Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Odd) Semester Examination September 2025

Roli No.....

Name of the Course: BCA
Semester: I
Name of the Paper: Mathematical Foundation of Computer Science
Paper Code: TBC 103
Time: 1.5 Hours **Maximum Marks: 50**

Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q1. (10 Marks)

a. Let $U = \{0, 1, 2, 3, 4, 5, 6, 7\}$, $A = \{0, 2, 4, 6\}$, $B = \{1, 3, 5, 7\}$, and $C = \{0, 3, 6\}$
Then find, (CO1)

(i) $A \cup B$,
(ii) $B \cap C$,
(iii) B^C, Where B^C denotes the complement of set B
(iv) $A - B$,
(v) $A \Delta B$, Where Δ is the symmetric Difference of two sets A and B.

OR

b. In a survey concerning the unhealthy habits of students, it was found that 55% of them regularly eat junk food, 50% skip Breakfast, and 42% sleep late at night. Furthermore 28% of them eat junk food and skip breakfast, 20% eat junk food and also sleep late, 12% skip breakfast and sleep late, and 10% have all three habits. (CO1)

(i) What percentage of students do not have any of these unhealthy habits?
(ii) What percentage of students have exactly two unhealthy habits?

Q2. (10 Marks)

a. Let $U = \{x : x \in N, 1 \leq x \leq 12\}$ be a universal set and $A = \{1, 9, 10\}$, $B = \{3, 4, 6, 11, 12\}$, and $C = \{2, 5, 6\}$ are subset of U. Find the sets. (CO1)

(i) $(A \cup B) \cap (A \cup C)$,
(ii) $A \cup (B \cap C)$,
(iii) $(A \cup B \cup C)^C$.

OR

b. Explain with Examples. (CO1)

(i) Singleton Set,
(ii) Equality of Sets,
(iii) Countable and Uncountable sets,
(iv) Complement of a Set.

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Q3. (10 Marks)

a. Explain the Cartesian product of sets. If $A = \{a, b, c\}$ and $B = \{b, c\}$, prove that $A \times B \neq B \times A$. Also find $n(A \times B)$. (CO2)

OR

b. Draw the Venn diagram of the following sets: (CO1)

(i) $A - (B \cup C)$,

(ii) $(A - B) \cap (A - C)$,

(iii) $A \cup A^C$ where A^C is the complement of the set A,

(iv) $A \Delta B$ where Δ represents the symmetric difference.

Q4. (10 Marks)

a. What is a function? Explain and define the following terms: (CO2)

(i) One-to-One Function (or Injective Function),

(ii) Onto Function (or Bijective Function),

(iii) Inverse Function.

OR

b. What is the difference between relations and functions? Give an example in support of your answer. Also, explain with an example. (CO2)

(i) Reflexive Relation,

(ii) Symmetric Relation,

(iii) Transitive Relation.

Q5. (10 Marks)

a. What is the partial order relation and partial order set (Poset)? Give an example of a relation that is reflexive, symmetric, and transitive.

OR

b. Define the following: (CO2)

(i) Fibonacci sequence,

(ii) Ackermann's Function,

(iii) Characteristic function,