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DEPARTMENT OF MECHATRONICS ENGINEERING

Two Mark Questions and Answers

Introduction to AI

Q1. Define Artificial Intelligence (AI).

• A1: AI is the branch of computer science that deals with creating systems capable of performing tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and language understanding.

Q2. What are the main goals of **AI**?

• A2: The main goals of AI are to create systems that can think, learn, and act intelligently, solve problems, automate tasks, and emulate human cognitive processes.

2. Production Systems

Q3. What is a production system in AI?

• A3: A production system is a framework consisting of rules (productions), a global database (working memory), and a control strategy to solve problems using a rule-based approach.

Q4. Name the components of a production system.

- A4: The components are:
 - 1. A set of rules (productions).
 - 2. A global database (working memory).
 - 3. A control strategy to apply rules.

3. Control Strategies

Q5. What is a control strategy in a production system?

• A5: A control strategy determines the sequence and priority of rule execution in a production

system to achieve the desired outcome efficiently.

Q6. Differentiate between forward and backward chaining.

- A6:
 - Forward chaining: Starts from known facts and applies rules to infer conclusions.
 - **Backward chaining:** Starts from the goal and works backward to find supporting facts.

4. Search Strategies

Q7. What is a search strategy in AI?

• A7: A search strategy is a method used to navigate through a problem space to find a solution.

Q8. Differentiate between uninformed and informed search.

- A8:
 - **Uninformed search:** No additional information about the problem (e.g., BFS, DFS).
 - **Informed search:** Uses heuristics to guide the search (e.g., A*, greedy search).

5. Problem Characteristics

Q9. What are problem characteristics in AI?

• A9: Problem characteristics describe the nature of a problem, such as its complexity, size of the state space, and the availability of knowledge.

Q10. What is a well-defined problem?

• A10: A well-defined problem has a clear initial state, goal state, and a set of rules for transitions.

6. Future of Artificial Intelligence

Q11. What is the expected future of AI?

• A11: AI is expected to advance in areas like autonomous systems, natural language understanding, medical diagnostics, and general intelligence.

Q12. What are the challenges for the future of AI?

• A12: Challenges include ethical concerns, data privacy, bias in algorithms, and achieving general intelligence.

7. Intelligent Agents

Q13. Define an intelligent agent.

• A13: An intelligent agent is an entity that perceives its environment through sensors and acts upon it using actuators to achieve goals.

Q14. What are the characteristics of intelligent agents?

• A14: They are autonomous, reactive, proactive, and capable of learning.

8. Typical Intelligent Agents

Q15. What are typical intelligent agents?

- **A15:** Examples include:
 - 1. Simple reflex agents.
 - 2. Goal-based agents.
 - 3. Utility-based agents.

Q16. How do utility-based agents differ from goal-based agents?

• A16: Utility-based agents consider the best possible action by maximizing a utility function, while goal-based agents aim to achieve specific goals.

9. Production System Characteristics

Q17. What are the characteristics of a production system?

• A17: Characteristics include modularity, separation of knowledge and control, and goal-oriented behavior.

Q18. What is a specialized production system?

• A18: A specialized production system is designed for specific applications, such as expert systems, with rules tailored for particular domains.

10. Matching, Indexing, and Heuristic Functions

Q19. What is matching in a production system?

• A19: Matching is the process of identifying rules whose conditions match the current state in the working memory.

Q20. What is a heuristic function in AI?

• A20: A heuristic function estimates the cost or likelihood of reaching the goal from a given state, aiding in efficient search.

11. Hill Climbing

Q21. What is hill climbing in AI?

• A21: Hill climbing is a heuristic search algorithm that continuously moves towards the neighbor with the highest value to find the peak solution.

Q22. Mention one drawback of hill climbing.

• A22: It can get stuck in local maxima, plateaus, or ridges, failing to find the global optimum.