2018

CBCS

3rd Semester

MATHEMATICS

PAPER—C7P

(Honours)

(Practical)

Full Marks : 20

Time : 2 Hours

Program must be written in any programming language or any software. The input/output must be mentioned clearly.

Group—A

Answer any *one* question 7

The question must be allotted by lottery

[Q.No. 1 to Q.No. 22 will be in Gr-A]

Group—B

Answer any *one* question 8

The questions must be allotted by lottery

[Q.No. 23 to Q.No. 40 will be in Gr. B]

Practical Note Book : 02/ Viva : 03

Group—A

Answer any *one* question : 1×7

1. Write a program to find the seem of the series $\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\ldots\ldots\ldots+\frac{1}{N}$. Demonstrate it for N = 99, 909 and 9009.

2. Write a program to enter n integers into an array and short them in an ascending order. Test the program for n = 0 and 11.

3. Write a program to find a real root of an equation by Regula falsi method. Demonstrate your program for the equation $x^x + 2x - 6 = 0$.

4. Write a program to find a real root of an equation by second method. Demostrate your program for the equation $x\sin(x) - 1 = 0$.

5. Write a program to find a real root of an equation by Bisection method. Demonstrate your program for the equation $x^3 + x^2 - 1 = 0$

6. Write a program to find a real root of equation by Newton-Raphson method, correct upto 5 decimal places. Demonstrate your program for the equation $x^5 - 5x^3 + 10x - 14 = 0$.

7. Write a program to evaluate $\int_{1.6}^{2.4}(2\log 2x + x^{13})dx$ by Simpson y^3 rule taking 100 subintervals.

8. Write a program to evaluate the integral $\int_0^{\pi/2}\sqrt{\cos(x)}\,dx$ numerically by Trapezoidal rule.

9. Write a program to evaluate $\int_0^1(23x + e^{\cos x})dx$ by Weddle's rule taking 12 subintervals.

10. Write a program to evaluate $\int_0^1(x^2 + \alpha\cos x)\,dx$ by simpson's 1/3 rule taking $h = 0.1$ and α is your class roll number.

11. Write a program to find a real root of the equation $x^3 - 2x - 5 = 0$ by using Method of false position, correct upto three places of decimals.

12. Write a program to estimate the value of $f(42)$ from the following available Data :

x	20	25	30	35	40	45
$f(x)$	354	332	291	260	231	204

13. Write a program to compute the value of $\int_{0.2}^{1.4}(\sin x - \log x + e^x)\,dx$ taking $h = 0.2$ by using Trapezoidal Rule.

14. Write a program to find the root of the following equation using Bisection method Correct to three decimal places : $x^3 - x - 11 = 0$

15. Write a program to find the sum of the series :

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots\ldots + \frac{1}{n} \text{ for given } n = 17.$$

16. Write a program to find the root of the equation $xe^x = \cos x$, using Secant method Correct upto four plaus of decimals.

17. Find the solution of algebraic equation $x^4 - x - 10 = 0$ by Bisection method.

18. Complete a real root of the transcendental equation $x + \log x - 2 = 0$ correct upto 4 significant figure by iteration method.

19. Find the value of 12 correct upto three decimal places by Newton-Raphson Method.

20. Find a real root of the equation $x^3 - 2x - 5 = 0$ by Regular Falsi method.

21. Compute $\int_0^1 \frac{dx}{1+x^2}$ by taking 10 equal sub-intervals by Trapezoidal rule, correct upto 5 significant figures.

22. Evaluate $\int_0^{\pi/2} \left(\sqrt{1 - 0.162 \sin^2 x}\right) dx$ by using Simpson's $1/3$ rule taking six equal sub-intervals.

Group—B

Answer any *one* question 1×8

23. Write a program to find the value of sin (0.175) by Lagrange interpolation technique of the following information :

x	0.15	0.17	0.18	0.21	0.23
sinx	0.14944	0.16918	0.18886	0.20846	0.22798

24. Write a program to find the value of $f(142)$ by Newton Forward interpolation formula of the following information :

x	140	150	160	170	180
$f(x)$	3.685	5.854	6.302	8.072	10.225

25. Write a program to find the value of $y(0.1)$ from the differential equation $\frac{dy}{dx} = x + y + 100$, $y(0) = 1.2$ by second order Runge-Kutta method.

26. Write a program to find the value of $y(0.1)$ and $y(0.2)$ from the differential equation $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$ by Euler's method.

27. Write aprogram to find the value of y when $x = 0.1$ and 0.2 from the differential equation $\frac{dy}{dx} = x^2 - y$, $y(0) = 1$ by Modified Euler's Method.

28. Write a program to find the largest eigen value in magnitude and corresponding eigen vector of the matrix.

$$\begin{bmatrix} 1 & 3 & 2 \\ -1 & 0 & 2 \\ 3 & 4 & 5 \end{bmatrix}$$ by Power Method.

29. Write a program to find the value of $y(0.2)$ from the differential equation $\frac{dy}{dx} = x^2 + y + 1.03$ by fourth order Runge-Kutta method.

30. Write a program to find the value of $y(0.2)$ from the differential equation $\frac{dy}{dx} = 1 + y \sin x - x^2$, $y(0.0) = 0$ by second order Runge-Kutta method.

31. Write a program to solve the system of equations

$$x + 4y - z = -5$$
$$x + y - 6z = -12$$
$$3x - y - z = 4$$

by Gauss elimination method.

32. Write a program to fit a straight line to the following data :

Year (x)	1961	1971	1981	1991	2001
Production (y) (in thousand)	8	10	12	10	16

and find the expected production in 2006.

(Continued)

33. Given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ with $y(1) = 1$. Write a program to find the approximate value of y at $x = 2$ in steps of 0.2, using Modified Euler's method.

34. The area A(square cm) of a circle of diameter d(cm) is given for the following values :

d	80	85	90	95	100
A	5026	5674	6362	7088	7854

Write a program to calculate the area of a circle of diameter 82.5 cm.

35. Write a program to evaluate $f(9)$ using Lagrange's interpolation formula, given the following set of tabulated values :

X	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

36. Write a program to solve the equations :

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

by using Gauss Seidal method.

37. A solid of revolution is formed by rotating about the x-axis, the area between the x-axis, the lines $x = 0$ and $x = 1$

and a curve through the points with the following co-ordinates :

x	0	.25	.50	.75	1
y	1	.9896	.9589	.9089	.8415

Write a program to estimate the volume of the solid formed by using Simpson's $\frac{1}{3}$ Rule.

[Volume = $\int_a^b \pi y^2 dx$]

38. Write a program to solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0.2, 0.4$ by using $R - k$ method of fourth order.

39. Fit a second degree curve to the following data taking x as independent variables.

xi	1	2	3	4	5	6	7	8	9
ni	2	6	7	8	10	11	11	10	9

40. Solve by Euler's method the ODE $\frac{dy}{dx} = x - y$, $b(0) = 1$ and $u = 0.2$. Find $y(0.4)$.

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