# TOPIC : 4 – Tutorial 1

1. Show that $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent.
2. Without using the truth table, prove that $\neg p \rightarrow (q \rightarrow r) \Leftrightarrow (q \rightarrow (p \vee r)$.
3. Show that $\neg(p \wedge \neg(p \wedge q))$ and $(\neg p \wedge \neg q)$ are logically equivalent.
4. Show that $(\neg p \wedge (\neg q \wedge r) \vee (q \wedge r) \vee (p \wedge r) \Leftrightarrow r$

Problems based on Normal forms:

5. Without using truth table find the PCNF and PDNF of $P \rightarrow (Q \wedge R) \wedge (P \rightarrow (\neg Q \wedge \neg R))$.
6. Obtain the product of sum canonical form of the formula $(\neg P \rightarrow R) \wedge (Q \leftrightarrow P)$
7. Find the PCNF of $(P \vee R) \wedge (P \vee \neg Q)$. Also find its PDNF, without using truth table.
8. Obtain the PCNF and PDNF of $(P \wedge Q) \vee (\neg P \wedge R)$
9. Obtain the PCNF and PDNF of $(Q \rightarrow P) \wedge (\neg P \wedge Q)$
10. Find the PCNF and PDNF of $(P \vee Q) \wedge (R \vee \neg P) \wedge (Q \vee \neg P)$ without using truth table.