18CS24

Seventh Semester B.E. Degree Examination, June/July 2023 Artificial Intelligence and Machine Learning

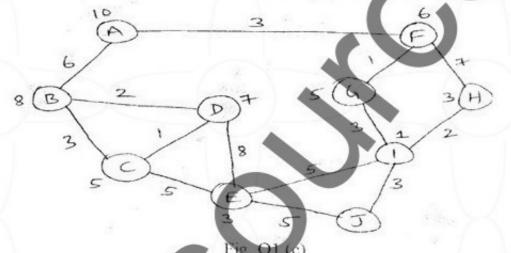
Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

a. What is Artificial Intelligence? List the applications.

- (05 Marks)
- b. Solve the 4-gallon water jug problem, writing appropriate production rules.
- (07 Marks)
- 2. Apply A* algorithm and find the most cost effective path from start state A to final state J.



310

- a. What is Heuristic search? Explain the characteristics of heuristic search.
- (07 Marks)

(08 Marks)

- b. Provide the solution for water Jug problem by stating the general rules.
- (07 Marks)

c Write the Hill climbing search algorithm of Al.

(06 Marks)

Module-2

- Discuss the framework of knowledge representation along with any two knowledge representation scheme.
 - b. Explain in brief forward reasoning and backward reasoning.

(10 Marks)

OR

4 a. Define concept learning. Explain the task of concept learning.

(05 Marks)

b. Write Find-S algorithm.

(05 Marks)

 Write candidate elimination algorithm. Apply the algorithm for the below dataset to obtain the final version space.

Ex	Citations	Size	Inlibrary	Price	Editions	Buy
	Some	Small	No	Affordable	One	No
2	Many	Big	No	Expensive	Many	Yes
3	Many	Medium	No	Expensive	Few	Yes
4	Many	Small	No	Affordable	Many	Yes

(it Marks)

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Module-3

- 5 a. Explain the concepts of entropy and information gain in decision tree. (05 Marks
 - b. Apply ID3 algorithm for constructing decision tree for the following training examples.

Instances	a ₁	a ₂	a ₃	Classification
1	True	Hot	High	No
2	True	Hot	High	No
3	False	Hot	High	Yes
4	False	Cool	Normal	Yes
5	False	Cool	Normal	Yes
6	True	Cool	High	No
7	True	Hot	High	No
8	True	Hot	Normal	Yes
9	False	Cool	Normal	Yes
10	False	Cool	High	Yes

c. List and explain the appropriate problems for decision tree learning.

(05 Marks)

OR

6 a. Apply perceptron rule for implement XOR gate by considering the following and compute the final weights.

Inputs: X_1 , X_2 Output: y

Initial weights: W11 = W21 = 1

$$W12 = W22 = 1$$

$$V1 = V2 = 1$$

Threshold = 1 and learning rate = 1.5

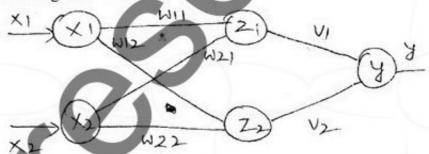


Fig. Q6 (a)

(06 Marks)

b. Write Back propagation algorithm.

- (07 Marks)
- c. Discuss the perceptron training rule and delta rule that solves the learning problem of perceptron.

 (07 Marks)

Module-4

a. Explain Bayes theorem and MAP hypothesis with equations.

(06 Marks)

b. Outline Brute force MAP learning algorithm.

- (08 Marks)
- e. In Orange country, 51% of the adults are males (other 49% are ofcourse females). One adult is randomly selected for a survey involving credit card usage.
 - (i) Find the prior probability that the selected person is male.
 - (ii) It is later learned that the selected survey subject was Smoking a Cigar. Also, 9.5% of males smoke Cigar, whereas 1.7% of females smoke Cigars. Use this additional information to find the probability that the selected subject is a male. (06 Marks)

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OR

8 a. Discuss the minimum description length algorithm.

(07 Marks)

Apply Naïve Bayes classifier for the below dataset to classify the new instances.
 (Color = Green, Legs = 2, Height = Tall and Smelly = No)

No.	Color	Legs	Height	Smelly	Species
1	White	3	Short	Yes	M
2	Green	2	Tall	No	M
3	Green	3	Short	Yes	M
4	White	3	Short	Yes	M
5	Green	2	Short	No	H
6	White	2 -,	Tall	No	H
7	White	2	Tall	No	TI I
8	White	2	Short	Yes	H

c. Explain Gibbs algorithm.

(07 Marks)

(06 Marks)

Module-5

a. Discuss K-Nearest Neighbor learning algorithm.

(08 Marks)

b. Discuss in brief locally weighted linear regression.

(06 Marks)

Explain in brief case based reasoning.

(06 Marks)

(10 Marks)

OR

a. Explain in brief the reinforcement learning technique.

b. Discuss the learning tasks and Q learning in the context of reinforcement learning. (10 Marks)

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