Code No: 154AQ **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, August/September - 2021
DISCRETE MATHEMATICS
(Common to CSE, IT, ITE)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Obtain the principal conjunctive normal form of $(p \rightarrow (q \wedge r)) \wedge (\sim p \rightarrow (\sim q \wedge \sim r))$
b) What do you mean by Well Formed Formula? Explain about Tautology with example? [7+8]

2.a) Consider the following relation on{1,2,3,4,5,6} R={(i, j) : i-j=2} Is R transitive? Is R reflexive? Is R Symmetric?
b) If R and S are equivalence relations on a set A. Prove that $R \cap S$ is an equivalence Relation.
c) Define the terms: POSET and Hasse diagram. [5+5+5]

3. Use strong induction to prove "Every positive integer greater than 1 can be written uniquely as a prime or as the product of two or more primes where the prime factors are written in order of non decreasing size". [15]

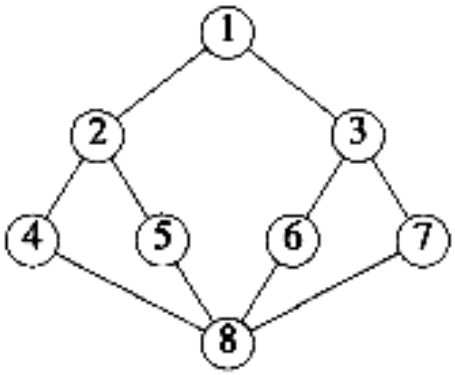
4.a) Obtain recurrence relation for tower of Hanoi problem and find its time complexity.
b) Explain the methods of solving recurrence relations with suitable examples. [7+8]

5.a) Give an example graph which is Hamiltonian but not Eulerian.
b) How to determine adjacency matrix for a graph. Explain properties of adjacency matrix by taking suitable graph with minimum 4 nodes 6 edges. [7+8]

6.a) Prove or Disprove that the following statements are logically equivalent without using truth table. $(P \rightarrow Q) \wedge (P \rightarrow R) \Leftrightarrow P \rightarrow (Q \wedge R)$?
b) Find the disjunctive normal forms of the following:
i) $\neg(P \vee Q) \leftrightarrow (P \wedge Q)$
ii) $P \rightarrow \{(P \rightarrow Q) \wedge (\neg Q \vee \neg P)\}$ [7+8]

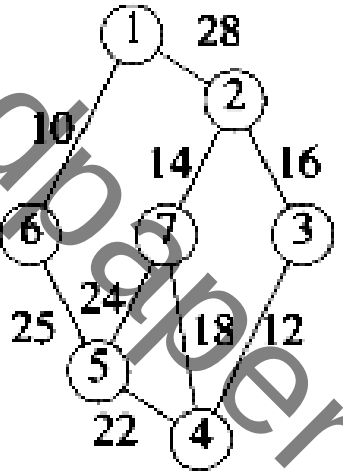
7.a) Compute the number of rows of 6 Americans, 7 Mexicans and 10 Canadians in which an American invariably stands between a Mexican and a Canadian and in which a Mexican and a Canadian never stand side by side.
b) Solve the recurrence relation $a_n+4a_{n-1}+4a_{n-2} = 8$ for $n>=2$ where $a_0=1$, $a_1=2$. [7+8]

8.a) Explain Breadth First Search algorithm with following Graph 1.



Graph: 1

b) Define Spanning tree. Apply Krushkal's algorithm to find minimum spanning tree on the following weighted graph 2. [7+8]



Graph: 2

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