

**R15**

Code No: 821AA

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****MCA I Semester Examinations, July/August - 2021****MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE****Time: 3 Hours****Max.Marks:75**

**Answer any five questions**  
**All questions carry equal marks**

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- 1.a) Prove by indirect method that  $(\neg Q), P \rightarrow Q, P \vee R \rightarrow R$   
b) What are the most common rules of inference? [7+8]
2. Write in the symbolic form and negate the following statements:  
a) Everyone who is rich can support charity.  
b) Some people are not appreciated by everyone.  
c) Everyone should help their friends, or their friends will not help them. [5+5+5]
- 3.a) Show that the relation of congruence modulo  $m$  has 'm' distinct equivalence classes.  
b) Let  $C$  be a collection of sets which are closed under intersection and union. Verify whether  $(C, \cup, \cap)$  is a lattice. [7+8]
- 4.a) Define monoid. Give examples.  
b) State the laws of Boolean algebra. [7+8]
- 5.a) How many words of length six over the alphabet  $\{a, b, c, d, e\}$  contain two a's, three b's and two c's.  
b) Find the number of ways the letters of the word MALAYALAM can be scrambled. [7+8]
6. State and explain pigeon-hole principle and explain its applications in detail. [15]
7. Solve the recurrence relation  $u_{n+2} - 5u_{n+1} + 6u_n = n$ . [15]
8. What is a spanning tree? What is minimum spanning tree? Explain Prim's algorithm for finding it with illustration. [15]

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