BCA-02

December - Examination 2018

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. Use of calculator is allowed in this paper.

Section - A **$10 \times 2 = 20$**

(Very Short Answer Type 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:

$A = \{x : x \text{ is even number} < 15\}$

(ii) Define reflexive relation.

(iii) Define decimal number system.

(iv) Write the negation of the following statement:

P: Neeraj is a intelligent boy.

(v) Define contradiction.

(vi) Define monoid.

(vii) Define order of an element in a group.

(viii) Define Boolean Algebra.

(ix) Define normal subgroup.

(x) Write absorption law for Boolean Algebra.

Section - B **$4 \times 10 = 40$**

(Short Answer Type 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 that 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) Prove the relation R defined on any non-void set A as $(a, b) \in R \Leftrightarrow a \geq b$ is partial order relation.

4) Solve:

(i) $(375)_8 = (?)_{10}$

(ii) $(876)_{10} = (?)_2$

(iii) $(1C4)_{16} = (?)_2$

(iv) $(1101000111)_2 = (?)_{16}$

5) Construct truth table of $(p \rightarrow q) \wedge \sim q \rightarrow \sim p$

6) If a, b, c, d are elements of lattice $(A, \leq)$ such that $a \leq b$ and $c \leq d$ then Prove that $a \vee c \leq b \vee d$

7) Prove that set $G = \{1, -1, i, -i\}$ is cyclic group for multiplication of complex numbers.

8) Prove that any non-empty subset H of a group G is subgroup of G if and only if $a \in H, b \in H \Rightarrow ab^{-1} \in H$.

9) Prove that every finite integral domain is a field.

Section - C **2 × 20 = 40**

(Long Answer Type 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) (i) Find conjunctive normal form (C.N.F.) of given function $f(x_1, x_2, x_3) = (x_1 + x_2 + x_3) . (x_1 . x_2 + x'_1 . x'_3)$

(ii) Find disjunctive normal form (D.N.F.) of given function $f(x_1, x_2, x_3) = (x_1 + x_2 + x_3) . (x_1 .. x_2 + x'_1 . x_3)'$

11) (i) If A, B and C are any sets then prove that

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

(ii) Explain following computer codes.

(a) ASC II

(b) UNICODE

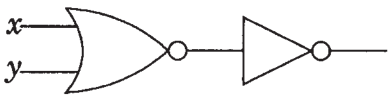
12) Prove that

(i) $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \vee r)$

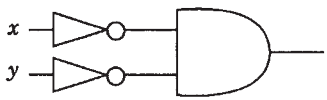
(ii) $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$

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

(a)



(b)



(ii) State and prove Lagrange's theorem for subgroups.