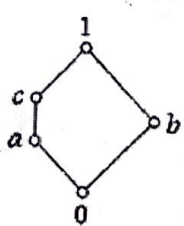


Shiv Nadar University Chennai

Mid Semester Examinations 2024-2025 Odd

Question Paper

Name of the Program: B.Tech., AI & DS; B.Tech., CSE (IoT); BTech CSE (CS)		Semester: III
Course Code & Name: MA2003 Discrete Mathematics, MA2001 Discrete Mathematics and Graph Theory		
Regulation 2021		
Time: 2 Hours	Answer All Questions	Maximum: 50 Marks

Q. No.	Questions	Marks	CO	KL
1	a Prove that the statements $(p \vee q) \rightarrow r$ and $(p \rightarrow r) \vee (q \rightarrow r)$ are not logically equivalent.	2	CO1	KL3
2	a Prove the following statement by method of contradiction: "There exists no positive integers a, b such that $a^2 - 4b = 2$ ".	2	CO1	KL3
3	a Prove that in a distributive lattice $\{L, \vee, \wedge\}$, if an element $a \in L$ has a complement, then it is unique.	2	CO2	KL3
4	a Using the laws of Boolean Algebra show that $xy + (xz)' + xy'z(xy + z) = 1$	2	CO2	KL3
5	a Prove / disprove that the poset given by the following Hasse diagram is a lattice. 	2	CO2	KL3
6	a Find the PDNF and PCNF of $(\neg p \rightarrow (q \wedge r)) \wedge (\neg q \leftrightarrow p)$ without truth table.	10	CO1	KL3
7	a Prove that the premises $p \rightarrow q, r \vee \neg q, s \rightarrow \neg r$ imply the conclusion $p \rightarrow \neg s$.	5+5	CO1	KL3
	b Show that the following premises are inconsistent. "If Raja misses many classes, then he fails in the final examination", "If Raja fails in the final examination, then he is uneducated", "If Raja reads a lot of books, then he is not uneducated" and "Raja misses many classes and reads a lot of books".			
8	a If R is the relation on set of integers such that $(a, b) \in R$ iff $3a + 4b = 7n$ for some integer n , verify if R is an equivalence relation.	6+4	CO2	KL3
	b Let R be the relation from $X = \{1, 3, 7, 15, 31\}$ to set $Y = \{1, 3, 6, 10, 15\}$ defined as aRb if and only if a and b are relatively prime i.e., $(GCD(a, b) = 1)$. Find the elements of the relation R and write the corresponding matrix.			
9	a Let D_{100} be the set of divisors of 100 and a is related to b iff $a b$ i.e., a divides b . a) Draw the Hasse diagram of $\{D_{100}, \}$. b) Find the upper bounds, lower bounds, LUB and GLB of $\{5, 10, 25\}$. c) Verify modular equality for $a = 4, b = 25, c = 20$. d) Is $\{D_{100}, \}$ a totally ordered set? Justify.	10	CO2	KL3

KL – Bloom's Taxonomy Levels

(KL1: Remembering, KL2: Understanding, KL3: Applying, KL4: Analyzing, KL5: Evaluating, KL6: Creating)

CO – Course Outcomes