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Question Paper Code : 52872

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2019.

Fifth/Sixth Semester

Computer Science and Engineering

CS 6659 — ARTIFICIAL INTELLIGENCE

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Information Technology)

(Regulation 2013)

(Also Common to PTCS 6659 – Artificial Intelligence for B.E. (Part-Time) Computer Science and Engineering – Fifth Semester – Regulations – 2014)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List down the characteristics of Production system.
2. What are the performance measures used for analysing the search algorithms?
3. Distinguish between predicate logic and propositional logic.
4. Represent the following in Semantic Net, "All students like the subject AI".
5. List down the issues in Bayes theorem to deal with uncertain reasoning systems.
6. Define Fuzzification.
7. Distinguish between continuous planning and conditional planning.
8. List down the various Machine learning techniques.
9. List down the characteristics of Expert System.
10. What is the need of an Expert system Shell?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Analyse the following problems with respect to the seven problem characteristics :

- (1) Travelling salesman problem
- (2) 8-puzzle problem
- (3) Towers of Hanoi
- (4) Chess. (8)

(ii) Explain Best First search algorithm with an example. (5)

Or

(b) (i) Explain the constraint satisfaction procedure to solve the cryptarithmic problem.

$$\begin{array}{r} \text{CROSS} \\ + \text{ROADS} \\ \hline \text{DANGER} \end{array} \quad (7)$$

(ii) Explain AO^* algorithm with an example. (6)

12. (a) (i) Explain the Min Max game playing algorithm with an example. (6)

(ii) Consider the following facts

- (1) All students in 4th year are intelligent
- (2) Raja is a 4th year student
- (3) Ragu is a 3rd year student
- (4) 3rd year students are not intelligent
- (5) 4th year students have no friends in 3rd year

Represent the facts in predicate, convert to clause form and prove by resolution, "Raja is not friend of Ragu". (7)

Or

(b) (i) Explain the unification algorithm with an example. (6)

(ii) Consider the following facts

- (1) There are 5000 employees in XYZ company
- (2) Employees earning more than Rs.25000/ annum pay tax
- (3) John is a manager in XYZ company
- (4) Manager earns Rs.50,000

Represent the facts in predicate, convert to clause form and prove by resolution, "John pays tax". (7)

13. (a) (i) Explain Dempster Shafer theory with an example. (6)
(ii) How is reasoning done in Bayesian network? (7)

Or

- (b) (i) Explain the concept of knowledge representation using Frame based system. (6)
(ii) What are fuzzy membership functions? Explain them with examples. (7)
14. (a) (i) Distinguish between STRIPS and ADL. (5)
(ii) Explain the concept of learning using neural networks with an example. (8)

Or

- (b) (i) Explain the concept of learning by parameter adjustment and learning by Macro operators. (8)
(ii) Explain the concept of learning using genetic algorithm (5)
15. (a) Explain the architecture of an expert system with a block diagram.

Or

- (b) Explain on the design principles involved in the following Expert systems.
(i) MYCIN
(ii) DART

PART C — (1 × 15 = 15 marks)

16. (a) (i) Design a fuzzy washing machine that can decide the speed of its motor based on dirt level (low medium, high, large), cloth type (cotton, wool, silk, blankets) and cloth weight (min, med, max). Design the table to specify the membership value related to each fuzzy term. Fix the speed of motor as 10 rpm, 20 rpm and 30 rpm. Derive rules for fixing motor speed. (10)
(ii) Show how JTMS could be used in medical diagnosis. Consider the rules such as, "If you have a runny nose assume you have cold unless it is allergy season". (5)

Or

- (b) (i) A diagnostic test has a probability 0.95 of giving a positive result when applied to a person suffering from a certain disease, and a probability 0.10 of giving a (false) positive when applied to a non-sufferer. It is estimated that 0.5 % of the population are sufferers. Suppose that the test is now administered to a person about whom we have no relevant information relating to the disease (apart from the fact that he/she comes from this population). Calculate the following probabilities:
- (1) that the test result will be positive;
 - (2) that, given a positive result, the person is a sufferer;
 - (3) that, given a negative result, the person is a non-sufferer;
 - (4) that the person will be misclassified. (8)
- (ii) You have 12 litres of apple juice in a 12 litres bucket and you want share it with your best friend. But you have all empty 8-litre and an empty 5-litre bottle. Design the production system for it. (7)
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