Roll No. : .....

Total No. of Questions : **10**] [Total No. of Printed Pages : **3**

BC–274

B.C.A. (Part–III) DUE Part–II Examination, 2021

DISCRETE MATHEMATICS

Paper - BCA–205

*Time : **1½** Hours*] [*Maximum Marks : **50***

Note :– Attempt *five* questions in all, selecting *one* question from each Unit. All questions carry equal marks.

Unit–I

1. (a) Explain the concept of conditional and bi-conditional statements with truth tables and suitable examples. 5

   (b) What are the negations of the following statements :

   (i) $\forall x\ (x^2 > x)$

   (ii) $\exists x\ (x^2 = 2)$ 2½+2½=5

Or

2. (a) Show that the following are logically equivalent :

   (i) $7\ \forall x(P(x) \rightarrow Q(x))$

   (ii) $\exists x(P(x) \wedge 7\ Q(x))$ 2½+2½=5

(b) Describe the concept of universal and existential quantifiers with suitable examples. 5

Unit–II

3. Prove the following using mathematical induction :

$n^3 - n$ is divisible by 3 whenever n is a positive integer. 10

Or

4. (a) Find the GCD of 2740 and 1760 using Euclidean algorithm.

(b) Describe congruence modulo relation with suitable example. 5,5

Unit–III

5. (a) What are the *three* properties of an equivalence relation ? Take a relation and explain how will you check it for equivalence.

(b) Explain the concept of partial ordering relation with suitable example. 5,5

Or

6. Describe the following with suitable examples :

(a) Power Set

(b) Empty Set

(c) Venn Diagram

(d) Composition of Relations

Unit–IV 2½×4=10

7. (a) Explain the procedure to find the sum of products of a function corresponding to given logic gates.

(b) Draw the logic circuit for the following expression :

$$(A + B)[C \cdot (\bar{A} + \bar{B})]$$

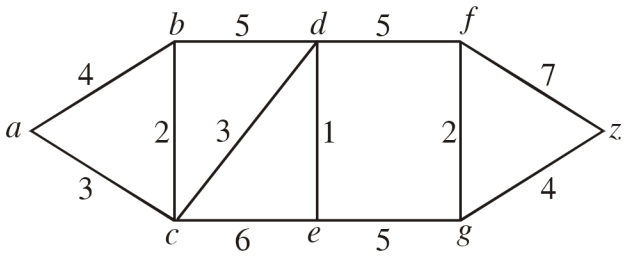
5,5

Or

8. Explain the concept of Boolean algebra as lattices with suitable examples. 10

Unit–V

9. Find the length of a shortest path between a and z in the following weighted graph :



10

Or

10. Describe the following with suitable examples :

(a) Graph coloring of a graph

(b) Representation of a graph in computer memory

(c) Isomorphic Graphs

(d) Multigraphs

2½×4=10