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B TECH 3RD YEAR

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AIML
Tutorial 8

1.

a) P : If it is your birthday
Q : there will be a cake.

Symbolic notation :- $(P \vee Q) \rightarrow Q$

b) Truth table :-

P	Q	P ∨ Q	P ∨ Q → Q
F	F	F	T
F	T	T	T
T	F	T	F
T	T	T	T

c) If there is a cake we can conclude ~~that it's my birthday or~~ there is a cake already ~~or this is not so~~.

d) If there is not a cake, there, ~~there~~ is it is not my birthday and there is no cake here.

e) If the statement was a lie, then it means that it's my ~~birt~~ birthday but the statement Q is a lie.

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Ans 2: Truth table :

P	Q	P → Q	~(P → Q)	~Q	P ∧ ~Q
F	F	T	F	T	F
F	T	T	F	F	F
T	F	F	T	T	T
T	T	T	F	F	F

Hence, ~(P → Q) and P ∧ ~Q are equivalent, because their values according to the truth table are same.

Ans 3:

1. P: It rains
   Q: I will stay at home
   S: P → Q

2. P: I go to Australia
   Q: I will earn more money
   S: P → Q

3: P: He is good.
   Q: He is honest.
   S: P ∧ Q

4. P: a = b
   Q: b = c
   R: a = c
   S: (P ∧ Q) → R

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5. P: It is hot.
Q: It is cold.
S: $\sim(P \vee Q)$

6. P: He goes to play a match.
Q: It does not rain.
S: $P \leftrightarrow Q$

7. P: Birds fly.
Q: Sky is clear.
S: $P \leftrightarrow Q$

8. P: ~~I~~ will He stays.
Q: I will go.
S: $P \leftrightarrow Q$

9. P: He stays
Q: I will go
S: $P \rightarrow Q$

10. P: He is poor.
Q: He is not honest.
S: $\sim(P \wedge Q)$

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Ans 4: P: I have a ticket
Q: I can enter a movie theater

S1: $P \rightarrow Q$

Hence, Some conclusions are :-

- If I don't have a ticket, I can still enter a theater
- It is not possible to enter a movie theater without ticket.
- It is not possible that I have a ticket and I don't enter theater.
- Hence, truth doesn't hold.

The statement S1 is logically incorrect.

For S2,
P: I can enter a movie theatre
Q: I have a ticket.

S2: $P \rightarrow Q$.

Hence some conclusions are :-

- If I can't enter a theatre, that means I don't have a ticket.
- If I can enter a theatre, that means I have a ticket.

Hence, the statement S2 is logically correct.

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