Roll No ....

CS/IT-3005-CBGS
B.E. III Semester
Examination, June 2020
Choice Based Grading System (CBGS)
Discrete Structure
Time : Three Hours

Maximum Marks : 70

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
    _____

    $\therefore$ 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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