BCA-02

June - Examination 2017

BCA Pt. I Examination

Discrete Mathematics

Paper - BCA-02

Time : 3 Hours]   **[Max. Marks :- 100**

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

Section - A   **10 × 2 = 20**
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 thirty words.

1) (i) Express the following set in Roster method:
   A = { x : x is a odd month of the year }.

   (ii) Define Identity Relation.

   (iii) Define binary number system.

   (iv) Write the negation of the following statement:
   p:3 is a natural number.

   (v) Define fallacies.

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

(vii) Define poset.

(viii) Prove that If R is a ring with unity, then unity is unique.

(ix) Define a subgroup.

(x) Write De-Morgen's law for Boolean Algebra.

Section - B $4 \times 10 = 40$
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 10 marks. Examinees have to delimit each answer in maximum 200 words.

2) In a village of 1000 families it was found the 40% families have agriculture profession. 20% families have milk product profession and 10% families have other profession. If 5% families have both agriculture and milk product profession 3% have milk product and other profession and 4% have agriculture and other profession and 2% families have all these profession find the number of family which have

(i) Only agriculture profession.

(ii) Only milk product profession.

(iii) No profession.

3) If R is Relation $N \times N$ defined $(a, b) R (c, d) \Rightarrow ab = bc \forall (a, b)$ and $(c, d) \in N \times N$ then prove that R is equivalence relation.

4) Solve:

(i) $(2322)_8 = (?)_{10}$
(ii) $(233)_{10} = (?)_2$
(iii) $(5C5)_{16} = (?)_2$
(iv) $(101010010001)_2 = (?)_{16}$

5) Using truth table, prove that

   $p \longleftrightarrow q \equiv (p \to q) \wedge (q \to p)$

6) Prove that dual of a lattice is again a lattice.

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

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

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

Section - C $2 \times 20 = 40$
### 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 20 marks. Examinees have to delimit each answer in maximum 500 words.

10) (a) Prove that following propositions are tautology:

   (i) $(p \wedge q) \to (p \vee q)$

   (ii) $\sim (p \to q) \to \sim q$

   (b) Prove that following propositions are fallacies:

   (i) $(p \wedge q) \wedge \sim (p \vee q)$

   (ii) $(p \vee q) \wedge (\sim p \wedge \sim q)$

11) (a) Prove that a Boolean algebra with 3 distinct elements is not possible.

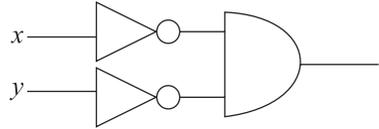   (b) Prove that union of two subgroups is a subgroup if and only if one is contained in other.

12) (a) Draw the logic circuit for Boolean expression
$E(x, y, z) = (x + y)(y + z)(z + x)$.

(b) Show that the logic circuits (a) and (b) shown in figure are equivalent.
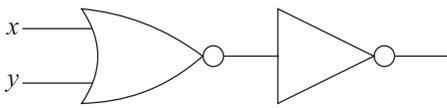
(a)   (b)

13) (i) Explain following computer codes

(a) ASC II

(b) UNICODE

(ii) Prove that If A, B and C are any sets then

(a) $(A \cup B)' = A' \cap B'$

(b) $(A \cap B)' = A' \cup B'$

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