**Rule of Inference**

1. Addition



He is a Rajesh

He is a either Rajesh or Ramesh.

1. Simplification



He is able to speak English and Hindi.

He is able to speak Hindi.

OR He is able to speak English.

1. Conjunction



He is able to speak Hindi.

He is able to speak English.

He is able to speak Hindi and English.

1. Modus Ponens





1. Modus Tollens





6)Hypothetical Syllogism







7)Disjunction Syllogism





8) Constructive Dilemma



Proof Home work

9) Destructive Dilemma



Proof Home work

**Example 1**

Can we conclude S from the following premises?

(1)

(2)

(3)

(4)

**Solution**

From premises (1) and (2), we have and . On taking conjunction rule in (1) and (2) gives

(-------(5)

Conjunction



Next taking De Morgan’s law in premises (3) gives

.------(6)

De Morgan’s law

Taking Destructive Dilemma in (5) and (6) gives

(()------(7)

Destructive Dilemma



Using Idempotent law in (7) gives

-------(8)

Next from premises (4), we have

------(9)

On making use of disjunctive syllogism in (8) and (9) gives

Disjunction Syllogism



Thus, S is the conclusion from the given premises.

**HOMEWORK**

**Example 2**

Can we conclude S from the following premises?

(1)

(2)

(3)

(4)

Answer :

No, we can’t conclude S from the premises.

**Example 3**

Derive **S** from the following premises using a valid argument.

(1) (2)

(3) (4) *R*

**Solution:**

From premises (1) and (2), we have and . On taking Hypothetical syllogism rule in (1) and (2) gives

-----(5)

Hypothetical Syllogism



From (4), We have ~(~R). ------(6)

Next taking Modus Tollens in (5) and (6), we have

[~(~R)].-------(7)

Modus Tollens



Next from premises (3), we have

------(8)

On making use of disjunctive syllogism in (7) and (8) gives

Disjunction Syllogism



Thus, S is the conclusion from the given premises.

**Example 4**

Check the validity of the following argument:

If Ram has completed B.E. or MBA, then he is assured of a good job. If Ram is assured of a good job, he is happy. Ram is not happy. So Ram has not completed MBA.

**Solution:**

Let **p:** Ram has completed B.E.

**q:** Ram has completed MBA.

**r:** Ram is assured of a good job.

**s:** Ram is happy.

The given premises are

(1)

(2)

(3)

The conclusion is ~q.

Solution : From premises (1) and (2), we have and . On taking hypothetical syllogism in (1) and (2) gives

𝑝∨𝑞→𝑠-----(4)

Hypothetical Syllogism



Using Modus Tollens in (3) and 4, we have

Modus Tollens



Which is equivalent to

~-----(5)

Taking Simplification rule in ~ gives ~

Thus, the conclusion is ~q.

**Example 5**

Check the validity of the following arguments:

If milk is black, then every cow is white. If every cow is white, then it has four leg. If every cow has four leg, then every buffalo is white and brisk. The milk is black.

Therefore, the buffalo is white.

**Solution:** Let

P: The milk is black.

Q: Every cow is white.

R: Every cow has four leg.

S: Every buffalo is white.

T: Every buffalo is brisk.

The given premises are

(1) (2)

(3) (4) P

The conclusion is S.

**Solution1:**

On using Modus Ponens in premises (1) and (4), we have

-----(5)

Modus Ponens



On using Modus Ponens in premises (2) and (5), we have

-----(6)

Modus Ponens



On using Modus Ponens in premises (3) and (6), we have

-----(7)

Modus Ponens



Therefore, the argument is valid.

Second Method is at NEXT PAGE.

Solution 2:

