GX1479

OLLSCOIL NA hÉIREANN
The National University of Ireland

NATIONAL UNIVERSITY OF IRELAND, GALWAY

SEMESTER 1 EXAMINATIONS 2003

THIRD UNIVERSITY EXAMINATION IN ARTS AND BSC EXAMINATION:
3BA1, 4BA4, 4BO2, 1SD1

CT319

ARTIFICIAL INTELLIGENCE

Prof. D. Bell
Prof. G. Lyons
Dr. C. Mulvihill

Candidates are required to answer any **THREE** questions
Answer all components of each question
All questions carry equal marks
Time allowed: **TWO hours**

1.
(a) Discuss what is meant by a finite state machine, explaining the terms 'state' and 'transition' in the course of your answer (10 marks)
(b) Develop a state transition table that specifies the behaviour of a patrolling guard creature. Use the states 'asleep', awake', patrolling' and the inputs 'enemy approaches' and 'alarm' (15 marks)

2.
(a) In the context of a genetic algorithm, explain the terms 'chromosome' and 'fitness function' (6 marks)
(b) Give your understanding of the overall working of a genetic algorithm (11 marks)
(c) Briefly outline how a chromosome could be encoded to assist in navigating out of a maze (8 marks)

3.
(a) What do you understand by the term 'artificial immune system'? (10 marks)
(b) By considering the patterns

010	010	010	010
101	101	111	001

and the initialisations

101	101	101	101
010	010	000	110
110	010	010	010
101	001	101	101
111	101	111	001

show how an immune system may be trained to recognise a 1 and a 4 (15 marks)

4.
(a) What do you understand by the term 'emergence'? (8 marks)
(b) By considering the Verbarium work of Sommerer and Mignonneau or the Autopoiesis work of Rinaldo, briefly discuss the role of interaction in emergent systems (10 marks)
(c) Does work of the type discussed in (b) qualify for the label 'artificially intelligent' in your opinion? (7 marks)

5.
'Artificial Intelligence is increasingly drawing on biological models for inspiration'
Discuss this statement. (25 marks)