Sub Code: R2321011 **R23** **Set No. 1**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY- GURAJADA VIZIANAGARAM
II B. Tech I Semester Regular Examinations, November – 2024
Numerical and Statistical Methods
(common to CE,ME)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part A, Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.

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PART-A **(20 M)**

1 a) Define interpolation. [2]
b) What is the condition for the root of $f(x)=0$ lies in (a,b) [2]
c) Write a note on curve fitting. [2]
d) Write the formula for Simpson 3/8 th rule. [2]
e) Using Eulers method find $y(1)$ for initial value problem $y'=x+y, y(0)=1.$ [2]
f) Write the different numerical methods used to solve initial value problem to ordinary differential equations. [2]
g) Define level of significance. [2]
h) What is the confidence interval in Estimation. [2]
i) When do you say that a sample is small sample. [2]
j) What is the test statistic for testing of hypothesis for difference of means. [2]

PART-B **(50 M)**

Unit-1

2 a) Find a real root of $x^3-x-2=0$ using Newton – Raphson's method. [5]
b) Obtain the value of $f(x)$ when $x=1.4$ using Newton forward interpolation formula for the following data [5]

X	1.1	1.3	1.5	1.7	1.9
f(x)	0.21	0.69	1.25	1.89	2.61

(OR)

3 a) Using Regular false method find the root of the equation $xe^x=\cos x$ correct to four decimal places. [5]
b) State Lagrange's interpolation formula and hence find the second degree polynomial for the data [5]

X	1	2	-4
f(x)	3	-5	4

Unit-2

4 a) Fit a parabola $a+bx+cx^2$ using method of least squares for the following data [5]

X	1	2	3	4
Y	1.7	1.8	2.3	3.2

b) Find $\frac{dy}{dx}$ at $x=1$ for the data [5]

X	0	1	2	3	4	5
Y	0	1	8	27	64	125

(OR)

5 a) Fit an exponential curve of the form $y=ae^{bx}$ for the following data [5]

X	1	2	3	4
Y	7	11	17	27

b) Evaluate $\int_{1}^{1.3} \sqrt{x}\,dx$ taking $h = 0.1$ using Simpson's 1/3 rd rule. [5]

Unit-3

6 a) Solve $y' = x^2 + y^2,\ y(0) = 1$ using Picard's method. [5]

b) Solve $y' = x - y^2,\ y(0) = 1$ using Taylor's series method and compute $y(0.1)$. [5]

(OR)

7 Using Modified Eulers method find $y(0.02)$ and $y(0.04)$ for the differential equation $y' = x^2 + y,\ y(0) = 1$. [10]

Unit-4

8 A population consisting of four numbers 1, 5, 6, 8. Consider all possible samples of size 2 that can be drawn with replacement from this population. Find (a) The mean of the population (b) The standard deviation of the population (c) The mean of the sampling distribution of means (d) The standard deviation of the sampling distribution of means. [10]

(OR)

9 a) In a big city 325 men out of 500 men were found to be employees. Does this information support the majority of men in the city are employees. [5]

b) A sample of 400 students is found to have a mean height of 171.38cm. Can it be reasonably regarded as a sample from a large population with mean height of 171.17cm and standard deviation of 3.30 cm. [5]

Unit-5

10 Ten soldiers participated in a shooting competition in the first week. After intensive training they participated in the competition in the second week. Their scores before and after training are given as follows. [10]

Scores Before	67	24	57	55	63	54	56	68	33	43
Scores after	70	38	58	58	56	67	68	75	42	38

Do the data indicate that training is effective ?

(OR)

11 A pair of dice are thrown 360 times and the frequency of each sum is indicated below. [10]

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	8	24	35	37	44	65	51	42	26	14	14

Would you say that the dice are fair on the basis of the chi-square test at 0.05 level of significance.

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