



VIT

Vellore Institute of Technology
(Approved by the All India Council of Technical Education, New Delhi)

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

REG.NO.: **02020205**

**SLOT: C2 + TC2 +
TCC2**

Programme Name & Branch : BTech (SCOPE)
Course Code and Course Name : BMAT205L Discrete Mathematics and Graph Theory
Faculty Name(s) : Common slot
Class Number(s) : Common slot
Date of Examination : 07.10.2025
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:
CO2 - Use algebraic structures in applications
CO3 - Counting techniques in engineering problems
CO4 - Use lattice and Boolean algebra properties in digital circuits

Q. No	Question	M	CO	BL
✓	✓ Show that there are exactly two group homomorphisms from $(\mathbb{Z}_2, +_2)$ to $(\mathbb{Z}_6, +_6)$.	5	2	2
	✓ Find the generator matrix corresponding to the (2,3) even parity check encoding function. Justify.	5		
✓	Let $n \in \mathbb{N}$, and $S = \{1, 2, \dots, 2n\}$ be given. Show that n is the largest possible cardinality of a subset $A \subseteq S$ satisfying the condition: given $a, b \in A$ such that $a \neq b$, then a does not divide b and b does not divide a .	10	3	3
✓	How many non-negative integer solutions exist for the equation $x_1 + x_2 + x_3 + x_4 = 23$, where $x_1, x_2, x_3 \geq 0$ and $x_4 \geq 3$?	10	3	3
✓	Solve the recurrence relation $a_n = 3a_{n-1} + 1$, for $n \geq 1$, $a_0 = 2$.	10	3	2
✓	Let A be the set of all 3-bit strings. Let $x_1x_2x_3, y_1y_2y_3 \in A$. Define a binary relation R on A by: $x_1x_2x_3 R y_1y_2y_3 \Leftrightarrow \forall i \in \{1, 2, 3\}, x_i \leq y_i$. Is (A, R) a poset? Justify. Does it form a lattice? Justify.	10	4	2