**Assignment No. 1** Date: 13-01-2024

Title: **Assignment on**

1. **Introduction to AI**
2. **Problem formulation**
3. **PEAS Properties**

Q1. Give one definition on AI for each of the following approaches:

1. **Acting Humanly:** AI acting in a way that is indistinguishable from human behavior.
2. **Thinking Humanly:** AI simulating human thought processes and cognitive functions.
3. **Acting Rationally:** AI making decisions that lead to optimal outcomes based on available information.
4. **Thinking Rationally:** AI following formal rules of logic to reach conclusions.

Q2. Explain the Components of AI system in detail.

Perception: Acquiring information from the environment.

Knowledge Representation: Storing acquired information in a structured format.

Learning: Improving performance based on experience.

Reasoning: Drawing conclusions based on acquired knowledge.

Problem Solving: Finding solutions to achieve goals.

NLP (Natural Language Processing): Enabling communication between humans and machines.

Q3. Write a short note on categorization of AI.

Based on Capabilities:

Weak AI: Specialized in a specific task.

General AI: Possesses human-like cognitive abilities.

Strong AI: Exceeds human intelligence across various domains.

Based on Functionalities:

Reactive AI: Responds to predefined situations.

Limited Memory AI: Learns from past experiences.

Theory of Mind Machines: Understands human emotions and beliefs.

Self-Aware AI: Has consciousness and self-awareness.

Q4. Explain problem formulation with the help of example.

State Formulation: Define possible states.

Initial State: Specify the starting point.

Goal Test: Determine conditions for success.

Action Sequence: Outline possible moves.

Path Cost: Assign costs to actions.

Example: Chess-playing AI - States (board configurations), Initial State (start of the game), Goal Test (checkmate), Action Sequence (legal moves), Path Cost (move efficiency).

Q5. Explain PEAS Properties in detail.

Performance Measure: Defines success criteria.

Environment: External system that the agent interacts with.

Actuators: Execute actions in the environment.

Sensors: Gather information from the environment.

Example: Autonomous car - Performance Measure (reaching the destination), Environment (road and traffic), Actuators (steering, brakes), Sensors (cameras, radar).

Q6. Describe different types of environments with suitable examples.

Fully Observable vs. Partially Observable

Deterministic vs. Stochastic

Dynamic vs. Static

Episodic vs. Sequential

Discrete vs. Continuous

Single Agent vs. Multi-Agent

Example: Chess game - Fully Observable (all pieces visible), Deterministic (rules determine outcomes), Dynamic (pieces move), Sequential (moves in turns), Discrete (individual moves), Multi-Agent (two players).

References:

1. Aritificial Intelligence by Peter, Russel Norvig.

Course In-charge

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