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

REG.NO.: 24BCT0108

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: C1+TC1+TCC1

Programme Name & Branch	**: B. Tech.**
Course Code and Course Name	**: BMAT205L and Discrete Mathematics and Graph Theory**
Faculty Name(s)	**: Common Slot QP**
Class Number(s)	**: Common Slot QP**
Date of Examination	**: 19-08-2025**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
  CO 1: Learn proof techniques and concepts of inference theory
  CO 2: Use algebraic structures in applications

Q. No.	Question	M	CO	BL
1.	Prove that the premises $a \to (b \to c), d \to (b \wedge \neg c), (a \wedge d)$ are inconsistent.	10	1	3
2.	Obtain the principal disjunctive normal form and the principal conjunctive normal form for the following statement: $p \vee (\neg p \to (q \vee (\neg q \to r)))$.	10	1	3
3.	Express the negations of the following statements using quantifiers and in English: (i). Everyone who is healthy can do all kinds of work. (ii). Some people are not admired by everyone. (iii). Everyone should help his neighbours, or his neighbours will not help him. (iv). Some of the students do not keep quiet or the teacher is absent.	10	1	2
4.	Does $G = \left\{ \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}, \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix} \right\}$ form a group under the matrix multiplication? If so, is it abelian?	10	2	1
5.	Prove that, the necessary and sufficient condition for a non-empty subset H of a group $(G, *)$ to be a subgroup is $a * b^{-1} \in H, \forall a, b \in H$.	10	2	1

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