Answer All Questions

Question 1:

a) Using a truth table, show that the sentence $((P \wedge Q) \rightarrow R) \equiv (\neg P \vee \neg Q \vee R)$ is true.

b) A new operator, $\oplus$, may be defined by the following truth table: Create a propositional calculus expression using only $\wedge$, $\vee$, and $\neg$ that is equivalent to $P \oplus Q$. Prove their equivalence using truth tables.

P	Q	P $\oplus$ Q
T	T	F
T	F	T
F	T	T
F	F	F

Question 2:

a) Attempt to unify the following pairs of expressions. Either show their most general unifiers or explain why they will not unify.
   i) p(X,Y) and p(a,Z).
   ii) p(X,X) and p(a,b).
   iii) ancestor(X,Y) and ancestor(bill,father(bill)).
   iv) ancestor(X,father(X)) and ancestor(david,george).
   v) q(X) and $\neg$ q(a).

b) What are the stem and the root of the following words?
   الحاسبات, Book, Recharge, شهادة, Directions, الطلاب, Unreadable, عمالة, كتابكم

Question 3:

a) Compare between the Knowledge acquisition and Knowledge elicitation.
b) List some of difficulties in knowledge elicitation.
c) Explain the Spiral Model For Expert System Development.
d) Represent the following statements in Semantic Net representation
   All mammals are animals.
   Bear is a mammal, and mammal is an animal.
   Animals have 4 legs.
   All animals give birth.
   Bear hibernate from fall to winter.

Question 4:

Build a finite state acceptor that recognizes the following strings of binary digits:
a) That contain "011".
b) That end in "011".
c) That contain "011" but not contain more than two consecutive "1"s.
d) That end in "111".
e) That contain "111" but not more than three consecutive "1"s.

Question 5:

Consider the following rules:
Rule1: if the soil type is clay, and the leaf color is yellow,
      then the disorder is Nitrogen Deficiency.
Rule2: if the leaf color does not yellow, and the stem malformation does not spindly,
       then the disorder is Powdery Mildew.
Rule3: if the leaf color does not yellow, and the stem malformation is spindly
       then the disorder is the Phosphors Deficiency.
Rule4: if the soil status is cohesive, and the soil color is dark
       then the soil type is clay.

Suppose the soil status is cohesive, the soil color is dark, and the leaf color is yellow, simulate the following:
   i. The back chain and its explanation model by the goal "the disorder is X".
   ii. The forward chain   **Good Luck**