



**SIDDHARTH INSTITUTE OF ENGINEERING AND TECHNOLOGY:: PUTTUR  
(AUTONOMOUS)**

**Siddharth Nagar, Narayanavanam Road-517583**

**Subject with Code: Principles of Artificial Intelligence (23CS0901)**

**Course & Branch: CSE**

**Year & Sem: II B.Tech & I Sem**

**Regulation: R23**

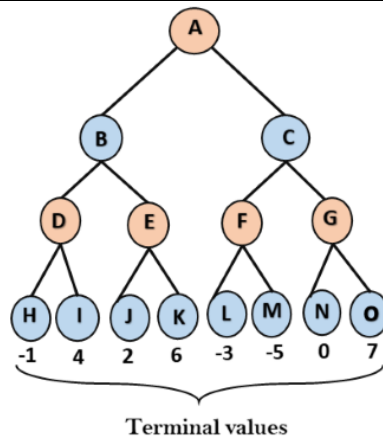
**UNIT I  
Introduction**

<b>1</b>	<b>a)</b>	What is AI? List out the categories in which AI definitions are organized.	[L1,CO1]	[2M]
	<b>b)</b>	Define intelligent agent.	[L1,CO1]	[2M]
	<b>c)</b>	What are the key factors that determine the rationality of an agent at any given time?	[L1,CO1]	[2M]
	<b>d)</b>	State and list PEAS for Medical diagnosis system.	[L1,CO1]	[2M]
	<b>e)</b>	List the different types of problems in AI	[L1,CO1]	[2M]
<b>2</b>	<b>a)</b>	State some definitions of artificial intelligence, and how can they be categorized.	[L2,CO1]	[5M]
	<b>b)</b>	Discuss how artificial intelligence categorized based on different approaches, and what do these categories entail?	[L2,CO1]	[5M]
<b>3</b>		List and explain in detail the foundation of Artificial Intelligence.	[L2,CO1]	[10M]
<b>4</b>		Describe the major milestones in the history of artificial intelligence	[L2,CO1]	[10M]
<b>5</b>	<b>a)</b>	Illustrate any two applications of AI in real time.	[L3,CO1]	[5M]
	<b>b)</b>	Analyze in what ways can an agent's rational behavior be influenced by its performance measure, prior knowledge, actions, and percept sequence?	[L4,CO1]	[5M]
<b>6</b>	<b>a)</b>	How do the properties of task environments influence the design and performance of intelligent agents in various applications?	[L1,CO1]	[5M]
	<b>b)</b>	What is the PEAS framework, and what are its components? Discuss with an example	[L2,CO1]	[5M]
<b>7</b>		Analyze different types of agents, and explain how do they interact with their environments?	[L4,CO1]	[10M]
<b>8</b>		Explain the different types of agent programs and their internal structures which influence the efficiency and autonomy of intelligent agents?	[L2,CO1]	[10M]
<b>9</b>	<b>a)</b>	What are the four conceptual components of a learning agent, and how do they contribute to the agent's ability to improve its performance in unknown environments? Describe in detail.	[L2,CO1]	[5M]
	<b>b)</b>	Illustrate the list of sequence done by the intelligent agent to maximize the performance measure.	[L3,CO1]	[5M]
<b>10</b>	<b>a)</b>	Discuss the four components used to define a problem formally.	[L2,CO1]	[5M]
	<b>b)</b>	Illustrate with an example what is meant by formulating problems.	[L3,CO1]	[5M]

## UNIT II

### Searching

1	a)	What does a search problem consist of? List them.	[L1,CO2]	[2M]
	b)	List and define how the search algorithms are classified?	[L1,CO2]	[2M]
	c)	State Heuristic function and Heuristic values.	[L1,CO2]	[2M]
	d)	Differentiate between A* and AO* algorithm.	[L1,CO2]	[2M]
	e)	What is meant by Adversarial search in AI?	[L1,CO2]	[2M]
2		What is searching? Explain the different types of search algorithms in AI.	[L2,CO2]	[10M]
3		Discuss Uninformed search with its search algorithms stating examples and complexity in its implementation.	[L2,CO2]	[10M]
4		What are Heuristic algorithms? Analyze in detail the different types of Heuristic algorithms with example.	[L4,CO2]	[10M]
5		Describe the Hill Climbing Algorithm in Artificial Intelligence with its State-space Diagram. Discuss its key features, advantages, and limitations.	[L2,CO2]	[10M]
6	a)	Explain the A* Search Algorithm in Artificial Intelligence with an example.	[L2,CO2]	[5M]
	b)	Describe the AO* Algorithm in Artificial Intelligence. Demonstrate how the AO* algorithm* works for given AND-OR graph	[L4,CO2]	[5M]
		<pre> graph TD     A((A)) --- 6  B((B))     A --- 8  C((C))     A --- 4  D((D))     B --- 5  E((E))     B --- 9  F((F))     C --- 2  G((G))     C --- 2  H((H))     C --- 2  I((I))     D --- 4  J((J))     E --- 7     F --- 9     G --- 3     H --- 0     I --- 0     J --- 0 </pre>		
7	a)	Discuss how efficient the problem reduction search helps in problem-solving technique of AI.	[L2,CO2]	[5M]
	b)	Explain in detail the Role of Adversarial Search and its algorithms in AI.	[L2,CO2]	[5M]
8	a)	What are common problems in game playing AI, and how can they be addressed explain with an example?	[L1,CO2]	[5M]
	b)	State Game Tree and discuss the concepts for defining a Game Tree with an example.	[L2,CO2]	[5M]
9		Describe Mini-Max Algorithm in Artificial Intelligence. Solve the following Game tree using Mini-Max Algorithm.	[L2,CO2]	[10M]

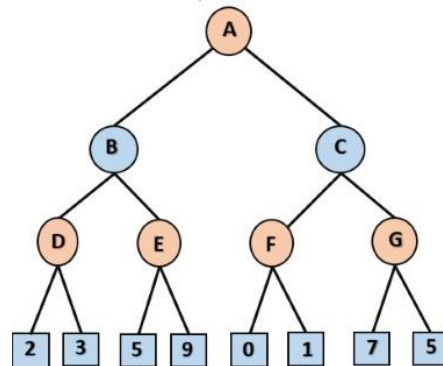


Terminal values

**10** Explain Alpha-Beta Pruning algorithm in detail and apply it on the given game tree illustrating the steps adapted to solve it.

[L2,CO2]

[10M]



**11** a) Discuss with an example how Optimal Decision Making in Multiplayer Games are performed?

[L2,CO2]

[5M]

b) How do we design good evaluation functions? Explain in detail.

[L2,CO2]

[5M]

### UNIT III

#### Representation of Knowledge

<b>1</b>	<b>a)</b>	List the kind of knowledge which needs to be represented in AI systems.	[L1,CO3]	[2M]
	<b>b)</b>	What is Knowledge? Give its types.	[L1,CO3]	[2M]
	<b>c)</b>	State the Techniques of knowledge representation.	[L1,CO3]	[2M]
	<b>d)</b>	What is Uncertainty in Artificial Intelligence?	[L1,CO4]	[2M]
	<b>e)</b>	List few AI Methods to Perform Decision Making Under Uncertainty	[L1,CO4]	[2M]
<b>2</b>	<b>a)</b>	Describe Knowledge representation and it's types in AI.	[L2,CO3]	[6M]
	<b>b)</b>	Explain the kind of knowledge which needs to be represented in AI systems.	[L2,CO3]	[4M]
<b>3</b>	<b>a)</b>	Illustrate AI knowledge cycle with neat diagram.	[L6,CO3]	[5M]
	<b>b)</b>	Give the relation between knowledge and intelligence and list requirements for knowledge Representation system	[L6,CO3]	[5M]
<b>4</b>		Analyze the different approaches to knowledge representation.	[L6,CO3]	[10M]
<b>5</b>		Discuss in detail the key issues related to knowledge representation in AI	[L6,CO3]	[10M]
<b>6</b>		Describe the Techniques of knowledge representation with their advantages and disadvantages.	[L2,CO3]	[10M]
<b>7</b>	<b>a)</b>	Explain how logical connectives in propositional logic are represented?	[L2,CO3]	[5M]
	<b>b)</b>	Discuss predicate logic and how are they used?	[L2,CO3]	[5M]
<b>8</b>	<b>a)</b>	What is a frame in the context of knowledge representation? Explain how do frames help in organizing knowledge?	[L2,CO3]	[5M]
	<b>b)</b>	Describe how Inheritance mechanism is used in knowledge representation.	[L2,CO3]	[5M]
<b>9</b>	<b>a)</b>	What is Constraint Propagation in AI? How Constraint Propagation Works?	[L1,CO3]	[5M]
	<b>b)</b>	What are expert systems? Illustrate how representing knowledge using rules in artificial intelligence work.	[L3,CO3]	[5M]
<b>10</b>	<b>a)</b>	Discuss the following in detail i) Rule-Based Deduction Systems ii) Reasoning under Uncertainty	[L2,CO4]	[5M]
	<b>b)</b>	What is Probabilistic reasoning in Artificial Intelligence? Summarize the Need of probabilistic reasoning in AI	[L5,CO4]	[5M]
<b>11</b>	<b>a)</b>	Explain in detail Bayes' probabilistic interferences with an example	[L2,CO4]	[5M]
	<b>b)</b>	Explain in detail about Dempster Shafer Theory with an example	[L2,CO4]	[5M]

### UNIT IV

#### Logic concepts

1	a)	What is FOL?	[L1,CO5]	[2M]
	b)	State binary Resolution rule.	[L1,CO5]	[2M]
	c)	List the four major factors on which the component of an agent can be improved by learning from data.	[L1,CO5]	[2M]
	d)	Give the difference between Propositional vs. First-Order Logic Inferences	[L4,CO5]	[2M]
	e)	State difference between Reinforcement Learning and Supervised Learning	[L1,CO5]	[2M]
2		Explain in detail about Syntax and Semantics of First-Order Logic with examples.	[L2,CO5]	[10M]
3	a)	State few key applications, challenges and limitations of FOL in AI.	[L1,CO5]	[5M]
	b)	Discuss in detail Inference in first-order logic	[L2,CO5]	[5M]
4		Illustrate the knowledge-engineering process with a real time example in detail.	[L3,CO5]	[10M]
5	a)	What is Unification? Discuss its algorithm and implementation procedure.	[L2,CO5]	[5M]
	b)	Analyze the difference between forward chaining and backward chaining	[L4,CO5]	[5M]
6		Explain the two modes in which an inference engine commonly operates. Provide examples of how each mode works in an intelligent system.	[L2,CO5]	[10M]
7	a)	What is Resolution in FOL? Illustrate the step involved with example.	[L3,CO5]	[5M]
	b)	Discuss the various forms of learning in detail.	[L2,CO5]	[5M]
8	a)	Describe the process of implementing the Inductive Learning Algorithm to generate classification rules. Include an example to demonstrate how the algorithm works.	[L2,CO5]	[5M]
	b)	State Bayes' theorem. Describe in detail how it is utilized for statistical learning methods in AI.	[L2,CO5]	[5M]
9		Explain decision tree in detail with example. Discuss how identification of attribute is performed in decision tree.	[L2,CO5]	[10M]
10		Discuss Explanation-based learning? Illustrate its working with neat architecture diagram and example.	[L2,CO5]	[10M]
11		What is Reinforcement Learning in artificial intelligence? Explain its main types and the techniques used within each type.	[L2,CO5]	[10M]

## UNIT V

### Expert Systems

1	a)	Draw the block diagram of expert system working.	[L1,CO5]	[2M]
	b)	What is knowledge acquisition?	[L3,CO5]	[2M]
	c)	State what is meta knowledge heuristic.	[L1,CO6]	[2M]
	d)	List the Pros and cons of knowledge acquisition	[L1,CO6]	[2M]
	e)	What is Meta knowledge and the in what orders they are divided?	[L1,CO6]	[2M]
2		What is an expert system? Discuss the need of it. Give detailed explanation of components of expert system with neat diagram	[L2,CO6]	[10M]
3		Discuss the following a) Characteristics of ES b) Advantages of ES c) Limitations of ES d) Capabilities of ES e) Applications of ES	[L2,CO6]	[10M]
4	a)	Analyze the Types of expert systems in AI elaborately.	[L4,CO6]	[5M]
	b)	Describe the Architecture of expert systems in detail with neat diagram.	[L2,CO6]	[5M]
5	a)	Justify the Roles of expert systems with its capabilities.	[L6,CO6]	[5M]
	b)	What is knowledge acquisition and its methods in the process? Also, List out the challenges of knowledge acquisition.	[L1,CO6]	[5M]
6	a)	Explain the goals and role of knowledge acquisition in AI explain with a real time examples.	[L2,CO6]	[5M]
	b)	Discuss Metaheuristic and its classification in detail.	[L2,CO6]	[5M]
7		Describe MYCIN with its development, key features, and impact.	[L2,CO6]	[10M]
8		Discuss what is DART with its key capabilities, architecture, real-world applications, advantages, and limitations.	[L2,CO6]	[10M]
9		Explain XCON with its functions, key features, architecture components, benefits, and challenges.	[L2,CO6]	[10M]
10		Illustrate Expert System Shell in AI along with its components, types, benefits, challenges, and applications.	[L3,CO6]	[10M]