

Time : 3 Hours]

[Total Marks : 80

[Min. Passing Marks : 24

Attempt any five questions, selecting one question from each unit.
 All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly. •

Use of following supporting material is permitted during examination.
 (Mentioned in form No. 205)

1. _____ NIL _____

2. _____ NIL _____

UNIT - I

1 (a) What is error ? Explain absolute and relative error in detail also explain the meaning of approximations and round of errors in detail.

12

(b) Write short note on truncation errors.

4

OR

1 (a) If we want to approximate $e^{10.5}$ with an error less than 10^{-12} using the Taylor series for $f(x) = e^x$ at 10, at least how many terms are needed.

8

(b) Explain how truncation errors can be estimated by geometry series.

8



UNIT - II

2 Solve the system of equations

$$3x_1 - 2x_2 + 3x_3 = 4$$

$$x_1 + 3x_2 + 3x_3 = -1$$

$$2x_1 + 4x_2 + 10x_3 = 2$$

Iterate two times using the Gauss-Seidel method, starting with the initial approximations as $x_1 = 0.3$, $x_2 = -0.8$ and $x_3 = 0.3$.

16

OR

2 (a) Explain successive substitution method with its derivation and algorithm.

8

(b) Derive formula for decomposition methods also write down its algorithm.

8

UNIT - III

3 (a) Fit a second degree parabola to the following data :

	3.0	4.0	5.0	6.0	7.0
	2.7	4.1	5.8	6.9	8.2

8

(b) Explain various applications of difference relations in the solution of differential equations with an example.

8

OR

3 (a) Given data is

A	1.0	1.1	1.2	1.3	1.4	1.5	1.6
B	7.989	8.403	8.781	9.129	9.451	9.750	10.031

find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.6$.

11



(b) Write short note on non-linear Regression analysis.

5

UNIT - IV

4 (a) Write an algorithm for Simpson's $\frac{3}{8}$ rule for a known function.

8

(b) State the assumptions made and derive the expression for numerical integration using Simpson $\frac{3}{8}$ rule.

8

OR

4 Evaluate $\int_0^6 \frac{dx}{1+x}$ by using Newton's method for integration.

Trapezoidal method, Simpson $\frac{1}{3}$ method and Simpson $\frac{3}{8}$ method.

16

UNIT - V

5 (a) Give Algorithm and explain Range-Kutta fourth order method for solution of differential equation of first order and first degree.

8

(b) Derive equations for Numerical solution of ordinary differential equations by Euler method.

8

OR

