

Roll No.

Total No. of Pages : 03

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B.Tech. (CSE/IT) (Sem-3)

MATHEMATICS – III

Subject Code : BTAM-302

M.Code : 70808

Date of Examination : 02-06-2023

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 Dirichlet's conditions for expansion of $F(x)$ in Fourier series
- b) Find the Laplace transform of $e^{-2t} \sin 4t$.
- c) Form partial differential equation by eliminating constant from following relation.

$$z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$$

- d) Differentiate between Type I error and Type II error.
- e) Explain Null Hypothesis and Alternative Hypothesis.
- f) Write formula of Modified Euler's method for ordinary differential equation.
- g) Write necessary and sufficient condition for $F(z)$ to be analytic.
- h) Determine the Binomial distribution whose mean is 9 and standard deviation is $3/2$.
- i) Define Eigen Value and Eigen Vectors.
- j) Define first shifting theorem in Laplace transform.

SECTION-B

2. Find the Fourier series for the function $f(x) = x + x^2, -\pi < x < \pi$. Hence show that

$$\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$$

3. Evaluate using Laplace transform $\int_0^{\pi} t^3 e^{-t} \sin t dt$.

4. Find the general solution of partial differential equation :

$$\frac{d^2 z}{\partial x^2} - 3 \frac{\partial^2 z}{\partial x \partial y} + 2 \frac{\partial^2 z}{\partial y^2} = e^{2x-y} + \cos(x + 2y).$$

5. Two independent sample of sizes 7 and 6 had the following values:

Sample A	28	30	32	33	31	29	34
Sample B	29	30	30	24	27	28	

Examine whether the samples have been drawn from normal populations having the same variance.

6. Consider an ordinary differential equation $\frac{dy}{dx} = x^2 + y^2, y(1) = 1.2$. Find $y(1.05)$ using the fourth order Runge - Kutta Methods.

SECTION-C

7. a) Prove that the function $f(z)$ defined by $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}, z \neq 0$ & $f(0) = 0$ is continuous and the Cauchy-Riemann equations are satisfied at the origin yet $f'(0)$ does not exist.
- b) Determine the analytic function $w = u + iv$ if $v = \log(x^2 + y^2) + x - 2y$

8. a) Fit a Poisson distribution to the following data and calculate theoretical frequencies.

X	0	1	2	3	4
Y	122	60	15	2	1

(given $e^{-0.5} = 0.61$)

- b) Show that Poisson distribution is a limiting case of Binomial Distribution.
9. Find the largest Eigen value of the matrix by power method

$$\begin{bmatrix} 1 & -3 & 2 \\ 4 & 4 & -1 \\ 6 & 3 & 5 \end{bmatrix}$$

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.