H. J. Thim Trust's
THEEM COLLEGE OF ENGINEERING

Experiment No:- 07 Date :

Aim:- prove the goal sentance from the following set of statements by Applying forward backward and resolution inference Algorithm.

- Forward chaining and Backward chaining:-

Example:- As per the law, it a crime for an American to sell weapons to Hostile nation. country Nono is an enemy of America. Nono has some missile, and all the missile, and all the missiles were sold to Nono by Robert. who is an American citizen.

Ans:- Fact conversion into FOL.

(1) It is a crime for an american to sell weapons to Hostile nations.

American (x) ∧ weapon (y) ∧ sell (x, y, z) ∧ Hostile (z) ⟶ criminal (x)

(2) An enemy of America is known as hostile.

Enemy (x, America) ⟶ Hostile (x)

(3) Nono is an enemy of America

Enemy (Nono ξ A ξ, America)

(4) Nono has some missile

owns (Nono, ξ A ξ m1 missile (m1)

H. J. Thim Trust's

THEEM COLLEGE OF ENGINEERING

Date : _____

(5) All the missiles were sold to nono by Robert

$\forall$ missile (m1) * owns (Nono, {A}, m1) → sell (Robert, T, Nono)

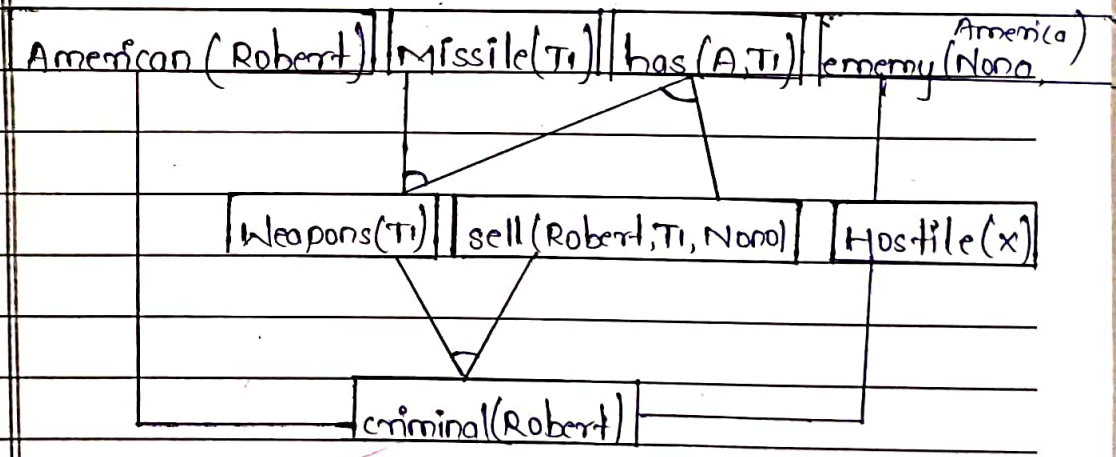
(6) Missile is a weapon

missile (m1) → weapon (m1)

(7) Robert is American

American (Robert)

• Forward chaining



Date :

- Backward chaining:-

"As per the law, it is a crime for an american to sell weapons to Hostile nation country Nono is an enemy of America. Nono has some missile, and all the missiles wer sold to NONO by Robert, who is American citizen prove that Robert is a criminal.

conversion of facts into FOL :-

a. American(x) ∧ weapon(y) ∧ sells(x,y,z) ∧ hostile(z) ⟶ criminal(x)

b. Enemy(Nono{A}, America)

c. Enemy(x, America) ⟶ Hostile(x)

d. has(Nono{A}, T_1)
Missile(T_1)

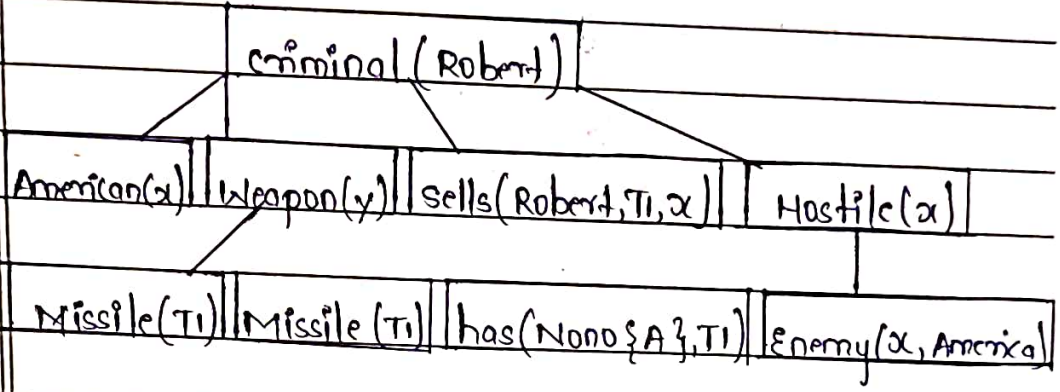
e. has(Nono{A}, T_1)

f. ∀T1: Missile(T_1) ∧ has(Nono{A}, T_1) ⟶ sell(Robert, T_1, Nono)

g. Missile(T_1) ⟶ weapon(T_1)

Date :

h. American (Robert)



Resolutions-

John likes all kind of food

Apple and vegetable are food

Anything anyone eats are not killed is food

Anil eats peanuts and still alive.

Harry eats everything that Anil eats

prove by resolution that 'John eats peanuts'

step(1):- conversion of facts into FOL.

a. $\forall x : food(x) \rightarrow likes(John, x)$

b. $food(apple) \wedge food(vegetable)$

c. $\forall(x)\,\forall(y) : eat(x,y) \wedge \sim kill(x) \rightarrow food(y)$

d. $eats(Anil, peanuts) \wedge alive(Anil)$

Date : _____

e. $\forall x$: eats (Anil, x) $\rightarrow$ eats (Harry, x)

f. $\forall x$: ~killed (x) $\rightarrow$ alive (x)

g. $\forall x$: ~alive (x) $\rightarrow$ killed (x)

h. likes (John, peanuts)

step(2):- Eliminate all the implication and replace them with or($\vee$) operator

a. $\forall x$: food (x) $\vee$ likes (John, x)

b. food (apple) $\wedge$ food (vegetable)

c. $\forall(x)\ \forall(y)$: eat(x, y) $\wedge$ ~killed (x) $\vee$ food(y)

d. eats (Anil, peanuts) $\wedge$ alive (Anil)

e. $\forall x$: eats (Anil, x) $\vee$ eats (Harry, x)

f. $\forall x$: ~killed (x) $\vee$ alive (x)

g. $\forall x$: ~alive (x) $\vee$ killed (x)

h. likes (John, peanuts)

Date : _____

2.ii Negate the predicates on the left of implication

a. $\forall x : \sim food(x) \vee likes(John, x)$

b. $food(x) \wedge food(vegetable)$

c. $\forall(x)\ \forall(y) \sim eats(x, y) \vee killed(x) \vee food(y)$

d. $eats(Anil, peanuts) \wedge alive(Anil)$

e. $\forall x \sim eats(Anil, x) \vee eats(Harry, x)$

f. $\forall x \sim killed(x) \vee alive(x)$

g. $\forall x \sim alive(x) \vee killed(x)$

h. $likes(John, peanuts)$

2.iii use standard variable for each predicate.

a. $\forall x : \sim food(x) \vee likes(John, x)$

b. $food(Apple) \wedge food(vegetables)$

c. $\forall y \forall z : \sim eats(x, z) \vee killed(y) \vee food(z)$

Date :

d. eats(Anil, peanut) ∧ alive(Anil)

e. ∀W : ~ eats(Anil, W) ∨ eats(Harry, W)

f. ∀q : ~ killed(q) ∨ alive(q)

g. ∀k : ~ alive(k) ∨ killed(k)

h. likes(Jobo, peanut)

2.iv Eliminate all the quantifiers

a. ~ food(x) ∨ likes(Jobo, x)

b. food(Apple)

c. food(vegetables)

d. ~ eats(y, z) ∨ killed(y) ∨ food(z)

e. eats(Anil, peanut)

f. alive(Anil)

g. ~ eats(Anil, W) ∨ eats(Harry, W)

h. killed(q) ∨ alive(q)

i. ~ alive(k) ∨ ~ killed(k)

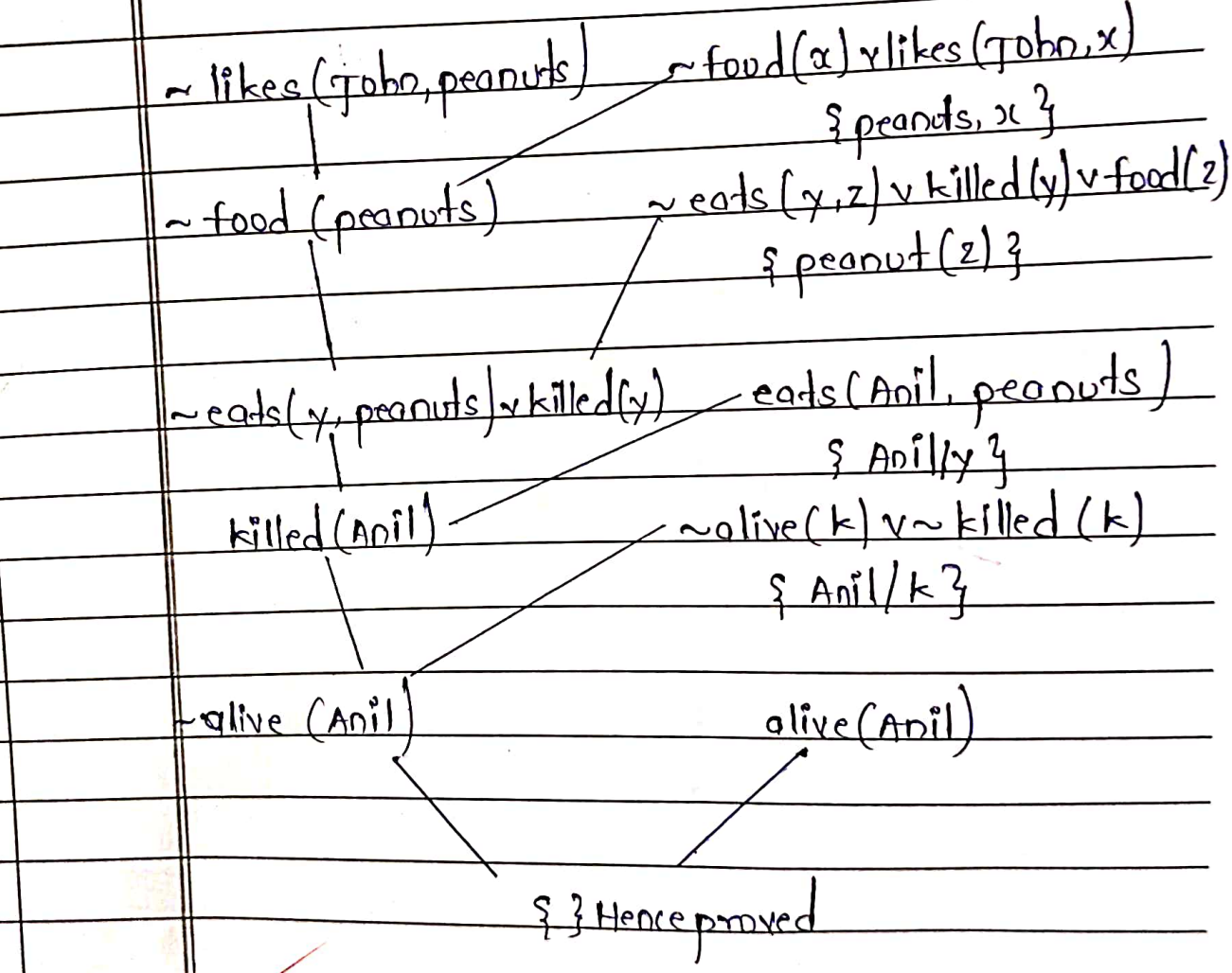
j. likes(Jobo, peanuts)

Date :

step(3):- Negate the statement to be proved.

~like (John, peanut)

step(4):- Draw a resolution graph



conclusion:- Hence, we proved the goals for the backward, forward and resolution inference algorithm.