Koneru Lakshmaiah Education Foundation

ACADEMIC YEAR 2023-24 - ODD SEMESTER

22A'D2001A - DATA DRIVEN ARTIFICIAL INTELLIGENT SYSTEMS

End Semester Exam [QUESTION PAPER SET 3]

TIME: 3 HOURS

MAX MARKS: 100 M

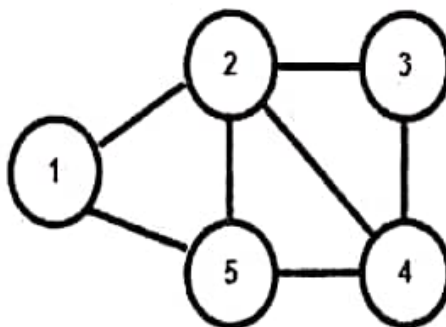| Q.NO	QUESTION DESCRIPTION	CO	COI-BTL
SECTION – A [ANSWER ALL QUESTIONS]			
1	Answer all Questions [5 X 2 = 10 M]		
1.A	Convert the following statement into first order logic: (1) Rohan is intelligent and hardworking. (2) Ritika is a doctor or Engineer.	CO1	BTL-2
1.B	Compare and contrast different types of machine learning.	CO2	BTL-2
1.C	Explain the role of the "weights" in an artificial neural network.	CO3	BTL-2
1.D	List the importance of Principal Component Analysis (PCA).	CO4	BTL-2
1.E	Explain the fundamental purpose of a recurrent neural network (RNN) in the context of sequential data.	CO5	BTL-2
SECTION – B [ANSWER ALL QUESTIONS]			
2	Answer all Questions [5X 6 = 30 M]		
2.A	Illustrates various types of Agents in AI.	CO1	BTL-2
2.B	Discuss the forward and backward chaining in Artificial Intelligence.	CO2	BTL-2
2.C	Compare and contrast between artificial and biological neuron in artificial neural network.	CO3	BTL-2
2.D	Describe the key stages of the Data Science Life Cycle, including data collection, data cleaning, exploratory data analysis (EDA), feature engineering, model building, and model evaluation. Explain the significance of each stage in the process.	CO4	BTL-2
2.E	Explain the architecture of a Recurrent Neural Network (RNN). Discuss its key components and how they enable the network to handle sequential data effectively. Provide a diagram to illustrate your answer	CO5	BTL-2
SECTION – C [ANSWER Q3 OR Q4]			
3	Answer all Questions [7M + 5M = 12 M]		
3.A	Illustrate Map colouring problem for a set of 3 colours {R, G, B} using forward checking technique. The figure is given below.	CO1	BTL-3
3.B	Outline the concept of Constraint Satisfaction Problem (CSP). Apply the CSP logic to solve the following crypt arithmetic problem. SEND + MORE = MONEY	CO1	BTL-2
OR			

4	Answer all Questions [7M + 5M = 12 M]		
4.A	Discuss the difference between a tautology and a contradiction in propositional logic. Provide an example of each.	CO1	BTL
4.B	Develop a detailed algorithm for the simple Hill Climbing algorithm. Discuss its limitations and propose strategies to overcome these limitations.	CO1	BTL-2

SECTION – D [ANSWER Q5 OR Q6]

5	Answer all Questions [7M + 5M = 12 M]		
5.A	Calculate the probability that alarm has sounded, but there is neither a burglary, nor an earthquake occurred, and David and Sophia both called the Harry.	CO2	BTL-3

Burglary (B) table:
T	0.002
F	0.998

Earthquake (E) table:
T	0.001
F	0.999

Alarm (A) table:
B	E	P(A=T)	P(A=F)
T	T	0.94	0.06
T	F	0.95	0.04
F	T	0.69	0.69
F	F	0.999	0.999

David Calls (D) table:
A	P(D=T)	P(D=F)
T	0.91	0.09
F	0.05	0.95

Sophia calls (S) table:
A	P(S=T)	P(S=F)
T	0.75	0.25
F	0.02	0.98

5.B	Find the maximally specific hypothesis for the following table using Find S algorithm.	CO2	BTL-2

Example	Sky	AirTemp	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	No
5	Sunny	Warm	High	Strong	Warm	Same	No
6	Rainy	Cold	High	Strong	Warm	Change	No
7	Sunny	Warm	High	Strong	Cool	Change	Yes

OR

6	Answer all Questions [7M + 5M = 12 M]		
6.A	Compare and contrast the hypothesis space representations used in the Find-S and Candidate Elimination algorithms. How do these representations impact their respective learning capabilities?	CO2	BTL-3
6.B	Discuss the Directed Acyclic Graph (DAG) and Conditional Probability Table (CPT) with example.	CO2	BTL-2

SECTION – E [ANSWER 7 OR Q8]

7	Answer all Questions [7M + 5M = 12 M]		
7.A	Apply a critical assessment of the constraints and trade-offs associated with classification loss functions in the context of optimizing model training.	CO3	BTL-3

	demonstrating a practical understanding of their specific roles and impact on enhancing classification performance.		
7.B	Explain the architecture of a typical feedforward neural network, including the input layer, hidden layers, and output layer. Provide a diagram to illustrate your answer.	CO3	BTL-2

<div align="center">OR</div>

8	**Answer all Questions [7M + 5M = 12 M]**		
8.A	Analyze the complex mechanisms of convolutional neural networks (CNNs) and their pivotal role in image recognition by evaluating the significance of features like convolutional layers and their contribution to determining patterns within visual data.	CO3	BTL-3
8.B	Explain the concept of an activation function in the context of ANNs. For the network shown in figure, calculate the net input to the output neuron Y.	CO3	BTL-2

SECTION – F [ANSWER 9 OR Q10]

9	**Answer all Questions [7M + 5M = 12 M]**		
9.A	Examine why the k-means clustering method is sensitive to outliers, explaining that it calculates cluster centers based on average values, making it influenced by extreme data points and potentially leading to less accurate groupings.	CO4	BTL-4
9.B	Summarize FIVE applications of NLP in details.	CO4	BTL-2

<div align="center">OR</div>

10	**Answer all Questions [7M + 5M = 12 M]**		
10.A	Analyze the working principle of k-NN classification algorithm with a suitable example. Analyze the impact of using an even value for k in the k-NN algorithm on decision boundaries.	CO4	BTL-4
10.B	Explain the use of pie charts, bar charts, line charts, scatter plots, and maps in visualizing various aspects of complex datasets.	CO4	BTL-2

SECTION – F [ANSWER 11 OR Q12]

11	**Answer all Questions [7M + 5M = 12 M]**		
11.A	Demonstrate the concept of adversarial search in AI. What are Minimax and Alpha-Beta pruning techniques, and how are they used in adversarial search algorithms?	CO5	BTL-4
11.B	Discuss the classification techniques ID3, CART, and ADABOOST Classifier in machine learning.	CO5	BTL-2

<div align="center">OR</div>

12	**Answer all Questions [7M + 5M = 12 M]**		
12.A	Examine why alpha-beta pruning is better than the minimax approach in games, highlighting how it quickly skips unnecessary branches in the game tree, making decisions faster and using fewer computations.	CO5	BTL-4
12.B	Discuss the architecture of recurrent neural networks.	CO5	BTL-2

<div align="center">*** END OF QUESTION PAPER ***</div>