Paper Code : 21307

F–407

B. C. A. (Second Semester) EXAMINATION, 2019

(New Course)

Paper No. BCA—N– 202

DISCRETE MATHEMATICS

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

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Explain duality conditional and in-conditional statements.

   (b) Explain conditional and bi-conditional operators, with an example.

2. Simplify the following Boolean function :

$$F(A, B, C, D) = \Sigma(0, 1, 2, 8, 9, 10)$$

in :

(i) Sum of products form

(ii) Product of sum form

(iii) Give implementation of the function using gates.

(iv) Construct truth table also.

3. (a) Define the terms with respect to graph : Graph, path, cycle, tree, distance.

   (b) What is the shortest path problem ? Write down the Dijkstra's algorithm.

4. (a) Consider A = B = C = R and Let $f : A \to B$ and $g : B \to C$ be defined by $f(x) = x + 9$ and $g(y) = y^2 + 3$. Find the following composition function :
   (i) $f \circ f$
   (ii) $f \circ g$
   (iii) $g \circ f$

   (b) Explain injective, surjective and bijective functions with an example.

5. (a) Consider a relation R defined by X = Y (mode) 5 on set N. Find out the equivalence classes of R.

   (b) Prove Intersection of sets is distributive w. r. t. Union sets.

6. (a) Give difference between equivalence relation and partial order relation using proper example.

   (b) Show that A Subset B implies that union (B – A) = 0.

7. (a) State the modus tollens rule and prove that it is valid.

   (b) What are the planner graphs ?

8. Write short notes on any *four* of the following :
   (i) Propositional logic connectives
   (ii) K-map technique
   (iii) Permutation function
   (iv) Types of relation
   (v) Use of function in coding theory