



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

SLOT: A1+TA1+TAA1

Programme Name & Branch : B. Tech
 Course Code : BMAT205L
 Course Name : Discrete Mathematics and Graph Theory
 Faculty Name(s) : ANJANEYULU G S G N, PALLAVI MISHRA,
 ABHISHEK DAS, PRAVEEN, SELVAKUMAR R, PARTHIBAN A, SUJASREE M
 Class Number(s) : 2452, 4418, 0889, 0869, 0864, 0893, 0872
 Date of Examination : 05.10.2025 (Session 2)
 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
 2. Use algebraic structures in applications.
 3. Counting techniques in engineering problems.
 4. Use lattice and Boolean algebra properties in Digital circuits.

Q. No	Question	M	CO	BL
1.	An encoding function $e: B^3 \rightarrow B^6$ is given by the generator matrix $G = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{pmatrix}$ Determine all code words generated by the matrix. Find the associated parity check matrix H . Use H to decode the following received words 100111, 001101.	10	2	3
2.	A factory produces 1000 items, each stamped with a serial number from 1 to 1000. Every 3rd item undergoes a quality test for strength. Every 5th item undergoes a quality test for durability. Every 7th item undergoes a quality test for finish. How many items are tested for strength or durability but not finish? How many items will not go for any kind of test?	10	3	2
3.	a) A competition offers 20 distinct tasks. A team must select 8 distinct tasks to attempt. <ol style="list-style-type: none"> i. How many ways can the team choose 8 tasks if two particular tasks (say Task 1 and Task 2) cannot both be chosen? ii. How many ways can the team choose 8 tasks if at least 3 tasks must come from a favoured set of 10 tasks? iii. Suppose the team arranges the 8 chosen tasks in an ordered sequence. How many such ordered lists are possible if the first task must come from the favoured set of 10 and the last task must come from the remaining 10? 	6	3	2



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	b) How many 6-digit even numbers can be formed using the digits of 12233444?	4		
4.	Solve the recurrence relation $a_{n+1} - 10a_n + 25a_{n-1} = 5^n; n \geq 1, a_0 = 1, a_1 = 5.$	10	3	3
5.	a) Let $S = \left\{ \begin{pmatrix} a & a \\ a & a \end{pmatrix} / a \in \mathbb{Z} \right\}$. A relation R on S is defined as ARB if $\exists k \in \mathbb{N}$ such that $B = kA$ for $A, B \in S$. Verify whether S is a partially ordered set.	5	4	2
	b) Given the set $P = \{1, 2, 3, 4, 5, 6\}$ with the relations $2 \leq 1, 2 \leq 5, 6 \leq 2, 4 \leq 5, 6 \leq 4, 3 \leq 1, 6 \leq 3$ construct the Hasse diagram. Find the least upper bound and greatest lower bound of every pair of elements in P if it exists. Is (P, \leq) a lattice?	5		