BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – Dip.RA-2022
Course Name – AI in Robotics
Course Code - ECPE402C
(Semester IV)

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)   Select from the following an AI application that focuses on proving mathematical theorems.

   a) Natural language processing   b) Theorem proving
   c) Vision processing   d) Expert systems

(ii)   Name the domain where Chess and Go are examples of AI applications.

   a) Vision processing   b) Natural language processing
   c) Games   d) Expert systems

(iii)   Select from the following a heuristic search algorithm that focuses on expanding the most promising node based on an evaluation function.

   a) Best-first search   b) Depth-first search
   c) Breadth-first search   d) Hill climbing

(iv)   Identify from following that Hill climbing is prone to getting stuck in local optima because it:

   a) Always chooses the best successor   b) Can only move downhill
   c) Doesn't use heuristic information   d) Doesn't use an evaluation function

(v)   Indicate a search algorithm that explores the search space by expanding the shallowest unexpanded node

   a) Best-first search   b) Breadth-first search
   c) Depth-first search   d) Hill climbing

(vi)   Select a search algorithm that explores the search space by expanding the deepest unexpanded node

   a) Breadth-first search   b) Depth-first search
   c) Best-first search   d) Hill climbing

(vii)   Frames are used to represent knowledge in terms of:

   a) Hierarchical structures   b) Graphical representations
   c) Logical rules   d) Decision trees

(viii) Which Knowledge Representation technique uses nodes to represent concepts and links to represent relationships between concepts?
- a) Frames
- b) Semantic Nets
- c) Decision Trees
- d) Horn Clauses

(ix) Learning by induction defines:
- a) Inferring rules from specific instances
- b) Applying pre-defined rules directly
- c) Generating random hypotheses
- d) Analyzing expert opinions

(x) Select the type of reasoning that focuses on handling imprecise or vague information.
- a) Probabilistic reasoning
- b) Non-monotonic reasoning
- c) Certainty factor reasoning
- d) Fuzzy logic reasoning

(xi) Select from the following that is NOT a key component of a biological neuron
- a) Soma
- b) Axon
- c) Dendrite
- d) Weights

(xii) Select the function that is typically used to introduce non-linearity in artificial neurons.
- a) Linear function
- b) Sigmoid function
- c) Identity function
- d) Exponential function

(xiii) Identify the purpose of the activation function in an artificial neuron.
- a) To perform arithmetic operations
- b) To introduce non-linearity
- c) To store data
- d) To adjust the learning rate

(xiv) Choose from the following advantages of genetic algorithms.
- a) Guaranteed global optimum
- b) Fast convergence
- c) Easy implementation
- d) Ability to handle complex search spaces

(xv) Select the primary function of the input layer in a neural network.
- a) Process data
- b) Store weights
- c) Receive input signals
- d) Perform computations

Group-B
(Short Answer Type Questions)   3 x 5=15

2. Define Natural Language Processing. (3)

3. Define local maximum in hill climbing algorithm and how to overcome it. (3)

4. Discuss the key techniques that are used in sentence generation in NLP. (3)

5. Distinguish Artificial Neural Networks (ANNs) traditional computing systems. (3)

6. Explain frame in AI with an example. (3)

OR

Illustrate Structure of a Partitioned Network. (3)

Group-C
(Long Answer Type Questions)   5 x 6=30

7. Explain the role of crossover, mutation, and selection operators in genetic algorithms. (5)

8. Describe the concept of backpropagation in Artificial Neural Networks (ANNs) and its role (5) in training multi-layer networks.

9. Illustrate the applications of AI . (5)

10. Explain how Semantic Nets contribute to knowledge representation in Artificial (5) Intelligence.

11. Illustrate how neurons in an Artificial Neural Network (ANN) process information. (5)

12. Illustrate Means Ends Analysis with an example. (5)

OR

Explain A* algorithm with an example. (5)

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