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MCS-224

MASTER OF COMPUTER APPLICATIONS (MCA-NEW)

Term-End Examination

June, 2023

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 remaining questions.*

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1. (a) Compare descriptive, predictive and prescriptive analytics in machine learning. 6

(b) What is Min-Max Search Strategy ? Write MINIMAX algorithm. 5

(c) Differentiate between informed search and uninformed search. Name *one* algorithm for each. 4

(d) Describe the Modus Ponens and Modus Tollens as propositional rule of inference. 5

(e) What is Prenex Normal Form (PNF) ? Transform the following formula into PNF : 5

$$(\forall_x)(Q(x) \rightarrow (\exists_x)R(x, y))$$

(f) What is Ensemble Learning ? Briefly discuss any *one* of the ensemble learning method. 5

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

(h) What is a Neural Network ? How biological neuron relates to Artificial Neuron ? Illustrate with suitable diagram and a table to map the components of Biological Neuron with Artificial Neuron. 5

2. (a) Explain Turing test, with the help of a block diagram. Also, discuss Chinese room test as criticism to Turing test. 10

   (b) Briefly discuss the following, with suitable example for each : 10

   (i) Rule-based machine learning

   (ii) Bayesian Algorithms

   (iii) Decision trees

   (iv) Dimensionality reduction

3. (a) What do you understand by State Space Search ? Explain the state space representation of Water-Jug Problem (WJP), given below :

   "Given two jugs of 5-gallon and 3-gallon, both of which do not have measuring indicators on them. The jugs can be filled with water with the help of any pump, any number of times."

   The question is "how can you get 4 gallons of water in a 5-gallon jug ?" 10

(b) What is Binary Classification ? Can binary classification algorithms be altered to work for problems with more than two classes ? Justify. Also, discuss one-versus the rest and one-versus-one approach. 10

4. (a) Differentiate between the following : 10

(i) A* and AO* algorithm

(ii) Depth first search and Breadth first search

(b) What is linear regression ? How linear regression is performed using least square method ? Find the regression line for the data points (x, y) tabulated below : 10

x	y
1	3
2	4
3	2
4	4
5	5

Also, discuss the terms 'mean squared error' and 'mean absolute errors'.

5. Write short notes on any ***five*** of the following :

5×4=20

(a) Backward Chaining

(b) Scripts

(c) Non-Monotonic Reasoning Systems

(d) Convolutional Neural Networks

(e) Auto Encoders

(f) Transformers

(g) Logistic Regression

(h) Naive Bayes Algorithm

(i) Feature Selection

(j) K-Means Algorithm