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

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

SLOT:A1+TA1+TAA1

Programme Name & Branch : **B.Tech**
Course Code and Course Name : **BAMAT205 – DISCRETE MATHEMATICS AND LINEAR ALGEBRA**
Faculty Name(s) : **Common Question Paper for A1+TA1+TAA1 Slot**
Class Number(s) : **Common Question Paper for A1+TA1+TAA1 Slot**
Date of Examination : **15.03.2026**
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
  CO3: Relate algebraic structures to enhance problem-solving techniques.
  CO4: Understand the concepts of vector space, subspaces and linear transformation.

Q. No	Question	M	CO	BL
1.	Consider the set $G = \{f_1, f_2, f_3, f_4, f_5, f_6\}$ of six transformations on the set of complex numbers defined by $f_1(z) = z, f_2(z) = 1 - z, f_3(z) = \frac{z}{z-1}, f_4(z) = \frac{1}{z}, f_5(z) = \frac{1}{1-z}, f_6(z) = \frac{z-1}{z}$. Verify whether the set G is a group with respect to composition of functions as the binary operation. If it is a group, is it abelian? Justify your answer.	10	CO3	2
2.	For a $(7, 3)$ code, a generator matrix G is shown below: $G = \begin{pmatrix} 1 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \end{pmatrix}$ (i) Find all codewords generated by G (ii) Construct the Parity Check Matrix (iii) Find the error if the received code is 1110101.	10	CO3	3
3.	(i) Draw the Hasse diagram of $A = \{2,3,5,6,10,15,30,60\}$ under divisibility and determine whether it forms a lattice or not. Justify your answer. (ii) Simplify the following Boolean function using Boolean Algebra Laws: $F(A, B, C) = \bar{A} B \bar{C} + \bar{A} B C + A B \bar{C} + ABC + A \bar{B} C + A \overline{BC}$	10	CO3	3
4.	Let $V = \mathbb{R}^3$ and consider the set $W = \{(x, y, z) \in \mathbb{R}^3 : 2x - y + 3z = 0\}$. Prove that W is a subspace of $\mathbb{R}^3$. Find a basis for W and hence find its dimension.	10	CO4	3
5.	Let $V = P_2(x)$ (polynomials of degree ≤ 2), and $p_1(x) = 1 + x,\ p_2(x) = x + x^2, p_3(x) = 1 + x^2$. Check whether the set $\{p_1, p_2, p_3\}$ is linearly independent or linearly dependent.	10	CO4	3

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