Winter Semester 2018-19

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test – I

Programme Name & Branch: B. Tech.

Course Name & Code: Applied Linear Algebra & MAT 3004

Slot: C1+TC1+TCC1+V2

Maximum Marks: 50

Exam Duration: 90 minutes

Answer All the Questions (5 × 10 = 50)

S. No.	Question
1.	a) Find the inverse of $A = \begin{pmatrix} 2 & 1 & 1 \\ 3 & 2 & 1 \\ 2 & 1 & 2 \end{pmatrix}$ using Gauss-Jordan method. [7] b) Prove or disprove, if A and B are invertible, then $A + B$ is invertible. [3]
2.	Let $A = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 0 & 1 \\ 2 & 1 & 3 \end{pmatrix}$ and $b = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}$. a) Find LU decomposition of A. b) Under what conditions on b, does $Ax = b$ have a solution? [10]
3.	a) Let $A_{n\times n}$ be a matrix. Prove the following statements are equivalent. 1) $Ax = 0$ has only the trivial solution $x = 0$. 2) A is row equivalent to $I_{n\times n}$. 3) A is invertible. [5] b) Let $A = \{ (x, y, z) \in R^3 \mid 2x + 3y - 4z = 0\}$. Prove that A forms subspace of R^3. [5]
4.	Prove that $\{1 + 2x + x^2, 2 + 5x, 3 + 8x - 2x^2\}$ forms basis for $P_2(x)$. [10]
5.	a) Let $\alpha = \{v_1, v_2, \dots, v_n\}$ be a basis of a vector space V. Prove that every element in V can be expressed uniquely as a linear combinations of $v_1, v_2, \dots v_n$. [5] b) Let W be the subspace spanned by $\{(-1,1,0), (1,0,-1)\}$. Find a basis of W and extend to a basis of R^3. [5] Join @vitquestionpapers_2K19 On Telegram

A^{-1} $u \in V$