MCA DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2020)

Third Semester

MASTER OF COMPUTER APPLICATIONS

P20CAT3004: Artificial Intelligence

COURSE OUTCOMES

CO1:   Know the basics and problem-solving approach to AI problems,

CO2:   Analyze various search strategies for a problem.

CO3:   Evaluate different knowledge representation schemes for typical AI problems.

CO4:   Design and implement a typical AI problem to be solved Using Machine Learning Techniques.

CO5:   Design and implement a futuristic AI application

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

1.	List any two characteristics of an intelligent agent.	CO1	[K_1]
2.	How does AI affect the job market?	CO1	[K_4]
3.	What is the significance of alpha-beta pruning?	CO2	[K_2]
4.	Define backtracking search.	CO2	[K_1]
5.	Write down any two features of Prolog programming.	CO3	[K_2]
6.	Compare and contrast forward and backward chaining.	CO3	[K_2]
7.	What is Bayesian reasoning? How does an expert system rank potentially true hypotheses?	CO4	[K_3]
8.	How does the regression model differ from the classification model?	CO4	[K_4]
9.	What is reinforcement learning?	CO5	[K_1]
10.	Differentiate between supervised and unsupervised learning.	CO5	[K_2]

Answer all the Questions:-

PART B (6 x 5 = 30 Marks)

11.	Explain the various characteristics of AI problems.	CO1	[K_2]
12.	Consider the problem of the delivery robot finding a path from location A to	CO2	[K_3]

location G in the domain. The figure shows the graph where the nodes represent locations and the arcs represent possible single steps between locations. Each arc is shown with its associated cost, an estimate of the travel time of getting from one location to the next. Find the best path from A to G using Breadth First Search (BFS).
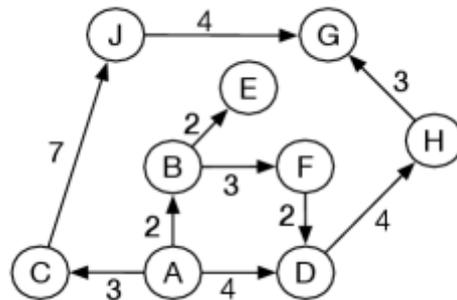
13. Consider the following sentences. Use backward chaining and draw the proof tree to prove that ''Charlie is a horse.''   CO3   [K$_3$]

   (i)   Horses, cows, and pigs are mammals.

   (ii)   An offspring of a horse is a horse.

  (iii)   Bluebeard is a horse.

  (iv)   Bluebeard is Charlie's parent.

   (v)   Offspring and parent are inverse relations.

  (vi)   Every mammal has a parent.

14. Discuss about mental events and mental objects.   CO3   [K$_2$]

15. Explain a simple linear regression model. In a statistical course, a linear regression equation was computed to predict the final exam score from the score on the first test. The equation is y = 10 + 0.9x, where y represents the final exam score and x is the score on the first exam. Suppose Joe scores a 90 on the first exam. What would be the predicted value of his score on the final exam?   CO4   [K$_2$]

16. Draw the architecture of a multilayer neural network and explain the steps involved in forward pass during training time.   CO5   [K$_5$]

Answer any FIVE Questions

PART C (5 x 10 = 50 Marks)

17. Discuss the different types of intelligent agents based on the complexity of the environment.   CO1   [K₂]

18. What is Mini-Max search in game playing? Explain the algorithm with an example.   CO2   [K₃]

19. Consider the following sentences: CO3   [K₄]

      A female bird lays eggs.

      If it has feathers, it is a bird.

      All ravens have feathers.

      Shaddow is a raven.

      Shaddow is female.

   a. Translate these sentences into formulas in predicate logic.

   b. Convert all rules to Conjunctive Normal Form (CNF). You do not need to restate rules that are already in CNF.

   c. Carry out a resolution proof of the statement: Shaddow lays eggs.

20. Consider the given dataset of three binary variables A, B, C, and a decision variable Y. Build a decision tree that classifies Y as True or False.   CO4   [K₄]

A	B	C	Y
F	F	F	F
T	F	T	T
T	T	F	T
T	T	T	F

21. Explain Support Vector Machines (SVM) in detail. Discuss its working principle, advantages, and applications. Provide an example of how SVM is used in classification problems.   CO5   [K₃]

22. Write short notes on the following: CO2 [K_2]
    a. Learning with hidden variables
    b. Bayes Rule
    c. Local search
    d. Constraint satisfaction problems

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