Answer all in the given sequence. All question having same marks Max.Marks (10)

Seat /ID	Discrete Structure (CS1005)	Section: BCS3H
Date: 4-09-2024	Quiz-1	Time: 30 mint

Problem-1

Let p and q be the propositions "The election is decided" and "The votes have been counted," respectively. Express each of these compound propositions as an English sen tence.

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

Problem-2

Use truth table for given statement is a tautology, contradiction or contingency

(p ∧¬ q)∧ $(\neg p \vee q)$

Problem-3

Write converse, contrapositive and inverse of given conditional statement.

"if it snows tonight then I will stay at home "

Problem-4

Show that using law of logical equivalence and justify each steps

(p ∧ q) → (p → q) ≡ T

Problem-5

Use truth table

Determine the validity of the following argument:

If 7 is less than 4, then 7 is not a prime number.
7 is not less than 4.

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7 is a prime number.

Answer all in the given sequence. All question having same marks Max.Marks (10)

Solution-1

a) If the election is not decided, then the votes have not been counted.

b) The election is decided, or the votes have been counted.

c) Either the votes have not been counted, or else the election is not decided and the votes have been counted.

d) If the votes have been counted, then the election is decided.

Solution-2

Contradiction

Solution-3

Converse: If I stay home, then it will snow tonight.

Contrapositive: If I do not stay at home, then it will not snow tonight.

Inverse: If it does not snow tonight, then I will not stay home.

Solution-4

$(p \wedge q) \rightarrow (p \rightarrow q)$	
$\equiv \neg(p \wedge q) \vee (p \rightarrow q)$	Law of Implication
$\equiv \neg(p \wedge q) \vee (\neg p \vee q)$	Law of Implication
$\equiv (\neg p \vee \neg q) \vee (\neg p \vee q)$	De Morgan's Law
$\equiv (\neg p) \vee (\neg q \vee (\neg p \vee q))$	Associative Law
$\equiv (\neg p) \vee ((\neg p \vee q) \vee \neg q)$	Commutative Law
$\equiv (\neg p) \vee (\neg p \vee (q \vee \neg q))$	Associative Law
$\equiv (\neg p) \vee (\neg p \vee \mathbf{T})$	Negation Law
$\equiv (\neg p) \vee (\mathbf{T})$	Domination Law
$\equiv \mathbf{T}$	Domination Law

Solution-5

First translate the argument into symbolic form.

Let p be "7 is less than 4" and q be "7 is a prime number."

			Premises		conclusion	
p	q	$\neg q$	$p \rightarrow \neg q$	$\neg p$	q	
T	T	F	F	F	T	
T	F	T	T	F	F	
F	T	F	T	T	T	
F	F	T	T	T	F	critical row

IT IS NOT VALID