

Code No: 154AQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech II Year II Semester (Special) Examinations, January/February - 2021****DISCRETE MATHEMATICS****(Common to CSE, IT)****Time: 2 hours****Max. Marks: 75****Answer any five questions****All questions carry equal marks**

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- 1.a) Given the following statements as premises, all referring to an arbitrary meal: i) If he takes coffee, he doesn't drink milk ii) He eats crackers only if he drinks milk iii) He does not take soup unless he eats crackers iv) At noon today, he had coffee Whether he took soup at noon today? If so, what is the correct conclusion?
 b) Verify the validity of the following inference:
 i) All integers are rational numbers
 ii) some integers are powers of 3 Therefore, Some rational numbers are powers of 3. [8+7]
- 2.a) Find the PDNF & PCNF by constructing the truth table:
 $(P \wedge Q) \vee (\neg P \wedge R) \vee (Q \wedge R)$
 b) Use equivalences to show that $(A \vee B) \rightarrow A \equiv B \rightarrow A$. [8+7]
- 3.a) Let $X = \{1,2,3,4,5,6,7\}$ and $R = \{(x,y)/x-y \text{ is divisible by } 3\}$ in X . Show that R is an equivalence relation.
 b) Let R and S be the following relations $A = \{a,b,c,d\}$ defined
 $R = \{(a,a), (a,c), (c,b), (c,d), (d,b)\}$ and $S = \{(b,a), (c,c), (c,d), (d,a)\}$
 Find i) $R \circ S$ ii) $S \circ R$ iii) $R \circ R$. [8+7]
- 4.a) List and explain various operations performed on sets.
 b) Suppose R and S are symmetric then prove that $R \cup S$ and $R \cap S$ are symmetric. [8+7]
5. Use Mathematical induction, prove that $1^2 + 2^2 + 3^2 + \dots = \frac{n(n+1)(2n+1)}{6}$ for $n \geq 1$. [15]
- 6.a) Using generating function, solve the $y_{n+2} - 4y_{n+1} + 3y_n = 0$, given $y_0 = 2, y_1 = 4$.
 b) Determine the solution of the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$ with initial conditions $a_0 = 1$ and $a_1 = 6$? [7+8]
7. Find all solutions of the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$. [15]
8. If G is a connected planar graph then prove that $|V| - |E| + |R| = 2$. [15]

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