VIT

Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES

Winter Semester 2023-2024

Continuous Assessment Test –I

Programme Name & Branch: M.Tech. (Integrated) Computer Science and Engineering

Slot: G1+TG1-Common

Course Name & code: Linear Algebra & MAT1022

Class Number (s): VL2023240504931, VL2023240504934, VL2023240504935, VL2023240500431

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

General instruction(s): **Answer ALL Questions**

Q.No.	Question	Max Marks
1.	Find the solutions for the system of linear equations using Gauss-Jordan inverse method. $$x-y+4z=6$$ $$x-2z=10$$ $$2x-2y+4z=8$$	10
2.	Given the system of linear equations. $$x-y+4z=6$$ $$x-2z=10$$ $$2x-2y+hz=12$$ Find the value of h for which the system of equations has a) Unique solution b) Infinitely many solutions	5
3.	Solve the system of linear equations using LU-factorization method and find the solution space. $$x-y+4z=6$$ $$x-2z=10$$ $$2x-2y+9z=5$$	10
4.	Let V be the set R^2 with following operations defined as follows. • For any $(x_1,y_1),(x_2,y_2)\in R^2$ define $$(x_1,y_1)+(x_2,y_2)=(2(x_1+y_1+1+x_2+y_2),-1(x_1+y_1+x_2+y_2)).$$ • For any $c\in \mathbb{R}$ and for any $(x_1,y_1)\in \mathbb{R}^2$, define $$c\cdot(x_1,y_1)=(c\cdot x_1, c\cdot y_1).$$ Verify whether V is a vector space or not under the given binary operations $+,\cdot$.	10
5.	Let W be the set of all 2×2 matrices with $A=\begin{bmatrix} a & b \\ c & d\end{bmatrix}$ such that $a+b+c+d=0$. Is W is a subspace of $M_{2\times 2}$? Explain.	5
6.	a) Express the polynomial $v=t^2+4t-3$ in the set P polynomials of degree less than or equal to 2 as a linear combination of the polynomials. $$p_1=t^2-2t+5, p_2=2t^2-3t, p_3=t+1.$$ b) Determine whether the set S forms basis of R^4. $$S=\{(1,1,1,1),(1,2,3,2),(2,5,6,4),(2,6,8,5)\}.$$	10