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**ASSIGNMENT – I (UNIT – I, LOGIC)**
**SMTA1302, DISCRETE MATHEMATICS**

**Answer All The Questions** **Max: 15 Marks**

**Part A**
**Choose the correct answer (5×1 = 5)**

1. The compound proposition p is equivalent to q if_____is a tautology.

a) $p \leftrightarrow q$
b) $p \rightarrow q$
c) $\neg(p \vee q)$
d) $\neg p \vee \neg q$

2. The dual of $(P \vee F) \wedge (Q \vee T)$ is ----------

a) $(P \wedge F) \vee (Q \wedge T)$
b) $(P \wedge T) \vee (Q \wedge F)$
c) $((P \vee \neg Q) \wedge T) \vee (Q \wedge F)$
d) $((P \vee \neg Q) \wedge F) \vee (Q \wedge T)$

3. $(p \rightarrow q) \wedge (r \rightarrow q)$ is logically equivalent to _____

a) $p \rightarrow (q \wedge r)$
b) $p \rightarrow (q \vee r)$
c) $p \wedge (q \vee r)$
d) $(p \vee r) \rightarrow q$

4. The PDNF form for the following formula, $p \vee (\neg p \wedge q)$ is

a) $\neg p \wedge q$
b) $(p \wedge q) \vee (p \wedge \neg q) \vee (\neg p \wedge q)$
c) p
d) $(\neg p \wedge p) \vee (\neg p \wedge q) \vee (p \wedge \neg q)$

5. If M(x) : x is a Mammal, W(x) : x is warm blooded. Then
The symbolic form of the statement "every mammal is warm blooded" is _
a) $(\forall x)(M(x) \rightarrow W(x))$
b) $(\exists x)(M(x) \wedge W(x))$
c) $(\forall x)((M(x)) \wedge W(x))$
d) $((x)) \rightarrow M(x)$

**Part B**
**Answer the following (5×1 =5)**

6. Demonstrate that R is a valid inference from the premises P $\rightarrow Q$ , Q $\rightarrow R$ and P.

7. Let p: I will study Discrete Mathematics, q: I will watch TV, r: I am in a good mood. Write the following statements using p,q,r and logical connectives

(i) If I do not study discrete mathematics and I watch TV, then I am in a good mood.

(ii) If I am in a good mood, then I will study discrete mathematics or I will watch TV.

8. Show that p is equivalent to the following propositions:

(i) $(p \wedge q) \vee (p \wedge \neg q)$

(ii) $(p \vee q) \wedge (p \vee \neg q)$

9. Construct the truth table for the compound proposition and Prove that $(p \rightarrow (q \rightarrow r)) \Rightarrow (p \rightarrow q) \rightarrow (p \rightarrow r)$ is a Tautology.

10. Using the laws of logic simplify $(p \vee q \vee r) \wedge (p \vee T \vee \neg q) \wedge (p \vee \neg T \vee r)$

**Part C**
**Answer the following**
**(1×5 = 5)**

11. Obtain PDNF of $P \rightarrow ((P \rightarrow Q) \wedge \neg(\neg Q \vee \neg P))$ .