

END OF SEMESTER EXAMINATIONS, APRIL/MAY - 2018
NUMERICAL METHODS
SUBJECT CODE: 14UBCS01

MAJOR: B.Sc. (Computer Science)
TIME : 3 HOURS

SEMESTER : III
MAX. MARKS: 75

SECTION – A (5 X 2 = 10)

Answer ALL the Questions:

1. What do you mean by the order of convergence of an iterative method for finding the root of the equation $f(x) = 0$?
2. State a sufficient condition for Gauss - Jacobi method to converge.
3. Construct a linear interpolating polynomial given the pts (x_0, y_0) & (x_1, y_1) .
4. Write the formula for Simpson's $\frac{3}{8}$ th's rule.
5. Compare the Taylor Series & Runge – kutta method.

SECTION – B (5 X 4 = 20)

Answer ALL the Questions:

6. a) Find the positive root of $x^3 - x = 1$ correct to four decimal places by bisection method.

(OR)

- b) Find an iterative formula to find the reciprocal of a given number N and hence find the value of $\frac{1}{19}$.

7. a) Solve the system of equations by Gauss elimination method.

$$x + 2y + z = 3; \quad 2x + 3y + 3z = 10; \quad 3x - y + 2z = 13.$$

(OR)

- b) Solve the following system by traingularization method.

$$x + y + z = 1; \quad 4x + 3y - z = 6; \quad 3x + 5y + 3z = 4.$$

8. a) Find a polynomial of degree two which takes the values.

x	0	1	2	3	4	5	6	7
y	1	2	4	7	11	16	22	29

(OR)

- b) Using Lagrange's interpolation formula, find $y(10)$ from the following table.

$$x: \quad 5 \quad 6 \quad 9 \quad 11$$

$$y: \quad 12 \quad 13 \quad 14 \quad 16$$

9. a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$, using Trapezoidal rule with $h = 0.2$.

(OR)

- b) Explain the Newton – cote's formula.

10. a) Solve $\frac{dy}{dx} = x + y$, given $y(1) = 0$ and get $y(1.1)$, by Taylor Series method.

(OR)

b) Using Adam's method, find $y(0.4)$, given $\frac{dy}{dx} = \frac{1}{2}xy$, $y(0) = 1$, $y(0.1) = 1.01$, $y(0.2) = 1.022$, $y(0.3) = 1.023$.

SECTION - C (3 X 15 = 45)

Answer Any THREE Questions:

11. Solve for a positive root of $x^3 - 4x + 1 = 0$ by Regula Falsi method.

12. Solve the system of equations by Gauss – Jordan method.

$$x + y + z + w = 2$$

$$2x - y + 2z - w = -5$$

$$3x + 2y + 3z + 4w = 7$$

$$x - 2y - 3z + 2w = 5$$

13. Find the values of y at $x = 21$ and $x = 28$ from the following data.

x: 20 23 26 29

y: 0.3420 0.3907 0.4384 0.4848

14. By dividing the range into ten equal parts, evaluate $\int_0^\pi \sin x \, dx$ by Trapezoidal and Simpson's rule.

Verify your answer with integration.

15. Using Runge – kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, given $y(0) = 1$ at $x = 0.2, 0.4$.
