R-15

Code: 5GC32

II B.Tech. I Semester Supplementary Examinations August 2021

Mathematical Methods-III

(Common to EEE & ECE)

Max. Marks: 70   Time: 3 Hours

Answer *any five* full questions by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. Prove that the eigen vectors corresponding to the two different eigen values are linearly independent

OR

2. For what values of κ the equations $x + y + z = 1$; $2x + y + 4z = \kappa$;

$4x + y + 10z = \kappa^2$ have a solution and solve them completely in each case.

UNIT–II

3. Compute real root of $xe^x = \sin x$ using False Position method

OR

4. Compute $y(0.8)$ and $y(1.0)$ by Milne's method if $y' = 1 + y^2$, $y(0) = 0$, $y(0.2) = 0.2027$, $y(0.4) = 0.4228$, $y(0.6) = 0.6841$.

UNIT–III

5. Find the missing term in the table

x	0	1	2	3	4
f(x)	1	3	9	-	81

OR

6. Find first and second derivatives of y at x=1.5 if

x	1.5	2	2.5	3	3.5	4
y	3.375	7.000	13.625	24.000	38.875	59.000

UNIT–IV

7. Fit the curve of the $y = ae^{bx}$ to the following data

x	77	100	185	239	285
y	2.4	3.4	7.0	11.1	19.6

OR

8. Solve by the method of separation of variables $4\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} = 3u$ and $u(0, y) = e^{-5y}$.

UNIT–V

9. Expand $f(x) = \sqrt{1 - \cos x}, 0 < x < 2$ in a Fourier series. Hence evaluate

$$\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + - - -$$

OR

10. Find the Fourier transform of $f(x) = \begin{cases} 1 - x^2 \ for \ |x| < 1 \\ 0, \ for \ |x| > 1 \end{cases}$

and hence evaluate $\displaystyle\int_0^\infty \frac{x \cos x - \sin x}{x^3} \cos \frac{x}{2} dx$

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R-15

Code: 5G333

II B.Tech. I Semester Supplementary Examinations August 2021
Signals and Systems
(Electronics and Communication Engineering)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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		Marks	CO	Blooms Level

UNIT–I

1. a) Find the even and odd components of the following signal $x(t) = \cos t + \sin t +2\sin t+4\cos t$ — 7M, CO 1, L3

   b) Obtain the expressions to represent trigonometric Fourier coefficients in terms of exponential Fourier coefficients. — 7M, CO 2, L2

OR

2. a) Show that a composite signal is periodic if the ratio of their fundamental periods is a rational number — 6M, CO 1, L1

   b) Find the Fourier series of the following wave form
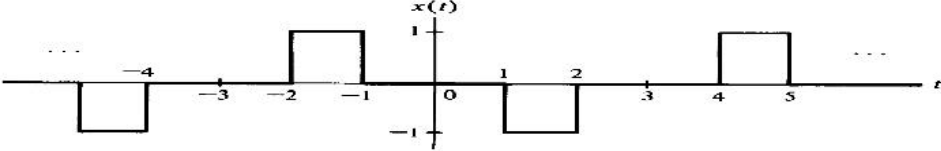
   — 8M, CO 2, L3

UNIT–II

3. a) Find the Fourier Transform of a Gaussian Pulse — 7M, CO 3, L2

   b) State and prove Differentiation Property of Fourier Transform — 7M, CO 2, L3

OR

4. a) Find the Fourier transform of DC Signal — 7M, CO 3, L4

   b) State and prove Time Convolution property of Fourier Transform. — 7M

UNIT–III

5. a) Explain about the distortion less transmission — 6M, CO 1, L3

   b) Explain the following
      i. Signal Bandwidth
      ii. System Bandwidth
      iii. Paley-Wiener Criterion — 8M, CO 2, L1

OR

6. a) A signal $v(t)=\cos 5 t +0.5\cos 10 t$ is instantaneously sampled. The interval between the samples is T_s. If the sampling signal is

   $$S(t) = 5\sum_{k=-\infty}^{\infty} u(t-0.1k) \qquad \text{and the} \qquad v_s(t) = \sum_{k=-\infty}^{\infty} I_k u(t-0.1k)$$

   show that $I_k = I_{k+4}$ where I_k is the strength of the kth pulse — 7M, CO 3, L4

   b) Discuss the concept of Sampling of Band pass signals — 7M, CO 1, L1

UNIT–IV

7. a) Derive an expression for convolution of two signals. Find the convolution of unit step signal with itself | 7M | 4 | L3
   b) Show that when two signals are convolved in time domain is multiplied in frequency domain. | 7M | 4 | L2

OR

8. a) Define auto correlation and cross correlation? Prove that the auto correlation function is maximum at origin. | 7M | 4 | L4
   b) Find the autocorrelation and Energy Spectral Density(ESD) of $x(t)=e^{-at}u(t)$ | 7M | 4 | L3

UNIT–V

9. a) Explain the Time convolution and Scaling properties of Laplace transform. | 7M | 5 | L2
   b) Find the inverse Laplace transform of x(s) = 5(s+5)/ s(s+3) (s+7); Re(s) > -3 | 7M | 4 | L4

OR

10. a) Explain the constraints on ROC for various classes of signals | 7M | 5 | L2
    b) Derive the relation between Z transform and Fourier transform | 7M | 4 | L4

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