

BCA-05**Discrete Mathematics**

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

Second Semester Examination 2019

Time : 3 Hours**Maximum Marks : 80**

Note : This paper is of Eighty (80) marks divided into three (03) sections A,B and 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 any two (02) questions only. (2x19=38)

1. A). Suppose R and S are relations on set A. Prove that if R and S are transitive then $R \cap S$ is also transitive.
B). What is Relation.Explain equivalence relation & partial order relation with example.
2. A). Define Boolean algebra. What are the main difference between Boolean algebra and algebra of real numbers.
B). Define Ring. Explain the basic properties of Ring.
3. Express the statements as logical expressions:
A). Every student spends more than 5 hours every weekday in class.
B). Any integer is either positive or negative.
C). Some students are clever.
D). All men are mortal.

- 4 A). What are the various types of matrices? Explain each type with a suitable example.
- B). In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?

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. (4x8=32)

1. Show that the relation $(x,y)R(a,b)$ such that $x^2+y^2=a^2+b^2$ is an equivalence relation on the plane and describe the equivalence classes.
2. Prove that the composition of any function with the identify function is the function itself.
3. Find the number of positive integral solutions to the equation $x+y+z=10$.
4. Explain Pigeonhole principle in detail.
 - a) $A+(B+C)=(A+B)+C$
 - b) $A+(A.B)=A$
5. Prove that every field is an integral domain.
6. Let $A= \{A,B,C\}$. Describe all partial order relations on A.
7. Define counting principle. If there are 36 boys and 24 girls in a class, find the number of ways of selecting one student as class representative.
8. Explain Gauss elimination scheme using suitable example.

Section –C

(Objective Type Questions)

Note : Section 'C' contains ten (10) objective - Type questions of one (01) mark each. All the questions of this section are compulsory. (10X1=10)

1. Domain of a function is:
 - a) The maximal set of numbers for which a function is defined
 - b) The maximal set of numbers which a function can take values
 - c) It is set of natural numbers for which a function is defined
 - d) None of the mentioned

2. State whether the given statement is true or false
Codomain is the subset of range.
 - a) True
 - b) False

3. The truth value of given statement is
'If 9 is prime then 3 is even'.
 - a) False
 - b) True

4. What is the dual of $(A \wedge B) \vee (C \wedge D)$?
 - a) $(A \vee B) \vee (C \vee D)$
 - b) $(A \vee B) \wedge (C \vee D)$
 - c) $(A \vee B) \vee (C \wedge D)$
 - d) $(A \wedge B) \vee (C \vee D)$

5. Which of the following satisfies commutative law?
 - a) \wedge
 - b) \vee
 - c) \leftrightarrow
 - d) All of the mentioned

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 Cartesian Product $B \times A$ is equal to the Cartesian product $A \times B$. Is it True or False?
- a) True
 - b) False
8. The set of positive integers is _____
- a) Infinite
 - b) Finite
 - c) Subset
 - d) Empty
9. A Symmetric matrix is a one in which
- a) All diagonal elements are Zero
 - b) All diagonal elements are 1
 - c) $A=A^T$
 - d) $A=-A^T$
10. For matrix A if $AA^T=I$ is identity matrix then A is:
- a) Orthogonal matrix
 - b) Nilpotent matrix
 - c) Idempotent matrix
 - d) None of the mentioned
