GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Computing Science and Engineering

Bachelor of Computer Applications
Mid Term Examination - Nov 2023

Duration : 90 Minutes
Max Marks : 50

Sem I - C1UC125T - Applied Linear Algebra

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) Explain, whether the vectors (1, -2, 1), (2, 1, -1) and (7, -4, 1) are linearly dependent or not. K2 (2)

2) Find the value of constant λ , if the matrix $\begin{pmatrix} \lambda & 1 & 2 \\ 0 & -1 & 5 \\ 2 & 0 & 1 \end{pmatrix}$ is singular (not invertible). K1 (3)

3) Find the value of 'k' for which the given set of equations has infinite solutions: K2 (4)
(3k-8) x + 3y + 3z = 0,
3x + (3k-8) y + 3z = 0,
3x+3y+(3k-8)z = 0.

4) *Show that the polynomials 1,* x *and* x^2 *span the vector space* $P_2(x)$ *.* K2 (6)

5) By Gauss Jordan method, find the inverse of the matrix A = $\begin{pmatrix} 1 & 2 & 3 \\ 3 & 5 & 6 \\ 2 & 4 & 5 \end{pmatrix}$. K3 (6)

6) Solve the system of equations : $x_1 + x_2 + x_3 = 1$, $3x_1 + x_2 - 3x_3 = 5$, $x_1 - 2x_2 - 5x_3 = 10$ by Gauss elimination method. K3 (9)

7) Examine the following system of equations for the unique solution by Gauss Jordan method: x – y + 3z – w = 1, y - 3z + 5w = 2, x – z + w = 0, x + 2z – w = -5. K4 (8)

8) *Let the linear transformation* T: $\mathbb{R}^3 \rightarrow \mathbb{R}^3$ *be defined by* T(x, y, z) = (x + z, 2x + y + 3z, 2y + 2z)*. Then find the dimension of the range space and null space of T.* K4 (12)

OR

Investigate the values of a and b so that the system $2x + 3y + 5z = 9, 7x + 3y - 2z = 8, 2x + 3y + az = b$ has (i) Unique solution (ii) No solution (iii) Infinite no. of solutions. K4 (12)