Paper Code	Examiner	Department	Ext
CSE 202		Computer Science & Software Engineering	

Xi'an Jiaotong-Liverpool University

西交利物浦大学

2016/17 Semester 2 - Final Exam

Bachelor Degree - Year 3

Introduction to Artificial Intelligence

Time Allowed : 2 Hours

Instructions to Candidates

1. Total marks available are 100. This exam will count for 80% in the final assessment.
2. Answer all questions.
3. The number in the column on the right indicates marks available for each section.
4. Answers should be written in the answer booklet(s) provided.
5. All the answers must be in English.

Question 2 (20 marks)

Answer the following questions. Each question is worth 5 points.

1. What are the fundamental components of an Expert System?.

2. What are the main differences between symbolic AI and Deep Learning?

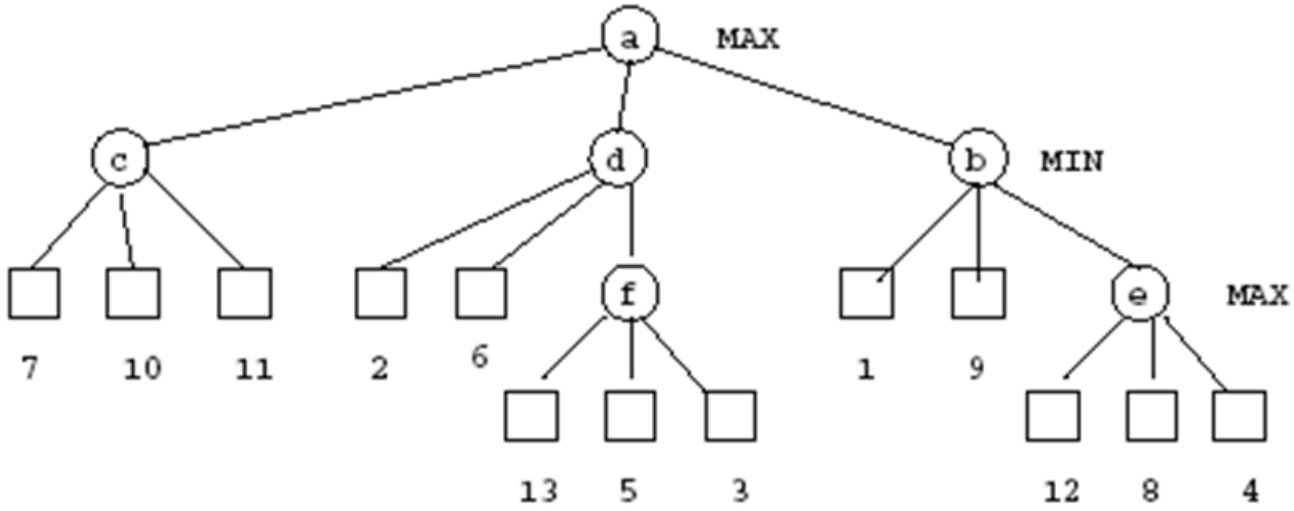
3. Rational agents are often specified by a PEAS description. What does each of the letters in the acronym PEAS stand for? For an Automated Taxi Driver system, give the PEAS descriptions.

4. In your opinion, what are the main problems of Expert Systems?

Question 3 (15 marks)

Questions on Game Playing. There are 15 points in total.

Consider a Game Playing problem. Using the following Minimax tree,



answer the following questions:

(a) What score is guaranteed for MAX?

(b) Indicate all the nodes (by giving their values) that are pruned using pruning, assuming the search always goes RIGHT to LEFT (generates nodes b and e first etc.)

Question 4 (15 marks)

Question on propositional logic. There are 15 points in total.

Assume that A, B, C, D, E and F are propositions and the following sentences are in a knowledge base ($\neg A$ denotes the negation of A):

$$\neg A$$
$$\neg A \Rightarrow \neg B \wedge \neg C$$
$$\neg B \Rightarrow \neg D \wedge \neg E$$
$$\neg C \Rightarrow D \vee E \vee F$$

Using the inference rules for propositional logic, prove that "F is true". When you derive F, specify exactly the sequence of inference rules that you have used.

Question 5 (20 marks)

Answer the following questions on Predicate Logic. Each question is worth 10 points.

(1) Translate the following English sentences into predicate logic where the universe is the set of people. Assume the allowable predicates:
$S(x)$: x is a student.
$F(x, y)$: x and y are friends.
$O(x, y)$: x is older than y.

a) Every student has a friend who is also a student.

b) There is someone who is older than all of his/her friends.

(2) Write a predicate logic statement equivalent to the negation of each of the statements above that DOES NOT USE negation anywhere except immediately in front of the predicate symbols S, F, and O.

End of paper