Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 07

B.Sc. (Computer Science) (Sem.–1)

ALGEBRA

Subject Code : BCS-101

M.Code : 70878

Date of Examination: 10-01-2023

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) Transform the equation $x^5 - 3x^3 + 2x^2 + 4x + 3 = 0$ into other whose roots shall be equal in magnitude but opposite in sign to those of this equation.

b) Find the equation whose roots are the cubes of the roots of $x^3 + 3x^2 + 2 = 0$

c) Use Synthetic Division, find the value of quotient and remainder when $x^5 - 2x^3 + x - 5$ is divided by $x = -5$

d) Define Orthogonal matrix with the help of a suitable example.

e) Find the rank of the matrix $A = \begin{bmatrix} 1 & -3 & 4 & 6 \\ 9 & 1 & 2 & 0 \end{bmatrix}$

f) Examine the consistency of the following system of equations

$x + 3y - z = 4$

$2x + y + z = 7$

$2x - 4y + 4z = 6$

g) Find a if the vectors $\begin{bmatrix} 1 \\ -1 \\ 3 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}, \begin{bmatrix} a \\ 0 \\ 1 \end{bmatrix}$ are linearly dependent.

h) Find the minimal equation of the matrix A = $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

i) Find the Eigen value of the matrix A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$

j) State Cayley Hamilton theorem with the help of an example.

SECTION-B

2. Solve the equation $x^4 - 10x^3 + 35x^2 - 50x + 24 = 0$ by Ferrari's method.

3. Using Elementary transformations, find the inverse of the matrix A = $\begin{bmatrix} -1 & 1 & 2 \\ 0 & 2 & 1 \\ -1 & 3 & 4 \end{bmatrix}$

4. Solve the cubic $x^3 - 5x^2 - 16x + 80 = 0$ it being given that the sum of its two roots is zero.

5. For what value of r, the system of Equations

$x - 2y - z = -1$

$3x - y + 2z = 1$

$y + rz = 1$

have (a) Unique solution (b) Infinitely many solution (c) No solution.

6. Prove that the matrix A = $\begin{bmatrix} 2 & -1 & 2 \\ 5 & -3 & 3 \\ -1 & 0 & -2 \end{bmatrix}$ satisfies its characteristics equation. Hence find inverse of A.

7. If α, β and γ are the roots of $3x^3 + 6x^2 - 9x + 2 = 0$. Find the value of $\sum \frac{\alpha}{\beta}$.

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.