

Question1
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1. A) [3 Marks] each item can take one mark, but maximum of 3 marks (so as if we have one question extra in case one of the items in this question was incorrectly answered.

a) Some people are not angry.

$$\exists x \neg A(x)$$

b) All tall people are friendly.

$$\forall x (T(x) \rightarrow F(x))$$

c) No friendly people are angry.

$$\neg \exists x (F(x) \wedge A(x))$$

Or

$$\forall x \neg (F(x) \wedge A(x))$$

Or

$$\forall x (\neg F(x) \vee \neg A(x))$$

d) If a person is friendly, then that person is not angry

$$\forall x (F(x) \rightarrow \neg A(x))$$

Or

$$\forall x (\neg F(x) \vee \neg A(x))$$

Or

$$\forall x \neg (F(x) \wedge A(x))$$

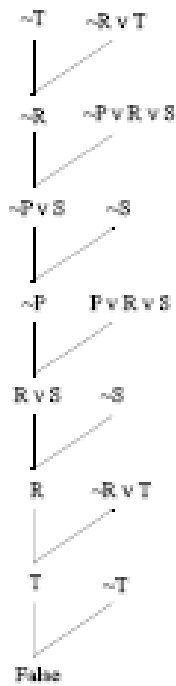
B) [2 Marks] You are given the following sentences in Propositional Logic defining a knowledge base.

1.  $P \rightarrow R \vee S$ ,
2.  $\neg P \rightarrow R \vee S$ ,
3.  $\neg S$ ,
4.  $(R \vee U) \rightarrow T$

I. Convert the premise sentences into conjunctive normal form (CNF)

1.  $\neg P \vee R \vee S$ ,
2.  $P \vee R \vee S$ ,
3.  $\neg S$ ,
4.  $\neg R \vee T$ ,
5.  $\neg U \vee T$

Prove[ 1Mark]



**[3 Marks] 1 mark per each column**

KR scheme	Frame	Semantic Networks	First Order Logic
Knowledge representation elements (Syntax)	1- Class 2-Slot 3-slot value	1- node  2- arc	1- predicate 2- variable 3- Quantifier 4- connectives
Inference Mechanism	1- inheritance  2- multiple inheritance 3-	[1] inheritance  3- intersection	1- resolution  2- Unification 3- Contradiction

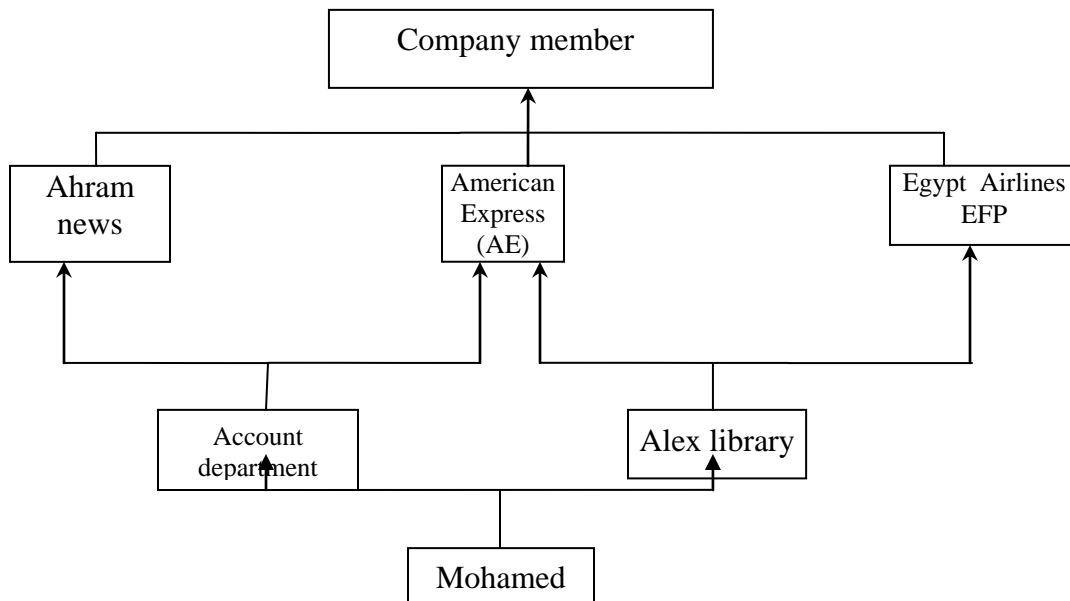
B) Consider the following frame system which presents the following: **(2 marks)**

Assume also that Mohamed works at Account department and member in Alex library

A. Give the class precedence list for Mohamed

B. Suppose that AN, AE, and EFP provide discounted subscriptions to Science Magazine for their members with the following percentage:

AN (40%), AE (30%) and EFP (20%) respectively. Which discount will Mohamed obtain when he subscribes to the magazine? (based on his class precedence list)



**b) Class Precedence list :**

1- . [1Mark]

Account department - Ahram news - Alex library-AE member- Egypt Airlines (EFP)-company

2- [1Mark]

Discount is 40%