

NAME :: M. Jumaid
ID :: 16027
Subject :: Discrete Structure

Program :: Software. ENG

Submitted :: Sis ID-101

Smesler :: 2nd

Q: 1:

Which of the following
proposition?

(a) :- By Premium Bands!
it is not proposition

(b) :- The apple Macintosh is a 16 bit
computer

it is proposition

(c) There is a largest even number.

it is proposition

(d) Why are we here?

it is not proposition

(e) $8+7 = 13$

it is proposition

(f) $a+b = 13$

it is not proposition

★

★

Q = "3"

In each part of this question a proposition p is defined which of the statements that following the definition correspond to the proposition $\neg p$? (there may be more than one correct answer)

(A)

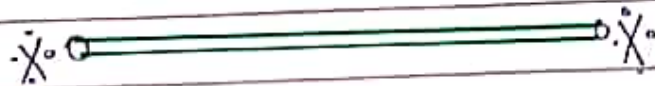
P is "Some people like Maths".

(a) "Some people dislike Maths"

(b) "everybody dislikes Maths"

(c) "everybody like Maths"

A is the correct Option



..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 and it is not 3"

B is the correct Option

✱—————✱

..C"

P is "All people in my class are tall and thin."

(a) "Someone in my class is short & fat"

(b) "No one in my class is tall and thin"

(c) ✓ "Someone in my class is short or fat"

C is the correct Option

✱—————✱

Q. 4

Correct the truth tables for

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

Truth table

$\neg P \vee \neg Q$

P	Q	$\neg P$	$\neg Q$	$\neg P \vee \neg Q$
T	T	F	F	F
T	F	F	T	T
F	T	T	F	T
F	F	T	T	T

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

P	q	$\neg p$	$(\neg p \vee q)$	$q \wedge (\neg p \vee q)$
T	F	F	T	T
T	F	F	F	F
F	T	T	T	T
F	T	T	T	T

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

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



$(p \wedge q) \vee r$

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



Q. 5"

use truth table to show that

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

P	Q	\neg	$\neg p$	$\neg q$	$(p \vee \neg q)$	$\neg(p \vee \neg q)$	$((p \vee \neg q) \vee (\neg(p \vee \neg q)))$	$\neg((p \vee \neg q) \vee (\neg(p \vee \neg q)))$	$\neg p \wedge q$
T	T	F	F	F	T	F	T	F	F
T	F	T	F	T	T	F	T	F	F
T	T	F	F	F	T	F	T	F	F
T	F	T	F	T	T	F	T	F	F
F	T	T	T	F	F	T	F	T	T
F	F	T	T	T	F	T	F	T	F
F	T	T	T	F	F	T	F	T	F
F	F	T	T	T	F	T	F	T	F

Hence it is proved that

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

Q.6

Use the laws of logical proposition to prove that

$$(Z \wedge W) \vee (-Z \wedge W) \vee (Z \wedge -W) \equiv Z \vee W$$

State carefully which law you are using at each stage

Ans $(Z \wedge W) \vee (-Z \wedge W) \vee (Z \wedge -W) = (Z \wedge W) \vee (Z \wedge -W) \vee (-Z \wedge W)$
(Commutative law)

$$= (Z \wedge (W \vee -W)) \vee (-Z \wedge W)$$

Distributive law

$$= (Z \wedge T) \vee (-Z \wedge W)$$

Complement law

$$= Z \vee (-Z \wedge W)$$

Identity law

P.T.O

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

Distributive law

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

Complement law

$$= (z \vee w) T$$

Commutative law

$$= z \vee w$$

Identity law

