Exam. Code : 107202
Subject Code : 2103

Bachelor of Computer Application (B.C.A.) 2nd Semester
NUMERICAL METHODS & STATISTICAL
TECHNIQUES
Paper—III

Time Allowed—Three Hours]   [Maximum Marks—75

Note :— (1) Students will attempt any **FIVE** questions.
All questions carry **15** marks each.

(2) Students can only use Non-programmable
and Non-storage type Calculator.

1. (a) Solve $x^3 - 9x + 1 = 0$ for the root between
$x = 2$ and $x = 4$ by the bisection method.

(b) Find a real root of the equation $x^3 - x - 1 = 0$
using Newton-Raphson method, correct to four
decimal places.

2. (a) Solve by Gaussian elimination method with partial
pivoting, the following system of equations :

$$0x_1 + 4x_2 + 2x_3 + 8x_4 = 24$$
$$4x_1 + 10x_2 + 5x_3 + 4x_2 = 32$$
$$4x_1 + 5x_2 + 6.5x_3 + 2x_4 = 26$$
$$9x_1 + 4x_2 + 4x_3 + 0x_4 = 21$$

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(b) Solve the system of equations :

$$x + 2y + z = 8$$

$$2x + 3y + 4z = 20$$

$$4x + 3y + 2z = 16$$

by Gauss-Jordon elimination method.

3. By using the method of least squares, find a relation of the form $y = ax^b$, that fits the data :

x	2	3	4	5
y	27.8	62.1	110	161

4. Evaluate f(15), given the following table of values :

X	10	20	30	40	50
Y = f(x)	46	66	81	93	101

by Newton's forward difference interpolation method.

5. (a) Find Lagrange's interpolation polynomial fitting the point $y(1) = -3$, $y(3) = 0$, $y(4) = 30$, $y(6) = 132$. Hence find $y(5)$.

(b) Find the approximate value of

$$\int_0^{\pi} \sin x \, dx$$

using trapezoidal rule.

6. A function $y = f(x)$ is given at the sample points $x = x_0$, x_1 and x_2. Show that the Newton's divided difference interpolation formula and the corresponding Lagrange's interpolation formula are identical.

7. (a) Find out the correlation coefficient to the following data :

X	65	66	67	67	68	69	71	73
Y	67	68	64	68	72	70	69	70

(b) Calculate the rank correlation coefficient from the following after assigning ranks to them.

X	73.2	85.8	78.9	75.8	77.2	81.2	83.8
Y	97.8	99.2	98.8	98.3	98.3	96.7	97.1

8. (a) If in a moderately asymmetrical distribution the values of median and mean are 72 and 78 respectively. Estimate the value of mode.

(b) Calculate the mean and standard deviation from the following data :

X	20−25	25−30	30−35	35−40	40−45	45−50	50−55
Y	170	110	80	45	40	30	25