

SRM VALLIAMMAI ENGINEERING COLLEGE

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**QUESTION BANK****SUBJECT : Artificial Intelligence****SEM / YEAR: VI Sem / III Year**

UNIT I - <u>INTRODUCTION</u>			
Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.			
PART - A			
Q.No	Questions	BT	Competence
1.	Define Artificial Intelligence.	BTL-1	Remember
2.	Differentiate Natural Intelligence from Artificial Intelligence.	BTL-2	Understand
3.	Access what is meant by a Turing Test?	BTL-5	Evaluate
4.	Identify the capabilities, computer should possess to pass Turing test?	BTL-1	Remember
5.	Show what is meant by Total Turing Test?	BTL-3	Apply
6.	What are the capabilities computers needs to pass total Turing test?	BTL-5	Evaluate
7.	Summarize about software agents?	BTL-3	Apply
8.	Why are condition-action rules important in the design of an agent?	BTL -1	Remember
9.	Infer the structure of an agent in an environment.	BTL-4	Analyze
10.	Generalize what is a rational agent?	BTL-6	Create
11.	State and Express the concept of rationality.	BTL-2	Understand
12.	Analyse how to measure the performance of an agent?	BTL-4	Analyze
13.	Generalize and define Omniscience and information Gathering.	BTL-6	Create
14.	What is important for task environment?	BTL-1	Remember
15.	List the properties of environments.	BTL-1	Remember
16.	Express the ways to formulate a problem?	BTL-2	Remember

17.	Order the different type of agents.	BTL-4	Analyze
18.	Give Structure of Simple Relex Agent	BTL-2	Understand
19.	How can the performance of an agent are improved.	BTL-2	Understand
20.	Show what are the three classes of problem?	BTL-3	Apply
PART – B			
1.	i) How did you describe PEAS description for at least four agent types? (7) ii) How did you describe PEAS? (6)	BTL-1	Remember
2.	Summarize in detail about production system characteristics. (13)	BTL-2	Understand
3.	Describe in detail about i) Simple reflex agent.(3) ii) Model based agent.(3) iii) Utility based agent.(3) iv) Goal based agent .(4)	BTL-1	Remember
4.	Can you apply the facts to describe Iterative deepening depth first search. (13)	BTL-3	Apply
5.	Compare and contrast human intelligence to artificial intelligence with numerous examples and applications. (13)	BTL-5	Evaluate
6.	Explain the role of Artificial intelligence in the future. (13)	BTL-4	Analyze
7.	Discuss about agents and Environments. (13)	BTL-2	Understand
8.	Analyse the Characteristic of intelligent Agents. (13)	BTL-4	Analyze
9.	Compose and explain in detail about intelligent agents. (13)	BTL-6	Create
10.	Examine the PEAS specification of the task environment of an agent. (13)	BTL-1	Remember
11.	Explain the structure of agents. (13)	BTL-4	Analyze
12.	Discuss about the multi – agent systems with the help of an illustration. (13)	BTL-2	Understand
13.	Describe the role of communication for intelligent agents. (13)	BTL-1	Remember
14.	Show how problem solving agents solving contingency problems different from the one solving exploratory problems. (13)	BTL-3	Apply

PART-C			
1.	Explain crypt arithmetic problem for the below Problem: SEND +MORE	BTL-4	Analyze

	Initial state: MONEY No two letters have the same value. The sums of the digits must be shown in the problem.(15)		
2.	Consider the given problem. Describe the operator involved in it. Consider the water jug problem: You are given two jugs, a 4-gallon one and 3-gallon one. Neither has any measuring marker on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallon of water from the 4-gallon jug? Explicit Assumptions: A jug can be filled from the pump, water can be poured out of a jug on to the ground, water can be poured from one jug to another and that there are no other measuring devices available.(May/June 2016) (Nov/Dec-2016) (15)	BTL-5	Evaluate
3.	Compose the process of simulated annealing with example.(May/June 2017)(15)	BTL-6	Create
4.	Develop your own multi – agent systems with the help of an illustration.(15)	BTL-6	Create

UNIT II - PROBLEM SOLVING METHODS

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games

PART - A

Q.No	Questions	BT	Competence
1.	Define Problem Formulation.	BTL-1	Remember
2.	What are the four components to define a problem? Define them.	BTL-1	Remember
3.	Define a graph and a path.	BTL-1	Remember
4.	Discover what is optimal solution?	BTL-3	Apply
5.	Define abstraction.	BTL-1	Remember
6.	Rank and list the criteria to measure the performance of search strategies.	BTL-5	Evaluate
7.	Define heuristics. Why are heuristics crucial for the efficient design of an expert system?	BTL-1	Remember
8.	Show the significance of using heuristic functions.	BTL-3	Apply
9.	Generalize and define the effect of heuristic accuracy on performance.	BTL-6	Create
10.	Differentiate uninformed search and informed search.	BTL-2	Understand

11.	Examine the breadth first search.	BTL-3	Apply
12.	Summarize Simulated annealing.	BTL-2	Understand
13.	Summarize stochastic beam search.	BTL-2	Understand
14.	Access the depth-limited search.	BTL-5	Evaluate
15.	Point out what is Genetic algorithm.	BTL-4	Analyze
16.	Give the definition of game.	BTL-2	Understand
17.	Compose what is best-first search.	BTL-6	Create
18.	Analyse the definition of greedy best-first search.	BTL-4	Analyze
19.	Tell the classification of CSP with respect to constraints.	BTL-1	Remember
20.	Pointout and define node consistency, arc consistency and path consistency.	BTL-4	Analyze
PART - B			
1.	Discuss about i) Greedy best-first search. (4) ii) A* search . (4) iii) Memory bounded heuristic search. (5)	BTL-2	Understand
2.	Summarize the following uninformed i) Depth First Search. (4) ii) Iterative Deepening Depth First Search. (4) iii) Bidirectional Search. (5)	BTL-5	Evaluate
3.	i) Explain in detail about models for predicate logic.(6) ii) Explain Assertions and queries in first-order logic. (7)	BTL-4	Analyze
4.	Relate first order logic with proposition logic and discuss in detail about the same. (13)	BTL-3	Apply
5.	(i) Compose what is uninformed search? Explain depth first search with example.(6) (ii)Compose the algorithm for recursive best first search.(7)	BTL-6	Create
6.	(i) Explain the nature of heuristics with an example. What is the effect of heuristic accuracy on performance?(7) (ii) Write a simple back tracking algorithm for constraint satisfaction problems.(6)	BTL-1	Remember
7.	(i) What are the problems caused due to incomplete knowledge on the states or actions? Define each with example.(7) (ii) Explain constraint satisfaction problem in detail. (6)	BTL-4	Analyze
8.	What are the five uninformed search strategies? Explain any two in detail with example.(13)	BTL-1	Remember

9.	Describe the approach of formulation for constraint satisfaction problems with example. (13)	BTL-2	Understand
10.	(i) Explain the components of problem definition with example.(7) (ii) Briefly explain the search strategies in uninformed search.(6)	BTL-1	Remember
11.	Explain Briefly Problem Solving Strategies. (13)	BTL-4	Analyze
12.	Describe Alpha Beta Pruning with Algorithm. (13)	BTL-2	Understand
13.	Explain Stochastic Games with examples. (13)	BTL-1	Remember
14.	Show and explain Optimization Problems. (13)	BTL-3	Apply

PART-C			
1.	Compose the process of simulated annealing with example.(15)	BTL-6	Create
2.	(i) Develop the algorithm for steepest ascent hill climbing.(8) (ii) State the characteristics of an AI problem.(7)	BTL-6	Create
3.	Explain the Backtracking Search with algorithms. - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games	BTL-4	Analyze
4.	Summarize about the following with examples (i) Alpha Pruning (8) (ii) Beta Pruning (7)	BTL-5	Evaluate

UNIT-III KNOWLEDGE REPRESENTATION			
First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information			
PART - A			
Q.No	Questions	BT Level	Competence
1.	Define Universal Instantiation.	BTL-1	Remember
2.	Define Existential Instantiation	BTL-1	Remember
3.	Show what is Skolemization?	BTL-3	Apply
4.	What is first-order logic?	BTL-5	Evaluate
5.	Represent the following sentence in predicate form “All the children likes sweets”.	BTL-3	Apply
6.	Define universal and existential quantifiers.	BTL-1	Remember
7.	What is Prolog?	BTL-4	Analyze
8.	What are the elements and symbols of First order logic.	BTL-2	Understand

9.	Define terms.	BTL-1	Remember
10.	Define complex sentences	BTL-5	Evaluate
11.	Define upper ontology	BTL-3	Understand
12.	What are the three families of First-order inference algorithms?	BTL-4	Analyze
13.	What are the four parts of knowledge in first-order logic?	BTL-6	Create
14.	State the use of unification. (OR) What is the significance in using the unification algorithm?	BTL-2	Understand
15.	Define the first order definite clause.	BTL-2	Understand
16.	What is data-driven search? (forward chaining)	BTL-6	Apply
17.	State Herbrand's theorem.	BTL-4	Analyze
18.	Define Ontology Engineering.	BTL-2	Create
19.	Define Event Calculus.	BTL-1	Remember
20.	Define description logics.	BTL-1	Remember
PART - B			
1.	Explain the inference process in first order logic, using suitable example Prolog Programming. (13)	BTL-1	Remember
2.	What are the steps to convert first order logic sentence to Normal form? Explain each step. (13)	BTL-3	Apply
3.	Explain the unification algorithm used for reasoning under predicate logic with an example. (13)	BTL-4	Analyze
4.	Explain the forward chaining process and efficient forward chaining in detail with example. What is the need of incremental forward chaining? (13)	BTL-2	Understand
5.	<p>Consider the following facts</p> <ul style="list-style-type: none"> • Team India • Team Australia • Final match between India and Australia • India scored 350 runs, Australia scored 350 runs, India lost 5 wickets, Australia lost 7 wickets. • The team which scored the maximum runs wins. • If the scores are same the team which lost minimum wickets wins the match. <p>Represent the facts in predicate, convert to clause form and prove by resolution "India wins the match". (13)</p>	BTL-4	Analyze
6.	Describe the steps involved in the knowledge engineering process with example. Give the five logical connectives used to construct complex sentences and give the formal grammar of propositional logic. (13)	BTL-5	Evaluate
7.	<p>Consider the following facts and represent them in predicate form:</p> <p>F1. There are 500 employees in ABC company. F2. Employees earning more than Rs. 5000 pay tax. F3. John is a manager in ABC company. F4. Manager earns Rs. 10,000.</p> <p>Convert the facts in predicate form to clauses and then prove by resolution: "John pays tax". (13)</p>	BTL-2	Understand

8.	Explain Ontological Engineering Categories and Objects – Events - Mental Events and Mental Objects. (13)	BTL-1	Remember
9.	Write a short note on Reasoning Systems for Categories. (13)	BTL-6	Create
10.	Explain briefly Reasoning with Default Information. (13)	BTL-1	Remember
11.	Explain with an example the use of unification algorithm to prove the concept of resolution. (13)	BTL-4	Analyze
12.	(i). Discuss backward chaining algorithm.(6) (ii).Explain the algorithm for computing more general unifiers.(7)	BTL-2	Understand
13.	(i)How did you describe Resolution (6)? (ii)How would you identify an example for resolution? (7)	BTL-1	Remember
14.	i) Illustrate the user of First Order Logic to represent Knowledge.(8) ii)Write short note on Unification. (5)	BTL-3	Apply

PART-C			
1.	Explain resolution in predicate logic with suitable example.(15)	BTL-4	Analyze
2.	Consider the following sentences: <ul style="list-style-type: none"> • John like all kinds of food • Apples are food • Chicken is food • Anything anyone eats and isn't killed is food • Bill eats peanuts and still alive • Sue eats everything Bill eats (i)Translate these sentences into formulae in predicate logic. (ii)Convert the above FOL into clause form. (15)	BTL-5	Evaluate
3.	Develop and explain about the mental events and mental objects with example.(15)	BTL-6	Create
4.	Summarize about the reasoning systems for categories with examples.(15)	BTL-6	Create

UNIT IV - SOFTWARE AGENTS			
Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.			
PART - A			
Q.No	Questions	BT Level	Competence
1.	Define Purely Reactive Agents.	BTL-1	Remember
2.	What are the two types of information source?	BTL-3	Apply
3.	What are characteristics of the subsumption architecture?	BTL-1	Analyze
4.	State the advantage of vertically layered architecture.	BTL-6	Create
5.	Explore some interesting properties of agents and perception.	BTL-2	Understand
6.	What are four classes of agents?	BTL-6	Create
7.	What are logical formulae and logical deduction?	BTL-1	Remember
8.	What are the unsolved problems with other purely reactive architectures?	BTL-1	Remember
9.	Define belief-desire-intention (BDI) architectures	BTL-1	Remember
10.	What are the two types of control flow within layered architectures?	BTL-4	Remember
11.	State the advantage of horizontal layered architectures.	BTL-3	Apply
12.	Define Agent Communication.	BTL-2	Understand
13.	Define Coherence.	BTL-2	Understand
14.	Define the property of Coordination	BTL-5	Evaluate
15.	What are the three aspects to the formal study of communication?	BTL-1	Remember
16.	What are the fields Used in protocol?	BTL-5	Evaluate
17.	Define Ontology.	BTL-2	Understand
18.	Define bargaining.	BTL-4	Analyze
19.	Give the Diagrammatic Representation of Trust and Reputation Models for Multiagent Systems.	BTL-4	Analyze
20.	Define agent architecture.	BTL-3	Apply
PART - B			
1.	What are Abstract Architectures for Intelligent Agents.(13)	BTL-1	Remember
2.	Write briefly on Concrete Architectures for Intelligent Agents.(13)	BTL-2	Understand

3.	Write a short note on Layered architectures. (13)	BTL-4	Analyze
4.	Define Agent Communication. Write a short note on coordination, Dimensions of meaning and Message types.(13)	BTL-1	Remember
5.	Explain Negotiation in detail. (13)	BTL-1	Remember
6.	Explain Bargaining theories in detail. (13)	BTL-5	Evaluate
7.	Narrate Argumentation among Agents in detail.(13)	BTL-2	Understand
8.	Briefly explain (i). Communication Levels (4) (ii). Speech Acts (3) (iii). Knowledge Query and Manipulation Language (KQML)(3) (iv). Knowledge Interchange Format (KIF)(3)	BTL-6	Create
9.	With diagrammatic representation, explain Trust and Reputation in Multi-agent systems in detail.(13)	BTL-3	Apply
10.	Compare and contrast about the negotiation and bargaining.(13)	BTL-4	Analyze
11.	Examine the Argumentation among Agents.(13)	BTL-4	Analyze
12.	Describe the trust and reputation in multi-agent systems.(13)	BTL-2	Understand
13.	Explain about Planning and acting in the real world' .(13)	BTL-1	Remember
14.	How do you execute the planning in solving problems? (13)	BTL-3	Apply

PART-C			
1	Create and design the architecture of intelligence agent with an example. (15)	BTL-6	Create
2.	Explain about the agent communication. (15)	BTL-5	Evaluate
3.	Develop the trust and reputation in multi-agent systems and make an effective analysis over it. (15)	BTL-6	Create
4.	Analyse about the planning and acting in the real world is happens and explain it. (15)	BTL-4	Analyze



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UNIT V - APPLICATIONS			
AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.			
PART - A			
Q.No	Questions	BT Level	Competence
1.	List various applications of Artificial Intelligence.	BTL-1	Remember
2.	Define Language Modeling.	BTL-1	Remember
3.	What is Natural language processing (NLP)	BTL-4	Analyze
4.	What is Information retrieval?	BTL-2	Understand
5.	How is Information Retrieval System characterized?	BTL-2	Understand
6.	What are the objective of NLP	BTL-3	Apply
7.	What is Information Extraction?	BTL-5	Evaluate
8.	What are the features of NLP?	BTL-3	Apply
9.	What is n-gram language model?	BTL-3	Understand
10.	What is meant by Machine Translation?	BTL-4	Analyze
11.	What are the three main applications of machine translation.	BTL-6	Apply
12.	Define Interlingua.	BTL-5	Evaluate
13.	What is the role of a Translator?	BTL-1	Remember
14.	Define Speech Recognition	BTL-2	Create
15.	What are the difficulties in Speech recognition?	BTL-2	Understand
16.	What is a Robot?	BTL-4	Analyze
17.	Develop what is the role of Controller	BTL-6	Create
18.	Mention basic hardware component of a Robot.	BTL-1	Remember
19.	Define Robotic Perception	BTL-1	Remember
20.	Define Planning in Artificial Intelligence.	BTL-1	Remember

PART - B			
1.	Explain the various applications of Artificial Intelligence in detail.(13)	BTL-1	Remember
2.	What is Language model? Explain in detail.(13)	BTL-1	Remember
3.	Discuss the concept of Information retrieval.(13)	BTL-4	Analyze
4.	What are the ways Information Retrieval can be characterized?(13)	BTL-1	Remember
5.	How is Knowledge Acquired by the process of Information Extraction?(13)	BTL-3	Apply
6.	Explain N-gram character models Smoothing n-gram models.(13)	BTL-4	Analyze
7.	Write notes on Model evaluation N-gram word models.	BTL-5	Evaluate
8.	Explain how to translate text from one natural language (the source) to another (the target) with example.(13)	BTL-2	Understand
9.	Explain the concept of machine translation in detail.(13)	BTL-2	Understand
10.	Explain Speech Recognition concept in detail.(13)	BTL-6	Create
11.	What are the difficulties in Speech Recognition technique in Artificial Intelligence?(13)	BTL-4	Analyze
12.	Define Robotics. Discuss the various hardware components required for a Robot.(13)	BTL-2	Understand
13.	Write detailed notes on the following (i) Robotic Perception(5) (ii) Planning(4) (iii) Moving.(4)	BTL-1	Remember
14.	Write about information retrieval and information exchange.(13)	BTL-3	Apply
PART - C			
1.	Prepare how the natural language is processing, explain with a relevant example. (15)	BTL-6	Create
2.	Explain about the machine translation is made and give the best example for that with explanation. (15)	BTL-5	Evaluate
3.	Design a robotic action with the appropriate hardware needed and give the explanation. (15)	BTL-6	Create
4.	Analyse about the speech recognition application and explain about its functionalities.(15)	BTL-4	Analyze