

Code No: 132AC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year II Semester Examinations, September - 2023

MATHEMATICS - III

(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, MMT, AE, MIE)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A**(25 Marks)**

- 1.a) The probability density function is $y = \begin{cases} K(3x^2 - 1), & -1 \leq x \leq 2 \\ 0, & \text{elsewhere} \end{cases}$. Find K. [2]
- b) If for a poisson variate $2p(x=0) = p(x=2)$. Find mean. [3]
- c) Write the formula to calculate F to test the difference the between variances. [2]
- d) In a random sample of 200 packages shipped by air freight 52 had some damage. Find the maximum error with 95% confidence of proportions. [3]
- e) Write the formula to find the maximum error for:
i) single proportions ii) difference between the proportions [2]
- f) In a random sample of 100 packages shipped by air freight 13 had some damage. Find the standard error of proportions. [3]
- g) If first approximation of a root of $x^2 - x - 4 = 0$ is $x_0 = 2$ then find x_1 by Newton Raphson method. [2]
- h) Find the two points a and b such that $x \sin x + \cos x = 0$ has a root in between a and b. [3]
- i) Write a formula to find the approximate value of $\int_a^b f(x)dx$, when $(x_i, f(x_i)) i = 0, 1, 2, 3, \dots, n$ are known and $a = x_0 < x_1 < x_2 < \dots < x_n = b$. [2]
- j) If $y' = 2x - y$ $y(1) = 3$ find the solution, up to third degree term, using Picard's method. [3]

PART – B**(50 Marks)**

- 2.a) Find the mean and the variance of uniform probability distribution given by $f(x) = \frac{1}{n}$ for $x = 1, 2, 3, 4, \dots, n$
- b) Ten coins are thrown simultaneously. Find the probability of getting: [5+5]
i) At least 1 head ii) At least seven heads

OR

10.a) Find the first two derivatives of $f(x)$ at $x=1.2$ from the following table.

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.75	10.031

b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by taking $h = \frac{1}{6}$ using Simpson's $\frac{1}{3}$ rd rule. [5+5]

OR

11. Find $y(0.1)$ and $y(0.2)$ using Runge Kutta method given that $y' = x^2 - y, y(0) = 1$. [10]

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