CBCS SCHEME

USN | | | | | | | | | | **18CS71**

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
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

1 a. List all task domains of Artificial Intelligence. **(06 Marks)**
b. Explain Minimax procedure of tic – tac – toe. **(07 Marks)**
c. List all production rules for the water jug problem. **(07 Marks)**

OR

2 a. Illustrate Slot – and – filler structure method in Question and Answering system. **(06 Marks)**
b. Explain Hill climbing issues which terminates algorithm without finding a goal state or getting to a state from which no better state can be generated. **(04 Marks)**
c. Apply AO* algorithm for the following graph and find final path. **(10 Marks)**

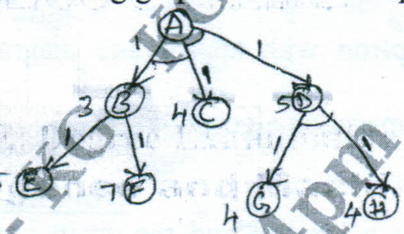

Fig. Q2(c)

Module-2

3 a. Convert the following statement into its Equivalent Predicate Logic from
i) Marcus was a man ii) Marcus was a Pompeian
iii) All Pompeians were Romans iv) Caesar was a Ruler
v) All Romans were either loyal to Caesar of hated him.
vi) Everyone is loyal to someone
vii) People only try to assassinate rulers they are not loyal to.
viii) Marcus tried to assassinate Caesar. **(08 Marks)**
b. List the issues on Knowledge representation. **(05 Marks)**
c. Construct maximally specific hypothesis for the following training examples. **(07 Marks)**

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

OR

4 a. Apply Candidate Elimination algorithm for the dataset given above (Question 3(c)). How do you classify following new instance from the set of hypothesis obtained by Candidate Elimination algorithm? **(12 Marks)**

Instance	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
A	Sunny	Warm	Normal	Strong	Cool	Change	?
B	Rainy	Cold	Normal	High	Warm	Same	?

b. What are Horn Clauses? Write a declarative and a procedural representation. List syntactic difference between Logic and PROLOG. **(08 Marks)**

Module-3

5 a. Construct decision tree using ID3 algorithm for the following data : **(12 Marks)**

Day	Outlook	Temp	Humidity	Wind	Decision
1	Sunny	Hot	High	Weak	Yes
2	Sunny	Hot	High	Strong	No
3	Overcast	Hot	High	Weak	Yes
4	Rain	Mild	High	Weak	No
5	Rain	Cool	Normal	Weak	Yes

b. Derive Gradient descent rule. **(08 Marks)**

OR

6 a. Give decision tree to represent the following Boolean functions :

i) $A \wedge \neg B$ ii) $A \vee [B \wedge C]$ iii) A XOR B iv) $[A \wedge B] \vee [C \wedge D]$. **(08 Marks)**

b. Explain Perceptron with appropriate diagram Represent AND Boolean function using Perceptron. **(04 Marks)**

c. Write Back propagation algorithm. **(08 Marks)**

Module-4

7 a. A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present and a correct negative result in only 97% of the cases in which the disease is not present. Further, 0.008 of the entire population have the Cancer. Does a patient have Cancer or not? **(10 Marks)**

b. Derive Brute force MAP learning and also mention assumption made in this process. **(10 Marks)**

OR

8 a. Explain Minimum Description Length Principle (MDL). **(06 Marks)**

b. Explain Naïve Bayes classifier and Bayesian belief Networks. **(08 Marks)**

c. Write EM algorithm. **(06 Marks)**

Module-5

9 a. Explain K – NN algorithm. **(06 Marks)**

b. Explain steps of Locally Weighted Linear regression. **(07 Marks)**

c. Describe Radial basis function with appropriate diagram. **(07 Marks)**

OR

10 a. Illustrate the basic concept of Q – learning using Simple Deterministic World. **(10 Marks)**

b. Explain Q – Learning algorithm. **(10 Marks)**

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