagnetic blood flow meter.

Section – II

- Q.4 Attempt any four. 16**
- a) Explain working of any one type of oxygenator.
 - b) Define the term masking and explain its importance in audiometry.
 - c) Explain various modes of ventilator.
 - d) Define deafness, its types and differentiate between pure tone and speech audiometry.
 - e) State various components of heart lung machine and describe its application during surgery.

- Q.5 Attempt any two. 12**
- a) Explain working of evoked response audiometry system.
 - b) With the help of block diagram explain working of anesthesia machine.
 - c) With the help of spirogram explain various lung volume and capacities.

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL INSTRUMENTATION – I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The spirometer is a mechanical _____ as the input is air flow and output is volume displacement.
 - a) differentiator
 - b) integrator
 - c) subtractor
 - d) none of above
- 2) The ratio of the radiant power transmitted by a sample to a radiant power incident on the sample is called _____.
 - a) absorbance
 - b) beers law
 - c) transmittance
 - d) optical density
- 3) The sounds reaching the ear are characterized by _____.
 - a) intensity
 - b) pitch
 - c) density
 - d) clarity
- 4) Diffusion measurements test the lung's ability to exchange _____ with the circulatory system.
 - a) blood
 - b) platelets
 - c) gas
 - d) RBCs
- 5) _____ are optical systems which provide better isolation of spectral energy than the optical filters.
 - a) diffraction gratings
 - b) filters
 - c) holographic gratings
 - d) monochromator
- 6) A colorimeter involves the measurement of color in electromagnetic spectrum of _____.
 - a) 400-700 nm
 - b) 100-300nm
 - c) 200-500nm
 - d) 250-500nm
- 7) Wavelength calibration of a spectrophotometer can be checked by using a _____ filter as a wavelength standard.
 - a) tungsten
 - b) ultraviolet
 - c) electromagnetic
 - d) holmium oxide
- 8) The buffer of pH measurement is stored at temperature between _____ degree Celsius.
 - a) 18 to 25
 - b) 19 to 25
 - c) 20 to 35
 - d) 15 to 20

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL INSTRUMENTATION – I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four. 16**
- a) Draw and explain working of pH electrode and mention application of pH meter.
 - b) Explain the optical ray diagram of spectrophotometer.
 - c) Explain the principle and working of impedance plethysmography.
 - d) State and explain BEER Lamberts law.
 - e) Explain working of ELISA reader and mention its any 2 applications.
- Q.3 Attempt any two. 12**
- a) Explain the protein separation technique using electrophoresis.
 - b) With the help of block diagram explain the working of complete blood gas analyzer.
 - c) Explain the principle and working of electromagnetic blood flow meter.

Section – II

- Q.4 Attempt any four. 16**
- a) Explain working of any one type of oxygenator.
 - b) Define the term masking and explain its importance in audiometry.
 - c) Explain various modes of ventilator.
 - d) Define deafness, its types and differentiate between pure tone and speech audiometry.
 - e) State various components of heart lung machine and describe its application during surgery.
- Q.5 Attempt any two. 12**
- a) Explain working of evoked response audiometry system.
 - b) With the help of block diagram explain working of anesthesia machine.
 - c) With the help of spirogram explain various lung volume and capacities.

Seat
No.

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL INSTRUMENTATION – I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The _____ of the patient' lungs is the ratio of volume delivered to the pressure rise during the inspiratory phase in the lungs.
 - a) mean airway pressure
 - b) airway resistance
 - c) tidal volume
 - d) compliance
- 2) Membrane oxygenators consist of a series of fine tubes which allow _____ of oxygen and carbon dioxide between the blood flowing through them
 - a) diffusion
 - b) concentration
 - c) collection
 - d) drifting
- 3) ELISA separates some component of the analytical reaction mixture by _____ certain components onto a solid phase which is physically immobilized.
 - a) refracting
 - b) adsorbing
 - c) absorbing
 - d) reserving
- 4) The spirometer is a mechanical _____ as the input is air flow and output is volume displacement.
 - a) differentiator
 - b) integrator
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- 5) The ratio of the radiant power transmitted by a sample to a radiant power incident on the sample is called _____.
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c) 200-500nm d) 250-500nm
- 10) Wavelength calibration of a spectrophotometer can be checked by using a _____ filter as a wavelength standard.
- a) tungsten b) ultraviolet
c) electromagnetic d) holmium oxide
- 11) The buffer of pH measurement is stored at temperature between _____ degree Celsius.
- a) 18 to 25 b) 19 to 25
c) 20 to 35 d) 15 to 20
- 12) The base of each audio logical examination is the determination of the hearing _____.
- a) intensity b) density
c) threshold d) loss
- 13) _____ noise is a noise containing all frequencies in the audible spectrum at approximately equal intensities.
- a) narrow band b) shot
c) white d) saw tooth
- 14) The bubble oxygenator has a sponge-like filter and reservoir to enable gaseous bubbles to be removed from the _____ before it is pumped back to the body.
- a) oxygenated blood b) deoxygenated blood
c) lungs d) respiratory track

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL INSTRUMENTATION – I

Day & Date: Friday, 06-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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c) collection d) drifting
- 12) ELISA separates some component of the analytical reaction mixture by _____ certain components onto a solid phase which is physically immobilized.
- a) refracting b) adsorbing
c) absorbing d) reserving
- 13) The spirometer is a mechanical _____ as the input is air flow and output is volume displacement.
- a) differentiator b) integrator
c) subtractor d) none of above
- 14) The ratio of the radiant power transmitted by a sample to a radiant power incident on the sample is called _____.
- a) absorbance b) beers law
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIO MEDICAL INSTRUMENTATION – I

Day & Date: Friday, 06-12-2019

Max. Marks: 56

Time: 02:30 PM To 05:30 PM

- Instructions:** 1) All questions are compulsory.
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Section – I

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 - b) With the help of block diagram explain working of anesthesia machine.
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOLOGICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Space charge neutrality is the representation of _____.
 a) diffusion & drift b) anion & cations
 c) cathode & anode d) model & object
- 2) _____ movements are very fast jump from one eye position to another.
 a) saccadic b) smooth pursuit
 c) vergence d) vestibular
- 3) In _____ movements eyes tracks moving objects.
 a) saccadic b) smooth pursuit
 c) vergence d) vestibular
- 4) In _____ movements angle between eyes changes.
 a) saccadic b) smooth pursuit
 c) vergence d) vestibular
- 5) _____ movement compensated head movements.
 a) saccadic b) smooth pursuit
 c) vergence d) vestibular
- 6) One ion equation is called as _____ equation.
 a) Donnan's b) Nernst
 c) Ohm's d) Fick's
- 7) Resting state of action potential starts from _____.
 a) -90mV b) -75mV
 c) +20mV d) +35mV
- 8) _____ produces 1000 watts.
 a) Cold b) Heat
 c) Warm d) Shivering
- 9) Models are simplified representation of _____.
 a) simulations b) objects
 c) systems d) none of above
- 10) Fick's law defines _____ process.
 a) diffusion b) drift
 c) ionization d) potential gradient

- 11) Ohms law defines _____ process.
- | | |
|--------------|--------------|
| a) diffusion | b) drift |
| c) current | d) potential |
- 12) Parkinson's occurs due to lack of _____.
- | | |
|----------|-------------|
| a) blood | b) oxygen |
| c) CSF | d) dopamine |
- 13) Stretch reflex is define as a controlling of load dynamic of _____.
- | | |
|------------|------------|
| a) muscles | b) Cells |
| c) CNS | d) tissues |
- 14) Einstein's relationship define relation between _____.
- | | |
|----------------------|--------------------|
| a) diffusion & drift | b) anion & cations |
| c) cathode & anode | d) model & object |

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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOLOGICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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Section – I

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- a) Explain with neat diagram electrode-electrolyte interface.
 - b) What is parallel conductance equation?
 - c) Derive cable equation.
 - d) Differentiate between Nernst and Donnan equation.
 - e) Explain different biophysics tools.
- Q.3 Attempt any two questions. 12**
- a) With the help of neat diagram explain electric model of cell membrane.
 - b) Explain Hodgkin Huxley model with necessary equations.
 - c) Differentiate between:
 - 1) compartmental and non compartmental modeling
 - 2) lumped and distributed parameter model

Section – II

- Q.4 Attempt any four questions. 16**
- a) Define active state tension and muscle tension.
 - b) Explain all 4 eye movements.
 - c) Explain insulin glucose feedback model.
 - d) Explain symptoms and causes of Parkinson's syndrome.
 - e) What are Glissades? Mention one example.
- Q.5 Attempt any two questions. 12**
- a) Draw and explain electrical model of thermoregulatory plant.
 - b) Explain the complete neuromuscular control system with all relevant blocks.
 - c) Explain working and significance of drug delivery system.

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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOLOGICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

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MCQ/Objective Type Questions

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Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

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a) diffusion & drift	b) anion & cations
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- 8) Space charge neutrality is the representation of _____.

a) diffusion & drift	b) anion & cations
c) cathode & anode	d) model & object
- 9) _____ movements are very fast jump from one eye position to another.

a) saccadic	b) smooth pursuit
c) vergence	d) vestibular
- 10) In _____ movements eyes tracks moving objects.

a) saccadic	b) smooth pursuit
c) vergence	d) vestibular

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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOLOGICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
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Section – I

- Q.2 Attempt any four questions. 16**
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOLOGICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ movement compensated head movements.
 - a) saccadic
 - b) smooth pursuit
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- 2) One ion equation is called as _____ equation.
 - a) Donnan's
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- 3) Resting state of action potential starts from _____.
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- 6) Fick's law defines _____ process.
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- 7) Ohms law defines _____ process.
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- 9) Stretch reflex is define as a controlling of load dynamic of _____.
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- 14) In _____ movements angle between eyes changes.
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOLOGICAL MODELING & SIMULATION

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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOLOGICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

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MCQ/Objective Type Questions

Duration: 30 Minutes

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Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) Fick's law defines _____ process.

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| a) simulations | b) objects |
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
BIOLOGICAL MODELING & SIMULATION

Day & Date: Monday, 09-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

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Section – I

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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSORS & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) Select the best description of read only memory _____.
 - a) Nonvolatile, used to store information that changes during system operation.
 - b) Nonvolatile, used to store information that does not changes during system operation.
 - c) Volatile, used to store information that changes during system operation.
 - d) Volatile, used to store information that does not changes during system operation.
- 2) In the memory hierarchy the fastest memory is _____.
 - a) SRAM
 - b) Cache
 - c) Register
 - d) DRAM
- 3) Length of the instruction POP D is _____.
 - a) 1 byte
 - b) 2 byte
 - c) 3 byte
 - d) 4 byte
- 4) In 8085 microprocessor system, with memory mapped I/O which of the following is true?
 - a) Devices have 8-bit address line.
 - b) Devices are accessed using IN and OUT instructions.
 - c) There can be maximum of 256 input devices and 256 output devices.
 - d) Arithmetic's and logical operation can be directly performed with the I/O data.
- 5) In synchronous data transfer type both transmitter and receiver will operate in _____.
 - a) Same clock pulse
 - b) Different clock pulse
 - c) Same or Different clock pulse
 - d) None
- 6) To put the 8085 microprocessor in the wait state _____.
 - a) Lower the HOLD input
 - b) Lower the READ input
 - c) Raise the HOLD input
 - d) Raise the READ input
- 7) The registers that are not accessible by the user are _____.
 - a) ACC and B reg.
 - b) IP and IE
 - c) IR
 - d) TMP1 and TMP2

- 8) Name the architecture and the instruction set of the microcontroller 8051 _____.
- a) Van- Neumann architecture with CISC instruction set
 - b) Van- Neumann architecture with RISC instruction set
 - c) Harvard architecture with CISC instruction set Software
 - d) Harvard architecture with RISC instruction set Software
- 9) Which of the following is an example of an input device?
- a) Scanner
 - b) Speaker
 - c) CD
 - d) Printer
- 10) How many interrupts are there in microcontroller 8051?
- a) 3
 - b) 6
 - c) 4
 - d) 5
- 11) How are the bits of register PSW affected if we select bank 2 of 8051?
- a) PSW.5 = 0 and PSW.4 = 1
 - b) PSW.2 = 0 and PSW.3 = 1
 - c) PSW.3 = 1 and PSW.4 = 1
 - d) PSW.3 = 0 and PSW.4 = 1
- 12) Which of the following comes under the indirect addressing mode?
- a) MOVX A, @DPTR
 - b) MOVC @A+DPTR
 - c) MOV A, R0
 - d) MOV @R0, A
- 13) Auto reload mode is allowed in which of the timer?
- a) Mode0
 - b) Mode1
 - c) Mode2
 - d) Mode3
- 14) To identify that which key is being pressed on key matrix, we used to _____.
- a) Ground all pins of the port at a time
 - b) Ground pins of the port one at a time
 - c) Connect all pins of the port to the main supply at a time
 - d) None

Seat No.	
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Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSORS & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Answer any four. **16**

- a) Explain different types of memory used in microprocessor.
- b) What is the function of ALE pin in 8085 microprocessor? Explain with its waveform.
- c) What is multiplexing? With neat dia. Explain demultiplexing of address and data lines.
- d) Draw the timing dia of MVI C, 88H.
- e) List and compare hardware and software interrupts.

Q.3 Answer any two. **12**

- a) Draw the neat schematic dia for the interface of 1K X 8 memory to 8085 microprocessor using 1K X 4 memory chips, Assume starting address is at C400H.
- b) With a neat block dia explain the architecture of 8085 microprocessor
- c) Explain the following.
 - 1) LHLD address
 - 2) CALL address
 - 3) RAL
 - 4) PISH Rp

Section – II

Q.4 Answer any four. **16**

- a) List and explain different data transfer techniques used.
- b) Interface 8051 to extend ROM and RAM. Explain how to access them.
- c) Explain the function of SCON register.
- d) Define the function of each flag bits of PSW of 8051.
- e) List and explain the different bit addressable SFR's available in 8051.

Q.5 Answer any two. **12**

- a) Distinguish counting and timing requirements. Explain the modes of operation of timer/counters of 8051 with dia.
- b) Define addressing mode? Explain different types of addressing modes with example.
- c) Interface a DAC to 8051 and write an ALP to generate staircase waveform.

- 8) Select the best description of read only memory _____.
- a) Nonvolatile, used to store information that changes during system operation.
 - b) Nonvolatile, used to store information that does not changes during system operation.
 - c) Volatile, used to store information that changes during system operation.
 - d) Volatile, used to store information that does not changes during system operation.
- 9) In the memory hierarchy the fastest memory is _____.
- a) SRAM
 - b) Cache
 - c) Register
 - d) DRAM
- 10) Length of the instruction POP D is _____.
- a) 1 byte
 - b) 2 byte
 - c) 3 byte
 - d) 4 byte
- 11) In 8085 microprocessor system, with memory mapped I/O which of the following is true?
- a) Devices have 8-bit address line.
 - b) Devices are accessed using IN and OUT instructions.
 - c) There can be maximum of 256 input devices and 256 output devices.
 - d) Arithmetic's and logical operation can be directly performed with the I/O data.
- 12) In synchronous data transfer type both transmitter and receiver will operate in _____.
- a) Same clock pulse
 - b) Different clock pulse
 - c) Same or Different clock pulse
 - d) None
- 13) To put the 8085 microprocessor in the wait state _____.
- a) Lower the HOLD input
 - b) Lower the READ input
 - c) Raise the HOLD input
 - d) Raise the READ input
- 14) The registers that are not accessible by the user are _____.
- a) ACC and B reg.
 - b) IP and IE
 - c) IR
 - d) TMP1 and TMP2

Seat No.	
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Set **Q**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSORS & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Answer any four. **16**

- a) Explain different types of memory used in microprocessor.
- b) What is the function of ALE pin in 8085 microprocessor? Explain with its waveform.
- c) What is multiplexing? With neat dia. Explain demultiplexing of address and data lines.
- d) Draw the timing dia of MVI C, 88H.
- e) List and compare hardware and software interrupts.

Q.3 Answer any two. **12**

- a) Draw the neat schematic dia for the interface of 1K X 8 memory to 8085 microprocessor using 1K X 4 memory chips, Assume starting address is at C400H.
- b) With a neat block dia explain the architecture of 8085 microprocessor
- c) Explain the following.
 - 1) LHLD address
 - 2) CALL address
 - 3) RAL
 - 4) PISH Rp

Section – II

Q.4 Answer any four. **16**

- a) List and explain different data transfer techniques used.
- b) Interface 8051 to extend ROM and RAM. Explain how to access them.
- c) Explain the function of SCON register.
- d) Define the function of each flag bits of PSW of 8051.
- e) List and explain the different bit addressable SFR's available in 8051.

Q.5 Answer any two. **12**

- a) Distinguish counting and timing requirements. Explain the modes of operation of timer/counters of 8051 with dia.
- b) Define addressing mode? Explain different types of addressing modes with example.
- c) Interface a DAC to 8051 and write an ALP to generate staircase waveform.

- 10) To identify that which key is being pressed on key matrix, we used to _____.
- a) Ground all pins of the port at a time
 - b) Ground pins of the port one at a time
 - c) Connect all pins of the port to the main supply at a time
 - d) None
- 11) Select the best description of read only memory _____.
- a) Nonvolatile, used to store information that changes during system operation.
 - b) Nonvolatile, used to store information that does not changes during system operation.
 - c) Volatile, used to store information that changes during system operation.
 - d) Volatile, used to store information that does not changes during system operation.
- 12) In the memory hierarchy the fastest memory is _____.
- a) SRAM
 - b) Cache
 - c) Register
 - d) DRAM
- 13) Length of the instruction POP D is _____.
- a) 1 byte
 - b) 2 byte
 - c) 3 byte
 - d) 4 byte
- 14) In 8085 microprocessor system, with memory mapped I/O which of the following is true?
- a) Devices have 8-bit address line.
 - b) Devices are accessed using IN and OUT instructions.
 - c) There can be maximum of 256 input devices and 256 output devices.
 - d) Arithmetic's and logical operation can be directly performed with the I/O data.

Seat No.	
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Set **R**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSORS & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Answer any four. **16**

- a) Explain different types of memory used in microprocessor.
- b) What is the function of ALE pin in 8085 microprocessor? Explain with its waveform.
- c) What is multiplexing? With neat dia. Explain demultiplexing of address and data lines.
- d) Draw the timing dia of MVI C, 88H.
- e) List and compare hardware and software interrupts.

Q.3 Answer any two. **12**

- a) Draw the neat schematic dia for the interface of 1K X 8 memory to 8085 microprocessor using 1K X 4 memory chips, Assume starting address is at C400H.
- b) With a neat block dia explain the architecture of 8085 microprocessor
- c) Explain the following.
 - 1) LHLD address
 - 2) CALL address
 - 3) RAL
 - 4) PISH Rp

Section – II

Q.4 Answer any four. **16**

- a) List and explain different data transfer techniques used.
- b) Interface 8051 to extend ROM and RAM. Explain how to access them.
- c) Explain the function of SCON register.
- d) Define the function of each flag bits of PSW of 8051.
- e) List and explain the different bit addressable SFR's available in 8051.

Q.5 Answer any two. **12**

- a) Distinguish counting and timing requirements. Explain the modes of operation of timer/counters of 8051 with dia.
- b) Define addressing mode? Explain different types of addressing modes with example.
- c) Interface a DAC to 8051 and write an ALP to generate staircase waveform.

Seat No.	
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Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSORS & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) How many interrupts are there in microcontroller 8051?
 - a) 3
 - b) 6
 - c) 4
 - d) 5
- 2) How are the bits of register PSW affected if we select bank 2 of 8051?
 - a) PSW.5 = 0 and PSW.4 = 1
 - b) PSW.2 = 0 and PSW.3 = 1
 - c) PSW.3 = 1 and PSW.4 = 1
 - d) PSW.3 = 0 and PSW.4 = 1
- 3) Which of the following comes under the indirect addressing mode?
 - a) MOVX A, @DPTR
 - b) MOVC @A+DPTR
 - c) MOV A, R0
 - d) MOV @R0, A
- 4) Auto reload mode is allowed in which of the timer?
 - a) Mode0
 - b) Mode1
 - c) Mode2
 - d) Mode3
- 5) To identify that which key is being pressed on key matrix, we used to _____.
 - a) Ground all pins of the port at a time
 - b) Ground pins of the port one at a time
 - c) Connect all pins of the port to the main supply at a time
 - d) None
- 6) Select the best description of read only memory _____.
 - a) Nonvolatile, used to store information that changes during system operation.
 - b) Nonvolatile, used to store information that does not changes during system operation.
 - c) Volatile, used to store information that changes during system operation.
 - d) Volatile, used to store information that does not changes during system operation.
- 7) In the memory hierarchy the fastest memory is _____.
 - a) SRAM
 - b) Cache
 - c) Register
 - d) DRAM
- 8) Length of the instruction POP D is _____.
 - a) 1 byte
 - b) 2 byte
 - c) 3 byte
 - d) 4 byte

- 9) In 8085 microprocessor system, with memory mapped I/O which of the following is true?
- a) Devices have 8-bit address line.
 - b) Devices are accessed using IN and OUT instructions.
 - c) There can be maximum of 256 input devices and 256 output devices.
 - d) Arithmetic's and logical operation can be directly performed with the I/O data.
- 10) In synchronous data transfer type both transmitter and receiver will operate in _____.
- a) Same clock pulse
 - b) Different clock pulse
 - c) Same or Different clock pulse
 - d) None
- 11) To put the 8085 microprocessor in the wait state _____.
- a) Lower the HOLD input
 - b) Lower the READ input
 - c) Raise the HOLD input
 - d) Raise the READ input
- 12) The registers that are not accessible by the user are _____.
- a) ACC and B reg.
 - b) IP and IE
 - c) IR
 - d) TMP1 and TMP2
- 13) Name the architecture and the instruction set of the microcontroller 8051 _____.
- a) Van- Neumann architecture with CISC instruction set
 - b) Van- Neumann architecture with RISC instruction set
 - c) Harvard architecture with CISC instruction set Software
 - d) Harvard architecture with RISC instruction set Software
- 14) Which of the following is an example of an input device?
- a) Scanner
 - b) Speaker
 - c) CD
 - d) Printer

Seat No.	
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Set **S**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
MICROPROCESSORS & MICROCONTROLLER

Day & Date: Wednesday, 11-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Answer any four. **16**

- a) Explain different types of memory used in microprocessor.
- b) What is the function of ALE pin in 8085 microprocessor? Explain with its waveform.
- c) What is multiplexing? With neat dia. Explain demultiplexing of address and data lines.
- d) Draw the timing dia of MVI C, 88H.
- e) List and compare hardware and software interrupts.

Q.3 Answer any two. **12**

- a) Draw the neat schematic dia for the interface of 1K X 8 memory to 8085 microprocessor using 1K X 4 memory chips, Assume starting address is at C400H.
- b) With a neat block dia explain the architecture of 8085 microprocessor
- c) Explain the following.
 - 1) LHLD address
 - 2) CALL address
 - 3) RAL
 - 4) PISH Rp

Section – II

Q.4 Answer any four. **16**

- a) List and explain different data transfer techniques used.
- b) Interface 8051 to extend ROM and RAM. Explain how to access them.
- c) Explain the function of SCON register.
- d) Define the function of each flag bits of PSW of 8051.
- e) List and explain the different bit addressable SFR's available in 8051.

Q.5 Answer any two. **12**

- a) Distinguish counting and timing requirements. Explain the modes of operation of timer/counters of 8051 with dia.
- b) Define addressing mode? Explain different types of addressing modes with example.
- c) Interface a DAC to 8051 and write an ALP to generate staircase waveform.

Seat No.	
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Set **P**

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATION

Day & Date: Thursday, 13-12-2019
 Time: 02:30 PM To 05:030 PM

Max. Marks: 70

Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) 100% modulation, the power in each sideband is _____ of that of carrier.
 - a) 50%
 - b) 40%
 - c) 60%
 - d) 25%
- 2) A high Q tuned circuit will permit an amplifier to have high _____.
 - a) Fidelity
 - b) Frequency range
 - c) Sensitivity
 - d) Selectivity
- 3) A 400 W carrier is amplitude modulated with $m = 0.75$. The total power in AM is _____.
 - a) 400W
 - b) 512W
 - c) 588W
 - d) 650W
- 4) The Superhetrodyne principle provides selectivity at _____ stage.
 - a) RF
 - b) IF
 - c) audio
 - d) Before RF
- 5) _____ FSK has no phase discontinuity.
 - a) Continuous FSK
 - b) Discrete FSK
 - c) Uniform FSK
 - d) None of the mentioned
- 6) The signal to quantization noise ratio of PCM system depends upon _____.
 - a) sampling rate
 - b) number of quantization levels
 - c) message signal bandwidth
 - d) noise
- 7) Quantization noise occurs in _____.
 - a) PCM
 - b) TDM
 - c) FDM
 - d) PWD
- 8) According to sampling theorem _____.
 - a) T_s is greater than $1/2f_m$
 - b) T_s is lesser than $1/2f_m$
 - c) T_s is equal to $1/2f_m$
 - d) T_s is lesser than or equal to $1/2f_m$
- 9) The amount of data transmitted for a given amount of time is called _____.
 - a) Bandwidth
 - b) Frequency
 - c) Noise
 - d) Signal power

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATION

Day & Date: Thursday, 13-12-2019
 Time: 02:30 PM To 05:030 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four **16**

- a) Explain noise factor and noise figure in communication system.
- b) Define AM and derive equation for it.
- c) A certain transmitter radiates 9kW with the carrier unmodulated and 10.125kW when the carrier is sinusoidal modulated. Calculate the modulation index. If another sine wave is Simultaneously transmitted with modulation index 0.4, determine the total radiated power.
- d) Explain Pre-emphasis and De-emphasis with necessary diagram.
- e) Derive formula for the instantaneous value of an FM voltage and define the modulation index.

Q.3 Attempt any two **12**

- a) Explain indirect method for FM generation in detail.
- b) Draw and explain block diagram of SSB generation using phase shift method to generate LSB.
- c) Explain working of high level modulated AM transmitter.

Section – II

Q.4 Attempt any four **16**

- a) Explain generation and detection of PPM in detail.
- b) Differentiate between TDM and FDM.
- c) Explain PWM generation with waveform.
- d) Differentiate between ASK and FSK.
- e) Define and explain Hamming codes and Convolution codes with an example.

Q.5 Attempt any two **12**

- a) Explain working of PCM-TDM system.
- b) State and explain sampling theorem and its types in detail.
- c) Explain direct and indirect method of PTM generation.

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATION

Day & Date: Thursday, 13-12-2019
 Time: 02:30 PM To 05:030 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) According to sampling theorem _____.
 - a) T_s is greater than $1/2f_m$
 - b) T_s is lesser than $1/2f_m$
 - c) T_s is equal to $1/2f_m$
 - d) T_s is lesser than or equal to $1/2f_m$
- 2) The amount of data transmitted for a given amount of time is called _____.
 - a) Bandwidth
 - b) Frequency
 - c) Noise
 - d) Signal power
- 3) The modulation technique that uses the minimum channel bandwidth and transmitted power is _____.
 - a) FM
 - b) DSB-SC
 - c) VSB
 - d) SSB
- 4) Bandwidth required in SSB-SC signal is (f_m is modulating frequency) _____.
 - a) $2f_m$
 - b) $< 2f_m$
 - c) $> 2f_m$
 - d) f_m
- 5) The modulation index when the un modulated carrier power is 15KW, and after modulation, carrier power is 17KW will be _____.
 - a) 68%
 - b) 51.63%
 - c) 82.58%
 - d) 34.66%
- 6) Analog signal may be converted into digital signal by _____.
 - a) Sampling
 - b) Amplitude modulation
 - c) Filtering
 - d) Mixing
- 7) M wave may be represented as $E(t) \cos \omega_c t$ where $E(t)$ is _____.
 - a) Envelope of the AM wave
 - b) Carrier signal
 - c) Amplitude of modulating signal
 - d) None of the above
- 8) 100% modulation, the power in each sideband is _____ of that of carrier.
 - a) 50%
 - b) 40%
 - c) 60%
 - d) 25%

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATION

Day & Date: Thursday, 13-12-2019
 Time: 02:30 PM To 05:030 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four** **16**
- a) Explain noise factor and noise figure in communication system.
 - b) Define AM and derive equation for it.
 - c) A certain transmitter radiates 9kW with the carrier unmodulated and 10.125kW when the carrier is sinusoidal modulated. Calculate the modulation index. If another sine wave is Simultaneously transmitted with modulation index 0.4, determine the total radiated power.
 - d) Explain Pre-emphasis and De-emphasis with necessary diagram.
 - e) Derive formula for the instantaneous value of an FM voltage and define the modulation index.
- Q.3 Attempt any two** **12**
- a) Explain indirect method for FM generation in detail.
 - b) Draw and explain block diagram of SSB generation using phase shift method to generate LSB.
 - c) Explain working of high level modulated AM transmitter.

Section – II

- Q.4 Attempt any four** **16**
- a) Explain generation and detection of PPM in detail.
 - b) Differentiate between TDM and FDM.
 - c) Explain PWM generation with waveform.
 - d) Differentiate between ASK and FSK.
 - e) Define and explain Hamming codes and Convolution codes with an example.
- Q.5 Attempt any two** **12**
- a) Explain working of PCM-TDM system.
 - b) State and explain sampling theorem and its types in detail.
 - c) Explain direct and indirect method of PTM generation.

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATION

Day & Date: Thursday, 13-12-2019
 Time: 02:30 PM To 05:030 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) _____ FSK has no phase discontinuity.
 - a) Continuous FSK
 - b) Discrete FSK
 - c) Uniform FSK
 - d) None of the mentioned
- 2) The signal to quantization noise ratio of PCM system depends upon _____.
 - a) sampling rate
 - b) number of quantization levels
 - c) message signal bandwidth
 - d) noise
- 3) Quantization noise occurs in _____.
 - a) PCM
 - b) TDM
 - c) FDM
 - d) PWD
- 4) According to sampling theorem _____.
 - a) T_s is greater than $1/2f_m$
 - b) T_s is lesser than $1/2f_m$
 - c) T_s is equal to $1/2f_m$
 - d) T_s is lesser than or equal to $1/2f_m$
- 5) The amount of data transmitted for a given amount of time is called _____.
 - a) Bandwidth
 - b) Frequency
 - c) Noise
 - d) Signal power
- 6) The modulation technique that uses the minimum channel bandwidth and transmitted power is _____.
 - a) FM
 - b) DSB-SC
 - c) VSB
 - d) SSB
- 7) Bandwidth required in SSB-SC signal is (f_m is modulating frequency) _____.
 - a) $2f_m$
 - b) $< 2f_m$
 - c) $> 2f_m$
 - d) f_m
- 8) The modulation index when the un modulated carrier power is 15KW, and after modulation, carrier power is 17KW will be _____.
 - a) 68%
 - b) 51.63%
 - c) 82.58%
 - d) 34.66%
- 9) Analog signal may be converted into digital signal by _____.
 - a) Sampling
 - b) Amplitude modulation
 - c) Filtering
 - d) Mixing

- 10) M wave may be represented as $E(t) \cos \omega_c t$ where $E(t)$ is _____.
- a) Envelope of the AM wave
 - b) Carrier signal
 - c) Amplitude of modulating signal
 - d) None of the above
- 11) 100% modulation, the power in each sideband is _____ of that of carrier.
- a) 50%
 - b) 40%
 - c) 60%
 - d) 25%
- 12) A high Q tuned circuit will permit an amplifier to have high _____.
- a) Fidelity
 - b) Frequency range
 - c) Sensitivity
 - d) Selectivity
- 13) A 400 W carrier is amplitude modulated with $m = 0.75$. The total power in AM is _____.
- a) 400W
 - b) 512W
 - c) 588W
 - d) 650W
- 14) The Superhetrodyne principle provides selectivity at _____ stage.
- a) RF
 - b) IF
 - c) audio
 - d) Before RF

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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATION

Day & Date: Thursday, 13-12-2019
 Time: 02:30 PM To 05:030 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

- Q.2 Attempt any four** **16**
- a) Explain noise factor and noise figure in communication system.
 - b) Define AM and derive equation for it.
 - c) A certain transmitter radiates 9kW with the carrier unmodulated and 10.125kW when the carrier is sinusoidal modulated. Calculate the modulation index. If another sine wave is Simultaneously transmitted with modulation index 0.4, determine the total radiated power.
 - d) Explain Pre-emphasis and De-emphasis with necessary diagram.
 - e) Derive formula for the instantaneous value of an FM voltage and define the modulation index.
- Q.3 Attempt any two** **12**
- a) Explain indirect method for FM generation in detail.
 - b) Draw and explain block diagram of SSB generation using phase shift method to generate LSB.
 - c) Explain working of high level modulated AM transmitter.

Section – II

- Q.4 Attempt any four** **16**
- a) Explain generation and detection of PPM in detail.
 - b) Differentiate between TDM and FDM.
 - c) Explain PWM generation with waveform.
 - d) Differentiate between ASK and FSK.
 - e) Define and explain Hamming codes and Convolution codes with an example.
- Q.5 Attempt any two** **12**
- a) Explain working of PCM-TDM system.
 - b) State and explain sampling theorem and its types in detail.
 - c) Explain direct and indirect method of PTM generation.

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATION

Day & Date: Thursday, 13-12-2019
 Time: 02:30 PM To 05:030 PM

Max. Marks: 70

- Instructions:** 1) Q.No.1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The modulation technique that uses the minimum channel bandwidth and transmitted power is _____.
 a) FM
 b) DSB-SC
 c) VSB
 d) SSB
- 2) Bandwidth required in SSB-SC signal is (f_m is modulating frequency) _____.
 a) $2f_m$
 b) $< 2f_m$
 c) $> 2f_m$
 d) f_m
- 3) The modulation index when the un modulated carrier power is 15KW, and after modulation, carrier power is 17KW will be _____.
 a) 68%
 b) 51.63%
 c) 82.58%
 d) 34.66%
- 4) Analog signal may be converted into digital signal by _____.
 a) Sampling
 b) Amplitude modulation
 c) Filtering
 d) Mixing
- 5) M wave may be represented as $E(t) \cos \omega_c t$ where $E(t)$ is _____.
 a) Envelope of the AM wave
 b) Carrier signal
 c) Amplitude of modulating signal
 d) None of the above
- 6) 100% modulation, the power in each sideband is _____ of that of carrier.
 a) 50%
 b) 40%
 c) 60%
 d) 25%
- 7) A high Q tuned circuit will permit an amplifier to have high _____.
 a) Fidelity
 b) Frequency range
 c) Sensitivity
 d) Selectivity
- 8) A 400 W carrier is amplitude modulated with $m = 0.75$. The total power in AM is _____.
 a) 400W
 b) 512W
 c) 588W
 d) 650W
- 9) The Superhetrodyne principle provides selectivity at _____ stage.
 a) RF
 b) IF
 c) Audio
 d) Before RF

- 10) _____ FSK has no phase discontinuity.
- a) Continuous FSK
 - b) Discrete FSK
 - c) Uniform FSK
 - d) None of the mentioned
- 11) The signal to quantization noise ratio of PCM system depends upon _____.
- a) sampling rate
 - b) number of quantization levels
 - c) message signal bandwidth
 - d) noise
- 12) Quantization noise occurs in _____.
- a) PCM
 - b) TDM
 - c) FDM
 - d) PWD
- 13) According to sampling theorem _____.
- a) T_s is greater than $1/2f_m$
 - b) T_s is lesser than $1/2f_m$
 - c) T_s is equal to $1/2f_m$
 - d) T_s is lesser than or equal to $1/2f_m$
- 14) The amount of data transmitted for a given amount of time is called _____.
- a) Bandwidth
 - b) Frequency
 - c) Noise
 - d) Signal power

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
PRINCIPLES OF COMMUNICATION

Day & Date: Thursday, 13-12-2019
 Time: 02:30 PM To 05:030 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four **16**

- a) Explain noise factor and noise figure in communication system.
- b) Define AM and derive equation for it.
- c) A certain transmitter radiates 9kW with the carrier unmodulated and 10.125kW when the carrier is sinusoidal modulated. Calculate the modulation index. If another sine wave is Simultaneously transmitted with modulation index 0.4, determine the total radiated power.
- d) Explain Pre-emphasis and De-emphasis with necessary diagram.
- e) Derive formula for the instantaneous value of an FM voltage and define the modulation index.

Q.3 Attempt any two **12**

- a) Explain indirect method for FM generation in detail.
- b) Draw and explain block diagram of SSB generation using phase shift method to generate LSB.
- c) Explain working of high level modulated AM transmitter.

Section – II

Q.4 Attempt any four **16**

- a) Explain generation and detection of PPM in detail.
- b) Differentiate between TDM and FDM.
- c) Explain PWM generation with waveform.
- d) Differentiate between ASK and FSK.
- e) Define and explain Hamming codes and Convolution codes with an example.

Q.5 Attempt any two **12**

- a) Explain working of PCM-TDM system.
- b) State and explain sampling theorem and its types in detail.
- c) Explain direct and indirect method of PTM generation.

- 9) _____ is the nature of Fourier representation of a discrete & aperiodic signal.
- a) Continuous & periodic b) Discrete and aperiodic
c) Continuous & aperiodic d) Discrete & periodic
- 10) _____ is the ROC defined or specified for the signals containing causal as well as anti-causal terms.
- a) Greater than the largest pole b) Less than the smallest pole
c) Between two poles d) Cannot be defined
- 11) _____ theorem states that the total average power of a periodic signal is equal to the sum of average powers of the individual fourier coefficients.
- a) Parseval's Theorem b) Rayleigh's Theorem
c) Both a & b d) None of the above
- 12) The ROC of sequence in the Z.T. of sequence $x[n] = a^n U[n]$ is _____.
- a) $z > a$ b) $z < a$
c) $|z| > a$ d) $|z| < a$
- 13) _____ mathematical notation specifies the condition of periodicity for a continuous time signal.
- a) $x(t) = x(t + T_0)$ b) $x(n) = x(n + N)$
c) $x(t) = e^{-\alpha t}$ d) None of these
- 14) The signal defined by the equations $f(t) = 0$ for $t < 0$, $f(t) = E$ for $0 \leq t \leq \alpha$ and $f(t) = 0$ for $t > \alpha$ is _____.
- a) a step function b) a impulse function
c) Shifted step function d) a ramp function

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEM

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Figures to the right indicates full marks.
 2) Assume suitable data wherever necessary.
 3) All questions are compulsory.

Section – I

Q.2 Attempt any four questions.

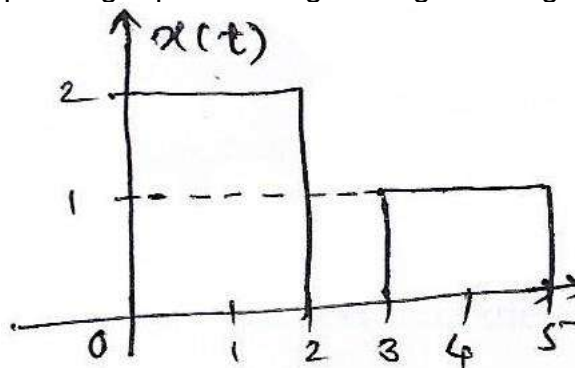
16

- Prove that the product of two even or odd signals is an even signal and that of the product of an even function and odd function is an odd function.
- Define energy signal and power signal and identify whether the following signals are energy or power signals.
 - $e^{\alpha t}, \alpha > 1$
 - $e^{-2j\pi ft}$
- Determine the even and odd components of given signals:
 - $x(t) = \sin \left[w.t + \frac{\pi}{4} \right]$
 - $x(t) = u(t)$
- What is meant by sampling? State the sampling theorem.
- Prove that the following systems are nonlinear and time invariant.
 - $y(n) - x(n) y(n-1) = x(n)$
 - $y(n+2) + 2y(n) = x(n+1) + 2$

Q.3 Attempt any two questions.

12

- Express the given sequence in terms of unit step response for $x[n] = \{1, 3, -2, 4\}, 0 \leq n \leq 3$.
- Define following properties with an example.
 - Deterministic and Non deterministic signals.
 - Causal and non causal signal
- Derive the corresponding equation for given signal using unit step function.



Section – II

Q.4 Attempt any four questions. **16**

- a) Determine the output response of low pass RC network due to an input $x(t) = te^{-t/RC}$ by convolution method.
- b) Find the Z transform of $x(n) = 2^n u(n - 2)$
- c) Derive time shifting and frequency shifting property of fourier transform.
- d) State and explain Parseval's theorem with an example.
- e) Determine the fourier transform of $x(t) = 1$ for $-1 \leq t \leq 1$, and for other values of t. Also plot the magnitude spectrum.

Q.5 Attempt any two questions. **12**

- a) Find the convolution of $x(n) = [1,2,3,4,5]$ with $h(n) = [1,2,3,3,2,1]$ by using both the matrix and multiplication methods.
- b) Find the Z transform of given signal with the help of linearity and shifting properties.

$$x(n) = \begin{cases} 1 & \text{for } 0 \leq n \leq N - 1 \\ 0 & \text{else where} \end{cases}$$

- c) Find inverse Z transform of following functions under different ROC conditions.

$$x(z) = \frac{1}{\left(1 - \frac{1}{4}z^{-1}\right)} + \frac{2}{\left(1 - \frac{1}{3}z^{-1}\right)}$$

Seat
No.

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEM

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) _____ is the possible range of frequency spectrum for discrete time fourier series (DTFS).
 - a) 0 to 2π
 - b) $-\pi$ to $+\pi$
 - c) Both a & b
 - d) None of the above
- 2) _____ is the nature of Fourier representation of a discrete & aperiodic signal.
 - a) Continuous & periodic
 - b) Discrete and aperiodic
 - c) Continuous & aperiodic
 - d) Discrete & periodic
- 3) _____ is the ROC defined or specified for the signals containing causal as well as anti-causal terms.
 - a) Greater than the largest pole
 - b) Less than the smallest pole
 - c) Between two poles
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- 4) _____ theorem states that the total average power of a periodic signal is equal to the sum of average powers of the individual fourier coefficients.
 - a) Parseval's Theorem
 - b) Rayleigh's Theorem
 - c) Both a & b
 - d) None of the above
- 5) The ROC of sequence in the Z.T. of sequence $x[n] = a^n U[n]$ is _____.
 - a) $z > a$
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 - d) $|z| < a$
- 6) _____ mathematical notation specifies the condition of periodicity for a continuous time signal.
 - a) $x(t) = x(t + T_0)$
 - b) $x(n) = x(n + N)$
 - c) $x(t) = e^{-\alpha t}$
 - d) None of these
- 7) The signal defined by the equations $f(t) = 0$ for $t < 0$, $f(t) = E$ for $0 \leq t \leq \alpha$ and $f(t) = 0$ for $t > \alpha$ is _____.
 - a) a step function
 - b) a impulse function
 - c) Shifted step function
 - d) a ramp function
- 8) All causal systems must have the component of _____.
 - a) memory
 - b) time invariance
 - c) stability
 - d) linearity

- 9) A system produces zero output for one input and same gives the same output for several other inputs. This system is called as _____.
- a) Non - invertible System b) Invertible system
c) Non-causal system d) Causal system
- 10) The fundamental period of the signal: $\sin 60t$ is _____.
- a) 1/60 sec b) 1/30 sec
c) 1/20 sec d) 1/10 sec
- 11) The power of the signal: $x(t) = \cos(t)$ is _____.
- a) 1/2 b) 1
c) 3/2 d) 2
- 12) A signal is anti-causal if _____.
- a) $x(t) = 0$ for $t = 0$ b) $x(t) = 1$ for $t < 0$
c) $x(t) = 1$ for $t > 0$ d) $x(t) = 0$ for $t > 0$
- 13) An energy signal has $G(f)=10$. Its energy density spectrum is _____.
- a) 10 b) 100
c) 50 d) 20
- 14) A LTI system is said to be initially relaxed system only if _____.
- a) zero input produces zero output
b) zero input produces non-zero output
c) zero input produces an output equal to unity
d) none of these

Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEM

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Figures to the right indicates full marks.
 2) Assume suitable data wherever necessary.
 3) All questions are compulsory.

Section – I

Q.2 Attempt any four questions.

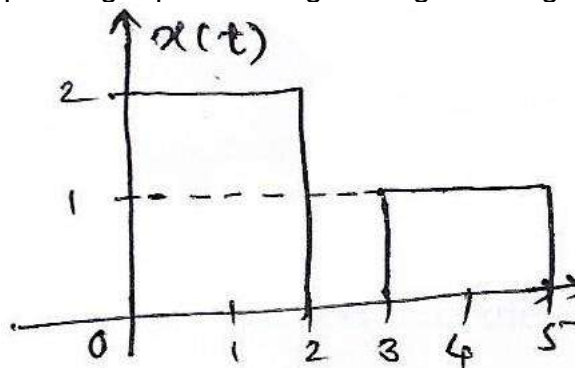
16

- a) Prove that the product of two even or odd signals is an even signal and that of the product of an even function and odd function is an odd function.
- b) Define energy signal and power signal and identify whether the following signals are energy or power signals.
 - 1) $e^{\alpha t}, \alpha > 1$
 - 2) $e^{-2j\pi ft}$
- c) Determine the even and odd components of given signals:
 - 1) $x(t) = \sin \left[w.t + \frac{\pi}{4} \right]$
 - 2) $x(t) = u(t)$
- d) What is meant by sampling? State the sampling theorem.
- e) Prove that the following systems are nonlinear and time invariant.
 - 1) $y(n) - x(n) y(n-1) = x(n)$
 - 2) $y(n+2) + 2y(n) = x(n+1) + 2$

Q.3 Attempt any two questions.

12

- a) Express the given sequence in terms of unit step response for $x[n] = \{1, 3, -2, 4\}, 0 \leq n \leq 3$.
- b) Define following properties with an example.
 - 1) Deterministic and Non deterministic signals.
 - 2) Causal and non causal signal
- c) Derive the corresponding equation for given signal using unit step function.



Section – II

Q.4 Attempt any four questions. **16**

- a) Determine the output response of low pass RC network due to an input $x(t) = te^{-t/RC}$ by convolution method.
- b) Find the Z transform of $x(n) = 2^n u(n - 2)$
- c) Derive time shifting and frequency shifting property of fourier transform.
- d) State and explain Parseval's theorem with an example.
- e) Determine the fourier transform of $x(t) = 1$ for $-1 \leq t \leq 1$, and for other values of t. Also plot the magnitude spectrum.

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- a) Find the convolution of $x(n) = [1,2,3,4,5]$ with $h(n) = [1,2,3,3,2,1]$ by using both the matrix and multiplication methods.
- b) Find the Z transform of given signal with the help of linearity and shifting properties.

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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEM

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) A signal is anti-causal if _____.
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- 8) The ROC of sequence in the Z.T. of sequence $x[n] = a^n U[n]$ is _____.
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEM

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Figures to the right indicates full marks.
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Section – I

Q.2 Attempt any four questions.

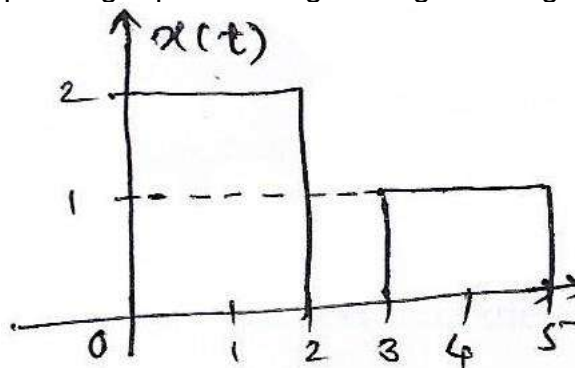
16

- a) Prove that the product of two even or odd signals is an even signal and that of the product of an even function and odd function is an odd function.
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 - 2) $y(n+2) + 2y(n) = x(n+1) + 2$

Q.3 Attempt any two questions.

12

- a) Express the given sequence in terms of unit step response for $x[n] = \{1, 3, -2, 4\}, 0 \leq n \leq 3$.
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- c) Derive the corresponding equation for given signal using unit step function.



Section – II

Q.4 Attempt any four questions. **16**

- a) Determine the output response of low pass RC network due to an input $x(t) = te^{-t/RC}$ by convolution method.
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Seat No.	
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T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEM

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

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Seat
No.

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
SIGNALS & SYSTEM

Day & Date: Monday, 16-12-2019
 Time: 02:30 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) Figures to the right indicates full marks.
 2) Assume suitable data wherever necessary.
 3) All questions are compulsory.

Section – I

Q.2 Attempt any four questions.

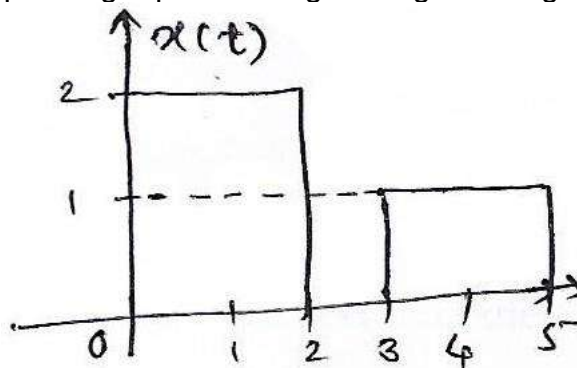
16

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Q.3 Attempt any two questions.

12

- a) Express the given sequence in terms of unit step response for $x[n] = \{1, 3, -2, 4\}, 0 \leq n \leq 3$.
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Section – II

Q.4 Attempt any four questions. **16**

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- e) Determine the fourier transform of $x(t) = 1$ for $-1 \leq t \leq 1$, and for other values of t. Also plot the magnitude spectrum.

Q.5 Attempt any two questions. **12**

- a) Find the convolution of $x(n) = [1,2,3,4,5]$ with $h(n) = [1,2,3,3,2,1]$ by using both the matrix and multiplication methods.
- b) Find the Z transform of given signal with the help of linearity and shifting properties.

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