

PAPER CODE NO.
COMP210

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THE UNIVERSITY
of LIVERPOOL

SUMMER 2001 EXAMINATIONS

Bachelor of Arts : Year 2
Bachelor of Arts : Year 3
Bachelor of Science : Year 2

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

TIME ALLOWED : Two Hours

INSTRUCTIONS TO CANDIDATES

SECTION A: Answer all 10 questions.

SECTION B: Credit will be given for the best 3 answers.

If you attempt to answer more than the required number of questions (in any section), the marks awarded for the excess questions will be discarded (starting with your lowest mark).

Section A.

Each question is worth 4 marks:

1. What is an agent?
2. What is a non-deterministic environment?
3. In the context of state-space search, what is a heuristic?
4. Give two desirable features of a knowledge representation scheme.
5. In the context of a rule-based system, what is “working memory”?
6. What is an expert system?
7. In the context of propositional logic, what is an interpretation?
8. Give an example of an argument in propositional logic.
9. In the context of intelligent agents, what is planning?
10. What is the frame problem?

Section B

Answer 3 of the questions below.

Each question is worth 20 marks.

1. (a) What are the components of a state-space search problem? (6 marks)
(b) Briefly describe both breadth-first and depth first search of a state-space. (10 marks)
(c) Why is depth first search preferable to breadth first search in some situations? (4 marks)
2. (a) Describe the architecture of a typical expert system. (9 marks)
(b) What is the control strategy used by the expert system MYCIN? (8 marks)
(c) Give one general problem with the development and use of expert systems. (3 marks)
3. (a) Draw a semantic network that represents the following statements
Chevette is a courier
Rydell is a policeman
Couriers are a kind of person
Policemen are a kind of person
Chevette is a friend of Rydell
Chevette picked up the sunglasses at the party. (10 marks)
(b) Using your answer to (a), explain how inference is performed in a semantic network (5 marks)
(c) Give an example of a statement that it is hard to represent using a semantic network, and explain why it is hard to represent it. (5 marks)
4. (a) Using a truth table, show that in propositional logic:
$$p \wedge (p \Rightarrow q) \vdash q$$
 (10 marks)
(b) What does it mean for a proof system to be sound with respect to some semantics? (5 marks)
(c) Describe how a proof problem can be formulated as a search problem. (5 marks)