BILAL

ID = 16020

Discrete Structure

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BS. (C.S)2

8:00AM to 11:00AM

BILAL = ID=16020

Q1,(A) Let p be the statement "DATAENDFLAG is off", q the statement "ERROR equal 0" and r the statement "Sum is less then 1000. Express the following sentence in Symbolic notation:

(a) DATAENDFLAG is off. ERROR equal 0. and Sum is less then 1,000.

p = DATAENDFLAG is off.
q = ERROR equal 0.
r = "Sum is less the 1,000.

$p \wedge q \wedge r$

(b) DATAENDFLAG is off out ERROR is not equal to 0

p = "DATAENDFLAG is off.
q = ERROR equal 0.
r = "Sum is less then 1,000

$p \wedge \sim q$

(c) DATAENDFLAG is off, however ERROR is not 0. or Sum is greater then or equal to 1000.

p = "DATAENDFLAG is off.
q = ERROR is equal to 0.
r = Sum is less the 1000

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

(D): DATAENDFLAG is on and ERROR equal 0 but Sum is greater then or equal to 1000

p = "DATAENDFLAG is off.
q = "ERROR is equal 0
r = "Sum is less then 1000.

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

e) Either DATAENDFLAG is on or it is the case that both ERROR is equal 0 and Sum is less then 1000.

⇒ p = "DATAENDFLAG is off.
q = "ERROR equal 0"
r = "Sum is less then 1000.

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

(a) (b) = Show that $p \vee q \rightarrow r \equiv (p \rightarrow r) \wedge (q \rightarrow r)$

∴ So from Colum (5) and (8) values are same
So hence Proved that $p \vee q \rightarrow r \equiv (p \rightarrow r) \wedge (q \rightarrow r)$
L.H.S = R.H.S

p	q	r	p∨q	p∨q→r	p→r	q→r	p→r	∧(q→r)
T	T	T	T	T	T	T	T	
T	F	T	T	F	F	F	F	
T	F	T	T	T	T	T	T	
T	F	F	T	F	F	T	F	
F	T	T	T	T	T	T	T	
F	T	F	T	F	T	F	F	
F	F	T	F	T	T	T	T	
F	F	F	F	T	T	T	T	

Q3 In the back of an old cupboard you discover a not Signed by a Pirate famous for his bizarre Sence of humor and love of logical Puzzles. In the notes he wrote that he had hidden a treasure Somewhere on the Property. He listed five Sentence. (a.e. below) and challenged the reader to use them to forgive out the location of the treasure.

A) If thes house is next to the lake, then the treasure is not in the kitchen.

B) If the tree is in the front yard is. an elm then the treasure is in the kitchen.

C) The house is next to the lake.

D) The tree is in the front yard is an elm or the ~~front is~~ treasure is buried under the ~~flagpole~~ flag Pole.

E) If the tree is in the backyard is an oak then the treasure is in ~~garage~~.

where is the treasure hidden?

ANS/= P= This house is next to a lake.

q = The treasure is in the kitchen

r = The tree ~~is the~~ is in the front is an el

s = The treasure is buried under the flag Ple

t = The tree is in the back yard is an oak.

u = The treasure is in garage.

We will Arrange these Sentence as given below

a) $P \rightarrow \sim q$
b) $r \rightarrow q$
c) P
d) $r \vee s$
e) $t \rightarrow u$

We will assume that the Previous four Premise are true and drive a Conclusion using rules of Inference-

Step	Reason
$P \rightarrow \sim q$	Premise
$r \rightarrow q$	Premise
P	Premise
$r \rightarrow$	Premise
$t \rightarrow u$	Premise
$\sim q$	modus Ponens of (1) and (3)
$\sim r$	modus tollens of (2) and (6)
s	Elimination of (5) and (7)

Q.2(A) Write the Converse, Inverse and Contrapositive of the following @IF Howard Can Swim across the lake, Then Howard Can Swim to the Island.

A) CONTRAPOSITIVE:- If howard cannot Swim the island, then Howard Cannot Swim across the lake.

INVERSE:- If Howard Can Swim across the lake. Then Howard cant Swim to the Island.

CONVERSE:- If Howard can swim to the island then Howard swim across the lake.

B) If today is Easter, then tomorrow is Monday.

CONTRAPOSITIVE:- If tomorrow is not monday then today is not Easter.

INVERSE:- If today is not Easter then tomorrow is not monday.

CONVERSE:- If tomorrow is monday the today is easter.

(Q2 B) Use truth tabele to determine whether the Argument Psaw are Valid. Indicate which colums represent the Premises and which represent the conclusion.

A. P
$P \rightarrow q$
$\therefore q \vee r$
r

The first row is the only row in which all Premises are true and the conclusion is also true there is not other row where Premises are all true, So this argument is valid

				Premise	Premise	Premise	conclusion
P	q	r	¬q	P	P→q	¬q∨r	r
T	T	T	T	T	T	T	T
T	T	T	T	T	T	F	F
T	F	T	T	T	F	T	T
T	F	F	T	T	F	T	F
F	T	T	F	F	T	T	T
F	T	F	F	F	T	F	F
F	F	T	T	F	T	T	T
F	F	F	T	F	T	T	F

B) P∧q→¬r

P∨¬q

¬q→q

¬r

In third row all Premise are true but conclusion is false so this argument is invalid.

Conclusion

						Premise	Premise	Premise	
P	q	r	¬q	¬r	P∧q	P∧q→r	P∨¬q	¬q→	r
T	T	T	F	F	T	F	T	T	F
T	T	F	F	T	T	T	T	T	T
T	F	T	T	F	F	T	T	T	F
T	F	F	T	T	F	T	T	T	T
F	T	T	F	F	F	T	F	T	F
F	T	F	F	T	F	T	F	T	T
F	F	T	T	F	F	T	T	F	F
F	F	F	T	T	F	T	T	F	T