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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*

Weightagte : 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

(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) $(\forall x)\mathrm{C}(x) \rightarrow \sim \mathrm{H}(x)$

(ii) $(\exists x)(\mathrm{C}(x) \wedge \mathrm{H}(x))$

(iii) $(\exists x)(\mathrm{H}(x) \rightarrow \mathrm{C}(x))$

(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. 10

(b) Explain Dempster Shafer theory with a suitable example. 10

5. (a) Suppose a six-faced die is thrown twice. Describe each of the following events : 10

(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 : 10

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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