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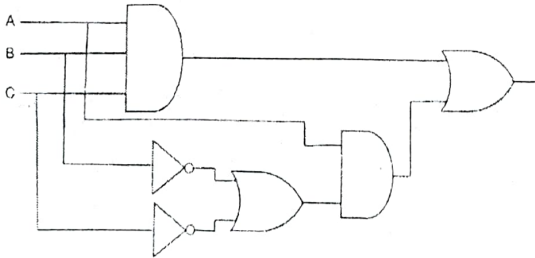
Continuous Assessment Test (CAT) – II OCTOBER 2025

Programme	:	B Tech	Semester	:	Fall Semester 2025-26
Course Code & Course Title	:	BMAT205L, Discrete Mathematics and Graph Theory	Slot	:	C1+TC1+TCC1
Faculty	:	Dr. Sandip Dalui, Dr. Vidhya V, Dr. Ashish Kumar, Dr. Berin Greeni A, Dr. Pulak Konar, Dr. Tharasi Dilleswar, Dr. Nivedha D, Dr. Surath Ghosh, Dr. Jaganathan B, Prof. Chithraponnu R	Class Number	:	CH2025260100871, CH2025260100873, CH2025260100875, CH2025260100877, CH2025260100878, CH2025260100879, CH2025260100881, CH2025260100882, CH2025260100883, CH2025260100885
Duration	:	90 Minutes	Max. Mark	:	50

General Instructions:

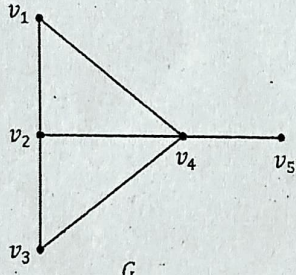
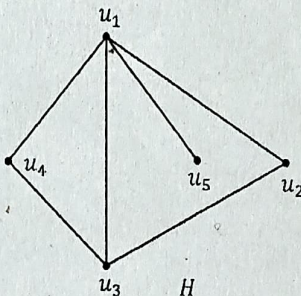
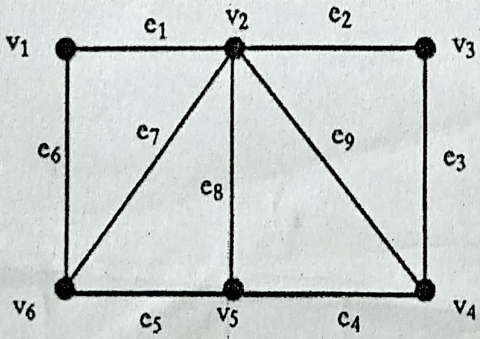
- Write only your registration number on the question paper in the box provided and do not write other information
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1		Solve $a_n = 4a_{n-1} + 5a_{n-2} + 3, a_1 = 3, a_2 = 5$ using generating function	10	3	K2
2		Let R be a relation on the set of all positive divisors of 150, defined by: aRb if and only if a divides b (i) Draw the Hasse diagram of (A, R), where A is the set of all positive divisors of 150 (5 marks) (ii) Determine whether (A, R) is a lattice. If yes, find the join and meet of the pairs $(6, 25)$ and $(10, 15)$ (3 marks) (iii) Find the complement of the element 50, if it exists. Otherwise, explain why it does not have a complement. (2 marks)	10	4	K3
3		(i) Find the Boolean algebraic expression for the following logical diagram (3 marks)  (ii) Create the truth table for the Boolean expression obtained. (3 marks) (iii) Find Sum of products and Product of sums from the truth table (4 marks)	10	4	K4

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4	Consider the graph G whose adjacency matrix is given below: $ \begin{bmatrix} 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 \end{bmatrix} $ In each of the following questions, provide proper justification for your conclusion. (i) Check whether the graph G is Eulerian. (3 marks) (ii) Verify whether the graph G contains a Hamiltonian Path. (4 marks) (iii) Determine whether the graph G is Bipartite. (3 marks)	10	5	K4
5	a) Does there exist a graph with 13 vertices each of degree 3? by giving proper justification	3	5	K3
	b) Determine whether the following two graphs G and H are isomorphic  G  H	5	5	K3
	c) Construct the incidence matrix B for the following graph G. 	2	5	K3

*****All the best *****