

Ibrahim Jan
ID. 6838
Section: B(SE)

(1)

SIN, M. Abrar Khan

Discrete structure

Attempt all Question

Q No. 1 Which of the following are propositions?
(a) Buy premium Bonds!

Ans: Is not Proposition.

(b) The apple Macintosh is a 16 bit Computer

Ans: Proposition.

(c) There is a largest even number

Ans: Proposition

(d) Why are we here?

Ans: Is not Proposition

(e) $P + 7 = 13$

Ans: Proposition

(f) $a + b = 13$

Ans: not Proposition.

2

Q No 2.

P is "x < 50" ; q "x > 40".

write as simply as you can

(a) $\neg p$

Ans $x \geq 50$

(b) $\neg q$

Ans $x \leq 40$

(c) $P \wedge q$

Ans $40 < x < 50$

(d) $P \vee q$

Ans $x < 50$

(e) $\neg P \wedge q$

Ans $x \geq 50$

(f) $\neg P \wedge \neg q$

Ans $x \geq 50 \cdot \& \ x \leq 40$

3

Q No 3.

In each part of this questions a proposition P is defined. which of the statements that follow - - - -

- (a) P is "Some people like maths":
(a) "Some people dislike Maths."
(b) "Everybody dislike Maths."
(c) "Everybody like maths."

Correct answer

(b) "Everybody dislike Maths"

- (b) P is "The answer is neither 2 or 3"
(a) "Neither 2 nor 3 is the answer."
(b) "The answer is not 2 or its is not 3."
(c) "The answer is not 2 and it is not 3";

Correct answer

(a) "Neither 2 nor 3 is the answer"

(c) "The answer is not 2 and its not 3"

- (c) P is "All people in my class are tall & thin"
(a) "some in my class is short and fat"
(b) "Noone in my class is tall and thin."
(c) "Someone in my class is short or fat."

Correct answer

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

(4)

Q No. 4

Construct truth tables for.

(a) $\neg P \vee \neg q$

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

(b) $q \wedge (\neg P \vee q)$

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

(c) $P \wedge (q \vee x)$

P	q	x	$q \vee x$	$P \wedge (q \vee x)$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F

(5)

(d) $(P \wedge Q) \vee X$

P	Q	X	$P \wedge Q$	$(P \wedge Q) \vee X$
T	T	T	T	T
T	T	F	T	T
T	F	T	F	T
T	F	F	F	F

Q Nos $\neg((p \vee \neg q) \vee (r \wedge (p \vee \neg q))) \equiv \neg p \vee q$ (6)

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

(p-t-o)

(7)

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

F
F
F
F
T
T
F
F

$\neg p \wedge q$

F
F
F
F
T
T
F
F

Hence left hand side
= right hand side

8

Q No 6

→ use the law of Logical Propositions to prove that

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

state carefully which law you are using at each stage.

$$= (Z \wedge W) \vee (\neg Z \wedge W) \vee (Z \wedge W) \equiv Z \vee W$$

$$= (Z \vee W) \vee (Z \wedge \neg W) \vee (\neg Z \wedge W) \quad \therefore \text{Applying Commutative law}$$

$$= (Z \wedge (W \vee \neg W)) \vee (\neg Z \wedge W) \quad \therefore \text{applying Distributive law}$$

$$= (Z \wedge T) \vee (\neg Z \wedge W) \quad \therefore \text{applying Complement law}$$

$$= Z \vee (\neg Z \wedge W) \quad \therefore \text{applying identity law}$$

$$= (Z \vee \neg Z) \wedge (Z \vee W) \quad \therefore \text{applying Distributive law}$$

$$= T \wedge (Z \vee W) \quad \therefore \text{applying complement law}$$

$$= (Z \vee W) \wedge T \quad \therefore \text{applying commutative law}$$

$$= Z \vee W \quad \therefore \text{applying identity law}$$

$$\boxed{Z \vee W \equiv Z \vee W}$$