



VIT

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

REG.NO.:

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

SLOT: A1 + TA1

Programme Name & Branch : B. Tech

Course Code and Course Name : BMAT205L – Discrete Mathematics & Graph Theory

Faculty Name(s) : Dr. M. Jagadeeswari, Dr. Yamuna M, Dr. Selvakumar R

Class Number(s) : VL2024250102589, VL2024250102587,
VL2024250102588

Date of Examination : 13.10.2024

Exam Duration : 90 minutes

Maximum Marks: 50

Answer All Questions

Q. No	Questions	M	CO	BL
1.	a) Derive the code words for the given parity check matrix $\begin{bmatrix} 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 1 & 0 \end{bmatrix}$ generated by the encoding function $e: B^3 \rightarrow B^6$. b) Form the decoding table then find the original message if the attained message is 001111 and 011110.	5+5	[CO2]	BL2
2.	In how many ways can the letter of the word "MODELLING" be arranged if there are always 4 letters between M and G? A large software development company employs 100 computer programmers. Of them, 45 are proficient in Java, 30 in C++, 20 in Python, six in C++ and Java, one in Java and Python, five in C++ and Python, and just one programmer is proficient in all three languages above. Determine the number of computer programmers that are not proficient in any of these three languages.	5 5	[CO3]	BL3
3.	Solve the recurrence relation $a_n - 12a_{n-1} + 44a_{n-2} - 48a_{n-3} = 0$, for $n \geq 3$ with initial conditions $a_0 = 0, a_1 = 1, a_2 = 10$ using generating function.	10	[CO3]	BL3
4.	Investigate the set $S = \{2, 3, 5, 6, 7, 10, 14, 15, 21, 30, 35, 42, 70\}$	10	[CO4]	BL3



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	<p>105} under the divisibility relation.</p> <p>a. Determine the set S is a partially ordered set (POSET). If so, construct the Hasse diagram.</p> <p>b. Examine the set S forms a lattice. Justify.</p>			
5.	<p>a) Simplify the boolean expression $\bar{A}BC + A\bar{B}C + ABC\bar{C} + ABC$.</p> <p>b) Consider the Boolean function</p> $f(A, B, C, D) = (A + \bar{B})(B.(C + D)) + \bar{A}.C.(B + D)$ <p>Express the given function as DNF and CNF.</p>	4+6	[CO4]	BL2

$AB\bar{C}D$
 $AB\bar{C}D'$
 $A\bar{B}'CD$
 $A\bar{B}'CD'$
 $A\bar{B}'C'D$
 $A\bar{B}'C'D'$
 $A\bar{B}'C'D$
 $A\bar{B}'C'D'$
 $A\bar{B}'C'D$