

Roll No.

Total No. of Pages : 02

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B.Tech.(ECE) (Sem.-3)

MATHEMATICS-III

Subject Code : BTAM-303-18

M.Code : 76448

Date of Examination : 21-06-2024

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) State relationship between Fourier and Laplace transforms.
- (b) State any two properties of linear transforms.
- (c) Define unit step function.
- (d) Define Dirichlet's conditions.
- (e) State discrete random variables.
- (f) State Z transforms give its application.
- (g) State Initial value theorem.
- (h) State properties of Regression lines.
- (i) State conditions for F-test.
- (j) State probability density function.

SECTION-B

- Find the z transform of $\sin(3k + 5)$.
- Express the following function in terms of unit step function and find its Laplace transform

$$f(t) = \begin{cases} t-1, & \text{for } 1 < t < 2 \\ 3-t, & \text{for } 2 < t < 3 \end{cases}$$

4. Let $f(x) = \begin{cases} \omega x & \text{where } 0 \leq x \leq \frac{1}{2} \\ \omega(l-x) & \text{where } \frac{1}{2} \leq x \leq l \end{cases}$

Show that $f(x) = \frac{4\omega l}{\pi^2} \sum_0^\infty \frac{(-1)^n}{(2n+1)^2} \sin \frac{(2n+1)\pi x}{l}$.

- Use the least square method to determine the equation of line of best fit for the data. Then plot the line.

X	8	2	11	6	5
Y	3	10	3	6	8

- In a normal distribution 31% of items are under 45 and 8% are over 64. What are the mean and standard deviation of the distribution?

SECTION-C

- Using Laplace transform solve the following differential equation :

$$\frac{\partial y}{\partial t} = \frac{\partial^2 y}{\partial t^2}, \text{ where } y\left(\frac{\pi}{2}, t\right) = 0, \left(\frac{\partial y}{\partial x}\right)_{x=0} = 0, \text{ and } y(x, 0) = 30 \cos 5x.$$

- Solve $y_{k+1} + \frac{1}{4} y_k = \left(\frac{1}{4}\right)^k$, ($k \geq 0$), $y(0) = 0$ by Z-transform.

- Find the variance of Binomial Distribution.

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.