974, 975
C ,127.

Air University

(Mid-Term Examination: Fall-2024) 241503

Subject:	**Discrete Structures**	Total Marks:	**50**
Course Code:	**MA-216**	Date:	
Class:	**BS-CYS**	Time:	
Semester:	**I**	Duration:	**2 Hours**
Section:	**A, B (Morning)**	FM Name:	**Mr. Amir Shahzad**

HoD's Signature:_____ FM's Signature:_____

Note:

- **All questions must be attempted. Understanding the question is part of the examination.**
- **This examination carries 25% weight towards the final grade.**
- **Scientific calculator is allowed.**

Q. No. 1 (CLO-1) (PLO-2)		**15 Marks**
a	**Demonstrate** (show) that $(p \rightarrow \sim q) \rightarrow \sim(p \leftrightarrow q)$ is a Tautology or contingency by using truth table.	5
b	Show that the distributive laws are equivalent by constructing a membership table.	5
c	Find the cartesian product of $A, B, and\ C$ where $A = \{1,2,3\}$, $B = \{0,1\}, C = \{-3, -5\}$.	5
Q. No. 2 (CLO-2) (PLO-3)		**15 Marks**
a	**Apply** the series of logical equivalences steps to prove that: $\sim(p \vee (\sim p \wedge q))$ and $(\sim p \wedge \sim q)$ are logically equivalent. **(Note: Do not make use of truth table).**	8
b	**Apply** a direct proof strategy to show that "if m and n are perfect square then mn is also a perfect square."	7
Q. No. 3 (CLO-4) (PLO-3)		**20 Marks**
a	**Apply** the Binary Search algorithm to search for "9" in the list 1, 3, 4, 5, 6, 8, 9, 11.	10
b	**Execute** the Bubble Sort algorithm to sort the list of elements 3, 2, 4, 1, 5, b showing the lists into increasing order.	10

********** End **********

$A \vee (B \wedge C) \rightarrow (A \vee B) \wedge (A \vee C)$

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