

(Turn Over)

(2)

- (b) Compute the real root of $x^3 - 5x + 3 = 0$ in the interval of $[1, 2]$ by Regula Falsi method.

2. (a) Derive Newton-Raphson formula,

$$x_{k+1} = x_k - \frac{f(x_k)}{f'(x_k)} \text{ for solving } f(x) = 0.$$

- (b) Find the positive root of $x = \cos x$ by Newton-Raphson Method. Take the initial approximation $x_0 = 8$.

3. (a) Find all the eigenvalues and eigenvectors of the matrix :

$$A = \begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$$

by Jacobi's method.

- (b) Explain Simpson's $\frac{1}{3}$ Rule.

4. Find the first and second derivatives of the function tabulated below, at the point $x = 3$:

x	3.0	3.2	3.4	3.6	3.8	4.8
$f(x)$	-14.00	-10.032	-5.296	.256	6.672	14.00

(3)

5. Solve the following system by Gaussian elimination method :

$$10x_1 - 7x_2 + 3x_3 + 5x_4 = 6$$

$$-6x_1 + 8x_2 + (-x_3) - 4x_4 = 5$$

$$3x_1 + x_2 + 4x_3 + 11x_4 = 2$$

$$5x_1 - 9x_2 - 2x_3 + 4x_4 = 7$$

Section - B

6. (a) Explain doping of group 'III' and group 'V' compounds.
(b) What do you understand by donors and acceptors ?
7. Explain Haynes-Shockley experiment for drift and diffusion of minority carriers.
8. Explain construction and working of depletion type MOSFET.
9. What are microwave devices ? Explain Tunnel diode and Gunn diode.
10. Explain any **three** of the following :
- (a) Optical absorption
 - (b) Solar Cell
 - (c) Thermal Diffusion
 - (d) Photo-conductive Devices (LDR)