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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: VII**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 20IS7OEAIM **Max Marks: 100**
Course: Artificial Intelligence and Machine Learning

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably assumed.

UNIT - I

1 a) With the help of Schematic diagram, explain the working of simple reflex agents. **06**

b) Suppose that the performance measure is concerned with just the first T time steps of the environment and ignores everything thereafter. Illustrate that a rational agent's action may depend not just on the state of the environment but also on the time step it has reached. **04**

c) Define the term uninformed search strategies. Design an algorithm for Breadth-first search as general graph-search algorithm and comment on time and space complexity for the same. **10**

UNIT - II

2 a) Describe the Stages in a greedy best-first search for reaching the goal state with the straight-line distance heuristic h_{SLD}. Also give conditions for optimality. **10**

b) Explain how constraint satisfaction problem can be applied to a cryptarithmetic problem. **10**

OR

3 a) Write A* search algorithm. Illustrate with an example. **10**

b) Write the simple Hill climbing algorithm. Explain with an example. How is simple Hill climbing different form Steepest-Ascent Hill Climbing. **10**

UNIT - III

4 a) What do you mean by well posed learning problem? Explain with an example. **08**

b) Consider the below training examples which finds malignant tumors from MRI scans. Show the specific and general boundaries of the version space after applying candidate elimination algorithm. (Note: Malignant is +ve, Benign is –ve) **12**

Example	Shape	Size	Color	Surface	Thickness	Target
1.	Circular	Small	Light	Smooth	Thick	Benign
2.	Oval	Large	Light	Irregular	Thick	Malignant
3.	Oval	Large	Dark	Smooth	Thick	Benign
4.	Circular	Large	Light	Irregular	Thick	Malignant
5.	Circular	Large	Light	Smooth	Thick	Malignant

UNIT - IV

5 a) Construct decision trees to represent the following Boolean expressions. **06**

i. $A \wedge B$

ii. $A \vee [B \wedge C]$

iii. A XOR B

b) Discuss the issues of avoiding over-fitting the data, handling continuous data and missing values in decision trees. **08**

c) Demonstrate ID3 algorithm. **06**

UNIT - V

6 a) Discuss the application of neural network which is used for learning to steer an autonomous vehicle. **06**

b) Write an algorithm for back-propagation which uses stochastic gradient descent method. Comment on the effect of adding momentum to the network. **08**

c) Derive an equation of gradient descent rule to minimize the error. **06**

OR

7 a) Describe the multilayer neural network. Explain why back propagation algorithm is required. **06**

b) Derive the back-propagation rule considering the output layer and training rule for output unit weights. **08**

c) Illustrate with an example, the working of classification in machine learning. **06**

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