

Roll No.

Total No. of Pages : 02

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B.Tech. (E&CE) (Sem.-3)
MATHEMATICS – III (INTEGRAL TRANSFORMS, PROBABILITY & STATISTICS)

Subject Code : BTAM-303-23

M.Code : 96258

Date of Examination : 04-12-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) Define Inverse Laplace Function.
- b) Explain properties of Fourier Transform.
- c) State scaling property of Z transforms.
- d) Write the properties of Normal distribution.
- e) Evaluate $L(\sin at)$.
- f) Find the Z transform of $4k\delta(k-1)$; $k \geq 0$.
- g) State Dirichlet's condition for a fourier series.
- h) State Bayes theorem.
- i) Find the probability of throwing an even number with an ordinary six faced die.
- j) Explain difference equations with example.

SECTION - B

- Find the inverse Laplace transform of $\frac{1}{s^4+4}$
- Find the Fourier series to represent $f(x) = x + x^2$ from $-\pi < x < \pi$.
- Find the Z-transform of $\sin(3k + 5)$.
- Find the z- transform of discrete unit step

$$U(k) = \begin{cases} 0, & k < 0 \\ 1, & k \geq 0 \end{cases}$$

6. **Find the mean and median of the following data :**

Size	50-53	53-56	56-59	59-62	62-65	65-68
Frequency	2	7	24	27	13	13

SECTION - C

7. Using Laplace transforms, find the solution of the initial value problem

$$y'' + 2t y' - y = t, \quad y(0) = y'(0) = 1$$

8. An infinitely long string having one end at $x = 0$ is initially at rest along x -axis. The end $x = 0$ is given a transverse displacement $f(t)$, when $t > 0$. Find the displacement of any point of the string at any point.
9. Assuming that the diameter of 1000 brass plugs taken consecutively from a machine form a normal distribution with mean 0.7515 cm and standard deviation 0.0020 cm, how many of the plugs are likely to be rejected if the approved diameter is 0.752 ± 0.004 cm?

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.