

Code: 19DF11T

M.C.A. I Semester Supplementary Examinations November 2022

Mathematical Foundations of Computer Science

Max. Marks: 60

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x12 = 60 Marks)

Marks CO BL

UNIT-I

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|---|----|-----|----|
| 1. a) Define Statement and Explain various types of Statements with Examples | 6M | CO1 | L3 |
| b) Prove the validity of the following argument. "If I get the job and work hard, then I will get promoted. If I get promoted, then I will be happy. Therefore, either I will not get the job or I will not work hard." | 6M | CO1 | L2 |

OR

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|--|----|-----|----|
| 2. a) Define Predicate Statement and explain all the Quantifiers with the help of examples | 6M | CO1 | L3 |
| b) Establish the validity of the following arguments.
$\exists x (p(x) \wedge q(x))$
$\forall x (p(x) \rightarrow r(x))$

$\therefore \exists x (r(x) \wedge \neg q(x))$
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UNIT-II

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|--|----|-----|----|
| 3. a) Define and Explain various types of Relations with their Properties | 6M | CO2 | L3 |
| b) Explain the properties of the relation R, Given $S=\{1,2,3,..,10\}$ and a relation R on S where $R = \{(x,y) / x+y =10\}$ | 6M | CO2 | L4 |
| OR | | | |
| 4. a) Define Lattice and Explain the various properties of lattices. | 6M | CO2 | L3 |
| b) Define Hasse Diagram and Draw the Hasse diagram for all the positive divisors of 36 where the relation is x divides y | 6M | CO2 | L3 |

UNIT-III

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|---|----|-----|----|
| 5. a) In how many ways can the 26 letters of the English alphabet be permuted So that none of the patterns CAR , DOG , PUN or BYTE occurs | 6M | CO3 | L1 |
| b) How many 8 digit numbers can be formed by arranging the digits 1, 1, 1, 1, 2, 3, 3, 3? | 6M | CO3 | L1 |

OR

6. a) State and prove principle of inclusion-exclusion for two sets with the help of example. 6M CO3 L4
- b) Define and Explain Pigeon-Hole Principles and its Application. 6M CO3 L3

UNIT-IV

7. a) Find the generating function for the sequence 1, 3, 5, 7, 9.....? 4M CO4 L4
- b) Find the generating function $G(n)$ for $F_n=5F_{n-1}+6 F_{n-2}$ where $F_0=1$ and $F_1=4$. 8M CO4 L4

OR

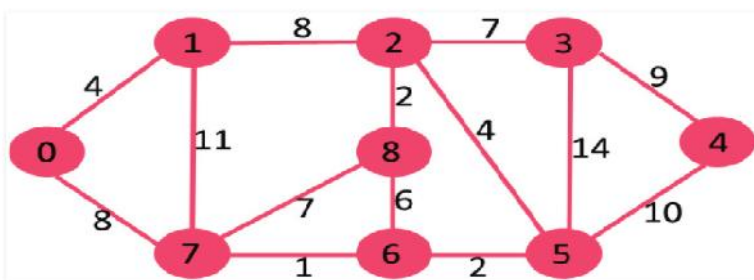
8. a) Find the generating function for the sequence 1, 1, 1, 1, 1, 1...? 4M CO4 L4
- b) Solve the recurrence relation $a_n + a_{n-1} - 6a_{n-2} = 0$ for $n \geq 2$ given that $a_0 = -1$ and $a_1 = 8$ 8M CO4 L3

UNIT-V

9. a) Define Graph and Explain the various types of representation of a Graphs. 6M CO5 L3
- b) Define the terms Eulers formula with the help of an example 6M CO5 L3

OR

10. a) Define Spanning Tree. 2M CO5 L3
- b) Draw the Spanning Tree by using Kruskals Algorithm for the given graph 10M CO5 L4



END