Sr. No. 11. Tutorial , Assignments, Quiz, Presentations etc/

PANDIT DEENDAYAL ENERGY UNIVERSITY, GANDHINAGAR
DEPARTMENT OF MATHEMATICS

DISCRETE MATHEMATICAL STRUCTURES **ASSIGNMENT-1**

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1) Define a finite set, countably infinite set and uncountable(uncountably infinite) set. Give at least one example each.

2) Draw Venn diagram showing a) $(A \cap B) \epsilon (A \cap C)$ but B is not a subset of C. b)$(A \cup B) = (A \cup C)$ but $B \neq C$.

3) Solve the following and prove your answer with mathematical induction. $1+3+5+....+(2n-1) = ?$

4) Using principe of mathematical induction, show that, $8^n - 3^n$ is a multiple of 5 for $n \geq 1$

5) Consider the set $\mathbf{Z}$ of integers and an integer $m > 1$. We say that x is congruent to y modulo m, written $x \equiv y (\text{mod} \quad m)$ if $x - y$ is divisible by m. Show that this defines an equivalence relation on $\mathbf{Z}$.

6) Let R be a relation of set A of people. R=$\{(a, b) : \text{a is brother of b}\}$. Is it an equivalence relation? Is R partial ordering? (discard half brother, paternity brother)

7) Prerequisites in college is a familiar partial ordering of available classes. We say $A << B$ if course A is a prerequisite for course B. Consider the mathematics courses and their prerequisites given in following table. Draw the Hasse diagram for the partial ordering of these classes.

Class	Prerequisites
Math 101	None
Math 201	Math 101
Math 250	Math 101
Math 251	Math 250
Math 340	Math 201
Math 341	Math 340
Math 450	Math 101, Math 250
Math 500	Math 450, Math 251

8) Prove that the following argument is valid: $p \rightarrow \sim q, r \rightarrow q, r \vdash \sim p$.

9) Show that the propositions $\sim (p \wedge q)$ and $\sim p \vee \sim q$ are logically equivalent.

10) Determine the validity of the following argument: $p \rightarrow q, \sim q \vdash \sim p$.