(Time: 2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.
   (2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
   (3) Answers to the **same question** must be **written together**.
   (4) Numbers to the **right** indicate **marks**.
   (5) Draw **neat labeled diagrams** wherever **necessary**.
   (6) Use of **Non-programmable** calculators is **allowed**.

1.   Attempt _any three_ of the following: 15
a.   What is Artificial Intelligence? State its applications
b.   Discuss Turing test with Artificial Intelligence approach.
c.   What are agents? Explain how they interact with environment.
d.   What is rational agent? Discuss in brief about rationality.
e.   Explain PEAS description of task environment for automated taxi.
f.   Give comparison between Full observable and partially observable agent.

2.   Attempt _any three_ of the following: 15
a.   Discuss in brief the formulation of single state problem.
b.   Give the outline of Breadth First Search algorithm.
c.   Give the outline of tree search algorithm.
d.   Explain the mechanism of genetic algorithm.
e.   Explain how transition model is used for sensing in vacuum cleaner problem.
f.   Give the illustration of 8 queen problem using hill climbing algorithm.

3.   Attempt _any three_ of the following: 15
a.   Explain the working mechanism of min-max algorithm.
b.   Explain in brief about resolution theorem.
c.   Write a note on Kriegspiel's Partially observable chess.
d.   Explain in brief about knowledge base agent.
e.   Explain the syntax for propositional logic.
f.   Write a note on Wumpus world problem.

4.   Attempt _any three_ of the following: 15
a.   What is first order logic? Discuss the different elements used in first order logic.
b.   Explain universal and existential quantifier with suitable example.
c.   Convert the following natural sentences into FOL form:
   i.   Virat is cricketer.
   ii.   All batsman are cricketers.
   iii.   Everybody speaks some language
   iv.   Every car has wheel.
   v.   Everybody loves somebody some time.
d.   What is knowledge engineering? Write the steps for its execution.
e.   Give comparison between forward chaining and backward chaining
f.   Explain in brief about unification.

5.   Attempt _any three_ of the following: 15
a.   What is planning? Explain STRIPS operators with suitable example.
b.   Explain in brief about partially ordered plan.
c.   Explain in brief about hierarchical planning.
d.   Write a note on mutex relation.
e.   What is semantic network? Show the semantic representation with suitable example.
f.   Write a note on Event calculus.

57835   Page **1** of **1**

(2½ Hours)

[Total Marks: 75]

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    (3) Answers to the **same question** must be **written together**.
    (4) Numbers to the **right** indicate **marks**.
    (5) Draw **neat labeled diagrams** wherever **necessary**.
    (6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt *any three* of the following:**   **15**
a. Elaborate artificial intelligence with suitable example along with its applications.
b. Discuss the historical evolution of Artificial Intelligence.
c. State the relationship between agents and environment.
d. Explain the concept of Rationality.
e. Explain types of environments.
f. Explain reflex agents with state.

2. **Attempt *any three* of the following:**   **15**
a. Write the procedure for tree search.
b. Explain the algorithm for breadth first search algorithm.
c. Give the outline of Uniform-cost search algorithm.
d. Explain A* algorithm for the shortest path.
e. Give the outline of Hill climbing algorithm.
f. Explain the working mechanism of genetic algorithm.

3. **Attempt *any three* of the following:**   **15**
a. What is alpha-beta pruning? Explain the function of alpha beta pruning.
b. Give the outline of min-max algorithm.
c. Write a note on card games.
d. What is knowledge based agent? Explain its role and importance.
e. Write a note on Wumpus world problem.
f. Give the outline of resolution algorithm.

4. **Attempt *any three* of the following:**   **15**
a What are predicates? Explain its syntax and semantics.
b What are Quantifiers? Explain the types with syntax and example.
c Convert the following into predicate form:
    i. Virat is software engineer.
    ii. All vehicles have wheels
    iii. Some-one speaks some language in this class.
    iv. Everybody loves somebody sometime.
    v. All software engineer develops software.
d Explain the process of knowledge engineering.
e What is unification? Explain the process of unification.
f Give the outline of simple forward chaining algorithm.

5. **Attempt *any three* of the following:**   **15**
a. What is planning? Explain the need of planning.
b. Explain block world problem for the following start state and end state.
c. Write a note on planning graph.
d. What are events? Explain its importance.
e. Write a note on semantic network.
f. Write a note on Truth maintenance system.

Page 1 of 1

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