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MCS–224

MASTER OF COMPUTER APPLICATIONS

(MCA–NEW)

Term-End Examination

December, 2025

MCS-224 : ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Time : 3 Hours *Maximum Marks : 100*

Weightage : 70%

***Note** : Question No. **1** is compulsory. Attempt any **three** questions from the rest.*

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1. (a) Compare narrow AI, general AI and super AI. Give suitable example for each. 6

(b) What is regression ? Define linear regression. 4

(c) Explain Dempster Shafer theory with a suitable example. 5

(d) For the following fuzzy sets :

$$A = \{a/0.5,\ b/.6,\ c/.3,\ d/0,\ e/.9\}$$

$$B = \{a/0.3,\ b/.7,\ c/.6,\ d/.3,\ e/.6\}$$

find the fuzzy sets $A \cap B, A \cup B$ and $(A \cap B)$. 6

(e) What is ensemble learning ? Briefly discuss any *one* of the ensemble learning algorithm. 4

(f) Draw confusion matrix and write formula for accuracy, precision, sensitivity and specificity. 5

(g) What is DBSCAN ? 3

(h) Define Linear Discriminant Analysis and write its *two* limitations. 7

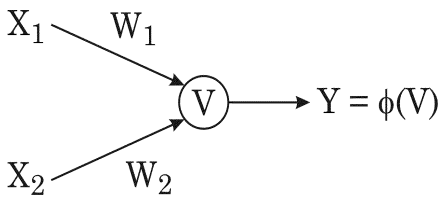
2. (a) Apply KNN-Classification algorithm to the following data and predict value for (10, 7) for K = 3 : 10

Feature 1	**Feature 2**	**Class**
1	1	A
2	3	A
2	4	A
5	3	A
8	6	B
8	8	B
9	6	B
11	7	B

(b) What is neural network ? How is biological neuron related to artificial neuron ? Illustrate with suitable diagram and draw a table to map the components of Biological Neuron with Artificial Neuron ? 10

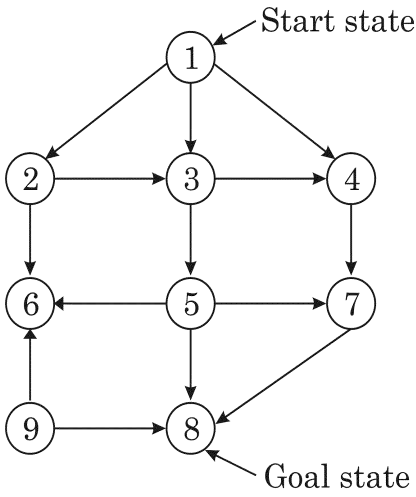
3. (a) Describe dimensionality reduction. Also, write the advantages and disadvantages of dimensionality reduction. 5

(b) Below is diagram of single artificial neuron (unit) :



The node has 2 inputs $X = (X_1, X_2)$ that receives only binary signals (0, 1). How many different input patterns can this node receive ? 5

(c) Write and apply BFS and DFS algorithms on the given graph : 10



4. (a) What are Association rules ? Discuss their importance in machine learning. 5

(b) Describe the terms overfitting and underfitting. 5

(c) Let C(x) mean 'x is used-car dealer', and H(x) mean 'x is honest'. Translate each of the following into English : 2×5=10

(i) $(\exists x)\, C(x)$

(ii) $(\exists x)\, H(x)$

(iii) $(\forall x)\big(C(x) \rightarrow \sim H(x)\big)$

(iv) $(\exists x)\big(C(x) \wedge H(x)\big)$

(v) $(\exists x)\big(H(x) \rightarrow C(x)\big)$

5. Differentiate any *five* of the following : 5×4=20

(a) Machine learning and Deep learning

(b) Classification and Regression technique

(c) A* and AO* algorithm

(d) Minimax and Alpha-Beta pruning search algorithms

(e) Uninformed and Informed search

(f) Forward chaining and Backward chaining

(g) Hierarchical and Partition clustering

(h) Predicate logic and Propositional logic

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