16342(D)

M. Tech 3rd Semester Examination

Artificial Intelligence and Expert Systems

CSE1-E02

Time : 3 Hours   Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one from each of the Sections A, B, C & D. Section E is compulsory.

SECTION - A

1. (a) What do you mean by artificial intelligence? Mention some of the characteristics of artificial intelligence. Also mention some examples which require intelligence.   (10)

   (b) What are the differences between an expert system and knowledge based system? Explain, and use examples to support your answer.   (10)

2. (a) Illustrate two hard problems that artificial intelligence research has not yet been able to solve.   (10)

   (b) What is the relationship between alpha-beta pruning and min-max search?   (10)

SECTION - B

3. (a) Give description of syntax, semantics and a proof theory for propositional logic.   (10)

   (b) Using truth table, prove that $P \Leftrightarrow Q$ is equivalent to $(P \Rightarrow Q) \wedge (Q \Leftarrow P)$.   (10)

4. (a) Explain structural knowledge. How knowledge can be represented using graphs?   (10)

   (b) Explain First Order Predicate Logic. In this context, what do you mean by valid formula and satisfiable?   (10)

SECTION - C

5. (a) Describe natural language processing. What are various applications of natural language processing?   (10)

   (b) Explain why we often use statistical models in NLP. Give examples of two statistical models used in NLP.   (10)

6. (a) What is the difference among top-down parsing, recursive descent parsing and bottom-up parsing strategy? Explain using examples.   (10)

   (b) What is difference between syntactic processing and semantic analysis? Give an example of NLP application in which we need to code semantic features.   (10)

SECTION - D

7. (a) Define expert systems. Discuss the architecture of an expert system.   (10)

   (b) What are advantages of speech recognition system? Explain the architecture of speech recognition system.   (10)

8. (a) What are the principle guidelines to choose whether a problem is appropriate for expert system solutions? (10)

   (b) Explain pattern recognition system. Describe various pattern classification schemes.   (10)

SECTION - E

9. (a) Differentiate among data, information and knowledge.

   (b) What is state space?

   (c) Describe Turing test.

   (d) What is rule based system?

   (e) Describe some of the limitations of expert system.

   (f) What is the role of a knowledge engineer?

   (g) Describe the role of an inference engine.

   (h) Give two examples of programming languages that are suitable for artificial intelligence. List their features that make them suitable for such applications.

   (i) Define an intelligent agent. Why is it useful?

   (j) Explain two engineering applications of expert systems.

                                                      (2x10=20)