



# VIT

Vellore Institute of Technology  
(Deemed to be University under section 3 of U.G. Act 1956)

REG. NO.:

SCHOOL OF ADVANCED SCIENCES  
DEPARTMENT OF MATHEMATICS  
CONTINUOUS ASSESSMENT TEST – II  
FALL SEMESTER – 2025~2026

SLOT: C1+TC1+TCC1

Programme Name & Branch : B.Tech. (All Branches)  
Course Code & Course Name : BMAT205L & Discrete Mathematics & Graph Theory  
Faculty Name(s) & Class Number(s) : Common Question Paper  
Date of Examination and Session : 07-10-2025 & AN Session  
Exam Duration : 90 Minutes Maximum Marks : 50 M

General Instruction(s):

- Answer All Questions.
- M – Max. Marks; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create).
- Course Outcomes:  
CO-2: Use algebraic structures in applications, CO-3: Counting techniques in engineering problems, CO-4: Use lattice and Boolean algebra properties in Digital circuits.
- Students are permitted to carry any number of text books and hand written class note books.

Q. No.	Questions	M	CO	BL
1.	Find the code words generated by the parity check matrix $H = \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$ , when the encoding function is $e : B^3 \rightarrow B^6$ . Also find how many errors $e$ will detect? and how many errors it will correct?	10	2	3
2.	A database assigns unique record IDs numbered from 1 to 5000. For system optimization, IDs that are divisible by 3, 5, or 7 are reserved for internal indexing and cannot be given to user records. How many valid record IDs can be assigned to users for internal indexing?	10	3	2

P.T.O



Q. No.	Questions	M	CO	BL
3.	<p>(i). How many different 3 –digit numbers can be formed using the digits 1, 2, 3, 4, 5 without repetition?</p> <p>(ii). In how many ways can the letters of the word <b>MATH</b> be arranged?</p> <p>(iii). From 7 men, a committee of 3 is to be formed. In how many ways can this be done?</p> <p>(iv). How many different 4 – letter words can be formed using the letters of the word <b>BOOK</b>?</p> <p>(v). In how many ways can 5 different books be arranged on a shelf?</p>	10	3	1
4.	<p>A city decides to plant trees along a highway. In the first year, 50 trees are planted. In the second year, 120 trees are planted. From the third year onwards, the number of trees planted in a year is equal to the sum of trees planted in the previous year and twice the number of trees planted two years earlier.</p> <p>① 1. Formulate a recurrence relation for the number of trees planted in year <math>n</math>.</p> <p>② 2. Find the number of trees planted in the <math>n^{\text{th}}</math> year.</p> <p>③ 3. Compute the total number of trees planted by the end of the 4th year.</p>	10	3	3
5.	<p>(1). Let <math>X_1 = \{S_0, S_1, S_2, \dots, S_7\}</math> where <math>S_0 = \{a, b, c, d, e, f\}</math>, <math>S_1 = \{a, b, c, d, e\}</math>, <math>S_2 = \{a, b, c, e, f\}</math>, <math>S_3 = \{a, b, c, e\}</math>, <math>S_4 = \{a, b, c\}</math>, <math>S_5 = \{a, b\}</math>, <math>S_6 = \{a, c\}</math> and <math>S_7 = \{a\}</math>.</p> <p>(i). Verify whether <math>(X_1, \subseteq)</math> is a partially ordered set or not.</p> <p>(ii). If so, draw a Hasse diagram for the same.</p> <p>(2). Consider the set <math>X_2 = \{2, 3, 6, 12, 24, 36\}</math> and let for <math>a, b \in X_2</math>, "<math>a \leq b</math>" be the relation "<math>a</math> divides <math>b</math>"</p> <p>(i). Verify whether <math>X_2</math> is a Poset or not.</p> <p>(ii). Draw the Hasse diagram of <math>(X_2, \leq)</math>.</p> <p>(iii). Check <math>(X_2, \leq)</math> is lattice or not.</p>	10	4	3

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