Code No: R2021421 **R20** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, January- 2023
INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(Com to CSE(AIML), AIML)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions, each Question from each unit
All Questions carry **Equal** Marks
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UNIT-I

1	a)	What is AI? Define Artificial intelligence on the basis of " Systems that think rationally " and " Systems that act like humans"	[7M]
	b)	Explain Goal based agent and Utility based agent architecture with proper diagram.	[7M]

OR

2	a)	Explain different types of agent Programs.	[7M]
	b)	Draw the Schematic diagram of a Simple Reflex Agent and explain in detail.	[7M]

UNIT-II

3	a)	What are the main aspects considered before solving a complex AI problem? What is state space representation in AI?	[7M]
	b)	Define Heuristic search and heuristic function WITH SUITABLE EXAMPLE.	[7M]

OR

4	a)	What are local search algorithms? Explain Hill climbing search.	[7M]
	b)	Differentiate between Uninformed and Informed Search technique.	[7M]

UNIT-III

5	a)	Differentiate between declarative knowledge and procedural knowledge	[7M]
	b)	Define First Oder Logic. Convert the following sentences into well formed formula of Predicate logic (First order logic) (i) Ruma Dislikes children who drink tea (ii) Any person who is respected by every person is a king.	[7M]

OR

6	a)	Differentiate propositional logic & predicate logic.	[8M]
	b)	Summarize on the following concepts: (i) Event calculus (ii) Generalized events (iii) Fluents and Objects	[6M]

UNIT-IV

7	a)	What do you mean by a well –posed learning problem? Explain the important features that are required to well define a learning problem	[7M]
	b)	Explain the various stages involved in designing a learning system.	[7M]

OR

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8 a) What are the basic design issues and approaches to machine learning? [6M]

b) Differentiate between Supervised and Unsupervised Learning. [8M]

UNIT-V

9 a) Explain learning in Decision Trees with an example. [7M]

b) What is over fitting and under fitting? Why does the decision tree algorithm suffer often with over fitting problem? [7M]

OR

10 a) Describe hypothesis Space search in ID3 and contrast it with Candidate-Elimination algorithm. [7M]

b) Discuss the effect of reduced Error pruning in decision tree algorithm. [7M]

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UNIT-I

1 a) Describe in detail about [8M]
i) Simple reflex agent.
ii) Model based agent.

b) Explain Goal based agent and utility based agent architectures with a proper diagram. [6M]

OR

2 a) Describe the four categories under which AI is classified with examples. [7M]

b) Explain in detail the properties of Task Environments. [7M]

UNIT-II

3 a) Summarize the characteristics of AI problems. [7M]

b) What is Greedy Best First Search? Explain with an example the different stages of Greedy Best First search. [7M]

OR

4 a) Enumerate the concept of searching with nondeterministic actions. [7M]

b) Explain Water Jug Problem using state space search. Generate Production rules for this problem. [7M]

UNIT-III

5 a) Define the term logic. What is the role of logic in Artificial Intelligence? Compare Propositional logic with First order logic. [9M]

b) Convert the following sentences to wff in first order predicate logic. [5M]
(i) No coat is water proof unless it has been specially treated.
(ii) A drunker is enemy of himself.
(iii) Any teacher is better than a lawyer.
(iv) If x and y are both greater than zero, so is the product of x and y.
(v) Every one in the purchasing department over 30 years is married.

OR

6 a) How is resolution in first order predicate logic different from that of propositional performed? What is Unification Algorithm & why it is required? [7M]

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b) Using the inference rules of Propositional logic , Prove the validity of following axioms: [7M]
   (i) If either algebra is required or geometry is required then all students will study mathematics.
   (ii) Algebra is required and trigonometry is required therefore all students will study mathematics.

UNIT-IV

7 a) What are the different types of Learning/ Training models in ML? [7M]
   b) Explain the basic design issues of machine learning models. [7M]

OR

8 a) How is Candidate Elimination algorithm different from Find-S Algorithm [7M]
   b) With a neat diagram, explain how you can model inductive systems by equivalent deductive systems. [7M]

UNIT-V

9 a) Compare Entropy and Information Gain in ID3 with an example. [7M]
   b) List the issues in Decision Tree Learning. Interpret the algorithm with respect to Over fitting the data. [7M]

OR

10 a) How do you calculate the entropy of children nodes after the split based on on a feature? [7M]
   b) What is pure mode and impure mode? Explain the impact of pure mode and impure mode in constructing a decision tree. [7M]

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UNIT-I

1	a)	What do you mean by AI? Explain contribution of AI in various fields.	[7M]
	b)	Name the elements of an agent and list down the Characteristics of intelligent agent.	[7M]

OR

2	a)	What are the four different kinds of agent programs? Explain a simple reflex agent with a diagram.	[7M]
	b)	Differentiate utility and learning based agents.	[7M]

UNIT-II

3	a)	Define the terms goal formulation and problem formulation. What are the components of well-defined problems?	[7M]
	b)	Explain AO* algorithm with an example.	[7M]

OR

4	a)	What are the problem characteristics of Artificial Intelligence? Solve 8 puzzle problem by any AI technique.	[7M]
	b)	Discuss iterative deepening search. Also give one example to explain	[7M]

UNIT-III

5	a)	Write various Knowledge Representation issues and Provide the solution of any two issues.	[7M]
	b)	Differentiate with example representation of “Instance” and “Isa” relationships.	[7M]

OR

6	a)	What is Ontological Engineering? Explain the Ontology of Situation calculus.	[7M]
	b)	What is a frame problem? How do you solve the following problems in situation calculus? (i) Solving the representational frame problem (ii) Solving the inferential frame problem	[7M]
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UNIT-IV

7	a)	Differentiate Find-S and Candidate Elimination Algorithm.	[7M]
	b)	Explain in detail about the inductive biased hypothesis space with examples	[7M]

OR

8	a)	Define and explain the concept of "Learning" Describe the features of the following methods of Learning. (i) Memorization (Rote learning). (ii) Direct Instruction (Taking advice). (iii) Analogy (By example). (iv) Induction. (v) Deduction	[7M]
	b)	Explain the various stages involved in designing a learning system	[7M]

UNIT-V

9	a)	What is a Decision Tree? Explain Decision Tree Induction Algorithm.	[7M]
	b)	Explain the importance of Entropy and Information Gain measures in the Construction of a Decision Tree with an example.	[7M]

OR

10	a)	Compare Pre-Pruning and Post-Pruning in decision trees.	[7M]
	b)	Explain various methods/types of splitting attributes.	[7M]

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UNIT-I

1	a)	What is a task environment? How it is specified? Give an example of PEAS description for an automated taxi.	[7M]
	b)	Summarize the factors that make up rationality of an agent. Give suitable examples.	[7M]

OR

2	a)	Compare learning agents with utility based agents.	[7M]
	b)	Explain with a diagram the model based reflex agent.	[7M]

UNIT-II

3	a)	Explain A* algorithm in detail with a suitable example.	[7M]
	b)	Describe different control strategies used in problem solving.	[7M]

OR

4	a)	Solve Travelling Salesman Problem using any AI technique.	[7M]
	b)	What is hill Climbing? Explain Simple Hill Climbing and Steepest – ascent hill climbing.	[7M]

UNIT-III

5	a)	What are the steps associated with the knowledge Engineering Process? Explain how categories and objects are useful in Knowledge Representation.	[7M]
	b)	Give semantic nets to describe the following: Narayan is a writer Narayan lives in Bombay Ishwar is a teacher Ishwar lives in Bangalore. Narayan sent a copy of his book to Ishwar Ishwar sent his thanks to Narayan.	[7M]

OR
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6	a)	Explain the non-monotonic reasoning. Explain different subtypes of no monotonic reasoning.	[7M]
	b)	Write sort notes on the following concepts: (i) Inductive bias (ii) Intervals (iii) Version spaces	[7M]

UNIT-IV

7	a)	Define and explain "learning". Describe in detail, the range of activities covered by the concept of "learning". Justify the statement-that "learning is the most important characteristic of intelligence".	[7M]
	b)	Describe and discuss in detail, the important aspects of (i) Rote Learning (ii)Learning by taking advice. Illustrate answer with the help of relevant examples.	[7M]

OR

8	a)	Explain in brief about Deduction method of learning.	[7M]
	b)	Explain in detail about Reinforcement Learning.	[7M]

UNIT-V

9	a)	Are Decision Trees affected by the outliers? Explain.	[7M]
	b)	Discuss the issues in Decision tree learning.	[7M]

OR

10	a)	What is the Inductive Bias of Decision Trees? Compare the different attribute selection measures.	[7M]
	b)	Discuss in detail Information Gain Selection measure for best split atribute.	[7M]