

18MA302T – Discrete Mathematics

Assignment (Unit-III)

Four Mark Questions

1. Construct the truth table for  $\neg q \wedge (p \rightarrow q) \Rightarrow \neg p$ .
2. Show that  $p \rightarrow s$  follows logically from the premises  $\neg p \vee q$ ,  $\neg q \vee r$  and  $r \rightarrow s$ .
3. Without using truth table for  $P \rightarrow (Q \rightarrow P) \equiv \neg P \rightarrow (P \rightarrow Q)$
4. Define: Rule P, Rule T, Rule CP.
5. Define tautology and contradiction.
6. Using truth table prove that (i)  $(P \rightarrow (P \vee Q))$  is tautology.  
(ii)  $(\neg P \wedge \neg Q) \wedge Q$  is contradiction.

Twelve Mark Questions

7. Show that  $(a \vee b)$  follows logically from the premises

$$p \vee q, (p \vee q) \rightarrow \neg r, \neg r \rightarrow (s \wedge \neg t) \text{ and } (s \wedge \neg t) \rightarrow (a \vee b)$$

8. Prove that the following set of premises is inconsistent. If Rama gets his degree, he will go for a job. If he goes for a job, he will get married soon. If he goes for higher study, he will not get married. Rama gets his degree and goes for higher study.

9. Using indirect method of proof, derive  $p \rightarrow \neg s$  from the premises  
 $p \rightarrow (q \vee r)$ ,  $q \rightarrow \neg p$ ,  $s \rightarrow \neg r$ ,  $p$ .

10. Prove the implication without using truth table  
 $[(p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow r$

11. Derive  $p \rightarrow (q \rightarrow s)$  using the CP rule (if necessary) from the premises  $p \rightarrow (q \rightarrow r)$  and  $q \rightarrow (r \rightarrow s)$ .

12. Using mathematical induction method

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}.$$

13. (i) Construct the truth table for  $P \rightarrow ((P \rightarrow (Q \rightarrow P)) \rightarrow P)$

- (ii) Without using the truth table prove that

$$(\neg P \vee Q) \wedge (P \wedge (P \wedge Q)) \Leftrightarrow (P \wedge Q)$$