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Reg. No. : ☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 96203

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Sixth Semester

Computer science and Engineering

19UCS603- ARTIFICIAL INTELLIGENCE AND MACHINE LERANING

(Regulations 2019)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (5x 1 = 5 Marks)

1. Which elements in agent are used for selecting external actions?   CO1- U

    (a) Perceive   (b) Performance   (c) Learning   (d) Actuator

2. What can be viewed as single literal of disjunction?   CO1- U

    (a) Multiple clause   (b) Combine clause

    (c) Unit clause   (d) None of the mentioned

3. Which variable cannot be written in entire distribution as a table?   CO3- U

    (a) Discrete   (b) Continuous

    (c) Both Discrete & Continuous   (d) None of the mentioned

4. Which of the following is the model used for learning?   CO1- U

    (a) Decision trees   (b) Neural networks

    (c) Propositional and FOL rules   (d) All of the mentioned

5. K-means clustering algorithm is an example of which type of   CO1-U
   clustering method?

    (a) Hierarchical   (b) Partitioning   (c) Density Based   (d) Random

PART – B (5 x 3= 15Marks)

6. Differentiate uninformed and informed search strategies .   CO1- U

7. List Out Two Kinds Of Synchronic Rules That Allow Deductions?   CO2- App

8. List out the applications of Bayesian N/W?   CO1- U

9. Give the major issues that affect the design of a learning element   CO1- U

10. List out some applications of unsupervised learning.   CO1- U

<center>PART – C (5 x 16= 80Marks)</center>

11. (a) Provide the PEAS description of the task environment for Internet book-shopping agent , Vaccum Cleaner Agent, Medical Diagnosis System and Autonomous Mars rover. Compare and contrast the properties of task environment   CO2-App   (16)

<center>Or</center>

(b) Consider the tree shown below. The numbers on the arcs are the arc lengths. Assume that the nodes are expanded in alphabetical order when no other order is specified by the search, and that the start state is A and goal is state M. No visited or expanded lists are used. What order would the states be expanded by each type of search? Stop when you expand G. Write only the sequence of states expanded by each search. Write only the sequence of states expanded by the following search   CO2-App   (16)

 (i) Breadth-first search   (ii) Depth-first search

(iii) Iterative deepening search
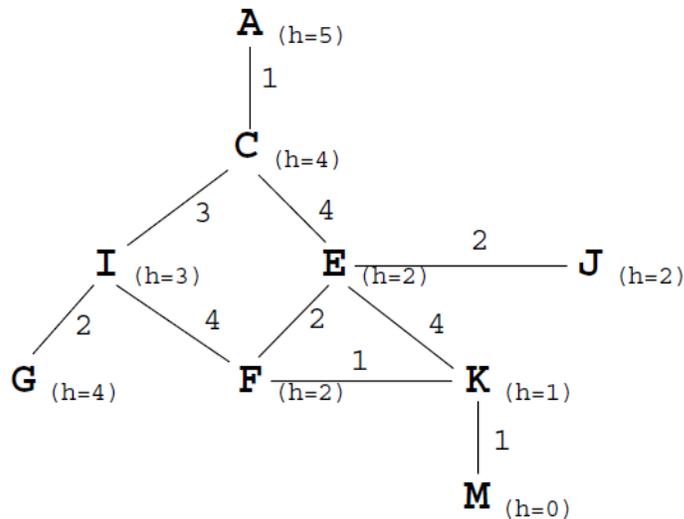
12. (a) Consider the following facts and query   CO2-App   (16)

       "One says that a person who gives good lectures about FOL to students is a good teacher. This group of people, studying at the ANU, have very good lectures about Logic and all of those lectures are given by Yannick who is a person." And We must prove that "Yannick is a good teacher" using forward Chaining algorithm and Backward chaining algorithm.

<center>2</center>

(b) Consider the following 5 facts that are added to a knowledge base in turn. Hobbit, Hero, Hafling are predicates, FinalBattle is a function, Frodo and Mount Doom are constants, and x and y are variables that are universally quantified.   CO2-App   (16)

    1. Journey(Frodo, Mount Doom)
    2. Hafling(x) → Hobbit(x)
    3. Journey(x, y) → FinalBattle(x, y)
    4. Hafling(Frodo)
    5. Hobbit(x) ^ FinalBattle(x, Mount Doom)→ Hero(x)

(i) Show how forward chaining can be used to infer whether Frodo is a Hero (i.e.Hero(Frodo)) .

(ii) Show how backward chaining can be used to infer whether Frodo is a Hero (i.e. Hero(Frodo)).

(iii) Justify "Frodo is Hero" by resolution.

13. (a) Apply Naive Bayes classifier for making a decision to Play Tennis using the following attribute: CO2-App   (16)

< Outlook: sunny, Temperature: cool, Humidity: high, Wind: strong >

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Table: Training examples for the target concept *PlayTennis*

Or

(b) (i) Describe a method for constructing Bayesian Networks   CO1-U   (8)

(ii) Explain Variable elimination algorithm for answering queries on Bayesian networks   CO1-U   (8)

14. (a) Explain about Decision tree learning with an example   CO1- U   (16)

Or

(b) Explain about Artificial Neural network with an example   CO1- U   (16)

15. (a) Apply fuzzy-means clustering to the following data points   CO2-App   (16)
{(1, 3), (2, 5), (6, 8), (7, 9)}

Or

(b) Apply K-means clustering to the following 8 examples to convert   CO2-App   (16)
into them into 3 clusters: A1=(2,10), A2=(2,5), A3=(8,4),
A4=(5,8), A5=(7,5), A6=(6,4), A7=(1,2), A8=(4,9). Assume the
initial seeds are A1,A4,A7.