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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.*

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

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

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- (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