BCA-02

June - 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 × 2 = 20**

(Very Short Answer Type Questions)

Note: Section 'A' contains 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) Define symmetric difference of two sets.

(ii) Define Identity Relation.

(iii) Define octal number system.

(iv) Write the negation of the following statement:

p: leap year has 366 days.

(v) Define dual of a poset.

(vi) Prove that if G is a group then identity element of G is unique.

(vii) Define normal subgroup.

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

(ix) Draw an exclusive OR gate (XOR gate).

(x) Write Idempotent law for Boolean Algebra.

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

(Short Answer Type Questions)

Note: Section 'B' contain 08 very 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 2000 families it was found that 800 families read Times of India. 400 families read Hindustan Times and 200 families read other news paper. If 100 families read both Times of India and Hindustan Times 60 families read Hindustan Times and other news paper and 80 familes read Times of India and other news paper and 40 families read all these news paper find the number of family which read.

(i) Only Times of India

(ii) Only Hindustan Times

(iii) No News paper

3) If R is Relation on set of integers defined by $aRb \Leftrightarrow (a-b)$ is an even integer then prove that R is equivalence relation.

4) Solve:

(i) $(4567)_8 = (?)_{10}$

(ii) $(957)_{10} = (?)_2$

(iii) $(4C5)_{16} = (?)_2$

(iv) $(101010010001)_2 = (?)_{16}$

5) Construct truth table of $(p \wedge q) \vee (\sim q \wedge r)$.

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

7) If in a group each element is inverse of itself then prove that group is an Abelian group.

8) Prove that $(Z_5, +_5, \times_5)$ is an integral domain, where $Z_5 = \{0, 1, 2, 3, 4\}$.

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

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) Prove that following propositions are tautology:

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

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

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

(iv) $((p \to q) \wedge (q \to r)) \to (p \to r)$

11) (i) Find conjunctive normal form (C.N.F) of given function.

$$f(x) = [(x_1 + (x'_1 + x'_2)'].\ [(x_1 + (x'_2 . x'3)]$$

(ii) Find disjunctive normal form (D.N.F) of given function.

$$f(x_1, x_2, x_3) = [x_1 . + (x'_1 + x_2)'].[x_1 . + (x'_2 + x'_2)']$$

12) (i) For any sets A, B and C prove that $(A \cup B) \cup C = A \cup (B \cup C)$

(ii) Prove that in a group order of an element and order of its inverse are equal.

13) Explain the following

(i) NOT function using NOR gate

(ii) OR function using NAND gate

(iii) AND function using NOR gate

(iv) NOR function using NAND gate