Roll No. ……..

BCA–502(DE-3)

B. C. A. (Fifth Semester)
EXAMINATION, 2024-25

ARTIFICIAL INTELLIGENCE

Time : $2\frac{1}{2}$ Hours

Maximum Marks : 60

Note : Attempt all questions.

Section—A

1. Multiple choice questions. 1 each

   (i) Among the given options, which search algorithm requires less memory ?

   (CO1, BL-1)

   (a) Optimal Search

   (b) Depth-First Search

   (c) Breadth-First Search

   (d) Linear Search

P. T. O.

(ii) Among the given options, which is not the required property of knowledge representation ? (CO3, BL-1)

(a) Inferential Efficiency

(b) Inferential Adequacy

(c) Representational Verification

(d) Representational Adequacy

(iii) An AI agent perceives and acts upon the environment using ..... . (CO1, BL-1)

(a) Sensors

(b) Perceiver

(c) Actuators

(d) Both (a) and (c)

(iv) Which agent deals with the happy and unhappy state ? (CO1, BL-1)

(a) Utility-based agent

(b) Model-based agent

(c) Goal-based agent

(d) Learning agent

(v) Select the most appropriate situation for that a blind search can be used : (CO3, BL-1)

(a) Real-life situation

(b) Small Search Space

(c) Complex game

(d) All of above

(vi) Among the given options, which is also known as inference rule ? (CO4, BL-2)

(a) Reference

(b) Reform

(c) Resolution

(d) None of above

(vii) The process of capturing the inference process as Single Inference Rule is known as : (CO2, BL-1)

(a) Clauses

(b) Ponens

(c) Generalized Modus Ponens

(d) Variables

(viii) In artificial Intelligence, knowledge can be represented as ..... . (CO1, BL-1)

(a) Predicate Logic

(b) Propositional Logic

(c) Both (a) and (c)

(d) None of the above

(ix) The total number of logical symbols in AI is ..... . (CO5, BL-2)

(a) There are 5 logical symbols.

(b) Number of logical symbols are based on the input.

(c) There are 3 logical symbols.

(d) Logical symbols are not used.

(x) Which of the following are the applications of Expert systems ? (CO3, BL-1)

(a) Disease Diagnosis

(b) Planning and Scheduling

(c) Decision-making

(d) All of the above

(xi) Translate the following statement into FOPL.

(CO5, BL-1)

"For every a, if a is a philosopher, then a is a scholar."

(a) $\forall$ a philosopher (a) scholar (a)

(b) $\exists$ a philosopher (a) scholar (a)

(c) All of the above

(d) None of the above

(xii) The search algorithm which is similar to the minimax search, but removes the branches that don't affect the final output is known as :

(CO3, BL-1)

(a) Depth-first search

(b) Breadth-first search

(c) Alpha-beta pruning

(d) None of the above

2. Attempt any *four* of the following (Short answer type questions). 3 each

(a) Explain the Quantifiers in First-order predicate logic with example. (CO2, BL-1)

(b) What is DFS ? Explain various stages of DFS with an example. (CO3, BL-1)

(c) Explain briefly the difference between procedural and declaration knowledge.

(CO2, BL-2)

(d) Write unification algorithm and explain resolution in predicate logic. (CO4, BL-3)

(e) In artificial intelligence what do you mean by Agents ? What is the role of Agents in artificial intelligence ? Briefly discuss properties of agents. (CO4, BL-3)

Section—B

(Long Answer Type Questions)

3. Attempt any *two* of the following : 6 each

(a) Enumerate Classical "Water Jug Problem". Describe the state space for this problem and also give the solution. (CO2, BL-2)

(b) Show the conceptual dependency representation of the following sentence :

(CO2, BL-6)

John wanted Mary to go to the store ?

(c) Write short notes on the following :

(CO4, BL-2)

(i) A* Algorithm

(ii) Mean-End Analysis

4. Attempt any *two* of the following : 6 each

(a) Explain the procedure of Knowledge Acquisition with the help of a diagram.

(CO3, BL-1)

(b) What do you mean by learning ? Explain briefly learning methods. (CO1, BL-2)

(c) What are the guidelines to choose whether a problem is appropriate for Expert system solutions ? (CO3, BL-5)

5. Attempt any *two* of the following : 6 each

(a) Express the following statements in propositional logic : (CO3, BL-5)

(i) If he campaigns hard, he will be elected.

(ii) If the humidity is high, it will rain either today or tomorrow.

(iii) Cancer will not be cured unless its cause is determined and a new drug for cancer is found.

(iv) It requires courage and skills to climb a mountain.

(v) The Sun rises in the west.

(b) What is an Expert System ? What are its advantages and limitations ? Briefly discuss the architecture of an Expert System.

(CO5, BL-2)

(c) Consider the following sentences :

(CO5, BL-6)

- John likes all kinds of food.
- Apples are food.
- Chicken is food.
- Anything anyone eats and isn't killed by is food.
- Bill eats peanuts and is still alive.
- Sue eats everything bill eats.

(i) Translate these sentences into formulas in predicate logic.

(ii) Prove that John likes peanuts using backward chaining.

(iii) Convert the formulas of a part into clause form.

(iv) Prove that John likes peanuts using resolution.