AUTONOMOUS

Date	Assignment Type	Topic (S)	Marks Secure
2|8|24	Individual 1	Define well-structed AI Problem, Explain the components of Production system	
	Individual 2		
	Group		
	Case Study		

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INDIVIDUAL ASSIGNMENT EVALUATION SHEET: 1

TITLE OF ASSIGNMENT:	Introduction of Artificial intelligence
TYPE OF ASSIGNMENT:	Individual Assignment - I
DATE OF ASSIGNMENT GIVEN:	2-08-24
DUE DATE:	7-08-24
SUBMISSION DATE:	7-08-24
STUDENT SIGNATURE:	N.V. Sai Vineela
SUBJECT CO-ORDINATOR:	wesley mam
MARKS ALLOTTED:	
REMARKS OF SUBJECT CO-ORDINATOR:	
SUBJECT CO-ORDINATOR:	

1) Define a well structured AI problem. What assumptions do we make about the environment when solving AI problems?

A) **Problem Definition:** clearly articulate what needs to be solved. This includes specifying the goals or objectives, the criteria for success, and the constraints or limitations.

Environment specification: Define the environment in which the AI will operate. This includes the conditions under which the problem needs to be solved, such as whether the environment is dynamic or static, fully or partially observable, and whether it is deterministic or stochastic.

Input and output: clearly specify what inputs the AI will recieve and what outputs it should produce. Inputs are the data (or) observations the AI uses to make decisions, while outputs are the actions or responses it generates.

Actions and Responses: Define the set of possible actions the AI can take and the corresponding responses or changes in the environment. This also involves understanding how the actions effect the Environment and how feedback is provided.

Evaluation Criteria: Establish metrics or criteria to evaluate the performance of the AI system. This could include accuracy, efficiency, robustness or any other relevant measure.

Constraints and Assumptions: Identify any constraints that limit the solution space, such as Computational resources, time limits, or data availability. Also, outline the assumptions made about the problem and the Environment.

Assumptions about the Environment:

when solving AI problems, we often make several assumptions about the Environment

Observability: We assume that the AI has access to the necessary information or observations about the Environment to make decisions. This could be full observability, where all relevant information is available, or partial observability, where only incomplete or noisy data is accessible.

Determinism Vs stochasticity: We assume whether the Environment is deterministic (where the outcomes of actions are predictable) or stochastic (where outcomes are uncertain and probabilistic).

Static vs Dynamic: We assume whether the Environment is static (unchanging while the AI is making decisions) or dynamic (constantly changing, which may effect the AI's decisions)

Rationality: We assume that the AI will act rationally to achieve its goals based on the available information and its understanding of the Environment.

Model Accuracy: We assume that the model or representation of the environment used by the AI is accurate enough to make effective decisions. This includes the accuracy of any simulations, data (or) predictive models employed.

Resource Constraints: We assume that the AI will operate within certain resource Constraints, such as Computational power, memory or time limitations.

Stability: We assume that the Environment will not change

drastically during the decision-making process, or that any changes can be managed or accounted for by the AI.

These assumptions help frame the problem and guide the development and evaluation of AI solutions. However, they can also introduce limitations or challenges if the real Environment deviates significantly from these assumptions.

2) Explain the Components of production system. How do production systems solve problems in AI?

A) A production system in AI is a formal model used to represent and solve problems. It Consists of a set of Components that work together to process information and produce solutions. The main Components of a production system are

i) Production Rules:

Definition: These are Conditional statements or rules that dictate the behaviour of the system. Each rule is typically expressed in the form of "IF Condition THEN Action."

Purpose: They define how the system should act based on the Current state of the environment or problem. When a rule's Condition is met, its action is executed.

ii) working memory (state memory):

Definition: This is a dynamic data structure that holds the Current state of the system. It includes facts or data that represent the current situation or problem Context.

Purpose: It is used to store and update information and as the system processes rules and make decisions. Working memory is updated with new facts and Conditions as the system Evolves.

iii) **Production Rule Interpreter (control system):**

Definition: This Component is responsible for selecting while rule to apply based on the current state of the working memory and the set of available rules.

Purpose: It determines the order in which rules are applied, often using strategies like Conflict resolution, priority levels or pattern matching. It Ensures that the system progresses towards a solution by executing applicable rules.

iv) **Conflict Resolution strategy:**

Definition: this a method for resolving situations where multiple rules could be applied at the same time.

Purpose: It helps the system decide which rule to apply when there are Conflicts or multiple possibilities. Common strategies include rule priority, recency or specificity.

How Production systems solve Problems in AI

Production systems solve problems through a cycle of pattern matching, rule application, and updating the working memory.

Pattern matching:

The production rule interpreter examines the Conditions of all production rules and matches them against the Current state of the working memory.

Rules with Conditions that are satisfied by the facts in working memory become eligible for Execution.

Rule selection:

The system selects which rules to apply based on the Conflict resolution strategy. The selection process may involve priortizing

certain rules or choosing based on the Conflict resolution, spefific problem solving strategy.

Action Execution

The selected rules are Executed, resulting in actions that modify the working memory. This could involve adding new facts, removing existing facts, or changing current facts.

updating working memory

After Executing a rule, the working memory is updated to reflect the changes.

Iteration :

The cycle repeats with the updated working memory. The system Continues to match rules, select actions, and update memory until a goal state is reached.