L^{-1} {	$\tan^{-1}(s)$ =		
a)	cost	b)	-t cost
c)	$\frac{t}{-\sin t}$	d)	$t \sin t$
$L\{t^2$	f(t) is		2
a)	$\frac{d}{ds}[f(s)]$	b)	$\frac{-d^2}{ds^2}[f(s)]$
c)	$\frac{d}{ds}[f(s)]^2$	d)	$\frac{d^2}{ds^2}[f(s)]$

Cosine terms

Cosine terms

None

None

1

2 2

1) a) 0 b) 2π c) π d) None 2) In fourier series f(x) = x for $(-\pi, \pi)$ which terms are absent _____. a) Sine terms b) Cosine terms None

S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **Bio-Medical Engineering ENGINEERING MATHEMATICS – III**

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

MCQ/Objective Type Questions

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

The period of |*sinx*| is _____.

2) Figures to right indicate full marks.

c) Neither of terms d)

If $f(x) = x^2$ in $(-\pi, \pi)$, then Fourier series of f(x) contains _____. 3)

- a) Only sine terms b) Only cosine terms None
 - c) Both sine and cosine terms d)

Fourier Expansion of an even function in the range $(-\pi, \pi)$ has only 4)

Fourier Series Expansion of an odd function has only terms.

b)

d)

b)

d)

a) Sine terms

a) 1

c) 0

c) Both sine and cosine

L.T. of $\int_0^\infty e^{-t} \sin t \, dt$ is _____.

5)

6)

7)

8)

Day & Date: Saturday, 07-12-2019

book.

Time: 10:00 AM To 01:00 PM

Duration: 30 Minutes

ns b) c) Both sine and cosine d)

Page 1 of 12

SLR-FM-460

Set

Max. Marks: 70

Marks: 14

14

Seat No.

Q.1

				Set	Ρ
9)	$L^{-1}\left\{\frac{2S^3+13S}{(S^2+3)(S^2+4)}\right\}$ is				
	a) $\cos 3t + \cos 2t$ c) $\sin 3t - \sin 2t$	b) d)	$\cos 3t - \cos 2t$ sin3t + sin2t		
10)	If $f(z) = u + iv$ is an Analytic function	on the	en $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		
11)	If the function $2x + x^2 + \alpha y^2$ is to be	Harm	nonic then value of α		
,	a) -1	b)	1	-	
	c) 2	d)	None		
12)	The value of $\int_{0}^{1+i} z^2 dz$ along $y = x$ is	5			
	a) $\frac{2}{3}(-1+i)$	b)	$\frac{2}{3}(-1-i)$		
	c) $\frac{2}{3}(1+i)$	d)	None		
13)	The fixed points of mapping $w = \frac{3z+z}{z+z}$	$\frac{4}{5}$ are			
	a) 2, 2	b)	2, -2		
	c) -2, 2	d)	None		
14)	The is Analytic function.				
	a) $f(z) = \sin z$	b)	f(z) = z		

c) f(z) = Im(z) d) R(iz)

SLR-FM-460

Seat
No.S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – IIIDay & Date: Saturday, 07-12-2019MaxTime: 10:00 AM To 01:00 PMMaxInstructions: 1) All Questions are compulsory.
2) Figures to right indicate full marks.Section – IQ.2 Attempt any four
a) Find Laplace transform of
$$\left\{e^{-4t}\int_0^t t \cdot \sin 3t \, dt\right\}$$

b) Find Laplace transform of $\left\{\frac{t.\sinh at}{a}\right\}$.

d) Find Laplace transform of $\{e^{-3t}sin^2t\}$

c) Find Laplace transform of $\left\{\frac{1-\cos t}{t^2}\right\}$.

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

a) Solve by using $L.T.\frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t}sint$ 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| = 1ii) |Z| = 1

Section – II

Q.4 Attempt any four

- a) Obtain Fourier series of $f(x) = (x^2) \pi \le x \le \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$
- **b)** Find Half Range Fourier Series for f(x) = x, 0 < x < 2 hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \cdots$
- c) Find Half Rage 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| = 1e) Evaluate $\int_C (z + z^2) dz$, where 'C' is the upper arc of circle |z| = 1

Q.5 Attempt any two

- **a)** Find Fourier Series for $f(x) = x^3$ in the rage $(-\pi, \pi)$.
- **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

SLR-FM-460

Set

Max. Marks: 56

12

16

16

		indico		Widilite	
Cho	ose	the correct alternatives from th	e opt	ions and rewrite the sentence.	14
1)	L{t	f(t) is		-2	
	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^{-2}	$1\left\{\frac{2S^3+13S}{(S^2+3)(S^2+4)}\right\} \text{ is } __\$			
	a)	$\cos 3t + \cos 2t$	b)	$\cos 3t - \cos 2t$	
	C)	sin3t – sin2t	d)	sin3t + sin2t	
3)	lf j	f(z) = u + iv is an Analytic function	on the	en $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)	lf tł	The function $2x + x^2 + \alpha y^2$ is to be	Harn	nonic then value of α	
	a)	-1	b)	1	
	C)	2	d)	None	
5)	The	e value of $\int_{0}^{1+i} z^2 dz$ along $y = x$ is	5		
	a)	$\frac{2}{3}(-1+i)$	b)	$\frac{2}{3}(-1-i)$	
	c)	$\frac{2}{3}(1+i)$	d)	None	
6)	The	e fixed points of mapping $w = \frac{3z}{z}$	-4 		
	a)	2. 2	ь b)	22	
	c)	-2, 2	d)	None	

f(z) = z

R(iz)

None

2π

b)

d)

b)

d)

The _____ is Analytic function.

The period of |*sinx*| is _____.

a) $f(z) = \sin z$

f(z) = Im(z)

a) 0

C) π

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

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

MCQ/Objective Type Questions

Duration: 30 Minutes

7)

8)

Seat

No.

Q.1

2) Figures to right indicate full marks.

SLR-FM-460

Max. Marks: 70

Marks: 14

Set

			SLR-FM	 -4 (60
			Se	et	Q
9)	In fourier series $f(x) = x$ for $(-\pi, \pi)$ a) Sine terms c) Neither of terms) whic b) d)	h terms are absent Cosine terms None		
10)	If $f(x) = x^2$ in $(-\pi, \pi)$, then Fourier a) Only sine terms c) Both sine and cosine terms	series b) d)	s of $f(x)$ contains Only cosine terms None		
11)	Fourier Expansion of an even function	on in t	he range $(-\pi,\pi)$ has only		
	a) Sine terms c) Both sine and cosine	b) d)	Cosine terms None		
12)	Fourier Series Expansion of an odda) Sine termsc) Both sine and cosine	functi b) d)	on has only terms. Cosine terms None		
13)	L.T. of $\int_0^\infty e^{-t} \sin t dt$ is				
	a) 1	b)	$\frac{1}{2}$		
	c) 0	d)	2		
14)	$L^{-1}\{\tan^{-1}(s)\} = $ a) $\frac{cost}{t}$	b)	-t cost		
	c) $\frac{-\sin t}{t}$	d)	t sin t		

S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III
Day & Date: Saturday, 07-12-2019 Max. Ma
Time: 10:00 AM To 01:00 PM
Instructions: 1) All Questions are compulsory.
2) Figures to right indicate full marks.
Section – I
Q.2 Attempt any four
a) Find Laplace transform of
$$\{e^{-4t} \int_0^t t \cdot \sin 3t \, dt\}$$

b) Find Laplace transform of $\{\frac{1-\cos t}{2a}\}$.
c) Find Laplace transform of $\{\frac{1-\cos t}{t^2}\}$.
d) Find Laplace transform of $\{e^{-3t} sin^2 t\}$
e) Find K such that the function $f(z) = e^x cosy + ie^x sin ky$ is analytic.
Q.3 Attempt any two
a) Solve by using $L.T.\frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t}sint$ and $y(0) = 0$, $y'(0) = 1$.
b) Find $L^{-1}\{\frac{1}{(s+1)(s^2+1)}\}$ 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
a) Obtain Fourier series of $f(x) = (x^2) -\pi \le x \le \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$

Find Half Range Fourier Series for f(x) = x, 0 < x < 2 hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \cdots$ D)

c) Find Half Rage 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

Seat

No.

- a) Find Fourier Series for $f(x) = x^3$ in the rage $(-\pi, \pi)$. 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

arks: 56

16

12

16

12

SLR-FM-460

Set

Q

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

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

Seat

No.

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

t

- Fourier Series Expansion of an odd function has only _____ terms. 1)
 - a) Sine terms Cosine terms b) c) Both sine and cosine d) None
- L.T. of $\int_0^\infty e^{-t} \sin t \, dt$ is _____. 2) $\frac{1}{2}$ a) 1 b) 2 c) 0 d) $L^{-1}\{\tan^{-1}(s)\} = ____.$ a) cost 3) b) -t cost

c)
$$\frac{t}{t}$$
 d) $t \sin t$

4)
$$L\{t^2f(t)\} \text{ is } ___.$$

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) $L^{-1}\left\{\frac{2S^3+13S}{(S^2+3)(S^2+4)}\right\} \text{ is } ___.$

a)
$$\cos 3t + \cos 2t$$

c) $\sin 3t - \sin 2t$
b) $\cos 3t - \cos 2t$
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

If the function $2x + x^2 + \alpha y^2$ is to be Harmonic then value of α _____. 7)

a) -1 b) 1

c) 2 d) None Set R

Max. Marks: 70

14

Marks: 14

				Set	R
8)	The value of $\int_0^{1+i} z^2 dz$ along $y = x$ is	5			
	a) $\frac{2}{3}(-1+i)$	b)	$\frac{2}{3}(-1-i)$		
	c) $\frac{2}{3}(1+i)$	d)	None		
9)	The fixed points of mapping $w = \frac{3z+z}{z+z}$	$\frac{4}{5}$ are			
	a) 2, 2 c) -2, 2	b) d)	2, -2 None		
10)	The is Analytic function. a) $f(z) = sin z$ c) $f(z) = Im(z)$	b) d)	f(z) = z $R(iz)$		
11)	The period of <i>sinx</i> is a) 0 c) π	b) d)	2π None		
12)	In fourier series $f(x) = x$ for $(-\pi, \pi)$ a) Sine terms c) Neither of terms	whic b) d)	h terms are absent Cosine terms None		
13)	If $f(x) = x^2$ in $(-\pi, \pi)$, then Fourier a) Only sine terms c) Both sine and cosine terms	series b) d)	s of $f(x)$ contains Only cosine terms None		
14)	Fourier Expansion of an even function	on in t	he range $(-\pi,\pi)$ has only		
	a) Sine terms	b)	Cosine terms		

- c) Both sine and cosine
- d) None

Seat
No.SNo.S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – IIIDay & Date: Saturday, 07-12-2019Max. MDay & Date: Saturday, 07-12-2019Max. MTime: 10:00 AM To 01:00 PMMax. MInstructions: 1) All Questions are compulsory.
2) Figures to right indicate full marks.
Section – IMax. MQ.2 Attempt any four
a) Find Laplace transform of
$$\left\{e^{-4t}\int_0^t t \cdot \sin 3t \, dt\right\}$$

b) Find Laplace transform of $\left\{\frac{t.sinh at}{2a}\right\}$.
c) Find Laplace transform of $\left\{\frac{1-\cos t}{t^2}\right\}$.
d) Find Laplace transform of $\left\{e^{-3t}sin^2t\right\}$
e) Find K such that the function $f(z) = e^x cosy + ie^x sin ky$ is analytic.Q.3 Attempt any two

Q

a) Solve by using $L.T.\frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t}sint$ 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) |Z - 2| = 1i) ii) |Z| = 1

Section – II

Q.4 Attempt any four

- a) Obtain Fourier series of $f(x) = (x^2) \pi \le x \le \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{2^2} + \frac{1}{4^2} + \cdots$
- **b)** Find Half Range Fourier Series for f(x) = x, 0 < x < 2 hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \cdots$
- Find Half Rage Fourier series of f(x) = x(2 x) in 0 < x < 2C)
- d) Find $\oint_{C} \log z \, dz$ where C is the circle |Z| = 1Evaluate $\int_{C} (z + z^2) dz$, where 'C' is the upper arc of circle |z| = 1e)

Attempt any two Q.5

- a) Find Fourier Series for $f(x) = x^3$ in the rage $(-\pi, \pi)$. 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

SLR-FM-460

/larks: 56

12

16

16

Set S

Max. Marks: 70

Marks: 14

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

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

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

1)	If $f(z) = u + iv$ is an Analytic function	on the	en $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
2)	If the function $2x + x^2 + \alpha y^2$ is to be	Harn	nonic 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	s	
	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 $w = \frac{3z+z}{z+z}$	$\frac{4}{5}$ 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) $f(z) = Im(z)$	d)	R(iz)
6)	The period of <i>sinr</i> is		
0)	a) 0	b)	2π
	$C) \pi$	d)	None
7)	In fourier parises $f(x) = x$ for $(x = x)$	un hie	b terme are abaant
1)	in rouner series $f(x) = x$ for $(-1, 1)$	b)	Cosine terms
	c) Neither of terms	d)	None
0)		u)	
8)	If $f(x) = x^2$ in $(-\pi, \pi)$, then Fourier	serie	s of $f(x)$ contains
	a) Unly sine terms	(a	Uniy cosine terms
	both sine and cosine terms	u)	INDITE

Seat No.

					Set	S
9)	Fourier E	xpansion of an even functi	on in	the range $(-\pi,\pi)$ has only		
	a) Sine c) Both	terms sine and cosine	b) d)	Cosine terms None		
10)	Fourier S a) Sine c) Both	eries Expansion of an odd terms sine and cosine	functi b) d)	on has only terms. Cosine terms None		
11)	L.T. of ∫ ₀ a) 1	$^{\infty}e^{-t}$ sint dt is	b)	$\frac{1}{2}$		
	c) 0		d)	2		
12)	$\frac{L^{-1}\{\tan^{-1} \\ a\}}{\frac{cost}{t}}$	(<i>s</i>)} =	b)	-t cost		
	c) $\frac{-\sin t}{t}$	-	d)	$t \sin t$		
13)	$L\{t^2 f(t)\}$ a) $\frac{d}{ds}[f]$	is (s)]	b)	$\frac{-d^2}{ds^2}[f(s)]$		
	c) $\frac{d}{ds}[f]$	$(s)]^2$	d)	$\frac{d^2}{ds^2}[f(s)]$		
14)	$L^{-1}\left\{\frac{2S}{(S^2+1)}\right\}$	$\left\{\frac{3^{3}+13S}{3(S^{2}+4)}\right\}$ is				
	a) cos 3c) sin3t	t + cos 2t — sin2t	b) d)	$\cos 3t - \cos 2t$ sin3t + sin2t		

No.
S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – III
Day & Date: Saturday, 07-12-2019 Max. M
Time: 10:00 AM To 01:00 PM
Instructions: 1) All Questions are compulsory.
2) Figures to right indicate full marks.
Section – I
Q.2 Attempt any four
a) Find Laplace transform of
$$\{e^{-4t} \int_0^t t \cdot \sin 3t \, dt\}$$

b) Find Laplace transform of $\{\frac{t.sinh \, at}{2a}\}$.
c) Find Laplace transform of $\{\frac{1-\cos t}{t^2}\}$.
d) Find Laplace transform of $\{e^{-3t} sin^2 t\}$
e) Find Laplace transform of $\{e^{-3t} sin^2 t\}$
e) Find K such that the function $f(z) = e^x cosy + ie^x sin ky$ is analytic.
Q.3 Attempt any two
a) Solve by using $L.T.\frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t} sint$ and $y(0) = 0$, $y'(0) = 1$.
b) Find $L^{-1} \{\frac{1}{(s+1)(s^2+1)}\}$ by convolution theorem.

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

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

Attempt any two Q.5

- a) Find Fourier Series for $f(x) = x^3$ in the rage $(-\pi, \pi)$. 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

arks: 56

12

16

16

12

SLR-FM-460



Page 1 of	f 12
-----------	------

Set

Ρ

		HUMAN ANATOMY AI	ND F	PHYSIOLOGY
Day a Time	& Date : 10:00	e: Tuesday, 10-12-2019 D AM To 01:00 PM		Max. Marks: 70
Instr	uctior	ns: 1) Q. No. 1 is compulsory and sho book.	uld b	e solved in first 30 minutes in answer
		Figures to the right indicates ful	l mar	ks.
		MCQ/Objective Ty	pe C	Questions
Dura	tion: 3	0 Minutes	-	Marks: 14
Q.1	Choo 1)	bse the correct alternatives from the Kidneys in human body are placed a a) venal c) vertebral	e opt gains b) d)	ions and rewrite the sentence. 14 at back side wall of cavity. Abdominal glomerulus
	2)	Oxygon and carbon dioxido are oxch	anao	d in the lungs and through all
	2)	 cell membranes by a) active transport c) filtration 	b) d)	Diffusion Osmosis
	3)	Conduction velocity is maximum in _ a) SA node c) Right ventricle	b) d)	 AV node Purkinje fibers
	4)	Insulin facilitates glucose uptake in _a) Kidney tubulec) RBC	b) d)	 Brain Skeletal muscle
	5)	is an example of long bone.a) Sternumc) Carpal	b) d)	Femur Patella
	6)	The saliva helps in the digestion of _ a) proteins c) fibers	b) d)	 Fats Starch
	7)	There are approximately mu a) 206 c) 500	scles b) d)	in human body. 360 700
	8)	is essential for blood clottinga) RBCc) Blood platelets	b) d)	WBC Lymph
	9)	Visual area is located in lobe. a) Frontal c) Temporal	b) d)	Parietal Occipital
	10)	The organ of corti is concerned with a) Hearing	b)	 Seeing

Seeing Balancing learing c) Tasting d)

Seat No.

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

11) _____ organ receives only oxygenated blood.

- a) Lung b) Liver
- c) Spleen
- 12) Sella turcica is _____.
 - a) covering of ovaryc) depression in skull
- b) covering of testisd) part of temporal bone

Gill

d)

SLR-FM-461

Set P

- 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 c) Liver

- b) Pancreas
- d) gall bladder

Q.2	Atte a) b) c) d) e)	Empt any four questions. Classify epithelial tissues and state their functions. Explain the composition of blood. Explain anatomy of liver and state its any two functions. Differentiate between systemic and pulmonary circulation. Explain various steps of blood coagulation.	16
Q.3	Atte a) b) c)	Explain generation of action potential with neat diagram. Explain the mechanism of respiration. Draw ECG waveform explaining it along with a note on bipolar lead configuration.	12
		Section – II	
Q.4	Atte a) b) c) d) e)	Explain with a neat diagram structure of spinal cord. Define reflex arc and mention any two examples of it. Explain structure and function of lens of eye. List endocrine glands and state their functions. Draw and explain various lobes of cerebrum in detail.	16
Q.5	Atte a) b) c)	empt any two questions. Explain process of formation of urine. Explain structure of ear with neat diagram. List main actions of androgens, estrogens and progesterone.	12

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

SLR-FM-461

Set P

Seat

No.

Max. Marks: 56

L_____

		•	Bio – Medical E	nair	neering
			HUMAN ANATOMY A	ND F	PHYSIOLOGY
Day a Time	& Date : 10:00	e: Tu 0 AN	lesday, 10-12-2019 ∕I To 01:00 PM		Max. Marks: 70
Instr	uctior	າ ຣ: 1) Q. No. 1 is compulsory and sho	ould b	e solved in first 30 minutes in answer
		2	book. 2) Figures to the right indicates fu	ll mar	ks
		-	MCO/Objective T	nne (Duestions
Dura	tion: 3	0 M	inutes		Marks: 14
Q.1	Choo	ose	the correct alternatives from th	e opt	tions and rewrite the sentence. 14
	1)		is essential for blood clotting	j	
		a)	RBC	b)	WBC
	-)	C)	Blood platelets	a)	Lympn
	2)	Vis	ual area is located in lobe.	b)	Pariotal
		a) C)	Temporal	d)	Occipital
	3)	Th	e organ of corti is concerned with		
	0)	a)	Hearing	b)	 Seeing
		c)́	Tasting	d)	Balancing
	4)		organ receives only oxygena	ated b	blood.
		a)	Lung	b)	Liver
		C)	Spleen	d)	Gill
	5)	Sel	la turcica is		
		a)	covering of ovary	b)	covering of testis
	\mathbf{O}	C)		u)	part of temporal bolle
	6)	IVIO a)	st of the fat digestion occurs in	b)	 Stomach
		c)	Duodenum	d)	small intestine
	7)	The	e largest gland in human body is	,	
	.,	a)	lung	b)	Pancreas
		c)	Liver	d)	gall bladder
	8)	Kid	neys in human body are placed a	gains	st back side wall of cavity.
		a)	venal	b)	Abdominal
		C)	vertebrai	a)	giomerulus
	9)		ygen and carbon dioxide are exch	nange	ed in the lungs and through all
		a)	active transport	b)	Diffusion
		c)	filtration	d)	Osmosis
	10)	Co	nduction velocity is maximum in		
	,	a)	SA node	b)	AV node

Purkinje fibers

d)

Seat No.

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

c) Right ventricle

Set | Q

SLR-FM-461 Set Q

Insulin facilitates glucose uptake in _ 11)

- a) Kidney tubule
- Brain
- c) RBC d) Skeletal muscle

_____ is an example of long bone. 12)

- a) Sternum b) Femur
- c) Carpal d) Patella
- The saliva helps in the digestion of _ 13)
 - b) a) proteins Fats c) fibers
 - d) Starch
- There are approximately _____ muscles in human body. 14)
 - a) 206
 - c) 500

360 b)

b)

d) 700

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

Seat No.

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

Q.2

Q.3

Q.4

Q.5

a)

b)

c)

d)

e)

a)

b)

C)

Instructions: 1) All questions are compulsory.

Explain the composition of blood.

Attempt any four questions.

Attempt any two questions.

Attempt any four questions.

configuration.

2) Figures to the right indicates full marks.

Classify epithelial tissues and state their functions.

Explain various steps of blood coagulation.

Explain the mechanism of respiration.

Explain anatomy of liver and state its any two functions.

Differentiate between systemic and pulmonary circulation.

Explain generation of action potential with neat diagram.

Draw ECG waveform explaining it along with a note on bipolar lead

Section – II

Section – I

SLR-FM-461

Max. Marks: 56

16

12

16

Set

		S.E	E. (Part – I) (Old) (CBCS) E Bio – Medical HUMAN ANATOMY /	Exam Engi AND	ination Nov/Dec-2019 neering PHYSIOLOGY	
Day Time	& Date : 10:0	e: Tu 0 AN	iesday, 10-12-2019 / To 01:00 PM		Max. Marks:	70
Instr	uctior	ns: 1) Q. No. 1 is compulsory and sh book.	ould	be solved in first 30 minutes in answe	эr
		2	2) Figures to the right indicates f	ull ma	irks.	
Dura	tion: 3		MCQ/Objective T	уре	Questions	1,
	Chor		the correct alternatives from t	ho on	mains.	1/
Q. I	1)	036	is an example of long bone		dions and rewrite the sentence.	1-
	,	a) c)	Sternum Carpal	b) d)	Femur Patella	
	2)	The	e saliva helps in the digestion of		<u> </u>	
		a) c)	proteins fibers	b) d)	Fats Starch	
	3)	The	ere are approximately m	uscle	s in human body.	
	,	a) c)	206 500	b) d)	360 700	
	4)		is essential for blood clottir	g.		
	,	a) c)	RBC Blood platelets	b) d)	WBC Lymph	
	5)	Vis a) c)	ual area is located in lobe Frontal Temporal	e. b) d)	Parietal Occipital	
	6)	The	e organ of corti is concerned witl	า		
		a) c)	Hearing Tasting	b) d)	Seeing Balancing	
	7)		organ receives only oxyger	nated	blood.	
		a) c)	Lung Spleen	b) d)	Liver Gill	
	8)	Sel a) c)	la turcica is covering of ovary depression in skull	b) d)	covering of testis part of temporal bone	
	9)	Mo a) c)	st of the fat digestion occurs in _ vectum Duodenum	b) d)	 Stomach small intestine	
	10)	The a) c)	e largest gland in human body is lung Liver	b) d)	 Pancreas gall bladder	
	11)	Kid a)	neys in human body are placed venal	again b)	st back side wall of cavity. Abdominal	

d)

glomerulus

Set R

14

14

70

Seat No.

c) vertebral

Oxygen and carbon dioxide are exchanged in the lungs and through all 12) cell membranes by __ ____·

- a) active transport b) Diffusion
- c) filtration d) Osmosis
- Conduction velocity is maximum in _ 13)
 - b) a) SA node c) Right ventricle
 - AV node Purkinje fibers d)
- 14)
- Insulin facilitates glucose uptake in _____ b) __. Brain
 - c) RBC

d) Skeletal muscle SLR-FM-461

Set R

Q.2	Atte a) b) c) d) e)	Explain any four questions. Classify epithelial tissues and state their functions. Explain the composition of blood. Explain anatomy of liver and state its any two functions. Differentiate between systemic and pulmonary circulation. Explain various steps of blood coagulation.	16
Q.3	Atte a) b) c)	Explain generation of action potential with neat diagram. Explain the mechanism of respiration. Draw ECG waveform explaining it along with a note on bipolar lead configuration.	12
Q.4	Atte a) b) c) d) e)	empt any four questions. Explain with a neat diagram structure of spinal cord. Define reflex arc and mention any two examples of it. Explain structure and function of lens of eye. List endocrine glands and state their functions. Draw and explain various lobes of cerebrum in detail.	16
Q.5	Atte a) b) c)	empt any two questions. Explain process of formation of urine. Explain structure of ear with neat diagram. List main actions of androgens, estrogens and progesterone.	12

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

Seat

No.

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Page **9** of **12**

SLR-FM-461

Max. Marks: 56

Set

R

c)	Liver	d)	gall bladder
Kidı a) c)	neys in human body are placed a venal vertebral	gains b) d)	t back side wall of cavity. Abdominal glomerulus
Oxy cell a) c)	/gen and carbon dioxide are exch membranes by active transport filtration	ange b) d)	d in the lungs and through all Diffusion Osmosis
Cor a) c)	nduction velocity is maximum in _ SA node Right ventricle	b) d)	 AV node Purkinje fibers
Insı a) c)	ulin facilitates glucose uptake in _ Kidney tubule RBC	b) d)	 Brain Skeletal muscle
a) c)	is an example of long bone. Sternum Carpal	b) d)	Femur Patella

4)

The largest gland in human body is

- Most of the fat digestion occurs in _ b) Stomach vectum a)

- part of temporal bone

organ receives only oxygenated blood.

- a) covering of ovary b) covering of testis depression in skull d) c)
- a) Lung b) Liver c) Spleen d) Gill 3) Sella turcica is

1) a) Hearing Tasting c)

c)

a)

Duodenum

lung

2)

5)

6)

7)

8)

9)

10)

Day & Date: Tuesday, 10-12-2019

book.

Time: 10:00 AM To 01:00 PM

Seat

No.

- The organ of corti is concerned with Seeing b)
- MCQ/Objective Type Questions

2) Figures to the right indicates full marks.

Duration: 30 Minutes Marks: 14

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

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

14

d)

d)

b)

Balancing

small intestine

Pancreas

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

SLR-FM-461

Set

S

Max. Marks: 70

11)	The saliva helps in the digestion	n 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 clo	otting.	
	a) RBC	b)	WBC
	c) Blood platelets	d)	Lymph
14)	Visual area is located in	lobe.	
	a) Frontal	b)	Parietal
	c) Temporal	d)	Occipital

Set S

List main actions of androgens, estrogens and progesterone.				

16 Classify epithelial tissues and state their functions. a) Explain the composition of blood. b) Explain anatomy of liver and state its any two functions. C) Differentiate between systemic and pulmonary circulation. d) Explain various steps of blood coagulation. e) Q.3 Attempt any two questions. 12 Explain generation of action potential with neat diagram. a) Explain the mechanism of respiration. b) Draw ECG waveform explaining it along with a note on bipolar lead c) configuration. Section – II Q.4 Attempt any four questions. 16 Explain with a neat diagram structure of spinal cord. a) Define reflex arc and mention any two examples of it. b) Explain structure and function of lens of eve. c) List endocrine glands and state their functions. d) Draw and explain various lobes of cerebrum in detail. e)

Attempt any four questions. Q.2

Attempt any two questions.

Explain process of formation of urine.

Explain structure of ear with neat diagram.

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks. Section – I

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

Seat No.

Q.5

a) b)

C)



12

Max. Marks: 56

SLR-FM-462 Set

Seat No.

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

- 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 Q.1

- Choose the correct alternatives from the options and rewrite the sentence. What is the effect of high pressure on the molecular weight of the polymer 1) product formed?
 - a) Increases
 - c) No change

- Decreases b)
- d) Cannot be determined
- 2) Composite biomaterial used in ____
 - a) Dental filling b)
 - c) Both a and b

Crystal structure means ____ 3)

- a) Random alignment of unit cells
- b) Periodic alignment of unit cells
- c) Ductile materials
- d) Brittle material
- 4) Bioglass is /an

7)

- a) Inert ceramic b)
- c) Composite
- The hardest biological material is ____ 5)
 - b) Enamel a) Dentin c) Gum d) Bone
- 6) Strength of a material is its _____.
 - b) Surface Property **Chemical Property** a)
 - Biological Property c)
 - Mechanical Property d) Which of the following polymers can have strong intermolecular forces?
 - Polystyrene b)
 - Nylon a) None c) Rubber d)
- Natural rubber become brittle below _____ and soft after _____. 8)
 - a) $100^{\circ}C$, $500^{\circ}C$ $10^{\circ}C, 500^{\circ}C$ b)
 - c) 10° C. 50° C d) None
- 9) Chrane Tanning process completed in ____
 - b) 5 to 16 weeks a) 5 to 16 days c) 5 to 16 hrs
 - d) 5 to 16 months

Max. Marks: 70



Marks: 14

- Bone particle
- d) None
- **Bioactive ceramic**
- d) Crystalline polymer



- 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
- Hydroxyapatite has _____ biocompatibility. 11)
 - a) Less b) Zero
 - c) Excellent d) None
- Major ingredients of traditional ceramics . 12)
 - a) Silica Clay b) c) Feldspar
 - d) All above
- In which of the following application ceramic biomaterial is used? 13)
 - a) Bone graft

- Artificial knees b) d) All above
- c) Hip prostheses CaP has been used in the form _____. 14)

 - a) Artificial heart
 - c) Artificial Bone
- b) Artificial teeth
- d) None

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four

- 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

- 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

- 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

- 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.

12

16

16

Max. Marks: 56

		Bio-N	ledical Engir	neering
		B	BIOMATERIA	LS
Day a Time	& Date : 10:00	: Thursday, 12-12-2019 AM To 01:00 PM		Max. Marks: 70
Instr	uctior	s: 1) Q. No. 1 is compulse Book.	ory and should I	be solved in first 30 minutes in answer
		2) Figures to the right i	ndicate full mar	ks.
		MCQ/Ob	jective Type	Questions
Dura	tion: 3) Minutes		Marks: 14
Q.1	Choc 1)	se the correct alternativ Natural rubber become b a) 100°C, 500°C	rittle below b)	otions and rewrite the sentence. 14 and soft after 10 ⁰ C, 500 ⁰ C
	2)	Chrane Tanning process	completed in	None
	2)	a) 5 to 16 daysc) 5 to 16 hrs	b) d)	5 to 16 weeks 5 to 16 months
	3)	Which of the following is a a) High temperature sta c) Low elongation	not a characteri ability b) d)	stic property of ceramic material? High mechanical strength Low hardness
	4)	Hydroxyapatite has a) Less c) Excellent	_ biocompatibili b) d)	ty. Zero None
	5)	Major ingredients of tradi a) Silica c) Feldspar	tional ceramics b) d)	Clay All above
	6)	In which of the following a a) Bone graft c) Hip prostheses	application cera b) d)	mic biomaterial is used? Artificial knees All above
	7)	CaP has been used in the a) Artificial heart c) Artificial Bone	e form b) d)	Artificial teeth None
	8)	What is the effect of high product formed? a) Increases c) No change	pressure on the b) d)	e molecular weight of the polymer Decreases Cannot be determined
	9)	Composite biomaterial us a) Dental filling c) Both a and b	sed in b) d)	Bone particle None
	10)	Crystal structure means _ a) Random alignment o b) Periodic alignment of	f unit cells f unit cells	

Seat No.

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

- c) Ductile materials
- d) Brittle material

- - Set Q

- 11) Bioglass is /an _____.
 - a) Inert ceramic
 - c) Composite

- b) Bioactive ceramic
- d) Crystalline polymer
- 12) The hardest biological material is ____
 - a) Dentin
 - c) Gum
- 13) Strength of a material is its _____.a) Surface Property
- b) Chemical Propertyd) Mechanical Property
- c) Biological Property d)
- 14) Which of the following polymers can have strong intermolecular forces?
 - a) Nylonc) Rubber

b) Polystyrene

Enamel

Bone

d) None

b)

d)

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four

- 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

- 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

- 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

- 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.

12

16

16

Max. Marks: 56

		Book.	,		
		2) Figures to the rig	ht indicate full mar	ks.	
		MCQ/0	Objective Type	Questions	
Dura	tion: 3) Minutes		Marks	s: 14
Q.1	Cho	se the correct alterna	atives from the op	tions and rewrite the sentence.	14
	1)	The hardest biologicala) Dentinc) Gum	l material is b) d)	Enamel Bone	
	2)	Strength of a materiala) Surface Propertyc) Biological Propert	is its b) y d)	Chemical Property Mechanical Property	
	3)	Which of the following a) Nylon c) Rubber	polymers can hav b) d)	e strong intermolecular forces? Polystyrene None	
	4)	Natural rubber becom a) 100° C, 500° C c) 10° C, 50° C	e brittle below b) d)	and soft after 10ºC, 500ºC None	
	5)	Chrane Tanning proce	ess completed in _		
		a) 5 to 16 days c) 5 to 16 hrs	b) d)	5 to 16 weeks 5 to 16 months	
	6)	Which of the followinga) High temperaturec) Low elongation	is not a characteri stability b) d)	stic property of ceramic material? High mechanical strength Low hardness	
	7)	Hydroxyapatite has a) Less c) Excellent	biocompatibili b) d)	ty. Zero None	
	8)	Major ingredients of tr a) Silica c) Feldspar	aditional ceramics b) d)	 Clay All above	
	9)	In which of the followin a) Bone graft c) Hip prostheses	ng application cera b) d)	mic biomaterial is used? Artificial knees All above	
	10)	CaP has been used in a) Artificial heart	the form b)	Artificial teeth	

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

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

Page **7** of **12**

SLR-FM-462

Set

R

Max. Marks: 70

Seat No.

- c) Artificial Bone
- d) None

Set R

- 11) What is the effect of high pressure on the molecular weight of the polymer product formed?
 - a) Increases
 - c) No change

- b) Decreases
- d) Cannot be determined
- 12) Composite biomaterial used in _____.
 - a) Dental filling

- b) Bone particle
- c) Both a and b
- d) None
- 13) Crystal structure means _____.
 - a) Random alignment of unit cells
 - b) Periodic alignment of unit cells
 - c) Ductile materials
 - d) Brittle material
- 14) Bioglass is /an _____.
 - a) Inert ceramic
 - c) Composite

- b) Bioactive ceramic
- d) Crystalline polymer

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four

- 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

- 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

- 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

- 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.

12

Max. Marks: 56

12

16

S.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **Bio-Medical Engineering BIOMATERIALS** Day & Date: Thursday, 12-12-2019 Max. Marks: 70 Time: 10:00 AM To 01:00 PM

- 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

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

- Which of the following is not a characteristic property of ceramic material? 1)
 - a) High temperature stability
 - c) Low elongation
- d) Low hardness
- Hydroxyapatite has _____ biocompatibility. 2)
 - a) Less b) Zero
 - c) Excellent
- 3) Major ingredients of traditional ceramics _
 - a) Silica Clay b) c) Feldspar d) All above
- 4) In which of the following application ceramic biomaterial is used?
 - Artificial knees a) Bone graft b)
 - c) Hip prostheses d) All above
- CaP has been used in the form 5) 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 Cannot be determined d)
- Composite biomaterial used in ____ 7)
 - Bone particle a) Dental filling b) None d)
 - c) Both a and b
- 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
 - c) Composite

- **Bioactive ceramic** b)
- d) Crystalline polymer

SLR-FM-462



Duration: 30 Minutes

Marks: 14

14

High mechanical strength

b)

- d)
- None

			SLR-FM-462
			Set S
10)	The hardest biological material is a) Dentin c) Gum	b) d)	Enamel Bone
11)	Strength of a material is its a) Surface Property c) Biological Property	b) d)	Chemical Property Mechanical Property
12)	Which of the following polymers can a) Nylon c) Rubber	have b) d)	e strong intermolecular forces? Polystyrene None
13)	Natural rubber become brittle below a) 100 ^o C, 500 ^o C c) 10 ^o C, 50 ^o C	b) d)	and soft after 10ºC, 500ºC None
14)	Chrane Tanning process completed	in	

- ıΡ · /
- a) 5 to 16 days c) 5 to 16 hrs b) 5 to 16 weeksd) 5 to 16 months

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four

- 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

- 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

- 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

- 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.

12

Max. Marks: 56

16

12
Seat No.	t			Set	Ρ
		S.E. (Part - I) (Old) (CBCS) Exam	ination Nov/Dec-2019	
			ledical Engir	neering	
Day &	& Dat	e: Saturday, 14-12-2019		Max. Marks	s: 70
Time	: 10:0				
Instr	uctio	ns: 1) Q.No.1 is compulso Book. 2) Figures to the right i	ry and should be	e solved in first 30 Minutes in answ	er
Durat	tion: (30 Minutes	jective Type	Questions	s: 14
Q.1	Cho	ose the correct alternativ	es from the on	tions and rewrite the sentence.	14
4.1	1)	In a CE configuration an e a) stabilization c) collector bias	emitter resistor is b) d)	s used for ac signal bypass higher gain	
	2)	A transistor may be useda) Fixed resistorc) Rectifier	as switching de [.] b) d)	vice or as a Turning device Variable resistor	
	3)	The Q point on a loadline a) V_C c) V_B	may be used to b) d)	determine V _{cc} I _c	
	4)	Voltage regulators keep a or load varies within limits a) dc c) sinusoidal	constant b) d)	output voltage when the input Ac Ripple	
	5)	The current gain for a con $I_c = 4.0 \text{ mA is}$ a) 16.80 c) 0.20	nmon base conf b) d)	iguration where $I_E = 4.2 \text{ mA}$ and 1.05 0.95	
	6)	The voltage regulation of $V_{FL} = 48V$ is a) 4.17% c) 6.2%	a power supply b) d)	having $V_{NL} = 50V$ and 5.2% 7.1%	
	7)	A crystal diode has forwar a) $k\Omega$ c) $M\Omega$	rd resistance of b) d)	the order of Ω None of these	
	8)	The reverse current of dic a) KA c) μA	de is of a order b) d)	of mA A	
	9)	The gate of a JFET's is a) reverse c) reverse as well as for	biased. b) ward d)	forward downward	
	10)	A JFET has power a) small	gain. b)	very high	

c) very small d) none of a above

SLR-FM-463

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 dely T = 1000 ms, value of capacitor is _____.
 - a) 0.9*μf*

b) 1.32μf

SLR-FM-463

Set P

- c) $7.5\mu f$ d) $2.49\mu f$
- 14) A stable multivibrator opening at 150th 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%

Page 3 of 16

SLR-FM-463

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full mark.

SECTION I

Q.2 Attempt any Four:

- 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:

- 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 $h_{FE} = 100, V_{CC} = 12 \text{ V}, V_{LE} = 6 \text{ V}, I_C = 3\text{mA}, V_{BE} = 0.7 \text{ V}$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four:

- 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 $R_{\rm D}$ and $R_{\rm S}$ 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

12

16

Max. Marks: 56

Set P

12

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



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

Seat					_
No.				Set	ז
		S.E. (Part - I) (Old) (CBCS) Ex Bio-Medical En ELECTRONICS CIRCUIT AN	ami Igin AL Y	ination Nov/Dec-2019 leering /SIS AND DESIGN - I	
Day & Time:	a Date 10:0	e: Saturday, 14-12-2019 0 AM To 01:00 PM		Max. Marks: 7	70
Instru	uctio	 ns: 1) Q.No.1 is compulsory and shoul Book. 2) Figures to the right indicate full r 	d be marl	e solved in first 30 Minutes in answer k.	
		MCQ/Objective Ty	pe	Questions	
Durati	ion: 3	30 Minutes		Marks:	14
Q.1	Choo 1)	ose the correct alternatives from the The reverse current of diode is of a or a) KA c) μA	der b) d)	tions and rewrite the sentence. of mA A	14
:	2)	The gate of a JFET's is biased. a) reverse c) reverse as well as forward	b) d)	forward downward	
	3)	A JFET has power gain. a) small c) very small	b) d)	very high none of a above	
	4)	The pinch-off voltage of a JFET is abo a) 5V c) 15V	but _ b) d)	0.6V 25V	
:	5)	When the input signal reduces the chaa) enhancementc) gate charge	anne b) d)	el size, the process is called substrate connecting depletion	
	6)	A monostable multivibrator has $R = 12$ value of capacitor is a) $0.9\mu f$ c) $7.5\mu f$	20Ω b) d)	and time dely T = 1000 ms, $1.32\mu f$ $2.49\mu f$	
	7)	A stable multivibrator opening at 150 th cycle of the circuit will be a) 50% c) 95.99%	^h as b) d)	s a discharge time of 2.5 m. Duty 75% 37.5%	
	8)	In a CE configuration an emitter resista) stabilizationc) collector bias	or is b) d)	s used for ac signal bypass higher gain	
	9)	A transistor may be used as switchinga) Fixed resistorc) Rectifier	dev b) d)	<i>v</i> ice or as a Turning device Variable resistor	
	10)	The Q point on a loadline may be used a) V_{C} c) V_{B}	d to b) d)	determine V_{CC} I _C	

Page **5** of **16**

SLR-FM-463

Set Q

SLR-FM-463

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

12) The current gain for a common base configuration where $I_E = 4.2 \text{ mA}$ and $I_{\rm C} = 4.0 \text{ mA is}$ _____.

11) Voltage regulators keep a constant _____ output voltage when the input

- a) 16.80 b) 1.05
- c) 0.20 d) 0.95

13) The voltage regulation of a power supply having $V_{NL} = 50V$ and

- a) 4.17% b) 5.2%
- c) 6.2% d) 7.1%
- 14) A crystal diode has forward resistance of the order of _____.
 - a) kΩ

or load varies within limits.

b) Ω d) None of these c) MΩ

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full mark.

SECTION I

Q.2 Attempt any Four:

- 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:

- 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 $h_{FE} = 100, V_{CC} = 12 \text{ V}, V_{LE} = 6 \text{ V}, I_C = 3\text{mA}, V_{BE} = 0.7 \text{ V}$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four:

- 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 $R_{\rm D}$ and $R_{\rm S}$ 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

12

16

Max. Marks: 56

Set Q

12

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



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

		S.E. (Part - I) (Old) (CBCS) E Bio-Medical E	xam ngir	ination Nov/Dec-2019 Deering
		ELECTRONICS CIRCUIT AN	IAL'	SIS AND DESIGN - I
Day Time	& Dat e: 10:0	e: Saturday, 14-12-2019 0 AM To 01:00 PM		Max. Marks: 70
Instr	uctio	ns: 1) Q.No.1 is compulsory and sho Book. 2) Figures to the right indicate ful	uld b I mar	e solved in first 30 Minutes in answer k
			vno	Questions
Dura	tion: 3	30 Minutes	yhe	Marks: 14
Q.1	Cho (1)	ose the correct alternatives from the current gain for a common base $I_c = 4.0 \text{ mA}$ is a) 16.80	b)	tions and rewrite the sentence. 14 iguration where $I_E = 4.2 \text{ mA}$ and 1.05
	2)	The voltage regulation of a power su $V_{FL} = 48V$ is a) 4.17% c) 6.2%	d) ipply b) d)	having $V_{NL} = 50V$ and 5.2% 7.1%
	3)	A crystal diode has forward resistant a) $k\Omega$ c) $M\Omega$	ce of b) d)	the order of Ω None of these
	4)	The reverse current of diode is of a α a) KA c) μA	order b) d)	of mA A
	5)	The gate of a JFET's is biase a) reverse c) reverse as well as forward	d. b) d)	forward downward
	6)	A JFET has power gain. a) small c) very small	b) d)	very high none of a above
	7)	The pinch-off voltage of a JFET is al a) 5V c) 15V	_oout b) d)	0.6V 25V
	8)	When the input signal reduces the ca) enhancementc) gate charge	hann b) d)	el size, the process is called substrate connecting depletion
	9)	A monostable multivibrator has $R =$ value of capacitor is a) $0.9\mu f$ c) $7.5\mu f$	120Ω b) d)	and time dely T = 1000 ms, $1.32\mu f$ $2.49\mu f$

No. • ` .

Seat

SLR-FM-463

Set R



- 10) A stable multivibrator opening at 150th has a discharge time of 2.5 m. Duty cycle of the circuit will be _____.
 - a) 50% b) 75%
 - d) 37.5% c) 95.99%
- 11) In a CE configuration an emitter resistor is used for
 - a) stabilization b) ac signal bypass collector bias C)
 - 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
 - C) sinusoidal
- b) Ac
- d) Ripple

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full mark.

SECTION I

Attempt any Four: Q.2

- 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:

- 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 $h_{FE} = 100, V_{CC} = 12 \text{ V}, V_{LE} = 6 \text{ V}, I_{C} = 3\text{mA}, V_{BE} = 0.7 \text{ V}$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four:

- 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

12

16

16

Max. Marks: 56

SLR-FM-463

Set R

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



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

Dura	tion:	30 Minutes		Marks	3: 14
Q.1	Cho)	A JFET has power gain.	ו פ ס ף	tions and rewrite the sentence.	14
		c) very small	d)	none of a above	
	2)	The pinch-off voltage of a JFET is al a) 5V c) 15V	bout _ b) d)	0.6V 25V	
	3)	When the input signal reduces the c a) enhancement c) gate charge	hann b) d)	el size, the process is called substrate connecting depletion	·
	4)	A monostable multivibrator has $R =$ value of capacitor is a) $0.9\mu f$ c) $7.5\mu f$	120Ω b) d)	a and time dely T = 1000 ms, $1.32\mu f$ $2.49\mu f$	
	5)	A stable multivibrator opening at 150 cycle of the circuit will be a) 50% c) 95.99%) th ha b) d)	s a discharge time of 2.5 m. Duty 75% 37.5%	
	6)	In a CE configuration an emitter resi a) stabilization c) collector bias	stor i b) d)	s used for ac signal bypass higher gain	
	7)	A transistor may be used as switchir a) Fixed resistor c) Rectifier	ng de b) d)	vice or as a Turning device Variable resistor	
	8)	The Q point on a loadline may be us a) V_{C} c) V_{B}	ed to b) d)	e determine V _{CC} I _C	
	9)	Voltage regulators keep a constant _ or load varies within limits.		_output voltage when the input	
		a) dc c) sinusoidal	b) d)	Ac Ripple	

Duration: 30 Mir

Seat

No.

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

Time: 10:00 AM To 01:00 PM

Day & Date: Saturday, 14-12-2019

2) Figures to the right indicate full mark.

MCQ/Objective Type Questions

. . . 14

S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019

Bio-Medical Engineering

ELECTRONICS CIRCUIT ANALYSIS AND DESIGN - I

SLR-FM-463

Set S

Max. Marks: 70

Set S

- 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 $V_{NL} = 50V$ and $V_{FL} = 48V$ 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) $k\Omega$ b) Ω
 - c) $M\Omega$ 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

Page **15** of **16**

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full mark.

SECTION I

Q.2 Attempt any Four:

- 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:

- 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 $h_{FE} = 100, V_{CC} = 12 \text{ V}, V_{LE} = 6 \text{ V}, I_C = 3\text{mA}, V_{BE} = 0.7 \text{ V}$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four:

- 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 $R_{\rm D}$ and $R_{\rm S}$ 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

16

16

Max. Marks: 56

Set S

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



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

a) c)	Superposition Norton's	b) d)	Thevenin's None of these
The	critical frequency is defined as th from the pass band.	ne po	pint at which the response drops
a)	-20 dB	b)	-3 dB
c)	-6 dB	d)	-40 dB

energy

high pass

band stop

____ acts as an independent variables in Y- parameter.

The bandwidth in a _____ filter equal the critical frequency.

- a) current b) power
- c) AC BD = 1
- a) AB CD = 1b) AD - BC = 1d) AA' - CD = 1

5)

2) among the following condition is true at the resonance. $X_c > X_L$ $X_c = X_L$ b) a) C) $X_c < X_L$ d) None of above The connecting of energy source at the port of network known as . 3)

supply voltage

driving point

Q point

parameters.

c) Voltage

a) low pass

c) band pass

supply frequency

S.E. (Part - I) (Old) (CBCS) Examination Nov/Dec-2019 **Bio-Medical Engineering** LINEAR CIRCUIT ANALYSIS Max. Marks: 70

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

Duration: 30 Minutes

a)

c)

a)

C)

1)

4)

6)

7)

8)

Seat

No.

Q.1

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.

Choose the correct alternatives from the options.

undergoes resonance only due to variation in _____.

MCQ/Objective Type Questions

If an ac signal generator drives a series RLC circuit, then the circuit

b)

d)

b)

d)

d)

b)

d)

theorems applicable for both linear and nonlinear circuits.

represents the precise condition of reciprocity for transmission

series resistance

phase angle

transfer point

resonance point

SLR-FM-464



Marks: 14

			Set P
9)	A low pass filter has a cut off freque filter will be KHz. a) 2.46 c) 644	ncy c b) d)	of 1.23 KHz. The bandwidth of 1.23 1.44
10)	Norton's current is equal to the curre circuited output terminal. a) short c) closed	ent pa b) d)	assing through the open broken
11)	The impedances Z_1 and Z_2 are said a) $Z_1Z_2 = R_0$ c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_0$	to be b) d)	e inverse if $Z_1+Z_2 = R_o$ $Z_1Z_2 = R_o^2$
12)	In an RC circuit when the switch in a a) do not vary with time c) rises with time	close b) d)	d, the response decays with time rises with frequency
13)	 Bandwidth of a series resonance cir over which circuit current in equal to current. a) 70.7% c) 75% 	cuit i o or g b) d)	s defined as the range frequency reater than of maximum 60% 11%
14)	Kirchoff's current law states that the junction or node in an electric circuit a) Voltages	alge s in z b)	braic sum of meeting at a zero. energies

c) Potentials d) currents

SLR-FM-464

SLR-FM-464 Set P

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

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 μ f of capacitor and a coil whose résistance and inductance are 15 Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

Q.3 Attempt any two questions.

a) Find the values of R and C so that $V_{x^2} 3V_y$. V_x and V_y are in quadrature.



Max. Marks: 56

16

- Set P
- b) In the given network determine currents i₁ (t) and i₂ (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.

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

100



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

Q.5 Attempt any two questions.

- a) Prove the following relation.
 - 1) Z parameters in terms of Y parameter
 - 2) Z parameters in terms of h parameter
- b) Determine Y and Z parameter for the network shown



- c) Write short note.
 - 1) Working of bridged T type attenuation
 - 2) Notch filtering using RCA circuits

16

Max. Marks: 70 Book Page No.3 2) Figures to the right indicate full mark. MCQ/Objective Type Questions **Duration: 30 Minutes** from the pass band. a) -20 dB b) -3 dB c) -6 dB d) -40 dB 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 d) 1.44 c) 644 Norton's current is equal to the current passing through the circuited output terminal. a) short b) open closed d) broken C) The impedances Z_1 and Z_2 are said to be inverse if _____. a) $Z_1 Z_2 = R_o$ c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_o$ b) $Z_1 + Z_2 = R_o$ d) $Z_1 Z_2 = R_o^2$ In an RC circuit when the switch in closed, the response _____. do not vary with time decays with time a) b) rises with time d) rises with frequency c) Bandwidth of a series resonance circuit is defined as the range frequency 6) over which circuit current in equal to or greater than _____ of maximum current.

- a) 70.7% b) 60%
- d) 11% C) 75%
- Kirchoff's current law states that the algebraic sum of _____ meeting at a 7) junction or node in an electric circuits in zero.
 - a) voltages b) energies potentials d) currents c)
- If an ac signal generator drives a series RLC circuit, then the circuit 8) undergoes resonance only due to variation in ___
 - a) supply voltage

c)

- b) series resistance
- supply frequency d) phase angle

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

Seat No.

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

- Q.1 Choose the correct alternatives from the options.
 - The critical frequency is defined as the point at which the response drops 1)
 - 2)
 - 3)
 - 4)
 - 5)

SLR-FM-464



- Marks: 14
 - 14

9) _ among the following condition is true at the resonance.

 $X_c > X_L$ a) C)

 $X_c = X_l$ b)

 $X_c < X_L$

- d) None of above
- The connecting of energy source at the port of network known as _____. 10)
 - a) driving point b) transfer point c) Q point
 - d) resonance point

SLR-FM-464

Set Q

- 11) represents the precise condition of reciprocity for transmission parameters.
 - b) AD BC = 1a) AB - CD = 1
 - d) AA' CD = 1c) AC - BD = 1
- _____ acts as an independent variables in Y- parameter. 12)
 - 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
- theorems applicable for both linear and nonlinear circuits. 14)
 - a) Superposition c) Norton's

- Thevenin's b)
- d) None of these

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

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 μ f of capacitor and a coil whose résistance and inductance are 15 Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

Q.3 Attempt any two questions.

a) Find the values of R and C so that $V_{x^2} 3V_y$. V_x and V_y are in quadrature.



Max. Marks: 56

Set

16

- Set Q
- **b)** In the given network determine currents i₁ (t) and i₂ (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.

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



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

Q.5 Attempt any two questions.

- a) Prove the following relation.
 - 1) Z parameters in terms of Y parameter
 - 2) Z parameters in terms of h parameter
- b) Determine Y and Z parameter for the network shown



- c) Write short note.
 - 1) Working of bridged T type attenuation
 - 2) Notch filtering using RCA circuits

16

No.								Jei	
		S.E.	(Part - I)	(Old) (C Bio-M LINEAR	BCS) Ex edical Er CIRCUI	am ngin ΓΑΝ	ination Nov/Dec-20 leering NALYSIS	19	
Day & Time:	Date: 10:00	Tues AM T	sday,17-12 Го 01:00 Р	2-2019 M				Max. Mark	s: 70
Instru	lctions	s: 1) ([2)	Q.No.1 is o Book Page Figures to	compulsor No.3 the right in	y and shou ndicate full	ld be mar	e solved in first 30 Minu K.	tes in answ	er
		_,	N	ICQ/Obi	ective Tv	ne	Questions		
Durati	ion: 30) Minu	utes			P O		Mark	s: 14
Q.1	Choos 1) _	se the a) c c) v	e correct a _ acts as a urrent oltage	alternative n indepen	es from the dent variab	e op bles i b) d)	tions. n Y- parameter. power energy		14
	2) -	Theb a) lo c) b	andwidth i ow pass and pass	n a	filter equa	l the b) d)	critical frequency. high pass band stop		
	3) _	a) S c) N	_ theorems Superpositi Iorton's	applicabl on	e for both I	inea b) d)	r and nonlinear circuits. Thevenin's None of these		
	4) -	The c a) -2 c) -6	ritical frequ _ from the 20 dB 6 dB	uency is d pass banc	efined as th l.	ne po b) d)	oint at which the respon -3 dB -40 dB	se drops	
	5) / f	A low filter v a) 2 c) 6	pass filter vill be 46 .44	has a cut KHz.	off frequer	b) d)	f 1.23 KHz. The bandw 1.23 1.44	idth of	
	6) (6 (2 (2) (2) (2) (2) (2) (2) (2) (2) (2)	Norto circuit a) s c) c	n's current ed output hort losed	is equal t terminal.	o the curre	nt pa b) d)	assing through the open broken	_	
	7)	The ir a) Z c) <u>1</u> z	mpedance $r_1 Z_2 = R_0$ $r_1 + rac{1}{Z_2} = R_0$	s Z ₁ and Z	2 are said 1	to be b) d)	e inverse if $Z_1+Z_2 = R_o$ $Z_1Z_2 = R_o^2$		
	8) a c	In an a) d c) ri	RC circuit o not vary ses with ti	when the with time me	switch in cl	osec b) d)	d, the response decays with time rises with frequency		
	9) E c c c c	Bandv over v currer a) 7 c) 7	width of a s which circu nt. '0.7% '5%	series reso it current i	onance circ n equal to	cuit is or gi b) d)	e defined as the range f eater than of ma 60% 11%	requency aximum	

Set R

SLR-FM-464

Seat No.

			SLR-FM-464	
			Set R	
10)	Kirchoff's current law states that the junction or node in an electric circuit a) voltages c) potentials	alge ts in z b) d)	braic sum of meeting at a zero. energies currents	
11)	If an ac signal generator drives a se undergoes resonance only due to va a) supply voltage c) supply frequency	ries I ariatio b) d)	RLC circuit, then the circuit on in series resistance phase angle	
12)	among the following condition a) $X_c > X_L$ c) $X_c < X_L$	n is ti b) d)	rue at the resonance. X _c = X _L None of above	
13)	The connecting of energy source at a) driving point c) Q point	the p b) d)	oort of network known as transfer point resonance point	
14)	represents the precise condition parameters. a) $AB - CD = 1$	tion c b)	f reciprocity for transmission AD - BC = 1	

- c) AC BD = 1 d)
- d) AA' CD = 1

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

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 μ f of capacitor and a coil whose résistance and inductance are 15 Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

Q.3 Attempt any two questions.

a) Find the values of R and C so that $V_{x^2} 3V_y$. V_x and V_y are in quadrature.



Max. Marks: 56

Set

16

- Set R
- **b)** In the given network determine currents i₁ (t) and i₂ (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.

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



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

Q.5 Attempt any two questions.

- a) Prove the following relation.
 - 1) Z parameters in terms of Y parameter
 - 2) Z parameters in terms of h parameter
- b) Determine Y and Z parameter for the network shown



- c) Write short note.
 - 1) Working of bridged T type attenuation
 - 2) Notch filtering using RCA circuits

16

		S.E	E. (Part - I) (Old) (CBCS) Ex Bio-Medical Ei LINEAR CIRCUI	am ngin ΓΑΝ	ination Nov/Dec-2019 neering NALYSIS
Day & Time	& Date : 10:00	e: Tu D AN	esday,17-12-2019 I To 01:00 PM		Max. Marks: 70
Instr	uctior	is: 1 2) Q.No.1 is compulsory and shou Book Page No.3) Figures to the right indicate full	ild be marl	e solved in first 30 Minutes in answer k.
			MCQ/Objective Ty	pe	Questions
Dura	tion: 3	0 Mi	nutes		Marks: 14
Q.1	Choo 1)	se t Nor circ	he correct alternatives from the ton's current is equal to the curre uited output terminal.	e op nt pa	tions. 14 assing through the
		a) c)	short closed	b) d)	open broken
	2)	The a) c)	impedances Z_1 and Z_2 are said $Z_1Z_2 = R_0$ $\frac{1}{Z_1} + \frac{1}{Z_2} = R_0$	to be b) d)	e inverse if $Z_1+Z_2 = R_o$ $Z_1Z_2 = R_o^2$
	3)	In a a) c)	n RC circuit when the switch in c do not vary with time rises with time	losec b) d)	d, the response decays with time rises with frequency
	4)	Ban ove curr a) c)	dwidth of a series resonance circ r which circuit current in equal to ent. 70.7% 75%	cuit is or gr b) d)	s defined as the range frequency reater than of maximum 60% 11%
	5)	Kirc junc a) c)	hoff's current law states that the tion or node in an electric circuits voltages potentials	algel s in z b) d)	braic sum of meeting at a ero. energies currents
	6)	lf ar und a) c)	n ac signal generator drives a ser ergoes resonance only due to va supply voltage supply frequency	ies F riatic b) d)	RLC circuit, then the circuit on in series resistance phase angle
	7)	a) c)	among the following condition $X_c > X_L$ $X_c < X_L$	is tr b) d)	ue at the resonance. X _c = X _L None of above
	8)	The a) c)	connecting of energy source at t driving point Q point	he p b) d)	ort of network known as transfer point resonance point

Set S

Seat No.





9) _ represents the precise condition of reciprocity for transmission parameters.

- a) AB CD = 1b) AD - BC = 1
- d) AA' CD = 1c) AC - BD = 1
- ____ acts as an independent variables in Y- parameter. 10)
 - a) current b) power c) voltage
 - d) energy
- The bandwidth in a _____ filter equal the critical frequency. 11)
 - a) low pass b) high pass
 - c) band pass band stop d)
- 12) _ theorems applicable for both linear and nonlinear circuits.
 - a) Superposition b) Thevenin's
 - c) Norton's None of these d)
- 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
- A low pass filter has a cut off frequency of 1.23 KHz. The bandwidth of 14) filter will be _____ KHz.
 - a) 2.46 b) 1.23 d)
 - c) 644
- 1.44

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

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 μ f of capacitor and a coil whose résistance and inductance are 15 Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

Q.3 Attempt any two questions.

a) Find the values of R and C so that $V_{x^2} 3V_y$. V_x and V_y are in quadrature.



Max. Marks: 56

Set

16

52

- Set S
- **b)** In the given network determine currents i₁ (t) and i₂ (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.

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



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

Q.5 Attempt any two questions.

- a) Prove the following relation.
 - 1) Z parameters in terms of Y parameter
 - 2) Z parameters in terms of h parameter
- b) Determine Y and Z parameter for the network shown



- c) Write short note.
 - 1) Working of bridged T type attenuation
 - 2) Notch filtering using RCA circuits

16

Instr	uctior	ns: 1	 Q. No. 1 is compulsory and sh book. 	noulc	be solved in first 30 minutes in answer						
		2	2) Figures to the right indicate ful	l ma	rks						
MCQ/Objective Type Questions											
Dura	tion: 3	80 M	inutes		Marks: 14						
Q.1	Choo 1)	ose f If th stra a) c)	the correct alternatives from the displacement is measured wit ain gauge normally required are One Three	ne o n stra b) d)	ptions and rewrite the sentence. 14 ain gauge then the number of Two Four						
	2)	A c of _ a) c)	apacitive pressure sensor has a 0.2% 0.1%	typic b) d)	cal measurement uncertainty ± 0.4% ± 0.8%						
	3)	Sm a) c)	allest change which a sensor ca Resolution Precision	n de b) d)	tect is Accuracy Scale						
	4)	a) c)	of the following is not a piezo PZT Quartz	beleo b) d)	ctric sensor. Roscelle salt None of the mentioned						
	5)	a) c)	of the following has the wide RTD Thermistor	st ra b) d)	nge of temperature measurement. Thermocouple Mercury thermometer						
	6)	Opt a) c)	tical fiber sensors are electrically active active as well as passive	b) d)	 passive cannot be determined						
	7)	Th∉ a) c)	e biological response of the biose biocatalytic membrane Chemical membrane	enso b) d)	r is determined by Physio-chemical membrane artificial membrane						
	8)	a) c)	refers to the degree of repea Accuracy Resolution	tabil b) d)	ity of a measurement. Precision Sensitivity						
	9)	Cha a) c)	ange is signal over long period o noise hysteresis	f tim b) d)	e is called offset drift						
	10)	Abi env	lity of the sensor to repeat a mea vironment is called	asure	ement when put back in the same						

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

SLR-FM-465

Set

Max. Marks: 70

Ρ

Page **1** of **12**

- b) Saturation
- Repeatability d) Threshold c)

Conformance

a)

- 11) _____ of the following is not a static property.
 - a) Repeatability

b) Hysteresis

SLR-FM-465

Set

- 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
 - c) lodine

- b) Basic solution
- d) Hydrazine

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks

Section – I

Q.2 Attempt any four

- 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.

- 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 verse voltage characteristics of thermistors.

Section – II

Q.4 Attempt any four

- a) What is mean by biosensor? Give classification of biosensor.
- **b**) Explain construction and working of pCO_2 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

- 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.



Max. Marks: 56

12

16

16

Seat No.

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

- 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

- ____ refers to the degree of repeatability of a measurement. 1)
 - Accuracy a)
 - Resolution d) Sensitivity c)
- 2) Change is signal over long period of time is called _____
 - noise b) offset a)
 - c) hysteresis d) drift
- 3) Ability of the sensor to repeat a measurement when put back in the same environment is called _____
 - Conformance a)
 - Repeatability C) d) Threshold

4) of the following is not a static property.

- a) Repeatability b) Hysteresis
- Frequency response d) Saturation C)
- Transducers employed in the bulk of enzyme electrodes use of the _____ 5) principles.
 - Amperometric a) b) Optical
 - Magnetic d) Colorimetric c)
- of the following transducers must be used for dissolved oxygen 6) analyser.
 - a) Potentiometric
- b) Polarographic d) Optical transducer
- Ion-selective electrode c) Oxygen content can be controlled by adding which of the following
- 7) materials with water? b) Basic solution
 - Acidic solution a) c) lodine
 - d) Hydrazine
- 8) If the displacement is measured with strain gauge then the number of strain gauge normally required are ____
 - One b) Two a) c) Three d) Four

Max. Marks: 70

Set

- b) Precision

- b) Saturation
9) A capacitive pressure sensor has a typical measurement uncertainty of _____.

a)

a)

a)

- a) ± 0.2% b) ± 0.4% ± 0.1% d) ± 0.8% c)
- 10) Smallest change which a sensor can detect is _
 - Resolution b) Accuracy a)
 - Precision C) d) Scale
- of the following is not a piezo electric sensor. 11) PZT
 - b) Roscelle salt
 - Quartz C)

active

- d) None of the mentioned
- 12) of the following has the widest range of temperature measurement.
 - RTD a) Thermistor c)
- b) Thermocouple Mercury thermometer d)
- Optical fiber sensors are electrically _ 13)

biocatalytic membrane

- b) passive
- active as well as passive C)
 - d) cannot be determined
- 14) The biological response of the biosensor is determined by
 - b) Physio-chemical membrane

SLR-FM-465

Set | Q

- Chemical membrane c)
- d) artificial membrane

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks

Section – I

Q.2 Attempt any four

- 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.

- 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 verse voltage characteristics of thermistors.

Section – II

Q.4 Attempt any four

- a) What is mean 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

- 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.



Max. Marks: 56

16

12

12

Seat No.

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

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

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

- of the following has the widest range of temperature measurement. 1)
 - RTD a)

c)

a)

a)

- b) Thermocouple 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 _____ biocatalytic membrane
 - b) Physio-chemical membrane

d) artificial membrane

- c) Chemical membrane
- 4) refers to the degree of repeatability of a measurement.
 - a) Accuracy b) Precision
 - d) Sensitivity c) Resolution
- Change is signal over long period of time is called . 5)
 - b) offset noise a)
 - hysteresis d) drift C)
- Ability of the sensor to repeat a measurement when put back in the same 6) environment is called _____
 - Conformance Saturation b)
 - Repeatability d) Threshold c)

7) of the following is not a static property.

- Repeatability b) Hysteresis a)
- Frequency response d) Saturation C)
- 8) Transducers employed in the bulk of enzyme electrodes use of the _____ principles.
 - a) Amperometric Optical b)
 - Magnetic d) Colorimetric c)
- 9) of the following transducers must be used for dissolved oxygen analyser.
 - a) Potentiometric C) Ion-selective electrode
- Polarographic b)
- d) Optical transducer

Max. Marks: 70

Marks: 14

Set

				Set	R			
Oxy mat	Oxygen content can be controlled by adding which of the following materials with water?							
a)	Acidic solution	b)	Basic solution					
c)	lodine	d)	Hydrazine					
lf th stra	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					
A capacitive pressure sensor has a typical measurement uncertainty								

01	•		
a)	± 0.2%	b)	±0.4%
C)	± 0.1%	d)	± 0.8%

13) Smallest change which a sensor can detect is _____.

- a) Resolution b) Accuracy
- d) Scale c) Precision
- 14) _____ of the following is not a piezo electric sensor.
 - a) PZT

10)

11)

12)

c) Quartz

b) Roscelle saltd) None of the mentioned

SLR-FM-465

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks

Section – I

Q.2 Attempt any four

- 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.

- 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 verse voltage characteristics of thermistors.

Section – II

Q.4 Attempt any four

- a) What is mean 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

- 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.



Max. Marks: 56

12

16

16

Page 10 of 12

SLR-FM-465

Seat No.

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

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

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

- Ability of the sensor to repeat a measurement when put back in the same 1) environment is called _____
 - b) Conformance a)
 - c) Repeatability d)
- of the following is not a static property. 2) Repeatability a)
- c) Frequency response 3) Transducers employed in the bulk of enzyme electrodes use of the _____ principles.
 - a) Amperometric
 - Magnetic c)
- of the following transducers must be used for dissolved oxygen 4) analyser.
 - a) Potentiometric
 - d) Optical transducer Ion-selective electrode c)
- 5) Oxygen content can be controlled by adding which of the following materials with water?
 - Acidic solution b) Basic solution a)
 - lodine d) Hydrazine c)
- 6) If the displacement is measured with strain gauge then the number of strain gauge normally required are
 - One a) b) Two
 - c) Three d) Four
- 7) A capacitive pressure sensor has a typical measurement uncertainty of .
 - a) ± 0.2% b) $\pm 0.4\%$ c) ± 0.1% d) ± 0.8%
- Smallest change which a sensor can detect is 8)
 - a) Resolution b) Accuracy
 - Precision c) d) Scale

Marks: 14

Max. Marks: 70

Saturation

- Threshold
- b) Hysteresis d) Saturation

b)

- b) Optical
- d) Colorimetric

Polarographic

			Set	S	
a) c)	of the following is not a piezo PZT Quartz	eleo b) d)	ctric sensor. Roscelle salt None of the mentioned		
a) c)	of the following has the wides RTD Thermistor	st rai b) d)	nge of temperature measurement. Thermocouple Mercury thermometer		
Opt a) c)	ical fiber sensors are electrically active as well as passive	b) d)	 passive cannot be determined		
The a) c)	e biological response of the biose biocatalytic membrane Chemical membrane	enso b) d)	r is determined by Physio-chemical membrane artificial membrane		
	refers to the degree of repeatability of a measurement.				

- 13)
 - a) Accuracy b) Precision c) Resolution d) Sensitivity
- Change is signal over long period of time is called _____. 14)
 - a) noise

9)

10)

11)

12)

- c) hysteresis

b) offsetd) drift

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks

Section – I

Q.2 Attempt any four

Seat No.

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

Q.3 Attempt any two.

- Draw and explain concept of half-cell potential and polarization concept of a) any electrode.
- Explain construction and working of LVDT and mention its application. b)
- Explain the typical current verse voltage characteristics of thermistors. C)

Section – II

Q.4 Attempt any four

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

Q.5 Attempt any two

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

12

16

Max. Marks: 56

16

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

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

Seat

No.

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

- is branch of mechanism that describe the cause of bio 1) mechanism.
 - Physics a)
 - **Kinematics** Informatics d) c)
- 2) Instrumented walkway record timings of _
 - Goniometer b) Footswitch a) Gait d) None c)

Antalgic hip gait is related to which of the following _ 3)

- a) Wadding gait Trendeleberg gait b) Painful hip gait d) Short leg gait c)
- 4) Neck joint is an example of .
 - Pivot joint Hinge joint b) a)
 - Saddle joint Condyloid joint c) d)
- 5) In which type of lever the force is in between weight and fulcrum?
 - Type II Type I a) b)
 - c) Type III d) All above

The movements around ball and socket joints are 6) Rotation and circumduction

Flexion and extension a) b) c) Hyper extension d) All above

Which of the following is example of biaxial joint? 7)

- Hinae Pivot a) b)
- c) Both a and b d) None
- 8) Sideward curvature of the spine is called
 - a) Knock knee **Kyphosis** b)
 - d) Lordosis c) Scoliosis
- 9) The trim lines of a ground reaction ankle foot orthosis should be anterior to the malleoli to serve as a
 - Dossiflexion assist b) Plantarflexion assist a) Dorsiflexion stop c)
 - d) Plantarflexion stop

SLR-FM-466



Max. Marks: 70

Marks: 14

- b)
- Chemistry



- 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 desease
- 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

Page 2 of 12

Seat No.

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

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.

- 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.

- **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.

- 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.

- 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

Max. Marks: 56

12

16

12

Set

Max. Marks: 70

Marks: 14

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

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

Seat

No.

- Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14
 - Sideward curvature of the spine is called _ 1)
 - a) Knock knee **Kyphosis** b)
 - c) Scoliosis Lordosis d)
 - 2) The trim lines of a ground reaction ankle foot orthosis should be anterior to the malleoli to serve as a .
 - Dossiflexion assist Plantarflexion assist a) b)
 - Plantarflexion stop c) Dorsiflexion stop d)
 - 3) 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
 - 4) The selection of thorax is made up of
 - Bone a) Cartilage b)
 - c) Both a and b d) None
 - Zygomatic bone is present in ____ 5)
 - a) Upper extremities b) Lower extremities
 - c) Vertebral column d) Skull
 - A short statured patient brought to orthopedics OPD with a x- ray showing 6) flattened vertebra with beak. The probable diagnosis is _____.
 - a) Achondroplasia b)
 - c) Eosinophilic granuloma d) Calve's desease
 - 7) Which of the following is responsible for limiting the range of movements?
 - a) Tendons b)
 - Muscle fibers c) Both a and b d)
 - _ is branch of mechanism that describe the cause of bio 8) mechanism. Chemistry
 - a) Physics
 - b) C) Informatics d)

- Ochronosis
- - Ligaments

Kinematics

Set Q

- 9) Instrumented walkway record timings of .
 - a) Goniometer c) Gait
- b) Footswitch d) None
- Antalgic hip gait is related to which of the following _____ 10)
 - a) Wadding gait
- b) Trendeleberg gait
- d) Short leg gait
- Neck joint is an example of _____. 11)

c) Painful hip gait

- a) Pivot joint b) Hinge joint c) Saddle joint
 - Condyloid joint d)

In which type of lever the force is in between weight and fulcrum? 12)

- Type II a) Type I b)
- All above c) Type III d)
- 13) The movements around ball and socket joints are ____ a) Flexion and extension
 - Rotation and circumduction b)
 - c) Hyper extension d) All above
- Which of the following is example of biaxial joint? 14)
 - a) Hinge c) Both a and b

- b) Pivot
- d) None

Seat No.

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

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.

- 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.

- **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.

- 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.

- 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

Max. Marks: 56

12

16

12

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

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

4)

Seat

No.

- Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14
 - 1) 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
 - 2) The movements around ball and socket joints are _____.
 a) Flexion and extension
 b) Rotation and circumduction
 - c) Hyper extension d) All above
 - 3) Which of the following is example of biaxial joint?
 - a) Hinge b) Pivot
 - c) Both a and b d) None
 - 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) Dossiflexion 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
 - c) Decrease in push off resistance
 - d) Decrease in external rotation of the foot
 - 7) The selection of thorax is made up of _____
 - a) Cartilage b) Bone
 - c) Both a and b d) None
 - 8) Zygomatic bone is present in _____.
 a) Upper extremities b) Lower extremities
 - c) Vertebral column d) Skull

Max. Marks: 70

Marks: 14

Set

				Set
9)	A s flat a) c)	hort statured patient brought to o tened vertebra with beak. The pro Achondroplasia Eosinophilic granuloma	rthope obable b) d)	edics OPD with a x- ray showing e diagnosis is Ochronosis Calve's desease
10)	Wh a) c)	iich of the following is responsible Tendons Both a and b	e for li b) d)	miting the range of movements? Ligaments Muscle fibers
11)	me a) c)	is branch of mechanism to chanism. Physics Informatics	hat de b) d)	escribe the cause of bio Chemistry Kinematics
12)	Ins [.] a) c)	trumented walkway record timing Goniometer Gait	s of _ b) d)	Footswitch None
13)	Ant a) c)	talgic hip gait is related to which c Wadding gait Painful hip gait	of the b) d)	following Trendeleberg gait Short leg gait
14)	Ne a)	ck joint is an example of Pivot joint	 b)	Hinge joint

c) Saddle joint d) Condyloid joint

SLR-FM-466

R

Seat No.

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

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.

- 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.

- **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.

- 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.

- 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

Max. Marks: 56

R

12

16

12

Set

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

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

Seat

No.

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

- When the counter of the shoe fits too tightly on a SACH foot which of the 1) 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 Bone b)
 - c) Both a and b d) None
- Zygomatic bone is present in ____ 3)
 - a) Upper extremities Lower extremities b)
 - 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)
 - c) Eosinophilic granuloma d)
- Which of the following is responsible for limiting the range of movements? 5)
 - a) Tendons Ligaments b)
 - c) Both a and b d) Muscle fibers
- is branch of mechanism that describe the cause of bio 6) mechanism.
 - a) Physics b) Chemistry c) Informatics **Kinematics** d)
- 7) Instrumented walkway record timings of
 - a) Goniometer Footswitch b)
 - c) Gait None d)
- 8) Antalgic hip gait is related to which of the following _____
 - a) Wadding gait Trendeleberg gait b)
 - c) Painful hip gait Short leg gait d)

- Ochronosis

- Calve's desease

Marks: 14

Max. Marks: 70

Neck joint is an example of _____.a) Pivot jointb) Hinge jointc) Saddle jointd) Condyloid jointIn which type of lever the force is in between weight and fulcrum?a) Type Ib) Type II

c) Type III d) All above

11) The movements around ball and socket joints are _____

- a) Flexion and extension b) Rotation and circumduction
- c) Hyper extension d) All above
- 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 ____

9)

10)

- 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 _____.

Plantarflexion assist

- a) Dossiflexion assist b)
- c) Dorsiflexion stop d) Plantarflexion stop

SLR-FM-466

Set S

Seat	
No.	
-	

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

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.

- 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.

- **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.

- 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.

- 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

Max. Marks: 56

12

16

16

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

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

Seat

No.

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

- A device prevents the oscillation of the moving system and enables 1) the latter to reach its final position quickly. b) Controlling
 - a) deflecting
 - damping d) all of the above C)
- 2) A moving-coil permanent-magnet instrument can be used as _____by using a low resistance shunt. b) Voltmeter

d) ballistic galvanometer

b) Square waveforms

- a) ammeter
- flux-meter c)
- 3) An rms reading voltmeter can accurately measure voltages of .
 - Sine waveforms a)
 - Saw tooth waveforms d) All of these C)
- 4) The measurement range of digital voltmeter is _____
 - 1V to 1kV 1V to 1MV b) a) 1kV to 1MV
 - d) 100 kV to 100MV c)
- 5) In a ramp type DVM, the multivibrator determines the rate at which the _
 - Clock pulses are generated Measurement cycles are initiated a) b) d) Its amplitude varies
 - c) It oscillates

Q meter is used to measure the properties of _ 6)

- a) Inductive coils b) Non inductive coils Capacitive coils d) Both (a) and (c) 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 d) Cost
 - c) Frequency range
- 9) In function generator, the output waveform of integrator is b) Square
 - Sinusoidal a) Triangular c)
- d) Saw-tooth

SLR-FM-467



Max. Marks: 70

- Marks: 14

A voltmeter connected across a resistor gives a value of 65 V but the 10) expected value of resistor was 68 V. Then the absolute error and the relative accuracy of the measurement will be _ 3.2%, 96.8% a)

b) 3.8%, 96.2%

c) 4%, 96%

d) 4.4%, 95.59%

SLR-FM-467

Set

- For an instrument the degree of repeatability or reproducibility in 11) measurements is alternative way of expressing its _____.
 - Precision b) Accuracy a)
 - d) Linearity Sensitivity c)
- 12) T he zero drift is measured in units of _
 - a) Volts-°C b) Volts /°c
 - c) °c/volts d) $(volts)^2/^{\circ}c$
- The difference between the measured value and the true value is known 13) as
 - Relative error a)

- b) Random error
- Absolute error d) Systematic error C)
- 14) If the control springs of PMMC instrument is made up of large moment of inertia, then it can be used as _____
 - a) Ammeter
 - Ballistic galvanometer C)
- b) Fluxmeter
- d) Wattmeter

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019 **Bio-Medical Engineering ELECTRONICS INSTRUMENTATIONS** Max. Marks: 56 Day & Date: Monday, 25-11-2019 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.

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

Q.3 Attempt any two.

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

Section – II

Q.4 Attempt any four.

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

Attempt any two. Q.5

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

SLR-FM-467

Seat No.

12

16

16

Max. Marks: 70

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

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

c)

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

- The basic difference between square wave and pulse generator is their _____. 1) b) Duty cycles
 - a) Waveforms shape
 - Frequency range d) Cost c)
- 2) In function generator, the output waveform of integrator is _____.
 - a) Sinusoidal b) Square c) d) Saw-tooth
 - Triangular
- 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
 - 3.2%, 96.8% a) 4%, 96%
- b) 3.8%, 96.2% 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
 - Sensitivity d) Linearity c)
- 5) T he zero drift is measured in units of
 - Volts /°c a) Volts-°C b)
 - c) °c/volts d) $(volts)^2/^{\circ}c$
- The difference between the measured value and the true value is known 6) as
 - Relative error a) C)
 - b) Random error 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 ____
 - Ammeter b) Fluxmeter a)
 - Ballistic galvanometer d) Wattmeter C)
- A _____device prevents the oscillation of the moving system and enables 8) the latter to reach its final position quickly.
 - deflecting b) Controlling a)
 - damping d) all of the above c)



Marks: 14

				SLR-FM-467
				Set Q
9)	A m usii	noving-coil permanent-magnet in ng a low resistance shunt.	strur	ment can be used asby
	a)	ammeter	b)	Voltmeter
	c)	flux-meter	d)	ballistic galvanometer
10)	An	rms reading voltmeter can accur	ately	r measure voltages of
	a)	Sine waveforms	b)	Square waveforms
	c)	Saw tooth waveforms	d)	All of these
11)	Th∉	e measurement range of digital v	oltm	eter is
	a)	1V to 1MV	b)	1V to 1kV
	c)	1kV to 1MV	d)	100 kV to 100MV
12)	In a	a ramp type DVM, the multivibrat	or de	etermines the rate at which the
	a)	Clock pulses are generated	b)	Measurement cycles are initiated
	c)	It oscillates	d)	Its amplitude varies
13)	Q n	neter is used to measure the pro	perti	es of
	a)	Inductive coils	b)	Non inductive coils
	c)	Capacitive coils	d)	Both (a) and (c)
4 4)	Les 13	and a second all all and a second bar of a		al and the tea many and the stat

- 14) In liquid crystal displays, the liquid crystal exhibits properties of _____.
 a) Liquid ______b) Solids
 c) Gases d) Both (a) and (b)

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

Seat No.

- 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.

- 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.

- 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.

- 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.

12

Max. Marks: 56

SLR-FM-467

16

12

Set R

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

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

c)

Seat

No.

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
 - d) Its amplitude varies

d) Saw-tooth

- 2) Q meter is used to measure the properties of _____
 - a) Inductive coils
 - c) Capacitive coils

It oscillates

b) Non inductive coilsd) Both (a) and (c)

b) Measurement cycles are initiated

- 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
- 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) T he zero drift is measured in units of _____
 - a) Volts-°C b) Volts /°c
 - c) °c/volts d) $(volts)^2/°c$
- The difference between the measured value and the true value is known as _____.
 - a) Relative error
 - c) Absolute error

- b) Random error
- d) Systematic error

Max. Marks: 70

Marks: 14

10) 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

SLR-FM-467

Set R

- 11) 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
- 12) A moving-coil permanent-magnet instrument can be used as _____by using a low resistance shunt.
 - a) ammeter b
 - b) Voltmeter
 - c) flux-meter d) ballistic galvanometer
- 13) An rms reading voltmeter can accurately measure voltages of _____.
 - a) Sine waveforms b) Square waveforms
 - c) Saw tooth waveforms d) All of these
- 14) The measurement range of digital voltmeter is ____
 - a) 1V to 1MV

b) 1V to 1kV

c) 1kV to 1MV

d) 100 kV to 100MV

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering ELECTRONICS INSTRUMENTATIONS Pate: Monday, 25-11-2019 Max, Marks: 56

Day & Date: Monday, 25-11-2019

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.

Seat No.

- 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.

- 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.

- 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.

- 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.

SLR-FM-467



16

16

12

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

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

Seat No.

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

- A voltmeter connected across a resistor gives a value of 65 V but the 1) expected value of resistor was 68 V. Then the absolute error and the relative accuracy of the measurement will be ____
 - b) 3.8%, 96.2% a) 3.2%, 96.8% c) 4%.96%
 - d) 4.4%. 95.59%

d) Linearity

- 2) For an instrument the degree of repeatability or reproducibility in measurements is alternative way of expressing its _
 - b) Accuracy a) Precision
 - Sensitivity C)
- T he zero drift is measured in units of 3)
 - a) Volts-°C b) Volts /°c
 - d) $(volts)^2/^{\circ}c$ C) °c/volts
- 4) The difference between the measured value and the true value is known as .
 - Relative error b) Random error a) d) Systematic error
 - Absolute error C)
- 5) 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
 - Ballistic galvanometer d) Wattmeter c)
- A device prevents the oscillation of the moving system and enables 6) the latter to reach its final position quickly.
 - a) deflectina b) Controlling
 - damping d) all of the above c)
- 7) A moving-coil permanent-magnet instrument can be used as _____by using a low resistance shunt.
 - ammeter b) Voltmeter a) c) flux-meter d) ballistic galvanometer
 - An rms reading voltmeter can accurately measure voltages of _____.
 - a) Sine waveforms Saw tooth waveforms

8)

c)

- b) Square waveforms
- d) All of these

Max. Marks: 70

Marks: 14

			Set	S
9)	The measurement range of digital a) 1V to 1MV c) 1kV to 1MV	l voltm b) d)	eter is 1V to 1kV 100 kV to 100MV	
10)	In a ramp type DVM, the multivibr a) Clock pulses are generated c) It oscillates	ator de b) d)	etermines the rate at which the Measurement cycles are initiated Its amplitude varies	<u> </u> .
11)	Q meter is used to measure the pa) Inductive coilsc) Capacitive coils	roperti b) d)	es of Non inductive coils Both (a) and (c)	
12)	In liquid crystal displays, the liquid	d crysta	al exhibits properties of	

- a) Liquid b) Solids d) Both (a) and (b) c) Gases
- The basic difference between square wave and pulse generator is their _____. 13)
 - a) Waveforms shape b) Duty cycles
 - c) Frequency range d) Cost
- In function generator, the output waveform of integrator is _____. 14)
 - a) Sinusoidal c) Triangular

- b) Square
- d) Saw-tooth

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

Seat No.

- 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.

- 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.

- 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.

- 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.

12

Max. Marks: 56

16

12

16

SLR-FM-467

Set S

			Bio-Medical E DIGITAL D	ngin ESIC	eering SN
Day a Time	& Date : 02:30	e: Tu D PN	esday,26-11-2019 1 To 05:30 PM		Max. Marks: 70
Instr	uctior	is: 1) Q. No. 1 is compulsory and sh	ould b	be solved in first 30 minutes in answer
		~	book.	mork	
		2		mark	
Dura	tion: 3	0 Mi	nutes	/pe C	Marks: 14
Q.1	Choo sente	ose t ence	the correct alternatives from th	e opt	ions and rewrite the 14
	1)	Ab a)	inary number with 'n' bits all of w $n^2 - 1$	hich a b)	are 1s has the value 2^n
		c)	$2^{(n-1)}$	d)	$2^n - 1$
	2)	lf (/ a) c)	$A2C)_{16} = (x)_8$, then 'x ['] is give by 7054 5154	b) d)	 6054 5054
	3)	Th∉ a) c)	e number of parity bits in a 12 bit 4 6	Hamr b) d)	ning code is 5 8
	4)	For a) c)	mathematical operations, the co Sequential Self complimentary	de mi b) d)	ust be Cyclic Unit distance
	5)	The anc a) c)	e logic operation $AB + \overline{A} \overline{B}$ can be I B to a two input NOR gate X-OR gate	imple b) d)	emented by giving the input A NAND gate X-NOR gate
	6)	Th∉ a) c)	e code used for labeling cells of tl Natural B'D Gray	ne k-n b) d)	nap is Hexadecimal Octal
	7)	A ′ <i>r</i> a) c)	n' variable k-map can have n^2 cells n^n cell	 b) d)	2^n cells n^{2n} cells
	8)	one a) c)	select lines are contained in e output. 512 64	a mu b) d)	Itiplexer with 1024 inputs and 258 10
	9)	Par a) c)	allel adders are Combinational logic circuits both (a) and (b)	b) d)	sequential logic circuits None of the above

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

SLR-FM-468

Set P

Seat

No.

			SLR-FM-468
			Set P
10)	Dynamic shift registers are made up a) Dynamic Hip flops c) MOS-NAND gates	of b) d)	MOS inverters CMOS inverters
11)	The basic memory element in a digit a) Consists of a NAND gate c) Is a flip flop	al ciro b) d)	cuit Consists of a NOR gate Is a shift register
12)	In a master slave J-K flip flop, $J = K$ = after the clock pulse will be a) 0 c) Q_n	= 1. T b) d)	The state Q_{n+1} of the flip flop $\frac{1}{\overline{Q}_n}$
13)	A TTL circuit acts as a current sink ir a) Low State c) High impedance state	n the j b) d)	High state None of these
14)	The logic family with both logic levels a) TTL c) CMOS	s neg b) d)	ative is ECL MOS

Max. Marks: 56

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Attempt any four. Q.2

Seat

No.

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

Q.3 Attempt any two.

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

Section – II

Q.4 Attempt any four

- Define and differentiate synchronous and asynchronous counter. a)
- Define following types of memories. b)
 - 1) ROM
 - 2) RAM
 - 3) EPROM
 - 4) Volatile
- Distinguish between combinational and sequential logic circuits. c)
- With the help of neat diagram, explain working of following types of shift d) registers
 - Parallel in-serial out 1)
 - Bidirectional 2)
- Using 4×1 MUX implement following logic function. e) $F(A, B, C) = \sum m(1, 2, 4, 7)$

12

16

Set P

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.


2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

.1 C	hoose	the correct alternatives from th	e opt	ions and rewrite the	14
1)		select lines are contained in	a mu	Itiplexer with 1024 inputs and	
-,	on a) c)	e output. 512 64	b) d)	258 10	
2)	Pa a) c)	rallel adders are Combinational logic circuits both (a) and (b)	b) d)	sequential logic circuits None of the above	
3)	Dy a) c)	namic shift registers are made up Dynamic Hip flops MOS-NAND gates	of b) d)	MOS inverters CMOS inverters	
4)	Th a) c)	e basic memory element in a digit Consists of a NAND gate Is a flip flop	al ciro b) d)	cuit Consists of a NOR gate Is a shift register	
5)	In aft a) c)	a master slave J-K flip flop, $J = K$: er the clock pulse will be 0 Q_n	= 1. T b) d)	The state Q_{n+1} of the flip flop $\frac{1}{\overline{Q}_n}$	
6)	A ⁻ a) c)	TTL circuit acts as a current sink ir Low State High impedance state	n the _. b) d)	High state None of these	
7)	Th a) c)	e logic family with both logic levels TTL CMOS	s neg b) d)	ative is ECL MOS	
8)	A k a) c)	pinary number with 'n' bits all of where $n^2 - 1$ $2^{(n-1)}$	nich a b) d)	re 1s has the value 2^n $2^n - 1$	
9)	lf (a) c)	$(A2C)_{16} = (x)_8$, then 'x' is give by 7054 5154	b) d)	 6054 5054	

Seat No.

Day & Date: Tuesday, 26-11-2019

book.

Time: 02:30 PM To 05:30 PM

Duration: 30 Minutes



Marks: 14

SLR-FM-468 Set Q 10) The number of parity bits in a 12 bit Hamming code is _____. a) 4 b) 5 c) 6 d) 8 For mathematical operations, the code must be _____. 11) a) Sequential b) Cyclic c) Self complimentary Unit distance d) 12) The logic operation $AB + \overline{A} \overline{B}$ can be implemented by giving the input A and B to a two input _____. b) NAND gate a) NOR gate c) X-OR gate d) X-NOR gate The code used for labeling cells of the k-map is _____. 13) Hexadecimal a) Natural B'D b) c) Gray d) Octal 14) A 'n' variable k-map can have _____. b) a) n^2 cells 2^n cells

c) n^n cell

 n^{2n} cells

d)

Max. Marks: 56

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Attempt any four. Q.2

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

Q.3 Attempt any two.

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

Section – II

Q.4 Attempt any four

- Define and differentiate synchronous and asynchronous counter. a)
- Define following types of memories. b)
 - 1) ROM
 - 2) RAM
 - 3) EPROM
 - 4) Volatile
- Distinguish between combinational and sequential logic circuits. c)
- With the help of neat diagram, explain working of following types of shift d) registers
 - Parallel in-serial out 1)
 - Bidirectional 2)
- Using 4×1 MUX implement following logic function. e) $F(A, B, C) = \sum m(1, 2, 4, 7)$

12

16

16



Seat No.

Set Q

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.

S.E. (Part – II) (CBCS) Examination Nov/Dec-2019 **Bio-Medical Engineering** DIGITAL DESIGN Day & Date: Tuesday, 26-11-2019 Max. Marks: 70 Time: 02:30 PM To 05:30 PM

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 14 sentence. 1) The logic operation AB + $\overline{A} \overline{B}$ 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 2) The code used for labeling cells of the k-map is _____ a) Natural B'D b) Hexadecimal c) Grav d) Octal 3) A 'n' variable k-map can have . 2^n cells a) n^2 cells b) c) n^n cell n^{2n} cells d) 4) select lines are contained in a multiplexer with 1024 inputs and one output. a) 512 b) 258 c) 64 d) 10 Parallel adders are 5) a) Combinational logic circuits b) sequential logic circuits c) both (a) and (b) None of the above d) 6) Dynamic shift registers are made up of a) Dynamic Hip flops MOS inverters b) c) MOS-NAND gates **CMOS** inverters d) 7) 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 8) 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 1 b) \overline{Q}_n c) Q_n d) 9) A TTL circuit acts as a current sink in the _ a) Low State High state b) c) High impedance state d) None of these

SLR-FM-468

Set R

Seat No.

				Set	R
10)	The logic family with both logic levels a) TTL c) CMOS	s nega b) d)	ative is ECL MOS		
11)	A binary number with 'n' bits all of what $n^2 - 1$ c) $2^{(n-1)}$	hich a b) d)	re 1s has the value 2^n $2^n - 1$		
12)	If $(A2C)_{16} = (x)_8$, then 'x' is give by a) 7054 c) 5154	b) d)	 6054 5054		
13)	The number of parity bits in a 12 bit a) 4 c) 6	Hamn b) d)	ning code is 5 8		
14)	For mathematical operations, the corala) Sequentialc) Self complimentary	de mu b) d)	ist be Cyclic Unit distance		

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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 $A \oplus B = A\overline{B} + \overline{A}B$ 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.

- 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) $AB + A\overline{B}C + B\overline{C} = AC + B\overline{C}$
 - 2) $A\overline{B}C + B + B\overline{D} + AB\overline{D} = B + C$
- 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

- 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) = $\sum m(1, 2, 4, 7)$

12

16

16



Max. Marks: 56

Seat No.

Set R

12

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.

c)	5154	d)	5054				
The	The number of parity bits in a 12 bit Hamming code is						
a)	4	b)	5				
c)	6	d)	8				
For	mathematical operations, the coo	de mu	ist be				
a)	Sequential	b)	Cyclic				
C)	Self complimentary	d)	Unit distance				

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

8)

9)

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 14 sentence. 1) Dynamic shift registers are made up of a) Dynamic Hip flops MOS inverters b) c) MOS-NAND gates d) **CMOS** inverters The basic memory element in a digital circuit _____ 2) 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 1 b) a) 0 c) Q_n d) \overline{Q}_n A TTL circuit acts as a current sink in the _ 4) 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 ECL b) c) CMOS d) MOS A binary number with 'n' bits all of which are 1s has the value _____. 6) a) $n^2 - 1$ 2^n b) c) $2^{(n-1)}$ d) $2^{n} - 1$ 7) If $(A2C)_{16} = (x)_8$, then 'x' is give by a) 7054 b) 6054

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

Seat No.

SLR-FM-468

Set

Max. Marks: 70

- 10) The logic operation $AB + \overline{A} \overline{B}$ 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
 - Hexadecimal b)
 - c) Gray d) Octal
- A 'n' variable k-map can have _____. 12)
 - b) 2^n cells a) n^2 cells
 - c) n^n cell n^{2n} cells d)
- _____ select lines are contained in a multiplexer with 1024 inputs and 13) one output.
 - a) 512 b) 258
 - c) 64

- d) 10
- 14) Parallel adders are _____.
 - a) Combinational logic circuits
 - c) both (a) and (b)
- b) sequential logic circuits
- None of the above d)



Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Attempt any four. Q.2

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

Q.3 Attempt any two.

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

Section – II

Q.4 Attempt any four

- Define and differentiate synchronous and asynchronous counter. a)
- Define following types of memories. b)
 - 1) ROM
 - 2) RAM
 - 3) EPROM
 - 4) Volatile
- Distinguish between combinational and sequential logic circuits. c)
- With the help of neat diagram, explain working of following types of shift d) registers
 - Parallel in-serial out 1)
 - Bidirectional 2)
- Using 4×1 MUX implement following logic function. e) $F(A, B, C) = \sum m(1, 2, 4, 7)$

12

16

Max. Marks: 56

Set S

12

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.

		E	LECTRONICS CIRCUIT AN	IAL	YSIS AND DESIGN- II
Day a Time	& Date : 02:3	e: W 0 PN	ednesday, 27-11-2019 / To 05:30 PM		Max. Marks: 70
Instr	uctio	ns: 1 2	l) Q. No. 1 is compulsory and sh book.) Figures to the right indicate full	nould mar	l be solved in first 30 minutes in answer ks.
			MCQ/Objective T	уре	Questions
Dura	tion: 3	30 M	inutes		Marks: 14
Q.1	Cho 1)	ose Uni equ	the correct alternatives from t ty gain frequency is the fr als 1.	he o eque	ptions and rewrite the sentence. 14 ency possible where the gain
		а) С)	stable	d)	maximum
	2)	The cha a) c)	e output voltage of differentiate is nge of input voltage with respec RC time constant Slew Rate	equ t to ti b) d)	al to instantaneous rate of me. Feedback resister Delay time
	3)	In o a) c)	pen loop configuration op – amp noing fixed	b outj b) d)	out levels are at ±vs at. moving none of the above
	4)	Sup to c a) c)	pply voltage rejection ratio is the hange in supply voltage. offset differential	ratio b) d)	of change in input voltage common gain
	5)	The inve a) c)	e algebraic difference between th erting terminals op - amp is calle Input bias current CMRR	ne cu d b) d)	rrents into the inverting and non Input off set current slew rate
	6)	The for <i>J</i> a) c)	e bandwidth of open loop op - an AC application at frequen high medium	np is cy. b) d)	very small, hence it can't be used cutoff low
	7)	Cla: a) c)	ss A power amplifier circuit can l Fixed bias Class AB	be co b) d)	onstructed using circuit. Class B None of the above
	8)	Emi	itter follower is used as a	nplif	er to match high impedance

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

SLR-FM-469

Ρ

Set

- source with low impedance load. b) cascode
 - Darlington a) C)
 - buffer d) push pull

- Seat No.

Set

- Hartley oscillator consists of positive feedback formed by L1L2 and class 9) amplifier.
 - А a)

a)

C)

- b) B
- C) AB d) Push pull
- Stability factor 'S' is defined as the ratio of the change in collector current 10) to change in _____ leakage current.
 - collector to base b) base to collector collector to emitter
 - d) emitter to base
- Class 'C' amplifier gives greater power efficiency of the order _____. 11)
 - 50% b) 75% a)
 - d) 85% 25% C)
- _____ is the maximum rate of change of output voltage per unit time of an 12) op - amp.
 - a) Offset voltage b) CMRR
 - c) Input bias d) Slew rate
- Cross over distortion can be avoided by operating class B amplifier in 13) class ____ mode.
 - a) A
 - b) AB С c) d) Push pull
- Ground always sinks the current and virtual ground sinks the current as 14) well as _____ of current.
 - a) sources
 - neutral c)

- b) references
- d) none

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

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Bio-Medical Engineering ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II

Q.2 Attempt any four questions.

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

+180

390 0

- Emitter bypass capacitor (C_F) 1)
- Resistance R_E and R_C 2)
- Calculate the DC bias voltage and currents in given circuit. C)

- Calculate the efficiency of class B amplifier for a supply voltage of d) Vcc = 24V with peak output voltage of.
 - 1) $V_1(p) = 22v$

 - 2) $V_{L}(p) = 6v$

Q.3 Attempt any two questions.

Find the output voltage of the circuit shown below. a)



- b) Define harmonic distortion and cross over distorted and explain working of class AB power amplifer.
- Explain working of RC phase shift and crystal oscillater with output C) waveforms.

Max. Marks: 56

B.D = 8000VBE = 1.6v 16

12

SLR-FM-469

Set



SLR-FM-469 Set P

Section – II

Q.4 Attempt any four questions.

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate Vo 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.

- a) Design a circuit diagram using op amp to provide the output voltage Vo as , Vo = -2 $(3v_1 + 4V_2 + 2V_3)$
- **b)** With the help of circuit diagram and waveform explain working of zero crossing detecter.
- c) Define following characteristic of op amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

16

TIME	. 02.0			
Instr	uctio	ons: 1) Q. No. 1 is compulsory and sh book.	ould	be solved in first 30 minutes in answer
		2) Figures to the right indicate full	mar	ks.
		MCQ/Objective Ty	/pe (Questions
Dura	tion: 3	30 Minutes		Marks: 14
Q.1	Cho 1)	Sose the correct alternatives from the Emitter follower is used as an source with low impedance load.	n e oj nplifi	otions and rewrite the sentence. 14 er to match high impedance
		a) Darlington c) buffer	b) d)	cascode push pull
	2)	Hartley oscillator consists of positive	fee	dback formed by L_1L_2 and class
		c) AB	b) d)	B Push pull
	3)	Stability factor 'S' is defined as the ra to change in leakage current.	atio (b)	of the change in collector current
		c) collector to emitter	d)	emitter to base
	4)	Class 'C' amplifier gives greater pow a) 50% c) 25%	vere b) d)	fficiency of the order 75% 85%
	5)	is the maximum rate of chang	je of	output voltage per unit time of an
		op - amp. a) Offset voltage c) Input bias	b) d)	CMRR Slew rate
	6)	Cross over distortion can be avoided class mode.	l by b)	operating class B amplifier in
		c) C	d)	Push pull
	7)	Ground always sinks the current and well as of current.	l virt	ual ground sinks the current as
	0)	a) sources c) neutral	b) d)	none
	8)	equals 1.	eque	ncy possible where the gain

ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II

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

Seat

No.

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

Set

SLR-FM-469

Max. Marks: 70

- varying a) stable C)

- b) fixed
- maximum d)

SLR-FM-4	69
----------	----

- The output voltage of differentiate is equal to instantaneous rate of change of input voltage with respect to time. b) Feedback resister a) RC time constant 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.
 - offset a)

c) CMRR

9)

- b) common
- differential c) d) gain
- 12) The algebraic difference between the currents into the inverting and non inverting terminals op - amp is called ____ .
 - a) Input bias current
- d) slew rate
- The bandwidth of open loop op amp is very small, hence it can't be used 13) for AC application at _____ frequency.
 - a) high
 - c) medium d) low
- 14) Class A power amplifier circuit can be constructed using _____ circuit.
 - a) Fixed bias c) Class AB

b) Class B

b) cutoff

d) None of the above

b) Input off set current

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

+180

390 0

- 1) Emitter bypass capacitor (C_E)
- 2) Resistance R_E and R_C
- c) Calculate the DC bias voltage and currents in given circuit.



- Vcc = 24V with peak output voltage of.
- 1) $V_L(p) = 22v$
- 2) $V_L(p) = 6v$

Q.3 Attempt any two questions.

a) Find the output voltage of the circuit shown below.



- **b)** Define harmonic distortion and cross over distorted and explain working of class AB power amplifer.
- c) Explain working of RC phase shift and crystal oscillater with output waveforms.

Max. Marks: 56

B.D = 8000VBE = 1.6v

12

SLR-FM-469

Set



SLR-FM-469 Set Q

Section – II

Q.4 Attempt any four questions.

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- b) Calculate Vo 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.

- a) Design a circuit diagram using op amp to provide the output voltage Vo as , Vo = -2 $(3v_1 + 4V_2 + 2V_3)$
- **b)** With the help of circuit diagram and waveform explain working of zero crossing detecter.
- c) Define following characteristic of op amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

16

ne: 02:3	30 PM To 05:30 PM		
tructic	ons: 1) Q. No. 1 is compulsory a book.	nd should be solved in first 30 minu	ites in a
	Figures to the right indicat	te full marks.	
	MCQ/Objecti	ive Type Questions	
ration:	30 Minutes		Mar
Chc 1)	The algebraic difference betwe inverting terminals op - amp is a) Input bias current c) CMRR	tom the options and rewrite the second the currents into the inverting an called b) Input off set current d) slew rate	∍ntence id non
2)	The bandwidth of open loop op for AC application at free a) high c) medium	o - amp is very small, hence it can't equency. b) cutoff d) low	be used
3)	Class A power amplifier circuit a) Fixed bias c) Class AB	can be constructed using cir b) Class B d) None of the above	cuit.
4)	Emitter follower is used as source with low impedance loa a) Darlington c) buffer	amplifier to match high impedan ad. b) cascode d) push pull	ce
5)	Hartley oscillator consists of po amplifier. a) A c) AB	b) B b) Push pull	class
6)	Stability factor 'S' is defined as to change in leakage cu a) collector to base c) collector to emitter	 b) base to collector d) emitter to base 	current
7)	Class 'C' amplifier gives greate a) 50% c) 25%	er power efficiency of the order b) 75% d) 85%	

Bio-Medical Engineering ELECTRONICS CIRCUIT ANALYSIS AND DESIGN- II

Day & Date: Wednesday, 27-11-2019 Tim

Inst inswer

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

Dur Q.1



Set

Max. Marks: 70

- ____ is the maximum rate of change of output voltage per unit time of an 8) op - amp. a)
 - Offset voltage b) CMRR
 - Input bias d) Slew rate c)

Seat No.

> 'ks: 14 . 14

Set R

9) Cross over distortion can be avoided by operating class B amplifier in class ____ mode.

a) A

a)

- b) AB
- c) C d) Push pull
- Ground always sinks the current and virtual ground sinks the current as 10) well as _____ of current. sources
 - b) references
 - d) none C) neutral
- Unity gain frequency is the _____ frequency possible where the gain 11) equals 1.
 - a) varying

- b) fixed
- d) maximum c) stable
- The output voltage of differentiate is equal to _____ instantaneous rate of 12) change of input voltage with respect to time.
 - a) RC time constant b) Feedback resister
 - Slew Rate d) Delay time c)
- 13) In open loop configuration op – amp output levels are _____ at $\pm vs$ at.
 - a) noing

c) fixed

c)

- b) moving d) none of the above
- Supply voltage rejection ratio is the ratio of change in input _____ voltage 14) to change in supply voltage.
 - offset a)
 - differential
- b) common
- d) gain

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

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

+180

390 0

- Emitter bypass capacitor (C_F) 1)
- Resistance R_E and R_C 2)
- Calculate the DC bias voltage and currents in given circuit. c)



- 1) $V_1(p) = 22v$
- 2) $V_{L}(p) = 6v$

Q.3 Attempt any two questions.

Find the output voltage of the circuit shown below. a)



- Define harmonic distortion and cross over distorted and explain working of b) class AB power amplifer.
- Explain working of RC phase shift and crystal oscillater with output C) waveforms.

Max. Marks: 56

B.D = 8000VBE = 1.6v 16

12



SLR-FM-469



Set R

16

Section – II

Q.4 Attempt any four questions.

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- **b)** Calculate Vo 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.

- a) Design a circuit diagram using op amp to provide the output voltage Vo as , Vo = -2 $(3v_1 + 4V_2 + 2V_3)$
- **b)** With the help of circuit diagram and waveform explain working of zero crossing detecter.
- c) Define following characteristic of op amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

məti	uctio	book.			
		2) Figures	to the right indica	te full mar	ks.
			MCQ/Object	ive Type	Questions
Dura	ation: (30 Minutes			Marks
Q.1	Cho 1)	ose the correct Stability fact to change in a) collecto c) collecto	ect alternatives fr or 'S' is defined as leakage cu r to base r to emitter	the ratio the ratio rrent. b) d)	ptions and rewrite the sentence. of the change in collector current base to collector emitter to base
	2)	Class 'C' am a) 50% c) 25%	plifier gives greate	er power e b) d)	efficiency of the order 75% 85%
	3)	op - amp. a) Offset v c) Input bi	maximum rate of roltage as	change of b) d)	output voltage per unit time of an CMRR Slew rate
	4)	Cross over c class r a) A c) C	distortion can be av node.	voided by b) d)	operating class B amplifier in AB Push pull
	5)	Ground alwa	ays sinks the curre of current.	nt and virt	ual ground sinks the current as

c) neutral d) none Unity gain frequency is the _____ frequency possible where the gain 6)

b) references

- equals 1. a) varying b) fixed
 - c) stable d) maximum
- The output voltage of differentiate is equal to _____ instantaneous rate of 7) change of input voltage with respect to time.
 - a) RC time constant b) Feedback resister Slew Rate d) Delay time C)
- 8) In open loop configuration op – amp output levels are _____ at $\pm vs$ at. a)
 - noing b) moving
 - c) fixed d) none of the above

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

sources

a)

Seat

No.

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



Set

Marks: 14

14

Max. Marks: 70

				Set S
9)	Sup to cl a) c)	ply voltage rejection ratio is the r nange in supply voltage. offset differential	atio b) d)	of change in input voltage common gain
10)	The inve a) c)	algebraic difference between the rting terminals op - amp is called Input bias current CMRR	e cu I b) d)	rrents into the inverting and non Input off set current slew rate
11)	The for A a) c)	bandwidth of open loop op - am AC application at frequenc high medium	p is xy. b) d)	very small, hence it can't be used cutoff low
12)	Clas a) c)	ss A power amplifier circuit can b Fixed bias Class AB	e co b) d)	onstructed using circuit. Class B None of the above
13)	Emi sour a) c)	tter follower is used as an rce with low impedance load. Darlington buffer	nplifi b) d)	er to match high impedance cascode push pull
14)	Hart a)	ley oscillator consists of positive amplifier. A	fee b)	dback formed by L_1L_2 and class B

c) AB

d) Push pull

Page **14** of **16**

SLR-FM-469

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

+180

390 0

- 1) Emitter bypass capacitor (C_E)
- 2) Resistance R_E and R_C
- c) Calculate the DC bias voltage and currents in given circuit.

- Calculate the efficiency of class B amplifier for a supply voltage of Vcc = 24V with peak output voltage of.
 - 1) $V_1(p) = 22v$
 - 2) $V_L(p) = 6v$

Q.3 Attempt any two questions.

a) Find the output voltage of the circuit shown below.



- **b)** Define harmonic distortion and cross over distorted and explain working of class AB power amplifer.
- c) Explain working of RC phase shift and crystal oscillater with output waveforms.

Max. Marks: 56

B.D = 8000VBE = 1.6v

16

12

SLR-FM-469



Set S

16

Section – II

Q.4 Attempt any four questions.

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- **b)** Calculate Vo 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.

- a) Design a circuit diagram using op amp to provide the output voltage Vo as, Vo = -2 (3v₁ + 4V₂ + 2V₃)
- **b)** With the help of circuit diagram and waveform explain working of zero crossing detecter.
- c) Define following characteristic of op amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Set

Seat	
No.	

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

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

- _____ is the ratio of volume delivered to the pressure rise during the 1) inspiratory phase in the lungs. tidal volume b)
 - a) airway resistance
 - 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)
 - c) gas
- _____ are optical systems which provide better isolation of spectral 5) energy than the optical filters.
 - a) diffraction gratings b) filters
 - c) Holographic gratings d) monochromatic
- A colorimeter involves the measurement of color in electromagnetic 6) spectrum of .
 - a) 400-700 nm 100-300nm b)
 - c) 200-500nm d) 250-500nm
- Wavelength calibration of a spectrophotometer can be checked by using 7) 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.
 - polarographic a) Clark b) c) micro NaCl d)

Max. Marks: 70

platelets

- d) **RBCs**

- Spectrophotometers employ 6V tungsten lamp that emits radiation in the wavelength of _____.
 - a) electromagnetic b)
 - c) visible d) ultraviolet
- 10) $pCo_2 = [?]$ -water vapour pressure $x \frac{\% Co_2}{100}$
 - a) gradient pressure
 - c) atmospheric pressure
- b) barometric pressure
- d) gauge pressure

x-ray

- 11) The base of each audio logical examination is the determination of the _____.
 - a) deafness b) hearing loss
 - c) hearing threshold d) sound intensity
- 12) 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
- 13) 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
- 14) Ear oximeters usually use of the transmission principle to measure the ______ saturation.
 - a) venous oxygen
 - c) capillary oxygen
- b) pulse oxygen
- d) arterial oxygen

Set P

SLR-FM-470

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Attempt any four questions. Q.2

- State and explain Beer Lambert's law with mathematical expression. a)
- What are the different types of microscopes? Give their applications. b)
- Explain construction and working of flame photometer. C)
- Explain with a block diagram working of spectrophotometer. d)
- Explain indicator and thermal dye dilution method of cardiac output e) measurement.

Q.3 Attempt any two questions.

- Explain working of Coulter blood cell counter. a)
- Explain working of autoanalyzer with neat diagram. b)
- c) Explain construction and working of PCo2 electrode.

Section – II

Q.4	Atte	empt any four questions.	16
	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.	
Q.5	Atte	empt any two questions.	12
	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.



Max. Marks: 56

16

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

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

a)

Seat No.

- Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14 1) electrode.
 - The partial pressure of oxygen is usually measured by polarographic
 - a) Clark b) c) micro d) NaCl
 - 2) Spectrophotometers employ 6V tungsten lamp that emits radiation in the wavelength of
 - electromagnetic a) b) x-ray
 - c) visible
 - $pCo_2 = [?]$ -water vapour pressure $x \frac{\% Co_2}{100}$ 3)
 - a) gradient pressure b)
 - c) atmospheric pressure d) gauge pressure

4) The base of each audio logical examination is the determination of the _____.

- deafness hearing loss b)
- hearing threshold d) sound intensity C)
- If the flow of blood is in the same direction as the ultrasonic beam, then it 5) is considered the blood is flowing transducer.
 - a) towards b) in between
 - c) along with d) away
- Doppler shift flow velocity is based on the analysis of echo signals from 6) the _____ in the vascular structure.
 - a) platelets b) erythrocytes
 - c) minerals d) WBC's
- Ear oximeters usually use of the transmission principle to measure the 7) 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 c) minute volume
 - b) tidal volume d) lung compliance

SLR-FM-470



Marks: 14

Max. Marks: 70

- - ultraviolet
- d)
- - barometric pressure

Set 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 The sounds reaching the ear are characterized by _____. a) intensity pitch b) d) c) density clarity Diffusion measurements test the lung's ability to exchange _____ with the circulatory system. a) blood b) platelets c) gas d) RBCs _____ are optical systems which provide better isolation of spectral energy than the optical filters. a) diffraction gratings b) filters c) Holographic gratings d) monochromatic A colorimeter involves the measurement of color in electromagnetic spectrum of ------

- a) 400-700 nm b)
- c) 200-500nm
- b) 100-300nm d) 250-500nm

SLR-FM-470

- 14) Wavelength calibration of a spectrophotometer can be checked by using a ______ filter as a wavelength standard.
 - a) tungsten

9)

10)

11)

12)

13)

- c) electromagnetic d)
- b) ultraviolet
 - d) holmium oxide

Page **5** of **12**

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Attempt any four questions. Q.2

- State and explain Beer Lambert's law with mathematical expression. a)
- What are the different types of microscopes? Give their applications. b)
- Explain construction and working of flame photometer. c)
- Explain with a block diagram working of spectrophotometer. d)
- Explain indicator and thermal dye dilution method of cardiac output e) measurement.

Q.3 Attempt any two questions.

- Explain working of Coulter blood cell counter. a)
- Explain working of autoanalyzer with neat diagram. b)
- c) Explain construction and working of PCo2 electrode.

Section – II

Q.4	Attempt any four questions.		16
	a) What is meant by positive and	negative pressure ventilator?	
	b) Explain working of ear oximetr	у.	
	c) Explain the importance of mas	king in audiometry.	
	d) Define lung volume and capac	ities of a spriogram.	
	e) Explain any one type of oxyge	nator.	
Q.5	2.5 Attempt any two questions.		12
	a) Explain working of heart lung r	nachine with block diagram.	
	b) Explain the need and working	of Anastasia machine.	

c) Explain working of speech and pure tone audiometry technique.



Max. Marks: 56

12

Seat	
No.	

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

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

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
- A colorimeter involves the measurement of color in electromagnetic spectrum of _____.
 - a) 400-700 nm b) 100-300nm
 - c) 200-500nm d) 250-500nm
- 3) 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
- 4) The partial pressure of oxygen is usually measured by _____ electrode.
 a) Clark b) polarographic
 - a) Clark b) polarogra c) micro d) NaCl
- 5) Spectrophotometers employ 6V tungsten lamp that emits radiation in the wavelength of _____.
 - a) electromagnetic b) x-ray
 - c) visible d) ultraviolet

6) $pCo_2 = [?]$ -water vapour pressure $x \frac{\% Co_2}{100}$

- a) gradient pressure b) barometric pressure
- c) atmospheric pressure d) gauge pressure
- 7) The base of each audio logical examination is the determination of the _____.
 - a) deafness b) hearing loss
 - c) hearing threshold d) sound intensity
- 8) 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



Max. Marks: 70

Marks: 14

Set R 9) Doppler shift flow velocity is based on the analysis of echo signals from the _____ in the vascular structure. erythrocytes a) platelets b) c) minerals d) WBC's 10) Ear oximeters usually use of the transmission principle to measure the saturation. venous oxygen b) pulse oxygen a) c) capillary oxygen d) arterial oxygen 11) 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 The ratio of the radiant power transmitted by a sample to a radiant power 12) incident on the sample is called beers law a) absorbance b) c) transmittance d) optical density The sounds reaching the ear are characterized by _____. 13) a) intensity b) pitch c) density d) clarity Diffusion measurements test the lung's ability to exchange _____ with the 14)

- 14) Diffusion measurements test the lung's ability to exchange _____ with the circulatory system.
 - a) blood
 - c) gas

- b) platelets
- d) RBCs

SLR-FM-470
Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

- State and explain Beer Lambert's law with mathematical expression. a)
- b) What are the different types of microscopes? Give their applications.
- Explain construction and working of flame photometer. C)
- Explain with a block diagram working of spectrophotometer. d)
- Explain indicator and thermal dye dilution method of cardiac output e) measurement.

Q.3 Attempt any two questions.

- Explain working of Coulter blood cell counter. a)
- Explain working of autoanalyzer with neat diagram. b)
- C) Explain construction and working of PCo2 electrode.

Section – II

0 1	۸++	ampt any four questions	16
Q.7	~,		10
	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.	
Q.5	Atte	empt any two questions.	12
	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.



16

12

Max. Marks: 56

barometric pressure

gauge pressure

Seat No.

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

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

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

- $pCo_2 = [?]$ -water vapour pressure $\times \frac{\% Co_2}{100}$ 1)
 - a) gradient pressure
 - atmospheric pressure c)
- 2) The base of each audio logical examination is the determination of the _____. hearing loss b)

b)

d)

- deafness a)
- c) hearing threshold d) sound intensity
- 3) 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 in between b)
 - d) c) along with away
- 4) Doppler shift flow velocity is based on the analysis of echo signals from the in the vascular structure.
 - a) platelets b) ervthrocytes
 - d) WBC's c) minerals
- Ear oximeters usually use of the transmission principle to measure the 5) saturation.
 - a) venous oxygen b) pulse oxygen
 - c) capillary oxygen d) arterial oxygen
- _ is the ratio of volume delivered to the pressure rise during the 6) inspiratory phase in the lungs.
 - a) airway resistance b) tidal volume
 - minute volume d) lung compliance c)
- The ratio of the radiant power transmitted by a sample to a radiant power 7) incident on the sample is called
 - a) absorbance b) beers law
 - c) transmittance d) optical density
- 8) The sounds reaching the ear are characterized by _____.
 - a) intensity pitch b)
 - c) density d) clarity

Max. Marks: 70

Marks: 14

			SLR-FM-470
			Set S
9)	Diffusion measurements test the lur circulatory system.	ıg's al	bility to exchange with the
	a) blood c) gas	b) d)	platelets RBCs
10)	are optical systems which pro- energy than the optical filters.	ovide	better isolation of spectral
	a) diffraction gratingsc) Holographic gratings	b) d)	filters monochromatic
11)	A colorimeter involves the measured spectrum of	ment	of color in electromagnetic
	a) 400-700 nm c) 200-500nm	b) d)	100-300nm 250-500nm
12)	Wavelength calibration of a spectron a filter as a wavelength star	ohoto ndard.	meter can be checked by using
	a) tungsten c) electromagnetic	b) d)	ultraviolet holmium oxide
13)	The partial pressure of oxygen is us a) Clark c) micro	ually b) d)	measured by electrode. polarographic NaCl

- 14) Spectrophotometers employ 6V tungsten lamp that emits radiation in the wavelength of _____.a) electromagnetic

 - c) visible

- b) x-ray
- ultraviolet d)

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

- a) Explain working of Coulter blood cell counter.
- **b)** Explain working of autoanalyzer with neat diagram.
- c) Explain construction and working of PCo2 electrode.

Section – II

Q.4	Attem	pt any four questions.	16
	a) V	Vhat is meant by positive and negative pressure ventilator?	
	b) E	xplain working of ear oximetry.	
	c) E	xplain the importance of masking in audiometry.	
	d) [Define lung volume and capacities of a spriogram.	
	e) E	Explain any one type of oxygenator.	
Q.5	Attem	pt any two questions.	12
	a) E	xplain working of heart lung machine with block diagram.	
	b) E	xplain the need and working of Anastasia machine.	
	· · -		

c) Explain working of speech and pure tone audiometry technique.



Max. Marks: 56

16

12

			T.E. (Part – I) (CBCS) Exa Bio-Medical E CLINICAL MODELIN	nin ngi G &	ation Nov/Dec-2019 neering SIMULATION
Day Time	& Date : 02:3	e: Mo 0 PN	onday, 09-12-2019 1 To 05:30 PM		Max. Marks: 70
Instr	uctio	ns: 1) Q. No. is compulsory and shou book.	ld b	e solved in first 30 minutes in answer
		2	 Figures to the right indicate ful 	l ma	rks.
			MCQ/Objective Ty	/pe (Questions
Dura	tion: 3	BO Mi	nutes		Marks: 14
Q.1	Cho 1)	ose t In _ a) c)	the correct alternatives from th movements angle betweer saccadic vergence	ne o neye b) d)	ptions and rewrite the sentence. 14 es changes. smooth pursuit vestibular
	2)	a) c)	movement compensated he saccadic vergence	ad n b) d)	novements. smooth pursuit vestibular
	3)	One a) c)	e ion equation is called as Donnan's Ohm's	equ b) d)	ation. Nernst Fick's
	4)	Res a) c)	ting state of action potential star -90mV +20mV	ts fro b) d)	om -75mV +35mV
	5)	Parł a) c)	kinsin's occurs due to lack of blood CSF	b) d)	oxygen dopamine
	6)	Stre a) c)	etch reflex is define as a controllin muscles CNS	ng oʻ b) d)	f load dynamic of cells tissues
	7)	Eins a) c)	stein's relationship define relatior diffusion & drift cathode & anode	n bet b) d)	ween anion & cations model & object
	8)	Spa a) c)	ce charge neutrality is the repres diffusion & drift cathode & anode	senta b) d)	ation of anion & cations model & object
	9)	a) c)	movements are very fast jur saccadic vergence	np fr b) d)	om one eye position to another. smooth pursuit vestibular
	10)	In _ a) c)	movements eyes tracks n saccadic vergence	novii b) d)	ng objects. smooth pursuit vestibular

Set P

Seat

No.

SLR-FM-471 Set P

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

T.E. ((Part – I) (CBCS) Examination Nov/Dec-2019	
	Bio-Medical Engineering	
	CLINICAL MODELING & SIMULATION	
to: Mondoy	00 12 2010	

Day & Date: Monday, 09-12-2019 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 questions.

- 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.

- 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.

- 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.

- 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
 - 2) Behavior of immune response

Max. Marks: 56

12

16

16

12

Set F

SLR-FM-471

Seat No.

				Go			
Day Time	& Date : 02:3	e: Mo 0 PN	onday, 09-12-2019 / To 05:30 PM		Max. Marks	3: 70	
Instr	uctio	ns: 1	 Q. No. is compulsory and shout book. Figures to the right indicate full 	uld b I ma	e solved in first 30 minutes in answe rks.	ər	
			MCQ/Objective T	уре	Questions		
Duration: 30 Minutes Mark							
Q.1	Cho 1)	ose Spa a) c)	the correct alternatives from the correct alternatives from the second s	h e o sent b) d)	ptions and rewrite the sentence. ation of anion & cations model & object	14	
	2)	a) c)	movements are very fast jui saccadic vergence	mp fi b) d)	rom one eye position to another. smooth pursuit vestibular		
	3)	In _ a) c)	movements eyes tracks r saccadic vergence	novi b) d)	ng objects. smooth pursuit vestibular		
	4)	a) c)	produces 1000 watts. cold warm	b) d)	heat shivering		
	5)	Moo a) c)	dels are simplified representatior simulations systems	n of _ b) d)	objects none of above		
	6)	Ficł a) c)	k's law defines process. diffusion ionization	b) d)	drift potential gradient		
	7)	Ohr a) c)	ms law defines process. diffusion current	b) d)	drift potential		
	8)	In _ a) c)	movements angle betweer saccadic vergence	n eye b) d)	es changes. smooth pursuit vestibular		
	9)	a) c)	movement compensated he saccadic vergence	ead n b) d)	novements. smooth pursuit vestibular		
	10)	One a) c)	e ion equation is called as Donnan's Ohm's	equ b) d)	ation. Nernst Fick's		

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

No.

Seat

SLR-FM-471

Set

Q

SLR-FM-471 Set Q

- 11) Resting state of action potential starts from ____
 - a) -90mV b) -75mV
 - c) +20mV d) +35mV
- 12) Parkinsin'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 _____.
 - b) cells
 - c) CNS d) tissues
- 14) Einstein's relationship define relation between ____
 - a) diffusion & driftc) cathode & anode

a) muscles

b) anion & cations

.

d) model & object

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

- 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.

- 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.

- 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
 - 2) Behavior of immune response

Max. Marks: 56

12

16

16

12

Set Q

SLR-FM-471

Seat No.

No.						000	• •	
	T.E. (Part – I) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering CLINICAL MODELING & SIMULATION							
Day a Time	& Date : 02:3	e: Monday, 09-12 0 PM To 05:30 P	2-2019 PM		Μ	ax. Marks	: 70	
Instr	uctio	ns: 1) Q. No. is c book.	compulsory and shou	uld b	e solved in first 30 minutes	s in answe	er	
		2) Figures to		i ma	rks.			
Dura	tion ?	0 Minutes		ype	QUESTIONS	Marks	· 14	
Q.1	Cho 1)	ose the correct Parkinsin's occu	alternatives from the second structure for the second structure to lack of	he o	ptions and rewrite the se	entence.	14	
	,	a) blood c) CSF		b) d)	oxygen dopamine			
	2)	Stretch reflex is a) muscles c) CNS	define as a controlli	ng o b) d)	f load dynamic of cells tissues			
	3)	Einstein's relation a) diffusion & c) cathode & a	onship define relation drift anode	n bet b) d)	ween anion & cations model & object			
	4)	Space charge n a) diffusion & c) cathode & a	eutrality is the repre drift anode	senta b) d)	ation of anion & cations model & object			
	5)	a) saccadic c) vergence	ents are very fast ju	mp fr b) d)	om one eye position to an smooth pursuit vestibular	other.		
	6)	In move a) saccadic c) vergence	ements eyes tracks r	novii b) d)	ng objects. smooth pursuit vestibular			
	7)	a) cold c) warm	es 1000 watts.	b) d)	heat shivering			
	8)	Models are simp a) simulations c) systems	olified representatior	n of _ b) d)	objects none of above			
	9)	Fick's law define a) diffusion c) ionization	es process.	b) d)	drift potential gradient			
	10)	Ohms law define a) diffusion c) current	es process.	b) d)	drift potential			

Set R

SLR-FM-471

Seat

- 11) In _____ movements angle between eyes changes.
 - a) saccadic
- b) smooth pursuitd) vestibular c) vergence
- ___ movement compensated head movements. 12)
 - saccadic a)
 - c) vergence

- b) smooth pursuit d) vestibular
- 13) One ion equation is called as _____ equation.
 - a) Donnan's b) Nernst
 - d) Fick's c) Ohm's
- Resting state of action potential starts from _ 14) b) -75mV
 - a) -90mV
 - c) +20mV d) +35mV

SLR-FM-471 Set R

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

- 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.

- 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.

- 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
 - 2) Behavior of immune response

Max. Marks: 56

12

16

16

12

Set

Seat No.

	T.E. (Part – I) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering CLINICAL MODELING & SIMULATION						
Day a Time	& Date : 02:3	e: Mo 0 PN	onday, 09-12-2019 1 To 05:30 PM		Max. Marks: 70		
Instr	nstructions: 1) Q. No. is compulsory and should be solved in first 30 minutes in answer book.						
		2) Figures to the right indicate full	ma	rks.		
_			MCQ/Objective Ty	vpe (Questions		
Dura	tion: 3	80 Mi	nutes		Marks: 14		
Q.1	Cho 1)	ose t In _ a) c)	the correct alternatives from the <u>correct alternatives</u> from the <u>saccadic</u> vergence	n e oj novir b) d)	ptions and rewrite the sentence. 14 ng objects. smooth pursuit vestibular		
	2)	() a) c)	produces 1000 watts. cold warm) d)	heat shivering		
	3)	Moc a) c)	lels are simplified representation simulations systems	of _ b) d)	objects none of above		
	4)	Fick a) c)	's law defines process. diffusion ionization	b) d)	drift potential gradient		
	5)	Ohn a) c)	ns law defines process. diffusion current	b) d)	drift potential		
	6)	In _ a) c)	movements angle between saccadic vergence	eye b) d)	es changes. smooth pursuit vestibular		
	7)	a) c)	movement compensated he saccadic vergence	ad m b) d)	novements. smooth pursuit vestibular		
	8)	One a) c)	e ion equation is called as Donnan's Ohm's	equ b) d)	ation. Nernst Fick's		
	9)	Res a) c)	ting state of action potential star -90mV +20mV	ts fro b) d)	om -75mV +35mV		
	10)	Parl a) c)	kinsin's occurs due to lack of blood CSF	b) d)	oxygen dopamine		

Set

S

Seat No.

Set S

- Stretch reflex is define as a controlling of load dynamic of _____. 11)
 - muscles a)

C)

- b) cells
- d) tissues CNS
- Einstein's relationship define relation between _____ 12)
 - diffusion & drift a)
- b) anion & cations
- cathode & anode c)
- d) model & object

_.

- Space charge neutrality is the representation of __ 13)
 - b) anion & cations diffusion & drift a) c) cathode & anode
 - d) model & object
- ____ movements are very fast jump from one eye position to another. 14)
 - a) saccadic

b) smooth pursuit

c) vergence

d) vestibular

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

- 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.

- 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.

- 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
 - 2) Behavior of immune response

Max. Marks: 56

12

16

16

12

Set S

SLR-FM-471

Seat No.

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

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

Seat

No.

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

- 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 OFH d) CMA
- 8) Which bits plays a significant role in the selection of a bank register of PSW?
 - a) RS1b) RS0c) Both a and bd) None





Set

Max. Marks: 70

Marks: 14

14

				Sat	P
9)	Whic assc a) c)	ch commands are used for addres ociated codes respectively by data MOV X and MOV C MOV Z and MOV A	ssing a poin b) d)	the off-chip data and iter? MOV Y and MOV B MOV C and MOV Y	■
10)	Whic oper a) c)	ch bit must be set in TCON registe ating in 'mode0'? TR0 IT0	er in d b) d)	order to start the 'timer0' while TF0 IE0	
11)	lf SN a) c)	10 =1, SM1=0 then the transceive 8-bit synchronous 8-bit asynchronous	er sele b) d)	ected is 9- bit synchronous 9-bit asynchronous	
12)	Wha a) c)	t is the address range of SFR reg 00H- 77H 80H- 7FH	jister b) d)	bank? 40-80H 80H- FFH	
13)	Aftei a) c)	r reset, SP register is initialized to 08H 06H	add b) d)	07H None of the above	
14)	Whic a)	ch of the following is one byte inst MVI B,05H	ructic b)	on? LDA 2500H	

c) IN 01H d) MOV A, B

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section I

Q.2 Answer any Four:

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

Q.3 Answer any Two:

- What is Microprocessor? Draw and explain the function of 8085 a) 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
 - Draw the timing dia of RIM instruction. 1)
 - Write an ALP to generate Fibonacci series. 2)

Section - II

Q.4 Answer any Four:

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

Q.5 Answer any Two:

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

12

Max. Marks: 56

12

16

16

Set

			Bio-Medical	Engine	ering	
			MICROPROCESSOR 8		DCONTROLLER	
Day Time	& Date : 02:3	e: We 0 PM	dnesday, 11-12-2019 To 05:30 PM		Ν	/lax. Marks: 70
Instr	uctio	ns: 1)	Q. No. 1 is compulsory and s	hould be	solved in first 30 minu	tes in answer
		2)	Figures to the right indicates	full marks	3.	
			MCQ/Objective	Type Qu	estions	
Dura	ition: 3	80 Mir	nutes	<i>.</i>		Marks: 14
Q.1	Cho 1)	ose tl Whic PSW	he correct alternatives from th bits plays a significant role /?	i the opti in the sel	ons and rewrite the s ection of a bank regist	entence. 14 er of
		a) c)	RS1 Both a and b	b) d)	RS0 None	
	2)	Whic asso a) c)	ch commands are used for ad ociated codes respectively by MOV X and MOV C MOV Z and MOV A	dressing data poin b) d)	the off-chip data and ter? MOV Y and MOV B MOV C and MOV Y	
	3)	Whic oper a) c)	ch bit must be set in TCON re ating in 'mode0'? TR0 IT0	gister in c b) d)	order to start the 'timer TF0 IE0	0' while
	4)	lf SM a) c)	10 =1, SM1=0 then the transc 8-bit synchronous 8-bit asynchronous	eiver sele b) d)	ected is 9- bit synchronous 9-bit asynchronous	
	5)	Wha a) c)	t is the address range of SFR 00H- 77H 80H- 7FH	t register b) d)	bank? 40-80H 80H- FFH	
	6)	After a) c)	reset, SP register is initialize 08H 06H	d to add _ b) d)	07H None of the above	
	7)	Whic a) c)	ch of the following is one byte MVI B,05H IN 01H	instructio b) d)	n? LDA 2500H MOV A, B	
	8)	In 80 orde a) b) c) d)	085 microprocessor data Bus r to Increase the speed of microp Reduce the number of pins Connect more peripheral chi Both a & b	and addro processor ps	ess bus are multiplexe	d in
	9)	Whice along	ch instruction is required to ro g with carry?	tate the c	ontent of accumulator	one bit

- RLC b) RAL a)
- RRC RAR d) C)

Seat

No.

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

SLR-FM-472

Set Q

				SLR-FM-472
				Set Q
10)	The a) c)	content A_{15} - A_8 while executing IN Same as the content of A_7 - A_{10} All bit reset	8-bit b) d)	port address instruction Irrelevant All bit set
11)	Whi cont a) c)	ch of the following instruction may tent Irrespective of its initial value? CLR A SUB A	be u b) d)	sed to clear the accumulator ORA A MOV A,00H
12)	The a) c)	idle mode can be terminated by _ PRESET Interrupt	b) d)	CLEAR Interrupt or reset
13)	The a) c)	interrupt $\overline{INT0}$ and $\overline{INT1}$ are proc IE0 and IE1 IF0 and IE1	essec b) d)	l internally by flags IE0 and IF1 IF0 and IF1

In order to compliment the lower order nibble of the accumulator, we can ____. a) ANI 0FH b) XRI 0FH 14)

ORI 0FH d) CMA c)

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section I

Q.2 Answer any Four:

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

Q.3 Answer any Two:

- What is Microprocessor? Draw and explain the function of 8085 a) 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
 - Draw the timing dia of RIM instruction. 1)
 - Write an ALP to generate Fibonacci series. 2)

Section - II

Q.4 Answer any Four:

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

Q.5 Answer any Two:

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

12

Max. Marks: 56

12

16

16

SLR-FM-472

Set

			Bio-Medical En MICROPROCESSOR & M	gine CRC	ering CONTROLLER			
Day Time	& Date : 02:3	e: We 0 PM	dnesday, 11-12-2019 To 05:30 PM			Max. Marks: 70		
Instr	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	S.			
_			MCQ/Objective Typ	e Qu	estions			
Dura	tion: 3	0 Min	nutes			Marks: 14		
Q.1	Choc 1)	The a)	idle mode can be terminated by _ PRESET	b)	CLEAR	sentence. 14		
		c)	Interrupt	d)	Interrupt or reset			
	2)	The a) c)	interrupt <u>INT0</u> and <u>INT1</u> are proc IE0 and IE1 IF0 and IE1	essec b) d)	l internally by flags _ IE0 and IF1 IF0 and IF1			
	3)	In or a) c)	der to compliment the lower orde ANI 0FH ORI 0FH	r nibb b) d)	le of the accumulato XRI 0FH CMA	r, we can		
	4) Which bits plays a significant role in the selection of a bank register of PSW?							
		a) c)	RS1 Both a and b	b) d)	RS0 None			
	5) Which commands are used for addressing the off-chip data and							
		asso a)	MOV X and MOV C	b)	MOV Y and MOV B	5		
		c)	MOV Z and MOV A	d)	MOV C and MOV Y	/		
	6) Which bit must be set in TCON register in order to start the 'timer0' while operating in 'mode0'?					er0' while		
		a) c)	TR0 IT0	b) d)	TF0 IE0			
	 If SM0 =1, SM1=0 then the transceiver selected is 							
		a) c)	8-bit synchronous 8-bit asynchronous	d)	9-bit synchronous 9-bit asynchronous			
	8)	Wha	t is the address range of SFR reg	ister ا	bank?			
		a) c)	80H- 7FH	d)	40-80H 80H- FFH			
	9)	After	reset, SP register is initialized to	add _	·			
		a) c)	08H 06H	b) d)	None of the above			
	10)	Whic	ch of the following is one byte inst	ructio	n?			
	,	a) c)	MVI B,05H IN 01H	b) d)	LDA 2500H MOV A, B			

Seat

No.

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

SLR-FM-472

Set R

- In 8085 microprocessor data Bus and address bus are multiplexed in 11) order to _____.
 - Increase the speed of microprocessor a)
 - b) Reduce the number of pins
 - C) Connect more peripheral chips
 - Both a & b d)
- 12) Which instruction is required to rotate the content of accumulator one bit along with carry?
 - RLC b) RAL a)
 - RRC C) d) RAR
- 13) The content A₁₅-A₈ while executing IN 8-bit port address instruction _____. Irrelevant
 - Same as the content of A_7 - A_{10} a) b)
 - All bit reset All bit set C) d)
- Which of the following instruction may be used to clear the accumulator 14) content Irrespective of its initial value?
 - a) CLR A
- b) ORA A
- SUB A C)
- MOV A,00H d)

Set | R

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section I

Q.2 Answer any Four:

Seat

No.

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

Q.3 Answer any Two:

- What is Microprocessor? Draw and explain the function of 8085 a) 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
 - Draw the timing dia of RIM instruction. 1)
 - Write an ALP to generate Fibonacci series. 2)

Section - II

Q.4 Answer any Four:

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

Q.5 Answer any Two:

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

12

Max. Marks: 56

12

16

16

Set

Seat No.								Set	S
		٦	Г.Е. (Part	- I) (CBCS)) Exami	nati	on Nov/Dec-2019		
			MICDO	Bio-Med	ical English	gine	ering		
Day &	Date	e: We	dnesday, 1	1-12-2019		UNC	Ma	x. Marks	: 70
Instru	iction	ns: 1)	Q. No. 1 is	compulsory a	and shoul	d be	solved in first 30 minutes	in answ	/er
		2)	book. Figures to	the right indic	ates full r	marks	5.		
		,	0	MCQ/Objec	tive Typ	e Qu	estions		
Durati	on: 3	0 Min	utes	•				Marks	: 14
Q.1	Choc 1)	se th Whic	e correct a h bit must	alternatives f be set in TCC	f rom the DN registe	optio er in c	ons and rewrite the sen order to start the 'timer0' v	tence. while	14
		opera a) c)	ating in 'mo TR0 IT0	ode0'?		b) d)	TF0 IE0		
	2)	lf SM a) c)	10 =1, SM1 8-bit synch 8-bit asynd	=0 then the tr nronous chronous	ansceive	r sele b) d)	ected is 9- bit synchronous 9-bit asynchronous		
:	3)	Wha [.] a) c)	t is the add 00H- 77H 80H- 7FH	ress range of	SFR reg	ister b) d)	bank? 40-80H 80H- FFH		
	4)	After a) c)	reset, SP 08H 06H	register is initi	ialized to	add <u>.</u> b) d)	07H None of the above		
:	5)	Whic a) c)	h of the fol MVI B,05⊦ IN 01H	lowing is one I	byte inst	ructic b) d)	n? LDA 2500H 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)	Whic along a) c)	th instructic g with carry RLC RRC	on is required ?	to rotate	the c b) d)	ontent of accumulator on RAL RAR	e bit	
8	8)	The (a) c)	content A ₁₅ Same as t All bit rese	-A ₈ while exe he content of et	cuting IN A ₇ -A ₁₀	8-bit b) d)	port address instruction Irrelevant All bit set	·	
9	9)	Whic conte a)	h of the fol ent Irrespec CLR A	lowing instruc ctive of its initi	tion may ial value?	be u b)	sed to clear the accumula ORA A	ator	

MOV A,00H SUB A C) d)

SLR-FM-472

Seat No.

10) The idle mode can be terminated by

> PRESET b) CLEAR a) c)

d) Interrupt Interrupt or reset

- 11) The interrupt $\overline{INT0}$ and $\overline{INT1}$ are processed internally by flags _____.
 - IE0 and IE1 IE0 and IF1 b) a)
 - IF0 and IE1 IF0 and IF1 c) d)

In order to compliment the lower order nibble of the accumulator, we can ____. 12)

- XRI 0FH ANI OFH b) a)
- ORI 0FH CMA c) d)
- Which bits plays a significant role in the selection of a bank register of 13) PSW?
 - a) RS1 b)
 - C) Both a and b d) None
- Which commands are used for addressing the off-chip data and 14) associated codes respectively by data pointer?
 - MOV X and MOV C a)
- MOV Y and MOV B b)

RS0

SLR-FM-472

Set

- MOV Z and MOV A d) c)
- MOV C and MOV Y

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section I

Q.2 Answer any Four:

- 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:

- 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:

- 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:

- 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.

12

Max. Marks: 56

Set

12

16

16

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

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

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

PRINCIPLES OF COMMUNICATIONS

- Figures to the right indicate full marks.
- 3) Assume suitable data wherever required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Seat No.

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

- 1) Wired channels are _____.
 - a) Lossy
 - c) Lossy & Lossless d) None of the above
- Transmission media used in low frequency band are _____. 2)
 - a) Air b) Water
 - c) Copper cable

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

In a delta modulation system, granular noise occurs when the 4)

- Modulating signal increases rapidly a)
- Pulse rate decreases b)
- Pulse amplitude decreases c)
- Modulating signal remains constant d)
- A PAM signal can be detected using 5)
 - a) Low pass filter
 - Band pass filter d) All pass filter c)

A PWM signal can be generated by ____ 6)

- a) An astable multi vibrator Integrating a PPM signal c)
- b) A monostable multi vibrator d) Differentiating a PPM signal

High pass filter

b)

- PCM includes the process of _____
 - a) Amplitude discretization
 - Time discretization b)
 - Amplitude & Time discretization c)
 - None of the mentioned d)

Switching or keying

8) Modulation process corresponds to _____ the amplitude, frequency or phase.

Switching a)

c)

7)

- b) Keving
- d) None of the mentioned

SLR-FM-473



Max. Marks: 70

Marks: 14

b) Lossless

d) All of the above

- 9) Time division multiplexing uses _____. a) High pass filter b) Commutator
 - c) High pass filter & Commutator d) None of the mentioned
- In TDM, at the receiver end, _____ filter is used. 10)
 - a) Low pass b) High pass
 - c) Band pass d) Band stop
- The coherent modulation techniques are 11)
 - a) PSK b) FSK c) ASK
 - d) All of the mentioned

Set P

- The real part of a sinusoid carrier wave is called as _____. 12)
 - a) Inphase b) Quadrature
 - c) Inphase & Quadrature d) None of the mentioned
- The term heterodyning refers to _____. 13)
 - 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) λ/4
 - c) 2λ d) 4λ

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

Seat No.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

16

12



T.E. (Part – I) (CBCS) Examination Nov/Dec-2019

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

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

Bio-Medical Engineering PRINCIPLES OF COMMUNICATIONS

- 2) Figures to the right indicate full marks.
- 3) Assume suitable data wherever required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Seat No.

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

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

Max. Marks: 70

Marks: 14





- b) Keying

- 10) Flat top sampling of low pass signals
 - Gives rise to aperture effect a)
- b) Implies over sampling

Set

- Leads to aliasing c)
- Introduces delay distortion d)
- In a delta modulation system, granular noise occurs when the _____. 11)
 - Modulating signal increases rapidly a)
 - Pulse rate decreases b)
 - c) Pulse amplitude decreases
 - d) Modulating signal remains constant
- 12) A PAM signal can be detected using
 - a) Low pass filter b)
 - c) Band pass filter All pass filter d)

.

- 13) A PWM signal can be generated by _
 - a) An astable multi vibrator
 - Integrating a PPM signal C)
- b) A monostable multi vibrator
- d) Differentiating a PPM signal

High pass filter

- 14) PCM includes the process of ____
 - Amplitude discretization a)
 - Time discretization b)
 - Amplitude & Time discretization C)
 - None of the mentioned d)

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

Seat No.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

16

12

12

16



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

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

a)

c)

Seat No.

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

- 1) A PAM signal can be detected using _
 - a) Low pass filter
 - c) Band pass filter
- A PWM signal can be generated by _ 2)
 - a) An astable multi vibrator
 - c) Integrating a PPM signal
- 3) PCM includes the process of _____.
 - a) Amplitude discretization
 - b) Time discretization
 - c) Amplitude & Time discretization
 - None of the mentioned d)
- 4) Modulation process corresponds to _____ the amplitude, frequency or phase.
 - a) Switching b) Keying
 - c) Switching or keying
- Time division multiplexing uses _____ 5)
 - a) High pass filter b) Commutator c) High pass filter & Commutator d) None of the mentioned
- 6) In TDM, at the receiver end, _____ filter is used.
 - a) Low pass b) High pass
 - c) Band pass d) Band stop
- The coherent modulation techniques are _ 7)
 - PSK b) FSK a)
 - ASK d) All of the mentioned c)
- 8) The real part of a sinusoid carrier wave is called as
 - b) Quadrature Inphase Inphase & Quadrature
 - d) None of the mentioned

SLR-FM-473



Max. Marks: 70

Marks: 14

b) High pass filter

- d) All pass filter
- b) A monostable multi vibrator
- d) Differentiating a PPM signal
- - d) None of the mentioned

Set R The term heterodyning refers to _____. 9) a) Frequency conversion b) Frequency mixing c) Frequency conversion & mixing d) None of the mentioned Wavelength and antenna size are related as _____. 10) a) $\lambda/2$ b) λ/4 c) 2λ d) 4λ Wired channels are _____. 11) b) Lossless a) Lossy c) Lossy & Lossless d) None of the above Transmission media used in low frequency band are _____. 12) a) Air b) Water d) All of the above c) Copper cable 13) 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 14) In a delta modulation system, granular noise occurs when the _____. Modulating signal increases rapidly a) Pulse rate decreases b)

- c) Pulse amplitude decreases
- d) Modulating signal remains constant
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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

16

12

Set R

SLR-FM-473

Seat No.

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

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

Seat No.

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

- 1) In TDM, at the receiver end, _____ filter is used.
 - a) Low pass b) High pass
 - d) Band stop c) Band pass
- The coherent modulation techniques are _ 2)
 - b) FSK a) PSK
 - c) ASK
- 3) The real part of a sinusoid carrier wave is called as _____
 - a) Inphase b) Quadrature
 - c) Inphase & Quadrature
- The term heterodyning refers to ____ 4)
 - a) Frequency conversion
 - b) Frequency mixing
 - Frequency conversion & mixing c)
 - None of the mentioned d)

Wavelength and antenna size are related as . 5)

- a) $\lambda/2$ b) $\lambda/4$
- 2λ C) d) 4λ
- Wired channels are ____ 6)

8)

- a) Lossy b) Lossless
- c) Lossy & Lossless d) None of the above
- Transmission media used in low frequency band are _____. 7)
 - b) Water a) Air d) All of the above c) Copper cable
 - Flat top sampling of low pass signals
 - a) Gives rise to aperture effect b) Implies over sampling
 - d) Introduces delay distortion C) Leads to aliasing
- 9) In a delta modulation system, granular noise occurs when the _____.
 - Modulating signal increases rapidly a)
 - b) Pulse rate decreases
 - c) Pulse amplitude decreases
 - Modulating signal remains constant d)

SLR-FM-473



Max. Marks: 70

- Marks: 14

- d) All of the mentioned
- d) None of the mentioned

10) A PAM signal can be detected using

a) Low pass filter

C)

C)

C)

- b) High pass filter
- Band pass filter C)
- d) All pass filter
- A PWM signal can be generated by ____ 11)
 - a) An astable multi vibrator
- b) A monostable multi vibrator

SLR-FM-473

Set S

d) Differentiating a PPM signal

.

PCM includes the process of _____. 12)

Integrating a PPM signal

- a) Amplitude discretization
- Time discretization b)
- c) Amplitude & Time discretization
- d) None of the mentioned
- Modulation process corresponds to _____ the amplitude, frequency or 13) phase.
 - Switching a)
- b) Keying d) None of the mentioned
- Switching or keying 14) Time division multiplexing uses ____
 - High pass filter a)
- b) Commutator
- High pass filter & Commutator d) None of the mentioned

Seat

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

No.

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

Q.3 Attempt any two.

- 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.

- 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.

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

16

16

12

12

Max. Marks: 56



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

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

4)

Seat No.

Q.1 Choose the correct alternatives from the options.

- If "n" tends to infinity, is the accumulator function a stable one. 1)
 - The function is marginally stable. a)
 - 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. b) It is unstable
 - It is stable a)
 - c) Both stable and unstable
- 3) Discrete-time signals are
 - a) Continuous in amplitude and continuous in time
 - Continuous in amplitude and discrete in time b)
 - Discrete in amplitude and discrete in time C)
 - d) Discrete in amplitude and continuous in time
 - properties does a Continuous time unit Impulse function follow.

d)

None of the mentioned

- Shifting, sampling, differentiation, multiplication a)
- Multiplication, sampling, shifting b)
- Shifting, multiplication, differentiation c)
- d) Sampling only

5) What is the area under a doublet function is _____.

- Negative a) Unity b)
- c) Zero d) Positive
- are the properties of continuous time Fourier series. 6)
 - Linearity, time shifting a)
 - 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.

SLR-FM-474

Max. Marks: 70

Marks: 14

7) _____ is the period of the signal when it is time shifted.

- a) Changes according to the situation.
- b) Different in different situation.
- c) Remains the same.
- d) Takes the shifted value.
- 8) _____ 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.
- The type of systems which are characterized by input and the output quantized at certain levels are called as _____.
 - a) Analogc) Continuous
- b) Discrete d) 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

a) Analog

c) Never

c)

- b) Discrete
- Digital d) Continuous
- 11) 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
- 12) 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
- 13) Real time instruments like oscilloscopes be time invariant _____.
 - a) Yes b) Sometimes
 - d) They have no relation with time

SLR-FM-474

Set

- 14) 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

Seat No.

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

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.

- 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) sine $50\pi t$

$$3) \quad 20\cos\left(10\pi t + \frac{\pi}{6}\right)$$

4) $j e^{j7t}$

- 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.

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 Ωo , 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.

- 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.

16

Set P

Max. Marks: 56

16

SLR-FM-474 Set P

- 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.

- **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.	

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

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

1)

Q.1 Choose the correct alternatives from the options.

- is the full form of BIBO.
 - Boundary input Boundary Output. a)
 - Boundary Input Bounded Output. b)
 - Bonded Input Bonded Output. c)
 - 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
 - Continuous d) Digital C)
- The type of systems which are characterized by input and the output 3) capable of taking any value in a particular set of values are called as
 - a) Analog Discrete b)
 - Digital d) C) Continuous
- An example of a discrete set of information/system is _____. 4)
 - 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 _____.
 - Increases with a delay in input a)
 - 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
 - Yes a) c) Never d)
- 7) Flat-top sampling of low pass signals
 - a) Give rise to aperture effect c) Lead to aliasing
- Implies over sampling b)
- Introduces delay distortion d)



Max. Marks: 70

SLR-FM-474

Marks: 14

14

They have no relation with time

- Sometimes

b)

- 8) 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
- 9) The function y[n] = y[n-1] + x[n] _____ in nature.
 - a) It is stable

b) It is unstable

SLR-FM-474

Set

- c) Both stable and unstable d) None of the mentioned
- 10) 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
- 11) _____ 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
- 12) What is the area under a doublet function is _____.
 - a) Unity b) Negative
 - c) Zero d) Positive
- 13) _____ 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.
- 14) _____ is the period of the signal when it is time shifted.
 - a) Changes according to the situation.
 - b) Different in different situation.
 - c) Remains the same.
 - d) Takes the shifted value.

Seat No.

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

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.

- 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) sine $50\pi t$

$$3) \quad 20\cos\left(10\pi t + \frac{\pi}{6}\right)$$

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.

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 Ωo , 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.

- 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.

16

Max. Marks: 56

12

SLR-FM-474 Set Q

- 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.

- **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.

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

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

c) Zero

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

SIGNALS & SYSTEMS

- 2) Figures to the right indicates full marks.
- 3) Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

3)

Seat

No.

Q.1 Choose the correct alternatives from the options.

- What is the area under a doublet function is 1)
 - a) Unity
- b) Negative Positive
- d)
- are the properties of continuous time Fourier series. 2)
 - a) Linearity, time shifting
 - Linearity, time shifting, frequency shifting b)
 - 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.
 - is the period of the signal when it is time shifted.
 - Changes according to the situation. a)
 - Different in different situation. b)
 - c) Remains the same.
 - d) Takes the shifted value.
- 4) is the full form of BIBO.
 - Boundary input Boundary Output. a)
 - Boundary Input Bounded Output. b)
 - Bonded Input Bonded Output. c)
 - Bounded Input, Bounded Output. d)
- The type of systems which are characterized by input and the output 5) quantized at certain levels are called as
 - Discrete a) Analog b)
 - Continuous d) c) Digital
- The type of systems which are characterized by input and the output 6) capable of taking any value in a particular set of values are called as
 - Analog a)

- Discrete b)
- Digital d) Continuous C)

SLR-FM-474

Max. Marks: 70

R

Marks: 14

- Set
- 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
 - c) Remains same with a delay in input
 - d) Vanishes with a delay in input
- 9) Real time instruments like oscilloscopes be time invariant .
 - b) Sometimes
 - c) Never d) They have no relation with time
- Flat-top sampling of low pass signals 10) a) Give rise to aperture effect
 - b) Implies over sampling
 - c) Lead to aliasing d) Introduces delay distortion
- If "n" tends to infinity, _____ is the accumulator function a stable one. 11)
 - a) The function is marginally stable.
 - b) The function is stable
 - c) The function is unstable
 - d) None of the mentioned
- The function y[n] = y[n-1] + x[n] _____ in nature. 12)
 - It is stable a)

Yes

a)

- c) Both stable and unstable
- b) It is unstable
- d) None of the mentioned
- Discrete-time signals are 13)
 - Continuous in amplitude and continuous in time a)
 - Continuous in amplitude and discrete in time b)
 - c) Discrete in amplitude and discrete in time
 - d) Discrete in amplitude and continuous in time
- 14) properties does a Continuous time unit Impulse function follow.
 - a) Shifting, sampling, differentiation, multiplication
 - Multiplication, sampling, shifting b)
 - Shifting, multiplication, differentiation c)
 - d) Sampling only

Max. Marks: 56

Seat No.

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

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.

- 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) sine $50\pi t$

$$3) \quad 20\cos\left(10\pi t + \frac{\pi}{6}\right)$$

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.

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 Ωo , 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.

- 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.

16

16

SLR-FM-474 Set R

- 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.

- **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.

T.E. (Part – I) (CBCS) Examination Nov/Dec-2019

SIGNALS & SYSTEMS

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

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

Seat No.

Q.1 Choose the correct alternatives from the options.

- The type of systems which are characterized by input and the output 1) capable of taking any value in a particular set of values are called as
 - Analog b) a)
 - Digital d) Continuous c)
- 2) 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
- 3) 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

4) Real time instruments like oscilloscopes be time invariant . a) Yes

Sometimes b)

They have no relation with time

Discrete

- c) Never d)
- 5) Flat-top sampling of low pass signals _
 - Implies over sampling a) Give rise to aperture effect b)
 - c) Lead to aliasing Introduces delay distortion d)
- If "n" tends to infinity, _____ is the accumulator function a stable one. 6)
 - a) The function is marginally stable.
 - b) The function is stable
 - c) The function is unstable
 - d) None of the mentioned
- The function y[n] = y[n-1] + x[n]7) in nature.
 - a) It is stable

- b) It is unstable
- c) Both stable and unstable d) None of the mentioned

SLR-FM-474

Bio-Medical Engineering

Max. Marks: 70

Marks: 14

- 8) Discrete-time signals are .
 - Continuous in amplitude and continuous in time a)
 - Continuous in amplitude and discrete in time b)
 - Discrete in amplitude and discrete in time c)
 - d) Discrete in amplitude and continuous in time
 - properties does a Continuous time unit Impulse function follow.
 - Shifting, sampling, differentiation, multiplication a)
 - Multiplication, sampling, shifting b)
 - c) Shifting, multiplication, differentiation
 - d) Sampling only

9)

13)

- What is the area under a doublet function is 10)
 - a) Unitv b) Negative
 - c) Zero d) Positive
- 11) 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.
- 12) is the period of the signal when it is time shifted.
 - a) Changes according to the situation.
 - b) Different in different situation.
 - c) Remains the same.
 - d) Takes the shifted value.
 - is the full form of BIBO.
 - a) Boundary input Boundary Output.
 - Boundary Input Bounded Output. b)
 - Bonded Input Bonded Output. c)
 - d) Bounded Input, Bounded Output.
- 14) 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

SLR-FM-474

Set

Seat No.

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

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.

- 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,
 - $1) \quad x(t) = je^{j5t}$
 - 2) sine $50\pi t$

$$3) \quad 20\cos\left(10\pi t + \frac{\pi}{6}\right)$$

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.

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 Ωo , 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.

- 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.

16

Max. Marks: 56

12

SLR-FM-474 Set S

- 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.

- **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.

Day Time	& Date : 10:0	te: Friday, 22-11-2019 00 AM To 01:00 PM	Max. Marks: 70
Instr	uctio	 ons: 1) Q. No 1 is compulsory. 2) Figures to the right indicate full marks 3) Assume suitable data wherever required 	ł
		MCQ/Objective Type Ques	tions
Dura	tion: 3	30 Minutes	Marks: 14
Q.1	Choo 1)	bose the correct answer.Each time the heart muscle contracts, blood apulse pressure is transmitted.a) Atriumb) Vent	14 are ejected from and
		c) Tricuspid valve d) Bicu	spid valve
	2)	The technique operates on the principlcuff from above level of systolic pressure.a) Sphygmomanometerb) Rivac) Oscillometricd) Rhe	e of occluding deflation of rocci ographic
	3)	The respiratory cycle is accompanied by char a) Thoracic b) tidal c) Lung d) Res	nges in volume. piratory
	4)	Ventricular fibrillation is detected usually by _ a) amplitude b) puls c) flow d) frequ	analysis. e domain Jency domain
	5)	The valve prevents backward flow of b right atrium. a) bicuspid b) tricu c) mitral d) aorti	lood from right ventricle to spid c
	6)	PR interval has a time period equal to a) 0.12 to 0.20 b) 0.06 c) 0.18 to 0.30 d) 0.35	seconds. to 0.10 to 0.40
	7)	The electrode from which no active potential of electrode.a) activeb) pasec) referenced) poin	comes in is called sive t
	8)	The skeletal system is made up of abouta)206b)226c)100d)216	bones.
	9)	The nail and hair are also special type of	:

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

Day & Date: Friday, 22-11-2019 Tir

Seat

No.

a) tissues

c) organs

SLR-FM-475



Set P

10)	The unit used for	or nerve conduction velocity measurement is
	\ /	

- a) m/s b) cm/s c) volts/sec d) km/s
- 11) The fourth heart sound is called _____ sound.
 - a) ventricle heart b) aortic
 - c) atrial d) pulmonary
- 12) 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
- 13) 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
- 14) The EEG waveform has voltage range around _____ mV.
 - a) 5 to 100

- b) 10 to 1000 d) 0.5 to 10
- c) 50 to 100 d) 0.5

Set P

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

Seat

No.

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.

- 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.

- 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.

- 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.

- 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.



Max. Marks: 56

SLR-FM-475

Set

16

16

12

Soat]				
No.							Set	Q
	•	T.E	. (Part – II)) (New) (CBCS)	Exa	mination Nov/Dec-201	9	
			MF	Bio-Medical	Engi UMFI	neering NTATION – II		
Day &	Date	: Fri	day, 22-11-2	2019		Ma	x. Marks	3: 70
Time:	10:00) AN	1 To 01:00 P	PM				
Instru	ction	1 : 1 2 3) Q. No 1 is 2) Figures to 3) Assume si	compulsory. the right indicate f uitable data where	ull ma ver ree	rks quired		
				MCQ/Objective	Туре	Questions		
Durati	on: 30	0 Mi	nutes				Marks	s: 14
Q.1	Choo	se t	he correct	answer.	(_ h	4		14
	1)	ine a)	206	stem is made up of	r abou b)	t bones. 226		
		c)́	100		d)	216		
	2)	The	nail and ha	ir are also special	type o	f		
		a) C)	organs		d)	bones		
	3)	The	unit used fo	or nerve conduction	n velo	city measurement is		
		a) c)	m/s volts/sec		b) d)	cm/s km/s		
2	4)	The	fourth hear	t sound is called	u) e	sound.		
	.,	a)	ventricle he	eart	b)	aortic		
		C) The	atrial		d)	pulmonary		
	5)	bea	e normal feta its per minut	al heart rate range	IS CON	sidered to be between		
		a)	100-200		b)	150-190		
	0)	C) The	120-150		d)	120-160	_	
ť	6)	mea	asured at the	e surface of the bo	is app dy.	roximately mv, wher	ר	
		a)	5		b)	0.5		
-	7)	C) The		form has voltage r	a) ango c	1.5		
1	()	a)	5 to 100	ionn nas voltage ra	b)	10 to 1000		
		c)	50 to 100		d)	0.5 to 10		
8	8)	Eac	h time the h	neart muscle contra	acts, b	lood are ejected from	_ and	
		a)	Atrium	is transmitted.	b)	Ventricles		
	-)	c)	Tricuspid v	alve	d)	Bicuspid valve	-	
Q	9)	The	e tech	nique operates on level of systolic or	the pi ressure	inciple of occluding deflatio	n of	
		a)	Sphygmom	nanometer	b)	Riva rocci		
		c)	Oscillometr	ric	d)	Rheographic		

at	
-	

The respiratory cycle is accompanied by changes in _____ volume. 10)

a) Thoracic

b) Tidal

SLR-FM-475

Set | Q

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

- b) Passive d) Point
- c) reference

_____ |9

Max. Marks: 56

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

Seat No.

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.

- 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.

- 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.

- 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.

- 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.

16

12

16

No.		
	T.E. (Part – II)	(New) (CBCS) Examination Nov/Dec-2019
		Bio-Medical Engineering
	ME	DICAL INSTRUMENTATION – II
Day &	Date: Friday, 22-11-2)19 Max

С Time: 10:00 AM To 01:00 PM

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 Choose the correct answer. The _____ valve prevents backward flow of blood from right ventricle to 1) right atrium. bicuspid b) tricuspid a) C) mitral d) aortic PR interval has a time period equal to _____ seconds. 2) b) 0.06 to 0.10 0.12 to 0.20 a) 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 The skeletal system is made up of about _____ bones. 4) a) 206 b) 226 100 d) 216 c) 5) The nail and hair are also special type of ____ tissues b) skins a) c) organs d) bones The unit used for nerve conduction velocity measurement is _____. 6) b) cm/s a) m/s c) volts/sec d) km/s The fourth heart sound is called _____ sound. 7) a) ventricle heart b) aortic d) pulmonary atrial C) 8) The normal fetal heart rate range is considered to be between _____ beats per minute. 100-200 a) b) 150-190 120-150 d) 120-160 C) 9) The normal amplitude of 'R' wave is approximately mV, when

> a) 5 b) 0.5 C) 1 d) 1.5

measured at the surface of the body.

Seat |

Q.1

SLR-FM-475

Set

Max. Marks: 70

SLR-FM-475 Set R The EEG waveform has voltage range around _____ mV. 10) a) 5 to 100 b) 10 to 1000 50 to 100 d) 0.5 to 10 C) Each time the heart muscle contracts, blood are ejected from _____ and 11) pulse pressure is transmitted. Atrium a) b) Ventricles Tricuspid valve d) Bicuspid valve C) The _____ technique operates on the principle of occluding deflation of 12) cuff from above level of systolic pressure. a) Sphygmomanometer b) Riva rocci c) Oscillometric d) Rheographic The respiratory cycle is accompanied by changes in _____ volume. 13) b) tidal a) Thoracic d) Respiratory c) Lung 14) Ventricular fibrillation is detected usually by _____ analysis. b) pulse domain amplitude a)

c) flow

d) frequency domain

Set R

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

Seat No.

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.

- 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.

- 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.

- 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.

- 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.

16

12

Max. Marks: 56

12

Seat No.			Set S				
T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering MEDICAL INSTRUMENTATION – II							
Day & Time:	Date: Friday, 22-11- 10:00 AM To 01:00 F	2019 PM	Max. Marks: 70				
Instru	ctions: 1) Q. No 1 is 2) Figures to 3) Assume s	compulsory. the right indicate full ma uitable data wherever re	urks quired				
	-,	MCQ/Objective Type	Questions				
Duratio	on: 30 Minutes		Marks: 14				
Q.1 (Choose the correct) The unit used for a) m/s c) volts/sec	answer. or nerve conduction velo b) d)	14 city measurement is cm/s km/s				
2	2) The fourth hear a) ventricle he c) atrial	rt sound is calleds eartb) d)	sound. aortic pulmonary				
3	 The normal feta beats per minut a) 100-200 c) 120-150 	al heart rate range is con te. b) d)	sidered to be between 150-190 120-160				
2	 The normal am measured at the a) 5 c) 1 	plitude of 'R' wave is app e surface of the body. b) d)	oroximately mV, when 0.5 1.5				
5	5) The EEG wave a) 5 to 100 c) 50 to 100	form has voltage range a b) d)	around mV. 10 to 1000 0.5 to 10				
6	 Each time the h pulse pressure a) Atrium c) Tricuspid v 	neart muscle contracts, b is transmitted. b) valve d)	lood are ejected from and Ventricles Bicuspid valve				
7	7) The tech cuff from above a) Sphygmon c) Oscillomet	nnique operates on the p level of systolic pressur nanometer b) ric d)	rinciple of occluding deflation of e. Riva rocci Rheographic				
8	 The respiratory a) Thoracic c) Lung 	cycle is accompanied by b) d)	y changes in volume. tidal Respiratory				
ç	 Ventricular fibril a) amplitude c) flow 	llation is detected usually b) d)	/ by analysis. pulse domain frequency domain				

The _____ valve prevents backward flow of blood from right ventricle to 10) right atrium.

- a) bicuspid b) tricuspid
- mitral d) aortic C)
- 11) PR interval has a time period equal to _____ seconds.
 - b) 0.06 to 0.10 0.12 to 0.20 a)
 - d) 0.35 to 0.40 0.18 to 0.30 C)
- The electrode from which no active potential comes in is called _____ 12) electrode. a) active
 - b) passive
 - c) reference d) point
- The skeletal system is made up of about _____ bones. 13)
 - b) 226 a) 206
 - c) 100 d) 216
- The nail and hair are also special type of _____ 14) .
 - b) skins tissues a)
 - c) organs d) bones

SLR-FM-475

Set S

Seat No.

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

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.

- 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.

- 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.

- 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.

- 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.

12

Max. Marks: 56

12

16

16



SLR-FM-475

Seat 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

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

3)

5)

8)

- Q.1 Choose the correct alternatives from the options and rewrite the sentence.
 - In cascade form of realization, bits should be used to represent 1) 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 Log2 N) stages b)
 - c) (N Log2 N)/2 stages
 - d) (N Log2(2 N))/2 stages If the filter has anti-symmetric unit sample response with M even, then the
 - value of $Q(\omega)$ IS _____. b) a) $\cos(\omega/2)$ $sin(\omega/2)$
 - c) 1 d) sinω

The scaling of a sequence x[n] by a factor α is given by _ 4)

- a) $y[n] = \alpha [x[n]]^2$ c) $y[n] = \alpha x[n]$
- $y[n] = \alpha x[n^2]$ b)

d)

y[n] = x[n]x[-n]d)

 $(N Log 2 N)^2/2$ stages

Continuous finite sequences

- DFT is applied to _____ a) Infinite sequences b) Finite discrete sequences
- c) Continuous infinite signals
- In FIR filters, _____ parameters remains unaffected by the 6) quantization effect.
 - a) Magnitude Response b) **Phase Characteristics**
 - None of the above c) Both a and b d)
- For a linear phase filter, if Z₁ is zero then _____ would be the value of 7) Z_1^{-1} or 1/ Z_1 .
 - a) Zero b) Unity Unpredictable d)
 - c) Infinity
 - DFT is applied to _____ a) Infinite sequences b)
 - Finite discrete sequences c) Continuous infinite signals Continuous finite sequences d)

Marks: 14

14



Set

Max. Marks: 70

			Set
9)	In Overlap-Add Method with linear length L and a discrete-time signal padding should be of length	convo of len	lution of a discrete-time signal of gth M, for a length N, zero
	a) L,M >N c) L,M <n< td=""><td>b) d)</td><td>L, M = N L ,M <n<sup>2</n<sup></td></n<>	b) d)	L, M = N L ,M <n<sup>2</n<sup>
10)	The nonlinear difference equations a) Iterative method c) Phase diagram	s are so b) d)	olved using Cobweb model Power series method
11)	The error in the filter output that re- calculations within the filter is calle a) Coefficient quantization error c) Round off noise	sults fr d b) d)	om rounding or truncating Adder overflow limit cycle Limit cycles
12)	In FIR filter design, par using Kaiser window. a) Order of filter (M) c) Both a and b	ramete b) d)	rs is/are separately controlled by Transition width of main lobe None of the above
13)	In Gibb's phenomenon, the ringing the a) band gap c) Bandwidth	effect b) d)	is predominantly present near band edge band shell
14)	filters exhibit their depend	dency	upon the system design for the

- 14) ______ filters exhibit their dependency upon the system design for the stability purpose.
 - a) FIR
 - c) Both a and b d) No
- b) IIRd) None of the above

Ρ

12

SLR-FM-476

Seat	
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

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.

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

Q.3 Attempt any two of the following questions.

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

Section – II

Q.4 Attempt any four of the following questions.

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

$$Ha(s) = \frac{s+0.1}{(s+0.1)^2+9}$$

- b) Derive the mapping formula for bilinear transformation method.
- c) Prove that a linear phase FIR filter having antisymmetric coefficient cannot be a high pass filter.
- d) Explain how adaptive filters and signal processing techniques helps in analysis of heart rate variability measurement.
- e) 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.

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

Max. Marks: 56

12

16

			MEDICAL SIGNAL	-	OCESSING	
Day Time	& Date : 10:0	e: Sa 0 AM	iturday, 23-11-2019 1 To 01:00 PM		Max. Marks:	70
nstr	uctior	ns: 1) Q. No. 1 is compulsory and sh book.	ould	be solved in first 30 minutes in answe	۶r
		2 3	 Pigures to the right indicate fu Assume suitable data if neces 	ll mar sary.	rks.	
			MCQ/Objective T	ype	Questions	
Dura	tion: 3	80 Mi	nutes		Marks:	14
Q.1	Choo sente	ose f ence	the correct alternatives from t	he op	otions and rewrite the	14
	1)	DF a) c)	T is applied to Infinite sequences Continuous infinite signals	b) d)	Finite discrete sequences Continuous finite sequences	
	2)	In C lenç pad	Dverlap-Add Method with linear of gth L and a discrete-time signal Iding should be of length	convo of ler 	olution of a discrete-time signal of ngth M, for a length N, zero	
		a) c)	L,M >N L,M <n< td=""><td>b) d)</td><td>L, M = N L ,M $\langle N^2$</td><td></td></n<>	b) d)	L, M = N L ,M $\langle N^2$	
	3)	The a) c)	e nonlinear difference equations Iterative method Phase diagram	are s b) d)	olved using Cobweb model Power series method	
	4)	The calo	e error in the filter output that res culations within the filter is called	sults f	rom rounding or truncating	
		a) c)	Coefficient quantization error Round off noise	b) d)	Adder overflow limit cycle Limit cycles	
	5)	In F usir	FIR filter design, para ng Kaiser window.	amete	ers is/are separately controlled by	
		a) c)	Order of filter (M) Both a and b	b) d)	Transition width of main lobe None of the above	
	6)	In C the	Gibb's phenomenon, the ringing	effec	t is predominantly present near	
		a) c)	band gap Bandwidth	b) d)	band edge band shell	
	7)	stal	filters exhibit their depend bility purpose.	ency	upon the system design for the	
		a) c)	FIR Both a and b	b) d)	IIR None of the above	
	8)	In c the coe	ascade form of realization, FIR filter coefficients in order to fficients.	avoid	bits should be used to represent d the quantization effect on filter	

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

D

Seat

No.

C

a) 5 to 10 b) 12 to 14 c) 20 to 24 28 to 40 d)

SLR-FM-476

Set Q
	SLR-FM-47			76	
				Set	Q
9)	For a) c)	the calculation of N- point DFT, I 2(N Log2 N) stages (N Log2 N)/2 stages	Radix b) d)	-2 FFT algorithm repeats (N Log2 N) ² /2 stages (N Log2(2 N))/2 stages	
10)	lf th valu a) c)	ne filter has anti-symmetric unit sa ue of Q(ω) IS cos(ω/2) 1	ample b) d)	response with M even, then the $\sin(\omega/2)$ $\sin\omega$	
11)	The a) c)	e scaling of a sequence x[n] by a y[n] = α [x[n]] ² y[n] = α x[n]	factor b) d)	α is given by y[n] = α x[n²] y[n] = x[n]x[-n]	
12)	DF a) c)	T is applied to Infinite sequences Continuous infinite signals	b) d)	Finite discrete sequences Continuous finite sequences	
13)	In F qua a) c)	FIR filters, parameters antization effect. Magnitude Response Both a and b	remai b) d)	ns unaffected by the Phase Characteristics None of the above	
14)	For Z ₁ ⁻¹ a) c)	a linear phase filter, if Z_1 is zero or $1/Z_1$. Zero Infinity	then ₋ b) d)	would be the value of Unity Unpredictable	

12

SLR-FM-476

Seat	
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

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.

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

Q.3 Attempt any two of the following questions.

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

Section – II

Q.4 Attempt any four of the following questions.

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

$$Ha(s) = \frac{s+0.1}{(s+0.1)^2+9}$$

- **b)** Derive the mapping formula for bilinear transformation method.
- c) Prove that a linear phase FIR filter having antisymmetric coefficient cannot be a high pass filter.
- d) Explain how adaptive filters and signal processing techniques helps in analysis of heart rate variability measurement.
- e) 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.

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

Max. Marks: 56

12

16

Seat No.				Set R
		T.E. (Part – II) (New) (CBCS) Bio-Medical MEDICAL SIGNA	Exam Engin	nination Nov/Dec-2019 eering DCESSING
Day & Time:	& Date 10:00	e: Saturday, 23-11-2019 D AM To 01:00 PM		Max. Marks: 70
Instru	uctior	 ns: 1) Q. No. 1 is compulsory and s book. 2) Figures to the right indicate f 3) Assume suitable data if nece 	hould b ull mark ssary.	be solved in first 30 minutes in answer
		MCQ/Objective	Type (Questions
Durat	ion: 3	0 Minutes	1960	Marks: 14
Q.1	Choo sente	ose the correct alternatives from ence.	the opt	tions and rewrite the 14
	1)	DFT is applied toa) Infinite sequencesc) Continuous infinite signals	b) d)	Finite discrete sequences Continuous finite sequences
	2)	In FIR filters, paramete quantization effect. a) Magnitude Response	rs rema b)	ins unaffected by the Phase Characteristics
	3)	 c) Both a and b For a linear phase filter, if Z₁ is zero 	d) ro then	None of the above would be the value of
	•)	$ \begin{array}{l} Z_1^{-1} \text{ or } 1/Z_1. \\ a) \text{Zero} \\ c) \text{Infinity} \end{array} $	b) d)	Unity Unpredictable
	4)	DFT is applied toa) Infinite sequencesc) Continuous infinite signals	b) d)	Finite discrete sequences Continuous finite sequences
	5)	In Overlap-Add Method with linear length L and a discrete-time signal padding should be of length	r convol I of lenç 	lution of a discrete-time signal of gth M, for a length N, zero
		a) L,M >N c) L,M <n< td=""><td>b) d)</td><td>L, M = N L ,M $<$N²</td></n<>	b) d)	L, M = N L ,M $<$ N ²
	6)	The nonlinear difference equationa) Iterative methodc) Phase diagram	s are so b) d)	olved using Cobweb model Power series method
	7)	The error in the filter output that recalculations within the filter is called a) Coefficient quantization error c) Round off poise	esults fre ed b) d∖	om rounding or truncating Adder overflow limit cycle
	8)	In FIR filter design, pa using Kaiser window.	ramete	rs is/are separately controlled by
		 a) Order of filter (M) c) Both a and b 	b) d)	Transition width of main lobe None of the above

Seat No.

c) Bandwidth band shell d) 10) filters exhibit their dependency upon the system design for the stability purpose. a) FIR b) IIR c) Both a and b d) None of the above In cascade form of realization, _____ bits should be used to represent 11) 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 28 to 40 d) For the calculation of N- point DFT, Radix -2 FFT algorithm repeats _____. 12) 2(N Log2 N) stages b) $(N Log2 N)^2/2$ stages a) c) (N Log2 N)/2 stages d) (N Log2(2 N))/2 stages 13) If the filter has anti-symmetric unit sample response with M even, then the value of $Q(\omega)$ IS . a) $\cos(\omega/2)$ b) $sin(\omega/2)$ d) sinω c) 1

- The scaling of a sequence x[n] by a factor α is given by 14)
 - a) $y[n] = \alpha [x[n]]^2$
 - c) $y[n] = \alpha x[n]$

b) $y[n] = \alpha x[n^2]$

d) y[n] = x[n]x[-n]

- 9) In Gibb's phenomenon, the ringing effect is predominantly present near the . a) band gap b) band edge

Set R

SLR-FM-476

12

SLR-FM-476

Seat	
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

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.

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

Q.3 Attempt any two of the following questions.

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

Section – II

Q.4 Attempt any four of the following questions.

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

$$Ha(s) = \frac{s+0.1}{(s+0.1)^2+9}$$

- b) Derive the mapping formula for bilinear transformation method.
- c) Prove that a linear phase FIR filter having antisymmetric coefficient cannot be a high pass filter.
- d) Explain how adaptive filters and signal processing techniques helps in analysis of heart rate variability measurement.
- e) 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.

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

Max. Marks: 56

12

16

Set

Max. Marks: 70

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

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

Seat

No.

- Q.1 Choose the correct alternatives from the options and rewrite the sentence.
 - The nonlinear difference equations are solved using _ 1)
 - a) Iterative method c) Phase diagram
- b) Cobweb model Power series method d)
- 2) The error in the filter output that results from rounding or truncating calculations within the filter is called _
 - a) Coefficient quantization error Adder overflow limit cycle b)
 - c) Round off noise d) Limit cycles
- 3) In FIR filter design, _____ parameters is/are separately controlled by using Kaiser window.
 - a) Order of filter (M) c) Both a and b
- Transition width of main lobe b)
- d) None of the above
- 4) In Gibb's phenomenon, the ringing effect is predominantly present near the _____.
 - a) band gap b) band edge
 - Bandwidth d) band shell C)
- 5) filters exhibit their dependency upon the system design for the stability purpose.
 - a) FIR b) IIR None of the above c) Both a and b d)
- 6) 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 28 to 40 d)
- For the calculation of N- point DFT, Radix -2 FFT algorithm repeats _____. 7) $(N Log2 N)^2/2$ stages
 - a) 2(N Log2 N) stages b)
 - c) (N Log2 N)/2 stages d) (N Log2(2 N))/2 stages



Marks: 14

			-	-
			Set	S
8)	If the filter has anti-symmetric unit saturates value of $Q(\omega)$ IS	ample	response with M even, then the	
	a) $\cos(\omega/2)$ c) 1	b) d)	sin(ω/2) sinω	
9)	The scaling of a sequence $x[n]$ by a a) $y[n] = \alpha [x[n]]^2$ c) $y[n] = \alpha x[n]$	factor b) d)	α is given by y[n] = α x[n²] y[n] = x[n]x[-n]	
10)	DFT is applied to a) Infinite sequences c) Continuous infinite signals	b) d)	Finite discrete sequences Continuous finite sequences	
11)	In FIR filters, parameters quantization effect.a) Magnitude Responsec) Both a and b	remai b) d)	ns unaffected by the Phase Characteristics None of the above	
12)	For a linear phase filter, if Z_1 is zero Z_1^{-1} or $1/Z_1$. a) Zero c) Infinity	then <u>-</u> b) d)	would be the value of Unity Unpredictable	
13)	DFT is applied to a) Infinite sequences c) Continuous infinite signals	b) d)	Finite discrete sequences Continuous finite sequences	
14)	In Overlap-Add Method with linear co length L and a discrete-time signal o padding should be of length	onvolu f leng 	ution of a discrete-time signal of th M, for a length N, zero	
	a) L.IVI >IN	(Q	L. $ V = N $	

c) L,M <N

b) L, M = N d) L, M $< N^2$ SLR-FM-476

Seat	
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

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.

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

Q.3 Attempt any two of the following questions.

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

Section – II

Q.4 Attempt any four of the following questions.

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

$$Ha(s) = \frac{s+0.1}{(s+0.1)^2+9}$$

- b) Derive the mapping formula for bilinear transformation method.
- c) Prove that a linear phase FIR filter having antisymmetric coefficient cannot be a high pass filter.
- d) Explain how adaptive filters and signal processing techniques helps in analysis of heart rate variability measurement.
- e) 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.

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

Max. Marks: 56

12

16

12

):00 AN	/I To 01:00 PM		
ions: 1	 Q. No. 1 is compulsory and it sh answer book. 	nould	be solved in first 30 minutes in
	 Figures to the right indicate full Assume suitable data wherever 	mark requ	s. ired.
	MCQ/Objective Ty	pe C	Questions
: 30 Mi	inutes		Mark
noose i	the correct alternatives from the	e opt	ions and rewrite the
The	e infrared region of the electromage	gnetic	spectrum is usually taken as
a)	0.77	b)	0.80
C)	1000	d)	1.5
	expresses incident energy of 2	X ray	radiation.
a)	REM	b)	Rad
C)	Rontegen	a)	Kev
The	e Xray in medical diagnostics region	on ha	ave wavelength of the order of
a)	$10^{-10}m$	b)	$10^{-12}m$
c)	$10^{-16}am$	d)	10 ¹⁰ cm
The rad	e dynamic range of a detector is th iation	ne rai	nge from minimum to maximum
a)	Intensity	b)	Contrast
c)	resolution	d)	Exposure
be a) c)	is the smallest detectable con shown by the imaging system with Dynamic range DQE	trast n diffe b) d)	for a given detail size that can erent intensity. MTF Contrast resoluation
, B s	canning of objects gives 2	, D im	ages that allows assessment of
size	e		
a)	dynamic	b)	static
C)	real time	d)	parallel
Cha def	aracteristic impedance is the spec ined as the product of of th	ific ir e me	npedance of a medium is edium with the velocity of sound.

Day & Date: Monday, 25-11-2019 Time: 10

Seat

No.

Instructi

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

Duration

- Q.1 Ch se
 - 1)
 - 2)
 - 3)
 - 4)
 - 5)
 - 6)
 - 7)
 - intensity resolution a) D)
 - density d) wavelength C)
 - 8) The CT number of a tissue indicates of that tissue. radiation
 - a) adsorption b)
 - c) scattering d) absorption

SLR-FM-477

Set P

Max. Marks: 70

s: 14

				Set
9)	In C a rig	CT scan X ray source and detecto gid gantry.	ors are	e mounted each other in
	a) c)	opposite parallel	b) d)	diagonal series
10)	Grio rad	ds are placed between the patien iation.	ts and	d for absorbing scattered
	a) c)	collimator film	b) d)	Patient table power supply
11)	Hee all p	el effect states that the intensity o portions of the beam.	f Xray	y beam is not throughout
	a) c)	uniform small	b) d)	Standard Large
12)	Ultr boc	asound travels at a velocity of ab	out _	in the soft tissues of the
	a) c)	155 m/s 15000 m/s	b) d)	1500 m/s 1155 m/s
13)	The cha	e factor of a ultrasound trar	nsduc	er determines its frequency
	a) c)	Intensity radiation	b) d)	Impedance Q
14)	Πρη	oth of petration = Velocity	of so	ound in the medium $ imes$ – – –
• •,			b)	2
	a) C)	absorption	d)	Time

Ρ

Seat No.

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

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.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

		T.E. (Part -II) (New) (CBCS) E Bio-Medical E MEDICAL IM	xam ngin AGIN	ination Nov/Dec-2019 eering NG – I
Day a Time	& Date : 10:0	e: Monday, 25-11-2019 0 AM To 01:00 PM		Max. Marks: 70
Instr	uctior	ns: 1) Q. No. 1 is compulsory and it s answer book. 2) Figures to the right indicate ful 3) Assume suitable data whereve	hould mark r requ	l be solved in first 30 minutes in ks. uired.
		MCQ/Objective T	ype (Questions
Dura	tion: 3	30 Minutes		Marks: 14
Q.1	Choo	ose the correct alternatives from the	ne op	tions and rewrite the 14
	1)	The CT number of a tissue indicates a) adsorption c) scattering	6 b) d)	of that tissue. radiation absorption
	2)	In CT scan X ray source and detect a rigid gantry. a) opposite c) parallel	ors ar b) d)	e mounted each other in diagonal series
	3)	Grids are placed between the patier radiation.a) collimatorc) film	nts an b) d)	d for absorbing scattered Patient table power supply
	4)	Heel effect states that the intensity of all portions of the beam. a) uniform c) small	of Xra b) d)	y beam is not throughout Standard Large
	5)	Ultrasound travels at a velocity of al body. a) 155 m/s c) 15000 m/s	bout _ b) d)	in the soft tissues of the 1500 m/s 1155 m/s
	6)	The factor of a ultrasound tra characteristics. a) Intensity c) radiation	b) d)	cer determines its frequency Impedance Q
	7)	<i>Depth of petration</i> = <u>Velocity</u> a) Intensity	<i>v of se</i> b)	<u>pund in the medium × −−−</u> 2 Q
		c) absorption	d)	Time
	8)	The infrared region of the electroma	gneti	c spectrum is usually taken as
		a) 0.77 c) 1000	b) d)	0.80 1.5

Seat

No.

SLR-FM-477

Set Q

SLR-FM-477 Set Q

- 9) _____ expresses incident energy of X ray radiation.
 - a) REM b) Rad c) Rontegen d) KeV
- 10) The Xray in medical diagnostics region have wavelength of the order of
 - a) $10^{-10}m$ c) $10^{-16}am$ b) $10^{-12}m$ d) $10^{10}cm$
- 11) The dynamic range of a detector is the range from minimum to maximum
 - radiation _____.
 - a) Intensity b) Contrast
 - c) resolution d) Exposure
- 12) _____ 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 resoluation
- 13) B scanning of _____ objects gives 2 D images that allows assessment of size.
 - a) dynamic
- b) static
- c) real time d) parallel
- 14) 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

T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019

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

Seat No.

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Assume suitable data wherever required.

Section – I

Bio-Medical Engineering MEDICAL IMAGING – I

Q.2 Attempt any four of the following questions.

- 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.

- 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.

- 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.

- 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.

SLR-FM-477



16

16

12

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

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

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

MEDICAL IMAGING – I

Duration: 30 Minutes

- Q.1 Choose the correct alternatives from the options and rewrite the sentence. is the smallest detectable contrast for a given detail size that can 1)
 - be shown by the imaging system with different intensity. MTF
 - a) Dynamic range b) c) DQE
 - d) Contrast resoluation
 - B scanning of _____ objects gives 2 D images that allows assessment of 2) size.
 - a) dynamic b) static
 - c) real time d) parallel
 - Characteristic impedance is the specific impedance of a medium is 3) defined as the product of _____ of the medium with the velocity of sound.
 - intensity b) resolution a) density d) wavelength c)
 - The CT number of a tissue indicates _____ of that tissue. 4)
 - a) adsorption b) radiation
 - absorption c) scattering d)
 - 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
 - Grids are placed between the patients and _____ for absorbing scattered 6)
 - radiation.
 - a) collimator b) Patient table d) c) film power supply
 - Heel effect states that the intensity of Xray beam is not _____ throughout 7) all portions of the beam.
 - a) uniform b) Standard
 - c) small d) Large
 - Ultrasound travels at a velocity of about in the soft tissues of the 8) body.
 - a) 155 m/s 1500 m/s b) 15000 m/s d) 1155 m/s C)

SLR-FM-477

Set R

Max. Marks: 70

Marks: 14

			Set	R
9)	The factor of a ultrasound t characteristics.	ransdu	cer determines its frequency	
	a) Intensityc) radiation	b) d)	Impedance Q	
10)	Depth of petration = - Veloci	ty of so	ound in the medium ×	
	a) Intensity c) absorption	b) d)	Q Time	
11)	The infrared region of the electron	nagnetio	c spectrum is usually taken as	
	a) 0.77 c) 1000	b) d)	0.80 1.5	
12)	expresses incident energy a) REM c) Rontegen	of X ray b) d)	radiation. Rad KeV	
13)	The Xray in medical diagnostics re	egion ha	ave wavelength of the order of	
	a) $10^{-10}m$ c) $10^{-16}am$	b) d)	$10^{-12}m$ $10^{10}cm$	
14)	The dynamic range of a detector is radiation	s the ra	nge from minimum to maximum	

- Contrast
 - a) Intensity c) resolution b)
 - d) Exposure

T.E. (Part -II) (New) (CBCS) Examination Nov/Dec-2019

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

Seat

No.

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Assume suitable data wherever required.

Section – I

Bio-Medical Engineering MEDICAL IMAGING – I

Q.2 Attempt any four of the following questions.

- 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.

- 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.

- 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.

- 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.

SLR-FM-477



R

12

16

12

Time:	10:00	0 AM To 01:00 PM			
Instru	uction	 ns: 1) Q. No. 1 is compulsory and it s answer book. 2) Figures to the right indicate ful 3) Assume suitable data wherever 	hould I mark r requ	be solved in first 30 minutes in s. uired.	
Durot	ion: 2	MCQ/Objective T	ype (Questions	
Durat					
Q.1	Choo	ose the correct alternatives from the	ie opi	tions and rewrite the	
	1)	Grids are placed between the patien radiation.	nts an	d for absorbing scattered	
		a) collimator	b)	Patient table	
		c) film	d)	power supply	
	2)	Heel effect states that the intensity of all portions of the beam.	of Xra	y beam is not throughout	
		a) uniform	b)	Standard	
		c) small	d)	Large	
	3)	Ultrasound travels at a velocity of a body.	bout _	in the soft tissues of the	
		a) 155 m/s	b)	1500 m/s	
		c) 15000 m/s	d)	1155 m/s	
	4)	The factor of a ultrasound tracharacteristics.	ansduo	cer determines its frequency	
		a) Intensity	b)	Impedance	
		c) radiation	d)	Q	
	5)	Depth of petration = $\frac{Velocity of sound in the medium \times}{Velocity of sound in the medium \times}$			
	,	a) Intensity	b)	0	
		c) absorption	d)	Time	
	6)	The infrared region of the electroma	agnetic	c spectrum is usually taken as	
		a) 0.77 c) 1000	b) d)	0.80 1.5	
	7)	expresses incident operay of	Y rou	radiation	
	')	a) RFM	b)	Rad	
		c) Rontegen	d)	KeV	
	8)	The Xray in medical diagnostics reg	jion ha	ave wavelength of the order of	
		\overline{a}) $10^{-10}m$	b)	$10^{-12}m$	

10¹⁰*cm*

d)

Seat No.

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

Day & Date: Monday, 25-11-2019

 $10^{-16}am$

C)

SLR-FM-477

Set S

14

14

Max. Marks: 70

- 9) The dynamic range of a detector is the range from minimum to maximum radiation .
 - a) Intensity b)
 - c) resolution d) Exposure
- 10) is the smallest detectable contrast for a given detail size that can be shown by the imaging system with different intensity.
 - a) Dynamic range MTF b)
 - c) DQE d) Contrast resoluation
- B scanning of _____ objects gives 2 D images that allows assessment of 11) size.
 - a) dynamic b) static
 - c) real time d) parallel
- Characteristic impedance is the specific impedance of a medium is 12) defined as the product of _____ of the medium with the velocity of sound.
 - intensity b) resolution a)
 - density d) wavelength C)
- 13) The CT number of a tissue indicates of that tissue.
 - a) adsorption b)
 - c) scattering
- In CT scan X ray source and detectors are mounted _____ each other in 14) a rigid gantry.
 - a) opposite
 - c) parallel

- b) diagonal
- d) series

Set

Contrast

- radiation
- d) absorption

SLR-FM-477

S

Seat No.

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

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.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

Set

Exhibit variations

Frequency

Gives infinite poles

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

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

4)

Seat

No.

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 __. b)
 - a) Remains constant
 - c) Gives zero feedback
- 2) ____ condition is used to verify the existence of a particular point on the root locus.

d)

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

Marks: 14

Max. Marks: 70

SLR-FM-478

			SLR-FM-47	'8
			Set I	Ρ
9)	In Routh array, if zero is found in the needs to be replaced? a) δ	e first b)	column, then by which term it	
	C) σ	d)	ε	
10)	 point on root locus specifiesa) Centroidc) Stability point	the m b) d)	eeting or collision of two poles. Break away Point Anti-break point	
11)	If a pole is located at origin, it get re a) $-10 \log(\omega)Db$ c) $-40 \log(\omega)dB$	prese b) d)	nted on the magnitude plot As -20 log(ω)DB -60 log(ω)dB	
12)	 among the following are the e a) Mass, Spring, Friction c) Work, Energy, Power 	eleme b) d)	nts of rotational motion. Inertia, Damper, Spring Force, Pressure, Viscosity	
13)	In signal flow graph, the product of a forward path is known as 'Path gain a) Branch c) Node	all '. b) d)	gains while going through a Path Loop	
14)	The system is said to be marginally	stable	e, if gain margin is	

a) 0́ c) +∞ b) d) 1 None of the above

Seat	
No.	

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

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 questions.

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



c) Find the impulse response of following system

$$\frac{C(s)}{R(s)} = \frac{6(s+3)}{(s+8)(s^2+4s+8)}$$

- d) Explain Mason's gain formula with on example.
- e) With the help of diagram define various time response specification.

Q.3 Attempt any two questions.

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



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



16

12



Max. Marks: 56

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



Q.4 Attempt any four questions.

- 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.

- 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:



16

SLR-FM-478

1

G2

Set

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 **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** Q.1 Choose the correct alternatives from the options and rewrite the sentence. 1) In accordance to relative stability, the settling time exhibits inversely proportional nature to _____ parts of roots. Real positive b) Real negative a) Imaginary positive d) Imaginary negative C)

Seat

No.

- In Routh array, if zero is found in the first column, then by which term it 2) needs to be replaced?
 - a) δ b) η
 - c) σ d) 3
- _ point on root locus specifies the meeting or collision of two poles. 3)
 - a) Centroid Break away Point b) Stability point d) Anti-break point c)
- If a pole is located at origin, it get represented on the magnitude plot As _____. 4)
 - a) $-10\log(\omega)Db$ b) $-20 \log(\omega) DB$
 - c) $-40 \log(\omega) dB$ d) $-60 \log(\omega) dB$
- 5) among the following are the elements of rotational motion.
 - Mass, Spring, Friction Inertia, Damper, Spring a) b)
 - c) Work, Energy, Power Force, Pressure, Viscosity d)
- 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 _____.
 - 0 b) a) d) None of the above C) +∞
- 8) 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
- condition is used to verify the existence of a particular point on the 9) root locus.
 - a) Amplitude
 - c) Magnitude

- Frequency b)
- d) Angle

SLR-FM-478

Set

Q

Max. Marks: 70

Marks: 14

10) The magnitude & phase relationship between _____ input and the steady state output is called as frequency domain.

a) Step

c) Sinusoidal

- b) Ramp
- d) Parabolic
- 11) _____ is the value of steady state error in closed loop control systems.
 - a) Zero b) Unity
 - c) Infinity d) Unpredictable
- 12) Associative law for summing point is applicable only to those summing points which are _____ connected to each other.
 - a) Directly b)
 - c) Orthogonally d) Diagonally
- 13) In a signal flow graph method, _____ is an overall transfer function of a system obtained.
 - a) Poisson's equation
 - c) Mason's equation
- b) Block diagram reduction rules

SLR-FM-478

Set

d) Lagrange's equation

Indirectly

- 14) 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

Seat	
No.	

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

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 questions.

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



c) Find the impulse response of following system

$$\frac{C(s)}{R(s)} = \frac{6(s+3)}{(s+8)(s^2+4s+8)}$$

- d) Explain Mason's gain formula with on example.
- e) With the help of diagram define various time response specification.

Q.3 Attempt any two questions.

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



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



16

12



Max. Marks: 56

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



- 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.

- 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:



16

12



1

G2

No.		
Seat		

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

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

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

- 1) Associative law for summing point is applicable only to those summing points which are _____ connected to each other.
 - Directlv a)
 - c) Orthogonally d)
- In a signal flow graph method, _____ is an overall transfer function of a 2) system obtained.
 - a) Poisson's equation b)
 - c) Mason's equation d)
- 3) Type 0 systems are unsuitable _____.
 - a) For ramp inputs
 - b) If the input is parabolic in nature
 - Both a and b c)
 - d) None of the above
- 4) 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 Imaginary negative d)
- In Routh array, if zero is found in the first column, then by which term it 5) needs to be replaced?
 - a) δ b) η d) c) σ 3
- 6) _ point on root locus specifies the meeting or collision of two poles.
 - a) Centroid Break away Point b)
 - Stability point d) Anti-break point C)
- 7) If a pole is located at origin, it get represented on the magnitude plot As _____.
 - a) $-10\log(\omega)Db$ $-20 \log(\omega) DB$ b) c) $-40 \log(\omega) dB$ d) $-60 \log(\omega) dB$
- 8) among the following are the elements of rotational motion.
 - Mass, Spring, Friction b) a) Work, Energy, Power C)
 - Inertia, Damper, Spring Force, Pressure, Viscosity d)

Max. Marks: 70

Marks: 14

Set

R

- b) Indirectly
- Diagonally
- - Block diagram reduction rules
 - Lagrange's equation

			SLR-FM-478	
			Set R	-
9)	In signal flow graph, the product of a forward path is known as 'Path gain a) Branch c) Node	all '. b) d)	gains while going through a Path Loop	
10)	The system is said to be marginally a) 0 c) $+\infty$	stable b) d)	e, if gain margin is 1 None of the above	
11)	Root locus specifies the movement the gain of systemsa) Remains constantc) Gives zero feedback	of clo: b) d)	sed loop poles especially when Exhibit variations Gives infinite poles	
12)	condition is used to verify the root locus. a) Amplitude c) Magnitude	exist b) d)	ence of a particular point on the Frequency Angle	
13)	The magnitude & phase relationship state output is called as frequency d a) Step c) Sinusoidal	betw lomair b) d)	reen input and the steady n. Ramp Parabolic	
11)	is the value of steady state a	rror in	closed loop control systems	

- 14) ______ is the value of steady state error in closed loop control systems.a) Zerob) Unityc) Infinityd) Unpredictable

Seat	
No.	

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

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 questions.

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



c) Find the impulse response of following system

$$\frac{C(s)}{R(s)} = \frac{6(s+3)}{(s+8)(s^2+4s+8)}$$

- d) Explain Mason's gain formula with on example.
- e) With the help of diagram define various time response specification.

Q.3 Attempt any two questions.

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



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



16

12



Max. Marks: 56

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



Section – II

G2

Q.4 Attempt any four questions.

- 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.

- 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:



16

SLR-FM-478

1

Set | R

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

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

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

FEEDBACK CONTROL SYSTEM

- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

1)

9)

Seat

No.

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

- _____ 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
- 2) If a pole is located at origin, it get represented on the magnitude plot As _____.
 - a) $-10 \log(\omega) Db$ b) $-20 \log(\omega) DB$ d) $(0 \log(\omega) dB$
 - c) $-40 \log(\omega) dB$ d) $-60 \log(\omega) dB$
- 3) _____ 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
- 4) 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
- 5) The system is said to be marginally stable, if gain margin is _____.
 - a) 0 b) 1 c) +∞ d) None of the
 - $-\infty$ d) None of the above
- 6) 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
- _____ condition is used to verify the existence of a particular point on the root locus.
 - a) Amplitude b) Frequency
 - c) Magnitude d) Angle
- 8) The magnitude & phase relationship between _____ input and the steady state output is called as frequency domain.
 - a) Step b) Ramp
 - c) Sinusoidal d) Parabolic
 - _____ is the value of steady state error in closed loop control systems.
 - a) Zero b) Unity
 - c) Infinity d) Unpredictable

SLR-FM-478

Set S

Max. Marks: 70

Marks: 14

10) 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
- In a signal flow graph method, _____ is an overall transfer function of a 11) system obtained.
 - b) a) Poisson's equation
 - Block diagram reduction rules

SLR-FM-478

Set S

- c) Mason's equation
- d) Lagrange's equation
- Type 0 systems are unsuitable _____. 12)
 - a) For ramp inputs
 - b) If the input is parabolic in nature
 - c) Both a and b
 - d) None of the above
- In accordance to relative stability, the settling time exhibits inversely 13) proportional nature to _____ parts of roots.
 - a) Real positive b) Real negative
 - c) Imaginary positive Imaginary negative d)
- 14) In Routh array, if zero is found in the first column, then by which term it needs to be replaced?
 - a) δ b) η ε
 - d) C) σ

Seat	
No.	

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

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 questions.

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



c) Find the impulse response of following system

$$\frac{C(s)}{R(s)} = \frac{6(s+3)}{(s+8)(s^2+4s+8)}$$

- d) Explain Mason's gain formula with on example.
- e) With the help of diagram define various time response specification.

Q.3 Attempt any two questions.

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



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



16

12



Max. Marks: 56

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



Section – II

G2

Q.4 Attempt any four questions.

- 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.

- 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:



16

SLR-FM-478

1

Set S
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

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

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

Duration: 30 Minutes

Seat

No.

Q.1

- How is the nature of instructions size in CISC processor? 1) a) Fixed b) Variable
 - Both a and b None c) d) 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?
 - **Bus Master** b) Bus Slave a)
 - C) **Bus Drives** d) **Bus Data Carries**
 - In the branch instructions of ARM, what does the mnemonic BVC imply . 3)
 - b) Carry Set a) Overflow Set d) Overflow Clear
 - Carry Clear c)
 - 4) What is the size range of the alphanumeric LCDs?
 - 1 to 8 characters b) 8 to 80 characters a) 100 to 150 characters d) 250 to 400 characters C)
 - What is the directional nature of two wires SDA and SCL usually adopted 5) in I2C bus for? carrying the information between the devices?
 - a) Unidirectional
 - C) Multidirectional
 - Which of the following instructions are called Program Status Register 6) transfer instructions?
 - LDR, STR a)
 - b) LDM, STM MCR, MRC d) MSR, MRS c)
 - 7) Instructions used to multiply R5 contents by R4 and to store the result into R6 is called
 - MUL R6, R5, LSL #2 a)
 - c) MUL R6, R5, LSR #2
 - Processor must accept and process frame before next frame arrives, 8) typically called .
 - Hard real-time system a)
 - Real-data constraints c)
- b) Real-time constraints

b) MUL R6, R5, R4

b) Bidirectional

d) None

d) None

d) Soft real-time system

Set

Max. Marks: 70

Marks: 14



- 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 r1, r2 ... rn 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

No.	Jei	
	T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering EMBEDDED SYSTEMS	
Day 8	Date: Wednesday, 27-11-2019 Max. Marks:	56
Ime	10:00 AM TO 01:00 PM	
Instr	ctions: 1) All questions are compulsory.2) Figure to the right indicates full marks.	
	Section – I	
Q.2	 Attempt any four of the following questions. 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. 	16
Q.3	 Attempt any two of the following questions. 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 	12
	Section – II	
Q.4	 Attempt any four of the following questions. 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. 	16
	 What is RTOS? Compare conventional OS with RTOS. Define task. Draw and Explain different states of task with fig. 	
Q.5	 Attempt any two of the following questions. 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 	12

2) Mailbox

SLR-FM-479

Set P

Seat 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

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

c)

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

- Processor must accept and process frame before next frame arrives, 1) typically called
 - Hard real-time system a) Real-data constraints
- b) Real-time constraints Soft real-time system d)
- 2) Scheduling of tasks is a very important consideration in RTOS. Which of the following best described the best scheduling policy design?
 - The scheduler must follow a pre-emptive policy a)
 - The scheduler must not use a pre-emptive policy option b)
 - The scheduler must not only use a pre-emptive policy options with the c) priority consideration
 - The scheduler must not use a pre-emptive policy options, but must d) employ priority consideration.
- 3) Time required to synchronous switch from the context of one thread to the context of another thread is called
 - Thread fly-back time a) b) Jitter
 - Context switching time C) d) None
- What are the two types of semaphores? 4)
 - Digital semaphores and binary semaphores a)
 - b) Analog semaphores and octal semaphores
 - Counting semaphores and binary semaphores c)
 - Critical semaphores and System semaphores d)
- Which of the following is NOT a valid deadlock prevention scheme? 5)
 - Release all resources before requesting a new resource a)
 - Number the resources uniquely and never request a lower numbered b) resources than the last one requested.
 - Never request a resource after releasing any resource c)
 - Request and all required resources be allocated before execution. d)
- Consider a set of n tasks with known run times r1, r2 ... rn to be run on a 6) uniprocessor machine. Which of the following processor scheduling algorithms will result in the maximum throughput?
 - Round-Robin Shortest-Job-First a) b)
 - Highest-Response-Ratio-Next d) First-Come-First-Served c)

Max. Marks: 70

Marks: 14

Set

- What will happen if a non-recursive mutex is locked more than once? 7)
 - Starvation a)
 - c) Aging d) Signaling
- 8) How is the nature of instructions size in CISC processor?
 - Fixed a)

Both a and b

C)

b) Variable d) None

b) Deadlock

- What does an IC that initiate or enable the data transfer on bus can be 9) regarded as in accordance to the I2C protocol specifications?
 - a) Bus Master
 - c) Bus Drives
- 10) In the branch instructions of ARM, what does the mnemonic BVC imply _____.
 - a) Overflow Set c) Carry Clear
- d) Overflow Clear
- What is the size range of the alphanumeric LCDs? 11)
 - 1 to 8 characters a)
 - C) 100 to 150 characters
- b) 8 to 80 characters d) 250 to 400 characters
- 12) 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
 - Multidirectional d) None c)
- Which of the following instructions are called Program Status Register 13) transfer instructions?
 - LDR, STR b) LDM, STM a)
 - MCR, MRC d) MSR, MRS C)
- Instructions used to multiply R5 contents by R4 and to store the result into 14) R6 is called
 - MUL R6, R5, LSL #2 a)
 - MUL R6, R5, LSR #2 c)
- b) MUL R6, R5, R4
- d) None

b) Bus Slave

- d) Bus Data Carries
- b) Carry Set

- **SLR-FM-479**
 - Set | Q

Seat	t		Set	Q
110.	T.E. (Part – I	」 I) (New) (CBCS) Examina Bio-Medical Engineer EMBEDDED SYSTEN	tion Nov/Dec-2019 ing IS	
Day & Time	& Date: Wednesday, 2 : 10:00 AM To 01:00	27-11-2019 PM	Max. Marks	s: 56
Instr	uctions: 1) All question 2) Figure to	ons are compulsory. the right indicates full marks.		
		Section – I		
Q.2	 Attempt any four of a) Define and class b) Explain with a r c) Explain in detai d) Explain load- st e) Explain in detai 	f the following questions. sify embedded system with exa- neat dia of ARM dataflow model I bus architecture of ARM process ore instruction of ARM process I different modes of operation o	imples. essor. or with an example. f ARM.	16
Q.3	Attempt any two of a) Explain the CAI b) Explain the follo 1) CPRS regis 2) RTC c) Explain the follo 1) ASR 2) EOR 3) MLA	the following questions. N communication protocol with owing. ster owing instruction with example.	a data format.	12
		Section – II		
Q.4	 Attempt any four of a) Write and explasion system also explain also explain need ar system 	f the following questions. ain different types of memory plain the selection process of m Explain the architectures of ke and advantages of embedded C	devices used in embedded emory with example. rnel in detail. programs in embedded	16
	d) What is RTOS?e) Define task. Dra	⁹ Compare conventional OS with aw and Explain different states	n RTOS. of task with fig.	
Q.5	 Attempt any two of a) Draw and explain also write the prince b) Explain with near c) Explain the following the following of the prince a) Mailback 	the following questions. hin the interfacing of matrix keyp rogram for the same. at dia the function of DMA. owings. es	ad with embedded system	12

2) Mailbox

SLR-FM-479

Set

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

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

Seat

No.

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

- What is the directional nature of two wires SDA and SCL usually adopted 1) in I2C bus for? carrying the information between the devices?
 - a) Unidirectional
 - Multidirectional d) c)
- 2) Which of the following instructions are called Program Status Register transfer instructions?
 - LDR. STR a)
 - MCR, MRC d) MSR, MRS c)
- Instructions used to multiply R5 contents by R4 and to store the result into 3) R6 is called
 - MUL R6, R5, LSL #2 a) C)
 - MUL R6, R5, LSR #2
- 4) Processor must accept and process frame before next frame arrives, typically called .
 - Hard real-time system a)
- b) Real-time constraints d) Soft real-time system
- Real-data constraints c)
- Scheduling of tasks is a very important consideration in RTOS. Which of 5) the following best described the best scheduling policy design?
 - The scheduler must follow a pre-emptive policy a)
 - The scheduler must not use a pre-emptive policy option b)
 - The scheduler must not only use a pre-emptive policy options with the c) priority consideration
 - d) The scheduler must not use a pre-emptive policy options, but must employ priority consideration.
- 6) Time required to synchronous switch from the context of one thread to the context of another thread is called
 - Thread fly-back time b) Jitter a)
 - Context switching time d) None C)
- What are the two types of semaphores? 7)
 - Digital semaphores and binary semaphores a)
 - Analog semaphores and octal semaphores b)
 - Counting semaphores and binary semaphores C)
 - Critical semaphores and System semaphores d)

Max. Marks: 70

Marks: 14

b) Bidirectional

- None
- b) LDM. STM

- MUL R6, R5, R4 b)

d) None

Set | R

- 8) 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.
- 9) Consider a set of n tasks with known run times r1, r2 ... rn 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
- 10) What will happen if a non-recursive mutex is locked more than once?
 - a) Starvation b) Deadlock
 - c) Aging d) Signaling
- 11) How is the nature of instructions size in CISC processor?
 - a) Fixed b) Variable
 - c) Both a and b d) None
- 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?
 - a) Bus Master
 - c) Bus Drives
- b) Bus Slave
- d) Bus Data Carries
- 13) In the branch instructions of ARM, what does the mnemonic BVC imply _____.
 - a) Overflow Set
 - b) Carry Setd) Overflow Clear
- 14) What is the size range of the alphanumeric LCDs?
 - a) 1 to 8 characters

c) Carry Clear

- b) 8 to 80 characters
- c) 100 to 150 characters
- d) 250 to 400 characters

Page 8 of 12

Seat	:				Set	R	
No.						• •	
T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019							
			EMBEDDE	D SYSTEMS			
Day &	& Dat	e: Wednesday, 2	7-11-2019		Max. Marks	s: 56	
Time	: 10:0	00 AM To 01:00 F	M				
Instru	uctio	ns: 1) All questic 2) Figure to t	ns are compulsor he right indicates	y. full marks.			
			Sect	ion – I			
Q.2	Atte	mpt any four of	the following que	estions.		16	
	a) b)	Explain with a n	eat dia of ARM da	taflow model.			
	c)	Explain in detail	bus architecture c	of ARM processor.	.] .		
	a) e)	Explain load- sto Explain in detail	different modes o	f operation of ARM.	JIE.		
Q.3	Átte	mpt any two of	the following que	estions.		12	
	a) b)	Explain the CAN	l communication p	rotocol with a data format.			
	D)	1) CPRS regis	ter				
		2) RTC	ving instruction wi	theyample			
	C)	1) ASR		un example.			
		2) EOR					
		3) MILA	Sect	ion – II			
04	۸tto	mot any four of	the following gu	estions		16	
Q.7	a)	Write and expla	in different types	of memory devices used ir	embedded	10	
	Ь)	system also exp	lain the selection	process of memory with example	nple.		
	c)	Explain need an	d advantages of e	mbedded C programs in emb	bedded		
	ط <i>ا</i>	system.		ional OS with DTOS			
	u) e)	Define task. Dra	w and Explain diff	erent states of task with fig.			
Q.5	Atte	mpt any two of	the following que	estions.		12	
	a)	Draw and explai	n the interfacing o	f matrix keypad with embedd	ed system		
	b)	Explain with nea	t dia the function	of DMA.			
	c)	Explain the follo	wings.				
		1) Semaphore	5				

2) Mailbox

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

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

Seat

No.

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

- Time required to synchronous switch from the context of one thread to the 11) context of another thread is called _
 - Thread fly-back time Jitter a) b)
 - Context switching time None c) d)
- 2) What are the two types of semaphores?
 - Digital semaphores and binary semaphores a)
 - Analog semaphores and octal semaphores b)
 - Counting semaphores and binary semaphores c)
 - Critical semaphores and System semaphores d)
- Which of the following is NOT a valid deadlock prevention scheme? 3)
 - Release all resources before requesting a new resource a)
 - Number the resources uniquely and never request a lower numbered b) resources than the last one requested.
 - Never request a resource after releasing any resource c)
 - Request and all required resources be allocated before execution. d)
- 4) Consider a set of n tasks with known run times r1, r2 ... rn to be run on a uniprocessor machine. Which of the following processor scheduling algorithms will result in the maximum throughput?
 - Round-Robin Shortest-Job-First a) b)
 - Highest-Response-Ratio-Next d) First-Come-First-Served C)
- 5) What will happen if a non-recursive mutex is locked more than once? b) Deadlock
 - Starvation a)
 - c) Aging d) Signaling
- How is the nature of instructions size in CISC processor? 6)
 - a) Fixed b) Variable
 - c) Both a and b d) None
- 7) What does an IC that initiate or enable the data transfer on bus can be regarded as in accordance to the I2C protocol specifications?
 - Bus Master a)
 - c) Bus Drives
- 8) In the branch instructions of ARM, what does the mnemonic BVC imply _____.
 - a) Overflow Set
 - Carry Clear c)

- b) Bus Slave
- d) Bus Data Carries
- b) Carry Set
- d) Overflow Clear

Max. Marks: 70

Marks: 14

Set

Set S

- 9) 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
- What is the directional nature of two wires SDA and SCL usually adopted 10) in I2C bus for? carrying the information between the devices?
 - Unidirectional a)
- b) Bidirectional

d) None

- c) Multidirectional d) None
- Which of the following instructions are called Program Status Register 11) transfer instructions?
 - LDR, STR a) b) LDM, STM c)
 - MCR, MRC d) MSR, MRS
- Instructions used to multiply R5 contents by R4 and to store the result into 12) R6 is called b) MUL R6, R5, R4
 - a) MUL R6, R5, LSL #2
 - MUL R6, R5, LSR #2 C)
- Processor must accept and process frame before next frame arrives, 13) typically called _____.
 - a) Hard real-time system
- b) Real-time constraints
- Real-data constraints C)

- d) Soft real-time system
- 14) Scheduling of tasks is a very important consideration in RTOS. Which of the following best described the best scheduling policy design?
 - The scheduler must follow a pre-emptive policy a)
 - b) The scheduler must not use a pre-emptive policy option
 - The scheduler must not only use a pre-emptive policy options with the C) priority consideration
 - d) The scheduler must not use a pre-emptive policy options, but must employ priority consideration.

No.					Set	Э	
T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering EMBEDDED SYSTEMS							
Day Time	& Dat : 10:0	e: Wednesday, 2 00 AM To 01:00 F	7-11-2019 'M		Max. Mark	s: 56	
Instr	uctio	ns: 1) All questio 2) Figure to t	ns are compuls he right indicat	ory. es full marks.			
		, ,	Se	ection – I			
Q.2	Atte a) b) c) d) e)	mpt any four of Define and class Explain with a ne Explain in detail Explain load- sto Explain in detail	the following sify embedded eat dia of ARM bus architectur ore instruction o different mode	questions. System with example dataflow model. e of ARM processor. f ARM processor wit s of operation of ARM	es. th an example. M.	16	
Q.3	Atte a) b) c)	mpt any two of the Explain the CAN Explain the follow 1) CPRS regises 2) RTC Explain the follow 1) ASR 2) EOR 3) MLA	the following of communication wing. ter wing instruction	uestions. n protocol with a data with example.	a format.	12	
			Se	ection – II			
Q.4	Atte a) b) c)	mpt any four of Write and expla system also exp What is kernel? Explain need an	the following in different typ lain the selection Explain the arc d advantages o	questions. es of memory devic on process of memor hitectures of kernel i of embedded C progr	ces used in embedded ry with example. n detail. rams in embedded	16	
	d) e)	What is RTOS? Define task. Dra	Compare conv w and Explain	entional OS with RT different states of tas	OS. sk with fig.		
Q.5	Atte a) b) c)	mpt any two of the Draw and explain also write the product Explain with near Explain the follow 1) Semaphore 2) Mailt are	the following of n the interfacin ogram for the s t dia the function wings. s	juestions. g of matrix keypad w ame. on of DMA.	vith embedded system	12	

Seat No.

Page **12** of **12**

Set T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019 **Bio-Medical Engineering**

Supportive services

HOSPITAL MANAGEMENT

Day & Date: Thursday, 28-11-2019 Time: 10:00 AM To 12:00 PM

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

2)

4)

7)

Seat

No.

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

b)

d)

- 1) CSSD is included in _____.
 - a) Line services
 - c) Auxiliary services
 - Most of the surgical equipment's are sterilizes using
 - a) Dry heat c) Moist heat
- b) d)
- Supportive services of the hospital includes all except 3)
 - a) Pharmacy services b) Laboratory services
 - Housekeeping services c)
 - d) Laundry services 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
- The operation theater consists of _____ 5)
 - a) 8 Zones b) 6 Zones
 - c) 4 Zones d) 2 Zones
- Audit gives details about _____ to account payable system. 6)
 - Transaction a) Account balance b)
 - c) Expenditure All above d)
 - details are given by management to marketing service system.
 - a) Customer Employee b)
 - c) Supplier d) None
- A hospital required to check and understand the applicability of the 8) standard clauses for the institution. In India, all the hospital have been certified for
 - a) ISO 9000 **ISO 9001** b)
 - c) ISO 9002 d) ISO 9003
- 9) The total process of collecting, handling packing storage transportation and final treatment of waste is called _____ Disposal of hospital waste b)

d)

None

- Sewage a)
- Dustbin c)

- Ethylene gas
- None

All above

SLR-FM-480

Max. Marks: 50

Marks: 10





- 10) BTR stands for _____.a) Bed Turnover Ratec) Bank Transfer Report
- Blood Transfer Report Bed Transfer Report b)
- d)

Page **3** of **12**

SLR-FM-480

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q.2 Answer any Four of the following questions.

- 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.

40

Set F

Max. Marks: 40

HOSPITAL MANAGEMENT book. 2) Figures to the right indicate full marks. MCQ/Objective Type Questions **Duration: 20 Minutes** Choose the correct alternatives from the options and rewrite the sentence. 1) Audit gives details about _____ to account payable system. a) Account balance Transaction b) c) Expenditure All above d) _ details are given by management to marketing service system. 2) a) Customer b) Employee None c) Supplier d) certified for a) ISO 9000 **ISO 9001** b) ISO 9003 ISO 9002 d) c)

A hospital required to check and understand the applicability of the 3)

standard clauses for the institution. In India, all the hospital have been

- 4) The total process of collecting, handling packing storage transportation and final treatment of waste is called
 - a) Sewage b) Disposal of hospital waste d)
 - c) Dustbin
- BTR stands for ___ 5) a) Bed Turnover Rate
 - c) Bank Transfer Report
- 6) CSSD is included in .
 - a) Line services
 - c) Auxiliary services
- 7) Most of the surgical equipment's are sterilizes using
 - Dry heat b) a)
 - Moist heat c) d)
- Supportive services of the hospital includes all except ____ 8)
 - a) Pharmacy services
 - c) Housekeeping services
- 9) As norm of planning purpose, the average number of patients expected to visit the OPD daily are
 - 2 for every authorized bed a)
 - 5 for every authorizes bed b)
 - c) 10 for every authorized bed
 - d) 10 for every 100 authorized bed

T.E. (Part – II) (New) (CBCS) Examination Nov/Dec-2019 **Bio-Medical Engineering** Max. Marks: 50

Day & Date: Thursday, 28-11-2019 Time: 10:00 AM To 12:00 PM

Seat

No.

Q.1

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 20 minutes in answer

Marks: 10

10

SLR-FM-480

- None
- **Blood Transfer Report** b)
- d) Bed Transfer Report
- b) Supportive services
- All above d)
- - Ethylene gas

 - Laboratory services
 - d) Laundry services
- b)
- None







- The operation theater consists of _____a) 8 Zonesbc) 4 Zonesc 10)

___. b) 6 Zones 2 Zones

d)

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q.2 Answer any Four of the following questions.

- What is Hospital administration? Explain in detail the challenges in hospital a) administration.
- Enlist different department of hospital. Explain in detail any two b) departments with respect to functions, major instrument and man power requirement.
- Give a brief of c)
 - waste disposal 1)
 - Sterilization of surgical tools 2)
- Write and explain in detail the design of radiological department in d) 1) hospital.
 - 2) Describe the classification of hospital equipment's and their maintenance planning procedure.
- Write a note on e)
 - 1) ISO and NABA certification
 - 2) WTO and its implication
- Define medical audit? Explain in detail the pre requisite and steps to **f**) conduct medical audit.
- State the types, objective and function of OPD services in hospitals. g) 1)
 - 2) Write in detail about the planning and designing guidelines for hospital.

Max. Marks: 40



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

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

Seat

No.

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 10

- The total process of collecting, handling packing storage transportation 1) and final treatment of waste is called b) Disposal of hospital waste
 - Sewage a)
 - c) Dustbin
- 2) BTR stands for ____
 - a) Bed Turnover Rate
 - c) Bank Transfer Report
- CSSD is included in 3)
 - a) Line services
 - c) Auxiliary services

d)

- Most of the surgical equipment's are sterilizes using _____. 4)
 - a) Dry heat b)
 - c) Moist heat d) None
- Supportive services of the hospital includes all except ____ 5) b) Laboratory services
 - a) Pharmacy services
 - c) Housekeeping services
- 6) As norm of planning purpose, the average number of patients expected to visit the OPD daily are
 - 2 for every authorized bed a)
 - 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 2 Zones d)
- 8) Audit gives details about _____ to account payable system.
 - a) Account balance Transaction b)
 - c) Expenditure d) All above
 - details are given by management to marketing service system. Employee b)

None

Customer a) Supplier c)

9)

d)

SLR-FM-480

Marks: 10

- d) None
- **Blood Transfer Report** b)
- d) **Bed Transfer Report**
- b) Supportive services
- All above d)
- - Ethylene gas

Laundry services

Max. Marks: 50



- 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
 - c) ISO 9002

- b) ISO 9001 d) ISO 9003
- d) ISO

Page **9** of **12**

SLR-FM-480

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q.2 Answer any Four of the following questions.

- 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.

Max. Marks: 40

40

Set R

Seat No.

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

- 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

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
- As norm of planning purpose, the average number of patients expected to 2) 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
- The operation theater consists of _ 3)
 - a) 8 Zones 6 Zones b)
 - 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
- _ details are given by management to marketing service system. 5) a) Customer
 - Employee b)
 - c) Supplier d) None
- A hospital required to check and understand the applicability of the 6) standard clauses for the institution. In India, all the hospital have been certified for ISO 9001
 - a) ISO 9000
 - b) c) ISO 9002 d) **ISO 9003**
- 7) The total process of collecting, handling packing storage transportation and final treatment of waste is called b) Disposal of hospital waste
 - a) Sewage

8)

9)

c) Dustbin

- b) **Blood Transfer Report**
- **Bed Transfer Report** d)
- CSSD is included in _____.

c) Bank Transfer Report

BTR stands for _____ a) Bed Turnover Rate

- a) Line services
 - c) Auxiliary services

- Supportive services b)
- All above d)

None

d)

Max. Marks: 50

Marks: 10





- Most of the surgical equipment's are sterilizes using _____. 10)
 - a) Dry heatc) Moist heat

Ethylene gas b) d)

None

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q.2 Answer any Four of the following questions.

- 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.

Page **12** of **12**



Max. Marks: 40

uctio	ns: 1	 Q. No. 1 is compulsory and sh book. 	ould	l be solved in first 30 minutes i
		 Figures to the right indicate ful Assume suitable data wherever 	l ma er rec	rks quired
		MCQ/Objective Ty	уре	Questions
tion: 3	80 M	inutes		Ν
Cho 1)	o se f The sha	the correct answer. e foetal heart rate is computed from a pingwave.	om tl	he foetal ECG by appropriately
	a) c)	R QRS	b) d)	P T
2)	The a) c)	ecycle is accomplished by pulse rate ECG	cha b) d)	nges in the thoracic volume. Cardiac Respiratory
3)	The	e Doppler frequency shift is a me	asur	e of the size and direction of
	a) c)	flow velocity platelets flow	b) d)	flow quantity RBC's flow
4)	ln r nur	nultichannel telemetry the number of signals to be transmitted	er of	used is the same as the
	a) c)	carriers frequencies	b) d)	subcarriers signals
5)	the a) c)	shock is experienced by the electrical wiring at any point on t micro gross	e sub the s b) d)	pject by an accidental contact w surface of the body. hold on leakage
6)	At o a) c)	current of the order cause 16 mili amp 1 A	s ter b) d)	nporary respiratory paralysis. 10 mili amp 6A
7)	Gro the	ound resistance can be measure	d by	passing up to 1A current throu
	a) c)	neutral line power line	b) d)	ground line transformer line
8)	Ein ele vec	thoven postulated that at any giv ctrical axis of the heart can be re ctor.	en ir pres	nstant of the cardiac cycle, the ented as a dimensional
	a)	Linear	b)	three

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering BIOMEDICAL INSTRUMENTATION – II Max. Marks: 70

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

Instru in answer

Duratio

Q.1 (

- 2
- З
- е 4
 - vith
- 6
- ıgh
 - Inear C) 1
- three D)
- d) 2

Seat No.

SLR-FM-483

Set P

Marks: 14

				SLR-FM-483
				Set P
9)	Prin	iciple of Rheographic detection i	s ba	se on detection of
	a)	brachial artery	b)	arterial pulse
	c)	cardiac output	d)	respiratory rate
10)	T w	ave of ECG represents electrica	l act	ivity associated with
	a)	depolarization of atria	b)	repolarization of atria
	c)	depolarization of ventricles	d)	repolarization of both ventricles
11)	EEC	G waveform delta range varies fr	om ₋	Hz.
	a)	0.5-4	b)	4-8
	c)	8-13	d)	22-30
12)	The carc a) c)	heart sounds are produced by <u>-</u> diac cycle. mechanical circulation	b) d)	events that occur during the electrical chemical
13)	The	pulse pressure and waveforms	are	indicators for blood pressure and
	a)	velocity	b)	position
	c)	flow	d)	oxygen saturation
14)	Ven	itricular ectopic beats result in ai	n abı	normal sequence of ECG.
	a)	repolarization	b)	depolarization
	c)	bradycardia	d)	tachycardia

Page **3** of **12**

SLR-FM-483

Seat	
No.	

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

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.

- Differentiate between action potential generation between nerve muscle a) and cardiac muscle.
- Explain various methods of measuring human body temperature. b)
- Define and explain various types of heart sounds with neat figures. c)
- List various direct and indirect blood pressure measurement techniques d) and explain any one indirect method.
- Design an instrumentation amplifier for amplifying EMG signal. e)

Q.3 Attempt any two questions.

- Explain principle of Einthoven's triangle and draw ECG waveforms for 12 a) leads.
- Explain 10-20 electrode placement of EEG and draw various EEG wave b) patterns.
- Explain the need and working of ambulatory monitoring system. C)

Section - II

Attempt any four questions. Q.4

- Explain the foetal scalp pH measurement technique with its significance. a)
- Explain the effect of various ranges of currents on human body. b)
- Draw and explain working of ECG telemetry transmitter and receiver. c)
- d) Explain block diagram and working of abdominal foetal electrocardiogram processing circuit.
- Define leakage currents and explain its various types. e)

Q.5 Attempt any two questions.

- Draw and explain block diagram of ultrasonic Doppler shift based FHR a) measuring circuit.
- Draw and explain block diagram of EMG biofeedback technique. b)
- Explain block diagram and working of a radio telemetry capsule. c)

12

16

16

12

Max. Marks: 56

		 2) Figures to the right indicate full marks 3) Assume suitable data wherever required 	
ıra	tion: 3	30 Minutes Marks ^{. ,}	14
4	Cho	and the correct answer	
1	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.	14
		a) Linear b) Three c) 1 d) 2	
	2)	Principle of Rheographic detection is base on detection ofa) brachial arteryb) arterial pulsec) cardiac outputd) respiratory rate	
	3)	T wave of ECG represents electrical activity associated witha) depolarization of atriab) repolarization of atriac) depolarization of ventriclesd) repolarization of both ventricles	
	4)	EEG waveform delta range varies from Hz.a) 0.5-4b) 4-8c) 8-13d) 22-30	
	5)	The heart sounds are produced by events that occur during the cardiac cycle.events that occur during thea) mechanicalb) electricalc) circulationd) chemical	
	6)	The pulse pressure and waveforms are indicators for blood pressure and a) velocity b) position c) flow	
	7)	C)NowC)Oxygen saturationVentricular ectopic beats result in an abnormal sequence of ECG.a)repolarizationb)depolarizationc)bradycardiad)tachycardia	
	8)	The foetal heart rate is computed from the foetal ECG by appropriately shapingwave. a) R b) P c) QRS d) T	
	9)	Thecycle is accomplished by changes in the thoracic volume. a) pulse rate b) Cardiac	

Seat No.

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

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

Du

Q.'

d) Respiratory c) ECG

SLR-FM-483

Set

Max. Marks: 70

Q

10) The Doppler frequency shift is a measure of the size and direction of

a)	flow velocity	y

.

b) flow quantity

- c) platelets flow
- d) RBC's flow
- 11) 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
- shock is experienced by the subject by an accidental contact with 12) the electrical wiring at any point on the surface of the body.
 - Micro b) hold on a) Gross C)
 - d) Leakage
- At current of the order _____ causes temporary respiratory paralysis. 13) a)
 - 16 mili amp b) 10 mili amp
 - 1 A d) 6A C)
- Ground resistance can be measured by passing up to 1A current through 14) the .
 - a) neutral line
 - power line c)

- b) ground line
- d) transformer line



Set

Seat

No.

Seat	
No.	

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

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.

- 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.

- 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.

- 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.

- 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.



12

16

12

Page 6 of 12

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

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

a)

C)

Seat No.

Q.1 Choose the correct answer.

- 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
- At current of the order _____ causes temporary respiratory paralysis. 2)
 - b) 10 mili amp 16 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 d) transformer line
 - power line c)
- 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 C)
 - 1 d) 2
- 5) Principle of Rheographic detection is base on detection of _____.
 - brachial artery a) cardiac output c)
- b) arterial pulse d) respiratory rate

b) three

T wave of ECG represents electrical activity associated with _ 6)

- depolarization of atria a) depolarization of ventricles
 - b) repolarization of atria d) repolarization of both ventricles
- 7) EEG waveform delta range varies from Hz.
 - b) 4-8 a) 0.5-4
 - d) 22-30 8-13 C)
- The heart sounds are produced by _____ events that occur during the 8) cardiac cycle.
 - mechanical b) electrical a) circulation d) chemical C)

SLR-FM-483



Max. Marks: 70

Marks: 14

The pulse pressure and waveforms are indicators for blood pressure and 9)

- velocity a)
- flow C)

c)

C)

- b) position d) oxygen saturation
- 10) Ventricular ectopic beats result in an abnormal _____ sequence of ECG.
 - a) repolarization
 - d) tachycardia C) bradycardia
- 11) The foetal heart rate is computed from the foetal ECG by appropriately shaping _____wave.
 - b) P a) R c) QRS d) T
- The _____cycle is accomplished by changes in the thoracic volume. 12)
 - pulse rate a) ECG
 - b) Cardiac d) Respiratory

13) The Doppler frequency shift is a measure of the size and direction of

- flow velocity a)
- C) platelets flow
- b) flow quantity

b) depolarization

- d) RBC's flow
- In multichannel telemetry the number of _____ used is the same as the 14) number of signals to be transmitted.
 - Carriers a) Frequencies
- b) subcarriers
 - d) signals



SLR-FM-483

Max. Marks: 56

Seat	
No.	

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

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.

- 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.

- 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.

- 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.

- 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.

16

12

12

Page **9** of **12**

Set

Max. Marks: 70

Seat No.

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

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

Assume suitable data wherever required

MCQ/Objective Type Questions

Duration: 30 Minutes

Q.1 Choose the correct answer.

- 1) T wave of ECG represents electrical activity associated with
 - depolarization of atria a)
 - depolarization of ventricles C)
- b) repolarization of atria d) repolarization of both ventricles
- EEG waveform delta range varies from _____ Hz. 2)
 - 4-8 a) 0.5-4 b) d) 22-30 c) 8-13
- 3) The heart sounds are produced by _____ events that occur during the cardiac cycle.
 - a) Mechanical b) Electrical
 - C) Circulation d) Chemical
- The pulse pressure and waveforms are indicators for blood pressure and 4)
 - Velocity a)
 - b) position c) Flow d) oxygen saturation
- 5) Ventricular ectopic beats result in an abnormal _____ sequence of ECG.
 - a) Repolarization b) depolarization
 - Bradycardia d) tachycardia c)
- The foetal heart rate is computed from the foetal ECG by appropriately 6) shaping _____wave.
 - b) P R a) QRS c) d) T
- The _____cycle is accomplished by changes in the thoracic volume. 7)
 - a) pulse rate b) Cardiac
 - C) ECG d) Respiratory
- The Doppler frequency shift is a measure of the size and direction of 8)
 - flow velocity a) platelets flow C)
- b) flow quantity
- d) RBC's flow

Marks: 14

			SLR-FM-483
			Set S
9)	In multichannel telemetry the number number of signals to be transmitted.a) Carriersc) Frequencies	er of b) d)	used is the same as the Subcarriers Signals
10)	shock is experienced by the the electrical wiring at any point on t a) Micro c) Gross	e sub he s b) d)	oject by an accidental contact with surface of the body. hold on leakage
11)	At current of the order causes a) 16 mili amp c) 1 A	s ter b) d)	nporary respiratory paralysis. 10 mili amp 6A
12)	Ground resistance can be measured the a) neutral line c) power line	d by b) d)	passing up to 1A current through ground line transformer line
13)	Einthoven postulated that at any give electrical axis of the heart can be revector. a) Linear c) 1	en ir pres b) d)	nstant of the cardiac cycle, the ented as a dimensional three 2

Principle of Rheographic detection is base on detection of _____. 14)

a) brachial artery

- c) cardiac output
- b) arterial pulsed) respiratory rate

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

Seat No.

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.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

16

12

16
Seat No. 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

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

7)

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

- In order to estimate the total attenuation of an ultrasound pulse passing 1) through tissue you would need to know
 - a) The size of the pulse
 - b) Frequency c) Type of tissue d) Distance
- Gradual decrease in x-ray beam intensity as it passes through material is 2) 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 wavelength of x-ray photons b)
 - c) energy of x-ray photons d) amplitude of x-ray photons
- If fast moving electrons rapidly decelerate, then rays produced are _____. 5)
 - a) alpha rays b) beta rays d) x-rays c) gamma rays

Change in speed of ultrasound causes _ 6)

- a) reflection b) diffraction c) refraction d) image
- 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) < 20 keVc) < 30keV d) < 40keV
- The X Ray is recorded on a plate coated with _ 9)
 - b) Silver Halide a) Gold Halide
 - c) Copper Halide d) Iron Halide

SLR-FM-484



Max. Marks: 70

Set

Marks: 14

10) Angiography is _____

c) Fluorine

- a) a surgical procedure
- b) a diagnosis d) a disease of the nerves
- c) an imaging technique
- The dye used in angiography is made of _ 11)
 - a) lodine
- b) Phosphorus
- 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

A medium of ultrasound waves transmission is characterized by _____. 13)

- a) By its thickness
- b) By its acoustic impedance d) By its density
- c) By its water content
- _____ is the most common form of medical imaging, using high-energy 14) radiation to penetrate skin and tissues but not bone.
 - a) X-ray
 - c) Thermography
- b) Ultrasound
- d) Mamography

Set

SLR-FM-484

SLR-FM-484

Set

Max. Marks: 56

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

- 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.

- 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.

- 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.

16

12

12

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

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

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

- Intensity of radiation is used for mammography is _____. 1)
 - a) < 10keV b) < 20 keV
 - c) < 30keV d) < 40keV
- 2) The X - Ray is recorded on a plate coated with _
 - a) Gold Halide
 - c) Copper Halide
- 3) Angiography is
 - a) a surgical procedure
 - c) an imaging technique
- 4) The dye used in angiography is made of
 - a) lodine
 - c) Fluorine Nitrogen d)
- 5) 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

6) A medium of ultrasound waves transmission is characterized by _

- By its acoustic impedance a) By its thickness b)
- d) Bv its densitv c) By its water content
- 7) _____ 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 In order to estimate the total attenuation of an ultrasound pulse passing 8)
 - through tissue you would need to know _
 - a) The size of the pulse b) Frequency
 - d) c) Type of tissue Distance

Max. Marks: 70

Marks: 14

SLR-FM-484

- a diagnosis b)
- a disease of the nerves d)
 - Phosphorus



Set

- Silver Halide
- b)
- Iron Halide d)

9)	Gradual decrease in x-ray beam in called	ntens	ity as it passes through material is
	a) attenuation	b)	decay
	c) radioactivity	d)	imaging
10)	Speed of ultrasound depends upo	n	·
	a) medium	b)	amplitude
	c) material	d)	wavelength
11)	Attenuation coefficient depends or	า	·
	a) frequency of x-ray photons	b)	wavelength of x-ray photons
	c) energy of x-ray photons	d)	amplitude of x-ray photons
12)	If fast moving electrons rapidly de	celera	ate, then rays produced are
,	a) alpha rays	b)	beta rays
	c) gamma rays	d)	x-rays
13)	Change in speed of ultrasound ca	uses	
,	a) reflection	b)	diffraction
	c) refraction	d)	image
14)	In best piezo-electric substances.	maxi	mum value of strain is about
,	a) 0.5%	b)	0.4%

c) 0.3% b) 0.1%

SLR-FM-484

Set Q

SLR-FM-484

Max. Marks: 56

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

- 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.

- 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.

- 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.

16

12

12

MEDICAL IMAGING - I Day & Date: Saturday, 23-11-2019 Max. Marks: 70 Time: 10:00 AM To 01:00 PM 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** If fast moving electrons rapidly decelerate, then rays produced are _____. alpha rays b) beta rays a) C) gamma rays d) x-rays 2) Change in speed of ultrasound causes ____ a) reflection b) diffraction c) refraction d) image b) 0.4% a) 0.5% d) 0.1 % c) 0.3% Intensity of radiation is used for mammography is _____. a) < 10keV b) < 20keV c) < 30keV d) < 40keV The X - Ray is recorded on a plate coated with _____ a) Gold Halide Silver Halide b) c) Copper Halide Iron Halide d) Angiography is a) a surgical procedure b) a diagnosis c) an imaging technique d) a disease of the nerves The dye used in angiography is made of b) Phosphorus

Seat

No.

Duration: 30 Minutes

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

1)

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering**

In best piezo-electric substances, maximum value of strain is about 3)

- 4)
- 5)
- 6)
- 7)
 - a) lodine
 - c) Fluorine d) Nitrogen
- In a thermograph, heat is identified by _ 8)
 - 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

A medium of ultrasound waves transmission is characterized by _____. 9)

- a) By its thickness b) By its acoustic impedance
- c) By its water content d) By its density

SLR-FM-484



Marks: 14

			Set	R			
rad a) c)	is the most common form of iation to penetrate skin and tissu X-ray Thermography	med ies b b) d)	ical imaging, using high-energy out not bone. Ultrasound Mamography				
In c thrc a) c)	order to estimate the total attenu ough tissue you would need to ki The size of the pulse Type of tissue	ation now b) d)	of an ultrasound pulse passing Frequency Distance				
Gra	Gradual decrease in x-ray beam intensity as it passes through material is						

- 12) called _____.
 - a) attenuation b) decay
 - c) radioactivity d) imaging
- Speed of ultrasound depends upon 13)

10)

11)

- amplitude a) medium b) c) material
 - wavelength d)
- 14) Attenuation coefficient depends on
 - a) frequency of x-ray photons
 - c) energy of x-ray photons
- b) wavelength of x-ray photons

SLR-FM-484

d) amplitude of x-ray photons

SLR-FM-484

Max. Marks: 56

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

- 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.

- 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.

- 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.

16

12

12

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

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

Seat No.

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

d)

Angiography is 1)

c) Fluorine

- a) a surgical procedure
- an imaging technique C)
- 2) The dye used in angiography is made of a) lodine
 - Phosphorus b)

b) a diagnosis

- Nitrogen d)
- 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)
 - c) By its water content d)
- is the most common form of medical imaging, using high-energy 5) radiation to penetrate skin and tissues but not bone.
 - Ultrasound a) X-ray b)
 - c) Thermography d) Mamography
- In order to estimate the total attenuation of an ultrasound pulse passing 6) through tissue you would need to know
 - a) The size of the pulse b) Frequency
 - Type of tissue d) Distance C)
- 7) Gradual decrease in x-ray beam intensity as it passes through material is called .
 - a) attenuation b) decay
 - c) radioactivity imaging d)
- 8) Speed of ultrasound depends upon
 - a) medium
 - b) amplitude material wavelength c) d)

SLR-FM-484

Max. Marks: 70

Marks: 14

a disease of the nerves

- By its acoustic impedance

- By its density

				SLR-I	FM-4	84	
					Set	S]
9)	Atte a) c)	enuation coefficient depends on frequency of x-ray photons energy of x-ray photons	b) d)	 wavelength of x-ray photons amplitude of x-ray photons			
10)	lf fa a) c)	ast moving electrons rapidly dece alpha rays gamma rays	elera b) d)	ite, then rays produced are beta rays x-rays			
11)	Cha a) c)	ange in speed of ultrasound cau reflection refraction	ses b) d)	 diffraction image			
12)	In t a) c)	pest piezo-electric substances, n 0.5% 0.3%	naxir b) d)	num value of strain is about _ 0.4% 0.1 %			
13)	lnt∉ a) c)	ensity of radiation is used for ma < 10keV < 30keV	mmo b) d)	ography is < 20keV < 40keV			

- ___·
- 14) The X Ray is recorded on a plate coated with _____
 a) Gold Halide
 b) Silver Halide
 c) Copper Halide
 d) Iron Halide b) Silver Halided) Iron Halide

SLR-FM-484

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

- 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.

- 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.

- 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.

12

16

Max. Marks: 56

16

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering**

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

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

CONTROL SYSTEM

- 2) Figures to right indicate full marks.
- 3) Assume suitable data if necessary

MCQ/Objective Type Questions

Duration: 30 Minutes

Seat

No.

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

- If finite number of blocks are connected in series or cascade configuration, 1) then the blocks are combined algebraically by _
 - By addition a)
 - b) By multiplication c) By differentiation d) By integration
- If a pole is located at s = -5 in left-hand plane (LHP), 1 it be represented 2) in Laplace domain as _____.
 - a) 1/s + 5b) 1/s – 5 d) *s*/*s* − 5 c) s/s + 5
- For the transfer function given below, the zero of the system lie _____. 3) $G(s) = 5s - 1/s^2 + 5s + 4$ b) s = -4 & s = -1
 - a) s = -1 & s = -1/4
 - c) s = 1 / 5d) s = -1/5
- Among the following _____ are solely responsible in determining the 4) speed of response of control system.
 - a) Poles b) Zeros Speed of input d) All of the above c)
- 5) Conventional control theory is applicable to _____ systems.
 - a) SISO b) MIMO
 - Time varying C) d) Non-linear
- 6) Root locus specifies the movement of closed loop poles especially when the gain of system _____.
 - Remains constant a)
 - Gives zero feedback d) Gives infinite poles
- If a system is subjected to step input, _____ type of static error coefficient 7) performs the function of controlling steady state error.
 - a) Position b) Velocity
 - c) Acceleration d) Retardation
- For _____ systems are the signal flow graphs applicable. 8)
 - a) Causal

C)

C)

- b) Invertible
- Linear time invariant system d) Dynamic

Max. Marks: 70

Marks: 14

Set

b) Exhibit variations

			SLR-FM-4	85
			Set	Ρ
9)	At condition of ξ' , resonant value is considered to be unity alon a) $0 < \xi < 0.707$ c) $\xi = 0$	t pea g wit b) d)	Ik does not exist and its maximum th zero resonant frequency. $\xi > 0.707$ $\xi = 1$	
10)	The system is said to be marginally a) 0 c) $+\infty$	stab b) d)	ble, if gain margin is 1 None of the above	
11)	Consider the equation S ³ + 3s ² + 5s located in left half of s-plane a) Zero c) Three	s + 2 b) d)	= 0. Number of roots that are Two Four	
12)	Due to an addition of pole at origin, $\omega = 0.$ a) -45° c) -90°	the b) d)	polar plot gets shifted by at -60° -180°	
13)	 point on root locus specifiesa) Centroidc) Stability point	the r b) d)	neeting or collision of two poles. Break away point Anti-break point	
14)	In a second order system, if the dar then the nature of roots will be a) Imaginary c) Real but not equal	mpin b) d)	g ratio is greater than equal to '1', Real and equal Complex conjugate	

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

Seat

No.

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.

- Calculate range of 'k' for the system to be stable for a unity feedback system a) characterized by the open loop transfer function $G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$.
- State and explain Maison's gain formula. b)
- c) Calculate the transfer function $Y(s) \mid U(s)$ for given electrical network.



Obtain the transfer function Y(s) | X(s) of following signal flow graph. d)



X (s)

Derive the transfer function of given system using block diagram reduction a) technique.



- Determine the stability of following system given by. b)
 - $s^4 + 6s^3 + 23s^2 + 40s + 50 = 0$ 1)
 - 2)
 - $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$ $5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 200 = 0$ 3)

12

Y (s)

16

Max. Marks: 56

Set

SLR-FM-485

c) Measurements conducted on a servomechanism show error response to be, $e(t) = 1.66 e^{-8t} \sin(6t + 37^0)$. 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.

- 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)
$$G(s) = \frac{1}{(1+s)(1+2s)}$$

2) $G(s) = \frac{1}{1+s}$

$$G(s) = \frac{1}{s(s+1)(1+2s)}$$

e) Using Nyquist criterion determine whether closed loop system having following open loop function are stable or not.

1)
$$G(s)H(s) = \frac{1+4s}{s^2(1+s)(1+2s)}$$

2) $G(s)H(s) = \frac{1}{s^2+100}$

Q.5 Attempt any two of the following questions.

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 $0 \le k < \infty$ 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.

$$G(s)H(s) = \frac{k(1+0.5s)(s+1)}{(1+10s)(s+1)}$$

16



Set

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

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

a)

1)

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

- 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.

- 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
- 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

SLR-FM-485

Max. Marks: 70

Marks: 14



- 9) If a pole is located at s = -5 in left-hand plane (LHP), 1 it be represented in Laplace domain as _____.
 - a) 1/s + 5b) 1/s - 5 c) s/s + 5d) *s*/*s*−5
- For the transfer function given below, the zero of the system lie _____. 10) $G(s) = 5s - 1/s^2 + 5s + 4$ a) s = -1 & s = -1/4b) s = -4 & s = -1
 - c) s = 1 / 5d) s = -1/5
- Among the following _____ are solely responsible in determining the 11) speed of response of control system.
 - a) Poles b) Zeros
 - Speed of input c) d) All of the above
- 12) Conventional control theory is applicable to _____ systems.
 - SISO b) MIMO a)
 - c) Time varying d) Non-linear
- Root locus specifies the movement of closed loop poles especially when 13) the gain of system ____ ____·
 - a) Remains constant
 - Gives zero feedback
- b) Exhibit variations
- d) Gives infinite poles
- If a system is subjected to step input, _____ type of static error coefficient 14) performs the function of controlling steady state error.
 - Position a)

C)

b) Velocity

c) Acceleration d) Retardation

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

3) Assume suitable data wherever required.

Section – I

Attempt any four of the following questions. Q.2

- Calculate range of 'k' for the system to be stable for a unity feedback system a) characterized by the open loop transfer function $G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$.
- b) State and explain Maison's gain formula.
- Calculate the transfer function $Y(s) \mid U(s)$ for given electrical network. c)



d) Obtain the transfer function Y(s) | X(s) of following signal flow graph.

 a_2



X (s)

Derive the transfer function of given system using block diagram reduction a) technique.

Y (s)



- Determine the stability of following system given by. b)
 - $s^4 + 6s^3 + 23s^2 + 40s + 50 = 0$ 1)
 - 2)
 - $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$ $5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 200 = 0$ 3)

Max. Marks: 56

16

12

Set

SLR-FM-485

Seat No.

c) Measurements conducted on a servomechanism show error response to be, $e(t) = 1.66 e^{-8t} \sin(6t + 37^0)$. 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.

- 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)
$$G(s) = \frac{1}{(1+s)(1+2s)}$$

2) $G(s) = \frac{1}{1+s}$

$$G(s) = \frac{1}{s(s+1)(1+2s)}$$

e) Using Nyquist criterion determine whether closed loop system having following open loop function are stable or not.

1)
$$G(s)H(s) = \frac{1+4s}{s^2(1+s)(1+2s)}$$

2) $G(s)H(s) = \frac{1}{s^2+100}$

Q.5 Attempt any two of the following questions.

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 $0 \le k < \infty$ 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.

$$G(s)H(s) = \frac{k(1+0.5s)(s+1)}{(1+10s)(s+1)}$$

16



SLR-FM-485 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

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

Seat

No.

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
- Root locus specifies the movement of closed loop poles especially when the gain of system _____.
 - a) Remains constant
 - c) Gives zero feedback
- If a system is subjected to step input, _____ type of static error coefficient performs the function of controlling steady state error.

b) Exhibit variations

d) Gives infinite poles

- 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°

Marks: 14

Max. Marks: 70

			SLR-FM-4	85
			Set	R
9)	point on root locus specifies th a) Centroid I c) Stability point	ne n b) d)	neeting or collision of two poles. Break away point Anti-break point	
10)	In a second order system, if the damp then the nature of roots will be a) Imaginary I c) Real but not equal	ping b) d)	g ratio is greater than equal to '1', Real and equal Complex conjugate	
11)	If finite number of blocks are connect then the blocks are combined algebra a) By addition d c) By differentiation	ed aica b) d)	in series or cascade configuration, ally by By multiplication By integration	
12)	If a pole is located at $s = -5$ in left-h in Laplace domain as a) $1/s + 5$ c) $s/s + 5$	han b) d)	d plane (LHP), 1 it be represented 1/s - 5 s/s - 5	
13)	For the transfer function given below, $G(s) = 5s - 1/s^2 + 5s + 4$ a) $s = -1 \& s = -1/4$ c) $s = 1/5$, the b) d)	e zero of the system lie s = -4 & s = -1 s = -1/5	
14)	Among the following are solely speed of response of control system.	y re	sponsible in determining the	

- a) Poles b)
- c) Speed of input
- b) Zerosd) All of the above

Page **10** of **16**

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

Seat No.

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.

- Calculate range of 'k' for the system to be stable for a unity feedback system a) characterized by the open loop transfer function $G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$.
- State and explain Maison's gain formula. b)
- c) Calculate the transfer function $Y(s) \mid U(s)$ for given electrical network.



Obtain the transfer function Y(s) | X(s) of following signal flow graph. d)



Q.3 Attempt any two of the following questions.

Derive the transfer function of given system using block diagram reduction a) technique.



- Determine the stability of following system given by. b)
 - $s^4 + 6s^3 + 23s^2 + 40s + 50 = 0$ 1)
 - 2)
 - $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$ $5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 200 = 0$ 3)

16

SLR-FM-485



Max. Marks: 56

c) Measurements conducted on a servomechanism show error response to be, $e(t) = 1.66 e^{-8t} \sin(6t + 37^0)$. 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.

- 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)
$$G(s) = \frac{1}{(1+s)(1+2s)}$$

2) $G(s) = \frac{1}{(1+s)(1+2s)}$

$$G(s) = \frac{1}{s(s+1)(1+2s)}$$

e) Using Nyquist criterion determine whether closed loop system having following open loop function are stable or not.

1)
$$G(s)H(s) = \frac{1+4s}{s^2(1+s)(1+2s)}$$

2) $G(s)H(s) = \frac{1}{s^2+100}$

Q.5 Attempt any two of the following questions.

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 $0 \le k < \infty$ 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.

$$G(s)H(s) = \frac{\kappa}{s(s^2 + 2s + 2)}$$

c) Sketch the Nyquist plot for a system with the open loop transfer function.

$$G(s)H(s) = \frac{k(1+0.5s)(s+1)}{(1+10s)(s+1)}$$

16



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

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

Seat

No.

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

- The system is said to be marginally stable, if gain margin is . 1)
 - a) 0 b) 1 d) None of the above C) +∞
- Consider the equation $S^3 + 3s^2 + 5s + 2 = 0$. Number of roots that are 2) located in left half of s-plane .
 - a) Zero b) Two
 - c) Three d) Four
- 3) 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°
- _ point on root locus specifies the meeting or collision of two poles. 4) a) Centroid
 - b) Break away point
 - Stability point d) Anti-break point c)
- 5) In a second order system, if the damping ratio is greater than equal to '1', then the nature of roots will be ____
 - b) Real and equal Imaginary a)
 - Real but not equal d) Complex conjugate C)
- If finite number of blocks are connected in series or cascade configuration, 6) then the blocks are combined algebraically by
 - b) By multiplication By addition a)
 - By differentiation d) By integration C)
- 7) If a pole is located at s = -5 in left-hand plane (LHP), 1 it be represented in Laplace domain as _____.
 - a) 1/s + 5b) 1/s - 5 d) *s*/*s* − 5 c) s/s + 5
- For the transfer function given below, the zero of the system lie . 8) $G(s) = 5s - 1/s^2 + 5s + 4$ a) s = -1 & s = -1/4b) s = -4 & s = -1
 - c) s = 1 / 5d) s = -1/5

SLR-FM-485

Set

Max. Marks: 70

Marks: 14

SLR-FM-485 Set S

- 9) Among the following _____ are solely responsible in determining the speed of response of control system.
 - a) Polesc) Speed of input
- b) Zeros
- 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
- b) Exhibit variations
- c) Gives zero feedback d) Gives infinite poles
- 12) 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
- 13) For _____ systems are the signal flow graphs applicable.
 - a) Causal

- b) Invertible
- c) Linear time invariant system d) Dynamic
- 14) At _____ condition of ξ' , resonant peak does not exist and its maximum value is considered to be unity along with zero resonant frequency.
 - a) $0 < \xi < 0.707$
 - c) $\xi = 0$

- b) $\xi > 0.707$
- d) $\xi = 1$

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

Seat No.

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

3) Assume suitable data wherever required.

Section – I

Attempt any four of the following questions. Q.2

- Calculate range of 'k' for the system to be stable for a unity feedback system a) characterized by the open loop transfer function $G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$.
- b) State and explain Maison's gain formula.
- Calculate the transfer function $Y(s) \mid U(s)$ for given electrical network. c)



d) Obtain the transfer function Y(s) | X(s) of following signal flow graph.



Q.3 Attempt any two of the following questions.

Derive the transfer function of given system using block diagram reduction a) technique.



- Determine the stability of following system given by. b)
 - $s^4 + 6s^3 + 23s^2 + 40s + 50 = 0$ 1)
 - 2)
 - $a_0s^4 + a_1s^3 + a_2s^2 + a_3s + a_4 = 0$ $5s^6 + 8s^5 + 12s^4 + 20s^3 + 100s^2 + 150s + 200 = 0$ 3)

Max. Marks: 56

16

12

SLR-FM-485

Page **16** of **16**

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.

- Define and explain concept of Gain Margin and phase margin. a)
- With the help of diagram explain working of lead-log network. b)
- Derive and explain correlation between time and frequency response for c) second order system.
- Sketch the polar plots of the transfer function given below and determine d) whether these plots cross the real axis.

1)
$$G(s) = \frac{1}{(1+s)(1+2s)}$$

2) $G(s) = \frac{1}{(1+s)(1+2s)}$

$$G(s) = \frac{1}{s(s+1)(1+2s)}$$

Using Nyquist criterion determine whether closed loop system having e) following open loop function are stable or not.

1)
$$G(s)H(s) = \frac{1+4s}{s^2(1+s)(1+2s)}$$

2) $G(s)H(s) = \frac{1}{s^2+100}$

Q.5 Attempt any two of the following questions.

The characteristic equation of a feedback control system is a)

 $s^4 + 3s^3 + 12s^2 + (k - 16)s + k = 0$

Sketch root locus plot for $0 \le k < \infty$ 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.

$$G(s)H(s) = \frac{\kappa}{s(s^2 + 2s + 2)}$$

C) Sketch the Nyquist plot for a system with the open loop transfer function.

$$G(s)H(s) = \frac{k(1+0.5s)(s+1)}{(1+10s)(s+1)}$$

SLR-FM-485

16

Seat No.							Set	Ρ
	T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering							
Day & I Time: 1	Date: Tu 0:00 AN	uesday,26-11 /I To 01:00 P	-2019 M			Max	Marks	s: 70
Instruct	nstructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.							
	2					o. Nuactiona		
Duratio	n: 30 M	inutes		ive iy	pe c	Ruestions	Marks	s: 14
Q.1 C	hoose entence	the correct a	alternatives f	rom th	e opt	ions and rewrite the		14
1) The a) c)	e relationship Many-to-on One-to-one	between Ω and Θ	nd ω is	b) d)	 One-to-many Many-to-many		
2) In t a) c)	he bilinear tr Simpso's ru Forward dif	ansformation <u>.</u> Ile ference		_ rule b) d)	is used. Backward difference Trapezoidal rule		
3) The a) c)	e equation fo F/Fs Fs/F	r normalized f	requen	cy is b) d)	F.Fs None of the mentioned		
4) a) b) c) d)	defines w(n)= 1, n= w(n)= 1, n= w(n)= 0, n= None of the	the rectangula 0,1,2M-1=0, 0,1,2M-1=-1 0,1,2M-1=1, mentioned	ar wind else w , else v else w	low fu /here where /here	nction of length M-1.		
5) In _ bel	meth ow diagram. ^{Outp}	ods, the outpu ut Data 		ence	is considered as shown in t	he	
			together	r [γ,(n) M-1 point add together	sγ_(n)		
~	a) c)	Overlap sav	ve method d & save meth	od	b) d)	Overlap add method None of the mentioned		
6) a) c)	is used in Delay elem Adders	n the realization ents	on of a	syste b) d)	m. Multipliers All of the mentioned		

SLR-FM-486

Page **1** of **12**

7)	The structure shown below is know	n as _	
	$x(t) \rightarrow h_1(t)$ $h_1(t) \rightarrow h_2(t)$ $\vdots \qquad \vdots$ $h_N(t) \rightarrow h_N(t)$; y(t)
	a) Parallel form structurec) Direct form	b) d)	Cascade structure None of the mentioned
8)	If x(n) and X(k) are an N- point DFT a) X(-k) c) X(k)	pair, b) d)	then X (k+N) = -X(k) None of the mentioned
9)	 method is used to find the in a) Counter integration b) Expansion into a series of term c) Partial fraction expansion d) All of the mentioned 	nverse s	e z-transform of a signal.
10)	If $H(z)$ is the system function of an L function of the inverse LTI system, t a) $H(z)^*H_I(z) = 1$ c) $H(z).H_I(z) = 1$	TI sys. then _ b) d)	stem and $H_I(z)$ is the system $H(z)^*H_I(z) = \delta(n)$ $H(z).H_I(z) = \delta(n)$
11)	 is an method for implementir a) Direct Form c) Lattice structure 	ng an l b) d)	FIR system? Cascade Form All of the mention
12)	If x1(n) and x2(n) are two real value be a complex valued sequence define $0 \le n \le N - 1$, then the value of x1(a) $\frac{x(n)-x*(n)}{2}$ c) $\frac{x(n)-x*(n)}{2j}$	ed sed ned a (n) = b) d)	quences of length N, and let x(n) s x(n) = x1(n) + jx2(n), $\frac{\frac{x(n)+x*(n)}{2}}{\frac{x(n)+x*(n)}{2j}}$
13)	In this type of designing, the system form.	n funct	tion of IIR filter is expressed in
	a) Parallel formc) Mixed form	b) d)	Cascade form Any of the mentioned
14)	A frequency response take in freque	ency s	ampling technique is equal
	a) Zero c) Either of them	b) d)	One None of the mentioned

		T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering DIGITAL SIGNAL PROCESSING	
Day a Time	& Dat : 10:0	e: Tuesday,26-11-2019 Max. Marks: 00 AM To 01:00 PM	: 70
Instr	uctio	ns: 1) All questions are compulsory.2) Figures to the right indicate full marks.	
		Section – I	
Q.2	Attea)	Example any four of the following questions. Realize the system using Direct Form-I and Direct Form-II. $H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$ Determine circular correlation values of the two acqueress.	16
	b) c) d) e)	Determine circular correlation values of the two sequences. $x(n) = \{1,0,0,1\}$ and $h(n) = \{4,3,2,1\}$ State and prove the complex conjugate property of DFT. Draw the single butterfly of 2-radix DIT & DIF FFT algorithm. Determine DFT of the sequence : $x(n) = \{1,2,3,4\}$	
Q.3	Atte a) b) c)	Find the following questions. Given: $x(n) = \{0, 1, 2, 3\}$, find X (k) using DIT FFT algorithm. Determine linear convolution using overlap save method: $x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\} \& h(n) = \{1, 2, 3\}$ Perform the circular convolution of the following two sequences: $X_1(n) = \{2, 1, 2, 1\}$ $X_2(n) = \{1, 2, 3, 4\}$	12
		Section – II	
Q.4	Atte a) b) c) d) e)	Explain the concept of frequency transformation in IIR filters. Differentiate between FIR and IIR systems. Derive the magnitude response $ W(\omega) $ of a rectangular window function? Explain frequency sampling method of designing FIR filter. Write a short note on LMS algorithm.	16
Q.5	Atte a)	Example any two of the following questions. Transfer function of analog filter is $h(s) = \frac{1}{(s+1)(s+3)}$. Find H (z) using	12
	b)	Impulse invariance method. Write a difference between Impulse Invariance Technique (IIT) and Bilinear Transformation Technique (BLT).	
	c)	Design IIR Butterworth filter to satisfy following condition: $0.8 < H(e^{jw}) \le 1$, for $0 \le w \le 0.2\pi$, $ H(e^{jw}) \le 0.2$, for $0.6\pi \le w \le \pi$ using Bilinear Transformation Method. Assume T = 1 sec.	

Seat

No.

Page **3** of **12**

SLR-FM-486

Set P

		DIGITAL SIGNAL	PRC	CESSING
Day a Time	& Date : 10:0	э: Tuesday,26-11-2019 0 AM To 01:00 PM		Max. Marks: 70
nstru	iction	s: 1) Q. No. 1 is compulsory and it sl	hould	be solved in first 30 minutes in answer
		book. 2) Figures to the right indicate ful	l mar	KS.
		MCQ/Objective T	vpe	Questions
Dura	tion: 3	30 Minutes	76-	Marks: 14
Q.1	Choo sente	ose the correct alternatives from tl ence.	he op	tions and rewrite the 14
	1)	If x(n) and X(k) are an N- point DFT a) X(-k) c) X(k)	pair, b) d)	then X (k+N) = -X(k) None of the mentioned
	2)	 method is used to find the i a) Counter integration b) Expansion into a series of term c) Partial fraction expansion d) All of the mentioned 	nvers s	e z-transform of a signal.
	3)	If $H(z)$ is the system function of an L function of the inverse LTI system, t a) $H(z)^{*}H_{I}(z) = 1$ c) $H(z).H_{I}(z) = 1$	TI sy: then _ b) d)	stem and $H_I(z)$ is the system $-\frac{H(z)^*H_I(z) = \delta(n)}{H(z) \cdot H_I(z) = \delta(n)}$
	4)	 is an method for implementir a) Direct Form c) Lattice structure 	ng an b) d)	FIR system? Cascade Form All of the mention
	5)	If x1(n) and x2(n) are two real value be a complex valued sequence defi $0 \le n \le N - 1$, then the value of x1(a) $\frac{x(n)-x*(n)}{2}$ c) $\frac{x(n)-x*(n)}{2j}$	ed se ned a (n) = b) d)	quences of length N, and let x(n) is x(n) = x1(n) + jx2(n), $\frac{\overline{x(n)+x*(n)}}{2}$ $\frac{x(n)+x*(n)}{2j}$
	6)	In this type of designing, the system form. a) Parallel form c) Mixed form	n func b) d)	tion of IIR filter is expressed in Cascade form Any of the mentioned
	7)	A frequency response take in frequency to a) Zero c) Either of them	ency : b) d)	sampling technique is equal One None of the mentioned

Seat No.

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019

c) Either of them None of the mentioned u)

SLR-FM-486

Set

Q

- 8) The relationship between Ω and ω is
 - Many-to-one b) a)
 - C) One-to-one
- One-to-many

SLR-FM-486

Set

- d) Many-to-many
- 9) In the bilinear transformation _____ rule is used. **Backward difference** b)
 - Simpso's rule a) c)
 - Forward difference d)
- 10) The equation for normalized frequency is
 - F/Fs F.Fs a) b) Fs/F c)
 - None of the mentioned d)

Trapezoidal rule

- 11) defines the rectangular window function of length M-1.
 - w(n)= 1, n=0,1,2...M-1=0, else where a)
 - w(n)= 1, n=0,1,2...M-1=-1, else where b)
 - w(n)=0, n=0,1,2...M-1=1, else whereC)
 - None of the mentioned d)

c)

Direct form

12) _ methods, the output sequence is considered as shown in the In below diagram.



d) None of the mentioned

State and prove the complex conjugate property of DFT. Draw the single butterfly of 2-radix DIT & DIF FFT algorithm. Determine DFT of the sequence : $x(n) = \{1,2,3,4\}$	
mpt any two of the following questions. Given: $x(n) = \{0, 1, 2, 3\}$, find X (k) using DIT FFT algorithm. Determine linear convolution using overlap save method: $x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\} \& h(n) = \{1, 2, 3\}$ Perform the circular convolution of the following two sequences: $X_1(n) = \{2, 1, 2, 1\} X_2(n) = \{1, 2, 3, 4\}$	12
Section – II	
mpt any four of the following questions. Explain the concept of frequency transformation in IIR filters. Differentiate between FIR and IIR systems. Derive the magnitude response $ W(\omega) $ of a rectangular window function? Explain frequency sampling method of designing FIR filter. Write a short note on LMS algorithm.	16
Transfer function of analog filter is $h(s) = \frac{1}{(s+1)(s+3)}$. Find H (z) using impulse invariance method. Write a difference between Impulse Invariance Technique (IIT) and Bilinear Transformation Technique (BLT). Design IIR Butterworth filter to satisfy following condition: $0.8 < H(e^{jw}) \le 1$, for $0 \le w \le 0.2\pi$, $ H(e^{jw}) \le 0.2$, for $0.6\pi \le w \le \pi$ using Bilinear Transformation Method. Assume T = 1 sec.	12

 $H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$ Determine circular correlation values of the two sequences. b) $x(n) = \{1.0.0.1\}$ and $h(n) = \{4.3.2.1\}$

- C)
- d)

Realize the system using Direct Form-I and Direct Form-II.

e)

Atter Q.3

- a)
- b)
- c)

Q.4 Atter

- a)
- b)
- c)
- d)
- e)

Q.5 Atter

- a)
- b)
- c)

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Attempt any four of the following questions.

Section – I

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering** DIGITAL SIGNAL PROCESSING

Max. Marks: 70

16

Seat No.

Day & Date: Tuesday, 26-11-2019

Time: 10:00 AM To 01:00 PM

Q.2

a)

SLR-FM-486

Set Q

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

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

Seat

No.

- Q.1 Choose the correct alternatives from the options and rewrite the sentence.
 - 1) In _____ methods, the output sequence is considered as shown in the below diagram.
 - Output Data y.(n) M-1 points add together Y.(n) M-1 points add together y (n) Overlap save method Overlap add method a) b) Overlap add & save method None of the mentioned C) d) 2) is used in the realization of a system. Delay elements b) **Multipliers** a) All of the mentioned Adders d) C) 3) The structure shown below is known as $h_1(t)$ h2(t) x(t)y(t) $h_N(t)$ Parallel form structure Cascade structure b) a) Direct form d) None of the mentioned c) 4) If x(n) and X(k) are an N- point DFT pair, then X (k+N) = _ X(-k) -X(k) a) b) X(k) d) None of the mentioned C)

SLR-FM-486

Set R

Max. Marks: 70

Marks: 14

			SLR-FM-486	
			Set R	
5)	 method is used to find the ir a) Counter integration b) Expansion into a series of terms c) Partial fraction expansion d) All of the mentioned 	iverse	z-transform of a signal.	
6)	If $H(z)$ is the system function of an L ² function of the inverse LTI system, t a) $H(z)^*H_I(z) = 1$ c) $H(z).H_I(z) = 1$	TI sys hen _ b) d)	tem and $H_I(z)$ is the system $H(z)^*H_I(z) = \delta(n)$ $H(z) H_I(z) = \delta(n)$	
7)	 is an method for implementin a) Direct Form c) Lattice structure 	g an I b) d)	FIR system? Cascade Form All of the mention	
8)	If x1(n) and x2(n) are two real value be a complex valued sequence define $0 \le n \le N - 1$, then the value of x1(a) $\frac{x(n)-x*(n)}{2}$ c) $\frac{x(n)-x*(n)}{2j}$	ed sec ned as n) = b) d)	puences of length N, and let x(n) s x(n) = x1(n) + jx2(n), $\frac{\overline{x(n)+x*(n)}}{2}$ $\frac{x(n)+x*(n)}{2j}$	
9)	In this type of designing, the system function of IIR filter is expressed in form.			
	a) Parallel formc) Mixed form	b) d)	Cascade form Any of the mentioned	
10)	A frequency response take in frequency sampling technique is equal			
	a) Zero c) Either of them	b) d)	One None of the mentioned	
11)	The relationship between Ω and ω is a) Many-to-one c) One-to-one	s b) d)	 One-to-many Many-to-many	
12)	In the bilinear transformation a) Simpso's rule c) Forward difference	_ rule b) d)	is used. Backward difference Trapezoidal rule	
13)	The equation for normalized frequer a) F/Fs c) Fs/F	ncy is b) d)	F.Fs None of the mentioned	
14)	defines the rectangular wind a) $w(n)=1$, $n=0,1,2M-1=0$, else w b) $w(n)=1$, $n=0,1,2M-1=-1$, else w c) $w(n)=0$, $n=0,1,2$, $M-1=1$, else w	low fu vhere where	inction of length M-1.	

c) w(n)= 0, n=0,1,2...M-1=1, else whered) None of the mentioned
		T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering DIGITAL SIGNAL PROCESSING	
Day a Time	& Dat : 10:0	te: Tuesday,26-11-2019 Max. Marks 00 AM To 01:00 PM	: 70
Instr	uctio	ns: 1) All questions are compulsory.2) Figures to the right indicate full marks.	
		Section – I	
Q.2	Atte a) b)	Example any four of the following questions. Realize the system using Direct Form-I and Direct Form-II. $H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$ Determine circular correlation values of the two sequences.	16
	c) d) e)	$ x(n) = \{1,0,0,1\} \text{ and } h(n) = \{4,3,2,1\} $ State and prove the complex conjugate property of DFT. Draw the single butterfly of 2-radix DIT & DIF FFT algorithm. Determine DFT of the sequence : $x(n) = \{1,2,3,4\} $	
Q.3	Atte a) b) c)	empt any two of the following questions. Given: $x(n) = \{0, 1, 2, 3\}$, find X (k) using DIT FFT algorithm. Determine linear convolution using overlap save method: $x(n) = \{1,2,-1,2,3,-2,-3,-1,1,1,2,-1\} \& h(n) = \{1,2,3\}$ Perform the circular convolution of the following two sequences: $X_1(n) = \{2, 1, 2, 1\}$ $X_2(n) = \{1, 2, 3, 4\}$	12
		Section – II	
Q.4	Atte a) b) c) d) e)	Explain the concept of frequency transformation in IIR filters. Differentiate between FIR and IIR systems. Derive the magnitude response $ W(\omega) $ of a rectangular window function? Explain frequency sampling method of designing FIR filter. Write a short note on LMS algorithm.	16
Q.5	Atte a)	Example any two of the following questions. Transfer function of analog filter is $h(s) = \frac{1}{(s+1)(s+3)}$. Find H (z) using	12
	b)	Impulse Invariance method. Write a difference between Impulse Invariance Technique (IIT) and Bilinear Transformation Technique (BLT).	
	c)	Design IIR Butterworth filter to satisfy following condition: $0.8 < H(e^{jw}) \le 1$, for $0 \le w \le 0.2\pi$, $ H(e^{jw}) \le 0.2$, for $0.6\pi \le w \le \pi$ using Bilinear Transformation Method. Assume T = 1 sec.	

Set R

SLR-FM-486

Seat

No.

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering DIGITAL SIGNAL PROCESSING** Max. Marks: 70 Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer Marks: 14 14

book.

Time: 10:00 AM To 01:00 PM

Day & Date: Tuesday, 26-11-2019

2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Seat

No.

- Q.1 Choose the correct alternatives from the options and rewrite the sentence.
 - If H(z) is the system function of an LTI system and $H_1(z)$ is the system 1) function of the inverse LTI system, then _____.
 - a) $H(z)^*H_I(z) = 1$ $H(z)^{*}H_{I}(z) = \delta(n)$ b) c) $H(z).H_{I}(z) = 1$ d) H(z). $H_{I}(z) = \delta(n)$
 - 2) _ is an method for implementing an FIR system?
 - a) Direct Form Cascade Form b) c) Lattice structure d) All of the mention
 - If x1(n) and x2(n) are two real valued sequences of length N, and let x(n)3) be a complex valued sequence defined as x(n) = x1(n) + ix2(n).

$0 \leq$	$\leq n \leq N - 1$, then the value of ϵ	x1(n) =	•
a)	x(n)-x*(n)	b)	x(n)+x*(n)
c)	$\begin{array}{c}2\\x(n)-x*(n)\end{array}$	(b	$\begin{array}{c}2\\x(n)+x*(n)\end{array}$
•)	2i	ω)	2 <i>i</i>

- In this type of designing, the system function of IIR filter is expressed in 4) form.
 - a) Parallel form b) Cascade form
 - c) Mixed form d) Any of the mentioned
- A frequency response take in frequency sampling technique is equal 5) to .
 - **Zero** b) a) One
 - c) Either of them d) None of the mentioned
- 6) The relationship between Ω and ω is
 - a) Many-to-one One-to-many b) c) One-to-one d) Many-to-many
- In the bilinear transformation _____ rule is used. 7)
 - a) Simpso's rule **Backward difference** b)
 - c) Forward difference Trapezoidal rule d)
- The equation for normalized frequency is 8) F.Fs
 - a) F/Fs b) c) Fs/F
 - d) None of the mentioned

SLR-FM-486

Set

9) _____ defines the rectangular window function of length M-1.

- a) w(n)= 1, n=0,1,2...M-1=0, else where
- b) w(n)= 1, n=0,1,2...M-1=-1, else where
- c) w(n)=0, n=0,1,2...M-1=1, else where
- d) None of the mentioned
- 10) In _____ methods, the output sequence is considered as shown in the below diagram.



- c) Partial fraction expansion
- d) All of the mentioned

SLR-FM-486

Set

In the concept of frequency transformation in IIR filters. In the concept of frequency transformation in IIR filters. In the magnitude response $ W(\omega) $ of a rectangular window function? In frequency sampling method of designing FIR filter. In short note on LMS algorithm.	10
y two of the following questions.	12
er function of analog filter is $h(s) = \frac{1}{(s+1)(s+3)}$. Find H (z) using	
e invariance method. a difference between Impulse Invariance Technique (IIT) and Bilinear formation Technique (BLT).	
IIR Butterworth filter to satisfy following condition:	
$ H(e^{jw}) \le 1$, for $0 \le w \le 0.2\pi$, $ H(e^{jw}) \le 0.2$, for $0.6\pi \le w \le \pi$	
Bilinear Transformation Method. Assume $T = 1$ sec.	

Realize the system using Direct Form-I and Direct Form-II. a) $H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$

Attempt any four of the following questions.

- Determine circular correlation values of the two sequences. b) $x(n) = \{1,0,0,1\}$ and $h(n) = \{4,3,2,1\}$
- State and prove the complex conjugate property of DFT. c)
- Draw the single butterfly of 2-radix DIT & DIF FFT algorithm. d)
- Determine DFT of the sequence : $x(n) = \{1, 2, 3, 4\}$ e)

Attempt any two of the following questions. Q.3

- Given: $x(n) = \{0, 1, 2, 3\}$, find X (k) using DIT FFT algorithm. a)
- Determine linear convolution using overlap save method: b) $x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\} \& h(n) = \{1, 2, 3\}$
- Perform the circular convolution of the following two sequences: C) $X_1(n) = \{2, 1, 2, 1\}$ $X_2(n) = \{1, 2, 3, 4\}$

Section – II

Attempt any four of the following questions Q.4

- a) Explair
- Differe b)
- Derive c)
- d) Explair
- Write a e)

Q.5 Attempt an

- a) Transfe impuls
- Write a b) Transf
- C) Design

0.8 < | using E

Instructions: 1) All questions are compulsory.

Day & Date: Tuesday, 26-11-2019

Time: 10:00 AM To 01:00 PM

2) Figures to the right indicate full marks.

Section – I

T.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering** DIGITAL SIGNAL PROCESSING

Set

Max. Marks: 70

16

12

16

Seat No.

Q.2

Seat No.

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

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

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 I2Cprotocol specifications?
 - a) Bus masterb) Bus slavec) Bus Driverd) 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

Max. Marks: 70

Marks: 14

Set F

- 6) How many registers are there in ARM processor?
 - 35 registers (28 GPR and 7 SFR) a)
 - b) 37 register (28 GPR and 9 SFR)
 - c) 37 register (32 GPR and 6 SFR)
 - 35 register (30 GPR and 5 SFR) d)
- When building, code for both ARM and THUMB states, which tool decides 7) for each function call whether to use a BL or BLX instruction?
 - b) The archiver a) The linker
 - The complier d) The assembler C)
- Which of the following provides a buffer between the user and the low 8) level interfaces to the hardware?
 - Operating system a) b) Kernel
 - Software C) d) Hardware
- 9) The Strategy of allowing processes that are logically runnable to be temporarily suspended is called ____
 - b) Non preemptive scheduling Preemptive scheduling a)
 - Shortest job first d) None c)
- 10) Which of the following is a part of RTOS kernel?
 - Memory b) Input a)
 - 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
- In a _____ real time system, it is guaranteed that critical real time tasks 12) 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 d) None
 - c) Critical Section Code
- The no. of process completed per unit time is known as ____ 14)
 - a) Output b) Throughputs
 - Efficiency d) Capacity C)



Seat No.

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

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.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

16

12

SLR-FM-487



Set

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

- 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

Seat

No.

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

- Which of the following provides a buffer between the user and the low 1) level interfaces to the hardware?
 - a) Operating system b) Kernel
 - Software d) Hardware c)
- 2) The Strategy of allowing processes that are logically runnable to be temporarily suspended is called
 - Preemptive scheduling b) Non preemptive scheduling a)
 - C) Shortest job first

Which of the following is a part of RTOS kernel? 3)

- Memory b) Input a)
 - c) ISR d) Register
- Time required to synchronous switch from the context of one thread to the 4) context of another thread is called
 - Threads fly back time a) b) Jitter
 - c) Context switch time
- In a _____ real time system, it is guaranteed that critical real time tasks 5) will be completed within their deadlines.
 - a) Soft b) Hard
 - c) Critical d) None
- The code that changes the value of semaphore is _____ 6)
 - 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 _____
 - Output b) Throughputs a) C)
 - Efficiency d) Capacity
- What are the essential tight constraint/s related to the design metrics of an 8) embedded system?
 - Ability to fit on a single chip a)
 - Low power consumption b)
 - C) Fast data processing for real time operation
 - d) All of the above



Max. Marks: 70

SLR-FM-487

Marks: 14

- d) None

- d) None



- 9) What does an IC that initiate or enable the data transfer on bus can be regarded as, in accordance to the I2Cprotocol 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)
 - b) 37 register (28 GPR and 9 SFR)
 - c) 37 register (32 GPR and 6 SFR)
 - 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
 - c) The complier
- b) The archiver
- d) The assembler

Seat No.

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

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.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

16

12

16

12

Set C

SLR-FM-487

Set R

Max. Marks: 70

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

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

1)

Seat

No.

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

- 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
- 2) 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)
- 3) 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

The complier

C)

C)

- b) The archiver d) The assembler
- 4) Which of the following provides a buffer between the user and the low level interfaces to the hardware?
 - a) Operating system b) Kernel
 - Software d) Hardware
- 5) 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
- 6) Which of the following is a part of RTOS kernel?
 - a) Memory b) Input
 - c) ISR d) Register
- 7) 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

Marks: 14



- 8) In a _____ real time system, it is guaranteed that critical real time tasks will be completed within their deadlines.
 - a) Soft

C)

C)

Critical

- b) Hard d) None
- 9) The code that changes the value of semaphore is _____.
 - Remainder section code a)
- b) Non critical code d) None
- Critical Section Code C)
- The no. of process completed per unit time is known as _____. 10)
 - Output b) Throughputs a) Efficiency
 - d) Capacity
- 11) 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
- What does an IC that initiate or enable the data transfer on bus can be 12) regarded as, in accordance to the I2Cprotocol specifications?
 - Bus master b) Bus slave a)
 - 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?
 - Simulation and Validation a)
 - Integration b)
 - Hardware and software partitioning C)
 - d) Scheduling
- 14) In LPC2148 which among the following is/are the functions of mask registers?
 - Byte addressability a)
 - b) Reallocation to ARM local bus for faster possible I/O timing
 - Treating sets of port bits in the form of group without changing other c) bits
 - d) All of the above

Seat No.

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

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.

- 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.

- 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.

- 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.

- 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.

16

16

12

12



Max. Marks: 56

Set

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

- 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

a)

Seat

No.

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

- Which of the following is a part of RTOS kernel? 1)
 - Memory 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
 - Threads fly back time b) Jitter a)
 - Context switch time d) None c)
 - In a _____ real time system, it is guaranteed that critical real time tasks 3) will be completed within their deadlines.
 - a) Soft b) Hard
 - Critical c) d) None
 - 4) The code that changes the value of semaphore is b) Non critical code
 - Remainder section code a)
 - Critical Section Code c) d) None
 - The no. of process completed per unit time is known as _____. 5)
 - Output b) Throughputs a)
 - Efficiency C) d) Capacity
 - What are the essential tight constraint/s related to the design metrics of an 6) embedded system?
 - Ability to fit on a single chip a)
 - Low power consumption b)
 - Fast data processing for real time operation c)
 - All of the above d)
 - What does an IC that initiate or enable the data transfer on bus can be 7) regarded as, in accordance to the I2Cprotocol specifications?
 - a) Bus master

b) Bus slave

Bus Driver C)

d) Bus data carries



Marks: 14

SLR-FM-487

- 8) 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
- 9) 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
- 10) 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
- 11) 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)
- 12) 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
- 13) Which of the following provides a buffer between the user and the low level interfaces to the hardware?
 - a) Operating system

Software

C)

- b) Kernel
- 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.

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

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.

- 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.
- Explain the following instruction of ARM7 processor
 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

16

12

Set S

SLR-FM-487

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

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

- Q.1 Choose correct alternatives from the options and rewrite the sentence.
 1) 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
 - 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 matter
 - d) All above
 - 6) 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%



Seat No.

Marks: 14

- Function and prosthetic control improve as _____. 7)
 - Length of the residual limb increases a)
 - Length of the residual limb decreases b)
 - Length of the residual limb remains same c)
 - d) None

Three times

c)

- Amputation at the transtibial level (below the knee) occur at least _____ as 8) often as amputations at other levels.
 - Half a)
 - b) Twice d) Four times
- 9) One of the most common features of neurological disorders and language deficits and are collectively known as _

 - Dysphasias a) c) Anomias
- Which of the following is best choice for the prosthesis? 10)
 - a) Aluminum b) Ceramic
 - c) Silicon d) None
- Distributes WB to Ischial shelf component population: Tibial plateau fractures 11) Mid to distal femur fractures.
 - a) ADL Training: Elevation
 - b) Patellofemoral orthosis
 - Purpose of heel/ sole wedges c)
 - d) KAFO and HKAFO fracture orthosis
- Less than _____ inches may be insufficient length for prosthetic control. 12)
 - b) 3 2 a) C) 4 d) 5
- Recovery from aphasia is usually complete within six months of treatment. 13) b) False
 - a) True
- Which plastic is commonly used in prefabricated AFOs? 14)
 - Polypropylene a)

- b) Polyethylene
- Transpolysoprene c)
- d) Polyeapriolactone

- b) Alogias
- d) Aphasias

SLR-FM-488

Set

Seat No. B.E. (Part – I) (New) (

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Answer Any Four.

- 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.

- 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.

- 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 limp.
- e) Write and explain different types of visual aids.

Q.5 Attempt Any Two.

- 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 agumentive hearing aids in detail.

Max. Marks: 56

SLR-FM-488

12

16

12

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

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

C)

Seat

No.

- Q.1 Choose correct alternatives from the options and rewrite the sentence. Amputation at the transtibial level (below the knee) occur at least _____ as 1)
 - often as amputations at other levels. Half a) b) Twice
 - Three times c) d) Four times
 - 2) One of the most common features of neurological disorders and language deficits and are collectively known as
 - a) **Dysphasias** b)
 - Anomias c)
 - 3) Which of the following is best choice for the prosthesis?
 - Aluminum a) Silicon d) None c)
 - Distributes WB to Ischial shelf component population: Tibial plateau fractures 4) Mid to distal femur fractures.
 - ADL Training: Elevation a)
 - Patellofemoral orthosis b)
 - Purpose of heel/ sole wedges c)
 - KAFO and HKAFO fracture orthosis d)
 - Less than _____ inches may be insufficient length for prosthetic control. 5)
 - a) 2 b) 3 d) 5 c) 4
 - Recovery from aphasia is usually complete within six months of treatment. 6) a) True b) False
 - Which plastic is commonly used in prefabricated AFOs? 7)
 - Polypropylene b) Polyethylene a)
 - Transpolysoprene d) Polyeapriolactone
 - Rehabilitation engineering aims to improves the quality of life of people 8) with disabilities in functional areas, such as
 - Mobility b) Communication a) Hearing c)
 - d) All above

SLR-FM-488

Max. Marks: 70

Set

Marks: 14



- Alogias
- d) Aphasias
- b) Ceramic

- Set Q
- 9) According to World Health Organization (WHO) classification, an example of impairment is _____.
 - a) İschemic brain damage
 - b) weakness of one arm
 - c) loss of ability to get dressed
 - d) need for an ankle-foot orthosis to walk
- 10) 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
- 11) 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.
- 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%	d)	50 - 60%

- 14) 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

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Answer Any Four.

Seat

No.

- 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.

- 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.

- 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 limp.
- e) Write and explain different types of visual aids.

Q.5 Attempt Any Two.

- 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 agumentive hearing aids in detail.





12

16

Max. Marks: 56

16

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

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

Seat No.

Q.1

1) The following is (are) the biomedical principles in ergonomics _____.

Choose correct alternatives from the options and rewrite the sentence.

- 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
- 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%
- 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





Max. Marks: 70

Marks: 14

Set

- 9) Recovery from aphasia is usually complete within six months of treatment.
 - a) True

C)

- b) False
- 10) Which plastic is commonly used in prefabricated AFOs?
 - a) Polypropylene

- b) Polyethylene
- Transpolysoprene
- d) Polyeapriolactone
- 11) 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
- 12) According to World Health Organization (WHO) classification, an example of impairment is _____.
 - a) İschemic brain damage
 - b) weakness of one arm
 - c) loss of ability to get dressed
 - d) need for an ankle-foot orthosis to walk
- 13) 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
- 14) 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.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Answer Any Four.

Seat

No.

- 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.

- 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.

- 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 limp.
- e) Write and explain different types of visual aids.

Q.5 Attempt Any Two.

- 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 agumentive hearing aids in detail.



Max. Marks: 56



16

16

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

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

a)

Seat No.

- 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) Aluminumb) Ceramicc) Silicond) 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.
 - 2 b) 3
 - c) 4 d) 5
 - 4) Recovery from aphasia is usually complete within six months of treatment.a) Trueb) 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

SLR-FM-488



Max. Marks: 70

Marks: 14

- 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

Set S

- 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.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Answer Any Four.

- 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.

- 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.

- 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 limp.
- e) Write and explain different types of visual aids.

Q.5 Attempt Any Two.

- 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 agumentive hearing aids in detail.

Max. Marks: 56

Set

SLR-FM-488

12

16

12

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

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

C)

a)

C)

Seat

No.

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

- Which of the following is the content of MI? 1)
 - a) Patients records b) Data processing
 - d) None c) Both a and b
- Which of the following is the function of operation theatre module? 2)
 - Complication a)
 - b) Drug to drug interaction facilities d) Both a and c Pre anesthetic check up
- Incomplete functionality of HMIS occurs because of _ 3)
 - Lack of computer awareness b) Unavailability of component
 - Disconnection in the network d) All above c)
- 4) Converting numeric representation of an object into visual representation is called
 - a) Render
 - b) Data converter image converter d) None
- In computer assisted surgery _____ provides image guidance for the 5) surgeon.
 - a) The nurse b) Patient c) Helper
 - d) The computer
- The resolution of the image depends upon the number of _____ in a given 6) area.
 - a) Voxels b) Bits
 - c) Pixels d) Bytes
- Tele education consists of _____ education through website. 7)
 - a) Only real time video conferencing
 - Only non-real time education b)
 - 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

c)

- a) 2D volume rendering software b) ID volume rendering software Both a and b
 - d) 3D volume rendering software

SLR-FM-489

Set

Max. Marks: 70



Marks: 14

10)	Telemedicine includes _	Via telephone /fax.
-----	-------------------------	---------------------

- a) Video conferencing c) Both a and b
- b) Digital image transmission

Set

- d) None
- The scan converter helps in _____ presentation directly through the video 11) conferencing system. Transmitting a)
 - b) Converting

b) Different

- d) Storing
- Simulation has the potential to offer for more _____ images than 12) theoretical analysis.
 - a) Accurate
 - c) Compression d) Blurring
- Visualizer provides _____image of visible human as. 13)
 - a) 2D b) 3D
 - c) 4D d) None
- Which of the following device is medical peripheral device? 14)
 - Video camera a)

Receiving

C)

b) Scan converter d) All above

C) Microscope

No.			000	•
		B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-201 Bio-Medical Engineering MEDICAL INFORMATICS	9	
Day & Time:	& Dat : 02:3	te: Tuesday, 10-12-2019 Ma 30 PM To 05:30 PM	ax. Marks	56 56
Instru	uctio	2) All question are compulsory2) Figures to the right indicate full marks.		
		Section – I		
Q.2	Ans a) b) c) d) e)	Swer Any Four. What is HMIS? Write its advantages and disadvantages of HMIS. Explain the facilities of online learning software used in MI. Explain the function of radiology and blood bank module. Explain legal security and private issues in CPR. Explain different development tools of CPR.		16
Q.3	Ans a) b) c)	 Swer Any Two. Define MI? Explain in detail scope and salient feature of MI. What is AI? Explain different materials and methods used for Exper system. Explain the following 1) Diasaster management plans 2) Function of internet and intranet in MI 	t	12
		Section – II		
Q.4	Ans a) b) c) d) e)	swer Any Four. Explain 3-D navigation system used in CAS. Explain the advantages of simulators in surgical simulation. What is telemedicine? Explain different material and methods u telemedicine (Any two). Explain reliability and cost analysis of telemedicine. Write a note on virtual environment (VE).	ised for	16
Q.5	Ans a) b) c)	 Swer any Two. What is CAME? Explain different education software used in CAME Define telesurgery? Explain in detail robotic surgery. Explain the following 1) Limitation of conventional surgery 2) Human resources available in surgical simulation 		12

Seat No



Seat No.

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

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

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

- 1) Tele- surgery has the following characteristics ____
 - a) Reliability

Video conferencing

- c) Acceptable end to end delay d) All above
- 2) BERTA is ____

a)

a)

c) Both a and b

a) 2D volume rendering software b) ID volume rendering software

b) Low data error

- d) 3D volume rendering software
- 3) Telemedicine includes _____Via telephone /fax.
 - b) Digital image transmission
 - c) Both a and b d) None
- 4) The scan converter helps in _____ presentation directly through the video conferencing system.
 - a) Transmitting b) Converting
 - c) Receiving d) Storing
- 5) Simulation has the potential to offer for more _____ images than theoretical analysis.
 - a) Accurate
 - c) Compression d) Blurring
- 6) Visualizer provides _____image of visible human as.
 - a) 2D b) 3D
 - c) 4D d) None
- 7) Which of the following device is medical peripheral device?
 - a) Video camera b) Scan converter
 - c) Microscope d) All above
- 8) Which of the following is the content of MI?
 - a) Patients recordsb) Data processingc) Both a and bd) None
- 9) Which of the following is the function of operation theatre module?
 - Complication b) Drug to drug interaction facilities

b) Different

- c) Pre anesthetic check up d) Both a and c
- 10) Incomplete functionality of HMIS occurs because of _
 - a) Lack of computer awareness b) Unavailability of component
 - c) Disconnection in the network d) All above

Max. Marks: 70

Marks: 14

9

Set

D volume renderin D volume renderii

Set Q

SLR-FM-489

- 12) In computer assisted surgery _____ provides image guidance for the surgeon.
 - a) The nurse

is called _____. a) Render

c) image converter

11)

b) Patient

d) None

b) Data converter

- c) Helper d) The computer
- 13) The resolution of the image depends upon the number of _____ in a given area.

Converting numeric representation of an object into visual representation

- 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

	SLR-FM-489		
Seat	Set 0	ຊ	
	B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering MEDICAL INFORMATICS		
Day & Time Instr	& Date: Tuesday, 10-12-2019 Max. Marks: 5 : 02:30 PM To 05:30 PM uctions: 1) All question are compulsory	56	
	2) Figures to the right indicate full marks. Section – I		
Q.2	 Answer Any Four. 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. 	16	
Q.3	 Answer Any Two. 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 Diasaster management plans Function of internet and intranet in MI 	12	
	Section – II		
Q.4	 Answer Any Four. 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). 	16	
Q.5	 Answer any Two. a) What is CAME? Explain different education software used in CAME. b) Define telesurgery? Explain in detail robotic surgery. c) Explain the following Limitation of conventional surgery 	12	

2) Human resources available in surgical simulation

Set

Seat

No.

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

- 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

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

- In computer assisted surgery _____ provides image guidance for the 1) surgeon. b) Patient
 - The nurse a)
 - C) Helper d) The computer
- The resolution of the image depends upon the number of _____ in a given 2) area.
 - a) Voxels b) Bits
 - c) Pixels d) Bytes
- Tele education consists of education through website. 3)
 - a) Only real time video conferencing
 - Only non-real time education b)
 - Both a and b c)
 - d) None

4) Tele- surgery has the following characteristics _____. b) Low data error

- a) Reliability
- c) Acceptable end to end delay d) All above
- BERTA is 5)

c)

- a) 2D volume rendering software b) ID volume rendering software
 - Both a and b d) 3D volume rendering software
- 6) Telemedicine includes _____Via telephone /fax.
 - a) Video conferencing b) Digital image transmission
 - d) None Both a and b c)
- 7) The scan converter helps in _____ presentation directly through the video conferencing system.
 - b) Converting Transmitting a)
 - Receiving d) Storing C)
- Simulation has the potential to offer for more _____ images than 8) theoretical analysis. b) Different
 - a) Accurate
 - c) Compression d) Blurring

Max. Marks: 70

Marks: 14

Visualizer provides _____image of visible human as. 9) b) 3D

- 2D a)
- c) 4D d) None
- 10) Which of the following device is medical peripheral device?
 - Video camera b) Scan converter a) c) Microscope
 - d) All above
- 11) Which of the following is the content of MI?
 - a) Patients records b) Data processing
 - c) Both a and b d) None

Which of the following is the function of operation theatre module? 12)

- a) Complication b) Drug to drug interaction facilities
- c) Pre anesthetic check up d) Both a and c
- 13) Incomplete functionality of HMIS occurs because of _
 - b) Unavailability of component

SLR-FM-489

Set R

- a) Lack of computer awareness d) All above Disconnection in the network C)
- 14) Converting numeric representation of an object into visual representation is called
 - Render a)
 - c) image converter
- b) Data converter
- d) None
| | SLR-FM-48 | 39 | | | | | | |
|--------------------------|---|----|--|--|--|--|--|--|
| Seat
No. | t Set | R | | | | | | |
| | B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019
Bio-Medical Engineering
MEDICAL INFORMATICS | | | | | | | |
| Day &
Time:
Instru | & Date: Tuesday, 10-12-2019 Max. Marks:
:: 02:30 PM To 05:30 PM
:: 02:00 PM To 05:30 PM
:: 02:30 PM To 05:30 PM
:: 02:30 PM To 05:30 PM
:: 02:30 PM To 05:30 PM | 56 | | | | | | |
| | 2) Figures to the right indicate full marks. | | | | | | | |
| 0.2 | Section – I | 16 | | | | | | |
| Q.Z | 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. | 10 | | | | | | |
| Q.3 | Answer Any Two. 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 Diasaster management plans | 12 | | | | | | |
| | 2) Function of internet and intranet in MI | | | | | | | |
| | Section – II | | | | | | | |
| Q.4 | Answer Any Four. 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). | 16 | | | | | | |
| Q.5 | Answer any Two. a) What is CAME? Explain different education software used in CAME. b) Define telesurgery? Explain in detail robotic surgery. c) Explain the following Limitation of conventional surgery | 12 | | | | | | |

2) Human resources available in surgical simulation

Set

Max. Marks: 70

Seat No.

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

- 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

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

- Telemedicine includes _____Via telephone /fax. 1)
 - c) Both a and b

a) Video conferencing

- 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
- Visualizer provides _____image of visible human as. 4)
 - a) 2D b) 3D c)
 - 4D d) None
- 5) Which of the following device is medical peripheral device? b) Scan converter
 - Video camera a)
 - d) All above Microscope c)
- Which of the following is the content of MI? 6)
 - a) Patients records b) Data processing
 - d) None C) Both a and b
- Which of the following is the function of operation theatre module? 7) a) Complication
 - b) Drug to drug interaction facilities
 - d) Both a and c c) Pre anesthetic check up
- Incomplete functionality of HMIS occurs because of 8) a) Lack of computer awareness
 - b) Unavailability of component
 - Disconnection in the network d) All above C)
- 9) Converting numeric representation of an object into visual representation is called ____
 - Render a) image converter

c)

- b) Data converter
- d) None

Marks: 14

b) Digital image transmission d) None

- Set S
- In computer assisted surgery _____ provides image guidance for the 10) surgeon.
 - a) The nurse

c) Helper

- b) Patient
 - 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
- Tele education consists of _____ education through website. 12)
 - a) Only real time video conferencing
 - b) Only non-real time education
 - Both a and b C)

Reliability

d) None

Tele- surgery has the following characteristics _____. 13)

- b) Low data error
- c) Acceptable end to end delay d) All above
- 14) BERTA is

a)

- . a) 2D volume rendering software b) ID volume rendering software
- c) Both a and b

- d) 3D volume rendering software

	SLR-FM-48	89
Seat No.	t Set	S
	B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering MEDICAL INFORMATICS	
Day & Time	& Date: Tuesday, 10-12-2019 Max. Marks: : 02:30 PM To 05:30 PM	56
Instr	2) Figures to the right indicate full marks.	
	Section – I	
Q.2	 Answer Any Four. 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. 	16
Q.3	 Answer Any Two. 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 Diasaster management plans Function of internet and intranet in MI 	12
	Section – II	
Q.4	 Answer Any Four. 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. 	16
Q.5	 e) Write a note on virtual environment (VE). Answer any Two. a) What is CAME? Explain different education software used in CAME. b) Define telesurgery? Explain in detail robotic surgery. c) Explain the following Limitation of conventional surgery 	12

2) Human resources available in surgical simulation

No.										
	B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019 Big Medical Engineering									
MEDICAL INSTRUMENTATION III										
Day & Time:	Date 02:30	e: Thursday, 12-12-2019 D PM To 05:30 PM	Max	. Marks: 70						
Instru	iction	is: 1) Q. No. 1 is compulsory and Book. 2) Figures to the right indicate	should be solved in first 30 minutes	in answer						
		MCQ/Objectiv	e Type Questions							
Durati	on: 3	0 Minutes		Marks: 14						
Q.1	Choc 1)	 bse the correct alternatives fro Ultrasonic generators are const a) Ultrasound c) Piezo electric 	n the options and rewrite the sent ucted on the effect. b) Doppler d) none of above	tence. 14						
	2)	The ultrasound transducer is ma a) Copper c) Aluminum	de up of crystal. b) Silver d) lead zirconate titanate							
	3)	Galvanic current produces a) chemical c) anatomical	_ effect in human body. b) physiological d) physical							
	4)	Faradic current is a sequence of density. a) numbers c) pulses	 b) shocks d) potentials 	ənt						
	5)	The frequency of surgical diather a) 1-3 c) 40-80	rmy ranges from MHz. b) 20-30 d) 10-20							
	6)	refers to the superficial ti seated tissues. a) Cut c) Desiccation	sue destruction without affecting de b) Coagulation d) Fulguration	ер						
	7)	 mode needs needle typea) Cutc) Desiccation	of electrode in surgical unit. b) Coagulation d) Fulguration							
	8)	The fluid removal during dialysis gradient. a) hydrostatic c) diffusion	takes place due to pressure b) drift d) ultrafilteration							
	9)	Blood pump is designed to givea) 10 to 50c) 400 to 550	blood flow at a rate of ml/min b) 50 to 350 d) 0 to 110							

Set P

Seat





a) dose

- b) tissue size
- c) wavelength d) velocity
- 11) Short wave diathermy has a working frequency of _____ MHz.
 - a) 27.12 b) 1-5
 - c) 76 d) 2150
- 12) The impulses originating from heart is through _____.
 - a) A-V node b) S.A. node
 - c) Purkinje fibers d) Bundle of his
- 13) The life of a pacemaker is determined by _____ consumption of the electronic circuit.
 - a) voltage b) frequency
 - c) current d) pulses
- 14) Ventricular fibrillation can be converted into efficient rhythm by applying high _____ shock to the heart.
 - a) voltage

- b) frequency
- c) current
- d) energy

	B.E. (Part – I)	(New) (CBC
No.		
Seat		

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

No.					Set	Q				
B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering										
Day & Time: (Day & Date: Thursday, 12-12-2019 Max. Marks: 70 Time: 02:30 PM To 05:30 PM									
Instru	 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									
Duratio	on: 30 Mi	nutes			Marks:	14				
Q.1 (Choose f 1) The gra a) c)	the correct a e fluid remova dient. hydrostatic diffusion	alternatives from th al during dialysis take	e opt es pla b) d)	tions and rewrite the sentence. ace due to pressure drift ultrafilteration	14				
2	2) Blo a) c)	od pump is d 10 to 50 400 to 550	lesigned to give bloo	d flov b) d)	v at a rate of ml/min. 50 to 350 0 to 110					
3	3) The the a) c)	e interaction I dose wavelength	between the laser be	am a b) d)	nd the tissue is determined by tissue size velocity					
Z	4) Sho a) c)	ort wave diatl 27.12 76	hermy has a working	frequ b) d)	uency of MHz. 1-5 2150					
Ę	5) The a) c)	e impulses or A-V node Purkinje fibe	riginating from heart i ers	is thro b) d)	ough S.A. node Bundle of his					
6	6) The elec a) c)	e life of a pac ctronic circuit voltage current	æmaker is determine t.	b) d)	consumption of the frequency pulses					
7	7) Ver higl a) c)	ntricular fibrill h shoo voltage current	lation can be convert ck to the heart.	ed in b) d)	to efficient rhythm by applying frequency energy					
8	3) Ultr a) c)	asonic gene Ultrasound Piezo electr	rators are constructe [.] ic	d on b) d)	the effect. Doppler none of above					
ç	9) The a) c)	e ultrasound Copper Aluminum	transducer is made ι	up of _ b) d)	crystal. Silver lead zirconate titanate					

Set Q

- Galvanic current produces _____ effect in human body. 10)
 - a) chemical

c) anatomical

physiological b)

SLR-FM-490

Set Q

- d) physical
- Faradic current is a sequence of _____ with defined shape and current 11) density.
 - a) numbers b) shocks c) pulses
 - d) potentials
- The frequency of surgical diathermy ranges from _____ MHz. 12)
 - a) 1-3 b) 20-30
 - c) 40-80 d) 10-20
- _____ refers to the superficial tissue destruction without affecting deep 13) seated tissues.
 - a) Cut c) Desiccation

- b) Coagulation
- d) Fulguration
- 14) mode needs needle type of electrode in surgical unit.
 - a) Cut

c)

- Coagulation b) Fulguration
- Desiccation d)

	B.E. (Part – I)	(New) (CBC
No.		
Seat		

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

	-										
Seat No.							Set	R			
	B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering										
MEDICAL INSTRUMENTATION III											
Day & Time: (Day & Date: Thursday, 12-12-2019 Max. Marks: 70 Fime: 02:30 PM To 05:30 PM Max. Marks: 70										
Instruc	Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.										
	2) ingues to the right indicates full marks.										
Duration: 30 Minutes Marke: 14											
01 (Choos		he correct a	alternatives from th	o ont	ions and rewrite	the sentence	1 <i>1</i>			
1) 7 (The a)	frequency c 1-3 40-80	of surgical diathermy	range b) d)	es from MH 20-30 10-20	Iz.	14			
2	2)	-)	refers to	the superficial tissue	desti	uction without aff	ecting deep				
2	-/ _ 5	seat	ted tissues.		ucon	detion without any					
	6	a)	Cut		b)	Coagulation					
	0	C)	Desiccation		d)	Fulguration					
3	3) _	<u>م</u>	mode ne	eds needle type of e	lectro	de in surgical unit					
	(z)	Desiccation		d)	Fulguration					
4	1) 7	The	fluid remova	al during dialysis take	es pla	ice due to	oressure				
	Ç	grad	dient.								
	e c	a) c)	diffusion		d)	drift ultrafilteration					
F	5) F	s) Rioc	alliación ad numn is d	lesigned to give blog	d flow	v at a rate of	ml/min				
	, L 2	3) a)	10 to 50		b)	50 to 350					
	C	c)	400 to 550		d)	0 to 110					
e	5) 7	The	interaction I	between the laser be	am a	nd the tissue is de	etermined by				
	t	he .			b)	ticcuo cizo					
	(a) C)	wavelength		d)	velocity					
7	7) 5	, Sho	rt wave diatl	hermy has a working	freau	iency of M	Hz.				
	, ,	a)	27.12	,	b) ˈ	1-5					
	(c)	76		d)	2150					
8	3) 7	The	impulses or	riginating from heart	is thro	bugh					
	č (a) C)	Purkinie fibe	ers	d)	Bundle of his					
ç) T	, The	life of a pac	emaker is determine	ed bv	consumptio	on of the				
c	· · ·	elec	tronic circuit	t.							
	ć	a)	voltage		b)	frequency					
	(U)	current		u)	puises					

Seat

Ventricular fibrillation can be converted into efficient rhythm by applying 10) 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 none of above d) The ultrasound transducer is made up of _____ crystal. 12) Silver a) Copper b)

- 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) numbersb) shocksc) pulsesd) potentials

SLR-FM-490

Set R

Seat			
No.			
	B.E. (Part – I)	(New)	(CBCS)

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

R

12

16

12

Seat No.							Set	S
		B.E	. (Part – I) M	(New) (CBC Bio-Medio EDICAL INS	CS) Exam cal Engin TRUMEN	ination Nov/De eering ITATION III	c-2019	
Day & Time:	Date 02:30	: Th) PN	ursday, 12-1 1 To 05:30 P	I2-2019 M			Max. Mark	s: 70
Instru	ction	n s: 1 2) Q. No. 1 is Book.) Figures to	compulsory a	nd should b ates full ma	e solved in first 30 rks.	minutes in ans	wer
		-	.) i iguioo to			Questiens		
Durati	on: 3(0 Mi	nutes		ve Type		Mark	s: 14
Q.1	Choo 1)	ose t The the	the correct a	alternatives fr between the la	om the op ser beam a	tions and rewrite and the tissue is de	the sentence. termined by	14
		a) c)	dose wavelength		b) d)	tissue size velocity		
	2)	Sho a) c)	ort wave diat 27.12 76	hermy has a w	orking freq b) d)	uency of Mł 1-5 2150	Ηz.	
	3)	The a) c)	e impulses of A-V node Purkinje fib	riginating from ers	heart is thr b) d)	ough S.A. node Bundle of his		
	4)	The elec a) c)	e life of a pac ctronic circui voltage current	cemaker is dete t.	ermined by b) d)	frequency pulses	n of the	
	5)	Ver higl a) c)	ntricular fibril n sho voltage current	lation can be c ck to the heart.	onverted ir b) d)	to efficient rhythm frequency energy	by applying	
	6)	Ultr a) c)	asonic gene Ultrasound Piezo electi	rators are cons ric	structed on b) d)	the effect. Doppler none of above		
	7)	The a) c)	e ultrasound Copper Aluminum	transducer is n	nade up of b) d)	crystal. Silver lead zirconate tita	anate	
	8)	Gal a) c)	vanic curren chemical anatomical	t produces	effect ii b) d)	n human body. physiological physical		
	9)	Far der a)	adic current isity. numbers	is a sequence	of w b)	/ith defined shape a shocks	and current	
		c)́	pulses		d)	potentials		

Page **10** of **12**

SLR-FM-490

10) The frequency of surgical diathermy ranges from _____ MHz.

- a) 1-3 b) 20-30
 - c) 40-80 d) 10-20
- 11) _____ refers to the superficial tissue destruction without affecting deep seated tissues.
 - a) Cut b) Coagulation
 - c) Desiccation d) Fulguration
- 12) _____ mode needs needle type of electrode in surgical unit.
 - a) Cut b) Coagulation
 - c) Desiccation d) Fulguration
- 13) The fluid removal during dialysis takes place due to _____ pressure gradient.
 - a) hydrostatic b) drift
 - c) diffusion d) ultrafilteration
- 14) Blood pump is designed to give blood flow at a rate of _____ ml/min.
 - a) 10 to 50
- b) 50 to 350 d) 0 to 110
- c) 400 to 550 d)

SLR-FM-490

Set S

No.		

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

<u> </u>]							
Seat No.						Set	Ρ		
B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering PRINCIPLES OF IMAGE PROCESSING									
Day & Time: (Date: Sat 02:30 PM	urday,14-12 To 05:30 P	2-2019 M		Max	k. Marks	s: 70		
Instru	ctions: 1)	Q.No.1 is o Book. Figures to	compulsory and a	should be	e solved in first 30 Minutes	in answ	ver		
	(۲								
Duration: 30 Minutes									
01 (Choose th		alternatives from	n the on	tions	maria	11		
u .r (I) To a doub a) t	void negativoles thickness of	ve values taking	absolute b)	values in lapacian image thinness of lines		14		
	c) 1	thickness of	fedges	d)	thinness of edges				
2	2) Grac a) c) a	lient magnit point detect area detect	ude images are ion ion	more use b) d)	eful in line detection edge detection				
3	3) Forr a) i c) l	noise reduc image smoo Image enha	tion we use othing Incement	 b) d)	image contouring image recognition				
4	1) Segr	nentation is	difficult for imag	ges that a	ire				
	a) 1 c) i	trivial Iluminated		b) d)	non trivial low resolution				
5	5) Morp a) p c) f	phology refe pixels rames	ers to	b) d)	matrix shape				
6	6) Rang a) r c) r	ge [0, L-1], v no of levels no of intens	where L is the ity levels	b) d)	Length low quality				
7	7) Histo a) c)	ogram equa sampling framing	lization refers to	image b) d)	Quantization				
8	3) Repl a) c)	ication of pi coding redu temporal re	ixels is called Indancy dundancy	b) d)	spatial redundancy both b and c				
ç	9) Dyna dete a) S	amic range rmined by _ Saturation	of imaging syste	m is a ra b)	tio where the upper limit is Noise				

c) Brightness d) Contrast **SLR-FM-491**

10)	Transforming difference between ac a) mapping c) Image watermarking	djacei b) d)	nt pixels is called image compression image equalization
11)	Shannon's theorem is also called a) noiseless coding theorem c) coding theorem	 b) d)	noisy coding theorem noiseless theorem
12)	Shrinking of image is viewed as a) under sampling c) critical sampling	 b) d)	over sampling nyquist sampling
13)	Gaussian noise is referred to as a) red noise c) white noise	 b) d)	black noise normal noise
14)	Closing is used for a) separation c) decompression	b) d)	Compression filling hole

Set P

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- a) Discuss the process of image formation in the eye briefly.
- b) What is mean 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.

- 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.

- 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 separatibility and shifting property of DFT and mention it's 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.

- 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.

Set P

Max. Marks: 56

16

12

12

		B.E	. (Part - I) (New) (CBCS) I Bio-Medical I	Exan Engir	nination Nov/Dec-201 neering	9
Day Time	& Dat e: 02:3	e: Sa 80 PM	turday,14-12-2019 To 05:30 PM	GE	PROCESSING Ma	ax. Marks: 70
Instr	uctio	ns: 1 2) Q.No.1 is compulsory and sho Book.	ould b	e solved in first 30 Minutes	s in answer
		-	MCO/Objective T	ivne	Questions	
Dura	tion: 3	30 Mi	nutes	урс	Questions	Marks: 14
Q.1	Cho 1)	ose t Rep a)	he correct alternatives from t lication of pixels is called coding redundancy	he op _∙ b)	tions. spatial redundancy	14
		c)	temporal redundancy	d)	both b and c	
	2)	Dyn dete a) c)	amic range of imaging system i ermined by Saturation Brightness	s a ra b) d)	tio where the upper limit is Noise Contrast	3
	3)	Trar a) c)	nsforming difference between a mapping Image watermarking	djace b) d)	nt pixels is called image compression image equalization	
	4)	Sha a) c)	nnon's theorem is also called _ noiseless coding theorem coding theorem	b) d)	noisy coding theorem noiseless theorem	
	5)	Shri a) c)	nking of image is viewed as under sampling critical sampling	 b) d)	over sampling nyquist sampling	
	6)	Gau a) c)	issian noise is referred to as red noise white noise	 b) d)	black noise normal noise	
	7)	Clos a) c)	sing is used for separation decompression	b) d)	Compression filling hole	
	8)	To a dou a) c)	avoid negative values taking ab bles thickness of lines thickness of edges	solute b) d)	values in lapacian image thinness of lines thinness of edges	
	9)	Gra a) c)	dient magnitude images are mo point detection area detection	ore us b) d)	eful in line detection edge detection	
	10)	For a) c)	noise reduction we use image smoothing Image enhancement	b) d)	image contouring image recognition	

Seat No.

Set Q

SLR-FM-491



11)	Segmentation is difficult for images	that a	are non trivial
	c) illuminated	d)	low resolution
12)	Morphology refers to		
	a) pixels c) frames	d)	matrix
12)	Bango [0, 1, 1], where L is the	u)	Shape
13)	a) no of levels	 b)	Length
	c) no of intensity levels	d)	low quality
14)	Histogram equalization refers to im	age _	
	a) sampling	b)	Quantization
	c) framing	a)	ΠΟΓΠΑΙΙΖΑΙΙΟΠ

Set Q

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four. a) Discuss the process of image formation in the eye briefly. b) What is mean 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.

- 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.

- 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 separatibility and shifting property of DFT and mention it's 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.

- 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.

Max. Marks: 56

12

16

12

Seat No.						Set	R
	B.I	E. (Part - I)	(New) (CBCS)	Exam	ination Nov/Dec-20	19	
		DDIN	Bio-Medical	Engin	Receing		
Day & Time: (Date: Sa 02:30 PN	aturday,14-12 // To 05:30 P	2-2019 M		NUCLOSING	Max. Marks	s: 70
Instru	Instructions: 1) Q.No.1 is compulsory and should be solved in first 30 Minutes in answer Book.						
	-	_,gce .e N	ICQ/Objective	Tvpe	Questions		
Duratio	on: 30 M	inutes				Marks	s: 14
Q.1 (Choose	the correct a	alternatives from	the op	tions.		14
ľ	r) ivio a) c)	pixels frames	ers to	b) d)	matrix shape		
2	2) Rai a) c)	nge [0, L-1], no of levels no of intens	where L is the ity levels	b) d)	Length low quality		
3	3) His a) c)	togram equa sampling framing	lization refers to in	nage b) d)	Quantization normalization		
4	4) Re a) c)	plication of p coding redu temporal re	ixels is called undancy dundancy	 b) d)	spatial redundancy both b and c		
5	5) Dyr det a) c)	namic range ermined by _ Saturation Brightness	of imaging system 	is a rat b) d)	tio where the upper limit Noise Contrast	is	
F	5) Tra	insformina di	fference between :	adiacer	t pixels is called		
	a) c)	mapping Image wate	rmarking	b) d)	image compression image equalization		
7	7) Sha a) c)	annon's theo noiseless c coding theo	rem is also called oding theorem prem	b) d)	noisy coding theorem noiseless theorem		
8	3) Shi a) c)	rinking of ima under samp critical sam	age is viewed as bling pling	 b) d)	over sampling nyquist sampling		
ç	9) Ga a) c)	ussian noise red noise white noise	is referred to as _	b) d)	black noise normal noise		
1	10) Clo a) c)	sing is used separation decompres	for sion	b) d)	Compression filling hole		

Set R

- 11) To avoid negative values taking absolute values in lapacian image doubles _____.
 - a) thickness of lines
 - c) thickness of edges
- thinness of lines b) thinness of edges
- d)
- 12) Gradient magnitude images are more useful in
 - a) point detection

- line detection b)
- c) area detection
- d) edge detection
- For noise reduction we use _____. 13)
 - a) image smoothing c) Image enhancement
- b) image contouring
- image recognition d)
- Segmentation is difficult for images that are _____. 14)
 - a) trivial illuminated

C)

- b) non trivial low resolution d)

Page **8** of **12**

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- a) Discuss the process of image formation in the eye briefly.
- b) What is mean 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.

- 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.

- 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 separatibility and shifting property of DFT and mention it's 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.

- 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.

Set R

Max. Marks: 56

16

12

12

Seat No.						Set	S	
	B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering							
Day & Time: (Date: Sa 02:30 PN	aturday,14-12 // To 05:30 P	2-2019 M		Ma	x. Marks	s: 70	
Instru	ctions: 2	1) Q.No.1 is c Book. 2) Figures to	compulsory and sh the right indicate fo	ould be ull mar	e solved in first 30 Minutes k.	in answ	/er	
		Μ	CQ/Objective	Tvpe	Questions			
Duratio	on: 30 M	inutes				Marks	s: 14	
Q.1 (Choose 1) Tra a) c)	the correct a Insforming dif mapping Image wate	Ilternatives from f ference between a rmarking	the op adjacer b) d)	tions. It pixels is called image compression image equalization		14	
2	2) Sha a) c)	annon's theor noiseless co coding theo	rem is also called _ oding theorem rem	b) d)	noisy coding theorem noiseless theorem			
3	3) Shi a) c)	rinking of ima under samp critical samp	ge is viewed as ling bling	 b) d)	over sampling nyquist sampling			
4	4) Ga a) c)	ussian noise red noise white noise	is referred to as	 b) d)	black noise normal noise			
5	5) Clo a) c)	sing is used separation decompress	for sion	b) d)	Compression filling hole			
6	δ) Το doι a) c)	avoid negativules thickness of thickness of	ve values taking at lines edges	bsolute b) d)	values in lapacian image thinness of lines thinness of edges			
7	7) Gra a) c)	adient magnit point detect area detecti	ude images are m ion on	ore use b) d)	eful in line detection edge detection			
8	3) For a) c)	noise reduct image smoc Image enha	ion we use othing ncement	b) d)	image contouring image recognition			
ę	9) Seg a) c)	gmentation is trivial illuminated	difficult for images	s that a b) d)	re non trivial low resolution			
1	10) Mo a) c)	rphology refe pixels frames	rs to	b) d)	matrix shape			

Page **11** of **12**

- 11) Range [0, L-1], where L is the _____.
 - b) a) no of levels
 - c) no of intensity levels d)
- Histogram equalization refers to image _ 12)
 - a) sampling b)
 - c) framing d) normalization
- Replication of pixels is called _____. 13)
 - a) coding redundancy c) temporal redundancy
- b) spatial redundancy both b and c d)
- Dynamic range of imaging system is a ratio where the upper limit is 14) determined by _____.
 - a) Saturation
 - c) Brightness

- Noise b)
- d) Contrast

Set S

SLR-FM-491

- Length low quality

Quantization

Seat	
No.	

Q.2

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

Attempt any four.

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

a) Discuss the process of image formation in the eye briefly. b) What is mean 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. 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.

- 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 separatibility and shifting property of DFT and mention it's 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.

- 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.

Max. Marks: 56



16

16

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

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

Seat

No.

Q.1 Choose the correct alternatives from the options.

- The time required for the nuclide to be eliminated by biological processes 1) or depends on the physical characteristics of the nuclide and its chemical form.
 - a) radioactive decay b) half life period
 - d) dose rate c) intensity
- 2) The dose equivalent rate in an organ is determined from knowledge of the spatial _____of the nuclide.
 - a) resolution b) distribution c) velocity intensity d)
- To compute the radiation dose delivered to an organ by radioactivity 3) 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
- Radiations that are not absorbed locally have an absorbed fraction 6) 1.
 - a) greater than equal to b)
 - c) less than d) not equal to
- A simplification of the MIRD approach to _____ computations has been 7) prepared for radionuclides absorbed in specific internal organs.
 - a) intensity b) dose amount c) radiation absorbed dose d)
- 8) Most medical radiologic exposures result in a _____ dose distribution within the patient. uniform

b)

- a) nonuniform
- c) irregular d) unsaturated

SLR-FM-492



Max. Marks: 70

Marks: 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
- summimg b)
- c) multiple

9)

d) total **SLR-FM-492**

Set

- 10) Both direct and reflected laser beams are dangerous.
 - potentially a) absorbingly b)
 - c) saturately Collectively d)
- 11) If a _____ laser output beam is focused on na smaller spot using a lens, it increases the _____ density at the focal point.
 - Spectrum a) Current b)
 - c) Resolution d) Power
- Personnel dosimeter is usually calibrated to estimate a dose upto at the 12) depth of _____ mm in soft tissues.
 - a) 10 b) 25 c) 0.5 d) 12
- Radiation escaping in undesired directions the x-ray tube housing is 13) termed ____.
 - a) primary b) secondary
 - leakage d) scattered c)
- If exposures exceed the limits for an individual by a _____ amount, the 14) expectation of harm to that individual is small.
 - small a) b) medium
 - C) large d) infinite

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section - I

Q.2 Attempt any Four:

- 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:

- 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:

- 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.

- 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.

Set P

Max. Marks: 56

12

16

16

: 02:3	0 PM To 05:30 PM		
uctio	ns: 1) Q. No. 1 is compulsory and book. 2) Figures to the right indicate	d should t e full marl	be solved in first 30 minutes in answer k.
	MCQ/Objective	e Type (Questions
tion: 3	30 Minutes		Marks: 14
Choo 1)	Description of the correct alternatives from Most medical radiologic exposur within the patient.	n the opt es result i	ions. 14 in a dose distribution
	c) irregular	d)	unsaturated
2)	The collective effective dose is do individuals in the population times population. a) average c) multiple	efined as s the total b) d)	the dose estimated for I number of individuals in the summimg total
3)	Both direct and reflected laser be a) absorbingly c) saturately	eams are b) d)	dangerous. potentially Collectively
4)	If a laser output beam is fo increases the density at the a) Current c) Resolution	cused on he focal p b) d)	na smaller spot using a lens, it point. Spectrum Power
5)	Personnel dosimeter is usually c depth of mm in soft tissu a) 10 c) 0.5	alibrated les. b) d)	to estimate a dose upto at the 25 12
6)	Radiation escaping in undesired termed a) primary c) leakage	directions b) d)	s the x-ray tube housing is secondary scattered
7) 8)	If exposures exceed the limits fo expectation of harm to that indivi a) small c) large The time required for the puelide	r an indivi dual is sn b) d)	idual by a amount, the nall. medium infinite
0)	or depends on the physi chemical form.	cal chara	cteristics of the nuclide and its

Seat	
No.	

B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering MEDICAL RADIATION SAFETY ENGINEERING

Day & Date: Tuesday, 17-12-2019 Time:

Instru

Durat

Q.1

- radioactive decay b) a)
- intensity C)

- half life period
 - d) dose rate

SLR-FM-492

Set

Max. Marks: 70

Q

14

9)	The dose equivalent rate in an organ spatialof the nuclide. a) resolution c) velocity	n is de b) d)	etermined from knowledge of the distribution intensity
10)	To compute the radiation dose delive deposited within the organ, the a) blood level c) sugar level	ered to of tl b) d)	o an organ by radioactivity he organ must be estimated. insulin level mass
11)	Various "bioassay" techniques exist material present in an Individ a) radioactive c) lead	to me dual. b) d)	easure the actual amount of mass Na I
12)	In internal dose computations, an or radiation dose is to be estimated is r a) target c) utilized	gan o eferre b) d)	r volume of tissue for which the ed to as the organ. source mutual
13)	Radiations that are not absorbed loc 1. a) greater than c) less than	ally ha b) d)	ave an absorbed fraction equal to not equal to
14)	A simplification of the MIRD approace prepared for radionuclides absorbed	ch to _ ∣in sp	computations has been ecific internal organs.

- b) dose amount
- a) intensity c) radiation d)
 - absorbed dose

Set Q

SLR	-FM-	-492
-----	------	------

Set Q

Max. Marks: 56

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section - I

Q.2 Attempt any Four:

Seat

No.

- Explain various sources of radiofrequency radiations. a)
- List various guidelines for radiation protection. b)
- Explain process and need of quality assurance of radiation counters. C)
- Explain effects of radio frequency radiation. d)
- What is the need and significance of minimum detectable activity? e)

Q.3 Attempt any Two:

- What are the procedures for safe operations of radiation equipments? a)
- Explain the concept and methods of radiation protection in external beam b) radiotherapy.
- Explain various methods of RF radiation measuring instruments. c)

Section - II

Attempt any four: Q.4

- a) Explain various biological effects and hazards of ultraviolet radiations.
- Describe process of regulation to radiation protection in detail. b)
- Explain ICRP method for personal dosimetry. C)
- Mention classification of ultraviolet radiations. d)
- Classify all types of LASERs and specify its various radiation hazards. e)

Q.5 Attempt any two.

- Explain process of bioassay of radio activity and mention associated a) hazard and risk in radiation protection.
- b) State various personal radiation monitoring methods and explain any one in detail.
- Explain working role of MIRD method in radiation monitoring. C)



12

16

16

Set F

Max. Marks: 70

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

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

Seat

No.

Q.1 Choose the correct alternatives from the options.

- 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
- Radiations that are not absorbed locally have an absorbed fraction _____1.
 - a) greater thanb) equal toc) less thand) 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) summing c) multiple d) total
- 6) Both direct and reflected laser beams are _____ dangerous.
 - a) absorbinglyb) potentiallyc) saturatelyd) 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

Marks: 14

			Set	R
8)	Personnel dosimeter is usually calib depth of mm in soft tissues. a) 10 c) 0.5	rated b) d)	to estimate a dose upto at the 25 12	
9)	Radiation escaping in undesired directermed a) primary c) leakage	b) d)	s the x-ray tube housing is secondary scattered	
10)	If exposures exceed the limits for an expectation of harm to that individua a) small c) large	indivi I is sn b) d)	dual by a amount, the nall. medium infinite	
11)	The time required for the nuclide to b or depends on the physical of chemical form. a) radioactive decay c) intensity	be elin charao b) d)	ninated by biological processes cteristics of the nuclide and its half life period dose rate	
12)	The dose equivalent rate in an organ spatialof the nuclide. a) resolution c) velocity	n is de b) d)	etermined from knowledge of the distribution intensity	
13)	To compute the radiation dose delive deposited within the organ, the a) blood level c) sugar level	ered to _ of tl b) d)	o an organ by radioactivity ne organ must be estimated. insulin level mass	
14)	Various "bioassay" techniques exist material present in an Individ a) radioactive	to me dual. b)	asure the actual amount of mass	

c) lead d) Na I

SLR-FM-492
Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section - I

Q.2 Attempt any Four:

- 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:

- 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:

- 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.

- 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.

Set R

Max. Marks: 56

12

16

16

		MEDICAL RADIATION SA	FET	Y ENGINEERING
Day Time	& Date : 02:3	e: Tuesday, 17-12-2019 0 PM To 05:30 PM		Max. Marks: 70
Instr	uctior	ns: 1) Q. No. 1 is compulsory and she book.	ould b	be solved in first 30 minutes in answer
		Figures to the right indicate ful	l mark	۲.
		MCQ/Objective Ty	/pe G	Questions
Dura	tion: 3	30 Minutes		Marks: 14
Q.1	Choo 1)	 bse the correct alternatives from th Both direct and reflected laser beam a) absorbingly c) saturately 	e opt i s are b) d)	ions. 14 dangerous. potentially Collectively
	2)	If a laser output beam is focus increases the density at the fo a) Current c) Resolution	əd on ocal p b) d)	na smaller spot using a lens, it oint. Spectrum Power
	3)	Personnel dosimeter is usually calibred depth of mm in soft tissues. a) 10 c) 0.5	ated t b) d)	to estimate a dose upto at the 25 12
	4)	Radiation escaping in undesired dire termed a) primary c) leakage	ctions b) d)	s the x-ray tube housing is secondary scattered
	5)	If exposures exceed the limits for an expectation of harm to that individua a) small c) large	indivi l is sm b) d)	dual by a amount, the nall. medium infinite
	6)	The time required for the nuclide to b or depends on the physical of chemical form. a) radioactive decay c) intensity	be elin charad b) d)	ninated by biological processes cteristics of the nuclide and its half life period dose rate
	7)	The dose equivalent rate in an organ spatialof the nuclide. a) resolution c) velocity	b) d)	etermined from knowledge of the distribution intensity
	8)	To compute the radiation dose delive deposited within the organ, the a) blood level c) sugar level	ered to _ of th b) d)	o an organ by radioactivity ne organ must be estimated. insulin level mass

B.E. (Part -I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering

Seat

No.

Set S

14

,) suya **'**

			Sot	S
9)	Various "bioassay" techniques exis material present in an Indiv a) radioactive	st to me vidual. b)	easure the actual amount of	5
10)	 c) lead In internal dose computations, an cradiation dose is to be estimated is a) target c) utilized 	a) organ o referre b) d)	Na I or volume of tissue for which the ed to as the organ. source mutual	
11)	Radiations that are not absorbed lo 1. a) greater than c) less than	bcally h b) d)	ave an absorbed fraction equal to not equal to	
12)	A simplification of the MIRD approa prepared for radionuclides absorbe a) intensity c) radiation	ach to <u>.</u> ed in sp b) d)	computations has been becific internal organs. dose amount absorbed dose	
13)	Most medical radiologic exposures within the patient. a) nonuniform c) irregular	result b) d)	in a dose distribution uniform unsaturated	
14)	The collective effective dose is defi individuals in the population times t	ned as he tota	the dose estimated for I number of individuals in the	

population. a) average c) multiple summimg total

- b)
 - d)

SLR-FM-492

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any Four:

- 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:

- 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:

- 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.

- 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.

Set S

Max. Marks: 56

12

16

16

Set

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

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

Seat

No.

Q.1 Choose the correct alternatives from the options.

- The fiber should be ______ to avoid deterioration of the optical 1) transmission characteristics resulting from mode-coupling-induced microbendina.
 - 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 = (n1 - n) / (n1 - n) indicates .
 - a) Fresnel reflection
 - b) Reflection coefficient
 - c) Refraction coefficient
 - d) Angular power distribution coefficient

3) _ performs the linear conversion of the received optical signal A into an electric current.

- a) Receiver b) Converter
- Detector Reflector C) d)
- In Stimulated Emission, which among the following parameters of 4) generated photon is/are? Similar to the photon of incident wave _____.
 - a) Phase
 - b) Frequency
 - c) Polarization & direction of travel
 - d) All above
- In Lambertian output pattern of LED, the source is _____ bright from all 5) directions.
 - a) Less Equally b)
 - Unpredictably c) More d)
- 6) The basic principle of the LASER is _
 - a) Stimulated absorption c) Spontaneous absorption
- Stimulated emission b)
- Spontaneous emission d)

Max. Marks: 70

Marks: 14

	SLR-FM-493
	Set P
7)	In the following given which is not property of the laser a) Intensity b) Directional c) Coherence d) Non-coherent
8)	Light emitted by ordinary source of light is a) Coherent b) Non-coherent c) Monochromatic d) None
9)	The primary colours in photography area) red, blue, yellowb) red, yellow, greenc) red, blue, greend) blue, yellow, green
10)	Optical fibres are based on the phenomenon ofa) interferenceb) dispersionc) diffractiond) total internal reflection
11)	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
12)	The quantum efficiency of an optical detector should be high. State whether the given statement is true or false. a) True b) False
13)	Which among the following is/are responsible for generating attenuationof an optical power in fiber?a) Absorptionb) Scatteringc) Waveguide effectd) All
14)	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

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four.

- 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:

- 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.

- 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.

- 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 onclogical and non-oncological application of PDT.

Set P

Max. Marks: 56

16

12

12

		MCQ/Objective	Type	Questions
Dura	tion:	30 Minutes		Marks: 14
Q.1	Chc 1)	bose the correct alternatives from Light emitted by ordinary source o a) Coherent c) Monochromatic	the op f light i b) d)	s 14 Non-coherent None
	2)	The primary colours in photograph a) red, blue, yellow c) red, blue, green	y are _ b) d)	red, yellow, green blue, yellow, green
	3)	Optical fibres are based on the ph a) interference c) diffraction	enome b) d)	non of dispersion total internal reflection
	4)	If a light travels in a certain mediu denser medium with high refractiv a) External Reflection c) Both a and b	m and re index b) d)	it gets reflected off an optically k, then it is regarded as Internal Reflection None
	5)	The quantum efficiency of an optic whether the given statement is tru a) True	al dete e or fal b)	ector should be high. State lse. False
	6)	Which among the following is/are of an optical power in fiber? a) Absorption c) Waveguide effect	respon b) d)	sible for generating attenuation Scattering All
	7)	Which among the following is rega photon? a) Kerr effect c) Hall effect	arded a b) d)	s an inelastic scattering of a Raman Effect Miller effect
	8)	 The fiber should be to avoid transmission characteristics result bending. a) Free from irregular external problem Coupled with plastic c) Large in diameter 	oid dete ing fror ressure	erioration of the optical m mode-coupling-induced micro-

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

Bio-Medical Engineering LASERS AND OPTICAL FIBERS IN MEDICINE

2) Figures to the right indicate full mark.

Q.1 Choo

Day & Date: Tuesday, 17-12-2019

Time: 02:30 PM To 05:30 PM

Seat

No.

- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
 - e in uiameter
 - Smooth and in a steady state d)

SLR-FM-493



Max. Marks: 70

Q

Set

Set C

- 9) The ratio r = (n1 n) / (n1 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.
 - a) Receiver

- b) Converter
- c) Detector d) Reflector
- 11) 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
- 12) In Lambertian output pattern of LED, the source is _____ bright from all directions.
 - a) Less b) Ec
 - c) More
-) Equally
- d) Unpredictably
- 13) The basic principle of the LASER is _____a) Stimulated absorption b
 - 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.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four.

- 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:

- 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.

- 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.

- 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 onclogical and non-oncological application of PDT.



Max. Marks: 56

12

16

16

		Set	R
B.E. (Part - I) LASERS	(New) (CBCS) Examination Nov/Dec-20 Bio-Medical Engineering AND OPTICAL FIBERS IN MEDICINE	19	
:: Tuesday,17-12) PM To 05:30 P	2-2019 № M	Max. Marks	s: 70

Stimulated emission

Spontaneous emission

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

Q.1 Choose the correct alternatives from the options.

In Lambertian output pattern of LED, the source is _____ bright from all 1) directions. Equally

b)

b)

d)

a) Less

Day & Date: Tuesday, 17-12-2019

Time: 02:30 PM To 05:30 PM

Duration: 30 Minutes

3)

- Unpredictably c) More d)
- The basic principle of the LASER is _ 2)
 - a) Stimulated absorption
 - c) Spontaneous absorption
 - 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 Non-coherent b)
- c) Monochromatic d) None

The primary colours in photography are 5)

- a) red, blue, yellow b) red, yellow, green d) blue, yellow, green
- c) red, blue, green
- 6) Optical fibres are based on the phenomenon of _____.
 - a) interference b) dispersion
 - c) diffraction d) total internal reflection
- If a light travels in a certain medium and it gets reflected off an optically 7) denser medium with high refractive index, then it is regarded as _____.
 - a) External Reflection b) Internal Reflection
 - c) Both a and b d) None
- The quantum efficiency of an optical detector should be high. State 8) whether the given statement is true or false. a) True b) False
- Which among the following is/are responsible for generating attenuation 9) of an optical power in fiber?
 - a) Absorption b)
 - Scattering c) Waveguide effect d) All

Seat No.

SLR-FM-493

Marks: 14



a) Kerr effect

- b) Raman Effect
- c) Hall effect
- d) Miller effect

SLR-FM-493

Set R

- 11) The fiber should be _____ to avoid deterioration of the optical transmission characteristics resulting from mode-coupling-induced microbending.
 - 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 = (n1 n) / (n1 n) indicates _____.
 - a) Fresnel reflection
 - b) Reflection coefficient
 - c) Refraction coefficient
 - d) Angular power distribution coefficient
- 13) A _____ performs the linear conversion of the received optical signal into an electric current.
 - a) Receiver

- 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

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four.

- 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:

- 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.

- 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.

- 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 onclogical and non-oncological application of PDT.



Max. Marks: 56

16

12

12

12

		B.E. (Part - I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering
		LASERS AND OPTICAL FIBERS IN MEDICINE
Day a Time	& Date : 02:3	e: Tuesday,17-12-2019 Max. Marks: 70 0 PM To 05:30 PM
Instr	uctior	ns: 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.
Dura	tion: 2	MCQ/Objective Type Questions
	uon. s	o minutes internetives from the entire 4
Q.1	1)	Optical fibres are based on the phenomenon of a) interference b) dispersion c) diffraction d) total internal reflection
	2)	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 asa) External Reflectionb) Internal Reflectionc) Both a and bd) None
	3)	The quantum efficiency of an optical detector should be high. State whether the given statement is true or false. a) True b) False
	4)	Which among the following is/are responsible for generating attenuationof an optical power in fiber?a) Absorptionb) Scatteringc) Waveguide effectd) All
	5)	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
	6)	 The fiber should be to avoid deterioration of the optical transmission characteristics resulting from mode-coupling-induced microbending. a) Free from irregular external pressure b) Coupled with plastic c) Large in diameter d) Smooth and in a steady state
	7)	 The ratio r = (n1 - n) / (n1 - n) indicates a) Fresnel reflection b) Reflection coefficient c) Refraction coefficient d) Angular power distribution coefficient
	8)	A performs the linear conversion of the received optical signal into an electric current.

Converter

Reflector

b)

d)

Receiver

Detector

a)

C)

SLR-FM-493

Set S

			SLR-FM-493
			Set S
9)	 In Stimulated Emission, which amongenerated photon is/are? Similar to a) Phase b) Frequency c) Polarization & direction of trave d) All above 	ng the the p	e following parameters of hoton of incident wave
10)	In Lambertian output pattern of LED directions. a) Less c) More), the b) d)	source is bright from all Equally Unpredictably
11)	The basic principle of the LASER isa) Stimulated absorptionc) Spontaneous absorption	b) d)	 Stimulated emission Spontaneous emission
12)	In the following given which is not p a) Intensity c) Coherence	roper b) d)	ty of the laser Directional Non-coherent
13)	Light emitted by ordinary source of a) Coherent c) Monochromatic	light i b) d)	s Non-coherent None
14)	The primary colours in photography a) red, blue, yellow c) red, blue, green	are _ b) d)	red, yellow, green blue, yellow, green

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four.

- 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:

- 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.

- 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.

- 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 onclogical and non-oncological application of PDT.



Max. Marks: 56

16

12

14

12

Seat No.						Set	Ρ		
B.E. (Part – I) (New) (CBCS) Examination Nov/Dec-2019 Bio-Medical Engineering									
Day & Time: (Date: Tu)2:30 PN	uesday, 17-12 // To 05:30 P	2-2019 M		Max	. Marks	s: 70		
Instruc	ctions: 1	I) Q. No. 1 is Book.	compulsory and sho	ould b	e solved in first 30 minutes	in ans	wer		
	4			in iniai	NJ.				
Duratio	on: 30 M	inutes	ic Q/Objective Ty	pe c	LUESTIONS	Mark	s: 14		
Q.1 (Choose	the correct a	alternatives from th	e opt	tions.		14		
1) Ar a)	ule-based sy True	stem consists of a b	unch b)	of IF-THEN rules. False				
2	2) Gra a) c)	aph used to r Undirected Directed Ac	epresent semantic n graph yclic graph (DAG)	etwor b) d)	k is Directed graph Directed complete graph				
3	3) Wh a) c)	iich of the foll Facts or Da Frame nam	lowing elements con ta es	stitute b) d)	es the frame structure? Procedures and default va Frame reference in hierard	alues chy			
4) Ne a) c)	ural Network Linear Func Discrete Fu	s are complex tions nctions	_ with b) d)	many parameters. Nonlinear Functions Exponential Functions				
5	5) A p and a)	lan that desc d specificity is Problem so	cribe how to take act S Iving	ions ii b)	n levels of increasing refine Planning	ment			
	c)	Non-hierarc	hical plan	d)	Hierarchical plan				
6	5) Wh a) c)	at are prese Sequence c Variables	nt in the planning gra of levels	aph? b) d)	Literals Heuristic estimates				
7	7) Wh a) b) c) d)	 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	3) A _ dec out a) c)	 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)) Wh a) c)	iich of the foll Goal Learning ru	lowing is the compor les	nent c b) d)	of learning system? Model All above				

- Set P
- 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

Set

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four:-

- 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:-

- 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:-

- 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

- 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

Max. Marks: 56

12

16

16

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 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** Choose the correct alternatives from the options.

Q.1

- 1) 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 Trees d) Neural Networks C)
- 2) Which of the following is the component of learning system?
 - a) Goal
 - Learning rules d) c)
- 3) In which of the following situations might a blind search be acceptable?
 - a) Real life situation Complex game b)
 - Small search space All above d) c)
- Machine learning involves 4)
 - 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

5) A typical database contain

- a) rules, facts and relationships
- b) only rules and relationships
- c) simulation of human thinking
- d) only facts

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)

- a) Expert system b) Database
- c) Fuzzy logic system Pattern reorganization system d)
- 7) Expert systems primarily started in the
 - a) Insurance field Medical field b) c) Aviation field
 - d) Library reference field
- A rule-based system consists of a bunch of IF-THEN rules. 8) a) True b) False
- 9) Graph used to represent semantic network is _ Directed graph
 - a) Undirected graph b)
 - Directed Acyclic graph (DAG) d) Directed complete graph c)

Marks: 14

14

SLR-FM-494



- b) Model

- All above

Max. Marks: 70

Seat

No.

- 10) Which of the following elements constitutes the frame structure?
 - a) Facts or Data

c)

- b) Procedures and default values Frame reference in hierarchy d)
- c) Frame names
- Neural Networks are complex _____ with many parameters. 11) b) **Nonlinear Functions**
 - a) Linear Functions
 - **Discrete Functions** d) **Exponential Functions**
- 12) A plan that describe how to take actions in levels of increasing refinement and specificity is _ b)
 - a) Problem solving
 - c) Non-hierarchical plan d) Hierarchical plan
- 13) What are present in the planning graph?
 - Sequence of levels b) a) c) Variables
 - d) Heuristic estimates

Planning

Literals

- What does the Bayesian network provides? 14)
 - a) Complete description of the domain
 - Partial description of the domain b)
 - c) Complete description of the problem
 - d) None of the mentioned

SLR-FM-494

Set

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four:-

- 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:-

- 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:-

- 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

- 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

Max. Marks: 56

12

16

16

Set

Max. Marks: 70

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

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

Seat

No.

Q.1 Choose the correct alternatives from the options.

A plan that describe how to take actions in levels of increasing refinement 1) and specificity is .

b)

Planning

Literals

- a) Problem solving
- c) Non-hierarchical plan Hierarchical plan d)
- 2) What are present in the planning graph?
 - a) Sequence of levels b)
 - 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
 - None of the mentioned d)
- 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
 - Trees d) **Neural Networks** c)
- Which of the following is the component of learning system? 5)
 - a) Goal b) Model
 - c) Learning rules d) All above
- In which of the following situations might a blind search be acceptable? 6) Complex game
 - a) Real life situation b)
 - c) Small search space All above d)
- 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

Marks: 14

Set R

SLR-FM-494

- 8) A typical database contain _____.
 - a) rules, facts and relationships
 - b) only rules and relationships
 - c) simulation of human thinking
 - d) only facts

a) Insurance field

- 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 _
 - b) Medical field
 - c) Aviation field d) Library reference field
- 11) A rule-based system consists of a bunch of IF-THEN rules.a) Trueb) False
- 12) Graph used to represent semantic network is _____.
 - a) Undirected graph b)
 - 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
 - c) Discrete Functions
- b) Nonlinear Functions

Directed graph

d) Exponential Functions

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four:-

- 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:-

- 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:-

- 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

- 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

Set R

Max. Marks: 56

16

12

16

Set

Max. Marks: 70

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

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

Seat

No.

Q.1 Choose the correct alternatives from the options.

- In which of the following situations might a blind search be acceptable? 1)
 - a) Real life situation c) Small search space
- b) Complex game 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

c) Frame names

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)

b)

d)

- a) Expert system
- c) Fuzzy logic system
- 5) Expert systems primarily started in the _
 - a) Insurance field Medical field b)
 - c) Aviation field Library reference field d)
- A rule-based system consists of a bunch of IF-THEN rules. 6)
 - a) True False b)
- Graph used to represent semantic network is _____ 7) Directed graph
 - a) Undirected graph b)
 - Directed complete graph Directed Acyclic graph (DAG) d) c)
- Which of the following elements constitutes the frame structure? 8) a) Facts or Data
 - Procedures and default values b)

Database

Pattern reorganization system

- Frame reference in hierarchy d)
- Neural Networks are complex _____ with many parameters. 9)
 - a) Linear Functions **Nonlinear Functions** b)
 - Discrete Functions d) **Exponential Functions** c)

Marks: 14

10) A plan that describe how to take actions in levels of increasing refinement and specificity is _____.

b)

a) Problem solving

Variables

C)

- c) Non-hierarchical plan
- d) Hierarchical plan

Planning

- 11) What are present in the planning graph?a) Sequence of levelsb)
 - b) Literalsd) 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

Model

b)

- c) Trees d) Neural Networks
- 14) Which of the following is the component of learning system?
 - a) Goal
 - c) Learning rules d) All above

SLR-FM-494

Set S

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four:-

- 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:-

- 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:-

۱

- 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

- 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

Max. Marks: 56

12

16

16

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 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** Choose the correct alternatives from the options and rewrite the sentence. 14 1) Activity is proportional to number of _____ daughter nuclei decayed nuclei a) b) undecayed nuclei father nuclei d) c) 2) Radioactive decay is a _____. b) non-spontaneous process

- random process a)
 - C) regular process
- 3) In gamma emission, change in nucleon number is _____
 - a) zero b) Definite
 - increase by 1 d) decreases by 1 C)
- 4) Gamma camera in Nuclear Medicine is used for _____.
 - organ imaging a)
 - b) measuring the radioactivity
 - monitoring the surface contamination C)
 - d) RIA

Seat

No.

Q.1

type of medical problem is not usually investigated using nuclear 5) medicine.

d)

massive process

- a) Cancer b) Broken bone
- Blood circulation d) **Disorders in organs** c)
- 6) A specific combination of protons and neutrons in a nucleus is called _____.
 - nucleons b) Nuclide a)
 - **Nucleolus** c) neutrino d)
- In SI base units, 1 Bq is equal to _____. 7)
 - 10 disintegration per second a)
 - 1.5 disintegration per second b)
 - 0.01 disintegration per second c)
 - 1 disintegration per second d)
- The principal disadvantage in using a high resolution collimator on a 8) gamma camera is that it has ____ More distortion
 - Limited field of view b) a)
 - C) Less scatter rejection d) Lower sensitivity

Set

Max. Marks: 70

Marks: 14

9) of the following is not characteristic of PET.

- Lead collimators a)
- b) Positron emitters
- C) 511 keV photons
- d) Absolute attenuation correction

SLR-FM-495

Set

- 10) Of the following radiations _____ would be the most desirable for radionuclide imaging?
 - 15 keV gamma b) 150 keV gamma a)
 - 150 keV beta d) 1500 keV gamma C)
- 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 90 minutes b)
 - c) 30 minutes d) 60 minutes
- 12) Rate of radioactive decay is proportional to _____
 - a) nature of rays no. of electron b)
 - c) no. of protons d) no. of unstable nuclei
- The absorbed dose to tissue in a nuclear medicine procedure is _____. 13)
 - The concentration of radioactivity in MBq per kg a)
 - b) The energy absorbed per unit mass of tissue
 - Measured in Sieverts c)
 - Dependent on the Quality Factor for the type of radiation d)
- Which one of the following factors has no influence on the biodistribution 14) and tumor uptake of 18 F-FDG?
 - a) Insulin level
 - Muscular exercise the day before b)
 - Ambient temperature c)
 - Body mass index d)

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

16

Set

Seat No.

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

- 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

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

Positron emitters

- 1) The principal disadvantage in using a high resolution collimator on a gamma camera is that it has
 - Limited field of view b) More distortion a)
 - C) Less scatter rejection d) Lower sensitivity
- 2) of the following is not characteristic of PET.
 - Lead collimators b) a)
 - 511 keV photons C) d) Absolute attenuation correction
- 3) Of the following radiations _____ would be the most desirable for radionuclide imaging?
 - 15 keV gamma 150 keV gamma a) b)
 - 1500 keV gamma c) 150 keV beta d)
- If a radioactive element has a half-life of 40 minutes, initial count rate was 4) 1000 per minute, then how long will it take for count rate to drop to 125 per minutes?
 - a) 120 minutes 90 minutes b)
 - c) 30 minutes d) 60 minutes

5) Rate of radioactive decay is proportional to _____

- a) nature of rays no. of electron b)
- c) no. of protons d) no. of unstable nuclei
- 6) The absorbed dose to tissue in a nuclear medicine procedure is _____.
 - The concentration of radioactivity in MBg per kg a)
 - The energy absorbed per unit mass of tissue b)
 - Measured in Sieverts C)
 - Dependent on the Quality Factor for the type of radiation d)
- 7) Which one of the following factors has no influence on the biodistribution and tumor uptake of 18 F-FDG?
 - Insulin level a)
 - b) Muscular exercise the day before
 - Ambient temperature C)
 - Body mass index d)
- Activity is proportional to number of 8)
 - daughter nuclei b) decayed nuclei a) C)
 - undecayed nuclei d) father nuclei

Max. Marks: 70

Marks: 14

- 9) Radioactive decay is a _____.
 - random process a)
 - C) regular process
- b) non-spontaneous process
- d) massive process

decreases by 1

- In gamma emission, change in nucleon number is _____. 10) zero
 - b) Definite
 - C) increase by 1 d)
- 11) Gamma camera in Nuclear Medicine is used for .
 - organ imaging a)
 - measuring the radioactivity b)
 - monitoring the surface contamination C)
 - RIA d)

a)

- 12) _ type of medical problem is not usually investigated using nuclear medicine.
 - Cancer a)
- b) Broken bone
- C) Blood circulation d) **Disorders in organs**
- 13) A specific combination of protons and neutrons in a nucleus is called _____.
 - a) nucleons

- b) Nuclide Nucleolus
- neutrino d) C)
- 14) In SI base units, 1 Bq is equal to _____.
 - 10 disintegration per second a)
 - b) 1.5 disintegration per second
 - 0.01 disintegration per second C)
 - 1 disintegration per second d)

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

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

- 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

C)

a)

C)

Seat

No.

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

- type of medical problem is not usually investigated using nuclear 1) medicine.
 - Cancer a)

nucleons

neutrino

- b) Blood circulation
 - d) Disorders in organs

Broken bone

- 2) A specific combination of protons and neutrons in a nucleus is called .
 - b) Nuclide
 - **Nucleolus** d)
- 3) In SI base units, 1 Bq is equal to
 - 10 disintegration per second a)
 - b) 1.5 disintegration per second
 - 0.01 disintegration per second c)
 - 1 disintegration per second d)
- 4) The principal disadvantage in using a high resolution collimator on a gamma camera is that it has
 - Limited field of view b) More distortion a)
 - C) Less scatter rejection d) Lower sensitivity
- 5) _ of the following is not characteristic of PET.
 - Lead collimators a) b)
 - 511 keV photons d) Absolute attenuation correction C)
- Of the following radiations _____ would be the most desirable for 6) radionuclide imaging?
 - a) 15 keV gamma
 - b) 150 keV gamma c) 150 keV beta d) 1500 keV gamma
- 7) 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
- Rate of radioactive decay is proportional to _ 8)
 - a) nature of rays b) c) no. of protons
- no. of electron
 - d) no. of unstable nuclei

Positron emitters

Set

R

Max. Marks: 70

Marks: 14

- 9) The absorbed dose to tissue in a nuclear medicine procedure is .
 - The concentration of radioactivity in MBg per kg a)
 - The energy absorbed per unit mass of tissue b)
 - Measured in Sieverts C)
 - Dependent on the Quality Factor for the type of radiation d)
- 10) Which one of the following factors has no influence on the biodistribution and tumor uptake of 18 F-FDG?

d)

d)

- Insulin level a)
- b) Muscular exercise the day before
- Ambient temperature c)
- Body mass index d)
- Activity is proportional to number of ____ 11) b)
 - daughter nuclei a)
 - undecayed nuclei C)
- 12) Radioactive decay is a .
 - a) random process
 - regular process c)
- b) non-spontaneous process

SLR-FM-495

Set R

massive process d)

decreases by 1

Definite

decayed nuclei

father nuclei

- 13) In gamma emission, change in nucleon number is _____.
 - a) zero b)
 - increase by 1
- 14) Gamma camera in Nuclear Medicine is used for _____.
 - a) organ imaging
 - measuring the radioactivity b)
 - monitoring the surface contamination C)
 - d) RIA

C)
Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

R

12

16

16

Set

Max. Marks: 70

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

- 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

C)

Seat

No.

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

- Of the following radiations _____ would be the most desirable for 1) radionuclide imaging?
 - 15 keV gamma a)
 - b) 150 keV gamma 150 keV beta d) 1500 keV gamma
- 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 90 minutes b)
 - c) 30 minutes d) 60 minutes
- 3) Rate of radioactive decay is proportional to
 - a) nature of ravs b) c) no. of protons
 - no. of electron d) no. of unstable nuclei
- The absorbed dose to tissue in a nuclear medicine procedure is . 4)
 - The concentration of radioactivity in MBg per kg a)
 - b) The energy absorbed per unit mass of tissue
 - Measured in Sieverts C)
 - Dependent on the Quality Factor for the type of radiation d)
- 5) Which one of the following factors has no influence on the biodistribution and tumor uptake of 18 F-FDG?
 - a) Insulin level

7)

- Muscular exercise the day before b)
- Ambient temperature C)
- Body mass index d)

6) Activity is proportional to number of _____

- daughter nuclei b) decayed nuclei a) d)
- undecayed nuclei C)
 - Radioactive decay is a .
 - random process a) regular process C)
- b) non-spontaneous process massive process
- d)
- 8) In gamma emission, change in nucleon number is _____. Definite a) zero
 - b)
 - increase by 1 decreases by 1 c) d)
- father nuclei

Marks: 14

- 9) Gamma camera in Nuclear Medicine is used for _____.
 - organ imaging a)
 - measuring the radioactivity b)
 - monitoring the surface contamination C)
 - d) RIA
- 10) type of medical problem is not usually investigated using nuclear medicine.
 - Cancer a)

C)

- b) Broken bone
- Blood circulation **Disorders in organs** d)
- 11) A specific combination of protons and neutrons in a nucleus is called _____.
 - nucleons b) a)
 - neutrino d) c)
- 12) In SI base units, 1 Bg is equal to
 - 10 disintegration per second a)
 - b) 1.5 disintegration per second
 - 0.01 disintegration per second c)
 - 1 disintegration per second d)
- 13) 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
- ____ of the following is not characteristic of PET. 14)
 - a) Lead collimators
 - 511 keV photons C)
- b) Positron emitters
- Absolute attenuation correction d)



SLR-FM-495

Set

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

16

			MEDICAL INFO	RMA	TICŠ
Day Time	& Date : 02:30	e: Tue 0 PM	esday, 10-12-2019 To 05:30 PM		Max. Marks: 70
Instr	uctior	1s: 1)	Q. No. 1 is compulsory and shou book.	ld be	solved in first 30 minutes in answer
		2)	Figures to the right indicate full m	arks.	
Dura	tion: 3	0 Min	MCQ/Objective Typ	e Que	estions Marks: 14
Q.1	Choo	ose th	he correct alternatives from the	optio	ons and rewrite the sentence. 14
	1)	HMIS	S is a medical information s	syster	n.
		a) c)	Computer based Hospital based	b) d)	Patient based None of these
	2)		_ is the heart of hospital.		
		a) c)	Radiology OPD	b) d)	Clinical Laboratory Indoor patient module
	3)	CST	based integrated HMIS can take	care _	
		a) c)	Diagnosis support module Clinic support module	b) d)	Data warehousing All above
	4)	EDI : a) c)	stands for <u>.</u> Electrical Data Interchange Electric Data Interchange	b) d)	Electrical Device Indicator Electrical Device Informer
	5)	Whic a) c)	ch is the following is not comes un Time lines Relevance	der s b) d)	trategic planning of HMIS? Quantity Education and training
	6)	The a) c)	cost of telecommunication using t Expensive Medium expensive	he int b) d)	ernet is <u></u> Not expensive Depends on distance
	7)	Surg	ical simulation the training	scor	es.
		a) c)	Decreases Disturb	b) d)	Improves None
	8)	Publ a) c)	ic grievances and feedback functi Inventory Module General Information module	on is b) d)	considered in <u></u> . Communication Module Administration module
	9)	CT s a) c)	can image having Relatively high resolution Long acquisition timer	b) d)	Excellent bony details Both a and b
	10)	Whic a) c)	ch of the following is a 3-D volume ADAM JAVA	e rend b) d)	ering software? BERTA ADAM and JAVA
	11)	Pictu a)	re Archiving and communication X- Ray image	systei b)	m (PAC) scan handle <u>.</u> Endoscope image

d)

All above

MRI image

C)

Seat No.

B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering MEDICAL INFORMATICS

Page **1** of **12**

Set P



One voxel contain _____ number. 12)

Two 28 bit a)

Four 8-bit b) Four 16-bit **SLR-FM-496**

Set P

- Two 16-bit C) d)
- Tele-education consists of _____education though website. 13)
 - Only real time video conferencing a)
 - b) Only non-real time video conferencing
 - Both real time and non-real time video conferencing C)
 - None of these d)
- Robotic and image guided surgery are based on _____ images of the 14) patients acquired by computer tomography
 - 1-D 2-D a) b)
 - 3-D c)

- d) 2-D and 3-D

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section - I

Q.2 Answer any Four: -

- 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: -

- 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: -

- 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: -

- 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.

SLR-FM-496



Max. Marks: 56

12

16

16

Set 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

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

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14 Public grievances and feedback function is considered in 1)

b)

d)

b)

d)

b)

d)

b)

- Inventory Module a)
- General Information module C)
- 2) CT scan image having ____
 - Relatively high resolution a)
 - Long acquisition timer C)
- 3) Which of the following is a 3-D volume rendering software?
 - ADAM a)
 - JAVA C)
- Picture Archiving and communication system (PAC) scan handle_____. 4)
 - X- Ray image a)
 - MRI image c) d)
- One voxel contain _____ number. 5)
 - Two 28 bit a) b) Two 16-bit
 - C)
- Tele-education consists of education though website. 6)
 - Only real time video conferencing a)
 - b) Only non-real time video conferencing
 - Both real time and non-real time video conferencing c)
 - None of these d)

Robotic and image guided surgery are based on images of the 7) patients acquired by computer tomography

- a) 1-D b) 2-D 3-D d) 2-D and 3-D c)
- HMIS is a _____ medical information system. 8)
 - Computer based Patient based a) b) Hospital based C) d)
- is the heart of hospital. 9)

a)

C)

- Radiology Clinical Laboratory b) a)
- OPD Indoor patient module C) d)
- 10) CST based integrated HMIS can take care Diagnosis support module

Clinic support module

- Data warehousing b)
- All above d)

Max. Marks: 70

Marks: 14

SLR-FM-496

Q



Seat No.

None of these

Endoscope image

ADAM and JAVA

Both a and b

Communication Module

Administration module

Excellent bony details

All above

BERTA

- Four 16-bit
- Four 8-bit

- d)

11) EDI stands for _____.

a)

c)

a)

a)

13)

- Electrical Data Interchange a)
- Electric Data Interchange c)

Time lines

Expensive

Decreases

b) **Electrical Device Indicator**

Education and training

SLR-FM-496

Set Q

- **Electrical Device Informer** d)
- Which is the following is not comes under strategic planning of HMIS? 12)
 - Quantity b)

d)

- Relevance
- The cost of telecommunication using the internet is _____.
 - Not expensive b)
- Medium expensive d) Depends on distance C)
- Surgical simulation _____ the training scores. 14)
 - b)

Disturb C)

- Improves
- d) None

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section - I

Q.2 Answer any Four: -

- 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: -

- 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: -

- 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: -

- 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.

SLR-FM-496

Set Q

Max. Marks: 56

12

16

16

		MEDICAL IN	NFORMATICS	
Day	& Dat	e: Tuesday, 10-12-2019	Ν	lax. Marks: 70
Inst	e: 02:3 ructio	ns:1) Q No 1 is compulsory and	should be solved in first 30 minut	es in answer
		book.		
		2) Figures to the right indicate	full marks.	
Dura	ation: ?	MCQ/Objective	e Type Questions	Marke: 11
		on minutes	the options and rewrite the se	ntence 1/
Q .1	1)	Which is the following is not com a) Time lines c) Relevance	es under strategic planning of HM b) Quantity d) Education and training	11S?
	2)	The cost of telecommunication us a) Expensive c) Medium expensive	sing the internet is <u>.</u> b) Not expensive d) Depends on distance	
	3)	Surgical simulation the tra a) Decreases c) Disturb	aining scores. b) Improves d) None	
	4)	Public grievances and feedback fa) Inventory Modulec) General Information module	function is considered in b) Communication Modu e d) Administration modul	ıle e
	5)	CT scan image having a) Relatively high resolution c) Long acquisition timer	b) Excellent bony detailsd) Both a and b	3
	6)	Which of the following is a 3-D vo a) ADAM c) JAVA	olume rendering software? b) BERTA d) ADAM and JAVA	
	7)	Picture Archiving and communica a) X- Ray image c) MRI image	ation system (PAC) scan handle <u></u> b) Endoscope image d) All above	<u></u>
	8)	One voxel contain number a) Two 28 bit c) Two 16-bit	er. b) Four 8-bit d) Four 16-bit	
	9)	 Tele-education consists of a) Only real time video conference b) Only non-real time video conference c) Both real time and non-real d) None of these 	education though website. encing onferencing time video conferencing	
	10)	Robotic and image guided surger patients acquired by computer to a) 1-D	ry are based on images of mography b) 2-D	the

Seat No.

> B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering**

Set R

Page ${\bf 7}$ of ${\bf 12}$

c) 3-D d) 2-D and 3-D

SLR-FM-496

11) HMIS is a _____ medical information system.

Computer based a) C)

Patient based b)

SLR-FM-496

Set R

- Hospital based
- d) None of these
- _ is the heart of hospital. 12)
 - Radiology a)
 - c) OPD

- b) Clinical Laboratory Indoor patient module d)
- 13) CST based integrated HMIS can take care _
 - Diagnosis support module a)
 - Clinic support module C)
- EDI stands for _ 14)
 - Electrical Data Interchange a)
 - Electric Data Interchange C)

- Data warehousing b) All above d)
- **Electrical Device Indicator** b)
- Electrical Device Informer d)

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section - I

Q.2 Answer any Four: -

- 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: -

- 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: -

- 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: -

- 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.

SLR-FM-496

Set R

Max. Marks: 56

16

12

16

			Bio-Medical En MEDICAL INFO	gine RMA	ering TICS	
Day	& Date	e: Tue	esday, 10-12-2019		Max. Marks: 70	C
lime	: 02:3		10 05:30 PM		a hard in first 20 minutes in an ann	
Insti	uction	ns: 1)	Q. No. 1 is compulsory and shou	lia pe	solved in first 30 minutes in answer	
		2)	Figures to the right indicate full m	arks.		
_			MCQ/Objective Typ	e Qu	estions	
Dura	ition: 3	0 Mir	nutes		Marks: 14	1
Q.1	Choc 1)	whic Whic a) c)	the correct alternatives from the ch of the following is a 3-D volume ADAM JAVA	optio e rend b) d)	ering software? BERTA ADAM and JAVA	1
	2)	Pictu a) c)	re Archiving and communication X- Ray image MRI image	syste b) d)	m (PAC) scan handle Endoscope image All above	
	3)	One a) c)	voxel contain number. Two 28 bit Two 16-bit	b) d)	Four 8-bit Four 16-bit	
	4)	Tele a) b) c) d)	-education consists ofedu Only real time video conferencin Only non-real time video confere Both real time and non-real time None of these	ication g encing videc	n though website.	
	5)	Robo patie a) c)	otic and image guided surgery are ents acquired by computer tomogr 1-D 3-D	e base aphy b) d)	ed on images of the 2-D 2-D and 3-D	
	6)	HMIS a) c)	S is a medical information Computer based Hospital based	syster b) d)	n. Patient based None of these	
	7)	a) c)	_ is the heart of hospital. Radiology OPD	b) d)	Clinical Laboratory Indoor patient module	
	8)	CST a) c)	based integrated HMIS can take Diagnosis support module Clinic support module	care _ b) d)	 Data warehousing All above	
	9)	EDI : a) c)	stands for <u>.</u> Electrical Data Interchange Electric Data Interchange	b) d)	Electrical Device Indicator Electrical Device Informer	
	10)	Whic a) c)	ch is the following is not comes ur Time lines Relevance	nder s b) d)	trategic planning of HMIS? Quantity Education and training	

No.

Seat

B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019

Page **10** of **12**

Set S

SLR-FM-496

- The cost of telecommunication using the internet is _____. 11)
 - Expensive a)

a)

c)

14)

- Not expensive b)
- Medium expensive c)

Decreases

Disturb

Depends on distance d)

SLR-FM-496

Set S

- Surgical simulation _____ the training scores. 12)
 - Improves b)
 - d) None

b)

d)

- Public grievances and feedback function is considered in _____. 13) **Communication Module**
 - Inventory Module a)

CT scan image having _

- General Information module C)

Administration module

- Relatively high resolution a)
- C) Long acquisition timer
- b) Excellent bony details
- d) Both a and b

Seat No. B.E. (Part - I) (Old) (CG

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section - I

Q.2 Answer any Four: -

- 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: -

- 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: -

- 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: -

- 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.

SLR-FM-496



Max. Marks: 56

16

16

12

Seat No.

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

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

1)

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

- Galvanic current is preliminarily used for the treatment of _____
- a) atonic paralysis
- c) muscle weakness
- d) hyperemia
- The pattern of tissue _____ is affected by shortwave diathermy delivery. 2) b) tissue heating
 - a) cell fluid heating
 - c) electrolytes heating d) cell distraction
- Accommodation is the property of a _____ unit of being able to respond 3) less strongly to a slowly increasing current impulse.
 - a) cellular b) cardiac
 - c) nerve d) neuromuscular
- 4) Chronic renal failure results in changes in the body _____ that occurs due to a progressive decrease in the number f functioning nephrons.
 - a) CSF blood b)
 - c) fluids d) hormones
- The overall performance of dialyzer can be compared in terms of their 5) clearance of _____.
 - a) dialvsate b) urea
 - c) creatnin d) sodium chloride
- Ultrafilteration monitor is used to monitor the amount of fluid removed from 6) the patient with _____ pressure.
 - a) negative b) positive
 - volume c) partial d)
- 7) For pacemaker implant a bipolar or unipolar catheter electrode is inserted through the _____ into right ventricle.
 - a) aortic vein b) pulmonary vein
 - pulmonary artery c) cephalic vein d)
- The frequency is independent of the electrical activity of the heart. 8)
 - a) resonance impulse b)
 - c) variable d) rhythmic
- 9) Rate responsive pacemakers have _____ that automatically adjust to changes in person's physical activity.
 - a) transducers b) microchips
 - c) sensors d) power source

Set

Max. Marks: 70

SLR-FM-497



Marks: 14

b) severe paralysis

			Set	Ρ
10)	In a defibrillator an enormous voltag patient. a) 400V	e of <u> </u>	is initially applied to the	
	c) 1400V	d)	140 KV	
11)	The energy delivered to the patient total stored energy.	from	defibrillator is only % of	
	a) 70	b)	71	
	c) 50	d)	65	
12)	Electrode gels are usually employed interface of the skin.	d to re	educe contact of the	
	a) capacitance	b)	resistance	
	c) impedance	d)	inductance	
13)	Short wave diathermy machine conspatient circuit.	sists o	of 2 main circuits and	
	a) power supply	b)	oscillating circuit	
	c) tuning circuit	d)	power tube circuit	
14)	The rheobase is the minimum response to stimulus.	of	current that will produce	
	a) frequency	b)	intensity	

c) phase d) vector

SLR-FM-497

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

Page 4 of 12	

		B.E. (Part – I) (Old) (CGPA) E Bio-Medical E BIOMEDICAL INSTR	xam ngir UME	nination Nov/Dec-2019 neering INTATION – III
Day Time	& Date : 02:30	e: Thursday, 12-12-2019 0 PM To 05:30 PM		Max. Marks: 70
Instr	uctior	ns: 1) Q. No. 1 is compulsory and sh book. 2) Figures to the right indicate ful	ould I I mar	be solved in first 30 minutes in answer ks.
		MCQ/Objective T	vpe	Questions
Dura	tion: 3	0 Minutes) • •	Marks: 14
Q.1	Choc 1)	The frequency is independer a) resonance c) variable	ne op nt of t b) d)	tions and rewrite the sentence. 14 he electrical activity of the heart. impulse rhythmic
	2)	Rate responsive pacemakers have changes in person's physical activity a) transducers c) sensors	y. b) d)	that automatically adjust to microchips power source
	3)	In a defibrillator an enormous voltag patient. a) 400V c) 1400V	le of b) d)	is initially applied to the 4000V 140 KV
	4)	The energy delivered to the patient total stored energy. a) 70 c) 50	from b) d)	defibrillator is only % of 71 65
	5)	Electrode gels are usually employed interface of the skin. a) capacitance c) impedance	d to re b) d)	educe contact of the resistance inductance
	6)	Short wave diathermy machine conspatient circuit.a) power supplyc) tuning circuit	sists b) d)	of 2 main circuits and oscillating circuit power tube circuit
	7)	The rheobase is the minimum response to stimulus. a) frequency c) phase	of b) d)	current that will produce intensity vector
	8)	Galvanic current is preliminarily use a) atonic paralysis	d for b)	the treatment of

d) hyperemia c) muscle weakness

Seat No.

Set

Q

- 9) The pattern of tissue _____ is affected by shortwave diathermy delivery.
 - a) cell fluid heating
- b) tissue heating

Set

- c) electrolytes heating
- d) cell distraction
- Accommodation is the property of a _____ unit of being able to respond 10) less strongly to a slowly increasing current impulse.
 - a) cellular b) cardiac d) c) nerve
 - neuromuscular
- Chronic renal failure results in changes in the body _____ that occurs due 11) to a progressive decrease in the number f functioning nephrons.
 - a) CSF blood b)
 - c) fluids d) hormones
- 12) The overall performance of dialyzer can be compared in terms of their clearance of .
 - a) dialysate b) urea
 - c) creatnin d) sodium chloride
- Ultrafilteration monitor is used to monitor the amount of fluid removed from 13) the patient with _____ pressure.
 - a) negative b) positive
 - c) partial volume d)
- 14) For pacemaker implant a bipolar or unipolar catheter electrode is inserted through the _____ into right ventricle.
 - a) aortic vein
 - cephalic vein C) d)
- b) pulmonary vein
 - pulmonary artery

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

No.

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering BIOMEDICAL INSTRUMENTATION – III : Thursday, 12-12-2019 Max. Marks: 70

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

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

- The overall performance of dialyzer can be compared in terms of their clearance of _____.
 - a) dialysate b) urea
 - c) creatnin d) sodium chloride
- 2) Ultrafilteration monitor is used to monitor the amount of fluid removed from the patient with ______ pressure.
 - a) negative b) positive
 - c) partial d) volume
- 3) 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
- 4) The ______ frequency is independent of the electrical activity of the heart.
 - a) resonanceb) impulsec) variabled) rhythmic
- 5) Rate responsive pacemakers have _____ that automatically adjust to changes in person's physical activity.
 - a) transducers b) microchips
 - c) sensors d) power source
- 6) In a defibrillator an enormous voltage of _____ is initially applied to the patient.
 - a) 400V b) 4000V c) 1400V d) 140 KV
- 7) The energy delivered to the patient from defibrillator is only _____ % of total stored energy.

a)	70	b)	71
C)	50	d)	65

8)	Electrode gels are usually employed to reduce contact of the				
	interface of the skin.				
	a) canacitanco	b)	rocictopoo		

a) capacitanceb) resistancec) impedanced) inductance

Set R

			5LR-FIVI-497
			Set R
9)	Short wave diathermy machine con patient circuit. a) power supply c) tuning circuit	sists b) d)	of 2 main circuits and oscillating circuit power tube circuit
10)	The rheobase is the minimum response to stimulus. a) frequency c) phase	of b) d)	current that will produce intensity vector
11)	Galvanic current is preliminarily use a) atonic paralysis c) muscle weakness	ed for b) d)	the treatment of severe paralysis hyperemia
12)	The pattern of tissue is affe a) cell fluid heating c) electrolytes heating	cted b) d)	by shortwave diathermy delivery. tissue heating cell distraction
13)	Accommodation is the property of a less strongly to a slowly increasing a) cellular c) nerve	curre b) d)	unit of being able to respond nt impulse. cardiac neuromuscular
14)	Chronic renal failure results in char to a progressive decrease in the nu a) CSF c) fluids	nges i mber b) d)	n the body that occurs due f functioning nephrons. blood hormones

.

.

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

d)	vector	
rily used for t b) d)	the treatment of severe paralysis hyperemia	
is affected b b) d)	by shortwave diathermy deliver tissue heating cell distraction	у.
rty of a asing currer b) d)	unit of being able to respon nt impulse. cardiac neuromuscular	d
		Page 10 of 12

Set B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

BIOMEDICAL INSTRUMENTATION – III Day & Date: Thursday, 12-12-2019 Time: 02:30 PM To 05:30 PM

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

Bio-Medical Engineering

2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Seat

No.

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

In a defibrillator an enormous voltage of _____ is initially applied to the 1) 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
- Electrode gels are usually employed to reduce contact _____ of the 3) interface of the skin.
 - a) capacitance b) resistance
 - c) impedance d) inductance
- 4) 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
- The rheobase is the minimum of current that will produce 5) response to stimulus.
 - a) frequency b) intensity
 - c) phase

Galvanic current is preliminar 6)

- a) atonic paralysis
 - c) muscle weakness
- 7) The pattern of tissue _____
 - a) cell fluid heating c) electrolytes heating
- Accommodation is the proper 8) less strongly to a slowly incre
 - a) cellular c) nerve

SLR-FM-497



Marks: 14

- d) 65
- 140 KV

SL	_R-FM-4	497
	Set	S

- 9) Chronic renal failure results in changes in the body _____ that occurs due to a progressive decrease in the number f functioning nephrons.
 - a) CSF b) blood
 - c) fluids d) hormones
- 10) The overall performance of dialyzer can be compared in terms of their clearance of _____.
 - a) dialysate b)
 - c) creatnin d) sodium chloride
- 11) Ultrafilteration monitor is used to monitor the amount of fluid removed from the patient with _____ pressure.
 - a) negative b) positive
 - c) partial d) volume
- 12) 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
- 13) The _____ frequency is independent of the electrical activity of the heart.
 - a) resonance b)
 - c) variable d) rhythmic
- 14) Rate responsive pacemakers have _____ that automatically adjust to changes in person's physical activity.
 - a) transducers

sensors

c)

b) microchips

impulse

urea

d) power source

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

16

12

12

Set No. B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering** PRINCIPLES OF IMAGE PROCESSING Day & Date: Saturday, 14-12-2019 Max. Marks: 70 Time: 02:30 PM To 05:30 PM **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 Image can be blurred using _ 1) a) Low pass filter b) Contouring Erosion d) High pass filter c) 2) For line detection we use mask that is Gaussian b) Laplacian a) Ideal d) **Butterworth** c) 3) Image having gradient pixels is called Sharp image Blur image a) b) Gradient image c) d) Binary image 4) For noise reduction we use ____ Image smoothing b) Image contouring a) Image enhancement Image recognition c) d) 5) Computation of derivatives in segmentation is also called Frequency filtering a) Spatial filtering b) c) Low pass filtering d) High pass filtering Blurring attenuate the _____. 6) a) Pixels b) Points c) Cross gradient Intensity d) Sobel is better than prewitt in image 7) a) sharpening b) blurring c) smoothing contrast d) 8) Pixels where intensity changes abruptly are called _ a) area pixels b) line pixels c) point pixels d) edge pixels 9) Example of discontinuity approach in image segmentation is _____ edge based segmentation boundary based segmentation a) b) region based segmentation d) Both a and b C) Image segmentation is also based on _ 10) morphology set theory a) b) c)

SLR-FM-498

Seat

Set P

- Log function is also called _____. 11)
 - a) Gaussian
- b) Gray scale image d)
- c) Gradient image
- Mexican hat

_.

_.

- Image intensities are normally ranged to ____ 12)
 - a) [0 1] b) [0 2]
 - [0 255] C) d) [0 256]
- For edge detection we combine gradient with ____ 13)
 - a) sharpening set theory b)
 - c) smoothing d) thresholding

Algorithm stating that boundaries of image are different from background 14) is ____ .

- discontinuity a)
- extraction C)

- b) similarity
- recognition d)

16

12

SLR-FM-498

Page **3** of **12**

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Set P

Max. Marks: 56



12

Seat				Set	Q
	B.E. (Part - I)	(Old) (CGPA) Ex	ami	nation Nov/Dec-2019	
	DDIN	Bio-Medical En	ngin	eering	
Day &	Date: Saturday, 14-12	2-2019		Max. Mark	(s: 70
Time:	02:30 PM To 05:30 PM	N			
Instru	ctions: 1) Q.No.1 is c book. 2) Figures to t	ompulsory and shoul the right indicate full i	ld be mark	solved in first 30 Minutes in ansv s.	ver
	М	CQ/Objective Ty	pe Q	Questions	
Duratio	on: 30 Minutes			. Mark	(s: 14
Q.1 (Choose the correct a Pixels where interaction a) area pixels c) point pixels 	Iternatives from the	e opt otly a b) d)	i ons. re called line pixels edge pixels	14
2	 Example of disco a) edge based c) region base 	ontinuity approach in d segmentation ed segmentation	imag b) d)	ge segmentation is boundary based segmentation Both a and b	
3	 Image segmenta a) morphology c) extraction 	ation is also based or /	n b) d)	 set theory recognition	
2	4) Log function is a a) Gaussian c) Gradient ima	ilso called age	b) d)	Gray scale image Mexican hat	
Ę	5) Image intensities a) [0 1] c) [0 255]	s are normally ranged	d to _ b) d)	[0 2] [0 256]	
6	 For edge detection a) sharpening c) smoothing 	on we combine gradi	ient v b) d)	vith set theory thresholding	
7	7) Algorithm stating	that boundaries of in	mage	e are different from background	
	is a) discontinuit c) extraction	ту	b) d)	similarity recognition	
3	 Image can be blue a) Low pass find c) Erosion 	urred using lter	b) d)	Contouring High pass filter	
g	9) For line detection a) Gaussian c) Ideal	n we use mask that is	s b) d)	 Laplacian Butterworth	
1	10) Image having gra a) Sharp imag c) Gradient im	adient pixels is callec je nage	d)	 Blur image Binary image	

Г

SLR-FM-498

11)	For noise reduction we use a) Image smoothing c) Image enhancement	b) d)	Image contouring Image recognition
12)	Computation of derivatives in segme a) Spatial filtering c) Low pass filtering	entatio b) d)	on is also called Frequency filtering High pass filtering
13)	Blurring attenuate the a) Pixels c) Cross gradient	b) d)	Points Intensity
14)	Sobel is better than prewitt in image a) sharpening c) smoothing	b) d)	 blurring contrast

Set Q

Page 6 of 12

SLR-FM-498

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

1

Max. Marks: 56

12

16

12

Seat No.					Set	R	
B.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering PRINCIPLES OF IMAGE PROCESSING							
Day & Time: (Date: Saturday, 14-1 02:30 PM To 05:30 F	12-2019 PM		Ma	ax. Marks	3: 70	
Instru	ctions: 1) Q.No.1 is book. 2) Figures to	compulsory and shoul	d be nark	solved in first 30 Minutes s.	s in answ	er	
	, <u>,</u>	$\frac{1}{1000}$	10 (Jugstions			
Duratio	on: 30 Minutes				Marks	s: 14	
Q.1 (Choose the correct 1) Computation of a) Spatial filto c) Low pass	alternatives from the derivatives in segmen ering filtering	opt i itatio b) d)	i ons. n is also called Frequency filtering High pass filtering		14	
2	2) Blurring attenua a) Pixels c) Cross grad	ate the dient	b) d)	Points Intensity			
3	 Sobel is better t a) sharpening c) smoothing 	than prewitt in image _	b) d)	 blurring contrast			
Z	 Pixels where in a) area pixels c) point pixels 	tensity changes abrup	tly ar b) d)	e called line pixels edge pixels			
Ę	5) Example of disc a) edge base c) region bas	continuity approach in ed segmentation sed segmentation	imag b) d)	le segmentation is boundary based segme Both a and b	 ntation		
6	6) Image segment a) morpholog c) extraction	ation is also based on Jy	b) d)	 set theory recognition			
7	7) Log function is a) Gaussian c) Gradient in	also called nage	b) d)	Gray scale image Mexican hat			
8	3) Image intensitie a) [0 1] c) [0 255]	es are normally ranged	to _ b) d)	[0 2] [0 256]			
ç	 For edge detect a) sharpening c) smoothing 	tion we combine gradio	ent v b) d)	<i>v</i> ith set theory thresholding			
1	10) Algorithm statin is a) discontinu c) extraction	ig that boundaries of in	nage b) d)	e are different from backg similarity recognition	jround		

Soat

11)	lmag a) c)	ge can be blurred using Low pass filter Erosion	b) d)	Contouring High pass filter
12)	For a) c)	line detection we use mask that Gaussian Ideal	is b) d)	 Laplacian Butterworth
13)	lmag a) c)	ge having gradient pixels is calle Sharp image Gradient image	d b) d)	 Blur image Binary image
14)	For a) c)	noise reduction we use Image smoothing Image enhancement	b) d)	Image contouring Image recognition

Set R
16

12

SLR-FM-498

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

16

Seat No.						Set	S
		B.E. (Part - I) PRIN	(Old) (CGPA) E Bio-Medical E CIPLES OF IMA	Exami Engin AGE F	ination Nov/Dec-20 eering PROCESSING	19	
Day 8 Time:	& Date : 02:3	e: Saturday, 14-12 D PM To 05:30 PM	2-2019 M		I	Max. Marks	s: 70
Instru	uctior	ns: 1) Q.No.1 is c book. 2) Figures to t	ompulsory and sho	ould be	e solved in first 30 Minut	tes in answ	er
Durat	ion: 3	Ninutes	CQ/Objective I	ype (Luestions	Marke	· 14
01	Choc	o the correct o	Itornativas from t	ha ani	liona	Maria	
Q. I	1)	Image segmenta	tion is also based (ne opi on	lions.		14
	- /	a) morphologyc) extraction	/	b) d)	set theory recognition		
	2)	Log function is a a) Gaussian c) Gradient ima	lso called	b) d)	Gray scale image Mexican hat		
	3)	Image intensities a) [0 1] c) [0 255]	are normally rang	ed to _ b) d)	[0 2] [0 256]		
	4)	For edge detection a) sharpening c) smoothing	on we combine gra	dient v b) d)	with set theory thresholding		
	5)	Algorithm stating is a) discontinuit	that boundaries of	f imag b)	e are different from bac similarity	kground	
		c) extraction		d)	recognition		
	6)	Image can be blu a) Low pass fi c) Erosion	urred using Iter	b) d)	Contouring High pass filter		
	7)	For line detection a) Gaussian c) Ideal	n we use mask that	t is b) d)	 Laplacian Butterworth		
	8)	Image having gra a) Sharp imag c) Gradient im	adient pixels is call e lage	ed b) d)	 Blur image Binary image		
	9)	For noise reduct a) Image smo c) Image enha	on we use othing ancement	b) d)	Image contouring Image recognition		
	10)	Computation of c a) Spatial filter c) Low pass fi	derivatives in segm ring Itering	entatio b) d)	on is also called Frequency filtering High pass filtering		

SLR-FM-498 Set S

11) Blurring attenuate the _____.

a)

- a) Pixels
- b) **Points**
- c) Cross gradient d) Intensity
- Sobel is better than prewitt in image 12)
 - a) sharpening b) blurring
 - c) smoothing d) contrast
- 13) Pixels where intensity changes abruptly are called _____
 - line pixels a) area pixels b) edge pixels
 - c) point pixels d)
- Example of discontinuity approach in image segmentation is _____. 14)
 - boundary based segmentation b)

____-

- edge based segmentation region based segmentation C)
- d) Both a and b

16

12

16

12

Seat No.

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

SLR-FM-498

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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.

- 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.

- 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.

	Bio-Medical E HOSPITAL MA	ingineering NAGEMENT	
Day & Dat Time: 02:3	e: Tuesday,17-12-2019 0 PM To 05:30 PM	Μ	ax. Marks: 70
Instructio	ns: 1) Q. No. 1 is compulsory and she book.	ould be solved in first 30 minut	es in answer
	2) Figures to the right indicate ful	l marks.	
-	MCQ/Objective T	ype Questions	
Duration: 3	30 Minutes		Marks: 14
Q.1 Cho	ose the correct alternatives from the Prevention of disease provided by	he options.	14
''	 a) Public health services c) Environmental health services 	b) Personal health service d) None	S
2)	The area required for CSSD depart a) 12-18 sq ft c) 8-25 sq ft	ment of hospital is b) 8-10 sq ft d) 10-15 sq ft	
3)	 Ancillary accomodalation includes _ a) Reception room and registration b) Radiology c) Laundry and waste room d) None 	n of patient	
4)	Microbiology and Heamatology are a) Radiology dept c) ICU dept	the division of b) Pharmacy dept d) Hospital Laboratory	
5)	The temperature range provided in a	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 ac a) Inter personal role c) Informational role	ct as resources allocate b) Leadership role d) Decisional role	
7)	 Which of the following documents u communicate information about patients another head nurse in the next shift a) Kardex record c) Shift report 	ised by the head nurse to ient has sudden hemocharge to ? b) Assignment record d) Incident Report	0

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

SLR-FM-499

Set

Ρ

8) The effective air changer in operation theater the best of the following is High turbulence displacement air flow a) Low turbulence displacement airflow b) c) Mechanical extract of air d) Low to high displacement airflow How is dry sterilization is done _____. 9) a) In autoclave b) In oven c) In magnetic Vibrator d) In hot plate Supportive services of the hospital includes all except. 10) a) Pharmacy Services Laboratory Services b) c) Housekeeping services Laundry services d) Which of the following is best suited for walls and ceiling of Operation 11) Theater? a) Ceramic Tiles **Terrazo Tiles** b) c) Glaze Tiles In situ mosaic finish d) 12) Medical records documents serves as a) A legal documents b) A scientific document c) Both a and b d) None Which of the following comes under clinical service? 13) a) CSSD Medical Record b) c) ICU d) Radiology Pathological waste is the category of 14) a) Type 1 waste b) Type 2 waste

d)

Type 4 waste

c) Type 3 waste

SLR-FM-499

Set

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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 roe 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.

- 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 diasaster management of auxiliary service in hospital.

Q.5 Attempt any two.

- 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

Max. Marks: 56

16

12

12

B.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

Day & Date: Tuesday, 17-12-2019 Time: 02:30 PM To 05:30 PM

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

Bio-Medical Engineering HOSPITAL MANAGEMENT

2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

2)

7)

Seat

No.

Q.1 Choose the correct alternatives from the options.

- The effective air changer in operation theater the best of the following is 1)
 - High turbulence displacement air flow a)
 - Low turbulence displacement airflow b)
 - c) Mechanical extract of air
 - d) Low to high displacement airflow
 - How is dry sterilization is done _ a) In autoclave In oven b)
 - c) In magnetic Vibrator d) In hot plate

Supportive services of the hospital includes all except. 3)

- a) Pharmacy Services Laboratory Services b)
- c) Housekeeping services d) Laundry services
- 4) Which of the following is best suited for walls and ceiling of Operation Theater?
 - a) Ceramic Tiles **Terrazo Tiles** b)
 - c) Glaze Tiles d) In situ mosaic finish

5) Medical records documents serves as

A scientific document a) A legal documents b) c) Both a and b d) None

6) Which of the following comes under clinical service?

- a) CSSD b) Medical Record d) Radiology
- c) ICU Pathological waste is the category of
- Type 1 waste b) Type 2 waste a)
 - Type 3 waste Type 4 waste d) C)

Prevention of disease provided by _ 8)

- a) Public health services b) Personal health services Environmental health services d) None c)
- 9) The area required for CSSD department of hospital is _____. 8-10 sq ft a)
 - 12-18 sq ft b)
 - c) 8-25 sq ft 10-15 sq ft d)





Max. Marks: 70

Marks: 14

- 10) Ancillary accomodalation 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 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

13) In which category the head nurse act as resources allocate _____.

- a) Inter personal role
- b) Leadership role

SLR-FM-499

Set C

- 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

c) Shift report

- b) Assignment record
- d) Incident Report

Page 5 of 12

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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 roe 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.

- 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 diasaster management of auxiliary service in hospital.

Q.5 Attempt any two.

- 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

Max. Marks: 56

16

12

16

Seat No.

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

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

Q.1 Choose the correct alternatives from the options.

- The temperature range provided in the ethylene oxide sterilizers is 1)
 - 49 to 63°C and 30 to 37.8°C a)
 - 4 to 6^oC and 30 to 37.8^oC b)
 - c) 50 to 80°C and 20 to 30.2°C
 - d) None

In which category the head nurse act as resources allocate _____. 2)

- a) Inter personal role b) Leadership role
- c) Informational role d) Decisional role
- Which of the following documents used by the head nurse to 3) communicate information about patient has sudden hemocharge to another head nurse in the next shift?
 - Kardex record b) Assignment record a)
 - c) Shift report d) Incident Report
- 4) The effective air changer in operation theater the best of the following is
 - High turbulence displacement air flow a)
 - b) Low turbulence displacement airflow
 - Mechanical extract of air c)
 - d) Low to high displacement airflow
- 5) How is dry sterilization is done
 - In autoclave a) b) In oven
 - In magnetic Vibrator c) d) In hot plate
- Supportive services of the hospital includes all except. 6)
 - a) Pharmacy Services b) Laboratory Services c)
 - Housekeeping services d) Laundry services
- Which of the following is best suited for walls and ceiling of Operation 7) Theater?
 - **Terrazo Tiles** b)
 - c) Glaze Tiles In situ mosaic finish d)
- Medical records documents serves as _____ 8)
 - A legal documents a) c) Both a and b

a) Ceramic Tiles

- A scientific document b)
- d) None

Max. Marks: 70

Marks: 14

14

SLR-FM-499

Set

R



- 11) Prevention of disease provided by _
 - a) Public health services b) Personal health services
 - c) Environmental health services d) None
- The area required for CSSD department of hospital is _____. 12)
 - a) 12-18 sq ft 8-10 sq ft b)
 - c) 8-25 sq ft d) 10-15 sq ft
- 13) Ancillary accomodalation includes
 - a) Reception room and registration of patient
 - b) Radiology

a) CSSD

a) Type 1 waste

c) Type 3 waste

c) ICU

9)

10)

- Laundry and waste room c)
- d) None

C)

- 14) Microbiology and Heamatology are the division of _____
 - Radiology dept a)

- Pharmacy dept b)
- ICU dept
- d) Hospital Laboratory

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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 roe 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.

- 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 diasaster management of auxiliary service in hospital.

Q.5 Attempt any two.

- 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

Max. Marks: 56

16

16

12

110.					
		B.E. (Part – I) (Old) (C Bio-Me HOSPIT	GPA) Exami edical Engine AL MANAGI	nation Nov/Dec-20 eering EMENT	19
Day & Time	& Date : 02:30	: Tuesday,17-12-2019) PM To 05:30 PM		ſ	Max. Marks: 70
Instr	uction	s: 1) Q. No. 1 is compulsor book.	y and should b	e solved in first 30 minu	utes in answer
		2) Figures to the right in	dicate full mark	S.	
_		MCQ/Obje	ctive Type C	luestions	
Dura	tion: 3) Minutes		_	Marks: 14
Q.1	Choc 1)	 se the correct alternative Supportive services of the a) Pharmacy Services c) Housekeeping service 	s from the opt hospital include b) s d)	ions. es all except. Laboratory Services Laundry services	14
	2)	Which of the following is beTheater?a) Ceramic Tilesc) Glaze Tiles	est suited for wa b) d)	alls and ceiling of Opera Terrazo Tiles In situ mosaic finish	ation
	3)	Medical records document a) A legal documents c) Both a and b	s serves as b) d)	 A scientific document None	
	4)	Which of the following com a) CSSD c) ICU	ies under clinica b) d)	al service? Medical Record Radiology	
	5)	Pathological waste is the c a) Type 1 waste c) Type 3 waste	ategory of b) d)	 Type 2 waste Type 4 waste	
	6)	Prevention of disease prova) Public health servicesc) Environmental health services	ided by b) services d)	Personal health servic None	es
	7)	The area required for CSS a) 12-18 sq ft c) 8-25 sq ft	D department c b) d)	f hospital is 8-10 sq ft 10-15 sq ft	
	8)	 Ancillary accomodalation in a) Reception room and response b) Radiology c) Laundry and waste root d) None 	ncludes egistration of pa om	tient	
	9)	Microbiology and Heamato a) Radiology dept c) ICU dept	llogy are the div b) d)	rision of Pharmacy dept Hospital Laboratory	

Seat No.

Set S

- 10) The temperature range provided in the ethylene oxide sterilizers is
 - \overline{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

11) In which category the head nurse act as resources allocate _____.

- a) Inter personal role
- b) Leadership role
- c) Informational role d) Decisional role
- 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?
 - a) Kardex record
- 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
- In magnetic Vibrator
- d) In hot plate

Set S

SLR-FM-499

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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.

- 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 roe 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.

- 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 diasaster management of auxiliary service in hospital.

Q.5 Attempt any two.

- 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

Max. Marks: 56

12

16

16

Seat No.

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

Duration: 30 Minutes

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

14 Q.1 Choose the correct answer. The 'filter' in filtered back projection refers to _____. 1) Bowtie filter between the beam and patient a) Conversion between attenuation and Hounsfield units b) Conversion between fan-beam and parallel geometry c) d) Fix for the blurring inherent to backprojection 2) The main advantage of iterative reconstruction techniques versus filtered backprojection is Better depiction of bone detail a) Does not require specification of reconstruction kernel or filter b) Better handling of noisy images C) d) Faster reconstruction 3) Decreasing kV in CT is advantageous because _____. X-ray penetration improves a) **Tissue contrast improves** b) Scan times are reduced c) d) Metal streak artifacts are improved 4) In the presence of a uniform magnetic field, hydrogen protons _____. Line up along the field and rotate around its axis a) Line up along the field and precess around its axis b) Remain oriented mostly randomly and precess around the field axis c) Are not affected by the magnetic field d) A spin echo is formed by __ 5) Reversing the direction of BO a) Flipping proton direction by a radiofrequency pulse b) Applying a negative magnetic field gradient c) d) none of above 6) Spatial localization in MRI primarily relies on . Distance to the receiving coil a) Distance from the transmission coil b) c) Varying magnetic field across the patient Tomographic reconstruction d) 7) If a signal is undersampled, aliasing will result and cause ____ Amplitude misregistration b) Frequency misregistration a)

- c) Phase misregistration
- d) Poor resolution

Set F

Max. Marks: 70

Marks: 14

				Set P
8)	In N a) c)	/IR imaging, matrix size determin Field of view Resolution	es _ b) d)	 Aliasing Bandwidth
9)	SNI a) c)	R in MRI is improved by increasi Resolution Gradient strength	ng b) d)	Bandwidth Acquisition time
10)	The reco a) c)	MR imaging parameter that deter overy is allowed to occur is the _ TR Bandwidth	ermi b) d)	nes how much T1 (longitudinal) None of these number of excitation
11)	Pro a) c)	tons in different molecules differ T1 Gyromagnetic ratio	in al b) d)	l of the following ways except T2 Precession frequency
12)	Tur a) c)	ns ratio for a C.T. is n = Np/Ns n = 1/Np	b) d)	n = Ns/Np n = Ns
13)	rooi a) c)	of the following substances a m for radiation shielding. Tungsten Lead	re us b) d)	sed to coat the walls of a CT scan Glass Iron
14)	The a)	windings of a C.T. are tied together	b)	Shorted

a) tied togetherb) Shortedc) wound over one anotherd) grounded

SLR-FM-500

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt Any Four

- 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

- 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

- 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

- 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.

12

16

Max. Marks: 56

16

Set

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

Seat

No.

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

Dura	uration: 30 Minutes Marks: 14				
Q.1	Choo 1)	ose t In M a) c)	he correct answer. IR imaging, matrix size determin Field of view Resolution	es _ b) d)	 Aliasing Bandwidth
	2)	SNI a) c)	R in MRI is improved by increasi Resolution Gradient strength	ng _ b) d)	Bandwidth Acquisition time
	3)	The reco a) c)	MR imaging parameter that deter overy is allowed to occur is the _ TR Bandwidth	ermi b) d)	nes how much T1 (longitudinal) None of these number of excitation
	4)	Pro a) c)	tons in different molecules differ T1 Gyromagnetic ratio	in al b) d)	l of the following ways except T2 Precession frequency
	5)	Turi a) c)	ns ratio for a C.T. is n = Np/Ns n = 1/Np	b) d)	n = Ns/Np n = Ns
	6)	rooi a) c)	of the following substances a n for radiation shielding. Tungsten Lead	re u: b) d)	sed to coat the walls of a CT scan Glass Iron
	7)	The a) c)	windings of a C.T. are tied together wound over one another	b) d)	Shorted grounded
	8)	The a) b) c) d)	filter' in filtered back projection Bowtie filter between the beam Conversion between attenuation Conversion between fan-beam Fix for the blurring inherent to b	refe and n an and ackp	rs to patient d Hounsfield units parallel geometry projection

Max. Marks: 70

Q

SLR-FM-500



- 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.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt Any Four

- 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

- 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

- 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

- 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.

12

16

Max. Marks: 56

12

Seat No.

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

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

Dura	Duration: 30 Minutes				Marks:	14	
Q.1	Choo 1)	A sp a) b) c) d)	he correct answer. bin echo is formed by Reversing the direction of BO Flipping proton direction by a ra Applying a negative magnetic fi none of above	idiofi eld ç	requency pulse gradient	14	
	2)	Spa a) b) c) d)	atial localization in MRI primarily relies on Distance to the receiving coil Distance from the transmission coil Varying magnetic field across the patient Tomographic reconstruction				
	3)	lf a a) c)	signal is undersampled, aliasing Amplitude misregistration Phase misregistration	will b) d)	result and cause Frequency misregistration Poor resolution		
	4)	In № a) c)	IR imaging, matrix size determin Field of view Resolution	es _ b) d)	Aliasing Bandwidth		
	5)	SNF a) c)	R in MRI is improved by increasi Resolution Gradient strength	ng _ b) d)	Bandwidth Acquisition time		
	6)	The reco a) c)	MR imaging parameter that det overy is allowed to occur is the _ TR Bandwidth	ermi b) d)	nes how much T1 (longitudinal) None of these number of excitation		
	7)	Pro a) c)	tons in different molecules differ T1 Gyromagnetic ratio	in al b) d)	I of the following ways except T2 Precession frequency		
	8)	Turi a) c)	ns ratio for a C.T. is n = Np/Ns n = 1/Np	b) d)	n = Ns/Np n = Ns		
	9)	roor a) c)	of the following substances a n for radiation shielding. Tungsten Lead	re u: b) d)	sed to coat the walls of a CT scan Glass Iron		

Max. Marks: 70

Set R

- 10) The windings of a C.T. are _____.
 - a) tied together

b) Shorted

SLR-FM-500

Set

- c) wound over one another d) grounded
- 11) 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
- 12) 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
- 13) 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
- 14) 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

Seat No. B.E. (Part – II) (CGPA) Ex

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt Any Four

- 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

- 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

- 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

- 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.

12

16

Max. Marks: 56

16

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

Duration: 30 Minutes

Seat No.

Q.1

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

- Choose the correct answer. The MR imaging parameter that determines how much T1 (longitudinal) 1) recovery is allowed to occur is the
 - a) TR c) Bandwidth
- b) None of these d) number of excitation

2) Protons in different molecules differ in all of the following ways except _____.

- T1 b) T2 a) d) Precession frequency
- c) Gyromagnetic ratio
- Turns ratio for a C.T. is _____. 3)
 - a) n = Np/Nsb) n = Ns/Np
 - c) n = 1/Npd) n = Ns
- 4) of the following substances are used to coat the walls of a CT scan room for radiation shielding.
 - b) Glass a) Tungsten d) Iron
 - c) Lead
- The windings of a C.T. are ____ 5)
 - a) tied together wound over one another c)
- b) Shorted
- d) Grounded
- 6) The 'filter' in filtered back projection refers to _____
 - Bowtie filter between the beam and patient a)
 - Conversion between attenuation and Hounsfield units b)
 - Conversion between fan-beam and parallel geometry C)
 - d) Fix for the blurring inherent to backprojection
- The main advantage of iterative reconstruction techniques versus filtered 7) 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 _____.
 - X-ray penetration improves a)
 - Tissue contrast improves b)
 - Scan times are reduced c)
 - Metal streak artifacts are improved d)

Marks: 14

Max. Marks: 70



- 9) 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
- 10) 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
- 11) 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
- 12) If a signal is undersampled, aliasing will result and cause ____
 - a) Amplitude misregistration
- b) Frequency misregistrationd) Poor resolution
- c) Phase misregistration d) P
 - , ,
- 13) In MR imaging, matrix size determines ____
 - a) Field of view b) Aliasing
 - c) Resolution d) Bandwidth
- 14) SNR in MRI is improved by increasing _
 - a) Resolution

- b) Bandwidth
- c) Gradient strength
- d) Acquisition time

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt Any Four

- 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

- 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

- 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

- 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.

12

16

Max. Marks: 56

16

Seat No.						Set	Ρ
	E	B.E. (Part	-II) (CGPA) Exa Bio-Medical I TION, MAINTEN	amina Engir NANC	ation Nov/Dec-2019 neering CE AND SERVICING		
Day & I Time: 0	Date: Sat)2.30 PM	turday,23-11 To 05.30 P	-2019 M		Ma>	. Marks	s: 70
Instruc	tions: 1)	Q. No. 1 is book.	compulsory and sl	nould l	be solved in first 30 minutes	; in ans	wer
	۷,				ns.		
Duratio	n: 30 Mir	nutes	CQ/Objective	уре	Questions	Mark	s: 14
Q.1 C	Choose ti entence	he correct a	alternatives from	the op	tions and rewrite the		14
1) Pho a) c)	nocardiogra Arm muscle Heart sound	phy is listening to _ sound	b) d)	Lung sound Respirating tract sound		
2	2) Tota a) c)	al productive Less idle tin Zero down t	maintenance aims ne ime	s at b) d)	Increase in productivity		
3	6) Equ a) b) c) d)	ipment histo The way eq Total down The rate at All the abov	ry cards are mean uipment behaves time of the equipm which different con e	s to re ent npone	cord nts wear off		
4) AM(a) b) c) d)	C stands for Annual Mac Annual Main Atomic Mas Autonomou	 hine Calibration htenance Contract s Calibration s Machine Calibrat	ion			
5	5) Wha proc a) (c) 2	at is the thick cedures? 0.25 mm 25 mm	ness of the lead ja	b) d)	hat is maintained for X-ray 2.5 mm 250 mm		
6	i) The a) c)	following is Corrective r Scheduled r	not a classification naintenance maintenance	of ma b) d)	iintenance Timely maintenance Preventive maintenance		
7	r) Wha a) c)	at color code Red Black	is used for a pers	on suf b) d)	fering from cardiac arrest? Blue Green		
8	6) Whi a) c)	ch authority NABH CBI	sets the standards	for ho b) d)	ospitals in India? NBRI DRDO		

Seat

9) 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
- 10) _____ are routinely used for the measurement of Lithium, Sodium and Potassium in body.
 - a) Spectrophotometer

11)

b) Colorimeterd) Centrifuge

SLR-FM-501

Set

- c) Flame photometer d)
- In ICU room should be at least _____ sq. feet with free movable space.
- a) 120 b) 100
- c) 200 d) 240
- 12) 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
- 13) Glass electrodes are suitable for measurement in the range of P^H_____.
 - a) 0-110 b) 11-100
 - c) 0-11 d) None
- 14) 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

Seat	
No.	

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

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.

- 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.

- 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.

- 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 deprt.

Q.5 Attempt any two of the following questions.

- 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.

Max. Marks: 56

16

12

16

						SLR-FM-501
Seat No.						Set Q
			B.E. (Part ·	II) (CGPA) Exa Bio-Medical E	mina Ingir	ation Nov/Dec-2019 neering
		I	NSTALLA ⁻	FION, MAINTEN	ANC	E AND SERVICING
Day & Time:	Date 02.30	: Sa) PM	turday,23-11 1 To 05.30 PI	-2019 ⁄I		Max. Marks: 70
Instru	ction	1 s: 1) Q. No. 1 is book.) Figures to t	compulsory and sh he right indicate ful	ould k II mari	be solved in first 30 minutes in answer
			, o M	CQ/Objective T	vpe	Questions
Durati	on: 3(0 Mi	nutes	,	1	Marks: 14
Q.1	Choo	ose t	he correct a	Iternatives from t	he op	tions and rewrite the 14
	1)	Wh a) c)	:. ich authority NABH CBI	sets the standards	for ho b) d)	ospitals in India? NBRI DRDO
:	2)	Wh X-ra a) c)	at should be ay with the he 0.5m 50m	the minimum distar elp of a portable X-ı	nce m ray? b) d)	aintained when performing an 5.0m 500m
:	3)	Pota) c)	are routin assium in bo Spectrophot Flame photo	ely used for the me dy. ometer ometer	easure b) d)	ement of Lithium, Sodium and Colorimeter Centrifuge
	4)	In I(a) c)	CU room sho 120 200	uld be at least	sq b) d)	. feet with free movable space. 100 240
:	5)	Wh a) c)	at is the valu 1 to 10V 0.4 to 4V	e of gap voltage ma	aintair b) d)	ned in ECG? 4 to 40V 14 to 400V
	6)	Gla a) c)	ss electrodes 0-110 0-11	s are suitable for mo	easur b) d)	ement in the range of P ^H 11-100 None
-	7)	The a) b) c) d)	e goal in desig To provide a To provide a To provide t All above	gning medical gas a a safe system a sufficient flow of g he required pressu	and va as or re	acuum system is vacuum
:	8)	Pho a) c)	onocardiogra Arm muscle Heart sounc	ohy is listening to _ sound	b) d)	Lung sound Respirating tract sound

Set Q

- 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?
 - a) Red

b) Blue d) Green

c) Black

) Greer

Seat	
No.	

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

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.

- 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.

- 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.

- 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 deprt.

Q.5 Attempt any two of the following questions.

- 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.

Max. Marks: 56

16

16

12

		Bio-Medica	l Engi	neering	
		INSTALLATION, MAINTI	ENAN(CE AND SERVICING	
Day Time	& Date : 02.3	e: Saturday,23-11-2019 0 PM To 05.30 PM		Ma	ax. Marks: 70
Instr	ructio	ns: 1) Q. No. 1 is compulsory and book.	should	be solved in first 30 minute	es in answer
		2) Figures to the right indicate	full mar	′ks.	
		MCQ/Objective	е Туре	Questions	
Dura	ation: 3	30 Minutes			Marks: 14
Q.1	Cho	ose the correct alternatives from	n the op	ptions and rewrite the	14
	3em 1)	What is the thickness of the lead procedures?	l jacket t	hat is maintained for X-ray	,
		a) 0.25 mm c) 25 mm	b) d)	2.5 mm 250 mm	
	2)	The following is not a classification a) Corrective maintenance c) Scheduled maintenance	on of ma b) d)	aintenance Timely maintenance Preventive maintenance	
	3)	What color code is used for a pe a) Red c) Black	rson suf b) d)	ffering from cardiac arrest? Blue Green	•
	4)	Which authority sets the standar a) NABH c) CBI	ds for ho b) d)	ospitals in India? NBRI DRDO	
	5)	What should be the minimum dis X-ray with the help of a portable a) 0.5m	stance m X-ray? b)	5.0m	g an
		c) 50m	d)	500m	
	6)	 are routinely used for the Potassium in body. a) Spectrophotometer c) Flame photometer 	measur b) d)	ement of Lithium, Sodium Colorimeter Centrifuge	and
	7)	In ICU room should be at least _ a) 120 c) 200	sc b) d)	i. feet with free movable sp 100 240	oace.
	8)	What is the value of gap voltage a) 1 to 10V c) 0.4 to 4V	maintai b) d)	ned in ECG? 4 to 40V 14 to 400V	
	9)	Glass electrodes are suitable for a) 0-110 c) 0-11	r measui b) d)	rement in the range of P ^H _ 11-100 None	·

B.E. (Part -II) (CGPA) Examination Nov/Dec-2019

Set R

4

- - 4

c) 0-11

10) 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

c) Heart sound

11) Phonocardiography is listening to _____

- a) Arm muscle sound
- b) Lung soundd) Respirating tract sound

SLR-FM-501

Set R

- 12) Total productive maintenance aims at _____
 - a) Less idle time b) Increase in productivity
 - c) Zero down time d) None
- 13) 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
- 14) AMC stands for ____.
 - a) Annual Machine Calibration
 - b) Annual Maintenance Contract
 - c) Atomic Mass Calibration
 - d) Autonomous Machine Calibration
| Seat | |
|------|--|
| No. | |

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

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.

- 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.

- 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.

- 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 deprt.

Q.5 Attempt any two of the following questions.

- 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.

Max. Marks: 56

R

16

12

16

Seat						Set	S
No.							•
		B.E. (Part	-II) (CGPA) Exa Bio-Medical E	mina Engir	ation Nov/Dec-2019 Deering		
		INSTALLA	TION, MAINTEN	IANC	E AND SERVICING		
Day & Time: (Date: \$ 02.30 F	aturday,23-1 M To 05.30 P	1-2019 M		Ma	ax. Marks	s: 70
Instruc	ctions:	1) Q. No. 1 is book.	compulsory and sh	iould l	be solved in first 30 minute	es in ans	wer
		2) Figures to	the right indicate fu	ll mar	ks.		
Duratio	on: 30 N	N /inutes	ICQ/Objective T	уре	Questions	Marks	s: 14
Q.1 (Choose	the correct	alternatives from t	he op	tions and rewrite the	marra	14
S	senten	ce.	ally used for the mo	•	mont of Lithium Sodium	and	
I	P	are routin	ody.	asure		anu	
	a) c)	Spectropho Flame phot	otometer ometer	b) d)	Colorimeter Centrifuge		
2	2) In	ICU room she	ould be at least	sq	. feet with free movable sp	ace.	
	a) C)	200		(d (b	240		
3	B) W	hat is the valu	ie of gap voltage ma	aintair	ned in ECG?		
	a) c)	1 to 10V 0.4 to 4V		d) d)	4 to 40V 14 to 400V		
4	l) G	lass electrode	s are suitable for m	easur	ement in the range of P^{H}_{-}		
	a) c)	0-110 0-11		b) d)	11-100 None		
5	5) TI	ne goal in des	igning medical gas	and v	acuum system is		
	a) b)	To provide To provide	a safe system a sufficient flow of c	as or	vacuum		
	(C)	To provide	the required pressu	re			
F	a) S) P	All above	anhy is listening to				
C	,, a)	Arm muscle	e sound	 b)	Lung sound		
7	С) л т	Heart soun	a Marintananaa aima	a) ot	Respirating tract sound		
1) i	Less idle tir	ne	b)	Increase in productivity		
	c)	Zero down	time	d)	None		
8	3) E a)	quipment histo The wav ec	ory cards are means juipment behaves	s to re	cord		
	b)	Total down	time of the equipme	ent	ata waar off		
	C)	The fale at	which different com	pone	nis wear on		

d) All the above

SLR-FM-501

- 9) AMC stands for _____.
 - a) Annual Machine Calibration
 - b) Annual Maintenance Contract
 - c) Atomic Mass Calibration
 - d) Autonomous Machine Calibration
- 10) 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
- 11) The following is not a classification of maintenance____
 - a) Corrective maintenance b)
 - Timely maintenance

Set S

- c) Scheduled maintenance d) Preventive maintenance
- 12) What color code is used for a person suffering from cardiac arrest?
 - a) Red b) Blue
 - c) Black d) Green
- 13) Which authority sets the standards for hospitals in India?
 - a) NABH b) NBRI
 - c) CBI d) DRDO
- 14) 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

Page **11** of **12**

Set S

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

Seat

No.

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.

- 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.

- 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.

- 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 deprt.

Q.5 Attempt any two of the following questions.

- 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.

Max. Marks: 56

12

16

12

Seat	
No.	

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

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

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

- Which micromachining process would be most likely used to construct 1) high aspect ratio micro channels and chambers within a silicon or glass substrate.
 - b) Surface a) Bulk
 - c) PMMA

- d) LIGA
- 2) Silicon dioxide is thin film used in many application. This film is used for which of the following layer.
 - Structural and piezoresistive layer a)
 - Sacrificial and masking layer b)
 - Masking and piezoresistive layer c)
 - d) Electrical and environmental isolation
- 3) The popular method of designating crystal planes and orientations is Czochralski

 - Etching c)

a)

- Lithography is used for _____. 4)
 - a) Farming resist layers on the substrate
 - b) Cutting tool
 - Farming electric bonds c)
 - d) None

5) Which of the following material are expensive for the fabrication technique?

- a) Silicon b) Glass d) Both a and b
- c) Polymer
- 6) Synchrotron radiation is to LIGA
 - a) Electromagnetic radiation
 - c) Ultraviolet light
- b) Microwave
- d) Infrared light

___is to bulk and surface micromachining.

- PCR stands 7)
 - a) Polymerase chain reaction
 - Polymer Chain Repeater b)
 - **Polynucleotide Chain Reaction** C)
 - d) None

- b) Miller Indices
- d) LIGA

Max. Marks: 70

Set

Marks: 14

- 8) Micro valves typically operate _____and have a _____operational life time than micro scale valve.
 - a) Slower, Shorter c) Faster, Longer

a)

a)

- b) Faster, Shorter
- d) Slower, Longer
- 9) Which of the following is an example of drug delivery micro system? Antibiotic administration
 - b) Pain medication
 - d) None C) Both a and b
- Si (Solid) + O2 (gas) \rightarrow SiO2(Solid) In which deposition process does this 10) reaction occurs.
 - a) Silicon Nitride CVD
 - b) Wet Oxidation of Silicon Dioxide
 - c) Dry Oxidation of Silicon Dioxide
 - d) Spin-on of photoresists
- The optical sensors is based on _____principle. 11)
 - b) piezoelectric effect Quantum efficiency
 - 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
 - c) Both a and b
- b) Whole genome
- d) None
- Micro bio sensors are based on ____ 13) a) lons 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
 - 0.1 0.2 Wc)

- b) 0.1 to 0.2 W
- d) None





Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Answer any Four.

- Discuss the steps involve in fabrication of MEMS. a)
- Explain the annealing process. b)
- Explain the process of chemical vapor deposition (CVD) with necessary c) dia.
- What is LIGA? Explain its major fabrication steps in detail. d)
- Enlist different types of etching processes and explain any one on detail. e)

Answer Any Two. Q.3

- Explain in detail various material used for fabrication of MEMS devices a) starting their properties and application.
- Explain in detail various processes used for doping in BioMEMS. b)
- c) Explain the following.
 - Imprinting or hot embossing 1)
 - 2) Process of curing

Section – II

Q.4 Answer any Four.

- Draw and explain the elements of Micro Total Analysis Systems (Micro TAS). a)
- Write a note on Nano pattering. b)
- Explain in detail PCR. C)
- List and explain different types packaging technologies used for micro d) system packaging.
- Explain genetic screening. e)

Answer Any Two. Q.5

- Explain in detail Bio sensing principles and sensing methods. a)
- b) Explain in detail physical sensor and its classification.
- Write and explain in detail micro surgical tools and micro needles. c)

12

16

16

12

Max. Marks: 56

SLR-FM-502

Set



No.	
Seat	

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

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

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

b) Faster, Shorter

b) Whole genome

d) None

- Micro valves typically operate and have a operational life 1) time than micro scale valve.
 - Slower. Shorter a)
 - d) Slower, Longer c) Faster, Longer
- Which of the following is an example of drug delivery micro system? 2) b) Pain medication
 - a) Antibiotic administration
 - C) Both a and b
- 3) Si (Solid) + 02 (gas) \rightarrow SiO2(Solid) In which deposition process does this reaction occurs.
 - Silicon Nitride CVD a)
 - Wet Oxidation of Silicon Dioxide b)
 - Dry Oxidation of Silicon Dioxide C)
 - d) Spin-on of photoresists
- 4) The optical sensors is based on principle.
 - a) Quantum efficiency b) piezoelectric effect
 - Both a and b d) None c)
- A micro array is an ordered array of microscopic elements on a planer 5) substrate that allows the specific binding of _____.
 - Gene or gene products a)
 - Both a and b d) None C)
- 6) Micro bio sensors are based on _
 - Ion sensitive field effect transistor a) lons effects b)
 - c) Piezoelectric effect d) Magnetic effect
- The power consumption of micro valve is typically 7)
 - a) 0.1 2.0 W b) 0.1 to 0.2 W d) None
 - 0.1 0.2 WC)
- Which micromachining process would be most likely used to construct 8) high aspect ratio micro channels and chambers within a silicon or glass substrate.

a)	Bulk	b)	Surface
c)	PMMA	d)	LIGA

Max. Marks: 70

Set

Marks: 14

- 9) 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
- 10) The popular method of designating crystal planes and orientations is _____.
 - a) Czochralski
- b) Miller Indices
- c) Etching d) LIGA
- 11) Lithography is used for _____.
 - a) Farming resist layers on the substrate
 - b) Cutting tool
 - c) Farming electric bonds
 - d) None
- 12) Which of the following material are expensive for the fabrication technique?
 - a) Silicon
 - c) Polymer

- b) Glass
- d) Both a and b
- 13) Synchrotron radiation is to LIGA _____is to bulk and surface micromachining.
 - b) Microwave
 - a) Electromagnetic radiationc) Ultraviolet light
- d) Infrared light

- 14) PCR stands _____
 - a) Polymerase chain reaction
 - b) Polymer Chain Repeater
 - c) Polynucleotide Chain Reaction
 - d) None

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Answer any Four.

- 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.

- **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.

- a) Draw and explain the elements of Micro Total Analysis Systems (Micro TAS).
- **b)** Write a note on Nano pattering.
- 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.

- 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.

16

16

12



Max. Marks: 56

SLR-FM-502

Seat	
No.	

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

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

2)

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

- Which of the following material are expensive for the fabrication technique? 1)
 - a) Silicon
 - c) Polymer
 - Synchrotron radiation is to LIGA _____is to bulk and surface micromachining.
 - Electromagnetic radiation a)
 - Ultraviolet light C)
 - 3) PCR stands
 - a) Polymerase chain reaction
 - b) Polymer Chain Repeater
 - c) Polynucleotide Chain Reaction
 - d) None

a)

- 4) Micro valves typically operate _____and have a _____operational life time than micro scale valve.
 - Slower, Shorter a)
 - c) Faster, Longer
 - d) Slower, Longer
- Which of the following is an example of drug delivery micro system? 5) a)
 - b) Pain medication Antibiotic administration d) None
 - C) Both a and b
- 6) Si (Solid) + 02 (gas) \rightarrow SiO2(Solid) In which deposition process does this reaction occurs.
 - a) Silicon Nitride CVD
 - Wet Oxidation of Silicon Dioxide b)
 - Dry Oxidation of Silicon Dioxide c)
 - Spin-on of photoresists d)
- 7) The optical sensors is based on _____principle.
 - Quantum efficiency b) piezoelectric effect
 - Both a and b d) None c)
- A micro array is an ordered array of microscopic elements on a planer 8) substrate that allows the specific binding of _____.
 - Gene or gene products b) Whole genome a)
 - Both a and b d) None c)

Max. Marks: 70

Marks: 14

Set

- b) Glass
- d) Both a and b
- d) Infrared light
- b) Microwave

b) Faster, Shorter

Micro bio sensors are based on _____. 9)

c) Piezoelectric effect

a) lons effects

b) Ion sensitive field effect transistor

SLR-FM-502

Set

- d) Magnetic effect
- The power consumption of micro valve is typically _ 10)
 - a) 0.1 2.0 W b) 0.1 to 0.2 W c) 0.1 – 0.2 W
 - d) None
- 11) 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
 - d) LIGA c) PMMA
- 12) Silicon dioxide is thin film used in many application. This film is used for which of the following layer.
 - Structural and piezoresistive layer a)
 - Sacrificial and masking layer b)
 - Masking and piezoresistive layer c)
 - d) Electrical and environmental isolation
- 13) The popular method of designating crystal planes and orientations is _____.
 - a) Czochralski b) Miller Indices
 - d) LIGA c) Etching
- 14) Lithography is used for _____
 - a) Farming resist layers on the substrate
 - Cutting tool b)
 - Farming electric bonds c)
 - d) None

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Answer any Four.

- 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.

- **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.

- a) Draw and explain the elements of Micro Total Analysis Systems (Micro TAS).
- **b)** Write a note on Nano pattering.
- 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.

- 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.

12

16

12



Max. Marks: 56



Seat No.

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

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

a)

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

- Si (Solid) + 02 (gas) \rightarrow SiO2(Solid) In which deposition process does this 1) reaction occurs.
 - Silicon Nitride CVD a)
 - b) Wet Oxidation of Silicon Dioxide
 - c) Dry Oxidation of Silicon Dioxide
 - Spin-on of photoresists d)
- 2) The optical sensors is based on _____principle.
 - Quantum efficiency b) piezoelectric effect Both a and b d) None
- C) 3) A micro array is an ordered array of microscopic elements on a planer
 - substrate that allows the specific binding of Gene or gene products a)
 - c) Both a and b
 - d) None
- 4) Micro bio sensors are based on
 - a) lons effects Ion sensitive field effect transistor b)
 - c) Piezoelectric effect Magnetic effect d)
- The power consumption of micro valve is typically _ 5)
 - a) 0.1 2.0 W b) 0.1 to 0.2 W
 - 0.1 0.2 Wd) None C)
- Which micromachining process would be most likely used to construct 6) high aspect ratio micro channels and chambers within a silicon or glass substrate.
 - Bulk b) Surface a)
 - d) LIGA C) PMMA
- Silicon dioxide is thin film used in many application. This film is used for 7) which of the following layer.
 - Structural and piezoresistive layer a)
 - Sacrificial and masking layer b)
 - Masking and piezoresistive layer c)
 - Electrical and environmental isolation d)



Max. Marks: 70

Marks: 14

b) Whole genome

Page **11** of **12**

- 8) The popular method of designating crystal planes and orientations is .
 - Czochralski a)

b) Miller Indices d) LIGA

- Etching C)
- Lithography is used for _____. 9)
 - a) Farming resist layers on the substrate
 - Cutting tool b)
 - c) Farming electric bonds
 - d) None

a) Silicon

- 10) Which of the following material are expensive for the fabrication technique?

 - d) Both a and b c) Polymer
- 11) Synchrotron radiation is to LIGA ______is to bulk and surface micromachining. b) Microwave

b) Glass

d) Infrared light

- a) Electromagnetic radiation
- c) Ultraviolet light
- 12) PCR stands .
 - a) Polymerase chain reaction
 - b) Polymer Chain Repeater
 - Polynucleotide Chain Reaction c)
 - None d)
- 13) Micro valves typically operate _____and have a _____operational life time than micro scale valve.
 - a) Slower, Shorter
 - c) Faster, Longer
- 14) Which of the following is an example of drug delivery micro system? b) Pain medication
 - Antibiotic administration a) c) Both a and b
- d) None



SLR-FM-502

- b) Faster, Shorter
- d) Slower, Longer

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Answer any Four.

- 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.

- **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.

- a) Draw and explain the elements of Micro Total Analysis Systems (Micro TAS).
- **b)** Write a note on Nano pattering.
- 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.

- 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.



16

Max. Marks: 56

12

16

Sel S



		E	B.E. (Part – II) (CGPA) I Bio-Medica TISSUE E	Exami al Eng NGINE	na in EE	ntion Nov/Dec-2019 eering RING)
Day & Time:	& Date 02:30	e: Tu D PN	esday, 26-11-2019 1 To 05:30 PM				Max. Marks: 70
Instru	uction	is: 1 2) Q. No. 1 is compulsory and Book.) Figures to the right indicate	d should e full ma	d b ark	e solved in first 30 min s.	utes in answer
			MCQ/Objectiv	е Туре) (Questions	
Durat	ion: 3	0 Mi	nutes				Marks: 14
Q.1	Choc sente 1)	ence A bl a)	he correct alternatives fro a. lastocyte is A very early stage of embry	o m the c vo b)	pt	A type of stem cell	14
	2)	C) The a) C)	human body is composed of Less than 10 ¹³ Less than 100 ¹³	d) of b) d)	_ (Cells Greater than 10 ¹³ Greater than 100 ¹³	
	3)	The dev a) b) c) d)	e embryonic stem cells were elopmental potential. With some subsequent loss Without any subsequent los With some subsequent gair Without any subsequent ga	said to s ss n iin	se	If renew of	
	4)	In a the a) c)	adult erythropoietin is produ kidney. Greater than 90% Equal to 90%	b) d)		_ by specialize intersti Less than 90% None	tial cell in
	5)	The a) c)	e normal human liver contain 10 100 ⁸	is appro b) d)	xir	mately hepatocyt 10 ⁸ 1000 ⁸	es /mL.
	6)	Hyd cap resp a) c)	fraulic pressure as well as th illary bed is at least a pectively. Two times, Three order Two times, Two order	ne hydra and b) d)	ul	ic permeability of the gl of magnitude higher Three times, Two orde None	omerular er
	7)	The a) c)	e was the first solid or Bone Skeletal	gan. b) d)		Kidney Lung	

Seat No.

SLR-FM-503

Set P

a) Stem Adult b) c) Aging d) Stromal 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 None d) Which of the following decreases in length during the contraction of a 12) skeletal muscle? a) A band of the sarcomere I band of the sarcomere b) Thick filaments d) Thin Filaments C) 13) The sarcomeres is the basic unit of Gene therapy a) Contractions b)

- c) Nerve regeneration None d)
- 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
 - c) Calcium

d) Potassium

- 8) Hematopoietic cells have a close structural and functional relationship with _____ cell.
- 9)
- **SLR-FM-503**



- Phosphate b)

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

16

		I	B.E. (Part – II) (CGPA) Exa Bio-Medical E TISSUE ENGI	mina ngin NEE	ition Nov/Dec-2019 eering RING
Day & Time:	& Date : 02:30	e: Tu D PN	esday, 26-11-2019 1 To 05:30 PM		Max. Marks: 70
Instru	uction	is: 1) Q. No. 1 is compulsory and sho Book.	ould b	e solved in first 30 minutes in answer
		2			
Durat	ion: 3	0 Mi	nutes	pe c	Auestions Marks: 14
Q.1	Choo	ose t	the correct alternatives from th	e opt	tions and rewrite the 14
	1)	Her with	matopoietic cells have a close str	uctura	al and functional relationship
		a) c)	Stem Aging	b) d)	Adult Stromal
	2)	The App a) c)	e Cell polymer system can be use blication Liver Bone	ed for b) d)	following tissue engg. Intestine All above
	3)	Res ove a)	storable guidance channels need r 4 to 12 days 4 to 12 Months	to ret	tain their mechanical integrity 4 to 12 weeks
	4)	Wh mol a) c)	ich of the following modes are us lecules to the nerverous system? Slow-release polymer system Both a and b	b) d)	delivery of neuroactive Pumps None
	5)	Wh ske a) c)	ich of the following decreases in letal muscle? A band of the sarcomere Thick filaments	b) d)	n during the contraction of a I band of the sarcomere Thin Filaments
	6)	The a) c)	e sarcomeres is the basic unit of . Contractions Nerve regeneration	b) d)	 Gene therapy None
	7)	The pre a) c)	e reabsorption of which of the foll sence of aldosterone In the dista Sodium Calcium	owing I tubu b) d)	ions is increased by the le of the kidney. Phosphate Potassium
	8)	A b a) c)	lastocyte is A very early stage of embryo Part of the blood system	b) d)	A type of stem cell A type brain cell

Page **4** of **12**

SLR-FM-503

Seat No.

- 4



- 4

			Set	Q
9)	The human body is composed of a) Less than 10 ¹³ c) Less than 100 ¹³	b) d)	cells Greater than 10 ¹³ Greater than 100 ¹³	
10)	 The embryonic stem cells were said developmental potential. a) With some subsequent loss b) Without any subsequent loss c) With some subsequent gain d) Without any subsequent gain 	to se	If renew of	
11)	In adult erythropoietin is produced the kidney.a) Greater than 90%c) Equal to 90%	b) d)	_ by specialize interstitial cell in Less than 90% None	
12)	The normal human liver contains ap a) 10 c) 100 ⁸	proxi b) d)	mately hepatocytes /mL. 10 ⁸ 1000 ⁸	
13)	 Hydraulic pressure as well as the hy capillary bed is at least and respectively. a) Two times, Three order c) Two times, Two order 	draul b) d)	ic permeability of the glomerular of magnitude higher Three times, Two order None	
14)	The was the first solid organ. a) Bone	b)	Kidnev	

a) Boneb) Kidneyc) Skeletald) Lung

SLR-FM-503

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

16

12

16

			B.E. (Part – II) (CGPA) Exa Bio-Medical E TISSUE ENG	imina Engin INEE	ation Nov/Dec-2019 neering ERING	
Day o Time	& Date : 02:3	e: Tu 0 PN	ıesday, 26-11-2019 ∕I To 05:30 PM		Max. Marks:	70
Instr	uctior	ns: 1	I) Q. No. 1 is compulsory and sh Book.	ould b	be solved in first 30 minutes in answe	۶r
		2	Figures to the right indicate fu	ll marl	rks.	
Duro	tion: 0		MCQ/Objective T	ype	Questions	1 /
	Charles		inules	ha an	Marks:	14 14
Q.1	sent	ose ence	the correct alternatives from t	ne op	ptions and rewrite the	14
	1)	The a) c)	e normal human liver contains a 10 100 ⁸	oproxi b) d)	timately hepatocytes /mL. 10 ⁸ 1000 ⁸	
	2)	Hyc cap res a) c)	draulic pressure as well as the h billary bed is at least and pectively. Two times, Three order Two times, Two order	ydrau b) d)	ulic permeability of the glomerular _ of magnitude higher Three times, Two order None	
	3)	The a) c)	e was the first solid organ Bone Skeletal	b) d)	Kidney Lung	
	4)	He witl a) c)	matopoietic cells have a close s h cell. Stem Aging	ructur b) d)	iral and functional relationship Adult Stromal	
	5)	The Apj a) c)	e Cell polymer system can be us plication Liver Bone	ed for b) d)	or following tissue engg. Intestine All above	
	6)	Re ove a) c)	storable guidance channels nee er 4 to 12 days 4 to 12 Months	d to re b) d)	etain their mechanical integrity 4 to 12 weeks None	
	7)	Wh mo a) c)	ich of the following modes are u lecules to the nerverous system Slow-release polymer system Both a and b	sed to ? b) d)	o delivery of neuroactive Pumps None	
	8)	Wh ske a) c)	hich of the following decreases in eletal muscle? A band of the sarcomere Thick filaments	b) d)	th during the contraction of a I band of the sarcomere Thin Filaments	

SLR-FM-503

Set R

					Set	R
9)	The sarcome a) Contract c) Nerve re	eres is the basic unit of <u>-</u> ions generation	b) d)	Gene therapy None		
10)	The reabsorp presence of a) Sodium c) Calcium	otion of which of the follo aldosterone In the dista	owing tubu b) d)	ions is increased by the e of the kidney. Phosphate Potassium		
11)	A blastocyte a) A very e c) Part of th	is arly stage of embryo ne blood system	b) d)	A type of stem cell A type brain cell		
12)	The human b a) Less tha c) Less tha	oody is composed of n 10 ¹³ n 100 ¹³	b) d)	cells Greater than 10 ¹³ Greater than 100 ¹³		
13)	The embryor development a) With son b) Without c) With son d) Without	nic stem cells were said al potential. ne subsequent loss any subsequent loss ne subsequent gain any subsequent gain	to se	f renew of		
14)	In adult erytl the kidney.	nropoietin is produced		by specialize interstitial	cell in	

- a) Greater than 90%

Less than 90% b)

SLR-FM-503

c) Equal to 90%

d) None

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

16

		 2) Figures to the right indicate full 	marl	(S.		
			(00)	Questions		
Dura	tion: 3	0 Minutes	/pe	QUESTIONS	Marks: 1	
Q.1	Choose the correct alternatives from the options and rewrite the					
	1)	Restorable guidance channels need over a) 4 to 12 days c) 4 to 12 Months	to re b) d)	etain their mechanical integri 4 to 12 weeks None	ty	
	2)	Which of the following modes are us molecules to the nerverous system?a) Slow-release polymer systemc) Both a and b	sed to b) d)	o delivery of neuroactive Pumps None		
	3)	Which of the following decreases in skeletal muscle?a) A band of the sarcomerec) Thick filaments	lengt b) d)	h during the contraction of a I band of the sarcomere Thin Filaments		
	4)	The sarcomeres is the basic unit of _ a) Contractions c) Nerve regeneration	b) d)	 Gene therapy None		
	5)	The reabsorption of which of the follo presence of aldosterone In the dista a) Sodium c) Calcium	owing I tubu b) d)	g ions is increased by the ile of the kidney. Phosphate Potassium		
	6)	A blastocyte is a) A very early stage of embryo c) Part of the blood system	b) d)	A type of stem cell A type brain cell		
	7)	The human body is composed of a) Less than 10 ¹³ c) Less than 100 ¹³	b) d)	cells Greater than 10 ¹³ Greater than 100 ¹³		

The embryonic stem cells were said to self renew _____ of

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

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

8)

developmental potential.

a) With some subsequent loss b) Without any subsequent loss c) With some subsequent gain d) Without any subsequent gain

Seat

No.

SLR-FM-503

Set

Max. Marks: 70

S

4

			SLR-FM-503		
			Set S		
9)	In adult erythropoietin is produced the kidney.		_ by specialize interstitial cell in		
	c) Equal to 90%	d)	None		
10)	The normal human liver contains ap a) 10 c) 100 ⁸	proxii b) d)	mately hepatocytes /mL. 10 ⁸ 1000 ⁸		
11)	Hydraulic pressure as well as the hy capillary bed is at least and _ respectively. a) Two times, Three order	b)	ic permeability of the glomerular of magnitude higher Three times, Two order		
12)	The was the first solid organ	u)	None		
12)	a) Bonec) Skeletal	b) d)	Kidney Lung		
13)	Hematopoietic cells have a close str with cell.	uctur	al and functional relationship		
	a) Stem c) Aging	b) d)	Adult Stromal		
14)	The Cell polymer system can be used for following tissue enga				

- 14) Application a) Liver c) Bone igg. **y** g
 - b) d)

Intestine

All above

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

16

12

16

(d)	2
t	c)	-t cost
C	d)	$t \sin t$
		12
	b)	$\frac{-d^2}{ds^2}[f(s)]$
	d)	$\frac{d^2}{ds^2}[f(s)]$

MCQ/Objective Type Questions Duration: 30 Minutes

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

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

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering ENGINEERING MATHEMATICS – III**

The period of |*sinx*| is _____. a) 0 b)

2) Figures to right indicate full marks.

Seat

Day & Date: Saturday, 07-12-2019

book.

Time: 10:00 AM To 01:00 PM

No.

2π None c) π d)

2) 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
- If $f(x) = x^2$ in $(-\pi, \pi)$, then Fourier series of f(x) contains _____. 3)
 - a) Only sine terms b) Only cosine terms
 - c) Both sine and cosine terms

Fourier Expansion of an even function in the range $(-\pi, \pi)$ has only 4)

Sine terms

- d) L.T. of $\int_0^\infty e^{-t} \sin t \, dt$ is _____. 6) 1 a) 1 b)
 - c) 0 $L^{-1}\{\tan^{-1}(s)\} =$ _____ a) cost
 - $-\sin t$ C)

a)

7)

8)

 $L\{t^2f(t)\}$ is _____.

a) $\frac{d}{ds}[f(s)]$

c) $\frac{d}{ds}[f(s)]^2$

Cosine terms

Cosine terms



None

None

2

b)

d)

b)

SLR-FM-735

Set

Max. Marks: 70

Marks: 14

			Set P		
9)	$L^{-1}\left\{\frac{2S^3+13S}{(S^2+3)(S^2+4)}\right\}$ is				
	a) $\cos 3t + \cos 2t$ c) $\sin 3t - \sin 2t$	b) d)	$\cos 3t - \cos 2t$ sin3t + sin2t		
10)	If $f(z) = u + iv$ is an Analytic function	on the	en $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		
11)	c) $\frac{\partial u}{\partial x} - i \frac{\partial v}{\partial y}$ d) None) 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				
	a) -1	b)	1		
	c) 2	d)	None		
12)	The value of $\int_0^{1+i} z^2 dz$ along $y = x$ is	5			
	a) $\frac{2}{-(-1+i)}$	b)	$\frac{2}{-}(-1-i)$		
	3	,	3		
	c) $\frac{2}{3}(1+i)$	d)	None		
13)	The fixed points of mapping $w = \frac{3z+z}{z+z}$	$\frac{4}{5}$ are			
	a) 2, 2	b)	2, -2		
	c) -2, 2	d)	None		
14)	The is Analytic function.				
	a) $f(z) = \sin z$	b)	f(z) = z		

c) f(z) = Im(z) d) R(iz)

SLR-FM-735

12

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

ical Engineering **ENGINEERING MATHEMATICS – III**

Section – I

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

Instructions: 1) All Questions are compulsory.

2) Figures to right indicate full marks.

Attempt any four

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

Attempt any two Q.3

Q.2

- **a)** Solve by using $L.T.\frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t}sint$ 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| = 1ii) |Z| = 1

Section – II

Q.4 Attempt any four

- a) Obtain Fourier series of $f(x) = (x^2) \pi \le x \le \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$
- **b)** Find Half Range Fourier Series for f(x) = x, 0 < x < 2 hence show that $\frac{\pi^4}{_{96}} = \frac{1}{_{14}} + \frac{1}{_{3^4}} + \frac{1}{_{5^4}} = \cdots \cdots$
- Find Half Rage Fourier series of f(x) = x(2 x) in 0 < x < 2c)
- d) Find $\oint \log z \, dz$ where C is the circle |Z| = 1e)
- Evaluate $\int_{C} (z + z^2) dz$, where 'C' is the upper arc of circle |z| = 1

Q.5 Attempt any two

- **a)** Find Fourier Series for $f(x) = x^3$ in the rage $(-\pi, \pi)$.
- **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

Max. Marks: 56

12

16

16

Set



			ype v	RUCSHUIJ	
tion: 3	80 M	inutes	-	Marks	5: 14
Cho	ose	the correct alternatives from th	e opt	tions and rewrite the sentence.	14
1)	L{t	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^{-2}	$1\left\{\frac{2S^3+13S}{(S^2+3)(S^2+4)}\right\} \text{ is } __\$			
	a) c)	$\cos 3t + \cos 2t$ $\sin 3t - \sin 2t$	b) d)	$\cos 3t - \cos 2t$ sin3t + sin2t	
3)	lf j	f(z) = u + iv is an Analytic functi	on the	en $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)	lf tł	the function $2x + x^2 + \alpha y^2$ is to be	Harr	nonic then value of α	
	a)	-1	b)	1	
	C)	2	d)	None	
5)	The	e value of $\int_0^{1+i} z^2 dz$ along $y = x$ is	s		
	a)	$\frac{2}{3}(-1+i)$	b)	$\frac{2}{3}(-1-i)$	
	c)	$\frac{2}{3}(1+i)$	d)	None	
6)	The	e fixed points of mapping $w = \frac{3z}{2}$	$\frac{+4}{-}$ are		
	a)	2, 2	-5 b)	2, -2	
	Ś	~ ~	ń	N 1	

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

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.

MCO/Objective Type Questions

Dura

Seat

No.

Q.1



None c) -2, 2 d)

The _____ is Analytic function. 7) a) $f(z) = \sin z$ f(z) = zb) f(z) = Im(z)d) R(iz)The period of |*sinx*| is _____. 8)

a) 0 b) 2π c) π d) None Max. Marks: 70

				Set	Q
9)	In fourier series $f(x) =$ a) Sine terms c) Neither of terms	x for (−π, π) wh b) d)	ich terms are absent Cosine terms None		
10)	If $f(x) = x^2$ in $(-\pi, \pi)$, a) Only sine terms c) Both sine and cosir	then Fourier serie b) ne terms d)	es of $f(x)$ contains Only cosine terms None		
11)	Fourier Expansion of ar	n even function in	the range $(-\pi,\pi)$ has only		
	a) Sine terms c) Both sine and cosir	b) ne d)	Cosine terms None		
12)	Fourier Series Expansion a) Sine terms c) Both sine and cosir	on of an odd func b) ne d)	tion has only terms Cosine terms None		
13)	L.T. of $\int_0^\infty e^{-t} \sin t dt$ is	6			
	a) 1	b)	$\frac{1}{2}$		
	c) 0	d)	2		
14)	L ⁻¹ {tan ⁻¹ (s)} = a) $\frac{cost}{t}$	b)	-t cost		
	c) $\frac{t}{-\sin t}$	d)	t sin t		

No.S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – IIIDay & Date: Saturday, 07-12-2019MaxTime: 10:00 AM To 01:00 PMMaxInstructions: 1) All Questions are compulsory.
2) Figures to right indicate full marks.Section – IQ.2 Attempt any four
a) Find Laplace transform of
$$\left\{e^{-4t}\int_0^t t \cdot \sin 3t \, dt\right\}$$

b) Find Laplace transform of $\left\{\frac{t \sinh at}{2a}\right\}$.

c) Find Laplace transform of $\left\{\frac{1-\cos t}{t^2}\right\}$.

- **d)** Find Laplace transform of $\{e^{-3t}sin^2t\}$
- **e)** Find K such that the function $f(z) = e^x cosy + ie^x sin ky$ is analytic.

Q.3 Attempt any two

Seat

a) Solve by using $L.T.\frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t}sint$ 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

- a) Obtain Fourier series of $f(x) = (x^2) \pi \le x \le \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$
- **b)** Find Half Range Fourier Series for f(x) = x, 0 < x < 2 hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \cdots$
- **c)** Find Half Rage 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

- **a)** Find Fourier Series for $f(x) = x^3$ in the rage $(-\pi, \pi)$.
- **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

SLR-FM-735

Set

Max. Marks: 56

12

16

16

Set

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

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

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

- Fourier Series Expansion of an odd function has only _____ terms. 1)
 - a) Sine terms b) c) Both sine and cosine d)
- L.T. of $\int_0^\infty e^{-t} \sin t \, dt$ is _____. 2) $\frac{1}{2}$ a) 1 b) 2 c) 0 d) $L^{-1}\{\tan^{-1}(s)\} =$ _____. a) cost3) b) -t cost

c)
$$\frac{t}{t}$$
 d) $t \sin t$

4)
$$L\{t^2f(t)\} \text{ is } ___.$$

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) $L^{-1}\left\{\frac{2S^3+13S}{(S^2+3)(S^2+4)}\right\} \text{ is } ___.$

a)
$$\cos 3t + \cos 2t$$

c) $\sin 3t - \sin 2t$
b) $\cos 3t - \cos 2t$
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

If the function $2x + x^2 + \alpha y^2$ is to be Harmonic then value of α _____. 7)

a) -1 b) 1 c) 2 d) None Max. Marks: 70

Marks: 14

R

SLR-FM-735

Cosine terms None



Seat	
No	

				Se	et
8)	The	e value of $\int_0^{1+i} z^2 dz$ along $y = x$ is	6	·	
	a)	$\frac{2}{3}(-1+i)$	b)	$\frac{2}{3}(-1-i)$	
	c)	$\frac{2}{3}(1+i)$	d)	None	
9)	The	e fixed points of mapping $w = \frac{3z+z}{z+z}$	$\frac{4}{5}$ are		
	a) c)	2, 2 -2, 2	b) d)	2, -2 None	
10)	Th∈ a) c)	f(z) = sin z f(z) = Im(z)	b) d)	f(z) = z $R(iz)$	
11)	The a) c)	e period of <i>sinx</i> is 0 π	b) d)	2π None	
12)	In f a) c)	ourier series $f(x) = x$ for $(-\pi, \pi)$ Sine terms Neither of terms	whic b) d)	h terms are absent Cosine terms None	
13)	lf <i>f</i> a) c)	$(x) = x^2$ in $(-\pi, \pi)$, then Fourier Only sine terms Both sine and cosine terms	series b) d)	s of $f(x)$ contains Only cosine terms None	
14)	Fou	urier Expansion of an even function	on in t	the range $(-\pi,\pi)$ has only	
	<u>a)</u>	 Sine terms	b)	Cosine terms	

- c) Both sine and cosine
- d) None

R
No.S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
Bio-Medical Engineering
ENGINEERING MATHEMATICS – IIIDay & Date: Saturday, 07-12-2019MaxTime: 10:00 AM To 01:00 PMMaxInstructions: 1) All Questions are compulsory.
2) Figures to right indicate full marks.Section – IQ.2 Attempt any four
a) Find Laplace transform of
$$\left\{e^{-4t}\int_0^t t \cdot \sin 3t \, dt\right\}$$

b) Find Laplace transform of $\left\{\frac{t.sinh at}{2a}\right\}$.
c) Find Laplace transform of $\left\{\frac{1-\cos t}{t^2}\right\}$.

d) Find Laplace transform of $\{e^{-3t}sin^2t\}$

e) Find K such that the function $f(z) = e^x \cos y + i e^x \sin ky$ is analytic.

Attempt any two Q.3

Seat

a) Solve by using $L.T.\frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t}sint$ 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) |Z - 2| = 1i) ii) |Z| = 1

Section – II

Q.4 Attempt any four

- a) Obtain Fourier series of $f(x) = (x^2) \pi \le x \le \pi$ hence show that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$
- **b)** Find Half Range Fourier Series for f(x) = x, 0 < x < 2 hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \cdots \cdots$
- Find Half Rage Fourier series of f(x) = x(2 x) in 0 < x < 2c)
- d) Find $\oint_{C} \log z \, dz$ where C is the circle |Z| = 1Evaluate $\int_{C} (z + z^2) dz$, where 'C' is the upper arc of circle |z| = 1e)

Q.5 Attempt any two

- **a)** Find Fourier Series for $f(x) = x^3$ in the rage $(-\pi, \pi)$.
- **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

SLR-FM-735

Set

Max. Marks: 56

12

16

12

S

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

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

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) = $				
	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	Harn	nonic 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	6			
	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 $w = \frac{3z+z}{z+z}$	$\frac{-4}{5}$ are	·		
	a) 2, 2	b)	2, -2		
	c) -2, 2	d)	None		
5)	The is Analytic function.				
,	a) $\overline{f(z)} = \sin z$	b)	f(z) = z		
	c) $f(z) = Im(z)$	d)	R(iz)		
6)	The period of <i>sinx</i> is				
-,	a) 0	b)	2π		
	c) π	d)	None		
7)	In fourier series $f(x) = x$ for $(-\pi \pi)$	whic	h 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	serie	s of $f(x)$ contains		
-,	a) Only sine terms	b)	Only cosine terms		
	c) Both sine and cosine terms	d)	None		

Max. Marks: 70

Marks: 14

Set

Cast	
Seat	
No	
INU.	

			Set	t S
9)	Fourier Expansion of an even function	on in 1	the range $(-\pi,\pi)$ has only	
	a) Sine terms c) Both sine and cosine	b) d)	Cosine terms None	
10)	Fourier Series Expansion of an odda) Sine termsc) Both sine and cosine	functi b) d)	ion has only terms. Cosine terms None	
11)	L.T. of $\int_0^\infty e^{-t} \sin t dt$ is			
	a) 1	b)	$\frac{1}{2}$	
	c) 0	d)	2	
12)	$L^{-1}\{\tan^{-1}(s)\} = \$ a) $\frac{cost}{t}$	b)	-t cost	
	c) $\frac{-\sin t}{t}$	d)	$t \sin t$	
13)	$L\{t^2f(t)\}$ is		12	
	a) $\frac{d}{ds}[f(s)]$	b)	$\frac{-d^2}{ds^2}[f(s)]$	
	c) $\frac{d}{ds}[f(s)]^2$	d)	$\frac{d^2}{ds^2}[f(s)]$	
14)	$L^{-1}\left\{\frac{2S^3+13S}{(S^2+3)(S^2+4)}\right\}$ is			
	a) $\cos 3t + \cos 2t$	d)	$\cos 3t - \cos 2t$	
	$c_j sinsi = sinzi$	u)	511151 + 511121	

12

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

Instructions: 1) All Questions are compulsory.

2) Figures to right indicate full marks.

Section – I

Q.2 Attempt any four

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

Attempt any two Q.3

- **a)** Solve by using $L.T.\frac{d^2y}{dt^2} + \frac{2dy}{dt} + 5y = e^{-t}sint$ 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| = 1ii) |Z| = 1

Section – II

Attempt any four Q.4

- a) Obtain Fourier series of $f(x) = (x^2) \pi \le x \le \pi$ hence show that $\frac{\pi^2}{\epsilon} = \frac{1}{\frac{1}{12}} + \frac{1}{\frac{1}{22}} + \frac{1}{\frac{1}{22}} + \frac{1}{\frac{1}{42}} + \cdots$
- **b)** Find Half Range Fourier Series for f(x) = x, 0 < x < 2 hence show that $\frac{\pi^4}{96} = \frac{1}{14} + \frac{1}{3^4} + \frac{1}{5^4} = \cdots$
- c) Find Half Rage Fourier series of f(x) = x(2-x) in 0 < x < 2
- d) Find $\oint \log z \, dz$ where C is the circle |Z| = 1Evaluate $\int_{C} (z + z^2) dz$, where 'C' is the upper arc of circle |z| = 1e)

Q.5 Attempt any two

- **a)** Find Fourier Series for $f(x) = x^3$ in the rage $(-\pi, \pi)$.
- **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

Max. Marks: 56

12

16

16

Set

SLR-FM-735

rage I UI IZ

SL	R-	FM	-7:	36

Set | P No. S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio – Medical Engineering** HUMAN ANATOMY AND PHYSIOLOGY Day & Date: Tuesday, 10-12-2019 Max. Marks: 70 Time: 10:00 AM To 01:00 PM 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 Kidneys in human body are placed against back side wall of _____ cavity. 1) a) venal b) Abdominal c) vertebral d) alomerulus Oxygen and carbon dioxide are exchanged in the lungs and through all 2) cell membranes by a) active transport b) Diffusion c) filtration d) Osmosis 3) Conduction velocity is maximum in _ a) SA node AV node b) c) Right ventricle d) Purkinje fibers Insulin facilitates glucose uptake in 4) a) Kidney tubule b) Brain c) RBC d) Skeletal muscle 5) is an example of long bone. Sternum b) Femur a) d) Patella c) Carpal 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) 206 360 b) 700 c) 500 d) 8) is essential for blood clotting. RBC WBC b) a) 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 _____ Hearing Seeing a) b)

d)

Balancing

Tasting

c)

Seat

11) _____ organ receives only oxygenated blood.

- a) Lung b) Liver d) Gill
- c) Spleen
- Sella turcica is _____ 12) _.
 - a) covering of ovary c) depression in skull
- b) covering of testis

SLR-FM-736

Set P

- part of temporal bone d)
- Most of the fat digestion occurs in _ 13)
 - b) Stomach a) vectum
 - c) Duodenum small intestine d)
- 14) The largest gland in human body is _
 - a) lung c) Liver

- b) Pancreas
- gall bladder d)

	HUMAN ANATOMY AND PHYSIOLOGY	/
Day Time	& Date: Tuesday, 10-12-2019 e: 10:00 AM To 01:00 PM	Max. Marks: 56
Instr	ructions: 1) All questions are compulsory.2) Figures to the right indicates full marks.	
	Section – I	
Q.2	 Attempt any four questions. 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. 	16
Q.3	 Attempt any two questions. 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 bip configuration. 	12 olar lead
	Section – II	
Q.4	 Attempt any four questions. 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. 	16
Q.5	 Attempt any two questions. a) Explain process of formation of urine. b) Explain structure of ear with neat diagram. 	12

Set P



Seat

No.

- c) List main actions of androgens, estrogens and progesterone.

re placed a	gains b) d)	t back side wall of cavity. Abdominal glomerulus
de are exch	ange	d in the lungs and through all
	b) d)	Diffusion Osmosis
aximum in _	b) d)	 AV node Purkinje fibers

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

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

2) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Day & Date: Tuesday, 10-12-2019

Time: 10:00 AM To 01:00 PM

Seat

No.

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

- is essential for blood clotting. 1) RBC WBC a) b) c) Blood platelets d) Lymph
- Visual area is located in _____ lobe. 2)
 - a) Frontal Parietal b) c) Temporal d) Occipital
- 3) The organ of corti is concerned with b) a) Hearing Seeing
 - Tasting d) Balancing c)
- 4) _ organ receives only oxygenated blood.
 - Lung Liver a) b) c) Spleen d) Gill
- Sella turcica is 5)

c)

- a) covering of ovary b) covering of testis depression in skull part of temporal bone d) C)
- Most of the fat digestion occurs in 6)
 - Stomach a) vectum b) small intestine Duodenum d) C)
- The largest gland in human body is _ 7) Pancreas a) lung b) c) Liver d) gall bladder
- 8) Kidneys in human body a a) venal
 - c) vertebral
- Oxygen and carbon dioxid 9) cell membranes by _____
 - a) active transport c) filtration
- Conduction velocity is ma 10)



Max. Marks: 70

Marks: 14

SLR-FM-736 Set Q

Insulin facilitates glucose uptake in _ 11) b)

- a) Kidney tubule
- Brain
- c) RBC d) Skeletal muscle

_____ is an example of long bone. 12)

- a) Sternum b) Femur
- c) Carpal d) Patella
- The saliva helps in the digestion of _ 13)
 - b) a) proteins Fats c) fibers
 - d) Starch
- There are approximately _____ muscles in human body. 14)
 - a) 206
 - c) 500

- 360 b)
- d) 700

Instr	uctio	ons: 1) All questions are compulsory.2) Figures to the right indicates full marks.	
		Section – I	
Q.2	Atte a) b) c) d) e)	Explain any four questions. Classify epithelial tissues and state their functions. Explain the composition of blood. Explain anatomy of liver and state its any two functions. Differentiate between systemic and pulmonary circulation. Explain various steps of blood coagulation.	16
Q.3	Atte a) b) c)	Explain generation of action potential with neat diagram. Explain the mechanism of respiration. Draw ECG waveform explaining it along with a note on bipolar lead configuration.	12
Q.4	Atte a) b) c) d) e)	Section – II empt any four questions. Explain with a neat diagram structure of spinal cord. Define reflex arc and mention any two examples of it. Explain structure and function of lens of eye. List endocrine glands and state their functions. Draw and explain various lobes of cerebrum in detail.	16
Q.5	Atte a) b)	empt any two questions. Explain process of formation of urine. Explain structure of ear with neat diagram.	12

c) List main actions of androgens, estrogens and progesterone.

Page **6** of **12**

SLR-FM-736

Set

Q

Seat No.

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

S.E. (Part - 1) (Old) (CGPA) Examination Nov/Dec-2019 Bio - Medical Engineering HUMAN ANATOMY AND PHYSIOLOGY Day & Date: Tuesday, 10-12-2019 Max. Marks: 70 Time: 10:00 AM To 01:00 PM Max. Morks: 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. 0.1 is compulsory and should be solved in first 30 minutes in answer book. 2) Figures to the right indicates full marks. Duration: 30 Minutes Marks: 14 0.1 Choose the correct alternatives from the options and rewrite the sentence. 14 1) is an example of long bone. . a) Sternum b) Femur . c) Carpal d) Patella . 2) The saliva helps in the digestion of . . . a) proteins b) Starch . . 3) There are approximately muscles in human body. . . a) 206 b) 360 . . . c) Blood platelets d) Lymph . . . 3) There are approximately b) Parietal . . . c) Tisual area is located in 	Seat No.						Set	R	
Bio - Medical Engineering HUMAN ANATOMY AND PHYSIOLOGY Day & Date: Tuesday, 10-12-2019 Max. Marks: 70 Time: 10:00 AM To 01:00 PM 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. 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 an example of long bone. a) Sternum b) Fats c) Garpal d) Patella 2 Patella 2 70 3 3 There are approximately		S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019							
Day & Date: Tuesday, 10-12-2019 Max. Marks: 70 Time: 10:00 AM To 01:00 PM 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. 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)				Bio – Medical		neering			
Inter to to the function of th	Day &	Date:	Tuesday, 10-1	2-2019		Ma>	(. Marks	s: 70	
Ministructions: 1) (arror, 1) somplately and should be solved in ministructions in anistrict book. 2) Figures to the right indicates full marks. 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 an example of long bone. a) Sternum b) Femur c) Carpal d) Patella 2) 2) The saliva helps in the digestion of	Instruc	tions	$(1) \bigcirc No 1 is$	ivi compulsory and sh	ould b	e solved in first 30 minutes	s in ans	wor	
MCQ/Objective Type Questions 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 an example of long bone. a) Sternum b) Femur c) Carpal b) Femur c) Carpal b) Fats c) fibra size d) Patella 2) The saliva helps in the digestion of a) proteins b) Fats c) fibra size d) Patella d) Starch 3) There are approximatelymuscless in human body. a) 206 b) 360 c) 500 d) 700 d)	mstruc		book. 2) Figures to	the right indicates fu	ill mar	ks	, 11 0113	WCI	
Duration: 30 Minutes Marks: 14 Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14 1) is an example of long bone. a) a) Sternum b) Femur c) Carpal d) Patella 2) The saliva helps in the digestion of			Z) i iguioo to	ICQ/Objective T	vne (Questions			
Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14 1) is an example of long bone. a) Sternum b) Femur c) Carpal d) Patella 2) The saliva helps in the digestion of a) proteins b) Fats c) fibers d) Starch 3) There are approximatelymuscles in human body. a) 206 b) 360 c) 500 d) 700 4) is essential for blood clotting. a) RBC b) WBC c) Temporal d) Occipital 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	Duratio	on: 30 l	Vinutes		, ,,,		Marks	s: 14	
1) is an example of long bone. a) Sternum b) Femur c) Carpal d) Patella 2) The saliva helps in the digestion of	Q.1 (Choos	e the correct	alternatives from t	he opt	tions and rewrite the sen	tence.	14	
 a) Sternum b) Fertur c) Carpal d) Patella 2) The saliva helps in the digestion of	1	I) _	is an ex	ample of long bone		F am			
 c) Curper (a) (b) Fats c) fibers (b) Fats c) fibers (c) (c) (c) (c) (c) (c) (c) (c) (c) (c)		a c) Sternum Carpal		d)	Femur Patella			
 2) The saliva helps in the digestion of	0	ט ד איני	ha aaliya hala	a in the dispetion of	u)	T atena			
 a) proteins b) rational of the second starch 3) There are approximatelymuscles in human body. a) 206 b) 360 c) 500 d) 700 4) is essential for blood clotting. 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) veral b) Abdominal 	2	2) I 2) 2	ne saliva neip:	s in the digestion of		 Fate			
 a) There are approximately muscles in human body. a) 206 b) 360 c) 500 d) 700 4) is essential for blood clotting. 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 C	fibers		d)	Starch			
 a) 206 b) 360 c) 500 d) 700 4)is essential for blood clotting. a) RBC b) WBC c) Blood platelets d) Lymph 5) Visual area is located inlobe. 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 	3	ε) Τ	here are annr	nyimately m	usclas	in human body			
 c) 500 d) 700 4) is essential for blood clotting. 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) vertal b) Abdominal b) Abdominal c) wertal 		, i a) 206		b)	360			
 4) is essential for blood clotting. 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	500		d)	700			
 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) Seella 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 	4	1)	is esse	ntial for blood clottin	g.				
 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) depression d) depression 		, a) RBC		b)	WBC			
 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) vental b) Adominal c) vental c) alpenerulur c) alpenerulur 		C	Blood plate	lets	d)	Lymph			
 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) vental b) Abdominal c) venal c) al pancreas d) al pancreas d) al pancreas 	5	5) V	isual area is lo	ocated in lobe) .				
 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) vental b) Addominal b) Abdominal c) vental d) encorruling 		a) Frontal		b)	Parietal			
 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) vental b) Abdominal c) vental d) admonstrate 		C	i emporal		a)	Occipital			
 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) alomacrulus 	6	6) T	he organ of co	orti is concerned with)				
 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 		a) Hearing		D)	Seeing 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 	-	ل ح			u)	Dalancing			
 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 	/	() _ _	organ r	eceives only oxyger	hated t	Diood.			
 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) venthrol 		a C) Spleen		d)	Gill			
 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 	8	3) 5	ella turcica is		,				
 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) vertabral 		, 0 a	covering of	ovary	b)	covering of testis			
 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 b) Abdominal 		C	depression	in skull	d)	part of temporal bone			
 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) vertabral d) glamorulus 	9) Most of the fat digestion occurs in								
 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) vortabral d) glamorulus 		́a) vectum	5 –	b)	Stomach			
 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 b) Abdominal 		C	Duodenum		d)	small intestine			
 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) vertabral d) glamorulus 	1	10) T	he largest glar	nd in human body is					
 c) Liver d) gall bladder 11) Kidneys in human body are placed against back side wall of cavity. a) venal b) Abdominal c) vertabral d) glamorulus 		a) lung		b)	Pancreas			
 11) Kidneys in human body are placed against back side wall of cavity. a) venal b) Abdominal c) vertabral d) glamarulus 		C	Liver		d)	gall bladder			
a) venal b) Abdominal	1	11) K	idneys in hum	an body are placed	agains	st back side wall of o	cavity.		
		a) Venal		b)	Abdominal			

SLR-FM-736

Set R

SLR-FM-736

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

- __. Brain
- d) Skeletal muscle

Day a Time	& Dat : 10:0	te: Tuesday, 10-12-2019 00 AM To 01:00 PM	Max. Marks: 56
Instr	uctic	ons: 1) All questions are compulsory.2) Figures to the right indicates full marks.	
		Section – I	
Q.2	Atte a) b) c) d) e)	Explain any four questions. Classify epithelial tissues and state their functions. Explain the composition of blood. Explain anatomy of liver and state its any two functions. Differentiate between systemic and pulmonary circulation. Explain various steps of blood coagulation.	16
Q.3	Atte a) b) c)	empt any two questions. Explain generation of action potential with neat diagram. Explain the mechanism of respiration. Draw ECG waveform explaining it along with a note on bipolar lead configuration.	12 ad
		Section – II	
Q.4	Atte a) b) c) d) e)	Explain with a neat diagram structure of spinal cord. Define reflex arc and mention any two examples of it. Explain structure and function of lens of eye. List endocrine glands and state their functions. Draw and explain various lobes of cerebrum in detail.	16
Q.5	Atte a) b)	empt any two questions. Explain process of formation of urine. Explain structure of ear with neat diagram.	12

c) List main actions of androgens, estrogens and progesterone.

SLR-FM-736

Seat No.

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

Set R

Most of the fat digestion occurs in a) vectum c) Duodenum	b) Stomach d) small intestine
The largest gland in human body is _ a) lung c) Liver	 b) Pancreas d) gall bladder
Kidneys in human body are placed ag a) venal c) vertebral	ainst back side wall of cavity. b) Abdominal d) glomerulus
Oxygen and carbon dioxide are excha cell membranes by a) active transport c) filtration	anged in the lungs and through all b) Diffusion d) Osmosis
Conduction velocity is maximum in a) SA node c) Right ventricle	 b) AV node d) Purkinje fibers
Insulin facilitates glucose uptake in a) Kidney tubule c) RBC	b) Brain d) Skeletal muscle
 is an example of long bone. a) Sternum c) Carpal 	b) Femur d) Patella

MCQ/Objective Type Questions Duration: 30 Minutes Q.1 Choose the correct alternatives from the options and rewrite the sentence. The organ of corti is concerned with 1) a) Hearing b) Seeing Tasting Balancing c) d) 2) organ receives only oxygenated blood. a) Lung Liver b)

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio – Medical Engineering** HUMAN ANATOMY AND PHYSIOLOGY Max. Marks: 70

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

c) Spleen

c)

Sella turcica is

a) covering of ovary

depression in skull

3)

4)

5)

6)

7)

8)

9)

10)

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.

d)

b)

d)

Gill

covering of testis

part of temporal bone

SLR-FM-736

Set S

Marks: 14

14

Seat No.

11)	The saliva helps in the digestion	n 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 clo	otting.	
	a) RBC	b)	WBC
	c) Blood platelets	d)	Lymph
14)	Visual area is located in	lobe.	
	a) Frontal	b)	Parietal
	c) Temporal	d)	Occipital

Set S

Explain structure of ear with neat diagram. List main actions of androgens, estrogens and p	rogesterone.

Seat

No.

Q.2

a)

b)

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

Instructions: 1) All questions are compulsory.

Explain the composition of blood.

Attempt any four questions.

2) Figures to the right indicates full marks.

Classify epithelial tissues and state their functions.

Section – I

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

Section – II Q.4 Attempt any four questions. Explain with a neat diagram structure of spinal cord. a) Define reflex arc and mention any two examples of it. b) Explain structure and function of lens of eve.

- c)
- List endocrine glands and state their functions. d)
- Draw and explain various lobes of cerebrum in detail. e)

Q.5 Attempt any two questions.

- Explain process of formation of urine. a)
- b)
- c)

SLR-FM-736



Max. Marks: 56

16

12

16

Instr	uctior	is: 1) Q. No. 1 is compulsory and sho Book	uld b	be solved in first 30 minutes in answe	۶r
		2	?) Figures to the right indicate full	mar	ks.	
			MCQ/Objective Ty	pe (Questions	
Dura	tion: 3	0 Mi	nutes	-	Marks:	14
Q.1	Choc 1)	ose f Wh pro a) c)	the correct alternatives from th at is the effect of high pressure o duct formed? Increases No change	e op n the b) d)	tions and rewrite the sentence. molecular weight of the polymer Decreases Cannot be determined	14
	2)	Cor a) c)	nposite biomaterial used in Dental filling Both a and b	 b) d)	Bone particle None	
	3)	Cry a) b) c) d)	stal structure means Random alignment of unit cells Periodic alignment of unit cells Ductile materials Brittle material			
	4)	Bio a) c)	glass is /an Inert ceramic Composite	b) d)	Bioactive ceramic Crystalline polymer	
	5)	Th∈ a) c)	e hardest biological material is Dentin Gum	b) d)	Enamel Bone	
	6)	Stre a) c)	ength of a material is its Surface Property Biological Property	b) d)	Chemical Property Mechanical Property	
	7)	Wh a) c)	ich of the following polymers can Nylon Rubber	have b) d)	e strong intermolecular forces? Polystyrene None	
	8)	Nat a) c)	ural rubber become brittle below 100ºC, 500ºC 10ºC, 50ºC	b) d)	and soft after 10 ⁰ C, 500 ⁰ C None	
	\sim			•		

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

Ins answer

Bio-Medical Engineering

Q.' ce.

S.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

SLR-FM-737

Set

Max. Marks: 70

Ρ

Seat No.

- Chrane Tanning process completed in ____ 9)
 - 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
- Hydroxyapatite has _____ biocompatibility. 11)
 - a) Less b) Zero
 - c) Excellent d) None
- Major ingredients of traditional ceramics . 12)
 - a) Silica Clay b) c) Feldspar
 - d) All above
- In which of the following application ceramic biomaterial is used? 13)
 - a) Bone graft

- Artificial knees b) d) All above
- c) Hip prostheses
- CaP has been used in the form _____. 14)
 - a) Artificial heart c) Artificial Bone
- b) Artificial teeth
- d) None

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four

- 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

- 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

- 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

- 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.

12

16

16

Max. Marks: 56

		S.E. (Part – I) (Old) (CGPA) E Bio-Medical E BIOMATE	Exam Engir ERIA	nination Nov/Dec-2019 neering LS
Day Time	& Date e: 10:0	e: Thursday, 12-12-2019 0 AM To 01:00 PM		Max. Marks: 70
Instr	uctio	ns: 1) Q. No. 1 is compulsory and sh Book.	ould	be solved in first 30 minutes in answer
		2) Figures to the right indicate fu	ll mar	ks.
D	1 O	MCQ/Objective T	уре	Questions
Dura	ition: 3	30 Minutes	_	Marks: 14
Q.1	Cho 1)	Natural rubber become brittle belov a) 100 ⁰ C, 500 ⁰ C c) 10 ⁰ C, 50 ⁰ C	he op v b) d)	otions and rewrite the sentence. 14 and soft after 10 ⁰ C, 500 ⁰ C None
	2)	Chrane Tanning process complete a) 5 to 16 days c) 5 to 16 hrs	_ in b) d)	5 to 16 weeks 5 to 16 months
	3)	Which of the following is not a chara) High temperature stabilityc) Low elongation	acteri b) d)	stic property of ceramic material? High mechanical strength Low hardness
	4)	Hydroxyapatite has biocomp a) Less c) Excellent	atibili b) d)	ity. Zero None
	5)	Major ingredients of traditional cera a) Silica c) Feldspar	imics b) d)	 Clay All above
	6)	In which of the following application a) Bone graft c) Hip prostheses	ı cera b) d)	mic biomaterial is used? Artificial knees All above
	7)	CaP has been used in the form a) Artificial heart c) Artificial Bone	 b) d)	Artificial teeth None
	8)	What is the effect of high pressure product formed?a) Increasesc) No change	on the b) d)	e molecular weight of the polymer Decreases Cannot be determined
	9)	Composite biomaterial used in a) Dental filling c) Both a and b	 b) d)	Bone particle None
	10)	 Crystal structure means a) Random alignment of unit cells b) Periodic alignment of unit cells 	i	

Seat

No.

- c) Ductile materials
- d) Brittle material

- 11) Bioglass is /an _____.
 - a) Inert ceramic
 - c) Composite

- b) Bioactive ceramic
- d) Crystalline polymer
- 12) The hardest biological material is ____
 - a) Dentin
 - c) Gum
- 13) Strength of a material is its _____.a) Surface Property
- b) Chemical Propertyd) Mechanical Property
- c) Biological Property d)
- 14) Which of the following polymers can have strong intermolecular forces?
 - a) Nylonc) Rubber

b) Polystyrene

Enamel

Bone

d) None

b)

d)

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four

- 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

- 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

- 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

- 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.

12

16

Max. Marks: 56

16

12

Set C

Instr	uctior	is: 1) Q. No. 1 is compulsory and sho	uld b	be solved in first 30 minutes in answer
		2	2) Figures to the right indicate full	mar	ks.
			MCQ/Objective Ty	pe	Questions
Durat	tion: 3	0 Mi	nutes	1	Marks: 14
Q.1	Choo	set	the correct alternatives from th	e op	tions and rewrite the sentence. 14
	1)	The a) c)	e hardest biological material is Dentin Gum	 b) d)	Enamel Bone
	2)	Stre a) c)	ength of a material is its Surface Property Biological Property	b) d)	Chemical Property Mechanical Property
	3)	Wh a) c)	ich of the following polymers can Nylon Rubber	have b) d)	e strong intermolecular forces? Polystyrene None
	4)	Nat a) c)	tural rubber become brittle below 100 ^o C, 500 ^o C 10 ^o C, 50 ^o C	b) d)	and soft after 10ºC, 500ºC None
	5)	Chi a) c)	rane Tanning process completed 5 to 16 days 5 to 16 hrs	in b) d)	5 to 16 weeks 5 to 16 months
	6)	Wh a) c)	ich of the following is not a chara High temperature stability Low elongation	cteri: b) d)	stic property of ceramic material? High mechanical strength Low hardness
	7)	Hyo a) c)	droxyapatite has biocompa Less Excellent	atibili b) d)	ty. Zero None
	8)	Ma <u></u> a) c)	jor ingredients of traditional ceran Silica Feldspar	nics b) d)	Clay All above
	9)	In v a) c)	vhich of the following application Bone graft Hip prostheses	cera b) d)	mic biomaterial is used? Artificial knees All above
	10)	Cal a) c)	P has been used in the form Artificial heart Artificial Bone	 b) d)	Artificial teeth None

No.

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

- - - ا- ا- ا- مام ام م م م م م م ا

Page **7** of **12**

SLR-FM-737

Max. Marks: 70

D Q

Seat



Set R

- 11) What is the effect of high pressure on the molecular weight of the polymer product formed?
 - a) Increases
 - c) No change

- b) Decreases
- d) Cannot be determined
- 12) Composite biomaterial used in _____.
 - a) Dental filling
 - c) Both a and b
- b) Bone particle
- d) None
- 13) Crystal structure means _____.
 - a) Random alignment of unit cells
 - b) Periodic alignment of unit cells
 - c) Ductile materials
 - d) Brittle material
- 14) Bioglass is /an _____.
 - a) Inert ceramic
 - c) Composite

- b) Bioactive ceramic
- d) Crystalline polymer

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four

- 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

- 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

- 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

- 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.

12

16

12

16

Max. Marks: 56

Set R

Day & Date: Thursday, 12-12-2019 Time: 10:00 AM To 01:00 PM 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** Q.1 Choose the correct alternatives from the options and rewrite the sentence. Which of the following is not a characteristic property of ceramic material? 1) a) High temperature stability High mechanical strength b) c) Low elongation d) Low hardness Hydroxyapatite has _____ biocompatibility. 2) a) Less b) Zero c) Excellent d) None 3) Major ingredients of traditional ceramics _ a) Silica Clay b) c) Feldspar d) All above 4) In which of the following application ceramic biomaterial is used? Artificial knees a) Bone graft b) c) Hip prostheses d) All above CaP has been used in the form 5) 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?

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

a) Increases b) Decreases

d)

- c) No change Cannot be determined d)
- Composite biomaterial used in ____ 7)
 - Bone particle a) Dental filling b) None
 - c) Both a and b
- 8) Crystal structure means
 - Random alignment of unit cells a)
 - b) Periodic alignment of unit cells
 - c) Ductile materials
 - d) Brittle material
- 9) Bioglass is /an
 - a) Inert ceramic
 - c) Composite

- **Bioactive ceramic** b)
- d) Crystalline polymer



Max. Marks: 70

Marks: 14

			5LK-FIM-/3/
			Set S
10)	The hardest biological material is a) Dentin c) Gum	b) d)	Enamel Bone
11)	Strength of a material is its a) Surface Property c) Biological Property	b) d)	Chemical Property Mechanical Property
12)	Which of the following polymers can a) Nylon c) Rubber	have b) d)	e strong intermolecular forces? Polystyrene None
13)	Natural rubber become brittle below a) 100°C, 500°C c) 10°C, 50°C	b) d)	and soft after 10ºC, 500ºC None
14)	Chrane Tanning process completed	in	

- Chrane Tanning process completed in _

 - a) 5 to 16 days c) 5 to 16 hrs b) 5 to 16 weeks d) 5 to 16 months

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any four

- 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

- 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

- 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

- 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.

12

16

Max. Marks: 56

16

Seat No.				Set P		
	S.E. (Part - I) (Old) (CGPA) Examination Nov/Dec-2019					
			ngir	Neering		
Day & Time:	a Date 10:0	e: Saturday, 14-12-2019 0 AM To 01:00 PM		Max. Marks: 70		
Instru	uctio	ns: 1) Q.No.1 is compulsory and shou Book.	uld b	e solved in first 30 Minutes in answer		
		2) Figures to the right indicate full	mar	k.		
Duroti	ion: S	MCQ/Objective Ty	/pe	Questions Marke: 1/		
Durau	01. 3	so minutes				
Q.1	Cho 1)	In a CE configuration an emitter resis a) stabilization c) collector bias	e op stor i b) d)	s used for ac signal bypass higher gain		
:	2)	A transistor may be used as switchina) Fixed resistorc) Rectifier	g de b) d)	vice or as a Turning device Variable resistor		
:	3)	The Q point on a loadline may be use a) V_{C} c) V_{B}	ed to b) d)	o determine V _{CC} I _C		
	4)	Voltage regulators keep a constant _ or load varies within limits.		_output voltage when the input		
		a) dc c) sinusoidal	b) d)	Ac Ripple		
	5)	The current gain for a common base	cont	figuration where $I_E = 4.2 \text{ mA}$ and		
		$I_c = 4.0 \text{ mA is }$ a) 16.80	b)	1.05		
	6)	The voltage regulation of a power su	u) vlaa	having $V_{\rm NL} = 50V$ and		
	- /	$V_{FL} = 48V$ is				
		a) 4.17% c) 6.2%	d)	5.2% 7.1%		
	7)	A crystal diode has forward resistance	e of	the order of		
		a) kΩ c) MΩ	b) d)	Ω None of these		
;	8)	The reverse current of diode is of a c a) KA	order b)	of mA		
	<u>0)</u>	C) μA The gate of a IEET's is biased	4 (D	A		
:	3)	a) reversec) reverse as well as forward	л. b) d)	forward downward		
	10)	A JFET has power gain. a) small c) very small	b) d)	very high none of a above		

Page ${\bf 1}$ of ${\bf 16}$

SLR-FM-738

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 dely T = 1000 ms, value of capacitor is _____.
 - a) 0.9*μf*

b) 1.32μf

SLR-FM-738

Set P

- c) $7.5\mu f$ d) $2.49\mu f$
- 14) A stable multivibrator opening at 150th 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.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full mark.

SECTION I

Q.2 Attempt any Four:

- 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:

- 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 $h_{FE} = 100, V_{CC} = 12 \text{ V}, V_{LE} = 6 \text{ V}, I_C = 3\text{mA}, V_{BE} = 0.7 \text{ V}$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four:

- 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 $R_{\rm D}$ and $R_{\rm S}$ 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

12

16

Max. Marks: 56

Set P

12

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



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

No.						Set	Q
		S.E. (Part - I)	(Old) (CGPA) E Bio-Medical E	xam Engii	ination Nov/Dec-2019 neering		
		ELECTRON	CS CIRCUIT AN	IAL	YSIS AND DESIGN - I		
Day & Time:	a Date 10:0	e: Saturday, 14-12 0 AM To 01:00 PM	2-2019 M		Ma	x. Marks	s: 70
Instru	uctio	ns: 1) Q.No.1 is c Book. 2) Figures to t	ompulsory and sho	uld b	e solved in first 30 Minutes	in answ	er
				in mai	n. Ouestiens		
Durati	ion: 3	IVI 30 Minutes		ype	QUESTIONS	Mark	s: 14
Q.1	Choo	ose the correct a	Iternatives from th	ne op	ptions and rewrite the sen	tence.	14
	1)	The reverse curre	ent of diode is of a	order	of		
		a) KA c) uA		d)	mΑ Δ		
	2)	The date of a IFF	-T's is biase	d u			
	<i>∠)</i>	a) reverse		b)	forward		
		c) reverse as w	ell as forward	d)	downward		
	3)	A JFET has	_ power gain.	L)			
		a) small c) verv small		(a b)	very nign none of a above		
	4)	The pinch-off volt	age of a JEET is a	bout			
	•,	a) 5V		b)	0.6V		
		c) 15V		d)	25V		
;	5)	When the input s	ignal reduces the c	hann	el size, the process is calle	d	•
		c) gate charge	L	b) d)	depletion		
	6)	A monostable mu	Iltivibrator has R =	120Ω	a and time dely T = 1000 ms	S,	
		value of capacito	r is	L)	1.00 (
		a) $0.9\mu f$ c) $7.5\mu f$		(a (b	1.32µf 2.49µf		
	7)	A stable multivibr	ator opening at 150) th ha	s a discharge time of 2.5 m	. Dutv	
	- /	cycle of the circui	t will be			,	
		a) 50%		b)	75% 37.5%		
	Q)	$C_{\rm r} = 0.33 $	tion on omittor rosi	u) stori	ST.S70		
	0)	a) stabilization		b)	ac signal bypass		
		c) collector bias	5	d)	higher gain		
	9)	A transistor may	be used as switchir	ng de	vice or as a		
		a) Fixed resistoc) Rectifier	r	(d d)	l urning device Variable resistor		
	10)	The Q point on a	loadline may be us	sed tr	determine		
	,	a) V_C		b)	V _{cc}		
		c) V _B		d)	I _C		

SLR-FM-738 Γ

0 1	
Seat	
NO.	

- c) V_B

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

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full mark.

SECTION I

Q.2 Attempt any Four:

- 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:

- 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 $h_{FE} = 100, V_{CC} = 12 \text{ V}, V_{LE} = 6 \text{ V}, I_C = 3\text{mA}, V_{BE} = 0.7 \text{ V}$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four:

- 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 $R_{\rm D}$ and $R_{\rm S}$ 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

12

16

Max. Marks: 56

Set Q

12

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



c) List various biasing of JFET configuration and describe working of any one with necessary diagram.
Seat No.						Set	R
		S.E. (Part - I)) (Old) (CGPA) I Bio-Medical	Exam Engir	ination Nov/Dec-2019 neering		
		ELECTRON	ICS CIRCUIT A	NAL	SIS AND DESIGN - I		
Day & Time:	Date 10:0	e: Saturday, 14-1 0 AM To 01:00 P	12-2019 PM		Max	. Marks	s: 70
Instru	ictio	ns: 1) Q.No.1 is Book.	compulsory and sh	ould be	e solved in first 30 Minutes i	n answ	er
		Figures to	the right indicate fu	ull mar	k.		
		N	ICQ/Objective	Туре	Questions		
Durati	ion: 3	80 Minutes				Marks	5: 14
Q.1	Choc 1)	The current gain $I_C = 4.0 \text{ mA is } _$ a) 16.80 c) 0.20	alternatives from the for a common bas	t he op se conf b) d)	tions and rewrite the sent iguration where $I_E = 4.2 \text{ mA}$ 1.05 0.95	ence. and	14
	2)	The voltage region $V_{FL} = 48V$ is a) 4.17% c) 6.2%	ulation of a power s 	supply b) d)	having $V_{NL} = 50V$ and 5.2% 7.1%		
	3)	A crystal diode h a) kΩ c) MΩ	nas forward resista	nce of b) d)	the order of Ω None of these		
	4)	The reverse cur a) KA c) μA	rent of diode is of a	i order b) d)	of mA A		
	5)	The gate of a JF a) reverse c) reverse as v	ET's is bias	ed. b) d)	forward downward		
	6)	A JFET has a) small c) very small	power gain.	b) d)	very high none of a above		
	7)	The pinch-off vo a) 5V c) 15V	ltage of a JFET is a	about _ b) d)	0.6V 25V		
	8)	When the input a) enhanceme c) gate charge	signal reduces the nt	channe b) d)	el size, the process is called substrate connecting depletion	 	
	9)	A monostable m value of capacite	nultivibrator has R = or is	= 120Ω	and time dely $T = 1000 \text{ ms}$,	,	

Γ

SLR-FM-738

10) A stable multivibrator opening at 150th has a discharge time of 2.5 m. Duty cycle of the circuit will be _____. a) 50% b) 75% d) 37.5% c) 95.99% 11) In a CE configuration an emitter resistor is used for a) stabilization b) ac signal bypass collector bias C) d) higher gain 12) A transistor may be used as switching device or as a _____.

- - b) Turning device a) Fixed resistor
 - 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
- c) sinusoidal
- b) Ac
- d) Ripple

SLR-FM-738

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full mark.

SECTION I

Attempt any Four: Q.2

Seat No.

- 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:

- 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 $h_{FE} = 100, V_{CC} = 12 \text{ V}, V_{LE} = 6 \text{ V}, I_{C} = 3\text{mA}, V_{BE} = 0.7 \text{ V}$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four:

- 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

Page 11 of 16

Max. Marks: 56

16

12

Set

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



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

							-	
Seat No.							Set	S
		S. E	E. (Part - I) (Old) (Bio-l LECTRONICS CI	(CGPA) Exan Nedical Engi RCUIT ANAL	nii ine .Y	nation Nov/Dec-2019 eering SIS AND DESIGN - I		
Day & Time:	Date 10:0	e: Sa 0 Al	aturday, 14-12-2019 // To 01:00 PM			Max.	Marks	s: 70
Instru	ictio	ns: ′	1) Q.No.1 is compulso Book. 2) Figures to the right	ory and should b	be ark	solved in first 30 Minutes ir	n answ	er
		-				Juactiona		
Durati	ion: 3	80 M	inutes	jective Type	: 6	luestions	Marks	s: 14
Q.1	Cho	ose	the correct alternati	ves from the o	pti	ons and rewrite the sente	ence.	14
_)	A JI	ET has powe	r gain.	P			••
		a)	small	b)		very high		
	•	C) TI	very small			none of a above		
	2)	I he	<pre>pinch-off voltage of a 5\/</pre>	a JFET is about		 0.6V		
		c)	15V	d)		25V		
	3)	Wh	en the input signal re	duces the chanr	nel	size, the process is called		
		a)	enhancement	b)	:	substrate connecting		
	4	C)	gate charge	a)				
	4)	A m valu	ionostable multivibrat	or has $R = 1200$	Ωε	and time dely $I = 1000 \text{ ms}$,		
		a)	0.9μ <i>f</i>	 b)		1.32µf		
		c)	7.5µf	d)		2.49µf		
;	5)	A st cyc	able multivibrator ope e of the circuit will be	ening at 150 th ha 	as	a discharge time of 2.5 m.	Duty	
		a)	50%	b)		75%		
	\mathbf{c}	C)	95.99%	a)		37.5%		
	6)	in a	Stabilization	emitter resistor b)	IS	used for		
		c)	collector bias	d)		higher gain		
	7)	A tr	ansistor may be used	as switching de	evi	ce or as a		
		a)	Fixed resistor	b)		Turning device		
	•	C)	Rectifier	a)		Variable resistor		
	8)	The	Q point on a loadline	e may be used to b)	00	determine		
		c)	V _B	d)		lc		
	9)	Volt	age regulators keep	a constant		output voltage when the inp	out	
		or lo	bad varies within limit	S. ኦነ		۵с		
		a)	uu	U)				

d) Ripple c) sinusoidal

SLR-FM-738

Seat

Set S

- 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 $V_{NL} = 50V$ and $V_{FL} = 48V$ 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) $k\Omega$ b) Ω
 - c) $M\Omega$ 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

Max. Marks: 56

		-	
Page	: 15	of	16

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full mark.

SECTION I

Q.2 Attempt any Four:

- 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:

- 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 $h_{FE} = 100, V_{CC} = 12 \text{ V}, V_{LE} = 6 \text{ V}, I_C = 3\text{mA}, V_{BE} = 0.7 \text{ V}$
- c) List various bias compensation technique of BJT and describe any one in detail with necessary diagram.

Section – II

Q.4 Attempt Any Four:

- 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 $R_{\rm D}$ and $R_{\rm S}$ 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

12

16

Set S

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



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

0	,	
bandwidth in a filter equa low pass band pass	l the b) d)	critical frequency. high pass band stop
theorems applicable for both I Superposition Norton's	inear b) d)	and nonlinear circuits. Thevenin's None of these
critical frequency is defined as th from the pass band.	ne po	oint at which the response drops
-20 dB	b)	-3 dB
-6 dB	d)	-40 dB

Seat No.

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

Duration: 30 Minutes

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

Q.1 Choose the correct alternatives from the options.

- If an ac signal generator drives a series RLC circuit, then the circuit 1) undergoes resonance only due to variation in . series resistance b)
 - supply voltage a)
 - supply frequency d) c) phase angle
- 2) among the following condition is true at the resonance.
 - $X_c > X_L$ $X_c = X_L$ a) b)
 - c) $X_c < X_L$ d) None of above
- The connecting of energy source at the port of network known as . 3)
 - driving point a) b) transfer point d) C) Q point resonance point
- 4) represents the precise condition of reciprocity for transmission parameters.
 - a) AB CD = 1b) AD - BC = 1
 - c) AC BD = 1d) AA' - CD = 1
- ____ acts as an independent variables in Y- parameter. 5)
 - a) current b) power
 - c) Voltage d) energy
- 6) The a)

 - c)
- 7)
 - a)
 - c)
- 8) The a)
 - c)

Max. Marks: 70

SLR-FM-739

Set

Marks: 14

			Set P
9)	A low pass filter has a cut off freque filter will be KHz. a) 2.46 c) 644	ncy c b) d)	of 1.23 KHz. The bandwidth of 1.23 1.44
10)	Norton's current is equal to the currection circuited output terminal. a) short c) closed	ent pa b) d)	assing through the open broken
11)	The impedances Z_1 and Z_2 are said a) $Z_1Z_2 = R_0$ c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_0$	to be b) d)	e inverse if $Z_1+Z_2 = R_0$ $Z_1Z_2 = R_0^2$
12)	In an RC circuit when the switch in (a) do not vary with time c) rises with time	close b) d)	d, the response decays with time rises with frequency
13)	Bandwidth of a series resonance cir over which circuit current in equal to current. a) 70.7% c) 75%	cuit i o or g b) d)	s defined as the range frequency reater than of maximum 60% 11%
14)	Kirchoff's current law states that the junction or node in an electric circuit a) Voltages	alge ts in z b)	braic sum of meeting at a zero. energies

c) Potentials d) currents

SLR-FM-739

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

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 μ f of capacitor and a coil whose résistance and inductance are 15 Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

Q.3 Attempt any two questions.

a) Find the values of R and C so that $V_{x^2} 3V_y$. V_x and V_y are in quadrature.



12



Max. Marks: 56

SLR-FM-739

- twork determine currents i_1 (t) and i_2 (t) when the switch is
- b) In the given network determine currents i₁ (t) and i₂ (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.

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



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

Q.5 Attempt any two questions.

- a) Prove the following relation.
 - 1) Z parameters in terms of Y parameter
 - 2) Z parameters in terms of h parameter
- b) Determine Y and Z parameter for the network shown



- c) Write short note.
 - 1) Working of bridged T type attenuation
 - 2) Notch filtering using RCA circuits

16

SLR-FM-739

Max. Marks: 70 Book Page No.3 2) Figures to the right indicate full mark. MCQ/Objective Type Questions **Duration: 30 Minutes** from the pass band. b) -3 dB c) -6 dB d) -40 dB a) 2.46 b) 1.23 c) 644 d) 1.44 Norton's current is equal to the current passing through the d) broken c) closed a) $Z_1 Z_2 = R_0$ c) $\frac{1}{Z_1} + \frac{1}{Z_2} = R_0$ b) $Z_1 + Z_2 = R_o$ d) $Z_1 Z_2 = R_o^2$ In an RC circuit when the switch in closed, the response _____. a) do not vary with time decays with time b) rises with time d) rises with frequency c) current. b) 60% d) 11%

- Kirchoff's current law states that the algebraic sum of _____ meeting at a 7) junction or node in an electric circuits in zero.
 - a) voltages b) energies d) currents
 - c) potentials If an ac signal generator drives a series RLC circuit, then the circuit
 - undergoes resonance only due to variation in ___
 - supply voltage a) supply frequency c)
- b) series resistance
- phase angle d)

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

Seat No.

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

Q.1 Choose the correct alternatives from the options.

- The critical frequency is defined as the point at which the response drops 1)
 - a) -20 dB
- A low pass filter has a cut off frequency of 1.23 KHz. The bandwidth of 2) filter will be _____ KHz.
- 3) circuited output terminal.

a)	short	b)	open
c)	closed	(h	hroker

- The impedances Z_1 and Z_2 are said to be inverse if _____. 4)
- 5)

 - Bandwidth of a series resonance circuit is defined as the range frequency over which circuit current in equal to or greater than _____ of maximum
 - a) 70.7%
 - c) 75%



Marks: 14

14

6)

8)

9) _ among the following condition is true at the resonance.

 $X_c > X_L$ a) C)

 $X_c = X_l$ b)

 $X_c < X_L$

- d) None of above
- The connecting of energy source at the port of network known as _____. 10)
 - a) driving point b) transfer point c) Q point
 - d) resonance point

SLR-FM-739

Set Q

- 11) represents the precise condition of reciprocity for transmission parameters.
 - b) AD BC = 1a) AB - CD = 1
 - d) AA' CD = 1c) AC - BD = 1
- _____ acts as an independent variables in Y- parameter. 12)
 - 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
- theorems applicable for both linear and nonlinear circuits. 14)
 - a) Superposition c) Norton's

- Thevenin's b)
- d) None of these

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

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 μ f of capacitor and a coil whose résistance and inductance are 15 Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

Q.3 Attempt any two questions.

a) Find the values of R and C so that $V_{x^2} 3V_y$. V_x and V_y are in quadrature.



Max. Marks: 56

16

12



SLR-FM-739

- Set Q
- b) In the given network determine currents i₁ (t) and i₂ (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.

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



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

Q.5 Attempt any two questions.

- a) Prove the following relation.
 - 1) Z parameters in terms of Y parameter
 - 2) Z parameters in terms of h parameter
- b) Determine Y and Z parameter for the network shown



- c) Write short note.
 - 1) Working of bridged T type attenuation
 - 2) Notch filtering using RCA circuits

16

SLR-FM-739

	0							
Seat No.							Set	R
	S.E	. (Part - I)	(Old) (C Bio-M	GPA) Ex edical Er	am ngir	ination Nov/Dec-2019 seering	9	
			LINEAR	CIRCUIT	۱Ä٦	NALYŠIS		
Day & Time:	Date: Tue 10:00 AM	esday,17-12 To 01:00 P	2-2019 M			Ma	ax. Marks	3: 70
Instru	ctions: 1) 2)	Q.No.1 is o Book Page Figures to	compulsor No.3 the right ir	y and shou ndicate full	ld be mar	e solved in first 30 Minutes k.	s in answ	er
		Ν	ICQ/Obj	ective Tv	pe	Questions		
Duratio	on: 30 Min	utes	· · · · · · · · · · · · · · · · · · ·	····· ,			Marks	s: 14
Q.1 (Choose th) a) c)	ne correct a acts as a current voltage	alternative n indepen	es from the dent variab	e op bles i b) d)	tions. n Y- parameter. power energy		14
2	2) The a) c)	bandwidth i Iow pass band pass	n a	filter equa	l the b) d)	critical frequency. high pass band stop		
3	3) a) c)	theorems Superpositi Norton's	s applicabl on	e for both l	inea b) d)	r and nonlinear circuits. Thevenin's None of these		
4	4) The a) c)	critical frequ from the -20 dB -6 dB	uency is de pass band	efined as th	ne po b) d)	oint at which the response -3 dB -40 dB	e drops	
5	5) A lov filter a) c)	v pass filter will be 2.46 644	has a cut KHz.	off frequen	b) d)	f 1.23 KHz. The bandwidt 1.23 1.44	th of	
6	6) Norto circu a) c)	on's current ited output short closed	is equal to terminal.	o the curre	nt pa b) d)	assing through the open broken		
7	7) The a) c)	impedance $Z_1Z_2 = R_0$ $\frac{1}{Z_1} + \frac{1}{Z_2} = R_0$	s Z_1 and Z_2	f_2 are said t	to be b) d)	e inverse if $Z_1+Z_2 = R_o$ $Z_1Z_2 = R_o^2$		
8	3) In an a) c)	n RC circuit do not vary rises with ti	when the with time me	switch in cl	oseo b) d)	d, the response decays with time rises with frequency		
ç	9) Band over curre a) c)	dwidth of a s which circu ent. 70.7% 75%	series reso lit current i	onance circ n equal to	uit is or gi b) d)	e defined as the range free eater than of maxi 60% 11%	quency mum	

Seat

			SLR-FM-739
			Set R
10)	Kirchoff's current law s junction or node in an o a) voltages c) potentials	ates that the algebraic sum of lectric circuits in zero. b) energies d) currents	meeting at a
11)	If an ac signal generate undergoes resonance a) supply voltage c) supply frequency	r drives a series RLC circuit, then the only due to variation in b) series resistance d) phase angle	≥ circuit
12)	among the follow a) $X_c > X_L$ c) $X_c < X_L$	ving condition is true at the resonance b) X _c = X _L d) None of above	е.
13)	The connecting of eneral driving point c) Q point	gy source at the port of network know b) transfer point d) resonance point	vn as
14)	represents the p parameters. a) $AB - CD = 1$ c) $AC - BD = 1$	recise condition of reciprocity for tran b) $AD - BC = 1$ d) $AA' - CD = 1$	smission

c) AC - BD = 1

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

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 μ f of capacitor and a coil whose résistance and inductance are 15 Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

Q.3 Attempt any two questions.

a) Find the values of R and C so that $V_{x^2} 3V_y$. V_x and V_y are in quadrature.



12

Max. Marks: 56

16

Set R

SLR-FM-739

- SLR-FM-739 Set R
- 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.

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



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

Q.5 Attempt any two questions.

- a) Prove the following relation.
 - 1) Z parameters in terms of Y parameter
 - 2) Z parameters in terms of h parameter
- b) Determine Y and Z parameter for the network shown



- c) Write short note.
 - 1) Working of bridged T type attenuation
 - 2) Notch filtering using RCA circuits

16

Seat No.							Set	S
		S.E	E. (Part - I)	(Old) (CGP Bio-Medio LINEAR CIF	A) Exam cal Engi RCUIT A	nination Nov/Dec-2019 neering NALYSIS)	
Day & Time:	Date 10:00	e: Tu D AN	esday,17-12 I To 01:00 P	2-2019 M		Ma	x. Marks	s: 70
Instru	ction	is: 1 2) Q.No.1 is o Book Page) Figures to	compulsory and No.3 the right indica	d should b ite full ma	e solved in first 30 Minutes rk.	in answ	er
			Ν	ICQ/Objecti	ve Type	Questions		
Duratio	on: 3	0 Mi	nutes	-			Marks	s: 14
Q.1 (Choo 1)	se t Nort circu a) c)	he correct a ton's current uited output short closed	alternatives from is equal to the terminal.	om the op current p b) d)	otions. bassing through the open broken		14
2	2)	The a) c)	impedance $Z_1Z_2 = R_o$ $\frac{1}{Z_1} + \frac{1}{Z_2} = R_c$	s Z_1 and Z_2 are	e said to b b) d)	e inverse if $Z_1+Z_2 = R_o$ $Z_1Z_2 = R_o^2$		
3	3)	In a a) c)	n RC circuit do not vary rises with ti	when the switc with time me	ch in close b) d)	ed, the response decays with time rises with frequency		
2	4)	Ban over curr a) c)	dwidth of a s r which circu ent. 70.7% 75%	series resonan it current in eq	ce circuit i ual to or g b) d)	is defined as the range freq greater than of maxin 60% 11%	uency num	
Ę	5)	Kirc junc a) c)	hoff's currer tion or node voltages potentials	it law states the in an electric o	at the alge circuits in b) d)	ebraic sum of meetin zero. energies currents	g at a	
e	6)	lf ar und a) c)	n ac signal g ergoes reso supply volta supply freq	enerator drives nance only due age uency	s a series e to variati b) d)	RLC circuit, then the circuit on in series resistance phase angle		
7	7)	a) c)	among th X _c > X _L X _c < X _L	e following cor	ndition is t b) d)	rue at the resonance. X _c = X _L None of above		
8	3)	The a) c)	connecting driving poin Q point	of energy sour t	ce at the b) d)	port of network known as transfer point resonance point		

Set S





9) _ represents the precise condition of reciprocity for transmission parameters.

- a) AB CD = 1b) AD - BC = 1
- d) AA' CD = 1c) AC - BD = 1
- ____ acts as an independent variables in Y- parameter. 10)
 - a) current b) power c) voltage
 - d) energy
- The bandwidth in a _____ filter equal the critical frequency. 11)
 - a) low pass b) high pass
 - c) band pass band stop d)
- 12) _ theorems applicable for both linear and nonlinear circuits.
 - a) Superposition b) Thevenin's
 - c) Norton's None of these d)
- 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
- A low pass filter has a cut off frequency of 1.23 KHz. The bandwidth of 14) filter will be _____ KHz.
 - a) 2.46 b) 1.23
 - c) 644
- d) 1.44

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four questions.

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

SA Za ZA ZA ZA

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 μ f of capacitor and a coil whose résistance and inductance are 15 Ω and 260 mH respectively. Determine
 - 1) Resonant frequency
 - 2) Q factor of the circuit at resonance

Q.3 Attempt any two questions.

a) Find the values of R and C so that $V_{x^2} 3V_y$. V_x and V_y are in quadrature.



12

Max. Marks: 56

16

SLR-FM-739

Set

b) In the given network determine currents i₁ (t) and i₂ (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.

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



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

Q.5 Attempt any two questions.

- a) Prove the following relation.
 - 1) Z parameters in terms of Y parameter
 - 2) Z parameters in terms of h parameter
- b) Determine Y and Z parameter for the network shown



- c) Write short note.
 - 1) Working of bridged T type attenuation
 - 2) Notch filtering using RCA circuits

16

12

SLR-FM-739



Instr	uctio	s: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answe book	r
		2) Figures to the right indicate full marks	
		MCQ/Objective Type Questions	
Dura	tion: 3	0 Minutes Marks: 1	4
Q.1	Choo 1)	se the correct alternatives from the options and rewrite the sentence.1If the displacement is measured with strain gauge then the number of strain gauge normally required are1a) Oneb) Twoc) Threed) Four	4
	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 isa) Resolutionb) Accuracyc) Precisiond) Scale	
	4)	of the following is not a piezo electric sensor.a) PZTb) Roscelle saltc) Quartzd) 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 bya) biocatalytic membraneb) Physio-chemical membranec) Chemical membraned) artificial membrane	
	8)	refers to the degree of repeatability of a measurement. a) Accuracy b) Precision c) Resolution d) Sensitivity	
	9)	Change is 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	

Seat No.

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

In er

a)

c)

SLR-FM-740

Set

Max. Marks: 70

Ρ

Conformance b) Saturation Repeatability d) Threshold

- 11) _____ of the following is not a static property.
 - a) Repeatability

b) Hysteresis

SLR-FM-740

Set P

- 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
 - c) lodine

- b) Basic solution
- d) Hydrazine

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks

Section – I

Q.2 Attempt any four

- 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.

- 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 verse voltage characteristics of thermistors.

Section – II

Q.4 Attempt any four

- a) What is mean 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

- 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.



Max. Marks: 56

12

16

12

Set

Seat No.

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

- 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

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

- ____ refers to the degree of repeatability of a measurement. 1)
 - b) Precision Accuracy a)
 - Resolution d) Sensitivity c)
- 2) Change is signal over long period of time is called _____
 - noise b) offset a)
 - c) hysteresis d) drift
- 3) Ability of the sensor to repeat a measurement when put back in the same environment is called _____
 - Conformance b) Saturation a)
 - Repeatability C) d) Threshold

4) of the following is not a static property.

- a) Repeatability b) Hysteresis
- Frequency response d) Saturation C)
- Transducers employed in the bulk of enzyme electrodes use of the _____ 5) principles.
 - Amperometric a) b) Optical
 - Magnetic d) Colorimetric c)
- of the following transducers must be used for dissolved oxygen 6) analyser.
 - a) Potentiometric Ion-selective electrode

c)

- b) Polarographic
- d) Optical transducer
- 7) Oxygen content can be controlled by adding which of the following materials with water?
 - Acidic solution a) c) lodine
- b) Basic solution d) Hydrazine
- If the displacement is measured with strain gauge then the number of 8) strain gauge normally required are ____
 - One b) Two a) c) Three d) Four

Max. Marks: 70

Marks: 14

9) A capacitive pressure sensor has a typical measurement uncertainty of _____.

- a) ± 0.2%
- b) ± 0.4% ± 0.1% d) ± 0.8% C)
- 10) Smallest change which a sensor can detect is _
 - Resolution b) Accuracy a)
 - Precision d) C) Scale
- of the following is not a piezo electric sensor. 4)
 - PZT b) Roscelle salt
 - C) Quartz

a)

a)

a)

- d) None of the mentioned

SLR-FM-740

Set | Q

- of the following has the widest range of temperature measurement. 5)
 - RTD a) Thermistor C)

active

- b) Thermocouple Mercury thermometer d)
- Optical fiber sensors are electrically _ 6)
 - b) passive
 - active as well as passive C)
 - d) cannot be determined
- 7) The biological response of the biosensor is determined by biocatalytic membrane
 - b) Physio-chemical membrane
 - Chemical membrane C)
- d) artificial membrane

Page 5 of 12

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks

Section – I

Q.2 Attempt any four

- 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.

- 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 verse voltage characteristics of thermistors.

Section – II

Q.4 Attempt any four

- a) What is mean by biosensor? Give classification of biosensor.
- **b**) Explain construction and working of pCO_2 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

- 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.



Max. Marks: 56

12

16

16

Seat No.

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

- 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

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

c)

a)

a)

Thermistor

- b) Thermocoupled) 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 _
 - b) Physio-chemical membrane

d) artificial membrane

c) Chemical membrane

biocatalytic membrane

- 4) _____ refers to the degree of repeatability of a measurement.
 - a) Accuracy b) Precision
 - c) Resolution d) Sensitivity
- 5) Change is signal over long period of time is called _____
 - a) noise b) offset
 - c) hysteresis d) drift
- Ability of the sensor to repeat a measurement when put back in the same environment is called _____
 - Conformance b) Saturation
 - c) Repeatability d) Threshold

7) _____ of the following is not a static property.

- a) Repeatability b) Hysteresis
- c) Frequency response d) Saturation
- Transducers employed in the bulk of enzyme electrodes use of the _____ principles.
 - a) Amperometric b) Optical
 - c) Magnetic d) Colorimetric
- 9) _____ of the following transducers must be used for dissolved oxygen analyser.
 - a) Potentiometricc) Ion-selective electrode
- b) Polarographic
- d) Optical transducer

Max. Marks: 70

Marks: 14

Set

Oxygen content can be controlled by adding which of the following 10) materials with water? a) Acidic solution

b) Basic solution

SLR-FM-740

Set R

- c) lodine d) Hydrazine
- 11) If the displacement is measured with strain gauge then the number of strain gauge normally required are ____
 - b) Two a) One c) Three d) Four
- A capacitive pressure sensor has a typical measurement uncertainty 12) of

· -			
a)	± 0.2%	b)	± 0.4%
C)	± 0.1%	d)	± 0.8%

- Smallest change which a sensor can detect is _____. 13)
 - 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

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks

Section – I

Q.2 Attempt any four

- 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.

- 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 verse voltage characteristics of thermistors.

Section – II

Q.4 Attempt any four

- a) What is mean 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

- 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.



Max. Marks: 56

12

16

12

Set

Max. Marks: 70

Seat No.

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

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

a) c)

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

- Ability of the sensor to repeat a measurement when put back in the same 1) environment is called _____
 - Conformance b) Saturation a) Threshold
 - c) Repeatability d)
- of the following is not a static property. 2)
- 3) Transducers employed in the bulk of enzyme electrodes use of the _____ principles.

b) Hysteresis

d) Saturation

b) Optical d) Colorimetric

Polarographic

b)

a) Amperometric

Frequency response

Repeatability

- Magnetic c)
- of the following transducers must be used for dissolved oxygen 4) analyser.
 - a) Potentiometric
 - d) Optical transducer Ion-selective electrode c)
- 5) Oxygen content can be controlled by adding which of the following materials with water?
 - Acidic solution b) Basic solution a)
 - lodine d) Hydrazine c)
- 6) If the displacement is measured with strain gauge then the number of strain gauge normally required are
 - One a) b) Two
 - c) Three d) Four
- 7) A capacitive pressure sensor has a typical measurement uncertainty of .
 - a) ± 0.2% b) $\pm 0.4\%$ c) ± 0.1% d) ± 0.8%
- Smallest change which a sensor can detect is 8)
 - a) Resolution b) Accuracy
 - Precision c) d) Scale

Marks: 14

			Set S	3
a) c)	of the following is not a piezo PZT Quartz	elec b) d)	ctric sensor. Roscelle salt None of the mentioned	
a) c)	of the following has the wides RTD Thermistor	st rar b) d)	nge of temperature measurement. Thermocouple Mercury thermometer	
Opti a) c)	ical fiber sensors are electrically active active as well as passive	b) d)	 passive cannot be determined	
The a) c)	biological response of the biose biocatalytic membrane Chemical membrane	nsor b) d)	is determined by Physio-chemical membrane artificial membrane	
	refers to the degree of repeat	abili	tv of a measurement.	

- 13) refers to the degree of repeatability of a measurement.
 - b) Precision a) Accuracy
 - c) Resolution d) Sensitivity
- Change is signal over long period of time is called _____. 14)
 - a) noise

9)

10)

11)

12)

- b) offsetd) drift
- c) hysteresis

Set S

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks

Section – I

Q.2 Attempt any four

Seat No.

- 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.

- 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 verse voltage characteristics of thermistors.

Section – II

Q.4 Attempt any four

- a) What is mean 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

- 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.

12

16

Max. Marks: 56

12
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

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

1)

Seat

No.

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

is branch of mechanism that describe the cause of bio mechanism.

Physics a)

- b) Chemistry **Kinematics** Informatics d) c)
- 2) Instrumented walkway record timings of _
 - Goniometer b) Footswitch a) Gait d) None C)

Antalgic hip gait is related to which of the following _ 3)

- a) Wadding gait Trendeleberg gait b) Painful hip gait d) c)
- 4) Neck joint is an example of .
 - Pivot joint b) a)
 - Saddle joint c)
- In which type of lever the force is in between weight and fulcrum? 5)
 - Type II Type I a) b)
 - c) Type III d) All above

The movements around ball and socket joints are 6)

Flexion and extension Rotation and circumduction a) b) c) Hyper extension d) All above

Which of the following is example of biaxial joint? 7)

- Hinae Pivot a) b)
- c) Both a and b d) None
- Sideward curvature of the spine is called 8)
 - a) Knock knee **Kyphosis** b)
 - d) Lordosis c) Scoliosis
- 9) The trim lines of a ground reaction ankle foot orthosis should be anterior to the malleoli to serve as a
 - Dossiflexion assist b) Plantarflexion assist a) Dorsiflexion stop c)
 - d) Plantarflexion stop

SLR-FM-741



Max. Marks: 70

Marks: 14

- Short leg gait
- Hinge joint
- Condyloid joint

- d)



- 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 desease
- 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

Page 2 of 12

Set

Seat	
No.	

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

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.

- 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.

- **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.

- 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.

- 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

Max. Marks: 56

12

16

16

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

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

Seat

No.

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

- Sideward curvature of the spine is called _ 1)
 - a) Knock knee
 - c) Scoliosis d) Lordosis
- The trim lines of a ground reaction ankle foot orthosis should be anterior 2) to the malleoli to serve as a _____
 - Dossiflexion assist b) Plantarflexion assist a)
 - Dorsiflexion stop Plantarflexion stop d) c)
- 3) 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
- 4) The selection of thorax is made up of
 - a) Cartilage Bone b)
 - c) Both a and b d) None
- Zygomatic bone is present in _____ 5)
 - a) Upper extremities b) Lower extremities c) Vertebral column
- A short statured patient brought to orthopedics OPD with a x- ray showing 6) flattened vertebra with beak. The probable diagnosis is _____.
 - a) Achondroplasia b) Ochronosis
 - c) Eosinophilic granuloma d) Calve's desease
- 7) Which of the following is responsible for limiting the range of movements?
 - a) Tendons Ligaments b)
 - c) Both a and b Muscle fibers d)
- is branch of mechanism that describe the cause of bio 8) mechanism.
 - b) Chemistry c) Informatics **Kinematics** d)
 - a) Physics

d) Skull



Set	Q





Max. Marks: 70

Marks: 14

SLR-FM-741

- **Kyphosis**
- b)

Set Q

- 9) Instrumented walkway record timings of .
 - a) Goniometer c) Gait
- b) Footswitch
- d) None
- Antalgic hip gait is related to which of the following _____ 10)
 - a) Wadding gait c) Painful hip gait
- b) Trendeleberg gait
- d) Short leg gait
- Neck joint is an example of _____. 11)

a) Flexion and extension

- a) Pivot joint b) Hinge joint c) Saddle joint Condyloid joint d)
- In which type of lever the force is in between weight and fulcrum? Type II
 - a) Type I b) All above c) Type III d)
- 13) The movements around ball and socket joints are ____
 - Rotation and circumduction b)
 - c) Hyper extension d) All above
- Which of the following is example of biaxial joint? 14)
 - a) Hinge c) Both a and b

12)

- b) Pivot None
- d)

Seat No.

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

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.

- 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.

- **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.

- 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.

- 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

Max. Marks: 56

12

16

16

Day Time	& Date : 02:3	e: Sa 0 PN	aturday, 23-11-2019 // To 05:30 PM		
Instr	uctior	າs: ໌	 Q. No. 1 is compulsory and she book. Figures to the right indicate full 	ould b I mark	e solved in first 3
			3) Assume suitable data if necess	sary.	
			MCQ/Objective Ty	ype (Questions
Dura	tion: 3	0 M	inutes		
Q.1	Choo 1)	ose In v a) c)	the correct alternatives from th which type of lever the force is in Type I Type III	ne opt betwe b) d)	t ions and rewrite een weight and fu Type II All above
	2)	The a) c)	e movements around ball and so Flexion and extension Hyper extension	cket jo b) d)	oints are Rotation and cire All above
	3)	Wh a) c)	nich of the following is example of Hinge Both a and b	biaxi b) d)	al joint? Pivot None
	4)	Sid a) c)	leward curvature of the spine is c Knock knee Scoliosis	alled b) d)	Kyphosis Lordosis
	5)	The	e trim lines of a ground reaction a	ankle f	foot orthosis shou

Seat

No.

cumduction

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering BIO MEDICAL PROSTHETIC AND ORTHOTICS**

0 minutes in answer

e the sentence.

lcrum?

SLR-FM-741

- Id be anterior to the malleoli to serve as a _____.
 - Dossiflexion assist b) Plantarflexion assist a)
 - Dorsiflexion stop d) Plantarflexion stop c)
- When the counter of the shoe fits too tightly on a SACH foot which of the 6) 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
- 7) The selection of thorax is made up of
 - a) Cartilage b) Bone
 - c) Both a and b d) None
- Zygomatic bone is present in _____ 8)
 - a) Upper extremities b) Lower extremities
 - c) Vertebral column d) Skull

Set R

Max. Marks: 70

Marks: 14

				Set
9)	A s flatt a) c)	hort statured patient brought to or ened vertebra with beak. The pro Achondroplasia Eosinophilic granuloma	rthope bable b) d)	edics OPD with a x- ray showing e diagnosis is Ochronosis Calve's desease
10)	Wh a) c)	ich of the following is responsible Tendons Both a and b	for lir b) d)	niting the range of movements? Ligaments Muscle fibers
11)	me a) c)	is branch of mechanism th chanism. Physics Informatics	nat de b) d)	escribe the cause of bio Chemistry Kinematics
12)	Inst a) c)	rumented walkway record timings Goniometer Gait	s of _ b) d)	Footswitch None
13)	Ant a) c)	algic hip gait is related to which o Wadding gait Painful hip gait	f the i b) d)	following Trendeleberg gait Short leg gait
14)	Neo a)	ck joint is an example of Pivot joint	b)	Hinge joint

c) Saddle joint d) Condyloid joint

SLR-FM-741

R

Seat	
No.	

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

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.

- 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.

- **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.

- 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.

- 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

Max. Marks: 56

R

12

16

12

Seat	
No.	

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

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

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

- When the counter of the shoe fits too tightly on a SACH foot which of the 1) 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 Skull d)
- A short statured patient brought to orthopedics OPD with a x- ray showing 4) flattened vertebra with beak. The probable diagnosis is _____.
 - Achondroplasia b) a)
 - Eosinophilic granuloma Calve's desease d) c)
- 5) Which of the following is responsible for limiting the range of movements?
 - Ligaments a) Tendons b)
 - Muscle fibers c) Both a and b d)
- is branch of mechanism that describe the cause of bio 6) mechanism. b) Chemistry
 - a) Physics
 - c) Informatics **Kinematics** d)
- Instrumented walkway record timings of _ 7)
 - a) Goniometer Footswitch b) c) Gait d) None
- Antalgic hip gait is related to which of the following 8)
 - a) Wadding gait b) Trendeleberg gait
 - c) Painful hip gait d) Short leg gait

Set

Max. Marks: 70

Marks: 14

- Ochronosis

Neck joint is an example of _____. a) Pivot joint b) Hinge joint **SLR-FM-741**

Set S

- a) Pivot jointb) Hinge jointc) Saddle jointd) Condyloid joint
- 10) In which type of lever the force is in between weight and fulcrum?
 - a) Type I b) Type II
 - c) Type III d) All above

11) The movements around ball and socket joints are _____

- a) Flexion and extension b) Rotation and circumduction
- c) Hyper extension d) All above
- 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 _____

9)

- 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 _____.

Plantarflexion assist

- a) Dossiflexion assist b)
- c) Dorsiflexion stop d) Plantarflexion stop

Seat No.

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

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.

- 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.

- **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.

- 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.

- 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

Max. Marks: 56

12

12

16

Set S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering**

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

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

ELECTRONIC INSTRUMENTATIONS

2) Figure to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Seat

No.

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

A device prevents the oscillation of the moving system and enables 1) the latter to reach its final position quickly.

b) Controlling

d) ballistic galvanometer

b) Square waveforms

- a) deflecting
- damping d) all of the above C)
- 2) A moving-coil permanent-magnet instrument can be used as _____by using a low resistance shunt. b) Voltmeter
 - a) ammeter
 - flux-meter c)

3) An rms reading voltmeter can accurately measure voltages of .

- Sine waveforms a)
 - Saw tooth waveforms d) All of these C)

4) The measurement range of digital voltmeter is _____

- 1V to 1kV 1V to 1MV b) a) 1kV to 1MV d) 100 kV to 100MV C)
- 5) In a ramp type DVM, the multivibrator determines the rate at which the _ a)
 - Clock pulses are generated Measurement cycles are initiated b) Its amplitude varies d)
 - c) It oscillates

Q meter is used to measure the properties of _ 6)

- a) Inductive coils b) Non inductive coils
 - Capacitive coils d) Both (a) and (c) C)

In liquid crystal displays, the liquid crystal exhibits properties of _____. 7)

- 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
- 9) In function generator, the output waveform of integrator is
 - Sinusoidal a) Triangular c)
- b) Square d) Saw-tooth

d) Cost

SLR-FM-742

Max. Marks: 70

Marks: 14

A voltmeter connected across a resistor gives a value of 65 V but the 10) expected value of resistor was 68 V. Then the absolute error and the relative accuracy of the measurement will be _ 3.2%, 96.8% a)

b) 3.8%, 96.2%

c) 4%, 96%

d) 4.4%, 95.59%

SLR-FM-742

Set P

- For an instrument the degree of repeatability or reproducibility in 11) measurements is alternative way of expressing its _____.
 - Precision b) Accuracy a)
 - d) Linearity Sensitivity c)
- 12) T he zero drift is measured in units of _
 - a) Volts-°C b) Volts /°c
 - c) °c/volts d) $(volts)^2/^{\circ}c$
- The difference between the measured value and the true value is known 13) as
 - Relative error a)

C)

- b) Random error
- d) Systematic error Absolute error C)
- 14) If the control springs of PMMC instrument is made up of large moment of inertia, then it can be used as _____
 - a) Ammeter
 - Ballistic galvanometer
- b) Fluxmeter
 - d) Wattmeter

-		,						
Seat No.		Set	Ρ					
	S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering ELECTRONIC INSTRUMENTATIONS							
Day & Time:	& Date: Monday, 25-11-2019 N : 02:30 PM To 05:30 PM	lax. Marks	: 56					
Instru	uctions: 1) All questions are compulsory. 2) Figure to the right indicates full marks.							
	Section – I							
Q.2	 Attempt any four. 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. 		16					
Q.3	 Attempt any two. a) Describe working of R-2R ladder DAC. b) Write a short note on: True RMS responding voltmeter Average responding voltmeter c) Explain the working of successive approximation type digital voltmeter 	eter.	12					
	Section – II							
Q.4	 Attempt any four. 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: LCD display system Touch screen display system 		16					
Q.5	Attempt any two.		12					
	a) What is Lissajous pattern? How it is useful in frequency and phase measurement?	9						
	 b) With the help of neat diagram explain working of function generator c) Explain working of multichannel data acquisition system and explain applications. 	or. iin its						

SLR-FM-742

SLR-FM-742 Set

Seat

No.

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

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

c)

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

- The basic difference between square wave and pulse generator is their _____. 1) b) Duty cycles
 - Waveforms shape a)
 - Frequency range d) Cost c)
- 2) In function generator, the output waveform of integrator is _____.
 - Sinusoidal b) Square a) d) Saw-tooth
 - c) Triangular
- 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
 - 3.2%, 96.8% a) 4%, 96%
- b) 3.8%, 96.2% 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
 - Sensitivity d) Linearity c)
- 5) T he zero drift is measured in units of
 - Volts /°c a) Volts-°C b)
 - c) °c/volts d) $(volts)^2/^{\circ}c$
- The difference between the measured value and the true value is known 6) as
 - Relative error a) C)
 - b) Random error 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 ____
 - Ammeter b) Fluxmeter a)
 - Ballistic galvanometer d) Wattmeter C)
- A _____device prevents the oscillation of the moving system and enables 8) the latter to reach its final position quickly.
 - deflecting b) Controlling a)
 - damping d) all of the above c)

Max. Marks: 70

Marks: 14

				SLR-FM-742
				Set Q
9)	A m usir	noving-coil permanent-magnet in ng a low resistance shunt.	strur	ment can be used asby
	a)	ammeter	b)	Voltmeter
	c)	flux-meter	d)	ballistic galvanometer
10)	An	rms reading voltmeter can accur	ately	r measure voltages of
	a)	Sine waveforms	b)	Square waveforms
	c)	Saw tooth waveforms	d)	All of these
11)	The	e measurement range of digital v	oltm	eter is
	a)	1V to 1MV	b)	1V to 1kV
	c)	1kV to 1MV	d)	100 kV to 100MV
12)	In a	a ramp type DVM, the multivibrate	or de	etermines the rate at which the
	a)	Clock pulses are generated	b)	Measurement cycles are initiated
	c)	It oscillates	d)	Its amplitude varies
13)	Q n	neter is used to measure the pro	perti	es 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)

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

Seat No.

- 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.

- 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.

- 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.

- 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.

12

Max. Marks: 56

SLR-FM-742

16

12

Seat No.

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

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

c)

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
 - are generated b) Measurement cycles are initiated d) Its amplitude varies
- 2) Q meter is used to measure the properties of _____
 - a) Inductive coils
 - c) Capacitive coils

It oscillates

d) Both (a) and (c)

b) Non inductive coils

- 3) In liquid crystal displays, the liquid crystal exhibits properties of _____.
 - a) Liquidb) Solidsc) Gasesd) Both (a) and (b)
- 4) The basic difference between square wave and pulse generator is their _____.
 - a) Waveforms shapec) Frequency range
- b) Duty cyclesd) Cost

d) Saw-tooth

- 5) In function generator, the output waveform of integrator is _____.
 - a) Sinusoidal b) Square
 - c) Triangular
- 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) T he zero drift is measured in units of _____
 - a) Volts-°C b) Volts /°c
 - c) °c/volts d) $(volts)^2/°c$
- The difference between the measured value and the true value is known as _____.
 - a) Relative error
 - c) Absolute error

- b) Random error
- d) Systematic error

Max. Marks: 70

Marks: 14

Set

If the control springs of PMMC instrument is made up of large moment of 10) inertia, then it can be used as _____

- a) Ammeter b) Fluxmeter
- c) Ballistic galvanometer
- d) Wattmeter

SLR-FM-742

Set | R

- 11) A _____device prevents the oscillation of the moving system and enables the latter to reach its final position quickly.
 - b) Controlling deflecting a) damping
 - d) all of the above
- 12) A moving-coil permanent-magnet instrument can be used as _____by using a low resistance shunt.
 - ammeter b) Voltmeter a)
 - flux-meter d) ballistic galvanometer
- An rms reading voltmeter can accurately measure voltages of _____. 13)
 - Sine waveforms b) Square waveforms a)
 - c) Saw tooth waveforms d) All of these
- The measurement range of digital voltmeter is _____ 14)
 - a) 1V to 1MV

c)

c)

b) 1V to 1kV

c) 1kV to 1MV

d) 100 kV to 100MV

-	1						
Seat No.						Set	R
	S.I	E. (Part – II ELE) (Old) (CGPA) Bio-Medical CTRONIC INS	Examination Nov/De Engineering TRUMENTATIONS	ec-2019		
Day & Time:	Date: M 02:30 PI	onday, 25-11 VI To 05:30 F	-2019 M		Max	. Marks	s: 56
Instru	ictions:	1) All questio 2) Figure to t	ns are compulsory ne right indicates f	ull marks.			
			Section	on – I			
Q.2	Attempt a) Diffe b) What c) Def d) Def e) Exp	any four. erentiate beto at are the fac ine accuracy ine types of e lain working	veen analog phase tors involved in a s precision and ser errors and methods of analog phase m	e meter and digital phase selection of voltmeter. sitivity with suitable exam s of minimization. neter.	meter. nple.		16
Q.3	Attempt a) Des b) Writ 1) 2) c) Exp	any two. scribe working te a short not True RMS r Average res plain the work	g of R-2R ladder D e on: esponding voltmeter ponding voltmeter ing of successive a	AC. er approximation type digital	l voltmete	r.	12
			Section	on – II			
Q.4	Attempt a) Diffe b) Why c) Exp d) Exp e) Write 1) 2)	any four. erentiate betw y delay lines lain the signi lain use of C te a short not LCD display Touch scree	veen dual beam a are required in CR ficance of three ar RO in tracing diod e on: system n display system	nd dual trace oscilloscope O? nd half digit display. e and transistor character	e. ristics.		16
Q.5	Attempt	any two.					12
	a) What more	at is Lissajou	s pattern? How it i	s useful in frequency and	phase		
	b) Witl c) Exp app	h the help of lain working lications.	neat diagram expla of multichannel da	ain working of function ge ta acquisition system and	nerator. I explain i	ts	

SLR-FM-742

Seat No.

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

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

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

- A voltmeter connected across a resistor gives a value of 65 V but the 1) expected value of resistor was 68 V. Then the absolute error and the relative accuracy of the measurement will be ____
 - b) 3.8%, 96.2% a) 3.2%, 96.8% c) 4%.96%
 - d) 4.4%. 95.59%
- 2) For an instrument the degree of repeatability or reproducibility in measurements is alternative way of expressing its _
 - b) Accuracy a) Precision
 - Sensitivity d) Linearity C)
- T he zero drift is measured in units of 3)
 - a) Volts-°C b) Volts /°c
 - d) $(volts)^2/^{\circ}c$ C) °c/volts
- 4) The difference between the measured value and the true value is known as .
- Absolute error d) Systematic error C) 5) If the control springs of PMMC instrument is made up of large moment of

inertia, then it can be used as ____

Relative error

a)

- a) Ammeter b) Fluxmeter
- Ballistic galvanometer d) Wattmeter c)
- A device prevents the oscillation of the moving system and enables 6) the latter to reach its final position quickly.
 - a) deflectina b) Controlling
 - damping d) all of the above c)
- 7) A moving-coil permanent-magnet instrument can be used as _____by using a low resistance shunt.
 - ammeter b) Voltmeter a) C) flux-meter
 - d) ballistic galvanometer

b) Random error

- 8) An rms reading voltmeter can accurately measure voltages of _____.
 - a) Sine waveforms Saw tooth waveforms C)
- b) Square waveforms
- d) All of these

Max. Marks: 70

Marks: 14

Set

			Set S			
The	measurement range of digital	voltm	eter is			
a)	1V to 1MV	b)	1V to 1kV			
c)	1kV to 1MV	d)	100 kV to 100MV			
In a a) c)	ramp type DVM, the multivibra Clock pulses are generated It oscillates	tor de b) d)	etermines the rate at which the Measurement cycles are initiated Its amplitude varies			
Q meter is used to measure the properties of						
a)	Inductive coils	b)	Non inductive coils			
c)	Capacitive coils	d)	Both (a) and (c)			
Let I	with an estal allow laws the flow date		al and the tea many and the staff			

- 12) In liquid crystal displays, the liquid crystal exhibits properties of _____.
 - a) Liquid b) Solids
 - c) Gases d) Both (a) and (b)
- 13) The basic difference between square wave and pulse generator is their _____.
 - a) Waveforms shape b) Duty cycles
 - c) Frequency range d) Cost
- 14) In function generator, the output waveform of integrator is _____.
 - a) Sinusoidal

9)

10)

11)

b) Squared) Saw-tooth

c) Triangular

u) Saw-10011

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

Seat No.

- 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.

- 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.

- 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.

- 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.

12

Max. Marks: 56

SLR-FM-742

16

12

		Bio-Medica	l Engin	eering
Dav	8. Data	DIGITAI		JN Max Marks: 70
Time	: 02:30) PM To 05:30 PM		
Instr	uctior	is: 1) Q. No. 1 is compulsory and book.	l should b	be solved in first 30 minutes in answer
		2) Figures to the right indicate	full mark	(S.
Duro	tion: 2	MCQ/Objective	• Туре С	Questions
	0011. 3			Walks. 14
Q.1	sente	ose the correct alternatives from ence.	n the opt	tions and rewrite the 14
	1)	A binary number with 'n' bits all c a) $n^2 - 1$ c) $2^{(n-1)}$	of which a b) d)	are 1s has the value 2^n $2^n - 1$
	2)	If $(A2C)_{16} = (x)_8$, then 'x' is give a) 7054 c) 5154	by b) d)	 6054 5054
	3)	The number of parity bits in a 12 a) 4 c) 6	bit Hamr b) d)	ming code is 5 8
	4)	For mathematical operations, thea) Sequentialc) Self complimentary	e code m b) d)	ust be Cyclic Unit distance
	5)	The logic operation $AB + \overline{A} \overline{B}$ can and B to a two input a) NOR gate c) X-OR gate	be imple b) d)	emented by giving the input A NAND gate X-NOR gate
	6)	The code used for labeling cells (a) Natural B'D c) Gray	of the k-r b) d)	nap is Hexadecimal Octal
	7)	A 'n' variable k-map can have a) n^2 cells c) n^n cell	 b) d)	2^n cells n^{2n} cells
	8)	select lines are contained one output. a) 512 c) 64	d in a mu b) d)	Iltiplexer with 1024 inputs and 258 10
	9)	Parallel adders area) Combinational logic circuitsc) both (a) and (b)	b) d)	sequential logic circuits None of the above

Set P

			SLR-FM-743
			Set P
10)	Dynamic shift registers are made up a) Dynamic Hip flops c) MOS-NAND gates	of b) d)	MOS inverters CMOS inverters
11)	The basic memory element in a digit a) Consists of a NAND gate c) Is a flip flop	al ciro b) d)	cuit Consists of a NOR gate Is a shift register
12)	In a master slave J-K flip flop, $J = K$ after the clock pulse will be a) 0 c) Q_n	= 1. 7 b) d)	The state Q_{n+1} of the flip flop $\frac{1}{\overline{Q}_n}$
13)	A TTL circuit acts as a current sink in a) Low State c) High impedance state	n the b) d)	High state None of these
14)	The logic family with both logic level a) TTL c) CMOS	s neg b) d)	ative is ECL MOS

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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 $A \oplus B = A\overline{B} + \overline{A}B$ 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.

- 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) $AB + A\overline{B}C + B\overline{C} = AC + B\overline{C}$
 - 2) $A\overline{B}C + B + B\overline{D} + AB\overline{D} = B + C$
- 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

- 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) = $\sum m(1, 2, 4, 7)$

12

16

16

Set P

Max. Marks: 56

Set P 12

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.

Dura	tion: 3	80 Mii	nutes	PO O	Marks	s: 14
Q.1	Choo	choose the correct alternatives from the options and rewrite the				
	 select lines are contained in a multiplexer with 1024 input 					
		one a) c)	output. 512 64	b) d)	258 10	
	2)	Para a) c)	allel adders are Combinational logic circuits both (a) and (b)	b) d)	sequential logic circuits None of the above	
	3)	Dyn a) c)	amic shift registers are made up Dynamic Hip flops MOS-NAND gates	of b) d)	MOS inverters CMOS inverters	
	4)	The a) c)	e basic memory element in a digit Consists of a NAND gate Is a flip flop	al ciro b) d)	cuit Consists of a NOR gate Is a shift register	
	5)	In a afte a) c)	master slave J-K flip flop, $J = K$: r the clock pulse will be 0 Q_n	= 1. T b) d)	The state Q_{n+1} of the flip flop 1	
	6)	A T a) c)	TL circuit acts as a current sink ir Low State High impedance state	n the _ b) d)	High state None of these	
	7)	The a) c)	e logic family with both logic levels TTL CMOS	s neg b) d)	ative is ECL MOS	
	8)	A bi a) c)	inary number with 'n' bits all of where $n^2 - 1$ $2^{(n-1)}$	nich a b) d)	re 1s has the value 2^n $2^n - 1$	
	9)	lf (A a) c)	$A2C)_{16} = (x)_8$, then 'x' is give by 7054 5154	b) d)	 6054 5054	

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

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

2) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Page **5** of **16**

SLR-FM-743

Seat No.

Set Q

Max. Marks: 70

Set Q 10) The number of parity bits in a 12 bit Hamming code is _____. a) 4 b) 5 c) 6 d) 8 For mathematical operations, the code must be _____. 11) a) Sequential b) Cyclic c) Self complimentary Unit distance d) 12) The logic operation $AB + \overline{A} \overline{B}$ can be implemented by giving the input A and B to a two input _____. b) NAND gate a) NOR gate c) X-OR gate d) X-NOR gate The code used for labeling cells of the k-map is _____. 13) Hexadecimal a) Natural B'D b) c) Gray d) Octal 14) A 'n' variable k-map can have _____. b) a) n^2 cells 2^n cells

c) n^n cell

 n^{2n} cells

d)

Page 6 of 16

SLR-FM-743

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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 $A \oplus B = A\overline{B} + \overline{A}B$ 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.

- 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) $AB + A\overline{B}C + B\overline{C} = AC + B\overline{C}$
 - 2) $A\overline{B}C + B + B\overline{D} + AB\overline{D} = B + C$
- 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

- 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) = $\sum m(1, 2, 4, 7)$

12

16

16

•

Max. Marks: 56

Set **Q** 12

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.

		S.E	E. (Part – II) (Old) (CGPA) Bio-Medical DIGITAL	Exam Engin DESI	ination Nov/Dec-2019 eering GN	
Day Time	& Date : 02:3	e: Tu 0 PN	iesday,26-11-2019 / To 05:30 PM		Max	. Marks: 70
Instr	uctio	ns: 1) Q. No. 1 is compulsory and s book.	should	be solved in first 30 minutes	in answer
		2	2) Figures to the right indicate f	uli mari	(S.	
Dura	tion: 3	30 Mi	INICQ/ODJECTIVE	іуре	Questions	Marks: 14
Q.1	Choose the correct alternatives from the options and rewrite the					
	1)	The and a) c)	e logic operation $AB + \overline{A} \overline{B}$ can l d B to a two input NOR gate X-OR gate	be impl b) d)	emented by giving the input NAND gate X-NOR gate	A
	2)	The a) c)	e code used for labeling cells of Natural B'D Gray	f the k-ı b) d)	map is Hexadecimal Octal	
	3)	A ′ <i>1</i> a) c)	n' variable k-map can have n^2 cells n^n cell	 b) d)	2^n cells n^{2n} cells	
	4)	one a) c)	select lines are contained e output. 512 64	in a mu b) d)	ultiplexer with 1024 inputs a 258 10	nd
	5)	Pai a) c)	rallel adders are Combinational logic circuits both (a) and (b)	b) d)	sequential logic circuits None of the above	
	6)	Dyr a) c)	namic shift registers are made Dynamic Hip flops MOS-NAND gates	up of b) d)	MOS inverters CMOS inverters	
	7)	The a) c)	e basic memory element in a di Consists of a NAND gate Is a flip flop	gital cir b) d)	cuit Consists of a NOR gate Is a shift register	
	8)	In a afte a) c)	a master slave J-K flip flop, J = er the clock pulse will be $_$ 0 Q_n	K = 1. ⁻ b) d)	The state Q_{n+1} of the flip flo $\frac{1}{\overline{Q}_n}$	р
	9)	A T a) c)	TL circuit acts as a current sinl Low State High impedance state	k in the b) d)	High state None of these	

Seat No.

SLR-FM-743

Set R

				Set	R
10)	The logic family with both logic level a) TTL c) CMOS	s neg b) d)	ative is ECL MOS		
11)	A binary number with 'n' bits all of we a) $n^2 - 1$ c) $2^{(n-1)}$	hich a b) d)	re 1s has the value 2^n $2^n - 1$	÷	
12)	If $(A2C)_{16} = (x)_8$, then 'x' is give by a) 7054 c) 5154	b) d)	 6054 5054		
13)	The number of parity bits in a 12 bit a) 4 c) 6	Hamr b) d)	ning code is 5 8		
14)	For mathematical operations, the coa) Sequentialc) Self complimentary	de mu b) d)	ist be Cyclic Unit distance		

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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 $A \oplus B = A\overline{B} + \overline{A}B$ 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.

- 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) $AB + A\overline{B}C + B\overline{C} = AC + B\overline{C}$
 - 2) $A\overline{B}C + B + B\overline{D} + AB\overline{D} = B + C$
- 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

- 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) = $\sum m(1, 2, 4, 7)$

12

16

16

Set R

Max. Marks: 56

Set R

12

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.
| | | S.E. (Part – II) (Old
Bid | d) (CGPA) Exam
p-Medical Engin
DIGITAL DESI | ination Nov/Dec-2019
eering
GN | | |
|---------------|---|--|---|---|------|--|
| Day &
Time | & Date
: 02:30 | : Tuesday,26-11-2019
PM To 05:30 PM | | Max. Marks | : 70 | |
| Instr | nstructions: 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/0 | Objective Type (| Questions | | |
| Durat | ion: 3 |) Minutes | | Marks | : 14 | |
| Q.1 | Choo | se the correct alternation | atives from the op | tions and rewrite the | 14 | |
| | 1) | Dynamic shift register
a) Dynamic Hip flops
c) MOS-NAND gate | s are made up of
s b)
s d) | MOS inverters
CMOS inverters | | |
| | 2) | The basic memory ele
a) Consists of a NAN
c) Is a flip flop | ement in a digital cir
ND gate b)
d) | cuit
Consists of a NOR gate
Is a shift register | | |
| | 3) | In a master slave J-K after the clock pulse v a) 0 c) Q_n | flip flop, J = K = 1.
vill be
b)
d) | The state Q_{n+1} of the flip flop $\frac{1}{\overline{Q}_n}$ | | |
| | 4) | A TTL circuit acts as a
a) Low State
c) High impedance s | a current sink in the
b)
state d) | High state
None of these | | |
| | 5) | The logic family with b
a) TTL
c) CMOS | both logic levels neg
b)
d) | jative is
ECL
MOS | | |
| | 6) | A binary number with
a) $n^2 - 1$
c) $2^{(n-1)}$ | ʻn' bits all of which a
b)
d) | are 1s has the value
2^n
$2^n - 1$ | | |
| | 7) | If $(A2C)_{16} = (x)_8$, then
a) 7054
c) 5154 | n ′x [′] is give by
b)
d) |
6054
5054 | | |
| | 8) | The number of parity
a) 4
c) 6 | bits in a 12 bit Ham
b)
d) | ming code is
5
8 | | |
| | 9) | For mathematical ope
a) Sequential
c) Self complimenta | rations, the code m
b)
ry d) | ust be
Cyclic
Unit distance | | |

Seat

No.

SLR-FM-743

Set S

Set S

SLR-FM-743

- 10) The logic operation $AB + \overline{A} \overline{B}$ 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
 - Hexadecimal b)
 - c) Gray d) Octal
- A 'n' variable k-map can have _____. 12)
 - b) 2^n cells a) n^2 cells
 - c) n^n cell n^{2n} cells d)
- _____ select lines are contained in a multiplexer with 1024 inputs and 13) one output.
 - a) 512 b) 258
 - c) 64

- d) 10
- 14) Parallel adders are _____.
 - a) Combinational logic circuits
 - c) both (a) and (b)
- b) sequential logic circuits
- None of the above d)

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four.

- 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 $A \oplus B = A\overline{B} + \overline{A}B$ 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.

- 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) $AB + A\overline{B}C + B\overline{C} = AC + B\overline{C}$
 - 2) $A\overline{B}C + B + B\overline{D} + AB\overline{D} = B + C$
- 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

- 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) = $\sum m(1, 2, 4, 7)$

12

16



Max. Marks: 56

Set S

12

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.

		2) Figures to the right indicate full marks	
		MCQ/Objective Type Qu	uestions
ra	tion: 3	: 30 Minutes	Marks: 14
1	Cho 1)	uoose the correct alternatives from the opt Unity gain frequency is the frequence equals 1. a) varying b) fi c) stable d) n	ions and rewrite the sentence. 14 cy possible where the gain xed naximum
	2)	The output voltage of differentiate is equal change of input voltage with respect to tim a) RC time constant b) F c) Slew Rate d) D	to instantaneous rate of e. Feedback resister Delay time
	3)	In open loop configuration op – amp outpu a) noing b) n c) fixed d) n	t levels are at \pm vs at. noving one of the above
	4)	Supply voltage rejection ratio is the ratio of to change in supply voltage. a) offset b) c c) differential d) g	^f change in input voltage ommon jain
	5)	The algebraic difference between the curreinverting terminals op - amp is calleda)Input bias currentb)Inc)CMRRd)s	ents into the inverting and non nput off set current lew rate
	6)	The bandwidth of open loop op - amp is ve for AC application at frequency. a) high b) c c) medium d) lo	ery small, hence it can't be used utoff ow
	7)	Class A power amplifier circuit can be cons a) Fixed bias b) C c) Class AB d) N	structed using circuit. Class B Jone of the above
	8)	Emitter follower is used as amplifier source with low impedance load.	to match high impedance

Bio-Medical Engineering ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II

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

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

Du

Seat

No.

Q.1

- ige
- n
- sed
- - Darlington a) buffer c)
- cascode b) d) push pull

SLR-FM-744



Max. Marks: 70

Set

- Hartley oscillator consists of positive feedback formed by L1L2 and class 9) amplifier.
 - А a)

a)

C)

- b) B
- C) AB d) Push pull
- Stability factor 'S' is defined as the ratio of the change in collector current 10) to change in _____ leakage current.
 - collector to base b) base to collector collector to emitter
 - d) emitter to base
- Class 'C' amplifier gives greater power efficiency of the order _____. 11)
 - 50% b) 75% a)
 - d) 85% 25% C)
- _____ is the maximum rate of change of output voltage per unit time of an 12) op - amp.
 - a) Offset voltage b) CMRR
 - c) Input bias d) Slew rate
- Cross over distortion can be avoided by operating class B amplifier in 13) class ____ mode.
 - a) A
 - b) AB С c) d) Push pull
- Ground always sinks the current and virtual ground sinks the current as 14) well as _____ of current.
 - a) sources
 - neutral c)

- b) references
- d) none

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

+180

390 0

- 1) Emitter bypass capacitor (C_E)
- 2) Resistance R_E and R_C
- c) Calculate the DC bias voltage and currents in given circuit.



- Vcc = 24V with peak output voltage of.
- 1) $V_L(p) = 22v$
- 2) $V_L(p) = 6v$

Q.3 Attempt any two questions.

a) Find the output voltage of the circuit shown below.



- **b)** Define harmonic distortion and cross over distorted and explain working of class AB power amplifer.
- c) Explain working of RC phase shift and crystal oscillater with output waveforms.

Max. Marks: 56

B.D = 8000VBE = 1.6v

SLR-FM-744

Set

16

Set P

16

Section – II

Q.4 Attempt any four questions.

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



- 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.

- a) Design a circuit diagram using op amp to provide the output voltage Vo as, Vo = -2 (3v₁ + 4V₂ + 2V₃)
- **b)** With the help of circuit diagram and waveform explain working of zero crossing detecter.
- c) Define following characteristic of op amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

Bio-Medical Engineering ELECTRONIC CIRCUITS ANALYSIS AND DESIGN- II Day & Date: Wednesday, 27-11-2019 Time: 02:30 PM To 05:30 PM 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** Choose the correct alternatives from the options and rewrite the sentence. Emitter follower is used as _____ amplifier to match high impedance 1) source with low impedance load. Darlington a) b) cascode buffer C) d) push pull

- Hartley oscillator consists of positive feedback formed by L₁L₂ and class 2) _ amplifier.
 - a) А b) B
 - AB d) Push pull c)
- 3) Stability factor 'S' is defined as the ratio of the change in collector current to change in leakage current.
 - collector to base b) base to collector a)
 - c) collector to emitter d) emitter to base
- Class 'C' amplifier gives greater power efficiency of the order 4)
 - b) 75% a) 50% c) 25% d) 85%
- 5) ____ is the maximum rate of change of output voltage per unit time of an op - amp.

b) CMRR

- c) Input bias d) Slew rate Cross over distortion can be avoided by operating class B amplifier in 6)
- class ____ mode.

a)	А	b)	AB
C)	С	d)	Push pull

- 7) Ground always sinks the current and virtual ground sinks the current as well as of current.
 - sources b) references a)
 - neutral d) none
- 8) Unity gain frequency is the _____ frequency possible where the gain equals 1.
 - b) fixed d) maximum
 - varying stable c)

Offset voltage

a)

C)

a)

S.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019

Max. Marks: 70

Set

Seat No.

Q.1

Marks: 14

- 9) The output voltage of differentiate is equal to instantaneous rate of change of input voltage with respect to time. b) Feedback resister a) RC time constant 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. offset b) common a) differential c) 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
- The bandwidth of open loop op amp is very small, hence it can't be used 13) for AC application at _____ frequency.
 - a) high
 - c) medium d) low
- 14) Class A power amplifier circuit can be constructed using _____ circuit.
 - a) Fixed bias

- b) Class B

- c) Class AB

Page 6 of 16



- - b) cutoff
 - - d) None of the above

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

+180

390 0

- 1) Emitter bypass capacitor (C_E)
- 2) Resistance R_E and R_C
- c) Calculate the DC bias voltage and currents in given circuit.



- Vcc = 24V with peak output voltage of.
- 1) $V_L(p) = 22v$
- 2) $V_L(p) = 6v$

Q.3 Attempt any two questions.

a) Find the output voltage of the circuit shown below.



- **b)** Define harmonic distortion and cross over distorted and explain working of class AB power amplifer.
- c) Explain working of RC phase shift and crystal oscillater with output waveforms.

Max. Marks: 56

B.D = 8000VBE = 1.6v 16

12

SLR-FM-744

Set Q

Set Q

16

Section – II

Q.4 Attempt any four questions.

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- **b)** Calculate Vo 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.

- a) Design a circuit diagram using op amp to provide the output voltage Vo as , Vo = -2 $(3v_1 + 4V_2 + 2V_3)$
- **b)** With the help of circuit diagram and waveform explain working of zero crossing detecter.
- c) Define following characteristic of op amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

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 Max. Marks: 70 Time: 02:30 PM To 05:30 PM

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

Seat

No.

- Q.1 Choose the correct alternatives from the options and rewrite the sentence. The algebraic difference between the currents into the inverting and non 1)
 - inverting terminals op amp is called
 - Input bias current a)
 - C) CMRR d) slew rate
 - 2) 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
 - 3) Class A power amplifier circuit can be constructed using _____ circuit.
 - Fixed bias b) Class B a) Class AB d) None of the above c)
 - Emitter follower is used as _____ amplifier to match high impedance 4) source with low impedance load.
 - a) Darlington b) cascode
 - c) buffer d) push pull
 - Hartley oscillator consists of positive feedback formed by L₁L₂ and class 5) amplifier.
 - А b) B a) d) Push pull c) AB
 - Stability factor 'S' is defined as the ratio of the change in collector current 6) to change in _____ leakage current.
 - a) collector to base b) base to collector
 - c) collector to emitter d) emitter to base
 - 7) Class 'C' amplifier gives greater power efficiency of the order
 - 50% b) 75% a)
 - d) 85% c) 25%
 - is the maximum rate of change of output voltage per unit time of an 8) op - amp.
 - Offset voltage b) CMRR a)
 - c) Input bias d) Slew rate

SLR-FM-744



Marks: 14

14

b) Input off set current

Set R

9) Cross over distortion can be avoided by operating class B amplifier in class ____ mode.

a) A

a)

- b) AB
- c) C d) Push pull
- Ground always sinks the current and virtual ground sinks the current as 10) well as _____ of current. sources
 - b) references
 - d) none C) neutral
- Unity gain frequency is the _____ frequency possible where the gain 11) equals 1.
 - a) varying

- b) fixed
- d) maximum c) stable
- The output voltage of differentiate is equal to _____ instantaneous rate of 12) change of input voltage with respect to time.
 - a) RC time constant b) Feedback resister
 - c) Slew Rate d) Delay time
- 13) In open loop configuration op – amp output levels are _____ at $\pm vs$ at.
 - a) noing

c) fixed

- b) moving d) none of the above
- Supply voltage rejection ratio is the ratio of change in input _____ voltage 14) to change in supply voltage.
 - offset a)
 - differential c)
- b) common
- d) gain

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

- 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.

+180

390 0

- 1) Emitter bypass capacitor (C_E)
- 2) Resistance R_E and R_C
- c) Calculate the DC bias voltage and currents in given circuit.



- Vcc = 24V with peak output voltage of.
- 1) $V_L(p) = 22v$
- 2) $V_L(p) = 6v$

Q.3 Attempt any two questions.

a) Find the output voltage of the circuit shown below.



- **b)** Define harmonic distortion and cross over distorted and explain working of class AB power amplifer.
- c) Explain working of RC phase shift and crystal oscillater with output waveforms.

Max. Marks: 56

B.D = 8000VBE = 1.6v

16

12

Set R

SLR-FM-744

Set R

16

Section – II

Q.4 Attempt any four questions.

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- **b)** Calculate Vo 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.

- a) Design a circuit diagram using op amp to provide the output voltage Vo as , Vo = -2 $(3v_1 + 4V_2 + 2V_3)$
- **b)** With the help of circuit diagram and waveform explain working of zero crossing detecter.
- c) Define following characteristic of op amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

		book.		
	2)) Figures to the right indicate full	mar	ks.
		MCQ/Objective Ty	/pe	Questions
on: 3	0 Mi	nutes		
Choo)	ose t Stat to cl a)	t he correct alternatives from th bility factor 'S' is defined as the ra hange in leakage current. collector to base	n e o j atio b)	ptions and rewrite the s of the change in collector base to collector
	c)	collector to emitter	d)	emitter to base
)	Clas a) c)	ss 'C' amplifier gives greater pow 50% 25%	/er e b) d)	fficiency of the order 75% 85%
)		is the maximum rate of chang amp.	ge of	output voltage per unit ti
	a)	Offset voltage	b)	CMRR
	c)	Input bias	d)	Slew rate
)	Cros clas	ss over distortion can be avoided s mode.	d by	operating class B amplifie
	a)	A	b)	AB
	c)	C	d)	Push pull
)	Gro well	und always sinks the current and as of current.	d virt	ual ground sinks the curr
	a)	sources	b)	references
	C)	neutral	d)	none

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

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

Duratio

Seat No.

Q.1 C entence.

- 1 current
- 2
- 3 me of an
- 4 er in
- 5 ent as
- Unity gain frequency is the _____ frequency possible where the gain 6) equals 1.
 - a) varying b) fixed
 - c) stable d) maximum
- The output voltage of differentiate is equal to _____ instantaneous rate of 7) change of input voltage with respect to time.
 - a) RC time constant b) Feedback resister d) Delay time
 - Slew Rate C)
- 8) In open loop configuration op – amp output levels are _____ at $\pm vs$ at. a) noing
 - b) moving
 - c) fixed d) none of the above



Max. Marks: 70

- Set 9) Supply voltage rejection ratio is the ratio of change in input _____ voltage to change in supply voltage. offset b) common a) C) differential d) gain 10) The algebraic difference between the currents into the inverting and non inverting terminals op - amp is called _ Input bias current b) Input off set current a) CMRR d) slew rate C) 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 d) low c) medium 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. Darlington b) cascode a) c) buffer d) push pull Hartley oscillator consists of positive feedback formed by L₁L₂ and class 14) _ amplifier.
 - a) A .
 - c) AB

- b) B
- d) Push pull

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four questions.

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

+180

390 0

- Emitter bypass capacitor (C_F) 1)
- Resistance R_E and R_C 2)
- Calculate the DC bias voltage and currents in given circuit. c)



- Vcc = 24V with peak output voltage of.
- 1) $V_1(p) = 22v$
- 2) $V_{L}(p) = 6v$

Q.3 Attempt any two questions.

Find the output voltage of the circuit shown below. a)



- Define harmonic distortion and cross over distorted and explain working of b) class AB power amplifer.
- Explain working of RC phase shift and crystal oscillater with output C) waveforms.

Max. Marks: 56

16

12

Set



B.D = 8000VBE = 1.6v

Set S

16

Section – II

Q.4 Attempt any four questions.

- a) With the help of diagram device expression of output voltage for inverting and non inverting amplifier.
- **b)** Calculate Vo 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.

- a) Design a circuit diagram using op amp to provide the output voltage Vo as, Vo = -2 (3v₁ + 4V₂ + 2V₃)
- **b)** With the help of circuit diagram and waveform explain working of zero crossing detecter.
- c) Define following characteristic of op amp.
 - 1) CMRR
 - 2) SVRR
 - 3) Input offset current
 - 4) Input bias current

sure rise during the inspiratory mean airway pressure tidal volume	pha b) d)	se in the lungs. airway resistance compliance	
brane oxygenators consist of of oxygen and carbon diox	a sei ide b	ries of fine tubes which allow between the blood flowing through	h
diffusion	b)	concentration	
collection	d)	drifting	
A separates some component _ certain components onto a s bilized.	: of th solid	ne analytical reaction mixture by phase which is physically	
refracting	b)	adsorbing	
absorbing	d)	reserving	
		1	Dano '

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

MCQ/Objective Type Questions

Bio-Medical Engineering BIO MEDICAL INSTRUMENTATION – I

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

- The buffer of pH measurement is stored at temperature between 1) degree Celsius.
 - 18 to 25 a) b) 19 to 25
 - 20 to 35 15 to 20 c) d)

2) Figures to the right indicate full marks.

- 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.
 - narrow band a) 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.
 - oxygenated blood a) c) lungs

c)

c)

Seat

Day & Date: Friday, 06-12-2019

book.

Time: 02:30 PM To 05:30 PM

Duration: 30 Minutes

No.

- b) deoxygenated blood d) respiratory track
- 5) The _____ of the patient' lungs is the ratio of volume delivered to the pressure
 - a) mea
 - tidal
- Membran 6) ____0 them
 - diffu a)
 - C) colle
- 7) ELISA se ce immobiliz refra a)

SLR-FM-745



Max. Marks: 70

Marks: 14

Set

				Set	Ρ
8)	The outp a) c)	spirometer is a mechanical out is volume displacement. differentiator subtractor	b) d)	_ as the input is air flow and integrator none of above	
9)	The incio a) c)	ratio of the radiant power trans dent on the sample is called absorbance transmittance	smitt b) d)	ed by a sample to a radiant power beers law optical density	
10)	The a) c)	sounds reaching the ear are c intensity density	hara b) d)	cterized by pitch clarity	
11)	Diffu the a) c)	usion measurements test the lu circulatory system. blood gas	ing's b) d)	ability to exchange with platelets RBCs	
12)	ener a) c)	are optical systems which p rgy than the optical filters. diffraction gratings holographic gratings	b) d)	de better isolation of spectral filters monochromator	
13)	A co spec a) c)	olorimeter involves the measure ctrum of 400-700 nm 200-500nm	eme b) d)	nt of color in electromagnetic 100-300nm 250-500nm	
14)	Wa\ a	velength calibration of a spectro	opho ndaro	tometer can be checked by using d.	

- ____ filter as a wavelength standard. tungsten b) u electromagnetic d) h
- a)

- c)
- b) ultravioletd) holmium oxide

Seat 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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

No.

- Draw and explain working of pH electrode and mention application of pH a) meter.
- b) Explain the optical ray diagram of spectrophotometer.
- Explain the principle and working of impedance plethysmography. c)
- State and explain BEER Lamberts law. d)
- Explain working of ELISA reader and mention its any 2 applications. e)

Attempt any two. Q.3

- Explain the protein separation technique using electrophoresis. a)
- With the help of block diagram explain the working of complete blood gas b) analvzer.
- Explain the principle and working of electromagnetic blood flow meter. C)

Section – II

Q.4 Attempt any four.

- Explain working of any one type of oxygenator. a)
- Define the term masking and explain its importance in audiometry. b)
- Explain various modes of ventilator. c)
- Define deafness, its types and differentiate between pure tone and speech d) audiometry.
- State various components of heart lung machine and describe its e) application during surgery.

Q.5 Attempt any two.

- a) Explain working of evoked response audiometry system.
- With the help of block diagram explain working of anesthesia machine. b)
- With the help of spirogram explain various lung volume and capacities. C)





Max. Marks: 56

16

12

16

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering BIO MEDICAL INSTRUMENTATION – I** 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** Choose the correct alternatives from the options and rewrite the sentence. The spirometer is a mechanical as the input is air flow and 1) output is volume displacement. differentiator a) b) integrator subtractor d) none of above c)

2) The ratio of the radiant power transmitted by a sample to a radiant power incident on the sample is called b) beers law

a) absorbance c) transmittance

intensity

a)

- The sounds reaching the ear are characterized by . 3)
- density d) clarity c) 4) Diffusion measurements test the lung's ability to exchange _____ with
- the circulatory system.
 - blood a) b) platelets
 - d) RBCs c) gas
- 5) are optical systems which provide better isolation of spectral energy than the optical filters.
 - diffraction gratings a) holographic gratings c) d) monochromator
- 6) A colorimeter involves the measurement of color in electromagnetic spectrum of
 - 400-700 nm 100-300nm a) b) c) 200-500nm d) 250-500nm
- 7) Wavelength calibration of a spectrophotometer can be checked by using
 - a filter as a wavelength standard. tungsten b) ultraviolet a)
 - electromagnetic d) holmium oxide c)
- 8) The buffer of pH measurement is stored at temperature between _____ degree Celsius.
 - 18 to 25 b) 19 to 25 a) 20 to 35 15 to 20 c) d)

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

Seat No.

Q.1



Set

Marks: 14

14

b) pitch

d) optical density

- b) filters

loss _ noise is a noise containing all frequencies in the audible spectrum at approximately equal intensities. narrow band b) shot a) white c) d) saw tooth 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. oxygenated blood b) deoxygenated blood a) c) d) respiratory track lungs 12) 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 tidal volume d) compliance c) 13) 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 ELISA separates some component of the analytical reaction mixture by certain components onto a solid phase which is physically

14) immobilized.

- refracting a) absorbing c)
- b) adsorbing d) reserving

- The base of each audio logical examination is the determination of the
- 9) hearing _
 - intensity a) b) density
 - threshold c) d)
- 10)
- 11)

Set | Q

SLR-FM-745

Seat 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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

No.

- Draw and explain working of pH electrode and mention application of pH a) meter.
- b) Explain the optical ray diagram of spectrophotometer.
- Explain the principle and working of impedance plethysmography. c)
- State and explain BEER Lamberts law. d)
- Explain working of ELISA reader and mention its any 2 applications. e)

Attempt any two. Q.3

- Explain the protein separation technique using electrophoresis. a)
- With the help of block diagram explain the working of complete blood gas b) analvzer.
- Explain the principle and working of electromagnetic blood flow meter. C)

Section – II

Q.4 Attempt any four.

- Explain working of any one type of oxygenator. a)
- Define the term masking and explain its importance in audiometry. b)
- Explain various modes of ventilator. c)
- Define deafness, its types and differentiate between pure tone and speech d) audiometry.
- State various components of heart lung machine and describe its e) application during surgery.

Q.5 Attempt any two.

- a) Explain working of evoked response audiometry system.
- With the help of block diagram explain working of anesthesia machine. b)
- With the help of spirogram explain various lung volume and capacities. C)



Max. Marks: 56

SLR-FM-745

16

12

16

Seat		
No.		
	T.E. (Part – I) (Old) (CGPA

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

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

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

- The of the patient' lungs is the ratio of volume delivered to the 1) pressure rise during the inspiratory phase in the lungs. b) airway resistance
 - mean airway pressure a)
 - tidal volume d) compliance c)

2) Membrane oxygenators consist of a series of fine tubes which allow _ of oxygen and carbon dioxide between the blood flowing through them

diffusion a)

C)

collection

- b) concentration
- d) drifting
- 3) ELISA separates some component of the analytical reaction mixture by certain components onto a solid phase which is physically immobilized.
 - refracting adsorbing a) b)
 - c) absorbing d) reserving
- 4) The spirometer is a mechanical as the input is air flow and output is volume displacement.
 - differentiator a) b) integrator
 - subtractor d) none of above c)
- 5) 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
 - transmittance d) optical density c)
- 6) The sounds reaching the ear are characterized by _____.
 - intensity pitch a) b)
 - density d) clarity c)
- Diffusion measurements test the lung's ability to exchange _____ with 7) the circulatory system.
 - a) blood b) platelets d) RBCs
 - c) gas

Set

R

Max. Marks: 70

Marks: 14

8) are optical systems which provide better isolation of spectral energy than the optical filters. diffraction gratings a) b) filters holographic gratings c) d) monochromator 9) A colorimeter involves the measurement of color in electromagnetic spectrum of 400-700 nm 100-300nm b) a) 200-500nm d) 250-500nm c) Wavelength calibration of a spectrophotometer can be checked by using 10) ____ filter as a wavelength standard. а tungsten b) ultraviolet a) electromagnetic d) holmium oxide c) 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 _ intensity b) density a) c) threshold d) loss 13) _ noise is a noise containing all frequencies in the audible spectrum at approximately equal intensities. narrow band b) shot a)

- 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

Page **8** of **12**

SLR-FM-745

Set R

Seat

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four.

No.

- Draw and explain working of pH electrode and mention application of pH a) meter.
- b) Explain the optical ray diagram of spectrophotometer.
- Explain the principle and working of impedance plethysmography. c)
- State and explain BEER Lamberts law. d)
- Explain working of ELISA reader and mention its any 2 applications. e)

Attempt any two. Q.3

- Explain the protein separation technique using electrophoresis. a)
- With the help of block diagram explain the working of complete blood gas b) analvzer.
- Explain the principle and working of electromagnetic blood flow meter. C)

Section – II

Q.4 Attempt any four.

- Explain working of any one type of oxygenator. a)
- Define the term masking and explain its importance in audiometry. b)
- Explain various modes of ventilator. c)
- Define deafness, its types and differentiate between pure tone and speech d) audiometry.
- State various components of heart lung machine and describe its e) application during surgery.

Q.5 Attempt any two.

- a) Explain working of evoked response audiometry system.
- With the help of block diagram explain working of anesthesia machine. b)
- With the help of spirogram explain various lung volume and capacities. C)



SLR-FM-745

Max. Marks: 56

12

16

16

		T.E.	(Part – I) (Old) Bio-l	(CGPA) Exar Medical Engi	nination Nov/Dec-2019 ineering	
			BIO MEDIC	AL INSTRUM	IENTATION – I	
Day Time	& Date e: 02:30	: Frid	ay, 06-12-2019 To 05:30 PM		Max. Marks:	70
Instr	ruction	s: 1)	Q. No. 1 is compul: book.	sory and should	be solved in first 30 minutes in answe	۶r
		2)	Figures to the right	indicate full ma	arks.	
			MCQ/C	Objective Type	Questions	
Dura	tion: 30) Min	utes		Marks:	14
Q.1	Choo 1)	se th The	e correct alternati sounds reaching th	ives from the o	options and rewrite the sentence.	14
		a) c)	intensity density	(d	pitch clarity	
	2)	Diffu the	usion measurement circulatory system.	ts test the lung's	s ability to exchange with	
		a) c)	blood gas	b) d)	platelets RBCs	
	3)	ene a) c)	are optical syste rgy than the optical diffraction grating holographic gratir	ems which provi filters. s b) ngs d)	de better isolation of spectral filters monochromator	
	4)	A co spe a) c)	olorimeter involves ctrum of 400-700 nm 200-500nm	the measureme b) d)	ent of color in electromagnetic 100-300nm 250-500nm	
	5)	Wav a a) c)	velength calibration filter as a wave tungsten electromagnetic	of a spectropho elength standar b) d)	otometer can be checked by using d. ultraviolet holmium oxide	
	6)	The deg a) c)	buffer of pH measuree Celsius. 18 to 25 20 to 35	urement is store b) d)	ed at temperature between 19 to 25 15 to 20	
	7)	The hea a) c)	base of each audio ring intensity threshold	o logical examin b) d)	nation is the determination of the density loss	
	8)	at a a) c)	noise is a noise pproximately equal narrow band white	containing all fr intensities. b) d)	equencies in the audible spectrum shot saw tooth	

Seat No.

SLR-FM-745

Set S



- 13) The spirometer is a mechanical _____ as the input is air flow and output is volume displacement.
 - differentiator a)
 - d) none of above subtractor
- The ratio of the radiant power transmitted by a sample to a radiant power 14) incident on the sample is called
 - absorbance a) transmittance

c)

C)

9)

b) beers law

b) integrator

d) optical density

SLR-FM-745

Seat No.

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

BIO MEDICAL INSTRUMENTATIO

Day & Date: Friday, 06-12-2019 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.

- 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.

- 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.

- 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.

- 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.



SLR-FM-745

12

Max. Marks: 56

12

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

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

8)

Seat

No.

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

- Space charge neutrality is the representation of _____ 1)
 - diffusion & drift b) anion & cations a) cathode & anode d) model & object c)

2) movements are very fast jump from one eye position to another.

- b) smooth pursuit a) saccadic vestibular C) vergence d)
- 3) movements eyes tracks moving objects. In
 - b) smooth pursuit saccadic a) c) vergence d) vestibular
- 4) movements angle between eyes changes. In _
 - b) smooth pursuit a) saccadic
 - d) vestibular c) vergence

movement compensated head movements. 5)

- saccadic b) smooth pursuit a)
- d) vestibular vergence C)
- 6) One ion equation is called as ____ equation.
 - Donnan's b) Nernst a)
- c) Ohm's d) Fick's
- 7) Resting state of action potential starts from
 - a) -90mV b) -75mV +20mV c) d) +35mV
 - produces 1000 watts.
 - Cold Heat b) a)
 - Warm c) d) Shivering
- 9) Models are simplified representation of
 - simulations objects a) b) systems d) none of above c)
- 10) Fick's law defines _____ process.
 - diffusion b) drift a) c)
 - ionization d) potential gradient

SLR-FM-746

Set

Max. Marks: 70

Marks: 14

Set P

- 11) Ohms law defines _____ process.
 - a) diffusion

C)

a)

- b) drift
- 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 _____.
 - 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

Seat No.					Set	Ρ
		T.E. (Part – I BIOLO) (Old) (CGPA Bio-Medica DGICAL MOD	A) Examination Nov al Engineering ELING & SIMULATI	/Dec-2019 ION	
Day & Time:	& Da : 02:	te: Monday, 09-12 30 PM To 05:30 F	2-2019 M		Max. Marks	s: 56
Instru	uctio	ons: 1) All questio 2) Figure to t	ns are compulso he right indicate	ory. s full marks.		
			See	ction – I		
Q.2	Atte a) b) c)	empt any four qu Explain with neat What is parallel o Derive cable equ	estions. diagram electro conductance equ ation.	de-electrolyte interface. ation?		16
	d) e)	Differentiate betw Explain different	veen Nernst and biophysics tools	Donnan equation.		
Q.3	Atte a) b) c)	With the help of r Explain Hodgkin Differentiate betv 1) compartmen 2) lumped and	estions. heat diagram exp Huxley model w veen: tal and non com distributed parar	blain electric model of ce th necessary equations partmental modeling neter model	ell membrane.	12
		_,	Sec	tion – II		
Q.4	Atte a) b) c) d) e)	empt any four que Define active sta Explain all 4 eye Explain insulin gl Explain symptom What are Glissad	estions. te tension and m movements. ucose feedback is and causes of les? Mention on	uscle tension. model. Parkinson's syndrome. e example.		16
Q.5	Atte a) b)	empt any two que Draw and explair Explain the comp blocks.	estions. electrical mode elete neuromusc	l of thermoregulatory pla ular control system with	ant. all relevant	12
	C)	Explain working a	and significance	of drug delivery system.		

			BIOLOGICAL MODEL	ING	
Day & Date: Monday, 09-12-2019 Max. Ma Time: 02:30 PM To 05:30 PM					
Instr	uctior	וs: 1 2) Q. No. 1 is compulsory and si book.) Figures to the right indicate fu	noule Il ma	d be solved in first 30 minutes in answer rks.
			MCQ/Objective T	уре	Questions
Dura	tion: 3	0 Mir	nutes		Marks: 14
Q.1	Cho 1)	ose t	the correct alternatives from t produces 1000 watts. Cold	he o	ptions and rewrite the sentence. 14
		c)	Warm	d)	Shivering
	2)	Moo a) c)	dels are simplified representatio simulations systems	n of b) d)	 objects none of above
	3)	Fick a) c)	s's law defines process. diffusion ionization	b) d)	drift potential gradient
	4)	Ohr a) c)	ns law defines process. diffusion current	b) d)	drift potential
	5)	Parl a) c)	kinson's occurs due to lack of _ blood CSF	b) d)	 oxygen dopamine
	6)	Stre a) c)	etch reflex is define as a controll muscles CNS	ing d b) d)	of load dynamic of Cells tissues
	7)	Eins a) c)	stein's relationship define relatio diffusion & drift cathode & anode	n be b) d)	etween anion & cations model & object
	8)	Spa a) c)	ice charge neutrality is the repre diffusion & drift cathode & anode	esen b) d)	tation of anion & cations model & object
	9)	a) c)	movements are very fast ju saccadic vergence	mp f b) d)	rom one eye position to another. smooth pursuit vestibular
	10)	In _ a) c)	movements eyes tracks saccadic vergence	mov b) d)	ing objects. smooth pursuit vestibular

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering

Seat

No.

SLR-FM-746

Set

Q
11) In _____ movements angle between eyes changes.

saccadic a)

C)

- b) smooth pursuitd) vestibular vergence
- movement compensated head movements. 12)
 - a) saccadic b) smooth pursuit
 - vergence C)
- d) vestibular
- One ion equation is called as _____ equation. 13)
 - Donnan's b) Nernst a)
 - d) Fick's Ohm's c)
- Resting state of action potential starts from _ 14) a) b) -75mV
 - -90mV
 - C) +20mV d) +35mV

Set Q

Seat No.						Set	Q
		T.E. (Part – I BIOLO) (Old) (CGP) Bio-Medic DGICAL MOI	A) Examination N al Engineering DELING & SIMUL	Nov/Dec-2019 ATION		
Day & Time:	& Da : 02:	ate: Monday, 09-12 30 PM To 05:30 F	2-2019 M		Max	. Marks	56 56
Instru	ucti	ons: 1) All questic 2) Figure to t	ns are compuls he right indicate	ory. es full marks.			
			Se	ction – I			
Q.2	Atte a) b) c)	empt any four qu Explain with neat What is parallel o Derive cable equ	estions. diagram electro conductance eq ation.	ode-electrolyte interf uation?	ace.		16
	d) e)	Differentiate betw Explain different	veen Nernst and biophysics tools	Donnan equation.			
Q.3	Atte a) b) c)	empt any two que With the help of r Explain Hodgkin Differentiate betw 1) compartmen 2) lumped and	estions. heat diagram ex Huxley model v veen: tal and non con distributed para	plain electric model vith necessary equat apartmental modeling meter model	of cell membrane ions. 9		12
		<i>,</i> .	Se	ction – II			
Q.4	Atte a) b) c) d) e)	empt any four que Define active sta Explain all 4 eye Explain insulin gl Explain symptom What are Glissad	estions. te tension and r movements. ucose feedback is and causes o les? Mention or	nuscle tension. model. f Parkinson's syndro e example.	me.		16
Q.5	Atte a) b)	empt any two que Draw and explair Explain the comp blocks.	estions. n electrical mod lete neuromuso	el of thermoregulator cular control system	y plant. with all relevant		12
	c)	Explain working	and significance	of drug delivery sys	tem.		

məti	uctio	hook	ioun	
		2) Figures to the right indicate ful	l ma	irks.
		MCQ/Objective T	уре	Questions
Dura	tion: 3	30 Minutes		Mark
Q.1	Cho 1)	ose the correct alternatives from t	he o ead i	ptions and rewrite the sentence. movements.
		a) saccadic c) vergence	b) d)	smooth pursuit vestibular
	2)	One ion equation is called as a) Donnan's c) Ohm's	e b) d)	quation. Nernst Fick's
	3)	Resting state of action potential sta a) -90mV c) +20mV	rts fr b) d)	rom -75mV +35mV
	4)	 produces 1000 watts.a) Coldc) Warm	b) d)	Heat Shivering
	5)	Models are simplified representation a) simulations c) systems	n of b) d)	 objects none of above
	6)	Fick's law defines process. a) diffusion c) ionization	b) d)	drift potential gradient
	7)	Ohms law defines process. a) diffusion c) current	b) d)	drift potential
	8)	Parkinson's occurs due to lack of a) blood c) CSF	b) d)	 oxygen dopamine
	9)	Stretch reflex is define as a controll	ing c	of load dynamic of

Einstein's relationship define relation between ____

b) Cells

tissues

anion & cations

d) model & object

d)

b)

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

muscles

diffusion & drift

cathode & anode

CNS

a)

C)

a)

c)

10)

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

SLR-FM-746

Set

R

Max. Marks: 70

Marks: 14

14

Seat No.

Dur

SLR-FM-746 Set R

- 11) Space charge neutrality is the representation of _____.
 - diffusion & drift a)
- b) anion & cations
- d) model & object cathode & anode
- movements are very fast jump from one eye position to another. 12)
 - a) saccadic

C)

a)

C)

b) smooth pursuit

vergence C)

saccadic

vergence

- d) vestibular
- 13) _ movements eyes tracks moving objects. In ___
 - b) smooth pursuit
 - d) vestibular
- In _____ movements angle between eyes changes. 14)
 - a) saccadic

b) smooth pursuitd) vestibular

C) vergence

Seat No.	:					Set	R
		T.E. (Part – I BIOLO) (Old) (CGPA Bio-Medica)GICAL MOD) Examination No I Engineering ELING & SIMULA	ov/Dec-2019 TION		
Day & Time:	& Da : 02:	te: Monday, 09-12 30 PM To 05:30 F	2-2019 M		Max.	Marks	56 :
Instru	uctio	ons: 1) All questio 2) Figure to t	ns are compulso	ry. s full marks.			
			Sec	tion – I			
Q.2	Atte a) b) c)	empt any four qu Explain with neat What is parallel o Derive cable equ	estions. diagram electro onductance equ ation.	de-electrolyte interfac ation?	e.		16
	d) e)	Differentiate betw Explain different	veen Nernst and biophysics tools.	Donnan equation.			
Q.3	Atte a) b) c)	With the help of r Explain Hodgkin Differentiate betw 1) compartmen 2) lumped and	estions. heat diagram exp Huxley model wi veen: tal and non comp distributed param	lain electric model of th necessary equation partmental modeling neter model	cell membrane. ns.		12
			Sec	tion – II			
Q.4	Atte a) b) c) d) e)	empt any four qu Define active sta Explain all 4 eye Explain insulin gl Explain symptom What are Glissad	estions. te tension and m movements. ucose feedback s and causes of les? Mention one	uscle tension. model. Parkinson's syndrom e example.	e.		16
Q.5	Atte a) b)	empt any two que Draw and explair Explain the comp blocks.	estions. electrical mode lete neuromuscu	of thermoregulatory Ilar control system wi	plant. th all relevant		12
	C)	Explain working a	and significance	of drug delivery syste	m.		

Instr	uction	i s: 1)	Q. No. 1 is compu book.	lsory and sl	nould	d be solved in first 30 minutes in ans	wer
		2)	Figures to the right	t indicate ful	l ma	rks.	
-		• • <i>1</i>	MCQ/	Objective T	уре	Questions	
Durat	:ion: 3	0 Min	lutes		_	Marks	: 14
Q.1	Choo	Se t l	he correct alternat 's law defines	ives from t	he o	ptions and rewrite the sentence.	14
	''	a) c)	diffusion ionization	_ process.	b) d)	drift potential gradient	
	2)	Ohm	ns law defines	_ process.			
		a) c)	diffusion current		b) d)	drift potential	
	3)	Park	kinson's occurs due	to lack of _			
		a) c)	blood CSF		b) d)	oxygen dopamine	
	4)	Stre a) c)	tch reflex is define a muscles CNS	as a controll	ing c b) d)	of load dynamic of Cells tissues	
	5)	Eins a) c)	tein's relationship d diffusion & drift cathode & anode	efine relatic	n be b) d)	tween anion & cations model & object	
	6)	Spa a) c)	ce charge neutrality diffusion & drift cathode & anode	is the repre	esent b) d)	ation of anion & cations model & object	
	7)	a) c)	movements are saccadic vergence	e very fast ju	mp f b) d)	rom one eye position to another. smooth pursuit vestibular	
	8)	In a) c)	movements e saccadic vergence	eyes tracks	movi b) d)	ng objects. smooth pursuit vestibular	
	9)	In a) c)	movements an saccadic vergence	ngle betwee	n ey b) d)	es changes. smooth pursuit vestibular	
	10)	a) c)	movement com saccadic vergence	pensated h	ead r b) d)	novements. smooth pursuit vestibular	

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

In

SLR-FM-746

Set S

Seat No.

- Max. Marks: 70
 - 4

SLR-FM-746 Set S

- 11) One ion equation is called as _____ equation.
 - Donnan's b) Nernst a) d) Fick's Ohm's C)
- Resting state of action potential starts from _ 12)
 - b) -75mV -90mV a)
 - +20mV C)

d) +35mV

.

- _ produces 1000 watts. 13)
 - Cold a) b) Heat Warm C)
 - d) Shivering
- Models are simplified representation of ____ 14)
 - simulations a)

C)

- b) objects
- systems d) none of above

Seat No.	:					Set	S
	T.	.E. (Part – I BIOL() (Old) (CGI Bio-Medi)GICAL MO	PA) Examinati cal Engineeri DELING & SII	ion Nov/Dec-2 ng MULATION	019	
Day & Time:	& Date: N : 02:30 P	/londay, 09-12 'M To 05:30 F	2-2019 M			Max. Marks	s: 56
Instru	uctions:	 All question Figure to t 	ns are compu ne right indica	lsory. tes full marks.			
			S	ection – I			
Q.2	Attempt a) Exp b) What c) Der	t any four qu Main with neat at is parallel c	e stions. diagram elec onductance e ation.	trode-electrolyte quation?	interface.		16
	d) Diffe) Exp	erentiate betwo lain different	veen Nernst an piophysics too	nd Donnan equat ls.	tion.		
Q.3	Attempt a) With b) Exp c) Diffe 1) 2)	t any two que h the help of r plain Hodgkin erentiate betv compartmen lumped and	estions. leat diagram e Huxley model reen: ral and non co distributed par	explain electric m with necessary e mpartmental mo ameter model	odel of cell memb equations. deling	orane.	12
			S	ection – II			
Q.4	Attempt a) Def b) Exp c) Exp d) Exp e) What	t any four qu ine active stat plain all 4 eye plain insulin gl plain symptom at are Glissac	estions. e tension and movements. ucose feedbac s and causes es? Mention c	muscle tension. ck model. of Parkinson's sy one example.	vndrome.		16
Q.5	Attempt a) Dra b) Exp bloc	t any two que w and explair alain the comp cks.	estions. electrical mo lete neuromus	del of thermoregi scular control sys	ulatory plant. stem with all relev	ant	12
	c) Exp	lain working a	and significand	e of drug deliver	y system.		

Set

Max. Marks: 70

	TE (Part _ I)	
No.		
Seat		

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

- 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 MinutesQ.1 Choose the correct alternatives from the options and rewrite the sentence.

- 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

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.
 - \dot{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 inputd) Raise the READ input
- c) Raise the HOLD input d) Raise the
- 7) The registers that are not accessible by the user are _____
 - a) ACC and B reg.
 - c) IR

3)

- b) IP and IE
- d) TMP1 and TMP2

Marks: 14

- 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

SLR-FM-747

Set | P

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Answer any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

Set

16

12

16

No.	Seat	
	No.	

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

Duration: 30 Minutes

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

- Q.1 Choose the correct alternatives from the options and rewrite the sentence.
 - Name the architecture and the instruction set of the microcontroller 8051 1)
 - Van-Neumann architecture with CISC instruction set a)
 - Van-Neumann architecture with RISC instruction set b)
 - c) Harvard architecture with CISC instruction set Software
 - d) Harvard architecture with RISC instruction set Software

2) Which of the following is an example of an input device?

- a) Scanner b) Speaker
- CD d) Printer c)
- How many interrupts are there in microcontroller 8051? 3)
 - 3 a) b) 6
 - 4 d) 5 c)
- How are the bits of register PSW affected if we select bank 2 of 8051? 4)
 - a) PSW.5 = 0 and PSW.4 = 1 b) PSW.2 = 0 and PSW.3 = 1PSW.3 = 0 and PSW.4 = 1
 - c) PSW.3 = 1 and PSW.4 = 1 d)
- 5) Which of the following comes under the indirect addressing mode? MOVC @A+DPTR
 - MOVX A,@DPTR a) b)
 - MOV A, R0 d) MOV @R0, A C)
- 6) Auto reload mode is allowed in which of the timer?
 - a) Mode0 b) Mode1
 - c) Mode2 d) Mode3
- 7) 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
 - Connect all pins of the port to the main supply at a time c)
 - d) None

Max. Marks: 70

Set

Marks: 14

- 8) Select the best description of read only memory .
 - Nonvolatile, used to store information that changes during system a) 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 _____
 - b) 2 byte a) 1 byte
 - 3 byte d) c) 4 byte
- 11) In 8085 microprocessor system, with memory mapped I/O which of the following is true?
 - Devices have 8-bit address line. a)
 - 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
- Raise the READ input d)
- 14) The registers that are not accessible by the user are
 - a) ACC and B reg.
- b) IP and IE

c) IR

TMP1 and TMP2 d)

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Answer any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

3	0 Mi	nutes	-		Marks
oc nte	ose t ence	the correct alternatives from th	e opt	ions and rewrite the	
	In s ope	synchronous data transfer type bo erate in	oth tra	insmitter and receiver will	
	a) c)	Same clock pulse Same or Different clock pulse	b) d)	Different clock pulse None	
	To a) c)	put the 8085 microprocessor in th Lower the HOLD input Raise the HOLD input	ne wa b) d)	it state Lower the READ input Raise the READ input	
	The a) c)	e registers that are not accessible ACC and B reg. IR	by thb) b) d)	ne user are IP and IE TMP1 and TMP2	
	Nar	me the architecture and the instru	iction	set of the microcontroller 8	051
	a) b) c) d)	Van- Neumann architecture with Van- Neumann architecture with Harvard architecture with CISC Harvard architecture with RISC	n CIS(n RIS(instru instru	C instruction set C instruction set ction set Software ction set Software	
	Wh a) c)	ich of the following is an example Scanner CD	e of ar b) d)	n input device? Speaker Printer	
	Hov	w many interrupts are there in mid	croco	ntroller 8051?	
	a) c)	3 4	b) d)	6 5	
	Ho\ a) c)	w are the bits of register PSW affe PSW.5 = 0 and PSW.4 = 1 PSW.3 = 1 and PSW.4 = 1	ected b) d)	if we select bank 2 of 8051 PSW.2 = 0 and PSW.3 = 2 PSW.3 = 0 and PSW.4 = 2	? 1 1
	Wh a) c)	ich of the following comes under MOVX A,@DPTR MOV A, R0	the in b) d)	direct addressing mode? MOVC @A+DPTR MOV @R0, A	
	Aut a) c)	o reload mode is allowed in whicl Mode0 Mode2	h of th b) d)	ne timer? Mode1 Mode3	

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

- 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

Q.1 Cho sen

- 1)
- 2)

3)

- 4)
- 5)
- 6)
- 7)
- 8)
- 9)



Duration:



Max. Marks: 70

s: 14

Set R

- 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.

Set

R

16

12

Seat	
No.	

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Answer any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

16

				r
Seat No.			Set	S
		T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering MICROPROCESSORS & MICROCONTROLLER		
Day & Time:	Date 02:30	: Wednesday,11-12-2019 Max.) PM To 05:30 PM	Mark	s: 70
Instru	ction	 s: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes i book. 2) Figures to the right indicates full marks. 	n ans	wer
		MCQ/Objective Type Questions		
Duratio	on: 30	0 Minutes	Mark	s: 14
Q.1	Choo	ese the correct alternatives from the options and rewrite the		14
5	sente 1)	How many interrupts are there in microcontroller 8051? a) 3 b) 6 c) 4 d) 5		
4	2)	How are the bits of register PSW affected if we select bank 2 of 8051a) PSW.5 = 0 and PSW.4 = 1b) PSW.2 = 0 and PSW.3 = 1c) PSW.3 = 1 and PSW.4 = 1d) PSW.3 = 0 and PSW.4 = 1	?	
(3)	Which of the following comes under the indirect addressing mode?a) MOVX A,@DPTRb) MOVC @A+DPTRc) MOV A, R0d) MOV @R0, A		
2	4)	Auto reload mode is allowed in which of the timer?a) Mode0b) Mode1c) Mode2d) Mode3		
Ę	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 		<u> </u>
6	 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 durin system operation.	ng	
		c) Volatile, used to store information that changes during system		
		d) Volatile, used to store information that does not changes during system operation.		
7	7)	In the memory hierarchy the fastest memory is a) SRAM b) Cache c) Register d) DRAM		
٤	8)	Length of the instruction POP D isa) 1 byteb) 2 bytec) 3 byted) 4 byte		

Page **10** of **12**

SLR-FM-747

Seat

- 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 inputb) Lower t
 - b) Lower the READ input

Set

S

- 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

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

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

Section – I

Q.2 Answer any four.

- 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.

- 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.

- 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.

- 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.

Max. Marks: 56

12

16

12

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 Bio-Medical Engineering PRINCIPLES OF COMMUNICATION				
Day Time	& Date : 02:3	: Thursday, 13-12-2019 Max. Marks: 70 PM To 05:030 PM		
Instr	uctio	 s: 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 		
		2) Figures to the right indicate full marks. MCQ/Objective Type Questions		
Dura	tion: 3) Minutes Marks: 14		
01	Cho	se the correct alternatives from the options and rewrite the sentence 14		
Q. 1	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) Ts is greater than 1/2fm b) Ts is lesser than 1/2fm c) Ts is equal to 1/2fm d) Ts is lesser than or equal to 1/2fm		
	9)	The amount of data transmitted for a given amount of time is called a) Bandwidth b) Frequency		

Set P

- d) Signal power



Set	Ρ
	-

- 10) The modulation technique that uses the minimum channel bandwidth and transmitted power is _____.
 - a) FM b) DSB-SC
 - c) VSB d) SSB
- 11) Bandwidth required in SSB-SC signal is (f_m is modulating frequency)

a)	2f _m	b)	< 2f _m
C)	> 2f _m	d)	f _m

- 12) 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%
- 13) Analog signal may be converted into digital signal by ____
- a) Sampling b) Amplitude modulation
 - c) Filtering d) Mixing
- 14) 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

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four

- 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 Simultenously 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

- 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

- 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

- 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.

SLR-FM-748

Max. Marks: 56

12

12





16

Seat	
No.	

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

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

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

- According to sampling theorem . 1)
 - Ts is greater than 1/2fm a)
 - Ts is lesser than 1/2fm b)
 - Ts is equal to 1/2fm C)
 - Ts is lesser than or equal to 1/2fm d)
- 2) The amount of data transmitted for a given amount of time is called _____.
 - b) Frequency a) Bandwidth
 - c) Noise d) Signal power
- The modulation technique that uses the minimum channel bandwidth and 3) 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

- The modulation index when the un modulated carrier power is 15KW, and 5) after modulation, carrier power is 17KW will be ____
 - a) 68% b) 51.63%
 - 82.58% d) 34.66% C)
- Analog signal may be converted into digital signal by __ 6) Sampling a)
 - b) Amplitude modulation
 - d) Mixing c) Filtering
- M wave may be represented as $E(t) \cos \omega_c t$ where E(t) is _____. 7)
 - a) Envelope of the AM wave
 - Carrier signal b)
 - c) Amplitude of modulating signal
 - d) None of the above
- 8) 100% modulation, the power in each sideband is _____ of that of carrier.
 - b) 40% a) 50%



Max. Marks: 70

Marks: 14

				Set
9)	A hi a) c)	igh Q tuned circuit will permit an Fidelity Sensitivity	amp b) d)	lifier to have high Frequency range Selectivity
10)	A 40 AM a)	00 W carrier is amplitude modula is 400W	ated	with $m = 0.75$. The total power in 512W
	c)	588W	d)	650W
11)	The a) c)	e Superhetrodyne principle provid RF audio	des s b) d)	selectivity at stage. IF Before RF
12)	a) c)	FSK has no phase discontinu Continuous FSK Uniform FSK	uity. b) d)	Discrete FSK None of the mentioned
13)	The	signal to quantization noise ration	o of	PCM system depends upon
	a) c)	 sampling rate message signal bandwidth	b) d)	number of quantization levels noise
14)	Qua a) c)	antization noise occurs in PCM FDM	 b) d)	TDM PWD

Q

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four

- 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 Simultenously 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

- 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

- 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

- 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.



12

16

16

12

Set Q

SLR-FM-748

	PRINCIPLES OF C	OMI	MUNICATION
: Th) PN	ursday, 13-12-2019 / To 05:030 PM		Max. Marks: 70
is: 1	 Q.No.1 is compulsory and sh book. 	ould	be solved in first 30 minutes in answer
2) Figures to the right indicate ful	ll mar	ks.
	MCQ/Objective T	уре	Questions
0 Mi	inutes		Marks: 14
se f	t he correct alternatives from t FSK has no phase discontin	he o uitv.	ptions and rewrite the sentence. 14
a) c)	Continuous FSK Uniform FSK	b) d)	Discrete FSK None of the mentioned
The	e signal to quantization noise rat	io of	PCM system depends upon
a) c)	 sampling rate message signal bandwidth	b) d)	number of quantization levels noise
Qua a) c)	antization noise occurs in PCM FDM	 b) d)	TDM PWD
Acc a) b) c) d)	cording to sampling theorem Ts is greater than 1/2fm Ts is lesser than 1/2fm Ts is equal to 1/2fm Ts is lesser than or equal to 1/	 '2fm	
The a) c)	e amount of data transmitted for Bandwidth Noise	a giv b) d)	ren amount of time is called Frequency Signal power
The trar	e modulation technique that uses a smitted power is	s the	minimum channel bandwidth and
a) c)	FM VSB	b) d)	DSB-SC SSB
Bar	ndwidth required in SSB-SC sign	nal is	(f _m is modulating frequency)
a) c)	 2f _m > 2f _m	b) d)	< 2f _m f _m

Day & Date: Time: 02:30

Instructions n answer

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering**

Duration: 30

2)

Seat

No.

Q.1 Choose ice.

- 1)
 - a
 - C Т
 - ____ a
 - C)
- 3) C а
 - Ċ
- A 4)
 - а
 - b
 - C
 - ď
- Т 5)
 - C
- 6) Т nd tr
 - a
 - Ċ
- 7) В

	•		
a)	2f _m	b)	< 2f _m
C)	> 2f _m	d)	f m

- The modulation index when the un modulated carrier power is 15KW, and 8) after modulation, carrier power is 17KW will be _
 - a) 68% b) 51.63%

c)	82.58%	d)	34.66%

- Analog signal may be converted into digital signal by _ 9) a)
 - Sampling b) Amplitude modulation d) Mixing
 - Filtering c)

SLR-FM-748

Set | R

Set | R 10) M wave may be represented as $E(t) \cos \omega_c t$ where E(t) is _____. a) Envelope of the AM wave Carrier signal b) c) Amplitude of modulating signal d) None of the above 100% modulation, the power in each sideband is _____ of that of carrier. 11) a) 50% b) 40% 60% d) 25% C) A high Q tuned circuit will permit an amplifier to have high _____. 12) 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 c) audio b) IFd) Before RF

Seat No.

Day & Date: Thursday, 13-12-2019 Time: 02:30 PM To 05:030 PM

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four

- a) Explain noise factor and noise figure in communication system.
- **b)** Define AM and derive equation for it.
- 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 Simultenously 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

- 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

- 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

- 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.

Max. Marks: 56

12

16

16

12



Day 8 Time:	& Date 02:30	e: Th 0 PN	ursday, 13-12-2019 I To 05:030 PM		Max. Marks: 70
Instru	uctior	is: 1) Q.No.1 is compulsory and sho book.	buld	be solved in first 30 minutes in answer
		2)	Figures to the right indicate full	mar	ks.
			MCQ/Objective Ty	/pe	Questions
Durat	ion: 3	0 Mi	nutes		Marks: 14
Q.1	Choc 1)	The tran	he correct alternatives from th modulation technique that uses smitted power is FM	the	ptions and rewrite the sentence. 14 minimum channel bandwidth and
		c)	VSB	d)	SSB
	2)	Ban	dwidth required in SSB-SC sign	al is	(fm is modulating frequency)
		a) c)	 2f _m > 2f _m	b) d)	< 2f _m f _m
	3)	The afte a) c)	modulation index when the un r r modulation, carrier power is 17 68% 82.58%	nodu KW b) d)	ulated carrier power is 15KW, and will be 51.63% 34.66%
	4)	Ana a) c)	log signal may be converted into Sampling Filtering	b dig b) d)	ital signal by Amplitude modulation Mixing
	5)	M w a) b) c) d)	vave may be represented as E(t) Envelope of the AM wave Carrier signal Amplitude of modulating signal None of the above	cos	$\omega_c t$ where E(t) is
	6)	100 a) c)	% modulation, the power in eacl 50% 60%	n sid b) d)	eband is of that of carrier. 40% 25%
	7)	A hi a) c)	gh Q tuned circuit will permit an Fidelity Sensitivity	amp b) d)	blifier to have high Frequency range Selectivity
	8)	A 40 AM a) c)	00 W carrier is amplitude modula is 400W 588W	ated b) d)	with $m = 0.75$. The total power in 512W 650W

Seat	
No.	

SLR-FM-748

Set S

- Duration: 30 Mir Q.1 Choose th
 - 1) The trans

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering** PRINCIPLES OF COMMUNICATION

- a)
- c)
- 2) Ban

a)	2f _m	b)	< 2f _{rr}
c)	> 2f _m	d)	f _m

- 3) The after
 - a)
 - c)
- 4) Anal a)
 - c)
- M wa 5)
 - a)
 - b)
 - c)
 - d)

- a) c)
- 7) A hio a)
 - C)
- A 40 8) AM

a)	400W	b)	512W
C)	588W	d)	650W

The Superhetrodyne principle provides selectivity at _____ stage. 9)

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
 - c) message signal bandwidth
- b) number of quantization levelsd) noise

SLR-FM-748

Set S

- 12) Quantization noise occurs in _____
 - a) PCM b) TDM
 - c) FDM d) PWD
- 13) According to sampling theorem _____.
 - a) Ts is greater than 1/2fm
 - b) Ts is lesser than 1/2fm
 - c) Ts is equal to 1/2fm
 - d) Ts is lesser than or equal to 1/2fm
- 14) The amount of data transmitted for a given amount of time is called _____.
 - a) Bandwidth
 - c) Noise

- b) Frequency
- d) Signal power

Seat No.

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

Instructions: 1) All questions are compulsory.

2) Figure to the right indicates full marks.

Section – I

Q.2 Attempt any four

- a) Explain noise factor and noise figure in communication system.
- b) Define AM and derive equation for it.
- 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 Simultenously 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

- 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

- 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

- 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.



SLR-FM-748

Set

16

12

16

		T.E. (Part – I) (Old) (CGPA) Examina Bio-Medical Enginee SIGNALS & SYSTE	ation Nov/Dec-2019 ering EM
Day Time	& Date : 02:3	e: Monday, 16-12-2019 30 PM To 05:30 PM	Max. Marks: 70
Instr	uctio	ns: 1) Q. No. 1 is compulsory and should be s	solved in first 30 minutes in answer
		2) Figures to the right indicate full marks.3) Assume suitable data wherever necess	sary.
		MCQ/Objective Type Qu	lestions
Dura	tion: 3	30 Minutes	Marks: 14
Q.1	Cho 1)	ose the correct alternatives from the optioAll causal systems must have the componentiala) memoryb) tic) stabilityd) line	ns. 14 nt of me invariance nearity
	2)	A system produces zero output for one inpu output for several other inputs. This system a) Non - invertible System b) Ir c) Non-causal system d) C	t and same gives the same is called as nvertible system Causal system
	3)	The fundamental period of the signal: sin60ta) 1/60 secb) 1c) 1/20 secd) 1	t is /30 sec /10 sec
	4)	The power of the signal: x(t) = cos(t) is a) 1/2 b) 1 c) 3/2 d) 2	
	5)	A signal is anti-causal ifa) $x(t) = 0$ for $t = 0$ b) $x(t) = 1$ for $t > 0$ c) $x(t) = 1$ for $t > 0$	(t) = 1 for t < 0 (t) = 0 for t > 0
	6)	An energy signal has $G(f)=10$. Its energy de a) 10 b) 1 c) 50 d) 2	ensity spectrum is 00 0
	7)	 A LTI system is said to be initially relaxed sy a) zero input produces zero output b) zero input produces non-zero output c) zero input produces an output equal to a d) none of these 	ystem only if unity
	8)	is the possible range of frequency s fourier series (DTFS). a) $0 to 2\pi$ b) - c) Both a & b d) N	pectrum for discrete time $-\pi to + \pi$ lone of the above

Seat

No.



Set P

Page **1** of **16**

				SLR-FM-749		
				Set	Ρ	
9)	is the nature of Fourier representation of a discrete & aperiodic signal.					
	a) c)	Continuous & periodic Continuous & aperiodic	b) d)	Discrete and aperiodic Discrete & periodic		
10) is the ROC defined or specified for the signals containing causa as well as anti-causal terms.			r the signals containing causal			
	a) c)	Greater than the largest pole Between two poles	b) d)	Less than the smallest pole Cannot be defined		
11)	equa a) c)	theorem states that the total al to the sum of average powers Parseval's Theorem Both a & b	avera of the b) d)	age power of a periodic signal is individual fourier coefficients. Rayleigh's Theorem None of the above		
12)	The a) z	ROC of sequence in the Z.T. of $z > a$	seque b)	ence $x[n] = a^n U[n]$ is z < a		
	C)	$ z > \alpha$	d)	$ z < \alpha$		
13)	cont	mathematical notation specil inuous time signal.	ies th	e condition of periodicity for a		
	a) : c) :	$x(t) = x(t + T_0)$ $x(t) = e^{-\alpha t}$	b) d)	x(n) = x(n+N) None of these		

- 14) The signal defined by the equations f(t) = 0 for t < 0, f(t) = E for $0 \le t \le \alpha$ 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.	

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

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.

- 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) $e^{\propto t}, \propto > 1$
 - 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.

- a) Express the given sequence in terms of unit step response for $x[n] = \{1, 3, -2, 4\}, 0 \le n \le 3$.
- **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.



Max. Marks: 70

Set

16

Section – II

Q.4 Attempt any four questions.

- 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 $-1 \le t \le 1$, and for other values of t. Also plot the magnitude spectrum.

Q.5 Attempt any two questions.

- 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.

$$x(n) = \begin{cases} 1 & for \ 0 \le n \le N-1 \\ 0 & else \ where \end{cases}$$

c) Find inverse Z transform of following functions under different ROC conditions.

$$x(z) = \frac{1}{\left(1 - \frac{1}{4}z^{-1}\right)} + \frac{2}{\left(1 - \frac{1}{3}z^{-1}\right)}$$

16

12

Set P
Day & Date: Monday, 16-12-2019 Time: 02:30 PM To 05:30 PM book. **Duration: 30 Minutes** Q.1 1) fourier series (DTFS). a) 0 to 2π b) c) Both a & b d)

- 2) is the nature of Fourier representation of a discrete & aperiodic signal.
 - a) Continuous & periodic
 - c) Continuous & aperiodic
- is the ROC defined or specified for the signals containing causal 3) as well as anti-causal terms.
 - a) Greater than the largest pole c) Between two poles
 - d) Cannot be defined

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 c) Both a & b
 - d)
- The ROC of sequence in the Z.T. of sequence $x[n] = a^n U[n]$ is _____. 5)
 - b) z < a a) z > ac) $|z| > \alpha$
- _ mathematical notation specifies the condition of periodicity for a 6) 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
- The signal defined by the equations f(t) = 0 for t < 0, f(t) = E for 7) $0 \le t \le \alpha$ and f(t) = 0 for $t > \alpha$ is _ a impulse function
 - a) a step function b)
 - c) Shifted step function d) a ramp function
- 8) All causal systems must have the component of _____
 - a) memory b)
 - stability d) linearity c)

T.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **Bio-Medical Engineering** SIGNALS & SYSTEM

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

- Figures to the right indicate full marks.
- Assume suitable data wherever necessary.

MCQ/Objective Type Questions

Choose the correct alternatives from the options.

- _____ is the possible range of frequency spectrum for discrete time $-\pi$ to $+\pi$
 - None of the above

Max. Marks: 70

Marks: 14 14

Set

Seat No.

- b) Discrete and aperiodic
- d) Discrete & periodic
- b) Less than the smallest pole

- b) Rayleigh's Theorem
- - None of the above
 - d) $|z| < \alpha$

time invariance

			SLR-FM-	749
			Set	Q
9)	A system produces zero output for o output for several other inputs. This a) Non - invertible System c) Non-causal system	one in syste b) d)	put and same gives the same m is called as Invertible system Causal system	
10)	The fundamental period of the signa a) 1/60 sec c) 1/20 sec	al: sin(b) d)	50t is 1/30 sec 1/10 sec	
11)	The power of the signal: $x(t) = cos(t)$ a) $1/2$ c) $3/2$) is b) d)	 1 2	
12)	A signal is anti-causal if a) $x(t) = 0$ for $t = 0$ c) $x(t) = 1$ for $t > 0$	b) d)	x(t) = 1 for t < 0 x(t) = 0 for t > 0	
13)	An energy signal has $G(f)=10$. Its e a) 10 c) 50	nergy b) d)	density spectrum is 100 20	
14)	 A LTI system is said to be initially real a) zero input produces zero output b) zero input produces non-zero o 	laxed t utput	system only if	

- c) zero input produces an output equal to unityd) none of these

SLR-FM-749

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

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.

- 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) $e^{\propto t}, \propto > 1$
 - 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.

- a) Express the given sequence in terms of unit step response for $x[n] = \{1, 3, -2, 4\}, 0 \le n \le 3$.
- **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.



Max. Marks: 70

12

16



Section – II

Q.4 Attempt any four questions.

- 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 $-1 \le t \le 1$, and for other values of t. Also plot the magnitude spectrum.

Q.5 Attempt any two questions.

- 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.

$$x(n) = \begin{cases} 1 & for \ 0 \le n \le N-1 \\ 0 & else \ where \end{cases}$$

c) Find inverse Z transform of following functions under different ROC conditions.

$$x(z) = \frac{1}{\left(1 - \frac{1}{4}z^{-1}\right)} + \frac{2}{\left(1 - \frac{1}{3}z^{-1}\right)}$$

16

12

Set Q

SLR-FM-749

		1.6	Bio-Medical Er	ngino	eering
Day a Time	& Date : 02:30	e: Mo 0 PN	onday, 16-12-2019 1 To 05:30 PM	515	Max. Marks: 70
Instr	uctior	15: 1) Q. No. 1 is compulsory and sho book.) Figures to the right indicate full	uld b mark	e solved in first 30 minutes in answer s.
		3	Assume suitable data wherever	nece	essary.
Dura	tion: 3	0 Mi	nutes	pe c	Marks: 14
Q.1	Choc 1)	D se t A si a)	the correct alternatives from the ignal is anti-causal if x(t) = 0 for $t = 0x(t) = 1$ for $t > 0$	e opt b)	ions. 14 x(t) = 1 for t < 0 x(t) = 0 for t > 0
	2)	An a) c)	energy signal has $G(f)=10$. Its en 10 50	b) d)	density spectrum is 100 20
	3)	A L a) b) c) d)	TI system is said to be initially rela zero input produces zero output zero input produces non-zero ou zero input produces an output eo none of these	axed Itput qual t	system only if o unity
	4)	four a) c)	is the possible range of frequencies (DTFS). 0 to 2π Both a & b	uency b) d)	y spectrum for discrete time $-\pi to + \pi$ None of the above
	5)	sigr a) c)	is the nature of Fourier repres nal. Continuous & periodic Continuous & aperiodic	entat b) d)	ion of a discrete & aperiodic Discrete and aperiodic Discrete & periodic
	6)	as v a) c)	is the ROC defined or specif well as anti-causal terms. Greater than the largest pole Between two poles	ied fo b) d)	or the signals containing causal Less than the smallest pole Cannot be defined
	7)	equ a) c)	theorem states that the total al to the sum of average powers Parseval's Theorem Both a & b	avera of the b) d)	age power of a periodic signal is e individual fourier coefficients. Rayleigh's Theorem None of the above
	8)	The a) c)	e ROC of sequence in the Z.T. of $z > a$ $ z > \alpha$	seque b) d)	ence x[n] = a^n U [n] is z < a $ z < \alpha$

Seat No.

SLR-FM-749

Set R

9) mathematical notation specifies the condition of periodicity for a continuous time signal. $x(t) = x(t + T_0)$ b) x(n) = x(n+N)a) c) $x(t) = e^{-\alpha t}$ None of these d) The signal defined by the equations f(t) = 0 for t < 0, f(t) = E for $0 \le t \le \alpha$ and f(t) = 0 for $t > \alpha$ is a) a step function b) a impulse function c) Shifted step function d) a ramp function 11) All causal systems must have the component of _ a) memory b) time invariance c) stability d) linearity 12) 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 The fundamental period of the signal: sin60t is _ 13) a) 1/60 sec 1/30 sec b) c) 1/20 sec d) 1/10 sec

- The power of the signal: x(t) = cos(t) is 14)
 - a) 1/2 b)
 - 3/2 c)

2

R

10)

- 1
- d)

SLR-FM-749 Set

SLR-FM-749

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

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.

- 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) $e^{\propto t}, \propto > 1$
 - 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.

- a) Express the given sequence in terms of unit step response for $x[n] = \{1, 3, -2, 4\}, 0 \le n \le 3$.
- **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.



Max. Marks: 70

Set

R

16

12

Section – II

Q.4 Attempt any four questions.

- 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 $-1 \le t \le 1$, and for other values of t. Also plot the magnitude spectrum.

Q.5 Attempt any two questions.

- 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.

$$x(n) = \begin{cases} 1 & for \ 0 \le n \le N-1 \\ 0 & else \ where \end{cases}$$

c) Find inverse Z transform of following functions under different ROC conditions.

$$x(z) = \frac{1}{\left(1 - \frac{1}{4}z^{-1}\right)} + \frac{2}{\left(1 - \frac{1}{3}z^{-1}\right)}$$

16

12

Set R

SLR-FM-749

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

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

- Figures to the right indicate full marks.
- Assume suitable data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Seat

Q.1 Choose the correct alternatives from the options.

- _____ is the ROC defined or specified for the signals containing causal 1) as well as anti-causal terms. Less than the smallest pole
 - a) Greater than the largest pole b) d)
 - c) Between two poles
- 2) theorem states that the total average power of a periodic signal is equal to the sum of average powers of the individual fourier coefficients.

b)

- a) Parseval's Theorem
- None of the above c) Both a & b d)
- 3) The ROC of sequence in the Z.T. of sequence $x[n] = a^n U[n]$ is _____.
 - a) z > ab) z < a c) $|z| > \alpha$ d) $|z| < \alpha$
- mathematical notation specifies the condition of periodicity for a 4) 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
 - The signal defined by the equations f(t) = 0 for t < 0, f(t) = E for
- 5) $0 \le t \le \alpha$ and f(t) = 0 for $t > \alpha$ is
 - a) a step function b) a impulse function
 - c) Shifted step function d) a ramp function
- 6) All causal systems must have the component of
 - a) memory b) c) stability
- 7) 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
 - c) Non-causal system d)
 - Causal system

b)

- 8) The fundamental period of the signal: sin60t is _____
 - 1/60 sec 1/30 sec a) b) 1/20 sec 1/10 sec c) d)

SLR-FM-749

Set

Max. Marks: 70



Cannot be defined

Rayleigh's Theorem

14

Marks: 14

- time invariance
- d) linearity

Invertible system

Set S 9) The power of the signal: x(t) = cos(t) is _ a) 1/2 1 b) c) 3/2 d) 2 A signal is anti-causal if _____. 10) a) x(t) = 0 for t = 0b) x(t) = 1 for t < 0c) x(t) = 1 for t > 0x(t) = 0 for t > 0d) 11) An energy signal has G(f)=10. Its energy density spectrum is _____. a) 10 100 b) c) 50 d) 20 A LTI system is said to be initially relaxed system only if _____. 12) 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 _ is the possible range of frequency spectrum for discrete time 13) fourier series (DTFS). a) 0 to 2π $-\pi$ to $+\pi$ b) c) Both a & b d) None of the above 14) _____ is the nature of Fourier representation of a discrete & aperiodic signal. a) Continuous & periodic b)

- Discrete and aperiodic

SLR-FM-749

- c) Continuous & aperiodic
- d) **Discrete & periodic**

SLR-FM-749

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

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.

- 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) $e^{\propto t}, \propto > 1$
 - 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.

- a) Express the given sequence in terms of unit step response for $x[n] = \{1, 3, -2, 4\}, 0 \le n \le 3$.
- **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.



Max. Marks: 70

Set

12

16

Section – II

Q.4 Attempt any four questions.

- 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 $-1 \le t \le 1$, and for other values of t. Also plot the magnitude spectrum.

Q.5 Attempt any two questions.

- 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.

$$x(n) = \begin{cases} 1 & for \ 0 \le n \le N-1 \\ 0 & else \ where \end{cases}$$

c) Find inverse Z transform of following functions under different ROC conditions.

$$x(z) = \frac{1}{\left(1 - \frac{1}{4}z^{-1}\right)} + \frac{2}{\left(1 - \frac{1}{3}z^{-1}\right)}$$

16

12

SLR-FM-749 Set S