Roll No.

BCA-05

Discrete Mathematics

Bachelor of Computer Applications (BCA-11/16/17)

Second Semester, Examination, 2018

Time : 3 Hours

Max. Marks: 80

Note: This paper is of eighty (80) marks containing three
(03) Sections A, B, C. Attempt the questions contained in these Sections according to the detailed instructions given therein.

Section-A

(Long Answer Type Questions)

- **Note :** Section 'A' contains four (04) long answer type questions of nineteen (19) marks each. Learners are required to answer *two* (02) questions only.
- (a) What do you understand by Venn diagram ? Explain every law of algebra of set using Venn diagram.
 - (b) How many reflexive relations and symmetric relations are there on a set of n elements ? Explain with proper example.

- 2. (a) Define functions. What are the various properties of functions ?
 - (b) Prove that the inverse of each element of a group is unique.
- 3. (a) What are the various operations on matrices ? Explain each type with a suitable example.
 - (b) In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together ?
- 4. Express the statements as logical expressions :
 - (a) If I will study I will get a good job.
 - (b) Any integer is either positive *or* negative.
 - (c) All students in this class are intelligent.
 - (d) All men are mortal.

Section-B

(Short Answer Type Questions)

- **Note :** Section 'B' contains eight (08) short answer type questions of eight (08) marks each. Learners are required to answer *four* (04) questions only.
- 1. Explain tautologies, contradictions and logical equivalence in context of Diserete Mathematics.
- 2. Explain Cramer's rule using suitable example.
- 3. In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and women ?

- 4. Find the number of positive integral solutions to the equation x + y + z = 10.
- 5. Prove that :

$$A + (B + C) = (A + B) + C$$

 $A + (A \cdot B) = A$

- 6. What is Integral domain and fields ? Explain the basic properties of integral domain and fields.
- 7. Let $A = \{a, b, c\}$. Describe all partial order relations on A.
- 8. Prove that Elementary row operations do not change the row space of a matrix.

Section-C

(Objective Type Questions)

- **Note :** Section 'C' contains ten (10) objective type questions of one (1) mark each. All the questions of this Section are compulsory.
- 1. Power set of empty set has exactly subset.
 - (a) One
 - (b) Two
 - (c) Zero
 - (d) Three
- 2. Let Q (x) be the statement "x < 5". What is the truth value of the quantification $\forall x Q(x)$, having domains as real numbers

- [4]
- 3. If set C is $\{1, 2, 3, 4\}$ and C D = Φ then set D can be :
 - (a) $\{1, 2, 4, 5\}$
 - (b) $\{1, 2, 3\}$
 - (c) $\{1, 2, 3, 4, 5\}$
 - (d) None of the mentioned
- 4. ~ A v ~ B is logically equivalent to :
 - (a) $\sim A \rightarrow \sim B$
 - (b) $\sim A \wedge \sim B$
 - (c) $A \rightarrow \sim B$
 - (d) $B \lor A$
- 5. A function is said to be if and only if f(a) = f(b) implies that a = b for all a and b in the domain of f.
 - (a) One-to-many
 - (b) One-to-one
 - (c) Many-to-many
 - (d) Many-to-one
- 6. The set O of odd positive integers less than 10 can be expressed by
 - (a) $\{1, 2, 3\}$
 - (b) $\{1, 3, 5, 7, 9\}$
 - (c) $\{1, 2, 5, 9\}$
 - (d) $\{1, 5, 7, 9, 11\}$

- 7. The Inverse exist only for non-singular matrices.
 - (a) True
 - (b) False
- 8. The set of positive integers is
 - (a) Infinite
 - (b) Finite
 - (c) Subset
 - (d) Empty
- 9. For a skew symmetric even ordered matrix A of integers, which of the following will not hold true ?
 - (a) det(A) = 9
 - (b) det(A) = 81
 - (c) det(A) = 7
 - (d) det(A) = 4
- 10. For matrix A if $AA^{T} = I$, I is identity matrix then A is :
 - (a) Orthogonal matrix
 - (b) Nilpotent matrix
 - (c) Idempotent matrix
 - (d) None of the mentioned