Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

Roll No .....

CS/IT-224-CBCS

B.E. III Semester

Examination, June 2020

Choice Based Credit System (CBCS)

Discrete Structure

Time : Three Hours

Maximum Marks : 60

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) If U is a universal set and its two subsets A and B, then prove that $(A \cup B)' = A' \cap B'$

   b) Show that the set Q of rational numbers is countable.

2. a) Show that

   $[(p \wedge q) \Rightarrow p] \Rightarrow (q \wedge \sim q)$ is a contradiction.

   b) Show that the language

   $L = \{a^m : m = i^2, i \geq 1\}$ is not a finite state

3. Define eulerian path and circuit of a graph with an example for each. State the necessary and sufficient conditions for existence of an Eulerian path in connected graph.

4. a) Prove :

   i) $A \times (B \cap C) = (A \times B) \cap (A \times C)$

   ii) $A \times (B \cup C) = (A \times B) \cup (A \times C)$

   b) Explain Pigeonhole principle with an example.

5. a) Test the validity of argument:

   if it rains, Ram will be sick
   it did not rain
   ∴ Ram was not sick

   b) Explain universal and existential qualifiers with example

6. Define the following with examples:
   i) Multigraph ii) Isomorphic graphs
   iii) Eulerian graph

7. a) Prove that the set
   $G = \{... -4m, -3m, -2m, -m, 0, m, 2m, 3m, 4m...\}$
   of multiples of integers by a fixed integer m is a group with respect to addition.
   b) Discuss ring and field with example.

8. Write short notes on :
   a) Hasse diagram
   b) Lattices
   c) Binomial theorem
   d) Permutations

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