Exam. Code : 105702
Subject Code : 1422

B.Sc. (Information Technology) 2nd Semester

NUMERICAL METHODS AND STATISTICAL TECHNIQUES

Paper—III

Time Allowed—2 Hours] [Maximum Marks—75

Note :— There are ***eight*** questions of equal marks. Candidates are required to attempt any ***four*** questions.

1. (a) Find a real root of $x^3 - 5x + 3 = 0$ using bisection method.

   (b) What are the problems of multiple roots ?

   (c) Find a root of an equation $f(x) = x^3 - x - 1$ using False Position method.

2. Evaluate $\int dx/(1+x)\,dx$ from interval [0, 1] applying :

   (a) Trapezoidal rule

   (b) Simpson's 3/8 rule.

3. (a) State when to use Newton's forward interpolation and when to use backward interpolation formula ? Also write the formula for y'(x) and y"(x) using Newton's backward differences.

(b) Find the value of tan 45° 15' by using Newton's forward difference interpolation formula for :

x^o	tan x^o
45	1.00000
46	1.03553
47	1.07237
48	1.11061
49	1.15037
50	1.19175

4. Find the Lagrange interpolation polynomial to fit the following data :

i	0	1	2	3
x_i	0	1	2	3
$e^{xi} - 1$	0	1.7183	6.3891	19.0855

Use the polynomial to estimate the value of $e^{1.5}$.

5. What do you mean by Central Tendency ? What are the different measures of central tendency ? Explain with examples the computation, advantages and limitations of each.

6. (a) The scores of two players A and B in ten matches during a tournament are :

A	32	28	47	63	71	39	10	60	96	14
B	19	31	48	53	67	90	10	62	40	80

Find which of the two players, A or B, is more consistent in scoring.

(b) A student obtained the mean and standard deviation of 100 observations as 40 and 5.1 respectively. It was later found that one observation was wrongly copied as 50, the correct figure being 40. Find the correct mean and standard deviation.

7. For the data given below, find the equation to the best fitting exponential curve of the form $y = ae^{bx}$:

x	1	2	3	4	5	6
y	1.6	4.5	13.8	40.2	125	300

8. Fit a second-degree parabola to the following data by the least squares method :

x	1	2	3	4	5	6	7	8	9
y	2	6	7	8	10	11	11	10	9