 BS (SE) : Section: "A"

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Subject: Descrete structure

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Mid Term Assignment.

Q:(1): Write of the following are proposition?

(a) Buy premium Bonds!

(b) The Apple macantosh is a 16 bit computer.

(c) There is a largest every number.

(d) Why are we have?

(e) $8+7 = 13$.

(f) $a+b = 13$.

Answers:

B and C

e and f

Q:(2) p is "$x<50$"; q is "$x>40$"

Write as simply as you can.

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

Answers:

a) $x \geq 50$
b) $x \leq 40$
c) $40 \leq x < 50$
d) $x \leq 50$ or $x > 40$
e) $x \geq 50$
f) $x \geq 50$ and $x \leq 40$

Q(3): In each part of this question a preposition p is defined. Which of the statement that the follow the definition correspond to the proposition $\neg p$.

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

a) "Some people dislike Maths."
b) "Everybody dislike maths."
c) "Everybody like maths".

Answers:

(b) "Everybody dislikes maths"

(b)

p is "The answer is either 2 or 3."

(a) "Neither 2 Nor 3 is the answer."

(b) "The answer is not 2 or it is not 3."
(c) "The answer is not 2 or and it is not 3."

Answers:

a and c

In part A (b) is prepositon.
In part B (A) and (c) both are prepositions.

(c).

In part c (c) is preposition.
(c) "someone in my class is short or fat"

Q(4): Construct truth-table for

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

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

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

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

(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

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

p	q	r	$p \wedge q$	$p \wedge q$
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

Q (5) Use truth table to show that $\neg(\neg p \vee \neg q) \vee (r \wedge (p \vee \neg q)) = p \wedge q$

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Truth table:

P	Q	~Q	P∨~Q	~(P∨~Q)	P∧Q	~P∧Q
T	T	F	T	F	T	F
T	F	T	T	F	F	F
F	T	F	F	T	F	T
F	F	T	T	F	F	F

Q No (1): Use the law of logical proposition to prove that

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

State carefully which law using each stage.

$(z \wedge w) \vee (\sim z \wedge w) \vee (z \wedge \sim w) = (z \wedge w) \vee (z \wedge \sim w) \vee (\sim z \wedge w)$ commutative law

$= (z \wedge \sim w) \vee (z \wedge w) \vee (\sim z \wedge w)$ commutative law

$= (z \wedge (w \vee \sim w)) \vee (\sim z \wedge w)$ Distributive law

$= (z \wedge T) \vee (\sim z \wedge w)$ Complement law

$= z \vee (\sim z \wedge w)$ Identity law

$= (z \vee \sim z) \wedge (z \vee w)$ Distributive law

$= T \wedge (z \vee w)$ Complement law

$= z \vee w$ Identity law

$= (z \vee w) \wedge T$ commutative law