

10. Write short notes on the following computer codes :

- (i) ASCII
- (ii) EBCDIC
- (iii) UNICODE
- (iv) BCD

11. If  $a, b, c$  are arbitrary elements of lattice  $(A, \leq)$ , then prove that :

- (i) If  $a \leq b$ , then  $a \wedge b = a$
- (ii)  $a \vee a = a$
- (iii)  $a \vee b = b \vee a$
- (iv)  $a \vee (a \wedge b) = a$
- (v)  $a \vee (b \vee c) = (a \vee b) \vee c$

12. Prove that

$$R = \{m+n\sqrt{2} \mid m, n \in Z\}$$

together with ordinary addition and multiplication is a commutative ring with unity.

13. Explain the following :

- (a) NAND function using NOR gate
- (b) NOT function using NOR gate
- (c) OR function using NOR gate
- (d) AND function using NOR gate

## BCA-02

December – Examination 2023  
**BCA (Part-I) Examination**  
**DISCRETE MATHEMATICS**  
**Paper : BCA-02**

*Time : 3 Hours ]*

*[ Maximum Marks : 100*

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

### Section-A

2×10=10

#### (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 form :

$$A = \{x : x \text{ is day of week}\}$$

(ii) Define Intersection of two sets.

- (iii) Define Binary Number System.
- (iv) Write the negation of the following statement :  
 $p$  : Discrete Mathematics is not a branch of Mathematics.
- (v) Give an example of finite Abelian group.
- (vi) Define cyclic group.
- (vii) Define Equivalence relation.
- (viii) Define Integral domain.
- (ix) Define Boolean lattice.
- (x) Draw a NAND gate.

**Section-B** **4×10=40**

**(Short Answer Type Questions)**

**Note** :- Answer any *four* questions. Each answer should not exceed **200** words. Each question carries 10 marks.

2. Solve :

(i)  $(12345)_{10} = (?)_{16}$

(ii)  $(30071)_8 = (?)_2$

3. Solve :

(i)  $(00101001)_2 \times (00000110)_2 = (?)_2$

(ii)  $(10000111)_2 \times (00000101)_2 = (?)_2$

- 4. Out of 200 students, 70 play cricket, 60 play football, 25 play hockey, 30 play both cricket and football, 22 play both cricket and hockey, 17 play both football and hockey and 12 play all the three games. How many students do not play any one of the three games ?
- 5. Using truth table, prove that :

$$p \rightarrow q \Leftrightarrow (\sim p \vee q)$$

- 6. Prove that inverse of an equivalence relation is also an equivalence relation.
- 7. Prove that intersection of 2 normal subgroups of a group is a normal subgroup of that group.
- 8. Prove that every commutative ring without zero divisor is a field.
- 9. Prove that binary relation ' $\leq$ ' is an partial order relation on Boolean algebra  $(B, +, ', 0, 1)$ .

**Section-C** **2×20=40**

**(Long Answer Type Questions)**

**Note** :- Answer any *two* questions. You have to delimit your each answer maximum up to **500** words. Each question carries 20 marks.