2017

MCA

2nd Semester Examination

COMPUTER ORIENTED NUMERICAL METHODS LAB

PAPER—MCA-208

(Practical)

Full Marks : 100

Time : 6 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer any *one* question (by Lottery basis)   1×70

1. Write a C program to evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's $\frac{1}{3}$ rule with 4 intervals.

2. Write a C program to solve the system of equations using Gauss Elimination method.

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$

3. Write a C program to determine the value of $\log_{10} 301$ using Lagrange interpolation, from the tabulated data given below :

x	300	304	305	307
$\log_{10}X$	2.4771	2.4829	2.4843	2.4871

4. Write a C program to find the smallest root of the equation

$$f(x) = x^3 - 6x^2 + 11x - 6 = 0$$

by using Newton-Raphson method.

5. Write a C program to evaluate the integral $I = \int_0^1 \frac{dx}{1+x}$ by using composite Trapezoidal rule.

6. Write a C program to find approximate value of the root of the equation

$$x^3 + x - 1 = 0$$

using Regula–Falsi method. Correct upto 3 decimal places.

(Continued)

7. Write a C program to solve the following system of equations

$$4x_1 + x_2 + x_3 = 4$$
$$x_1 + 4x_2 - 2x_3 = 4$$
$$3x_1 + 2x_2 - 4x_3 = 6$$

By using Gauss Elimination method.

8. Write a C program to calculate the value of the integral

$$\int_4^{5.2} \log x \cdot dx \text{ by Trapezoidal rule.}$$

9. Write a C program to solve the following system of equations

$$x + y - z = 0$$
$$-x + 3y = 2$$
$$x - 2z = -3$$

By using Gauss-Seidel method.

10. Given $dy/dx = y - x$, where $y(0)=2$. Write a C program to find $y(0.1)$ and $y(0.2)$ correct to four decimal places using Runge-Kutta method.

11. Write a C program to evaluate $I = \int_0^1 \dfrac{dx}{1+x}$ using

(Turn Over)

Simpson's $\frac{1}{3}$ rule with 8 intervals.

12. Write a C program to find the value of f(0.35) from the table

x	0.30	0.32	0.34	0.36	0.38	0.40
$f(x)$	1.2345	1.3254	1.4635	1.5736	1.6735	1.7693

using Newton's backward interpolation formula.

13. Write a C program to find the root correct to three decimal places using Regula-Falsi method :

$$x^4 - x - 10 = 0.$$

14. Write a C program to find the value of f(5) from the table

x	1	4	7	10	13	16
$f(x)$	10.1234	11.2345	12.3456	13.4567	14.5678	15.6789

using Newton's forward difference interpolation formula.

15. Write a C program to solve following system of equations by using Gauss-Seidel iteration method.

$$8x - 3y + 2z = 20$$
$$6x + 3y + 12z = 35$$
$$4x + 11y - z = 33$$

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16. Write a C program to solve the following system of equations

$$x + y - z = 0$$
$$-x + 3y = 2$$
$$x - 2z = -3$$

By Gauss-Seidel method. Write its matrix form.

17. A table of x and f(x) is given below. Write a C program to find the value of f(x) at x=4, use Lagrange Interpolation formula.

$x \rightarrow 1.5$	3	6
$f(x) \rightarrow -0.25$	2	20

18. Write a C program to find the root of the equation $x^4 + x - 4 = 0$ using Newton-Raphson method correct to four decimal places.

19. Write a C program to find approximate value of y for x=0.2, in steps of 0.1, if $\frac{dy}{dx} = x + y^2$, given that y=1 where x=0. Apply Runge-Kutta method.

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

$x = height$	100	150	200	250	300	350	400
$y = distance$	10.63	13.03	15.04	16.81	18.42	19.90	21.27

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Write a C program to find the value of y when x = 320 using Newton's Forward/Backward Interpolation formula.

21. Write a program in C to evaluate $\int\limits_{0}^{\frac{\pi}{2}} \sqrt{1 - 0.162 \sin^2 \varphi} \cdot d\varphi$ by Simpson's $\frac{1}{3}$ rd rule with 20 subintervals.

22. Write a program in C to find the smallest real root of the equation $xe^x = \cos x$ using Regula-Falsi method.

23. Write a program in C to find f(14.7) using Lagrange interpolation formula, given

x :	0	5	10	15	20	25	30
$f(x)$:	0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

24. Write a program in C to evaluate $\int\limits_{0}^{\frac{\pi}{2}} \sqrt{\sin(x)} \cdot dx$ taking n=8, correct to five significant figures by using Trapezoidal rule.

25. Write a program in C to find an approximate vaue of the real root of the equation $2x - \log_{10} x = 7$ correct to five significant figures by Bisection method.

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26. Write a program in C to find the value of y(6.9) from the following table using Newton's backward difference interpolation formula

x	0	1	2	3	4	5	6	7
y	0	7.3	25.8	61.7	123.8	213.6	341.9	510.4

27. Write a program in C to find the value of $\log_{10} 5.2$ from the following table using Lagrange's interpolation formula.

x	2	3	5	7
$\log_{10} x$	0.301	0.477	0.699	0.845

28. Write a program in C to find the root of the equation $x^4 - x - 1$ using Newton-Raphson's method correct upto five decimal places.

29. Write a program in C to solve the system of equations using Gauss-Seidal method

$$4.50x_1 + 0.13x_2 + 0.20x_3 = 1.58$$
$$0.25x_1 - 11.32x_2 + 0.38x_3 = -4.72$$
$$0.45x_1 - 0.58x_2 + 2.68x_3 = 5.32$$

(Turn Over)

30. Write a program in C to find the value of integral

$\int_{\sqrt{2}}^{\sqrt{5}} \dfrac{dx}{\sqrt{x^2 + 1}}$ using Trapezoidal rule taking 13 oridnates

correct to five decimal places.

Viva-Voce — 20

Practical Note Book — 10

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