

## Assignment - 5

Date :

Page No.:

Ans-1)  $SI \rightarrow$  Statement in propositional logic

```
function CHECK-TRUE(SI):  
  input ( $SI \rightarrow$  Sentence);  
  KB  $\leftarrow$  Knowledge Base,  
  Symbols  $\leftarrow$  a list of propositional symbols  
  return TT-ENTAILS(KB, SI)
```

```
function TT-ENTAILS(KB, SI):  
  Symbols  $\leftarrow$  A list of propositional symbols in  
  KB & SI  
  return TT-CHECKALL(KB, SI, Symbols, { })
```

```
function TT-CHECK-ALL(KB, SI, Symbols, model):  
  if EMPTY(Symbols) then  
    if PL-TRUE(KB, model) then return  
    PL-TRUE(KB, model)  
  else  
    return true // When KB false, always ret. true.
```

```
  else do  
    P  $\leftarrow$  FIRST(Symbols)  
    rest  $\leftarrow$  REST(Symbols)  
    return (TT-CHECK-ALL(KB, SI, rest, model  $\cup$  {P=true})  
    and TT-CHECK-ALL(KB, SI, rest, model  $\cup$  {P=false}))
```

PL-True() returns true if sentence holds within model.



Ans-2) function CHECK-EQUIVALENCE(KB1, KB2):

input: KB1: Knowledge Base 1

KB2: Knowledge Base 2

$A \rightarrow$  Statement a,  $B \rightarrow$  Statement b.

Given:  $A \Leftrightarrow B$

// In order to check-equivalence of KB1 & KB2,

// we need to check whether KB1 entails A,

// and KB2 entails B.

if ((PL-RESOLUTION(KB1, A)) && (PL-RESOLUTION(KB2, B)))

return true;

return false;

fun. PL-RESOLUTION(KB,  $\alpha$ ):

input: KB  $\rightarrow$  Knowledge Base,  $\alpha \rightarrow$  sentence in <sup>Prop.</sup> Logic  
clauses  $\leftarrow$  set of clauses in CNF representation  
of  $KB \wedge \neg \alpha$ .

new  $\leftarrow \{ \}$

loop do

for each pair of clauses  $C_i, C_j$  in clauses do

resolvent  $\leftarrow$  PL-RESOLVE( $C_i, C_j$ )

if (resolvents contain empty clause)

return true.

new  $\leftarrow$  new  $\cup$  resolvents

if (new  $\subseteq$  clauses)

return false

clauses  $\leftarrow$  clauses  $\cup$  new.

1

Date : \_\_\_\_\_  
Page No.: \_\_\_\_\_

3 a) On referring the above truth-table there is no row in which the Statement is false and the Knowledge Base is true. Hence, KB entails SI.

3 b) On changing the KB to  $\text{NOT}(\text{KB})$ , and SI to  $\text{NOT}(\text{SI})$ , there are 2 rows in which the statement is false and the Knowledge Base is true. Hence  $\text{NOT}(\text{KB})$  does not entail (SI).

4) a)  $A \Rightarrow (\text{NOT}(C \text{ OR } B))$

CNF  $\rightarrow \text{NOT}(A) \text{ OR } (\text{NOT}(C \text{ OR } B))$

b)  $(\text{NOT}(C \text{ OR } B)) \Rightarrow A$

CNF  $\rightarrow \text{NOT}(\text{NOT}(C \text{ OR } B)) \text{ OR } A$   
 $\Rightarrow (C \text{ OR } B) \text{ OR } A$