

Name :

Admission Number :

Course :

Semester :

Subject :

ASSIGNMENT - 1

Ques - 1

Write the following statement in symbolic form.
here,

p : "The food is good"

q : "The service is good"

r : "The rating is three-star"

a) Either the food is good, or the service is good, or both

As 'v' allows both possibilities as well as either of them so the statement required is

$$\therefore p \vee q$$

b) Either the food is good or the service is good, but both.

This statement uses "exclusive or"

It can be denoted as

$$\therefore (p \wedge \bar{q}) \vee (\bar{p} \wedge q) \quad \text{OR} \quad p \oplus q$$

- b)
- c) The food is good while the service is poor.
"while" is interpreted as "and". Hence the statement is $p \wedge q$.
- d) It is not the case that both the food is good and the rating is three-star.
"It is not the case" implies negation. Hence the statement is $\neg(p \wedge r)$.
- e) If both the food and services are good, then the rating will be three-star.
The statement is $(p \wedge q) \rightarrow r$.
- f) It is not true that a three-star rating always means good food and good services.
The statement is $\neg(r \rightarrow (p \wedge q))$.

Que-2. Write the following statement in symbolic form:
here,

p : "The material is interesting"

q : "The exercises are challenging"

r : "The course is enjoyable"

- a) The material are interesting and the exercise are challenging.

Here "and" implies conjunction.

The statement is $p \wedge q$.

b) The material is interesting and the exercise are not challenging and the course is not enjoyable.

"not" here implies negation. The statement is $\neg p \wedge \neg q \wedge \neg r$.

c) If the material is not interesting, the exercise are not challenging then the course is not enjoyable.

The statement is $(\neg p \wedge \neg q) \rightarrow \neg r$.

d) The material interesting means the exercise are challenging and conversely.

Here conversely denotes bicondition. The statement is $p \leftrightarrow q$ or $p \equiv q$.

e) Either the material is interesting or the exercise are not challenging, but not both.

It is denoting "exclusive or". So, the statement can be denoted as $(p \oplus q)$ or $(p \wedge q)$.

Que-3 Write the following in symbolic form.

a) The sun is bright and the humidity is not high.

p : "The sun is bright"

q : "The humidity is high"

$\therefore p \wedge \neg q$

if we have

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- b) If I finish my homework before dinner and it does not rain, then I will go to the ball game.
Let p be the proposition "I finish my homework before dinner" and q be the proposition "It rains" and r be the proposition "I will go to the ball game."

$$\therefore (p \wedge \neg q) \rightarrow r$$

- c) If you do not see me tomorrow, it means I have to go to Chicago.

Let p be the proposition "You see me tomorrow" and q be the proposition "I have to go to Chicago"

$$\therefore \neg p \rightarrow q$$

- d) If the utility cost goes up or the request for additional funding is denied, then a new computer will be purchased if and only if we can show that current computing facilities are indeed not adequate.

Let p be the proposition "The utility cost goes up" q be the proposition "The request for additional funding is denied", r be "a new computer will be purchased" and s be the proposition "we can show that the current computing facilities are indeed adequate".

$$\therefore (p \vee q) \rightarrow (r \leftrightarrow \neg s)$$

Que-4 let p denote the statement "The weather is nice" and q denote the statement "we have a picnic". Translate the following in English and simplify if possible.

a) $p \wedge \bar{q}$

"The weather is nice and we do not have a picnic."

b) $p \leftrightarrow q$

"The weather is nice if and only if we have a picnic."

c) $\bar{q} \rightarrow \bar{p}$

"If we do not have a picnic, then the weather is not nice."

d) $(\bar{p} \vee q) (\bar{p} \wedge \bar{q})$

"It is not the case that the weather is not nice or we have a picnic or the weather is nice and we do not have a picnic."