

Assignment No. 1

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INFT / A.

Q.1. LOGIC + LOGIC = PROLOG

$$\begin{array}{r} \text{L O G I C} \\ + \text{L O G I C} \\ \hline \text{P R O L O G} \end{array}$$

which can be map to.

$$\begin{array}{r} 9 0 4 1 5 4 2 \\ + 9 0 4 5 2 \\ \hline 1 8 0 9 0 4 \end{array}$$

$$\therefore L = 9$$

$$O = 0$$

$$G = 4$$

$$R = 8$$

$$I = 5$$

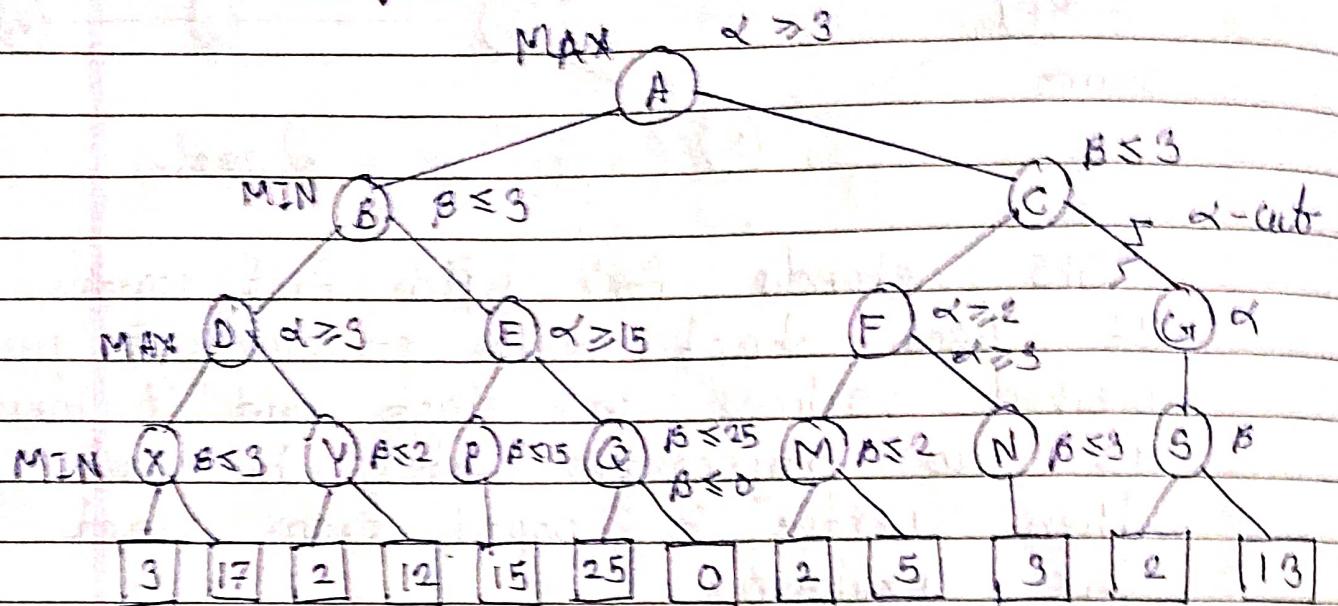
$$C = 2$$

$$P = 1$$

② α - β pruning

$$\alpha\text{-cut} = \beta(\text{child}) \leq \alpha(\text{parent})$$

$$\beta\text{-cut} = \alpha(\text{child}) > \beta(\text{parent})$$



There are two pruning in above tree

At node Y,

$$\beta(Y) \leq \alpha(B)$$

$$\beta(\text{child}) \leq \alpha(\text{parent})$$

$$2 \leq 3$$

α -cut

At node C,

$$\beta(C) \leq \alpha(A)$$

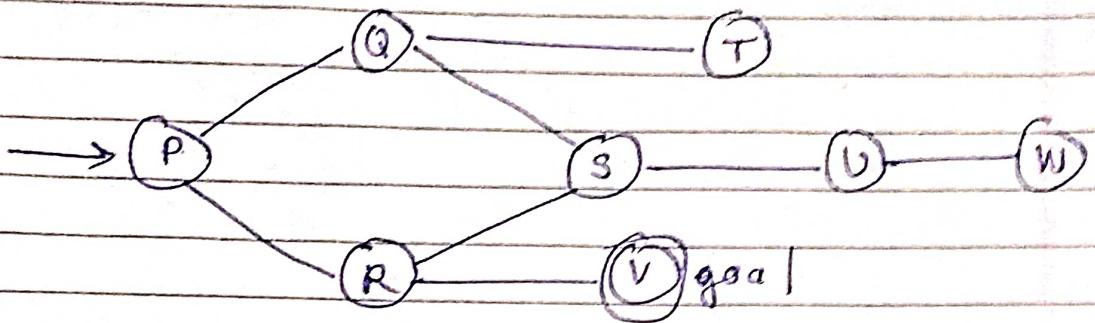
$$3 \leq 3$$

α -cut

prune [12]

prune Node [G]

Q.3



Step 1

open [P]
close [φ]

Step 2

open [R, Q]
close [P]

Step 3

open [V, S, Q]
close [P, R]

next node to be process is V
which is our goal

∴ path \Rightarrow P \rightarrow R \rightarrow V.

④ Convert below sentences to FOL

a] Any one with 2 or more spouse is biggermist.

→

$\text{spouse}(x) = x \text{ with spouse count}$
 $\text{biggermist}(x) = x \text{ is a biggermist.}$

$\exists x \text{ spouse}(x) \geq 2 \rightarrow \text{biggermist}(x)$

b] Every chicken is hatched from Egg

$\text{chicken}(x) = x \text{ is a chicken.}$

$\text{hatched}(x, y) = x \text{ is hatched from } y$

$\forall x, \text{chicken}(x) \rightarrow \text{hatched}(x, \text{egg})$

c] An equilateral triangle has all its sides and angle equivalent.

→ $\text{equilateral triangle}(x) = x \text{ is equilateral triangle.}$

$\text{equisides}(x) = \text{all sides of triangle}$
 $x \text{ are equivalent.}$

$\text{equiangles}(x) = \text{all angles of triangle}$
 $x \text{ are equivalent.}$

$\forall x, \text{equilateraltriangle}(x) \rightarrow \text{equisides}(x) \wedge \text{equiangles}(x)$

d] Some Indian likes temple.

$\text{Indian}(x) = x \text{ is a Indian}$

$\text{likes}(x, y) = x \text{ likes } y$

$\exists x, \text{Indian}(x) \rightarrow \text{likes}(x, \text{temple})$

e] An apple a day keeps doctor away

$\text{day}(x) : x \text{ is a day}$

$\text{person}(y) : y \text{ is a person}$

$\text{eatApple}(y, x) : \text{person } y \text{ eats apple on day } x$

$\text{away}(x, y) : \text{keep } y \text{ away from } x$

$\forall x, \exists y : \text{day}(x) \wedge \text{person}(y) \wedge \text{eatApple}(y, x)$

$\rightarrow \text{away}(x, \text{doctor})$

- ⑤ Draw resolution tree and prove "Manish is not in VIT"
- + Anyone in VIT knows someone who has bunked the class
- + If person has bunked a class, he has done something wrong.
- + If one has done something wrong then he can't be perfect.
- + Amit is in VIT
- + Only humans are imperfect.
- + Anyone manish knows is non-human

Step I: Predicate

- $\text{InVIT}(x) \Rightarrow x \text{ is in VIT}$
- $\text{knows}(x,y) \Rightarrow x \text{ knows } y$
- $\text{bunkclass}(x) \Rightarrow x \text{ bunk class}$
- $\text{donewrong}(x) \Rightarrow x \text{ has done wrong}$
- $\text{perfect}(x) \Rightarrow x \text{ is perfect}$
- $\text{human}(x) \Rightarrow x \text{ is human}$

Step II: FOL

- $\forall x : \text{InVIT}(x) \rightarrow \exists y : \text{knows}(x,y) \wedge \text{bunkclass}(y)$
- $\forall x : \text{bunkclass}(x) \rightarrow \text{donewrong}(x)$
- $\forall x : \text{donewrong}(x) \rightarrow \neg \text{perfect}(x)$
- $\text{InVIT}(\text{Amit})$
- $\forall x : \text{human}(x) \leftrightarrow \neg \text{perfect}(x)$
- $\forall x : \text{knows}(\text{manish}, x) \rightarrow \neg \text{human}(x)$

Step III : CNF

① $\sim \text{inVIT}(x) \vee [\text{knows}(x, \text{salil}) \wedge \text{bunkclass}(\text{salil})]$

i.e.

$[\sim \text{inVIT}(x) \vee \text{knows}(x, \text{salil})]$

$\wedge [\sim \text{inVIT}(x) \vee \text{bunkclass}(\text{salil})]$

a $\rightarrow \sim \text{inVIT}(x) \vee \text{knows}(x, \text{salil}) \checkmark$

b $\rightarrow \sim \text{inVIT}(x) \vee \text{bunkclass}(\text{salil}) \checkmark$

c $\rightarrow \text{inVIT}(\text{salil}) \vee \checkmark$

② $\sim \text{bunkclass}(x) \vee \text{doneWrong}(x) \checkmark$

③ $\sim \text{doneWrong}(x) \vee \sim \text{perfect}(x) \checkmark$

④ $\text{inVIT}(\text{amit})$

⑤ $\sim \text{human}(x) \vee \sim \text{perfect}(x)$

⑥ $\text{perfect}(x) \vee \text{human}(x) \checkmark$

⑦ $\sim \text{knows}(\text{manish}, x) \vee \sim \text{human}(x) \checkmark$

To prove Manish is not in VIT

i.e. $\sim \text{inVIT}(\text{manish})$

lets assume.

Manish is in VIT

i.e. $\text{inVIT}(\text{manish})$

Step IV: Resolution Tree.

① a

$\sim \text{inVIT}(x) \vee \text{knows}(x, \text{salil}) \quad \text{II} \quad \text{inVIT}(\text{manish})$

⑦

$\sim \text{knows}(\text{manish}, x) \quad \text{knows}(\text{manish}, \text{salil})$
 $\vee \sim \text{human}(x)$

⑥

$\text{perfect}(x) \vee \text{human}(x) \quad \sim \text{human}(\text{salil})$

③

$\sim \text{doneWrong}(x) \quad \text{perfect}(\text{salil})$
 $\vee \sim \text{perfect}(x)$

②

$\sim \text{bunkClass}(x) \vee \sim \text{doneWrong}(\text{salil})$

$\text{doneWrong}(x)$

x/salil

① b

$\sim \text{inVIT}(x) \vee \text{bunkClass}(x) \quad \sim \text{bunkClass}(\text{salil})$

x/salil

① c

$\text{inVIT}(\text{salil})$

$\sim \text{inVIT}(\text{salil})$

∴ our assumption is wrong ϕ

∴ $\sim \text{inVIT}$ is right ϕ

∴ Manish is not in VIT.

⑥ - write plan for student appearing for MHT CET 2021 engineering entrance exam

Initial State :

(Student, MHT CET - 2021)

Goal State :

Appearing (student, MHT CET - 2021)]

① Action [checkEligibility (student, MHT CET - 2021)]

Precondition \Rightarrow

Education (student, 12th) \wedge

Stream (student, Science) \wedge

Batch (student, 2021) \wedge

planning (student, Graduation).

Effects \Rightarrow

Eligible (student, MHT CET - 2021)

② Action [study (student, MHT CET - 2021)]

Precondition \Rightarrow

Eligible (student, MHT CET - 2021) \wedge

Ready (student, Books) \wedge

Joined (student, Coaching)

Effect \Rightarrow

prepared (student, MHT CET - 2021)

③ Action [Apply (student, MHICET - 2021)]

precondition \Rightarrow

Eligible (student, MHICET - 2021) \wedge
prepared (student, MHICET - 2021)

Effect \Rightarrow , student's preparation

Appearing (student, MHICET - 2021)