



# BRAINWARE UNIVERSITY

Term End Examination 2023-2024

Programme – MCA-2022

Course Name – Artificial Intelligence and Machine Learning

Course Code - MCA301

( Semester III )

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Brainware University  
Barasat, Kolkata - 743145

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) choose that Which type of logic allows for the representation of uncertainty and probability?
- a) First-order logic  
b) Fuzzy logic  
c) Modal logic  
d) Modal logic
- (ii) choose that What is the term for the process of deriving new facts or conclusions from existing knowledge?
- a) Knowledge acquisition  
b) Knowledge representation  
c) Knowledge inference  
d) Knowledge validation
- (iii) When assessing the performance of a binary classification model, what is \"recall\" also known as?
- a) True Negative Rate (TNR)  
b) False Positive Rate (FPR)  
c) Sensitivity  
d) Specificity
- (iv) In machine learning, what is the primary purpose of the F1-score?
- a) To measure the model's bias  
b) To balance precision and recall in binary classification  
c) To calculate the training error  
d) To visualize the decision boundary
- (v) In machine learning, what does the term \"feature importance\" indicate?
- a) The complexity of the features in the dataset  
b) The importance of each feature in contributing to model predictions  
c) The size of the training dataset  
d) The number of features in the model
- (vi) What is the primary purpose of outlier detection in machine learning?
- a) To increase the model's variance  
b) To identify data points that deviate significantly from the norm  
c) To eliminate all data points with extreme values  
d) To minimize the training error
- (vii) Which search technique uses backtracking to explore the search space?

- a) A\* Search  
c) Depth-First Search (DFS)
- b) Constraint Propagation  
d) Breadth-First Search (BFS)
- (viii) When evaluating regression models, what does the term "R-squared" ( $R^2$ ) measure?
- a) The model's bias  
c) The proportion of the variance in the dependent variable explained by the independent variables
- b) The degree of overfitting  
d) The accuracy of the model's predictions
- (ix) Select that What is an intelligent agent in the context of artificial intelligence?
- a) A software program that displays no autonomous behavior.  
c) A system that can perceive its environment, reason, and take actions to achieve goals.
- b) A physical robot that cannot make decisions on its own.  
d) A simple script that follows a predetermined set of instructions.
- (x) selectWhat is the main goal of Artificial Intelligence (AI)?
- a) To replace human intelligence  
c) To enhance human intelligence
- b) To simulate human intelligence  
d) To create robots
- (xi) selectWhich AI problem involves the machine's ability to make decisions and take actions to maximize its chances of achieving its goals?
- a) Machine Perception  
c) Machine Learning
- b) Machine Reasoning  
d) Reinforcement Learning
- (xii) choose that Which of the following is NOT a subfield of AI?
- a) Computer Vision  
c) Natural Language Processing
- b) Robotics  
d) Cybersecurity
- (xiii) select thatWhich of the following is not a characteristic of intelligent agents?
- a) Autonomy  
c) Inflexibility
- b) Reactivity  
d) Proactiveness
- (xiv) Identify that Which of the following is an example of a proactive intelligent agent in a smart home?
- a) A thermostat that adjusts the temperature based on user preferences.  
c) A robot vacuum that navigates autonomously to clean the floors.
- b) A motion sensor that turns on lights when it detects movement.  
d) A voice assistant that answers questions using pre-programmed responses.
- (xv) choose that Which AI reasoning approach uses if-then rules to draw conclusions?
- a) Inductive reasoning  
c) Abductive reasoning
- b) Deductive reasoning  
d) Analogical reasoning

### Group-B

(Short Answer Type Questions)

3 x 5=15

2. Define learning based agent (3)
3. Explain the A search algorithm and its components.\* (3)
4. Illustrate the advantages and limitations of using rule-based representation for knowledge representation (3)
5. Explain "ontology" in the context of knowledge representation. (3)
6. Explain briefly Natural Language Processing (NLP) (3)

OR

- Illustrate some common applications of NLP? (3)

### Group-C

(Long Answer Type Questions)

5 x 6=30

7. Write the steps for processing the natural languages (5)
8. Describe about the role of sensors in an agent's interaction with its environment? (5)



9. Discuss the advantages and limitations of using genetic algorithms for solving optimization problems in AI. (5)
10. Explain the concepts of "Weak Slot & Filler Structures" and "Strong Slot & Filler Structures" in knowledge representation. (5)
11. Explain the concept of nearest neighbor error probability in k-nearest neighbor (k-NN) classification (5)
12. Write the concept of discourse integration with suitable example (5)

**OR**

Write the process of pruning in decision trees ,Why is pruning important, and how does it affect the performance of a decision tree model (5)

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