BCA-02

June - Examination 2026
BCA (Part-I) Examination
Discrete Mathematics
Paper : BCA-02

[*Time:* ***3*** *Hours*] [*Maximum Marks:* ***70***]

Note :- The question paper is divided into three Sections A, B and C. Write answers as per the given instructions in each section. Use of calculator is allowed in this paper.

Section-A **7×2=14**

(Very Short Answer Type Questions)

Note :- Answer **all** questions. As per the nature of the question delimit your answer in one word, one sentence or maximum up to **30** words. Each question carries **2** marks.

1. (i) Express the following set in Roster method:

   A = {x : x is month of year having 31 days}.

   (ii) Define Equivalence Relation.

   (iii) Define intersection of two sets.

   (iv) Write the negation of the following statement:

   p:2026 is a leap year.

   (v) Give an example of finite Abelian group.

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

   (vii) Define poset.

Section-B **4×7=28**

(Short Answer Type Questions)

Note :- Answer **any four** questions. You have to delimit your each answer maximum up to **200** words. Each question carries **7** marks.

2. A survey shows that 63% of Indians like cheese where 76% like apples. If x% of Indian like both cheese and apples, then 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) $(4567)_8 = (?)_{10}$
   (ii) $(957)_{10} = (?)_2$
   (iii) $(4C5)_{16} = (?)_2$
   (iv) $(101010010001)_2 = (?)_{16}$

5. Using truth table, prove that -

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

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

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. In a Boolean Algebra B, show that a = b if and only if ab' + a'b = 0.

Section-C **2×14=28**

(Long Answer Type Questions)

Note :- Answer **any two** questions. You have to delimit your each answer maximum up to **500** words. Each question carries **14** marks.

10. (a) Find Conjunctive Normal Form (CNF) of given function.

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

(b) Find Disjunctive Normal Form (DNF) of given function.

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

11. (a) Prove that a ring is without zero divisors if and only if cancellation law holds good in it.

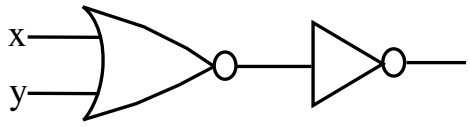
(b) Prove that set $G = \{a + b\sqrt{2}; a, b \in Q\}$ is a commutative group for addition.

12. (a) Explain following computer codes -

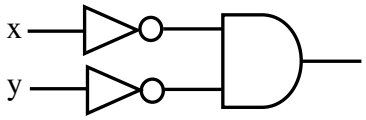
(i) ASCII (ii) UNICODE

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

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



(a)



(b)

(b) Prove that -

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