BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – BCA-2022
Course Name – Artificial Intelligence
Course Code - BCAE501B
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the option that is not a typical challenge in AI.
a) Handling uncertainty
b) Ensuring real-time decision-making
c) Predicting the future with 100% accuracy
d) Learning from minimal data

(ii) Define the role of sensors in an AI agent.
a) They act upon the environment to achieve goals
b) They retrieve and process information from external sources
c) They store data internally for later use
d) They perceive and gather data from the environmen

(iii) Identify the correct description of a software agent.
a) A program that performs physical tasks in the real world
b) A device that navigates through physical spaces
c) A program that autonomously performs tasks and makes decisions.
d) A human using sensory inputs to make decisions

(iv) Name the correct form that represents the structure of an AI agent.
a) Agent = Architecture + Program
b) Agent = Perception + Knowledge
c) Agent = Data + Algorithm
d) Agent = Hardware + Environment

(v) Identify a critical ethical issue in AI from the provided options.
a) Lack of computational power
b) Privacy violations
c) High development costs
d) Limited data availability

(vi) Choose when to apply depth-first search.
a) To explore all possible solutions
b) To find the shortest path
c) To explore paths in depth
d) To solve optimization problems

(vii) Match the best algorithm for finding the shortest path.

a) BFS
b) DFS
c) Random Search
d) Greedy Search

(viii) How does Depth-First Search (DFS) handle cycles in a state space?

a) By keeping track of visited nodes to avoid re-processing
b) By expanding nodes only once
c) By using a heuristic function
d) By ignoring all cycles

(ix) Differentiate between state space and problem space.

a) State space includes all possible states, problem space includes only the feasible states
b) State space is the initial state, problem space is the goal state
c) State space includes only final states, problem space includes intermediate states
d) State space and problem space are the same

(x) Select what is the purpose of logic in knowledge representation.

a) To create new facts
b) To store data
c) To represent and infer new knowledge
d) To compress information

(xi) Select which of the following is used to represent the "is-a" relationship.

a) Set theory
b) Predicate logic
c) Semantic Networks
d) Resolution

(xii) Which of the following statements best describes a fuzzy set?

a) A set with a clearly defined boundary.
b) A set where each element has a degree of membership.
c) A set that can only contain numerical values.
d) A set used in deterministic decision-making.

(xiii) Select what does semantic analysis in NLP primarily deal with.

a) The structure of sentences
b) The meaning of words and sentences
c) The pronunciation of words
d) The context of conversations

(xiv) Select which phase of NLP would likely involve resolving ambiguities in sentence meaning.

a) Syntactic processing
b) Semantic analysis
c) Discourse processing
d) Pragmatic processing

(xv) Identify inductive learning primarily relies on

a) Deductive reasoning
b) Specific examples to form general rules
c) Genetic algorithms
d) Rule-based systems

Group-B

(Short Answer Type Questions) 3 x 5=15

2. List the roles of sensors and actuators in AI. Recall an example of how they help in interaction between an agent and its environment. (3)
3. Define a learning agent. List the components that help a learning agent enhance its performance over time. (3)
4. Define depth-first search (DFS) and explain its key features. (3)
5. What is the A* search algorithm and what are its key components? (3)
6. How relevant information can be utilized in enhancing learning process? (3)

OR

Examine the differences between discourse processing and pragmatic processing in NLP. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. State the concept of an "agent" in AI. Describe how an agent interacts with its environment using specific examples. (5)
8. Illustrate the concept of goal-based agents and differentiate them from utility-based agents by providing a real-world example. (5)
9. Examine the factors influencing the efficiency of beam search. (5)
10. Summarize membership function in fuzzy logic, and how does it helps in representing uncertainty? Provide an example. (5)
11. Create a framework for an expert system focused on financial analysis. Explain how domain knowledge is represented and utilized, and how the expert system shell supports the decision-making process. (5)
12. Analyze the time and space complexities of BFS and DFS in AI search algorithms. (5)

OR

Distinguish between uniform-cost search and BFS in solving weighted and unweighted problems. (5)

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