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# BCA-02

## June - Examination 2019

## BCA Pt. I Examination

## Discrete Mathematics

## Paper - BCA-02

**Time : 3 Hours ]** **[ Max. Marks :- 70**

**Note:** The question paper is divided into three sections A, B and C. Write answers as per given instructions.

### Section - A $7 \times 2 = 14$

(Very Short Answer Questions)

**Note:** Section 'A' contain 10 Very Short Answer Type Questions. Examinees have to attempt all questions. Each question is of 02 marks and maximum word limit is 30 words.

1) (i) Express the following set in Roster method: .
A - {x : x is a odd number between 10 to 20}.

(ii) Define Identity Relation.

(iii) Define binary number system.

(iv) Write the negation of the following statement: p:7 is a negative integer.

(v) Define predicates.

(vi) Define identity element for operation* in a set.

(vii) Define poset.

## Section - B $4 \times 7 = 28$

(Short Answer Questions)

**Note:** Section 'B' contain 08 Short Answer Type Questions. Examinees will have to answer any four (04) questions. Each question is of 7 marks. Examinees have to delimit each answer in maximum 200 words..

2) Out of 200 students, 70 play cricket, 60 play football, 25 play hockey, 30 play both cricket and football, 22 play both cricket and hockey, 17 play both football and hockey and 12 play all the three games. How many students do not play any one of the three games?

3) Show that if R is an equivalence Relation then $R^{-1}$ also equivalence Relation.

4) Solve:

   (i) $(25.625)_{10} = (?)_2$

   (ii) $(1010.011)_2 = (?)_{10}$

5) Using truth table, prove that
   $p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$

6) Prove that a group of order less than 5 is Abelian.

7) Prove that a non-zero finite integral domain is a field.

8) Simplify the three variable Boolean expression $\prod(1,2,4,7)$ using Boolean algebra.

9) Prove that an Boolean Algebra does not have exactly 3 distinct elements.

## Section - C $2 \times 14 = 28$

(Long Answer Questions)

**Note:** Section 'C contain 04 Long Answer Type Questions, Examinees will have to answer any two (02) questions. Each question is of 14 marks. Examinees have to delimit each answer in maximum 500 words..

10. If A, B and C are any sets then prove that
    (a) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
    (b) $A \cup (B \cup C) = (A \cap B) \cup (A \cap C)$
    (c) $(A \cup B)' = A' \cap B'$
    (d) $(A \cap B)' = A' \cup B'$

11. (a) Prove that following propositions are tautology:
    (i) $(p \wedge q) \rightarrow (p \vee q)$
    (ii) $\sim (p \rightarrow q) \rightarrow \sim q$

    (b) Prove that following propositions are fallacies:
    (i) $(p \wedge q) \wedge \sim (p \vee q)$
    (ii) $(p \vee q) \wedge (\sim p \wedge \sim q)$

12. (a) Prove that a ring is without zero divisors if and only if cancellation law holds good in it.
    (b) Prove that set $G = \{a + b\sqrt{2}; a, b \in Q\}$ is a commutative group for addition.

13. (a) Explain following computer codes
    (i) ASC II (ii) UNICODE
    (b) Prove that order of an element a of a group and order of its inverse are equal.