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Subject :- Discrete structure

Dept :- Computer Science

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-i(31)-

Part (A)

$$i) (PAQ) \wedge Y \equiv P \wedge (Q \wedge Y)$$

P	Q	Y	$PAQ$	$(PAQ) \wedge Y$	$(Q \wedge Y)$	$P \wedge (Q \wedge Y)$
T	T	T	T	T	T	T
T	T	F	T	F	F	F
T	F	T	F	F	F	F
T	F	F	F	F	F	F
F	T	T	F	F	T	F
F	T	F	F	F	F	F
F	F	T	F	F	F	F
F	F	F	F	F	F	F

①   ②   ③   ④   ⑤   ⑥   ⑦



From column (5) and column (7)

They are same. So Hence

$$(PAQ) \wedge Y \equiv P \wedge (Q \wedge Y)$$



$$(ii) (P \wedge q) \vee (\sim P \vee (P \wedge \sim q)) \equiv t$$

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

∴ Q1 :-

Part (B)

P = "You have the flu"

q = "You miss the final exam"

r = "You pass the course"

(1) If you have flu, then you will miss the final exam.

Sol.  $P \rightarrow q$

(2) If you don't miss the final exam, you will pass the course.

Sol.  $\sim q \rightarrow r$

(3) If you neither have flu nor miss the final exam, then you will pass the course.

Sol.  $\sim P \wedge \sim q \rightarrow r$



-: Q2 :-

part (A)

Solution:-

	P	q	$P \rightarrow q$	q	P
	T	T	T	T	T
	T	F	F	F	T
	F	T	T	T	F
	F	F	T	F	F

premisses                      conclusion

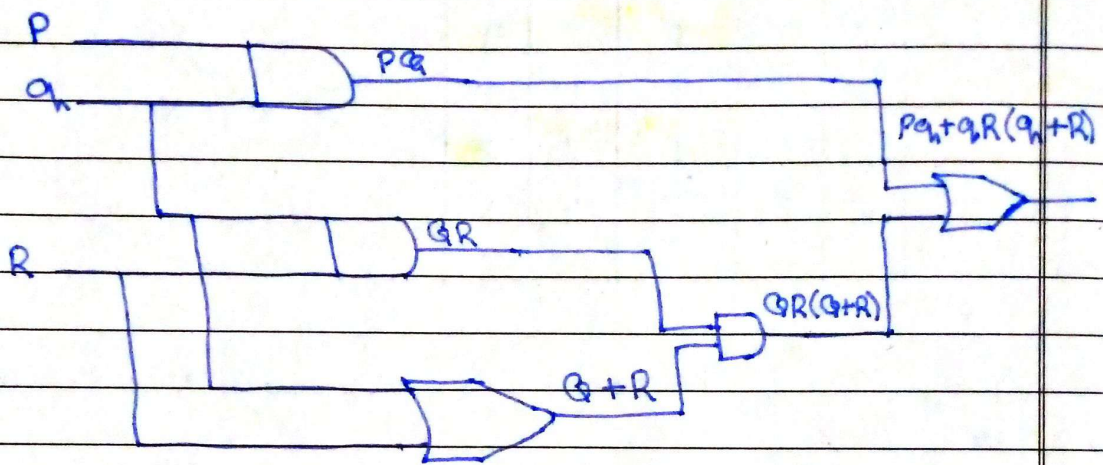
critical row

In the second critical row, the conclusion is false when the premises  $P \rightarrow q$  and  $q$  are true. Therefore, the argument is invalid.

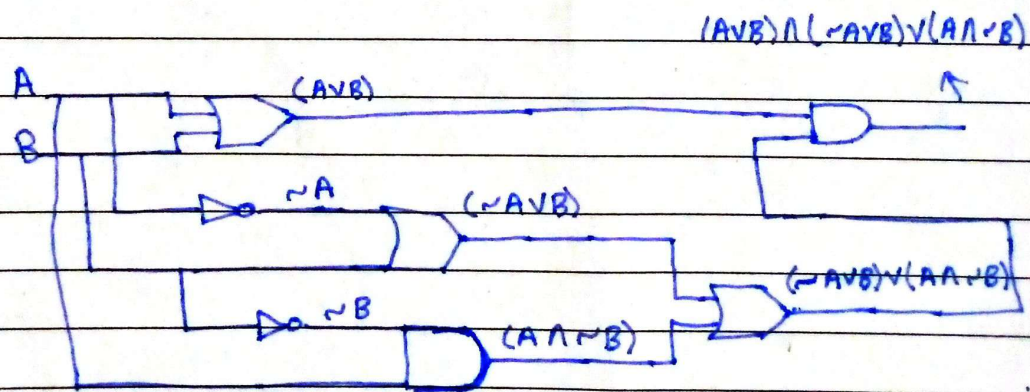


-: Q2 :-  
Part (B)

(1)  $Pq + qR (q+R)$



(2)  $(A \vee B) \wedge (\sim A \vee B) \vee (A \wedge \sim B)$





-: Q :-

part (a)

$$A = \{a, b, c\} \quad \text{and} \quad B = [1, 2, 3, 4]$$

Soln:-

$$P(A) = \{ \emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{a, c\}, \{a, b, c\} \}$$

and

$$P(B) = \{ \emptyset, \{1\}, \{2\}, \{3\}, \{4\}, \{1, 2\}, \{1, 3\}, \{1, 4\}, \{2, 3\}, \{2, 4\}, \{3, 4\}, \{1, 2, 3\}, \{1, 2, 4\}, \{1, 3, 4\}, \{2, 3, 4\}, \{1, 2, 3, 4\} \}$$

-: Q :-

part (b)

Three forms of set are follow.

(1) Tabular form:-

we list all the elements of a set, separated by commas and enclosed within braces or curly brackets  $\{ \}$ , For example.



Example:-

$A = \{1, 2, 3, 4, 5, \dots\}$  is the set  
& first Natural numbers.

$B = \{2, 4, 6, 8, \dots, 50\}$  is the set  
& Even numbers up to 50

$C = \{1, 3, 5, 7, 9, \dots\}$  is the set  
& positive odd numbers.

Note: The symbol " $\dots$ " is called an ellipsis  
It is a short for "and so forth."

(2) Descriptive form:-

we state the elements  
& a set in words.

Now we will write the examples  
discussed in last slides in descriptive  
form. for example.

$A =$  Set of first Natural numbers, (D.F)

$B =$  Set of positive even integers less  
or equal to fifty (D.F)

$C =$  Set of positive odd integers. (D.F)



(3) Set builder form :-

We write the common characteristics in symbolic form, shared by all the elements of the set.

Examples:-

Now we will write the same examples which we write in Tabular as well as Descriptive form, in Set Builder form.

$$A = \{x \in \mathbb{N} \mid x \leq 5\}$$

$$B = \{x \in \mathbb{E} \mid 0 < x \leq 50\}$$

$$C = \{x \in \mathbb{O} \mid 0 < x\}$$