



COMSATS UNIVERSITY ISLAMABAD (CUI)

DEPARTMENT OF COMPUTER SCIENCE

MIDTERM EXAMINATION SPRING - 2023

BS (CS) – I-II SEMESTER

BS (SE) – I-II SEMESTER

BS (DS/AI/CYS) – I SEMESTER

Course: CSC102-Discrete Structure

Dated: May 4, 2023

Maximum Marks: 25

Time Allowed: 90 Minutes

- All questions are self-explanatory and require no further explanations during exam time.
- Make sure that you have signed the attendance sheet before leaving the examination room.
- Return the question paper along with the answer sheet.
- Attempt all questions.

CLO – 1: Model real life problems using symbolic logic.

Q.# 1.

[10 Marks:2.5*4].

- ✓1. Find the negation of the following statement.

"If you pay your membership dues, then if you come to the club, you can enter free."

- 1.2. Simplify the following statements.

$$[(p \rightarrow q) \vee (q \rightarrow r)] \wedge (r \rightarrow s)$$

- ✓3. Write the negation of the following predicate.

$$\forall x [\exists y \forall z P(x, y, z)] \wedge \exists z \forall y P(x, y, z)$$

- ✓1.4. Translate the following statement in English using the predicate $S(x, y)$: "x shop in y" where x represents people and y represents store.

$$\exists x_1 \exists y \forall x_2 [S(x_1, y) \wedge (x_1 \neq x_2 \rightarrow \neg S(x_2, y))]$$

(CLO – 2: Apply rules of inference to build logical arguments.)

Q.# 2.

[5 Marks].

- 2.1. For each of these collections of premises, what relevant conclusion can be drawn? You should clearly mention the **rules of inference** used to obtain the conclusion from the premises.

Premise 1: $(p \wedge q) \vee r$

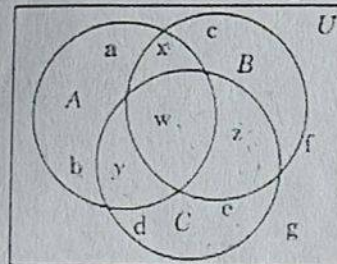
Premise 2: $r \rightarrow s$

(CLO – 3: Perform the operations associated with sets, functions, and relations.)

Q.# 3.

[10 Marks:2+2+2+4].

- ✓3.1 Determine $(A - B) \times (B - C)$ from following Venn Diagram



- ✓3.2 Let $U = \{1, 2, 3, 4, 5\}$, $C = \{1, 3\}$ and A and B are non-empty sets. Find A if:

$$A \cap B = \{3\}, \quad A \cup B = \{2, 3, 4\} \quad \text{and} \quad B \cup C = \{1, 2, 3\}$$

- ✓3.3 Prove that $A - (A - B) = A \cap B$ by using Membership Table

- 3.4 Let R be a reflexive and transitive relation on X. Show that $R \cap R^{-1}$ is an equivalence relation.

End