**Ain Shams University**
**Artificial Intelligence** **June 2010**
**Fourth Year** **Second Semester**
**Time: 3 Hours** **Final Exam**

---

**Question 1:**

a. The logical operator "↔" is read "if and only if." P ↔ Q is defined as being equivalent to (P → Q) ^ (Q → P). Based on this definition, show that P ↔ Q is logically equivalent to (P v Q) → (P ^ Q) By using truth tables.

b. Prove that implication is transitive in the propositional calculus, that is, that ((P → Q) ^ (Q → R)) → (P →R).

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

**Question 2:**

a. Represent the following statement in Semantic Net representation
All robins are birds.
Clyde is a robin, and robin is a bird.
Birds have wings.
All Birds have Nests.
Clyde owned Nest from spring to fall.

b. Define the Frames as a knowledge representation technique. Give examples.

c. Compare between the knowledge acquisition and knowledge elicitation.

**Question 3:**

"Hand run" the Depth-First algorithm on the following graph. Begin from state A.