



VIT

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

REG.NO:

SCHOOL OF ADVANCED SCIENCES
DEPARTMENT OF MATHEMATICS
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: C1+TC1+TCC1

Programme Name & Branch : B.Tech
 Course Code and Course Name : BMAT205L - Discrete Mathematics and Graph Theory
 Faculty Name(s) : Prof. M C Saravanarajan, Prof. D Ezhilmaran, Prof. G Deepa, Prof. A Manimaran, Prof. B Venkateswarulu, Prof. M Nalliah, Prof. Niranjan Hari, Prof. S Jagatheswari, Prof. Amrit Das, Prof. V Vijayakumar, Prof. V Murugan, Prof. Ankush Chanda, Prof. A Parthiban, Prof. Juhi Baroi, Prof. M Jagadeeswari, Prof. Sumit, Prof. Praveen
 Class Number(s) : VL2024250102540, 2539, 2545, 2537, 2541, 2542, 2543, 2544, 2554, 2546, 2549, 2547, 2548, 2552, 2553, 2558, 2555
 Date of Examination : 15/10/2024
 Exam Duration : 90 minutes Maximum Marks: 50

ANSWER ALL THE QUESTIONS

Q. No	Question	M	CO	BL
1.	An encoding function $e: B^3 \rightarrow B^6$ is given by the generator matrix $\begin{pmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{pmatrix}$. a) Determine all code words generated by the matrix. b) Find the associated parity check matrix H c) Use H to decode the following received words 101100, 010100	10	2	2
2.	a) How many integers between 357 and 573 (both inclusive) are divisible by (i) at least one of 3, 5, 7? (ii) 7 and 5 but not 3? (iii) 7 but neither 3 nor 5?	5	3	3
	b) How many different ways are there to choose 5 donuts from the 7 varieties such that there must be at least 3 varieties? Assume that there are at least 3 donuts of each variety.	5		

3.	Solve the recurrence relation using generating functions $4a_{n-2} - 4a_{n-1} + a_n = 4^n, n \geq 2, a_0 = 2, a_1 = 8$	10	3	3
4.	Draw the Hasse diagram for the poset $\{S_{105}, D\}$, divisors of 105 under the relation divides. Hence or otherwise prove that it is a lattice, if so find two sub lattices and two non sub lattices. Also find $7 * (21 \oplus 5)$ and $5 \oplus (21 * 7)$	10	4	3
5.	Obtain the sum of products and product of sums canonical form of the Boolean expression $x'_2 \oplus ((x'_3 \oplus x_1 \oplus (x_2 * x_3)') * (x_3 \oplus (x'_1 * x_2)))$	10	4	2