BCA-02

December - 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.

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:

$A = \{ x : x \text{ is a prime number} < 10\}$.

(ii) Define Cartesian product of sets.

(iii) Define binary number system.

(iv) Write the negation of the following statement:

p:5 is a prime number.

(v) Define Tautology.

(vi) Define identity element.

(vii) Define Cyclic group.

(viii) Define Boolean Algebra.

(ix) Define integral domain.

(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) question. Each question is of 10 marks. Examinees have to delimit each answer in maximum 200 words.

2) A survey shows that 63% of Indians like cheese where 76% like apples. If x% of Indian like both cheese and apples find the value of x.

3) Prove that 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) $(156)_8 = (?)_{10}$

(ii) $(296)_{10} = (?)_2$

(iii) $(5C5)_{16} = (?)_2$

(iv) $(10111010001)_2 = (?)_{16}$

5) Using truth table, prove that

$p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p)$

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 $G = \{1, \omega, \omega^2\}$ is cyclic group for multiplication of complex numbers where $1, \omega, \omega^2$ are cube roots of unity.

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

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

Section - C $\quad 2 \times 20 = 40$

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

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

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

11) Prove that

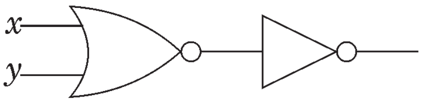
(i) $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \vee r)$

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

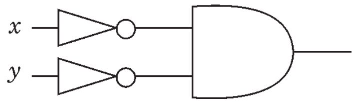
12) (i) Prove that finite commutative ring without zero divisors is a field.

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

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



(a)



(b)

(ii) Explain following computer codes.

a) ASC II

b) UNICODE