

S.Y.B.SC. (COMPUTER SCIENCE) SEM –III (2014 COURSE) :
SUMMER - 2018
SUBJECT: LINEAR ALGEBRA

Day: Tuesday
Date: 17/04/2018

S-2018-0845

Time: 12.00 NOON TO 02.00 PM
Max. Marks: 40

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.

Q.1 Attempt **ANY TWO** of the following: **(10)**

- a) Solve the following Homogeneous system of linear equation by Gauss Jordan method.

$$\begin{aligned}2x_1 + x_2 + 3x_3 &= 0 \\ x_1 + 2x_2 &= 0 \\ x_2 + x_3 &= 0\end{aligned}$$

- b) Determine the value of 'a' for which the following system have

i) No solution ii) Unique solution

$$\begin{aligned}x_1 + ax_2 &= 4 \\ ax_1 + 9x_2 &= 5\end{aligned}$$

- c) Prove that if V is a vector space then

i) $c\bar{0} = \bar{0}$, for every scalar c
ii) $(-1)\bar{u} = -\bar{u}$, for every \bar{u} in V

Q.2 Attempt **ANY TWO** of the following: **(10)**

- a) Show that intersection of two subspaces of a given vector space is subspace.

- b) Check whether the vectors $\bar{v}_1 = (1, 2, 1)$, $\bar{v}_2 = (1, 0, 2)$ and $\bar{v}_3 = (1, 1, 0)$ span vector space R^3 .

- c) Find basis and dimension of the solution space of homogeneous system.

$$\begin{aligned}x_1 + x_2 + x_3 + x_4 &= 0 \\ 2x_1 + x_2 - x_3 + x_4 &= 0\end{aligned}$$

Q.3 Attempt **ANY TWO** of the following: **(10)**

- a) Show that if λ is an Eigen value of matrix A then $\frac{\det(A)}{\lambda}$ is Eigen value of adjoint of A i.e. $\text{adj } A$.

- b) Find all eigenvalues of a matrix A and hence write the eigenvalues of A^t and

A^{-1} , where $A = \begin{bmatrix} 3 & 2 & 2 \\ 1 & 4 & 1 \\ -2 & -4 & -1 \end{bmatrix}$

- c) Find the matrix P that diagonalize the matrix $A = \begin{bmatrix} 1 & 0 \\ 6 & -1 \end{bmatrix}$

P.T.O.

Q.4 Attempt **ANY FIVE** of the following:

(10)

- a) Compute $\overline{u \cdot u}$ if $\overline{u} = \begin{bmatrix} \cos \theta \\ \sin \theta \end{bmatrix}$.
- b) Find nullity of matrix A of order 4×7 and rank $A = 3$.
- c) Define linear combination.
- d) Write definition of Row space.
- e) Define Eigen value.
- f) Find the characteristics polynomial of matrix A
Where $A = \begin{bmatrix} 10 & -9 \\ 4 & -2 \end{bmatrix}$.
- g) Define Diagonalization.

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