Assign ment-03

(~PVQ) ∧ R→5 V(~R ∧Q)

1] I,: Pistrue, Ristaue, Risfalse, Sistrue.

Here,

Rule 2 gives ~P as false.

Rule 5 gives (~PVQ) as True.

Rule 4 gives (~PVQ) 1 R as false.

Rule 2 gives NR as True.

Rule 3 gives NRAQ as True.

Rule 4 gives 5v (~RAD) as True.

Rule 7 gives (NPVQ) NR -> 5 v (NR NQ) as True.

So, the statement I, is True.

臣 Iz: Pis true, Q is false, Ristone, Sis true.

Here, Rule 2 gives NP as false.

Rule 5 gives NP VQ as False.

Rule 3 gives (~PVQ) AR as false.

Rule 2 gives NR as False.

Rule 3) gives NRAQ as false.

Rule 4 gives 5 v (NR 1Q) as True.

Rule 7 gives (NPVQ) 1 R > 5 V (NR 1Q) as True. So, the statement In is True. kule 2 gives by as laber. Rule 5 gives (NVG) or True. in Rule 4 give (NINE) of R as lake Rule & gives MR AS True. Rule 4 gives EV (NRAB) AS True. Rule 7 gives (NPUE) AR 754 (NRAE) AS True. So, the stedement I, is true. 日 To: Pis true, & is false, Ristrue, Sis true. there. Rolle & gives of as Tolise. that to give of he as false. Holle 8 gives (NVS) 18 as Palae. tide 3 gives orkal as tolor.

| P | Q | (PAQ) | ~(PAQ) | (PAQ) V~(PAQ) |
|---|---|-------|--------|---------------|
| F | F | F | T | T |
| F | T | F | T | T |
| T | F | F | T | T |
| T | T | T | F | T |

So, S1 is valid because it is true for every interpretation

| P | P Q PV | | PVQ PAQ | | (PVQ)→(PAQ) |
|---|--------|-------|---------|------|---------------------|
| F | F | F | F | Т | T |
| F | ats | MIT a | F | A/E) | F |
| T | F | T | F | F | F |
| T | Т | T | T | F | POLICE THE PARTY OF |

So, 52 is satisfiable because those is some interpretation for which it is true.

53: (PAQ) → R V~Q

| P | Q | R | PAQ (X) | ~Q | R V~Q (Y) | ~X | $X \rightarrow Y$ |
|---|---|---|---------|----|--------------|----|-------------------|
| F | F | - | F | T | T | T | T |
| F | F | T | F | T | T | T | T |
| F | T | F | F | F | F | T | T |
| F | T | T | F | F | Т | T | Т |
| Т | F | F | F | Т | | Т | T |
| T | F | T | F | Т | T | T | Т |
| Т | Т | F | T | F | F | F | F |
| Т | T | T | T | F | Т | F | Т |

Let's assume,

$$P \wedge Q = X$$
 $R \vee Q = Y$

Here, Sz is satisfiable because there is some interpretation for which it is true.

S4: (PVQ) N(PV~Q) VP

| | P | Q | PVQ | ~ Q | PVNQ | X= X1 ^ X2 | XVP |
|---|---|---|-------------------|-----|-------------------|------------|-----|
| | F | F | (X ₁) | T | (× ₂) | F | E |
| 2 | F | T | Т | F | F | F | F |
| - | T | F | T | T | T | T | Т |
| | T | T | T | F | T | T | Т |

50, 5.

Let's assume,

$$P \vee Q = X_1$$

 $P \vee Q = X_2$

So, S4 is satisfiable because there is some interpretation on for which it is true.

S5: P-Q-NP

| P | R | ~P | ~ Q | Q→~P | $P \rightarrow Q \rightarrow \sim P$ |
|---|---|----|-----|------|--------------------------------------|
| F | F | Т | T | T | T |
| F | T | Т | F | Т | T |
| T | F | F | T | Т | Т |
| T | T | F | F | F | F |

So, 55 is satisfiable because there is some interpretation for which it is true.

56: PVQ A NPVNQ AP

| P | Q | ~P | ~Q | PVQ | ~PV~Q (X2) | $X = X_1 \wedge X_2$ | XVb |
|---|---|----|----|-----|---------------|----------------------|-----|
| F | F | T | T | F | T | F | F |
| F | T | T | F | T | T | T | F |
| Т | F | F | T | T | T | T | T |
| T | T | F | F | Т | F | F | F |

Let's assume,

$$PVQ = X_1$$

 $\sim PV \sim Q = X_2$

So, So is satisfiable because there is some interpretation for which it is true.

Meaning of Statements

If the earth moves round the sun or the sun moves round the ewith, then Copernicus might be a mathematician but wasn't an astronomer.

- Let's assume,

P= The earth moves round the sun.

Q= The sun moves round the earth.

R= Copernicus is a mathematician.

S = Copernicus was an astronomer.

50, the sentence will be: PVQ -> RINNS

It Inspite of having French nationality, B. Russel was a critic of imperialism, then eithor he was not a bachelor or he was a universal lover.

-> Let's assume,

P= have french nationality. Q= a critic of imperialism.

R= He was a bachelor.

5 = He was a universal lover.

So, the sentence will be: P-2 - (~R vs).

Examples of Predicate Logic (Page-12)

(LOVES (x,y))

> Everyone loves someone.

* Yx (HANDSOME (x) => => =y (LOVES(y,x)))

> Every handsome people are loved by some people.

* All men are mortal.

 $\Rightarrow \forall_x (Man(x) \Rightarrow Mortal(x))$

* Noone likes hartal.

>> Yx (~ LIKES (X, HARTAL))

* Everyone taking AI will pass their exam.

→ Yx (TAKING(x,AI) -> PASS(X))

* Every race has a winner.

 $\Rightarrow \forall x (RACE(X) \rightarrow \exists y (WINNER(Y,X))$

* Sajjad likes everyone who is tall.

→ Yx (TALL(x) -> LIKES (Sajjad, x))

* Rita doesn't like anyone who prefers arguments.

→ Vx (PREFERS ARGUMENT(X) → ~ LIKES (Rita, X))

* There is something small and slirny on the table.

=>=>=>= (SMALL(x) \ SLIMY(X) \ ON(x, table))