



VIT[®]
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ADVANCED SCIENCES

Winter Semester 2023-2024

Continuous Assessment Test –I

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

Slot: C1+TC1+TCC1+V2

Course Name & Code: Discrete Mathematics and Graph Theory & MAT1014

Class Numbers: VL2023240501762 /64/66/72

Exam Duration: 90 Mins.

Maximum Marks: 50

General instructions: Answer ALL Questions

Q. No.	Question	Max Marks
1.	Obtain PCNF and PDNF for the following statement: $(p \rightarrow (q \wedge r)) \wedge (\neg p \rightarrow (\neg q \wedge \neg r))$	10
2.	Show that $(t \wedge s)$ can be derived from the premises $p \rightarrow q, q \rightarrow \neg r, r, p \vee (t \wedge s).$	10
3.	Prove the implication: $(x)(P(x) \rightarrow Q(x)), (x)(R(x) \rightarrow \neg Q(x)) \Rightarrow (x)(R(x) \rightarrow \neg P(x))$	10
4.	i. If M_2 is the set of 2×2 non-singular matrices over $\mathbb{R}$ $M_2 = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} / a, b, c, d \in \mathbb{R} \text{ and } ad - bc \neq 0 \right\}$ Is M_2 an abelian group, under the usual matrix multiplication? ii. Find all the subgroups of $\langle \mathbb{Z}_6, \oplus \rangle$.	10
5.	State and prove Lagrange's theorem.	10