



Q.1. Solve the following:

(6x5=30)

- (i). Define Truncation Error, Round off Error, Inherent Error and Order of Convergence.
- (ii). If  $g(x)$  is continuous on an interval  $[a, b]$  and  $g(x)$  maps  $[a, b]$  into itself then prove that  $g(x)$  has a fixed point in  $[a, b]$ .
- (iii). Prove Lagrange's Interpolation formula.
- (iv). Derive Newton Raphson iterative formula for finding the square root and cube root of a number  $A > 0$ .
- (v). Find the dominant Eigen value and Eigen vector of  $A = \begin{bmatrix} 5 & 2 \\ 4 & 8 \end{bmatrix}$
- (vi). Solve the following system of equations by Jacobi's method.

$$2x_1 + 3x_2 + 7x_3 = 8$$

$$5x_1 - x_2 + 2x_3 = 13$$

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

Solve the following:

Q.2. Solve the following system of equations by Choleski Method.

(10)

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

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

$$x_1 + 2x_2 + 2x_3 = 5$$

Q.3. (a) Find a real root of the equation  $x^3 - 2x - 5 = 0$  up to 3 decimal places by Regula falsi method.

b) Write an algorithm for the solution of nonlinear equation using bisection method. (6+4)

Q.4. Prove the following results.

(5+5)

(a) (i)  $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$

(ii)  $\Delta_k^r y = \nabla_{k+r}^r y$

(b) Use Newton's Forward formula to find the value of  $I$  when  $V=9$  from the table.

V	8	10	12	14	16
I	100	190	325	540	895