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Tutorial – 2 (08-08-2022)

Program	**B.Tech. (All Branches)**	**Semester**	**Fall 2022-2023**
Course Name	**Discrete Mathematics And Graph Theory**	**Course Code**	**MAT2002**
Faculty Name	**Dr. Navneet Kumar Verma**	**Slot / Class No**	**A21+A22+A23**
Submission date	**08-08-2022**	**Max. Marks**	**10**

Answer ALL the Questions

Q. No.	**Question Description**

Each question is of equal marks

Question-1 Construct the truth table for the following

1. $p \wedge \sim p$
2. $p \vee \sim q$
3. $(p \vee q) \vee \sim p$
4. $(p \vee q) \wedge r$
5. $(p \vee q) \vee \sim q$
6. $(\sim p \wedge q) \vee p$

Question-2 The Peirce arrow $\downarrow$ (NOR) is a logical binary operation which is defined as follows $p \downarrow q = \sim (p \vee q)$

a) Prove that $\sim p = p \downarrow p$

b) Prove that $(p \wedge q) = (p \downarrow p) \downarrow (q \downarrow q)$

c) Write $(p \rightarrow q)$ using Peirce arrow only.

Question-3 Show that $\neg p \wedge (\neg q \wedge r) \vee (q \wedge r) \vee (p \wedge r) \cong r$, without using the truth table, describe the used laws in each step

Question-4 Obtain disjunctive normal form of $p \wedge (p \Leftrightarrow q)$

Question-5 Obtain disjunctive normal form of $\sim (p \vee q) \Leftrightarrow (p \wedge q)$

Question-6 Obtain disjunctive normal form of $p \vee (\sim p \rightarrow (q \vee (q \rightarrow \sim r)))$

Question-7 Obtain conjunctive normal form of $\sim (p \vee q) \leftrightarrow (p \wedge q)$

Question-8 Obtain DNF of $(p \rightarrow q) \wedge (\sim p \wedge q)$ and $(p \wedge (p \rightarrow q)) \rightarrow q$

Question-9 Obtain DNF and CNF of $(p \wedge q) \wedge (q \rightarrow p)$