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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.*

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

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P. T. O.

(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

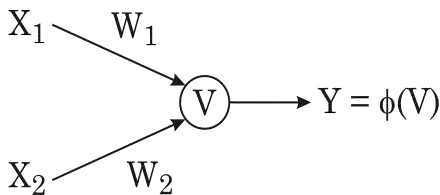
- (g) What is DBSCAN ? 3
- (h) Define Linear Discriminant Analysis and write its *two* limitations. 7
2. (a) Apply KNN-Classification algorithm to the following data and predict value for (10, 7) for $K = 3$: 10

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

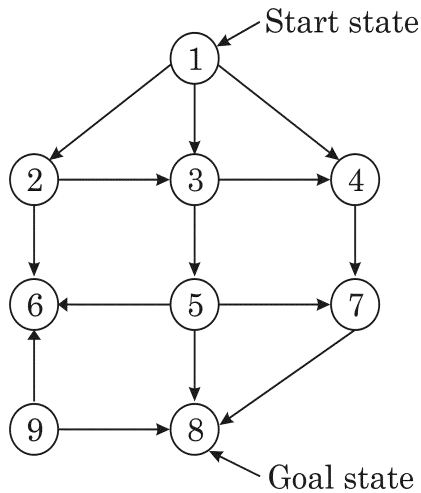
3. (a) Describe dimensionality reduction. Also, write the advantages and disadvantages of dimensionality reduction. 5

(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 : $2 \times 5 = 10$

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

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

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

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

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

5. Differentiate any *five* of the following :

$$5 \times 4 = 20$$

- (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

x x x x x