

II B. Tech I Semester Supplementary Examinations, July - 2022
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Com to CSE, CST, CSE, (AIML), AI, DS, CSE(AIDS), CSE(CS), IOTCSBT, CSBS, IOT, AIDS, AUML)

Time: 3 hours

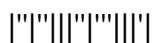
Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit

All Questions carry **Equal** Marks

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- 1 a) Prove or disprove the validity of the following arguments using the rules of inference. [7M]  
     All men are fallible  
     All kings are men  
     Therefore, all kings are fallible
- b) Show that the following statements is a tautology.  $(\sim P \wedge (P \rightarrow Q)) \rightarrow \sim Q$  [7M]
- Or
- 2 a) What is a Well Formed Formula? What are rules of the Well Formed Formulas? [7M]
- b) Obtain the PCNF of the following formula  $(\sim P \rightarrow R) \wedge (Q \rightarrow P)$  [7M]  
     (i) Using Truth Table. (ii) Without using Truth Table
- 3 a) Prove that a relation on a set A is symmetric if and only if  $R = R^{-1}$ ? [7M]
- b) Prove that If  $f : A \rightarrow B$  and  $g : B \rightarrow C$  are bijective functions then [7M]  
 $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$
- Or
- 4 a) Prove that  $H = \{0, 2, 4, \dots\}$  forms a sub group of  $\langle \mathbb{Z}_6, + \rangle$ . [7M]
- b) Let  $X = \{1, 2, 3, 4, 5, 6, 7\}$  and  $R = \{(x, y) / x - y \text{ is divisible by } 3\}$  in X. show that [7M]  
 R is an Equivalence Relation.
- 5 a) Discuss in brief about Eulers theorem. [7M]
- b) Find the number of positive integers less than are equal to 2076 and divisible by 3 or 4. [7M]
- Or
- 6 a) One type of automobile license plate number in Masachusetts consists of one [7M]  
 letter and five digits. Compute the number of such license plate numbers possible?
- b) There are four bus lines between A and B; and three bus lines between B and C. [7M]  
 In how many ways can a man travel (a) by bus from A to C by way of B?  
 (b) round trip by bus from A to C by way of B? (c) round trip by bus from A to C by way of B, if he does not want to use a bus line more than once?



- 7 a) Solve the recurrence relation  $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 3$  for  $n \geq 3$  [7M]  
b) Solve the Recurrence Relation  $n \geq 2 \forall n \geq 4, a_n = -8a_{n+1} - 6a_n - n^4$ , with initial conditions  $a_0=8$  and  $a_1=22$ . [7M]
- Or
- 8 a) Solve the Recurrence Relation  $a_n + 3a_{n-1} - 10a_{n-2} = n^2 + n + 1$  [7M]  
b) Solve the recurrence relation using generating function  $a_n - 4a_{n-1} = 0$  for  $n \geq 1$  where  $a_0=1$  [7M]
- 9 a) Define Minimum Spanning tree? Describe in brief about Kruskals algorithm with example. [7M]  
b) Define Graph? Explain in brief about representation of graphs. [7M]
- Or
- 10 a) Explain in brief about Four color problem. [7M]  
b) How many edges does a graph have if it has vertices of degree 4,3,3,2,2? Draw such a graph. [7M]

