VIT

Vellore Institute of Technology

Fall Sem. 2019-20

Continuous Assessment Test-I

Programme Name & Branch: B. Tech.

Course Name & Code: APPLIED LINEAR ALGEBRA (MAT3004)

Slot: A2+TA2+TAA2+V3

Exam Duration: 90 Minutes

Date:18-08-2019

Maximum Marks: 50

Answer all Questions (5 X 10=50)

S.No	Question	
1.	Using Gauss Jordan Elimination method, find the inverse of matrix $A=\begin{bmatrix}1 & 2 & 3\\ 2 & 3 & 5\\ 1 & 0 & 2\end{bmatrix}$	(10)
2.	Consider the system x+2y+z=3 ay+5z=10 2x+7y+az=b (A) For which value of a, the system has unique solution. (B) Find those pair of (a, b) for which the system has more than one solution. (C) For what value of a or b, the system has no solution.	(10)
3.	(A) Let W={$(x_1, x_2, x_3) \in R^3: x_1^2 + x_2^2 + x_3^2 \leq 1$} Prove or disprove that W is a subspace of R^3.	(5)
	(B) For what value(s) of A are the following vectors linearly independent: (1, 5, −2), (0, 6, A) and (3, 13, −3)?	(5)
4.	(A) Let $v_1 = (1, 2, 3)$, $v_2 = (0, 1, 2)$, $v_3 = (-1, 0, 1)$ be set of vectors of the vector space R^3. Prove or disprove that the vector (1, 1, 1) is a linear combination of v_1, v_2, v_3.	(5)
	(B) Let $S=\{v_1, v_2, \ldots v_n\}$ be a basis for a vector space V. Prove that each vector v in V can be uniquely expressed as a linear combination of $v_1, v_2, \ldots v_n$, i.e., there are unique scalars $a_i's, i = 1,2,\ldots n$ such that $v = a_1v_1 + a_2v_2 + \cdots \ldots a_nv_n$	(5)
5.	(A) Let W be a subspace of R^4 spanned by the vectors $v_1 = (1, 2, 4, 3), v_2 = (2, 4, 8, 6), v_3 = (0, 2, 1, 4)$. Find a basis for W and its dimension. Also extend it to a basis for R^4.	(5)
	(B) Express $A = \begin{bmatrix}2 & 1\\ 8 & 5\end{bmatrix}$ as a product of elementary matrices.	(5)

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