(b) Evaluate the integral

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

by taking h = $\frac{1}{6}$ using

(i) Trapezoidal rule, (ii) Simpson's $\frac{1}{3}$ rd rule and Simpson's $\frac{3}{8}$ th rule. 3+2+2=7

UNIT - V

9. (a) Using Runge-Kutta method of 4th order, find y for $x = 0.1, 0.2$ taking step size h = 0.1 given that

$$\frac{dy}{dx} = xy + y^2 \text{ , y (0) =1}$$ 9

(b) Solve the initial value problem 5

$$\frac{dy}{dx} = \frac{y-x}{y+x}$$

y (0) = 1 at $x = 0.1$ by Euler's method (take h = 0.02)

10. (a) Solve the equation 5

$$\frac{dy}{dx} = x + y + xy\,, \qquad y(0) = 1$$

for x = 0.25 and 0.5 using Taylor's series.

(b) Solve the equation 9

$$\frac{dy}{dx} = x - y^2, \qquad y(0) = 0$$

for $y(1)$ using Molne's predictor-corrector method, given that $y(0.2) = 0.02$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$

UG EVEN SEMESTER (CBCS) EXAMINATION, SEPTEMBER - 2021

COMPUTER SCIENCE

2nd Semester

COURSE NO. MCSCC - 204

(Scientific Computation)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions, taking one from each unit)

UNIT - I

1. (a) Discuss absolute error, relative error and percentage error with an example for each. 2+2+3=7

(b) Apply New-Raphson method to solve the following equatio correct to 4 decimal points. 5

$\text{Sin } x - \frac{x}{2} = 0$ starting from $x = 2$

(c) State the limitations of Newlon-Raphson method. 2

2. (a) Find a real root of equation x-2 + sin x = 0 correct to 3 decimal places using bisection method. 7

(b) Find the root of the equation $x^3 - 2x - 5 = 0$, on the interval [2, 3], with an accuracy of 3 decimal places by using regula-falsi method. 7

UNIT - II

3. (a) Find f(3.2) using Newlon-Gregory backward interpolation formula from the following data: 7

x :	2.0	2.5	3.0	3.5	4.0
f(x) :	246.2	409.3	537.2	636.3	715.9

(b) The values of x and sin x are given in the following table: 7

x :	15	20	25	30	35	40
sin$x$:	0.2588	0.3420	0.4226	0.5000	0.5735	0.6427

4. (a) Using Newton forward interpolation, find tan (0.71) from the given data: 7

x_i :	0.70	0.72	0.74	0.76	0.78
lanx_i :	0.84229	0.87707	0.91309	0.95045	0.98926

(b) Using Lagrange's interpolation formula, find the value of y where $x = 2.3$ 7

x :	1	2	4	5	8
y :	1.000	0.500	0.250	0.200	0.125

UNIT - III

5. (a) Find an equation of the form $y = ae^{bx}$ that fits the following data:

x	77	100	185	239	285
y	2.4	3.4	7.0	11.1	19.6

with the help of least square method. 7

(b) Solve the following system of equations by Gauss Elemination method: 7

$$5x_1 - x_2 + x_3 = 10$$
$$2x_1 + 4x_2 = 12$$
$$x_1 + x_2 + 5x_3 = -1$$

6. (a) Find the inverse of the following matrix 7

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

by using Gauss-Jordan method.

(b) Solve the following system of linear equation's by using Jacobi's method 7

$$x_1 + x_2 - x_3 = 2$$
$$2x_1 + 3x_2 + 5x_3 = -3$$
$$3x_1 + 2x_2 - 3x_3 = 6$$

UNIT - IV

7. (a) Compute the value of f′(0.20) and f″(0.05) of y = f(x) from the following labular points.

x :	0.00	0.05	0.10	0.15	0.20	0.25
y :	0.00000	0.10017	0.20134	0.30452	0.41075	0.52110

(b) Find the approximated value of $y = \int_0^{\pi} sinx\, dx$

using (i) Trapezoidal rule (ii) Simpson's 1/3rd rule (iii) Simpson's 3/8th rule, by dividing the rang eof inleger into six parts. 3+2+2=7

8. (a) Find the value of f′(0.4) and f″(0.4) from the following data: 7

x :	04	0.5	0.6	0.7	0.8
y :	1.5836	1.7974	2.0442	2.3275	2.6510