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PG/2nd Sem/MCA-296/24

13. Write a program to evaluate the integral

$$I = \int_0^1 \frac{dx}{1+x}$$

Use Simpson's 1/3 rule with 8 intervals.

14. Write a program to calculate the value of the integral

$$\int_0^1 (4x - 3x^2) dx$$

by Trapezoidal rule.

15. Write a program to solve the following system of equations :

$$\begin{aligned} 4x - y - z &= 3 \\ -2x + 6y + z &= 9 \\ -x + y + 7z &= -6 \end{aligned}$$

by Gauss-Seidal method.

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M.Sc. 2nd Semester Examination

MCA

PAPER : MCA-296

**(Numerical Methods and Optimization
Technique Lab)**

(Practical)

Full Marks : 100

Time : 3 hours

The figures in the right-hand margin indicate marks.

Answer *any two* questions from the following :

35×2=70

1. Write a program to find the determinant of a given matrix of any order.
2. Write a program to implement upper triangular matrix and using it find determinant.

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3. Write a program to find the solution of a system of linear equations using matrix inversion method.

4. Write a program to find a real root of the following equation :

$$x + \log x = 2$$

Use Newton-Raphson method.

5. Write a program to solve the following system of equations using Gauss Elimination method :

$$5x - y - 2z = 142$$

$$x - 3y - z = -30$$

$$2x - y - 3z = -50$$

6. Write a program to find the approximate value of the root of the equation $x - \cos x = 0$ by Regula-Falsi method. Correct up to four decimal places.

7. Write a program to find the value of $\sin 52^\circ$ from the following table :

x	45	50	55	60
$\sin(x)$	0.7071	0.7660	0.8192	0.8660

Use Newton's forward difference interpolation formula.

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8. The following table gives the value of x and y :

$X = \text{height}$	10	12	14	16	18	20
$Y = \text{distance}$	1.45	5.50	9.89	14.01	17.25	21.60

Write a program to find the value of y when $x = 19$ using Newton's forward/backward interpolation formula.

9. Write a program to determine the value of $Y(9.5)$ using Lagrange interpolation, from the tabulated data given below :

X	7	8	9	10
Y	3	1	1	9

10. Write a program to evaluate the following :

$$\int_0^1 \frac{dx}{1+x}$$

Use Simpson's 1/3 rule with 10 intervals.

11. Find one positive root of the following using Bisection Method correct up to two decimal places :

$$2x - 3 \sin x - 5 = 0$$

12. Using iteration method find real root of the equation $x^3 + x^2 - 1 = 0$ on the interval $[0, 1]$ with an accuracy up to two decimal places.