R18

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
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1.a) Show that $\sim(p \vee (\sim p \wedge q)$ and$(\sim p \wedge \sim q)$ are logically equivalent.
b) Show that $\sim (p \wedge q), (\sim q \vee r) \sim r \Longrightarrow (\sim p)$. [8+7]

2. Prove that $(\forall x)\big(P(x) \vee Q(x)\big) \Longrightarrow (x)P(x) \vee (\exists x)Q(x)$. [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 by43 for each positive integer n. [15]

6. Prove that, if F_n is the nth Fibonacci number, then $F_n = \frac{1}{\sqrt{5}}\left[\left(\frac{1+\sqrt{5}}{2}\right)^{n+1} - \left(\frac{1+\sqrt{5}}{2}\right)^{n+1}\right]$ for all integers n ≥ 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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