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Course:- Discrete structure

programm : BS (SE) section B

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Date:- Apr. 13, 2020

Q4:- construct truth table for

(a) $\sim p \vee \sim q$

p	q	$\sim p$	$\sim q$	$\sim p \vee \sim q$
T	T	F	F	F
T	F	F	T	T
F	T	T	F	T
F	F	T	T	T

Q4:- (b) $q \wedge (\sim p \vee q)$

p	q	$\sim p$	$\sim q$	$\sim p \vee q$	$q \wedge (\sim p \vee q)$
T	T	F	F	T	T
T	F	F	T	F	F
F	T	T	F	T	T
F	F	T	T	T	F

Q 4:(C)

$p \wedge (q \vee r)$

p	q	r	$q \vee r$	$p \wedge (q \vee r)$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F
F	T	T	T	F
F	T	F	T	F
F	F	T	T	F
F	F	F	F	F

Q4:- (d)

$(p \wedge q) \vee r$

p	q	r	$p \wedge q$	$(p \wedge q) \vee r$
T	T	T	T	T
T	T	F	T	T
T	F	T	F	T
T	F	F	F	F
F	T	T	F	T
F	T	F	F	F
F	F	T	F	T
F	F	F	F	F

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Q 5:- use the truth table to show that:

$\sim((p \vee \sim q) \vee (r \wedge (p \vee \sim q)) \equiv \sim p \wedge q$

Sol:-

L.H.S

$\sim((p \vee \sim q)) \vee (r \wedge (p \vee \sim q)$

p	q	r	$\sim p$	$\sim q$	$\sim r$	$p \vee \sim q$	$\sim(p \vee \sim q)$	$r \wedge (p \vee \sim q)$
T	T	T	F	F	T	T	F	T
T	T	T	F	F	T	T	F	F
T	F	[illegible]	F	T	F	T	F	T
T	F	F	F	T	T	T	F	F
F	T	T	T	F	F	F	T	F
F	T	F	T	F	T	F	T	F
F	F	T	T	T	F	T	F	T
F	F	F	T	T	T	T	F	F

R.H.S

$\sim p \wedge q$

p	q	$\sim p$	$\sim p \wedge q$
T	T	F	F
T	F	F	F
F	T	T	T
F	T	T	F

$\sim(p \vee \sim q) \vee (r \wedge (p \vee \sim q))$
T
F
T
F
T
T
T
F

QNo 1:-
Which of the are following are proposition?

Ans:-
Following are the propostions in them.

(b) The apple Macintosh is a 16 bit computer. [T] (It is a true declerative statement not question or command)

(e) 8+7 = 13 [F] is a proposition

Proposition:-
A Declerative sentence that is either true or false but not both.

* If a proposition is true. It has a truth value of "true" denoted by T
* If a proposition is False. It has a truth value of "false" denoted by F

* Every ~~sal~~ sentence cannot be a statement. Statement refferred as proposition.

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Q No 3:- In each part of this question a proposition p is defined. which of the statement that follow the definition correspond to the proposition $\neg p$?

[There may be more than one correct answers]

(a) p is "some people like maths".

Ans:-

$\neg p$ is
" some people dislike maths".

(b) p is "The answer is either 2 or 3".

Ans:-

$\neg p$ is
" Neither 2 nor 3 is the answer".

(c) p is "All people in my class are tall and thin".

Ans:-

$\neg p$ is
"No one in my class is tall and thin".

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Q2:-

p is "$x < 50$" ; q is "$x > 40$".

(a) $\sim p$

"x is not less than 50".

(b) $\sim q$

"x is not greater than 40".

(c) $p \wedge q$

"x is less than 50 and greater than 40".

(e) $\sim p \wedge q$

x is not less than 50 and 40"

(f) $\sim p \wedge \sim q$

"x is greater than 50 and less than 40".

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Page 9 Q 2 Alternative method.

Q2:-

p is "$x < 50$" ; q is "$x > 40$"

(a) $\sim p$ is

$x \geq 50$

(b) $\sim q$

$x \leq 40$

(c) $p \wedge q$

$40 < x < 50$

(e) $\sim p \wedge q$

$x > 50$

(f) $\sim p \wedge \sim q$

$x > 50$ or $x < 40$

$x < 50$ or $x > 40$ This is true for all value of x.

x — x — + — x — + — +

Q6. Use the law of logical proposition to prove that:

$$(z \wedge w) \vee (\neg z w) \vee (z \wedge \neg w) = z \vee w$$

State carefully which law you are using at each

Answer.

$(z \wedge w) \vee (\neg z \wedge w) \vee (z \wedge \neg w) = (z \wedge w) \vee (z \wedge \neg w) \vee (\neg z w)$

commutative law.

$= (z \wedge (w \vee \neg w)) \vee (\neg z w) \rightarrow$ Distributive law

$= z \vee (\neg z \wedge w) \rightarrow$ complement law.

$= z \vee (\neg z \wedge w) \rightarrow$ Identity law.

$= (z \vee \neg z) \wedge (z \vee w) \rightarrow$ Distributive law

$= T \wedge (z \vee w) \rightarrow$ complement law

$= (z \vee w)\ T \rightarrow$ comutative law

$= z \vee w \rightarrow$ Identity law

THE END