



Term Evaluation (Odd) Semester Examination September 2025

Roll No.....

Name of the Course: BCA AI&DS

Semester: I

Name of the Paper: Mathematical Foundation for AI,

Paper Code: TBD 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. Explain with Examples.

(CO1)

(i) Singleton Set,

(ii) Power Set,

(iii) Equality of Sets,

(iv) Equivalent Sets,

(v) Complement of a Set.

OR

b. 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.

Q2.

(10 Marks)

a. Draw the Venn Diagram for the following sets.

(CO1)

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

(ii) $A^c \cap B^c$, Where A^c and B^c denotes the complement of set A and B,

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

(iv) $(A - B) \cap (A - C)$.

OR

b. Let $A = \{\emptyset, b\}$, Construct the following sets;

(CO1)

(i) $A - \emptyset$,

(ii) $\{\emptyset\} - A$,

(iii) $A \cup P(A)$,

(iv) $A \cap P(A)$.



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Q3.

(10 Marks)

a. If A and B are any two sets, then prove the following Identity.

(CO1)

(i) $(A \cup B)^c = A^c \cap B^c$,

(ii) $(A \cap B)^c = A^c \cup B^c$.

Where A^c and B^c denotes the complement of set A and B.

OR

b. Explain the Cartesian product of sets. If $A = \{1, 2, 3\}$ and $B = \{2, 3\}$, prove that $A \times B \neq B \times A$. Also find $n(A \times B)$.

(CO2)

Q4.

(10 Marks)

a. 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.

OR

b. 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.

Q5.

(10 Marks)

a. Define the following:

(CO2)

(i) Fibonacci sequence,

(ii) Ackermann's Function,

(iii) Characteristic function,

OR

b. List all possible functions $X = \{a, b, c\}$ to $Y = \{0, 1\}$ and indicate in each case whether the function is One-to-One and Onto. How many functions are there from X to Y and Y to X.

(CO2)