Printed page: 5 Subject Code: **AMCA0401**

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA

SEM: IV- THEORY EXAMINATION (2023-2024)

Subject:-**Artificial Intelligence**

Time: 3Hours Max. Marks:100

General Instructions:

IMP: Verify that you have received question paper with correct course, code, branch etc.

1. *This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*
2. *Maximum marks for each question are indicated on right hand side of each question.*
3. *Illustrate your answers with neat sketches wherever necessary.*
4. *Assume suitable data if necessary.*
5. *Preferably, write the answers in sequential order.*
6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION – A **20**

1. Attempt all parts:-

1-a. Which of the following is NOT an application of Artificial Intelligence? (CO1) 1

(a) Image recognition

(b) Sentiment analysis

(c) Supply chain management

(d) Statistical regression

1-b. Which field is concerned with designing agents that can perceive environments and take actions to achieve their goals? (CO1) 1

(a) Robotics

(b) Natural Language Processing

(c) Expert Systems

(d) Machine Learning

1-c. Which of the following is an example of an uninformed search strategy?(CO2) 1

(a) A* search

(b) Depth-first search

(c) Greedy best-first search

(d) Hill climbing

1-d. In adversarial search algorithms, which technique is used to optimize the search process by pruning branches of the game tree that are not likely to lead to a better outcome? (CO2) 1

(a) Greedy search

(b) Depth-first search

(c) Alpha-beta pruning

(d) Uniform-cost search

1-e. Which graphical model represents probabilistic relationships between variables using directed acyclic graphs? (CO3) 1

(a) Decision Trees

(b) Markov Chains

(c) Bayesian Networks

(d) Neural Networks

1-f. In a Hidden Markov Model (HMM), what represents the observable outcomes of a system? (CO3) 1

(a) Hidden states

(b) Emission probabilities

(c) Transition probabilities

(d) Observations

1-g. In which type of learning does the model learn from labelled data? (CO4) 1

(a) Supervised learning

(b) Unsupervised learning

(c) Reinforcement learning

(d) Semi-supervised learning

1-h. In the Nearest Neighbour (NN) rule, a new data point is classified based on:(CO4) 1

(a) a) Its distance to the farthest neighbour

(b) b) Its distance to the nearest neighbour

(c) c) Its average distance to all neighbours

(d) d) Its distance to the centroid of the dataset

1-i. Which of the following tasks is NOT typically performed using computer vision? (CO5) 1

a) Object detection and recognition

b) Image enhancement and filtering

c) Speech recognition and synthesis

d) Video tracking and surveillance

1-j. What is the primary objective of Principle Component Analysis (PCA)? (CO5) 1

a) Maximizing the variance of the projected data

b) Minimizing the number of features in the dataset

c) Ignoring the correlation between different features

d) Maximizing the computational complexity of the algorithm

2. Attempt all parts:-

2.a.	Provide examples of real-world applications where artificial intelligence is extensively used and discuss their impact? (CO1)	2
2.b.	Define Adversarial Search. (CO2)	2
2.c.	Briefly explain Propositional Logic. (CO3)	2
2.d.	What is reinforcement learning, and how does it differ from supervised and unsupervised learning? (CO4)	2
2.e.	Explain the importance of feature selection in pattern recognition. (CO5)	2

SECTION – B **30**

3. Answer any <u>five</u> of the following-

3-a.	Compare and contrast the fields of Artificial Intelligence and Machine Learning. (CO1)	6
3-b.	Explain the significance of the Turing Test in the context of Artificial Intelligence. (CO1)	6
3-c.	Differentiate between uninformed and informed search strategies, providing examples of each. (CO2)	6
3-d.	Describe local search algorithms and optimistic problems in the context of search for solutions. Provide examples of local search algorithms? (CO2)	6
3-e.	Compare and contrast various inference techniques in first-order logic, such as resolution, forward chaining, and backward chaining. (CO3)	6
3-f.	Define supervised learning and unsupervised learning in machine learning. Provide a brief example for each type. (CO4)	6
3-g.	Briefly explain the role of computer vision in pattern recognition. (CO5)	6

SECTION – C **50**

4. Answer any <u>one</u> of the following-

4-a.	Provide examples of different types of intelligent agents and analyse how they operate in various environments and discuss the challenges and future prospects of intelligent agent systems. (CO1)	10
4-b.	Explore the diverse applications of Artificial Intelligence across various domains such as healthcare, finance, transportation, and entertainment. (CO1)	10

5. Answer any one of the following-

5-a.	Discuss the significance of Alpha-Beta pruning in game playing algorithms. Explain how it enhances the efficiency of the minimax algorithm, providing examples to illustrate its impact on search tree traversal. (CO2)	10
5-b.	Compare and contrast uninformed search strategies, such as depth-first search and breadth-first search, with informed search strategies, such as A* search. (CO2)	10

6. Answer any one of the following-

6-a.	Describe Bayesian networks as graphical models for representing probabilistic relationships and decision-making. Provide examples of decision problems modelled using utility theory and Bayesian networks.(CO3)	10
6-b.	Explain utility theory and its role in decision-making under uncertainty. Discuss how utility functions quantify preferences and help in selecting optimal actions in probabilistic environments. (CO3)	10

7. Answer any one of the following-

7-a.	Discuss the working principle of Support Vector Machine (SVM) for classification tasks. How does SVM find the optimal hyperplane to separate classes in the feature space. (CO4)	10
7-b.	Explain the concept of reinforcement learning and its components, including agents, environments, actions, and rewards. Discuss how reinforcement learning differs from supervised and unsupervised learning(CO4)	10

8. Answer any one of the following-

8-a.	Explain Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA) in detail, including their mathematical formulations and applications in pattern recognition. (CO5)	10
8-b.	Discuss the challenges and techniques involved in natural language processing (NLP) for pattern recognition. Explain the process of text preprocessing, feature extraction, and classification in NLP-based pattern recognition systems. (CO5)	10