Printed Page:-04 **Subject Code:- AMICSAI0602**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech. (Integrated)

SEM: VI - THEORY EXAMINATION (2023.- 2024)

Subject: 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 agent deals with the happy and unhappy state? (CO1) 1

(a) Utility-based agent
(b) Model-based agent
(c) Goal-based Agent
(d) Learning Agent

1-b. Which of the following machine requires input from the humans but can interpret the outputs themselves? (CO1) 1

(a) Actuators
(b) Sensor
(c) Agents
(d) AI system

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

(a) Negative Infinity
(b) 0
(c) Positive Infinity
(d) 1

1-d. Which of the following is/are Uninformed Search technique/techniques? (CO2) 1

(a) Breadth First Search (BFS)
(b) Depth-first search

(c) Bidirectional Search

(d) All of the mentioned

1-e. A ___ is a collection of attributes or slots and associated values that describe some real-world entity. (CO3) 1

(a) Frame

(b) Semantic networks

(c) Partitioned Semantic Networks

(d) None of the above

1-f. What is transposition rule? (CO3) 1

(a) From $p \rightarrow q$, infer $\sim q \rightarrow p$

(b) From $p \rightarrow q$, infer $q \rightarrow \sim p$

(c) From $p \rightarrow q$, infer $q \rightarrow p$

(d) From $p \rightarrow q$, infer $\sim q \rightarrow \sim p$

1-g. Which of the following is true for Utility Theory in AI? (CO4) 1

(a) Utility theory aims to represent and measure the choices and ideas of an intelligent entity(agent)

(b) It offers a framework for making decisions in situations of ambiguity by putting utilities(values) on several possible results

(c) It is a mathematical function used in Artificial Intelligence (AI) to represent a system's preferences or objectives

(d) All of the mentioned

1-h. Which is used to compute the truth of any sentence? (CO4) 1

(a) Semantics of propositional logic

(b) Alpha-beta pruning

(c) First-order logic

(d) Both Semantics of propositional logic & Alpha-beta pruning

1-i. Which of the following is a planning technique that works by searching a state space for a solution? (CO5) 1

(a) Goal stack planning

(b) Hierarchical planning

(c) State space search planning

(d) Continuous planning

1-j. Which of the following is a type of reasoning used in expert systems? (CO5) 1

(a) Rule-based reasoning

(b) Planning

(c) Search

(d) All of the above

2. Attempt all parts:-

2.a.	Define Sensors, Actuators and Effectors? (CO1)	2
2.b.	Write two differences between Breadth first and Depth first search. (CO2)	2
2.c.	Convert the following sentences into Predicates. i. x is greater than y. ii. Johns father Loves John. (CO3)	2
2.d.	What do you mean by HMM in AI, why it is being used ? (CO4)	2
2.e.	Define Neural net learning? (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	What are the main aspects considered before solving a complex AI problem? What is state space representation in AI? (CO1)	6
3-b.	What are some misconceptions about AI? Distinguish between strong and weak artificial intelligence? (CO1)	6
3-c.	What are the problems associated with Hill Climbing? How these can be overcomed? (CO2)	6
3-d.	Draw Hill Climbing State Space diagram (Graphical representation) and explain its different regions. (CO2)	6
3.e.	Explain Water Jug Problem in detail with all Production Rules. (CO3)	6
3.f.	What are rule-based expert systems and how do they work? (CO4)	6
3.g.	What is the difference between supervised and unsupervised machine learning? (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	What is PEAS? Explain different agent types with their PEAS descriptions? (CO1)	10
4-b.	What is Natural language processing? Mention its application domain in AI. What are some of the problems which arise in natural language understanding for autonomous machines like robots, intelligent computers. (CO1)	10

5. Answer any one of the following:-

5-a.	What is Heuristic Search? Give the desirable properties of heuristic search algorithm? (CO2)	10
5-b.	Explain Best First Search algorithms. Explain algorithm in detail with example. (CO2)	10

6. Answer any one of the following:-

6-a.	Consider the following facts and prove that "Marcus is dead" using Predicate Logic 1. Marcus was a man. 2. Marcus was a Pompeian. 3. Marcus was born in 40 A.D.	10

4. All men are mortal.
5. All Pompeians died when the volcano erupted in 79 A.D.
6. No mortal lives longer than 150 years
7. It is now 1991.
8. Alive means not dead.
9. If someone dies, he is dead at all later times. (CO3)

6-b. How will you differentiate between Partitioned nets and Semantic Nets? Explain your answer with suitable examples. (CO3) 10

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

7-a. Explain the role of Inference Engine and working memory in expert System with suitable example. (CO4) 10

7-b. Name any 4 Expert Systems. Explain the architecture of an Expert System in detail (CO4) 10

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

8-a. What is Dempster-Shafer theory? How does it differ from Bayesian networks? (CO5) 10

8-b. What is goal stack planning? How does it differ from other forms of planning? (CO5) 10