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Your Roll No. 2302010700 5

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Sr. No. of Question Paper : 1329

Unique Paper Code : 6202451103

Name of the Paper : Mathematics for Computing – I

Name of the Course : B.Voc.

Semester : I

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **5** questions.
3. **All** questions carry equal marks.

1. (a) Reduce the matrix A to its normal form and hence calculate the rank.

P.T.O.

$$A = \begin{bmatrix} 2 & -1 & 3 & 2 \\ 3 & -5 & 2 & 2 \\ 6 & -3 & 8 & 6 \end{bmatrix}$$

(b) Test the consistency and hence solve the following set of equations :

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

$$3x_1 + x_2 - 2x_3 = 1$$

$$4x_1 - 3x_2 - x_3 = 3$$

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

2. (a) Define any **two** of the following :

Vector space,

Convex set,

Linear Independence & Linear dependence,

Orthonormal vectors

(b) Examine the following vectors are linear dependence and find relations if it exists.

$X_1 = (1,2,4)$ $X_2 = (2,-1,3)$

$X_3 = (0,1,2)$ $X_4 = (-3,7,2)$

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3. (a) Find the Eigen values and the corresponding Eigen vectors of the matrix.

$$\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$$

(b) For the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. Find matrix P such that $P^{-1}AP$ is diagonal matrix.

4. (a) Calculate the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at (2,-1,2).

(b) Prove that the vector

$$\vec{V} = (x + 3y)\hat{\imath} + (y - 3z)\hat{\jmath} + (x - 2z)\hat{k}$$

is solenoidal.

5. (a) Find the inverse of matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ 3 & 1 & 2 \end{bmatrix}$ by elementary transformations.

(b) For what value of K, the equation $x + y + z = 1$, $2x + y + 4z = K$, $4x + y + 10z = K^2$ has a solution.

Unique / infinite / No soln

6. (a) Calculate the Orthonormal basis for the vectors by Gram Schmdit process.

$(1,2,-1,0)$, $(1,0,1,2)$, $(-1,1,1,0)$, $(1,-1,-1,0)$

(b) Explain the linear transformations for finite dimensional vector space.

7. (a) Find the divergence of vector

$$\vec{V} = (xyz)\hat{i} + (3x^2y)\hat{j} + (xz^2 - y^2z)\hat{k}.$$

(b) Explain characteristic polynomial of matrix.

= depd.

< indepn