**Roll No.** | | | | | | | | | | | | **Total No. of Pages : 03**

**Total No. of Questions : 09**

**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 $e^{-2t}$ Sin4$t$.

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

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

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

4. Find the general solution of partial differential equation :

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

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 Runga - Kutta Methods.

## SECTION-C

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

b) Determine the analytic function $w = u + \iota v$ 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

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