Roll No. Total No. of Pages: 02

Total No. of Questions: 07

B.Sc. (Computer Science) (2013 & Onwards) (Sem.-1)

## **ALGEBRA**

Subject Code: BCS-101 Paper ID: [A2181]

Time: 3 Hrs. Max. Marks: 60

## **INSTRUCTIONS TO CANDIDATES:**

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

## **SECTION-A**

- 1. Write briefly:
  - (a) Find all the integral roots of  $x^3 + x^2 2x 2 = 0$ .
  - (b) Solve the equation  $x^3 12x^2 + 44x 48 = 0$ , given that roots are in A.P.
  - (c) Define Hermitian and skew-Hermitian matrix
  - (d) Find the rank of  $\begin{bmatrix} 2 & 3 & 3 \\ 2 & 4 & 8 \\ 3 & 6 & 12 \end{bmatrix}$ .
  - (e) Given A and B two are orthogonal matrices of order n, and then prove that AB and BA are also orthogonal matrices.
  - (f) The characteristic roots of a skew-Hermitian matrix are either zero or purely imaginary number.
  - (g) Find the Eigen values of  $\begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$ .
  - (h) State Cayley Hamilton theorem.
  - (i) Define Linear independence and give an example.
  - (j) Define minimal and characteristic equation of the matrix.

## **SECTION-B**

- 2. Solve the equation  $2x^3 9x^2 + 12x 4 = 0$ , given that two of its roots are equal.
- 3. Solve the equation  $x^4 + 8x^3 + 9x^2 8x 10 = 0$  by Descarte's method.
- 4. Prove that every square matrix is uniquely expressible as the sum of the symmetric and a skew-symmetric matrix.
- 5. Solve x y + 2z = 4, 3x + y + 4z = 6, x + y + z = 1.
- 6. Find the Eigen values and Eigen vectors of  $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ .
- 7. Find the Characterstic equation of  $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$  and verify that it is satisfied by A and hence find the inverse of A.