Code No.: CS305PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: HYDERABAD
UGC AUTONOMOUS
II–B. TECH–I–Semester End Examinations (Regular) - January- 2022
DISCRETE MATHEMATICS
(Common to CSE, IT & CSM)

[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) Define compound proposition. [2M]
   b) Find the conjunction of the propositions p and q where p is the proposition "Rebecca's PC has more than 16 GB free hard disk space" and q is the proposition "The processor in Rebecca's PC runs faster than 1 GHz." [2M]
   c) Explain One-to-One and Onto Functions. [2M]
   d) What are a_1, a_2, and a_3? Where $\{a_n\}$ be a sequence that satisfies the recurrence relation $a_n = a_{n-1} + 3$ for n = 1, 2, 3..., and suppose that $a_0 = 2$. [2M]
   e) Define Sorting. [2M]
   f) Demonstrate an algorithm for finding the maximum (largest) value in a finite sequence of integers. [2M]
   g) Find the probability that a hand of five cards in poker contains four cards of one kind. [2M]
   h) Explain Divide-and-Conquer Recurrence Relation. [2M]
   i) Explain the mixed graph. [2M]
   j) What are the applications of trees? [2M]

PART-B (50 Marks)

2. What is the truth value of $\exists x P(x)$, where P (x) is the statement "$x_2 > 10$" and the universe of discourse consists of the positive integers not exceeding 4? [10M]

OR

3. Show that $\neg (p \vee q)$ and $(\neg p \wedge \neg q)$ is logically equivalent. [10M]

4. Is f invertible? Let f be the function from R to R with $f(x) = x^2$. [10M]

OR

5. What is (A ∪ B ∪ C) and (A ∩ B ∩ C)? Let A = {0, 2, 4, 6, 8}, B = {0, 1, 2, 3, 4}, and C = {0, 3, 6, 9}. [10M]

6. Describe an algorithm for finding the smallest integer in a finite sequence of natural numbers. [10M]

OR

7. Show that $7x^2$ is $O(x^3)$. Is it also true that x^3 is $O(7x^2)$? [10M]

8. A sequence of 10 bits is randomly generated. What is the probability that at least one of these bits is 0? [10M]

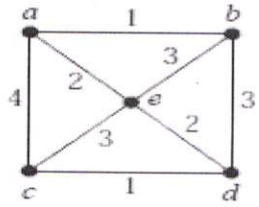
OR

9. Find an explicit formula for the Fibonacci numbers using generating functions. [10M]

10. Show that a simple graph that has a circuit with an odd number of vertices in it cannot be colored using two colors. [10M]

OR

11. Find a minimum spanning tree for the weighted graph. [10M]



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