

Code No: 154AQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, November/December - 2020

DISCRETE MATHEMATICS

(Common to CSE, IT)

Time: 2 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

- 1.a) Show that $\sim p \vee (\sim p \wedge q)$ and $(\sim p \wedge \sim q)$ are logically equivalent.
 b) Show that $\sim p \wedge q, \sim q \vee r \Rightarrow \sim p$. [8+7]
2. Prove that $\forall x P(x) \vee Q(x) \Rightarrow x P(x) \vee \exists x Q(x)$. [15]
3. Show that congruence modulo m is an equivalence relation on integers. [15]
- 4.a) A relation R on A is symmetric if and only if $R = R^{-1}$.
 b) A relation R on A is reflexive if and only if R^{-1} is reflexive. [7+8]
5. Prove by Mathematical induction that $6^{n+2} + 7^{2n+1}$ is divisible by 43 for each positive integer n . [15]
6. Prove that, if F_n is the n^{th} Fibonacci number, then $F_n = \frac{1}{\sqrt{5}} \left(\frac{1+\sqrt{5}}{2} \right)^{n+1} - \frac{1+\sqrt{5}}{2} \left(\frac{1+\sqrt{5}}{2} \right)^{n+1}$ for all integers $n \geq 0$. [15]
7. Solve the recurrence relation $a_n - a_{n-1} - 12a_{n-2} = 0, a_0 = 0, a_1 = 1$. [15]
- 8.a) State and prove fundamental theorem of graph theory.
 b) Prove that a complete graph K_n is planar if and only if $n \leq 4$. [7+8]

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