University of Mumbai

Examinations Summer 2022

Program: BE

Program No : Program: BE

Program No : 1T01224

Name of the Examination : S.E.(Electronics Engineering)(SEM-III)(Choice Base Credit Grading System) (R- 19) (C Scheme)

Subject (Paper Code): 51321 / / Engineering Mathematics-III

Time: 2 hour 30 minutes Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Laplace Transform of $\{e^{2t}(1+sint)\}$ is
Option A:	$\frac{1}{(s+2)}+\frac{1}{(s+2)^2+1}$
Option B:	$\frac{1}{(s-2)}+\frac{s}{(s-2)^2+1}$
Option C:	$\frac{1}{(s-2)}+\frac{1}{(s-2)^2+1}$
Option D:	$\frac{1}{(s-2)}+\frac{1}{(s-2)^2-1}$
2.	If $L[f(t)]=\frac{4s}{s^2-9}$, find $L[f(2t)]$
Option A:	$\frac{s}{s^2-36}$
Option B:	$\frac{4s}{s^2-36}$
Option C:	$\frac{4s}{s^2-9}$
Option D:	$\frac{4s}{s^2-18}$
3.	Inverse Laplace Transform of $\frac{1}{s^4}$ is
Option A:	$\frac{1}{3!}t^4$
Option B:	$\frac{1}{2!}t^4$
Option C:	$\frac{1}{3!}t^3$
Option D:	$\frac{1}{4!}t^4$
4.	Find Fourier coefficient b_n for the function $f(x)=1-x^2$, $-1\le x\le 1$
Option A:	$\frac{2}{3}$
Option B:	$\frac{1}{3}$
Option C:	0
Option D:	$-\frac{2}{3}$

5.	Find Fourier coefficient b_1 in half range sine series for the function $f(x) = sinx,\ 0 < x < \pi$?
Option A:	$\frac{\pi}{2}$
Option B:	0
Option C:	1
Option D:	-1
6.	Evaluate $\int_c z\,dz$ from z = 0 to z = 1+ i along curve y =x
Option A:	2i
Option B:	I
Option C:	-2i
Option D:	-i
7.	Which of the following is related to Cauchy-Riemann equations?
Option A:	$u_x = v_y, u_y = v_x$
Option B:	$u_x = -v_y, u_y = v_x$
Option C:	$u_x = v_y, u_y = -v_x$
Option D:	$u_x = u_y,\ v_y = v_x$
8.	If $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ find A^4.
Option A:	$5I$
Option B:	$25I$
Option C:	$125I$
Option D:	$625I$
9.	If $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 2 & 0 \\ 3 & 5 & 1 \end{bmatrix}$ Find Eigen Values of $A^2 + I$
Option A:	1,2,1
Option B:	1,4,1
Option C:	2,5,2
Option D:	9,4,1
10.	A vector field which has a vanishing divergence is called as _____
Option A:	Solenoidal field
Option B:	Rotational field
Option C:	Hemispheroidal field
Option D:	Irrotational field

Q2	**Solve any Four out of Six** **5 marks each**
A	Find L$[e^{2t}sin^2t]$
B	Evaluate $\int_0^{1+i}(x^2 - iy)\ dz$ along the path y = x
C	Obtain the Fourier series for $f(x) = x$ in $(0,2\pi)$.
D	Find $L^{-1}\left[\frac{1}{s(s^2+9)}\right]$

E	Find the eigen values and eigen vector for A = $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$
F	Show that $\bar{F} = (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + 2z)k$ is both irrotational and solenoidal

Q3	**Solve any Four out of Six** **5 marks each**
A	Find L$[(1+t)^3]$
B	Find the constants a, b, c, d, e if $f(z) = (ax^3 + bxy^2 + 3x^2 + cy^2 + x) + i(dx^2y - 2y^3 + exy + y)$ is analytic.
C	Find Fourier expansion of f(x) = 2x in (0,3)
D	If$A = \begin{bmatrix} -1 & 4 \\ 2 & 1 \end{bmatrix}$ $3\tan A = A\tan 3$
E	Evaluate$\int_A^B (ydx + xdy)$ along y = x^2 from A (0,0) to B (1,1)
F	Find inverse Laplace of $\log(\frac{s+1}{s+2})$

Q4	**Solve any Four out of Six** **5 marks each**
A	Evaluate $\int_0^\infty e^{-t}\left(\frac{\cos 3t - \cos t}{t}\right) dt$
B	Find the inverse Laplace transform by using convolution theorem $\frac{1}{(s-a)(s-b)}$
C	Obtain the half range Fourier cosine series expansion for f(x) = x(2 − x) in (0,2)
D	Obtain the orthogonal trajectories for the family of curves $e^{-x}\cos y = C$.
E	What is the divergence and curl of the vector field $\vec{f} = 3x^2\hat{\imath} + 5xy^2\hat{\jmath} + xyz^3\hat{k}$ at the point (1, 2, 3).
F	Verify Cayley- Hamilton theorem for A = $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$