Printed Page:- 04 **Subject Code**:- **ACSAI0401**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2023 - 2024)

Subject: Introduction to Artificial Intelligence

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the 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 a characteristic of a well-defined learning problem?(CO1) 1

(a) Ambiguous objectives

(b) Clear goals

(c) Specific criteria for success

(d) Concrete tasks

1-b. AI technique is commonly used for personalized learning recommendations is- (CO1) 1

(a) Genetic Algorithms

(b) Reinforcement Learning

(c) Collaborative Filtering

(d) Expert Systems

1-c. What is the complexity of minimax algorithm?(CO2) 1

(a) Same as of DFS

(b) Space – bm and time – bm

(c) Time – bm and space – bm

(d) None of the mentioned

1-d. The initial value of alpha is?(CO2) 1

(a) Negative Infinity

(b) Zero

(c) Positive Infinity

(d) One

1-e. What is the main constraint in the monkey banana problem?(CO3) 1

(a) Limited time

(b) Limited intelligence of the monkey

(c) Limited number of moves

(d) Limited strength of the monkey

1-f. In the N-Queens problem, what does "N" represent?(CO3) 1

(a) The number of queens placed on the board.

(b) The size of the chessboard (N x N).

(c) The number of available moves for each queen.

(d) The total number of squares on the chessboard.

1-g. Which of the following strategies are used by Inference Engine?(CO4) 1

(a) Forward Chaining

(b) Block Chaining

(c) Stable Chaining

(d) Both A and B

1-h. Which of the following are correct advantage of Semantic nets?(CO4) 1

(a) Linear approach

(b) Heuristic approach (Some knowledge is stored)

(c) Random approach

(d) An Optimal approach

1-i. What is a common application of continuous planning in AI?(CO5) 1

(a) Chess playing

(b) Automated manufacturing

(c) Natural language processing

(d) Image recognition

1-j. What is the role of a reward function in reinforcement learning?(CO5) 1

(a) It determines the probability of taking a particular action.

(b) It provides feedback to the agent about the quality of its actions.

(c) It defines the transition probabilities between states.

(d) It specifies the discount factor for future rewards.

2. Attempt all parts:-

2.a. Define Learning Agents.(CO1) 2

2.b. Write two differences between Breadth first and Depth first search.(CO2) 2

2.c. Explain Resolution in Predicate Logic.(CO3) 2

2.d. Explain Bayesian Network.(CO4) 2

2.e. Write any two difference between supervised and unsupervised machine learning.(CO5) 2

SECTION B **30**

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

3-a. Distinguish between strong and weak artificial intelligence with example.(CO1) 6

3-b. Explain well-defined Learning System. Explain the steps to design a well-defined Learning System.(CO1) 6

3-c. Define Adversarial Search and its type .Explain any one.(CO2) 6

3-d. Explain the DFS algorithm with example.(CO2) 6

3.e. If it is hot, then it is humid. If it is humid, then it will rain. It is hot." Show that "It will rain" using Semantic Tableaux method in Propositional Logic.(CO3) 6

3.f. Define properties of forward and backward chaining.(CO4) 6

3.g. Explain the core components of learning system.Also explain Well defined learning system in detail.(CO5) 6

SECTION C **50**

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

4-a. Discuss the role of constraint satisfaction problems in scheduling and resource allocation tasks.(CO1) 10

4-b. Describe AI applications in environmental monitoring, climate modelling, renewable energy optimization, wildlife conservation, and natural disaster prediction and mitigation.(CO1) 10

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

5-a. Describe the Iterative-Deepening Search with example.(CO2) 10

5-b. "Best First Search uses the advantages of Breadth First search and Depth First Search and hence considered as better approach". Justify the statement with example and algorithm.(CO2) 10

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

6-a. What do you mean by Semantic nets? Convert the following into a semantic net: i.) Tom is a cat. ii.) Tom caught a bird. iii.) Tom is owned by John. iv.) Tom is ginger in color. v.) Cats like cream. vi.) The cat sat on the mat. vii.) A cat is a mammal. viii.) A bird is an animal. ix.) All mammals are animals. x.) Mammals have fur.(CO3) 10

6-b. Explain water jug and & monkey banana problems with example.(CO3) 10

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

7-a. Why Expert System is used? Draw and explain architecture of Expert System.(CO4) 10

7-b. Explain the fundamental concepts of Hidden Markov Models (HMMs), including the notions of hidden states, observable emissions, and transition probabilities, and discuss how HMMs are used to model sequential data in various fields.(CO4) 10

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

8-a. What is neural net learning? How does it work and what are its advantages and disadvantages? Provide an example of a real-world application where it is used.(CO5) 10

8-b. Explain the advantages and disadvantages of Genetic Algorithms? Write the Stopping Conditions that a genetic algorithm may implement.(CO5) 10