UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE *of* INFORMATICS *and* ELECTRONICS

Department of Computer Science
and Information Systems

End of Semester Assessment Paper

Academic Year:	2006/2007	Semester:	Repeat
Module Title:	Artificial Intelligence/ Intelligent Systems	Module Code:	CS4816/4006
Duration of Exam:	2½ Hours	Percent of Total Marks:	100
Lecturer(s):	Dr. M. Eaton	Paper marked out of :	100

Instructions to Candidates:

- Answer ALL questions.
- All questions carry equal marks.
- 100% this exam

Q1. a) Describe the POE model of bio-inspired intelligent systems explaining the function of each of the three axes in this model. Outline how POE axes can be combined in order to create novel bio-inspired systems.

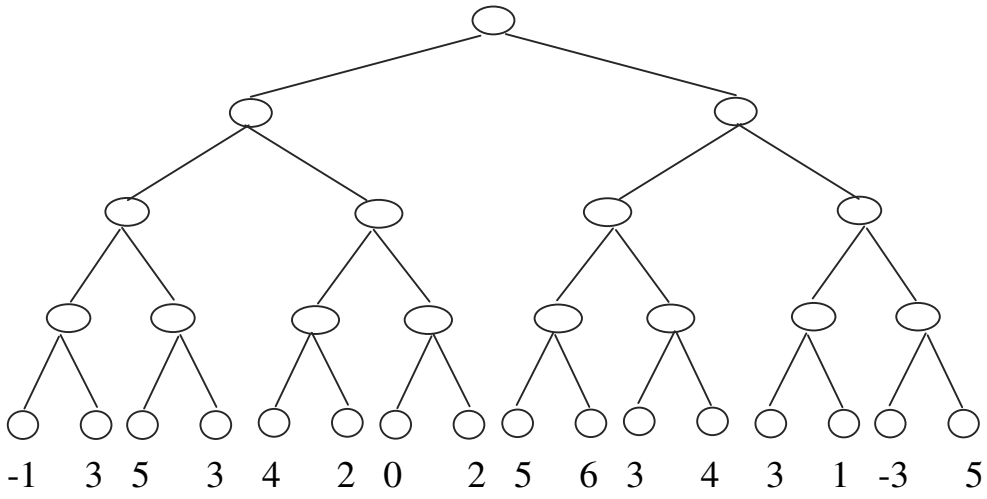
12 Marks

b) Describe the three different types of artificial neural network learning paradigms- supervised, unsupervised, and reinforcement learning. Give the advantages, disadvantages, and potential application areas of each type of learning.

13 Marks

Q2 a) The following tree shows the evaluations for a set of possible moves in a game following on from your current position **A**. Draw out the tree and <u>*indicate on it*</u> - using the principles of ***MiniMax*** search - which moves you would make in the tree (mark the node with an X) and which move your opponent would make (mark the node with a Y). Also indicate which levels are maximising and which levels are minimising levels relative to **A**.

Describe very simply how you arrive at the choice, i.e. outline you application of ***MiniMax*** to the tree. What are the limitations of MiniMax search?



17 Marks

b) Describe how the the ***AlphaBeta*** search Algorithm differs from *MiniMax.* What aspect of *MiniMax* search does it aim to improve on?

8 Marks

Q3. a) What is an Expert System? Outline and describe its components. Describe the ways in which inferences can be drawn in an Expert System, and how the designers of expert systems try to cope with *uncertainty* in the data and inference rules used by these systems.

13 Marks

b) Given the facts

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suckles young, warm-blooded, lives in sea, hindflippers
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And the following rules:

1. *eats meat* ***carnivore***
2. *suckles young* ***and*** *warm-blooded* ***mammal***
3. *hind flippers* ***pinniped***
4. *pinniped* ***and*** *mammal* ***seal***
5. ***not*** *warm-blooded* ***and*** *lives in sea* ***fish***

Apply the inference mechanism you have described in the previous section in a forward fashion to establish the identity of the facts

12 Marks

Q4 a) Specify in outline the procedure for Resolution.

12 Marks

b) Given the following sentence

when it is cold or it is icy it is winter and when it is hot it is summer

Now using:

I = it is icy

C = it is cold

H = it is hot

W = it is winter

S = it is summer

What does this sentence look like in clause form?

We are told that it is hot (H), now use resolution to prove that it is summer (S)

13 Marks