PG/IIS/MCA-208/16 (Pr.)

MCA 2nd Semester Examination, 2016

MCA

(Computer Oriented Numerical Methods Lab.)

(Pratical)

PAPER—MCA-208

Full Marks : 100

Time : 6 hours

The questions are of equal value

Answer any **one** question (by **Lottery** basis)

1. Write a C-program to evaluate

$$\int_0^1 \sqrt{1-x^3}\,dx$$

using Simpson's 1/3 rule with 6 intervals.

2. Write a program in C to find the value of $y(1{\cdot}1)$ from the following table using Newton's Forward difference interpolation formula :

x	1·0	2·0	3·0	4·0	5·0	6·0
y	0·0	3·0	8·0	15·0	24·0	35·0

3. Write a C-program to evaluate

$$\int_{0\cdot1}^{0\cdot7} (e^x + 2x)\,dx$$

using Trapezoidal rule, taking $h = 0\cdot1$.

4. Write a program in C to find the value of $y(0\cdot5)$ from the following table using Newton's forward difference interpolation formula :

x	0	1	2	3	4	5	6	7
y	0	7	26	63	124	215	342	511

5. Write a program in C to compute by Simpson's 1/3 rule, the integral

$$\int_0^1 x^2(1-x)\,dx$$

taking step length equal to $0\cdot1$.

6. Write a program in C to find the value of $f(5)$ from the following table using Lagrange's interpolation formula :

x	2	4	7	9
$f(x)$	10	26	65	101

7. Write a program in C to find a root of the equation

$$x^3 - 9x + 1 = 0$$

using bisection method correct upto three decimal places.

8. Write a program in C to find the value of $\log_{10}^{(3.5)}$ 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

9. Write a program in C to find a root of the equation

$$x^3 - 1{\cdot}1\,x^2 + 4x - 4{\cdot}4 = 0$$

using bisection method correct upto three decimal places.

10. Write a program in C to find a real root of the equation

$$x^3 + 2x - 2 = 0$$

using Regula-Falsi method correct upto three decimal places.

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

$$6{\cdot}1x_1 + 2{\cdot}2\,x_2 + 1{\cdot}2x_3 = 16{\cdot}55$$
$$2{\cdot}2x_1 + 5{\cdot}5\,x_2 - 1{\cdot}5x_3 = 10{\cdot}55$$
$$1{\cdot}2x_1 - 1{\cdot}5\,x_2 + 7{\cdot}2x_3 = 16{\cdot}80$$

12. Write a program in C to find a real root of the equation

$$3x - \cos x - 1 = 0$$

using Regula-Falsi method correct upto three decimal places.

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

$$4{\cdot}50x_1 + 0{\cdot}15\,x_2 + 0{\cdot}30x_3 = 1{\cdot}57$$
$${\cdot}15x_1 - 10{\cdot}50\,x_2 + 0{\cdot}45x_3 = -3{\cdot}86$$
$${\cdot}45x_1 + 0{\cdot}30\,x_2 - 15{\cdot}00x_3 = 14{\cdot}28$$

14. Write a C program to find the root of the equation

$$x^3 - 8x - 4 = 0$$

using Newton-Raphson's method correct upto 3 decimal places.

15. Write a C program to solve the system of equations using Gauss elimination method :

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

16. Write a C program to find a root of the equation

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

using Newton-Raphson method correct upto 3 decimal places.

17. Write a C program to solve the system of equations using Gauss elimination method :

$$6{\cdot}7x_1 + 1{\cdot}1x_2 + 2{\cdot}2x_3 = 20{\cdot}5$$
$$3{\cdot}1x_1 + 9{\cdot}4x_2 - 1{\cdot}5x_3 = 22{\cdot}9$$
$$2{\cdot}1x_1 - 1{\cdot}5x_2 + 8{\cdot}4x_3 = 28{\cdot}8$$

18. Write a C program to find a root of the equation

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

using fixed point iteration method.

19. Write a C-program to find the value of the integral

$$\int_0^1 \frac{\log(1+x^2)}{1+x^2}\,dx$$

using Weddle's rule taking 13 ordinates.

20. Write a C program to find the root of the equation

$$x^3 + x^2 - 1 = 0$$

using fixed point iteration method correct upto 3 decimal places.

21. Write a C-program to find the value of the integral

$$\int_1^2 \frac{dx}{\sqrt{x^2+1}}$$

using Trapezoidal rule taking 13 ordinates correct to six decimal places.

22. Write a C program to solve

$$\int_0^{\pi/2} \sqrt{1-0\cdot162\sin^2\phi}\ d\phi,$$

by Simpson's one-third rule, correct upto two places of decimal, taking 12 intervals.

23. Write a C program to solve the system of equations

$$2x + 3y + z = 9$$
$$x + 2y + 3z = 6$$
$$3x + y + 2z = 8$$

using Gauss-elimination method.

24. Write a C program to find one root of

$$10^x + \sin x + 2x = 0,$$

by the bisection method, upto three significant figures.

25. Write a C program to find a root of $\log x = \cos x$, between 1 and 2, correct to two decimal places, by bisection method.

26. Write a C program to find a real root of

$$x^x + x - 4 = 0,$$

by Newton-Raphson method, correct to six decimal places.

27. Write a C program to find a positive root of

$$x + \ln x - 2 = 0,$$

by Newton-Raphson method, correct to six significant figures.

28. Write a C program to find a root of the equation

$$2x - \log_{10} x - 7 = 0,$$

by Regula-Falsi method, which between 3 and 4, correct to three decimal places.

29. Write a C program to find a root of

$$3x - \cos x - 1 = 0,$$

by Regula-Falsi method, correct to four significant figure.

30. Write a C program to find the value of

$$\int_0^{\pi/2} e^{\sin x}\, dx,$$

taking 12 sub-intervals by Simpson's one-third rule, correct to five decimal places.

31. Write a C program to find the value of

$$\int_{0\cdot4}^{1\cdot6} \frac{x\,dx}{\sin hx},$$

taking 13 ordinates by Weddle's rule correct to five decimal places.

32. Write a C program to find the value of

$$\int_0^1 \sqrt{1-x^3}\, dx$$

by Trapezoidal rule, taking 10 equal intervals, correct to 2 decimal places.

y	0·11246	0·14032	0·16800	0·19547	0·22270

When $x = 1{\cdot}4$, using Newton's forward difference interpolation formula.

38. Write a C program to find the value $\sin 32^\circ$ from the table

x	:	30°	35°	40°	45°	50°	55°
$y = \sin x$	:	0·5000	0·5736	0·6428	0·7071	0·7660	0·8192

using Newton's Forward interpolation formula.

33. Write a C program to find the value of

$$\int_0^{\pi/2} \sqrt{\sin x}\ dx$$

by Trapezoidal rule, taking $n = 6$, correct to four significant figure.

34. Write a C program to solve the system of equations

$$27x_1 + 6x_2 - x_3 = 85{\cdot}10$$
$$6x_1 + 15x_2 + 2x_3 = 72{\cdot}00$$
$$x_1 + x_2 + 54x_3 = 110{\cdot}22$$

using Gauss-Seidal iteration method.

35. Write a C program to solve the system of equations

$$-10x_1 + 6x_2 + 3x_3 + 100 = 0$$
$$6x_1 - 5x_2 + 5x_3 + 100 = 0$$
$$3x_1 + 6x_2 - 10x_3 + 100 = 0$$

Correct up to three significant figures, using Gauss-elimination method.

39. Write a C program to find the value of $t(0{\cdot}39)$ from the table

x :	0·30	0·32	0·34	0·36	0·38	0·40
$f(x)$:	1·7596	1·7698	1·7804	1·7912	1·8024	1·8139

using Newton's Backward interpolation formula.

Viva-voce — 30

PNB — 10
