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MCS-224

**MASTER OF COMPUTER
APPLICATIONS [MCA (NEW)]**

Term-End Examination

June, 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 Artificial Narrow Intelligence,
Artificial General Intelligence and
Artificial Super Intelligence. 5
- (b) Discuss descriptive, predictive and
prescriptive analytics in machine
learning. 5
- (c) Differentiate between linear regression
and polynomial regression techniques. 5

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P. T. O.

- (d) Let $C(x)$ mean “ x is a used car dealer”, and $H(x)$ mean “ x is honest”. Translate each of the following into English sentences : 5

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

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

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

- (e) With reference to D-S (Dempster Shafer) theory, what are the different types of evidences ? Explain them briefly. 5

- (f) Briefly discuss the concept of classification, regression and clustering. Also give the list of algorithms for each concept. 5

- (g) What is the purpose of feature extraction in machine learning ? Explain in brief. 5

- (h) What is the advantage of using Princer algorithm over Apriori algorithm ? Explain in brief. 5
2. (a) Differentiate between Hierarchical clustering and Partition-based clustering with a suitable example of each concept. 10
- (b) Let the following points are to be clustered into 3 groups : 10
- $A_1(2,11)$, $A_2(2,15)$, $A_3(8,5)$, $A_4(6,8)$,
 $A_5(7,9)$, $A_6(6,3)$, $A_7(1,4)$, $A_8(4,8)$
- Assume that the initial cluster centers are $A_1(2,11)$, $A_3(8,5)$ and $A_8(4,8)$. Using the Manhattan distance measure and K-mean clustering algorithm, calculate the cluster heads after third iteration.
3. (a) For the following given transactions Data_set, generate association rules

using Apriori algorithm. Assume support = 50% and confidence = 75% :10

Transaction_Id	Set of Items
T ₁	Pen, Notebook, Pencil, Colours
T ₂	Pen, Notebook, Colours
T ₃	Pen, Eraser, Scale
T ₄	Pen, Colours, Eraser
T ₅	Notebook, Colours, Eraser

- (b) Let the training dataset for tissue paper whether it is 'Poor' or 'Fine' based on two properties (acid durability and strength) are as follows : 10

Acid Durability (Sec.)	Strength (gm/cm ²)	Class
7	7	Poor
7	4	Poor
3	4	Fine
2	4	Fine

Suppose there is an unknown sample $X = (3, 7)$, where 3 is acid durability and 7 is strength, find its class using KNN algorithm. (Assume $K = 3$ and use Euclidean distance).

4. (a) Write ID3-algorithm for creating decision tree for any training dataset.

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- (b) Explain Dempster Shafer theory with a suitable example.

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5. (a) Suppose a six-faced die is thrown twice. Describe each of the following events :

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(i) The maximum score is 6.

(ii) The total score is 9.

(iii) Each throw results in an even score larger than 2.

- (b) Consider the following missionaries and cannibal problem :

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Three missionaries and three cannibals are side of a river, along with a boat that can hold one or two people. Find a

way to get everyone to the other side, without ever leaving a group of missionaries out-numbered by cannibals.

- (i) Formulate and solve the above problem.
- (ii) Draw the state-space search graph for solving this problem.

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