Reg. No.:

Name :

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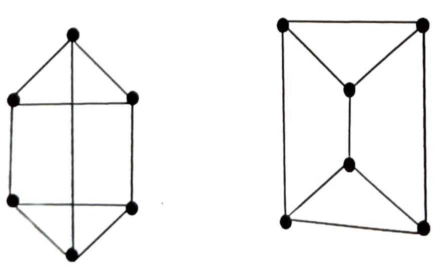
MID TERM EXAMINATIONS – April 2024

Programme	: B.Tech.		Semester	:	Winter 2023-24
Course Title	: Discrete Mathematics And Graph Theory/		Slot	:	B11+B12+B13
Course Code	MAT2002		Max. Marks	:	50
Time	: 1 ½ hours				

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1	(a)	If R is the relation on the set of positive integers such that $(a, b) \in R$ if and only if $a^2 + b$ is even, prove that R is an equivalence relation.	6
	(b)	Draw the digraph representing the partial ordering $\{(a, b) \mid a \text{ divides } b\}$ on the set $\{1, 2, 3, 4, 5, 6, 7, 8\}$. Reduce it to the Hasse diagram representing the given partial ordering.	4
2	(a)	If $a, b \in S = \{1, 2, 4, 8\}$ and $a + b = LCM\,(a, b)$, $a \bullet b = GCD\,(a, b)$ and $a' = \frac{8}{a}$, show that $\{S, +, \bullet, ', 1, 8\}$ is not a Boolean algebra.	5
	(b)	Draw the logic circuit L with inputs A, B, C and output Y which corresponds to each Boolean expression: (a) $Y = ABC + A'C' + B'C'$ (b) $Y = AB'C + ABC' + AB'C'$.	5
3		Use the laws to show the following: (1) $p \to (q \to r) \equiv (p \wedge q) \to r$ (2) $\neg(p \leftrightarrow q) \equiv \neg p \leftrightarrow q$ (3) $p \to q \equiv p \leftrightarrow p \wedge q$.	10
4	(a)	Is the following argument valid? If $x = 4$, then discrete math is bad. Discrete math is bad. Therefore, $x = 4$.	5
	(b)	Express the negation of the statement $\forall x\, \exists y (xy = 1)$ so that no negation precedes a quantifier.	5
5	(a)	Define graph, subgraph and weighted graph with example.	4
	(b)	Determine whether the following pair of graphs G and H are isomorphic. If isomorphic, label the vertices of the two graphs to show that their adjacency matrices are the same	6



Graph G Graph H

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