Slot C1

VIT
Vellore Institute of Technology

SCAN ME

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST – I
WINTER SEMESTER 2019-2020

Programme Name: B.Tech

Course Name: Applied Linear Algebra

Course Code: MAT3004

Exam Duration: 90 mins. **Maximum Marks: 50**

General instruction(s): *Attempt all questions.*

Q.No	Questions	Marks
1.	(a) For what values of k the given system has (*i*) no solution, (*ii*) unique solution and (*iii*) infinite number of solutions $$kx+2y=3$$ $$2x-4y=-6$$	5
	(b) Solve the following system for x, y and z $$\frac{1}{x}+\frac{2}{y}-\frac{4}{z}=1,\ \frac{2}{x}+\frac{3}{y}+\frac{8}{z}=0,\ -\frac{1}{x}+\frac{9}{y}+\frac{10}{z}=5$$	5
	(c) Determine values of λ for which the matrix $\begin{bmatrix} 1 & \lambda & 0 \\ 1 & 3 & 1 \\ 2 & 1 & 1 \end{bmatrix}$ is not invertible..	5
2.	(a) Is $W=\{(a,b): a,b \text{ are rationals}\}$ a subspace of $\mathrm{R}^2(\mathrm{R})$ or not?	5
	(b) Is the set of all diagonal matrices forms a subspace of vector space V of all $n \times n$ matrices over R ?	5
3.	(a) Let $\alpha=\{v_1, v_2, \ldots, v_n\}$ be a basis for a vector space V. Then show that each vector X in V can be uniquely expressed as a linear combination of $v_1, v_2, \ldots, v_n$.	5
	(b) Let $V=\mathrm{R}^2(\mathrm{R})$ and $W=\{(a,0): a \in \mathrm{R}\}$, $W_1=\{(0,b): b \in \mathrm{R}\}$ and $W_2=\{(c,c): c \in \mathrm{R}\}$. Show that $V=W \oplus W_1$ and $V=W \oplus W_2$	5
4.	Determine whether or not the vectors (1,-3,2), (2,4,1) and (1,1,1) are linearly independent.	5
5.	Find LU-Decomposition of $$\begin{bmatrix} 2 & 6 & 2 \\ -3 & -8 & 0 \\ 4 & 9 & 2 \end{bmatrix}$$	10