



Avinashilingam Institute for Home Science and Higher Education for Women
Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD
Re-accredited with 'A++' Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore-641 043, Tamil Nadu, India
Continuous Internal Assessment Test II – October 2024
Semester V

Class : III UG

Branch : Special Education and Mathematics

21BSMC16 - Discrete Mathematics

Time : 2 Hours

Max.Marks : 60

Course Outcomes:

- CO1: Determine the truth value of statements.
CO2: Find tautology and equivalence formula.
CO3: Identify the normal forms.
CO4: Construct Hasse diagram for a given set with relation.
CO5: Apply the concept of lattice in Boolean Algebra

Part A

6 x 1 = 6

Choose the Correct Answer

1. A product of the variables and their negations is called **CO3K1**
 - a. an elementary sum
 - b. an elementary product
 - c. PCNF
 - d. PDNF
2. Which of the following is a maxterm? **CO3K2**
 - a. $\sim P \vee \sim Q$
 - b. $\sim P \vee P$
 - c. $\sim Q \wedge Q$
 - d. $\sim P \wedge \sim Q$
3. Which of the following is a partial order relation on the set of integers? **CO4K2**
 - a. =
 - b. \leq
 - c. <
 - d. >
4. Dual of a poset (P, \leq) is **CO4K3**
 - a. (P, \geq)
 - b. $(P, <)$
 - c. $(P, >)$
 - d. $(P, =)$
5. $a * (a \oplus b) = a$ is called a/an ----- law **CO5K2**
 - a. Idempotent
 - b. Absorption
 - c. Distributive
 - d. Associative
6. In a bounded Lattice an element $b \in L$ is called a complement of an element $a \in L$ if **CO5K2**
 - a. $a \oplus b = 1$
 - b. $a \oplus b = 0$
 - c. $a * b = 0$
 - d. $a \oplus b = 1$ and $a * b = 0$

Part B

3 x 6 = 18

Answer ALL questions

7. a. Obtain the PDNF of the formula $(P \rightarrow Q)$ **CO3K3**
(or)
7. b. Show that (a) $P \vee (P \wedge Q) \Leftrightarrow P$ (b) $P \vee (\neg P \wedge Q) \Leftrightarrow P \vee Q$ **CO3K3**
8. a. Define poset and chain with examples. **CO4K4**
(or)
8. b. Show that the relation \geq is a partial ordering on the set of integers. **CO4K3**
9. a. Define lattice and state its properties. **CO5K3**
(or)
9. b. Prove that every chain is a distributive lattice. **CO5K4**

Part C

3 x 12 = 36

Answer ALL questions

10. a. Obtain PCNF from PDNF of $A : (P \wedge Q) \vee (\neg P \wedge R) \vee (Q \wedge R)$ **CO3K4**
(or)
10. b. Find PDNF and PCNF of $S : P \vee (\neg P \rightarrow (Q \vee (\neg Q \rightarrow R)))$ **CO3K3**
11. a. Let A be a given finite set and P(A) its power set. Let \subseteq be the inclusion relation on the elements of P(A). Draw Hasse diagram of $(P(A), \subseteq)$ for (1) $A = \{a\}$ (2) $A = \{a, b\}$ (3) $A = \{a, b, c\}$ and (4) $A = \{a, b, c, d\}$. **CO4K4**
(or)
11. b. (i) Draw Hasse diagram for the set $X = \{2, 3, 6, 12, 24, 36\}$ and the relation be such that $x \leq y$ if x divides y.
(ii) Let $X = \{2, 3, 6, 12, 24, 36\}$ and the relation \leq be such that $x \leq y$ if x divides y. If $A = \{2, 3, 6\}$, then find the lower bounds, upper bounds, LUB and GLB for A **CO4K4**
12. a. Let (L, \leq) be a lattice. Prove that for any $a, b \in L$ the following are equivalent. (i) $a \leq b$ (ii) $a * b = a$ and (iii) $a \oplus b = b$. **CO5K5**
(or)
12. b. Let L be a complemented and distributive lattice. Prove that for any $a, b \in L$ the following are equivalent. (i) $a \leq b$ (ii) $a * b' = 0$ (iii) $a' \oplus b = 1$ (iii) $b' \leq a'$ **CO5K5**

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