

BCA-02

June - Examination 2016

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. Write answer as per the given instructions.

Section - A**10 × 2 = 20**

(Very Short Answer Questions)

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

- 1) (i) Write the names of different types of number system?
- (ii) Explain sub sets?
- (iii) What is contradiction?
- (iv) Explain Domain and Range of Relation with example.
- (v) What is Poset?
- (vi) Define the term Injective function.
- (vii) Write the elementary properties of groups?

- (viii) What is Rings?
- (ix) Explain the Duality principle in Boolean algebra.
- (x) Explain the XNOR gate?

Section - B

4 × 10 = 40

(Short Answer Questions)

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

- 2) Explain the subtraction of binary No by 2's complement method with example.
- 3) Describe the Laws of algebra of sets?
- 4) Make the Truth Table for the following:
 $(p \leftrightarrow q) \leftrightarrow (q \leftrightarrow r)$
- 5) What is inverse Relation? Explain with example.
- 6) Draw Hasse diagram of the poset (A, \leq) where $A = \{1, 2, 3, 4\}$; aRb if $a|b$
- 7) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ and $g : \mathbb{R} \rightarrow \mathbb{R}$ be two function such that $f(x) = x-1$, $g(x) = x/2$ then find $f \circ g$ and $g \circ f$?
- 8) Let f be a homomorphism from a group G into a group G^1 then the following are true
 - (i) $f(e) = e^1$, where e and e^1 are identities of G and G^1 respectively.
 - (ii) $f(a^{-1}) = [f(a)]^{-1}$ for all a in G .
- 9) A subgroup N of a group G is normal in G if and only if $xN = Nx$, for each $x \in G$

Section - C**2 × 20 = 40**

(Long Answer Questions)

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

10) Perform the following conversions.

(i) $(475)_{10} = (?)_2 = (?)_8 = (?)_{16}$

(ii) $(110111)_2 = (?)_{10} = (?)_8 = (?)_{16}$

(iii) $(765)_8 = (?)_{10} = (?)_2 = (?)_{16}$

(iv) $(FIC)_{16} = (?)_{10} = (?)_8 = (?)_2$

11) Describe following terms, with suitable example.

(i) Domain and Range of Relation

(ii) Inverse Relation

(iii) Reflexive Relation

(iv) Symmetric Relation

(v) Transitive Relation

(vi) Anti-symmetric Relation

(vii) Equivalence Relation

12) Write the negation of following statements.

(i) If it is humid, then he wears cotton shirt but no cap.

(ii) If he makes money, then he will purchase a car or airship.

(iii) He plays only if the weather is cold.

(iv) If it rains, then he does not wear rain coat.

13) (i) Transform the following Boolean expression into sum of products.

(a) $x_1x_2 + x_1x_2^1(x_1^1x_3^1)^1$

(b) $[(x_1x_2)^1x_3]^1 \cdot [(x_1^1 + x_3)(x_2^1 + x_3^1)]^1$

(ii) Transform the following Boolean functions into conjunctive normal form.

(a) $E(x_1, x_2, x_3) = x_1(x_1 + x_2)(x_1 + x_2 + x_3)$

(b) $E(x_1, x_2, x_3) = (x_1 + x_2)(x_2 + x_3)(x_1 + x_3)$
