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Code No: 811AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA I Semester Examinations, July/August - 2021
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Time: 3 Hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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? [6+6]

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. [4+4+4]

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. [6+6]

4.a) Define monoid. Give examples.
b) State the laws of Boolean algebra. [6+6]

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. [6+6]

6. State and explain pigeon-hole principle and explain its applications in detail. [12]

7. Solve the recurrence relation $u_{n+2} - 5u_{n+1} + 6u_n = n$. [12]

8. What is a spanning tree? What is minimum spanning tree? Explain Prim's algorithm for finding it with illustration. [12]

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