M.G.M's COLLEGE OF ENGINEERING, NANDED

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Assignment: I

Subject: DM **Class: SE (CSE) - I**

Q.1. Let p and q be the propositions.

p: you drive over 65 miles per hour.

q: you get a speeding ticket.

Write these propositions using p and q and logical connectives

① you do not drive over 65 miles per hour.

② you will get a speeding ticket if you drive over 65 miles per hour.

③ whenever you get a speeding ticket, you are driving over 65 miles per hour.

Q2 Let p and q are propositions

p: swimming at NJ shore is allowed.

q: sharks have been spotted near the shore

Express in English.

① $p \wedge q$ ② $p \rightarrow \neg q$ ③ $\neg p \vee q$

④ $p \leftrightarrow \neg q$ ⑤ $\neg p \wedge (p \vee \neg q)$

Q3. Construct the truth table for following.

① $(p \rightarrow q) \rightarrow (q \rightarrow q)$ ② $p \vee \neg q$

③ $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$ ④ $p \leftrightarrow (q \vee p)$

Q4. show that ~~$\neg(p \wedge q)$~~ $\neg(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences.

Q5. Show that $(P \to q) \wedge (P \to r)$ and $P \to (q \wedge r)$ are logically equivalent.

Q.6 Show that $(P \vee q) \wedge (\neg P \vee r) \to (q \vee t)$ is a tautology by logical equivalences.

Q.7 Prove that

① $[(P \to q) \wedge (q \to r)] \to (P \to r)$ is a tautology.

② $[(P \wedge q) \wedge r] \to (s \vee r)$ is a contradiction by truth table.

Q.8 Explain duality. Write down the duals of following.

① $\neg (P \vee q) \wedge [P \vee \neg (q \wedge \neg s)]$

② $[(P \vee T) \wedge (q \vee F)] \vee [(r \wedge s) \wedge T]$

Q.9 Explain predicates and Quantifiers with example in detail.

Q.10 Translate these statements into english, where

$c(x)$ is "x is a comedian" and

$f(x)$ is "x is funny" and

domain consists of all people.

① $\forall x (c(x) \to F(x))$ ② $\forall x (c(x) \wedge F(x))$

③ $\exists x (c(x) \to F(x))$ ④ $\exists x (c(x) \wedge F(x))$

Q. 11. Let

$P(x) : x^2 - 8x + 15 = 0$

$q(x) :$ x is odd.

$r(x) : x > 0$

with the set of all integers as the universe. Determine the truth or falsity of each of the following statement.

① $\forall x\,[P(x) \rightarrow q(x)]$ ② $\forall x\,[q(x) \rightarrow P(x)]$

③ $\exists x\,[P(x) \rightarrow q(x)]$ ④ $\exists x\,[q(x) \rightarrow p(x)]$

Q.12 Explain Normal forms (both types of Normal forms).

Q.13 Find the disjunctive normal forms of following.

$$p \rightarrow [(p \rightarrow q) \wedge \neg(\neg q \vee \neg p)]$$

Q.14 Find the conjunctive normal form of following.

$$p \wedge (p \rightarrow q)$$

Q.15 Explain Principal Normal forms and its types.

Q.16 Obtain the principal disjunctive normal forms

$$p \rightarrow [(p \rightarrow q) \wedge \neg(\neg q \wedge \neg p)]$$

Q.17 Explain the principal Conjunctive Normal form.

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

Subject In Charge

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