(i) Printed Pages : 3   Roll No. ....

(ii) Questions   : 8   Sub. Code : | 0 | 5 | 4 | 3 |

Exam. Code : | 0 | 0 | 0 | 6 |

B.A./B.Sc. (General) 6th Semester

(2054)

MATHEMATICS

Paper : III (Numerical Analysis)

Time Allowed : Three Hours]   [Maximum Marks : 30

Note :— Attempt **five** questions in all, selecting at least **two** from each unit.

UNIT—I

1. (a) Find a root of equation $x^4 - x - 10 = 0$ using Secant methods.

(b) Find a real root of equation $x^3 + x^2 + 3x + 4 = 0$ correct to 4 decimal places using Newton Raphson method.   3,3

2. (a) Show that $\Delta + \nabla = \dfrac{\Delta}{\nabla} - \dfrac{\nabla}{\Delta}$.

(b) Find a polynomial using Bessel's Interpolation formula from the following data :

x	2	3	4	5
f(x)	7	9	12	16

3,3

3. (a) Find the divided differences of various order for the data in the table below :

$$x \quad : \quad -3 \quad -1 \quad 0 \quad 3 \quad 5$$

$$f(x) : -30 \quad -22 \quad -12 \quad 330 \quad 3458$$

(b) Compute f'(x) and f"(x) at x = 16, given

x	: 15	17	19	21	23	25

$$f(x) = \sqrt{x} \; : 3.873 \quad 4.123 \quad 4.359 \quad 4.583 \quad 4.796 \quad 5.0$$

3,3

4. Evaluate $\int_{0}^{6} \dfrac{dx}{1+x^2}$ by using :

(i) Trapezoidal rule

(ii) Simpson's 1/3 rule

(iii) Simpson's 3/8 rule

upto four decimals. 6

UNIT—II

5. Using LU Decomposition, solve the equations :

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

$$x + y + 3z = 4$$

$$x + y + z = 0$$

6

6. Using Jacobi's method, find all the eigen values and the eign vectors

of the matrix $A = \begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$.

3+3

7. Given $\dfrac{dy}{dx} = xy$ with $y(1) = 5$. Find the solution correct to three decimal places in the Interval $(1, 1.5)$ using Runge-Kutta Second order method.

6

8. Solve the following system of equations by Gauss elemination method :

$$3x + 4y + 5z = 40$$
$$2x - 3y + 4z = 13$$
$$x + y + z = 9.$$

6