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Subject: Descreate Structure

Program: BS(CS) (A)

Classes:

Question: 1

Part (A)

Let p be the statement "DATAENDFLAG is off" & the statement "ERROR equals 0" and q the statement "SUM is less than 1000"

(A):-

DATAENDFLAG is off ERROR equal 0, and SUM is less than 1000.

Answer:-

P = "Datacendbag is off"
q = "Error equal 0"
r = Sum is less then 1000"

We can then reverse the given sentence as "Datacendbag is off and ERROR equal 0 and Sum is less then 1000"

Replacing the statement by p = q and r and replacing "and" by ∧, we then obtain

p ∧ (q ∧ r)

Note:-

Brackets are unnecessary to place because the associative law tells as that p ∧ (q ∧ r) is equivalent with (p ∧ q) ∧ r and thus the statement p ∧ q ∧ r is unambiguous.

Question #1

Part #B

p = Dataendbag is "0"
q = ERROR is not equal to "0".

Note:-
we can used a word "but" ~~and~~ to the given sentence actually implies "and" thus I can then rewrite the given sentence as
"Dataendbag is "0" and ERROR is not "0" equal to "0".
(p∧-q)
Brackets are unnecessary to place because the associated law tell as that (p∧-q) is equivalent with p∧-q and thus the statement p∧-q is unambiguous.

Question #1

Part #C

Answer:-

p = "Dataendbag is off"
q = "Error equal 0"
δ = sum is less 1000"

we can then rewrite the given sentence

"Dataendbag is off and error is not equal 0 or sum is not less then 1000

Repalacing the statement by p-q and δ Raplacing "and" by "∧" and replacing "not" by ~ we then obtain

$(p \wedge -q) \vee -R$.

Notes-

Brackets are unnecessary to place because their associated law tell us that $(p \wedge -q) \vee -\delta$ is equivalent with $p \wedge (q \vee -\delta)$ and thus the statement $p \wedge -q \vee \delta$ is unambiguous.

Question # 1 (A)

Part (D)

Answer:

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

Note:

"Dataendbag is not "off" and ERROR equal 0" and Sum is not less then 1000.

Replacing the statement by p = q and r replacing by ∧ and replacing "and" by ∧ and "not" by ~ we then obtain

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

Question # 1

part # E

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

we can rewrite the given statement as

"Dataendbeg is off or ERROR equal to 0 and sum is less than 1000.

Replacing the statement by p, q and r replacing and into "∧" and or changed in to "∨"

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

Question #1

Part# B

Prove $(P \vee q) \rightarrow r = (P \rightarrow r) \wedge (q \rightarrow r)$

Answer:

$(P \vee q) \rightarrow r = (P \rightarrow r) \wedge (q \rightarrow r)$

Take R.H.S

$= (P \rightarrow r) \wedge (q \rightarrow r)$ ∨ = OR

$= (P \vee r) \wedge (q \vee r)$ ∧ = and

$= (P \wedge q) \vee \sim r$ → = not

$= s \vee \sim r$

$= s \rightarrow r$

$= (P \vee q) \rightarrow r$ So L.H.S proof

Question # 2

Part # A (a)

Answers-

Converse :-

General :-

p = "Howard can swim across the lake"

q = Howard can swim to the stand

$p \rightarrow q$

Converse :-

$p \rightarrow q$

Howard can swim to the Island

Howard can swim across the lake.

Inverse :-

$\neg p \rightarrow \neg q$

Howard cannot swim to the Island.

Howard cannot swim across the lake.

Contrapostive :-

$\neg q \rightarrow \neg p$ => Howard cannot swim across the lake. Howard cannot swim to the Island.

Question # 2

Part # A (b)

Answer

p = Today is Easter
q = Tomorrow is Monday.

Generalize -

If Today is Easter then Tomorrow is Monday = $p \rightarrow q$

Converse: -

$q \rightarrow p$

Tomorrow is Monday. Today is Easter.

Inverse: -

$\neg p \rightarrow \neg q$

Today is not Easter Tomorrow is not monday.

Contrapositive: -

$\neg p \rightarrow \neg q$

Tomorrow isn't Monday Today isn't Easter.

Question # 2

Part # B

Truth Table :-

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

Truth table

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

Question # 3

Answer:

Let

p = "This house is next to a lake"

q = The treasure is in the kitchen

r = The tree in the front yard is an elm.

s = The treasure is buried under the flagpole.

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

u = The treasure is in the garage.

We can translate the given sentence.

(a) $p \rightarrow \neg q$

(b) $r \rightarrow q$

(c) p

(d) $r \vee s$

(e) $t \rightarrow u$

Now:-

We will assume that the previous five premises are true and above

a Conclusion using rules of inference.

Step	Reason.
$P \rightarrow \neg q$	premise
$\gamma \rightarrow q$	Premise
P	Premise
$\gamma \vee s$	Premise
$t \rightarrow s$	premise
$\sim q$	Modus ponons of (1) and (5)
$\sim \gamma$	Modus tallens of (2) and (6)
s	Elimnation of (1) and (7)

We have then deived in step (s) that "b" is true and thus treasure is buried under the grapole.