(b) Calculate the value of $\int_0^{\pi} Sinx\,dx$ by Simpson's $^1/_3 rd$ and Simpson's $^3/_8 th$ rule taking $h = \frac{\pi}{12}$ 7

Unit - V

9. (a) Give 4

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

Appl Picard's method to obtain the seris of solutions and compute $y(0.1)$

(b) Find the values of $y(0.2)$ and $y(0.4)$ using Runge-Kutta method of fourth-order taking h =0.2, given that $\frac{dy}{dx} = \frac{y-x}{y+x}\,;\ y(0) = 1$ 10

10. (a) Find $y(0.25)$ and $y(0.5)$ using modified Euler method with h=0.25 given that 5

$$\frac{dy}{dx} = 3x^2 + y\,;\ y(0) = 4$$

(b) Find y (0.8) using Milne's predictor corrector method, if y(x) is the solution of the differential equation

$\frac{dy}{dx} = -xy^2, y(0) = 2\,, y(0.2) = 1.92308$ 9

y (0.4) = 1.72414, y (0.6) = 1.47059

★★★

UG (NEP) EVEN SEMESTER EXAMINATION, 2024

COMPUTER SCIENCE

2nd Semester

Course No. : CS–DSC – 152

(Numerical Methods)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer five questions selecting one from each unit)

Unit - I

1. (a) Find the real root of the equation 4

$$f(x) = x^3 - x - 1,$$

applying Bisection method.

(b) Find the real root of the equation 5

$$f(x) = x^3 - 5x - 3$$

correct to three decimal places using Regula-False method.

(c) find the real root of the equation 5

$$f(x) = x^4 - x - 10$$

which is near to 2 and correct to three decimal places applying Newton-Rophson method.

2. (a) Differentiate between trunction error and round-off error with the help of suitable example. 4

(b) Find the real root of the equation 5

$$f(x) = x^3 - 5x - 1$$

correct to three decimal places using Bisection method.

(c) Find the real root of the equation 5

$$f(x) = x \sin x - 1$$

correct to three decimal places using Secant method.

Unit - II

3. (a) Derive the Newton divided difference formula. 7

(b) A set of values x and $f(x)$ are given below. Using Lagrange's interpotation formula, find $f(x)$ at $x = 8$ 7

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

4. (a) Apply Newton's divided difference formula to find the value of $f(13)$ from the following data. 6

x	4	5	7	10	11	18
$f(x)$	48	100	294	900	1210	2028

(b) For the given data set 8

x	2.5	3.0	3.5	4.0	4.5	5.0
$f(x)$	24.147	22.043	20.225	19.644	17.262	16.047

Find $f(2.8)$ applying Newton-Gregary forward interpolation and $f(4.3)$ applying Newton-Gregary backward interpolation

Unit - III

5. (a) Solve the following system of equations using Gauss Elimination partial pivoting method. 7

$$2x + y + z = 12$$
$$3x + 2y + 3z = 8$$
$$5x + 10y - 8z = 10$$

(b) Using method of least squares fit a relation of the form $y = ab^x$ to the following data 7

x	2	3	4	5	6
y	144	172.8	207.4	248.8	298.5

6. (a) Solve the following system of linear equations by Gauss-Jordan method 7

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

(b) Using Gauss-Seidal method, solve the following system of linear equations upto 3 decimal places. 7

$$3x + y - z = 0$$
$$x + 2y + z = 0$$
$$x - y + 4z = 3$$

Unit - IV

7. (a) Given that 9

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dx}{dy}$ and $\frac{d^2y}{dx^2}$ at

(i) $x = 1.2$ (ii) $x = 1.6$

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ 5

using Tropezoidal rule taking $h = \frac{1}{8}$

8. (a) Find $\frac{dy}{dx}$ and $\frac{dy^2}{dx^2}$ at $x = 1$ from the following data. 7

x	- 2	- 1	0	1	2	3	4
y	104	17	0	-1	8	69	172