Code No.: DS402PC

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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Supply) - July- 2024
DISCRETE MATHEMATICS
(Common to CSC, CSD, AI&DS)

[Time: 3 Hours]   [Max. Marks: 70]

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A   (20 Marks)

1. a) What is tautology and contradiction? Draw the truth table for the both.   [2M]
   b) What is quantifier?   [2M]
   c) Discuss singleton set.   [2M]
   d) What is the power set of the empty set?   [2M]
   e) Write the properties of an algorithm.   [2M]
   f) What is recursive algorithm?   [2M]
   g) What is recurrence relation? Give an example.   [2M]
   h) What is the probability that when two dice are rolled, the sum of the numbers on the two dice   [2M]
      is 7?
   i) Write different types of graphs.   [2M]
   j) Define spanning tree.   [2M]

PART-B   (50 Marks)

2. Write the rules of inference for quantified statements. Using these rules provide the solution   [10M]
   for the premise "Everyone in this discrete mathematics class has taken a course in computer
   science" and "Marla is a student in this class" imply the conclusion "Marla has taken a course
   in computer science."

OR

3. What is nested quantifier? Let P (x, y) be the statement "x + y = y + x." What are the truth   [10M]
   values of the quantifications $\forall x \forall y$ P (x, y) and $\forall y \forall x$ P (x, y) where the domain for all
   variables consists of all real numbers?

4. Use set builder notation and logical equivalences to establish the first De Morgan law $\overline{A \cap B}$ [10M]
   $= \overline{A} \cup \overline{B}$.

OR

5. Write the properties of relation. How many reflexive relations are there on a set with n   [10M]
   elements?

6. Use the bubble sort to sort d, f, k, m, a, b, showing the lists obtained at each step.   [10M]

OR

7. Perform binary search on the following list of elements with searching element as 65.   [10M]
   15, 27, 36, 49, 59, 65, 81

8. What is the probability that a poker hand contains a full house, that is, three of one kind and [10M] two of another kind?

OR

9. Write in detail about divide-and-conquer algorithms. [10M]

10. Find a shortest path using dijkstra's algorithm with an example. [10M]

OR

11. What is the value of the prefix expression $+ - * 2\ 3\ 5/ \uparrow 2\ 3\ 4$? Write the prefix evaluation [10M] steps.

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