

**Seventh Semester B.E. Makeup Examination, January 2020**  
**ARTIFICIAL INTELLIGENCE**

Time: 3 Hours

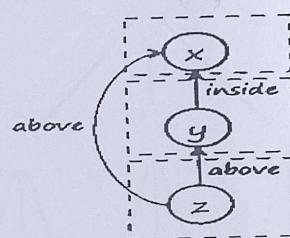
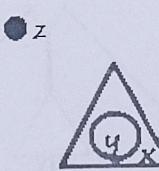
Max. Marks: 100

- Instructions:**
1. Precise and accurate answers expected.
  2. Data, if necessary, may be assumed.
  3. Sketches, when required, may be drawn.

**UNIT - I**

L CO PO M

- a. Define (i) Intelligence (ii) Artificial intelligence (iii) Strong Methods and Weak Methods  
 And discuss the Chinese Room Experiment in detail. (1) (1) (1) (12)
- c. Design Semantic net with appropriate frames for the following objects having relations to each other:

**OR**(3) (3) (2) (08)  
L CO PO M

- a. Construct a simple semantic net, for the following: Bob as builder, Fido as dog, and Fang as cat and Mice. Also represent the same using Frames demonstrating the inheritance. (3) (3) (2) (10)
- b. Explain the properties of Semantic tree. Define the search tree. Build the search tree for the given problem.  
 Three missionaries and three cannibals are on one side of a river, with a canoe. They all want to get to the other side of the river. The canoe can only hold one or two people at a time. At no time should there be more cannibals than missionaries on either side of the river, as this would probably result in the missionaries being eaten. (3) (3) (2) (10)

**UNIT - II**

L CO PO M

- a. Explain DFS and BFS in brief. Also explain the properties of search methods. Build a search tree for Searching for a Gift. (3) (1) (1) (10)
- b. Write the pseudo code for implementing of depth-first search. And analyze the given tree in Fig.1 using DFS.

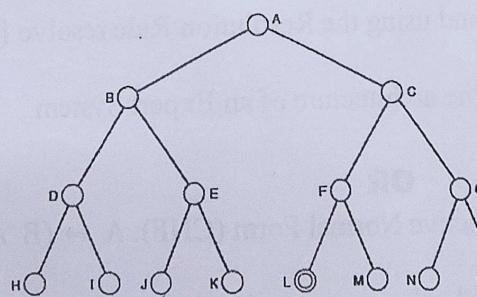


Fig.1. Tree

(3) (1) (1) (10)

**OR**

- 4 a. List and explain the Properties of Search Methods.

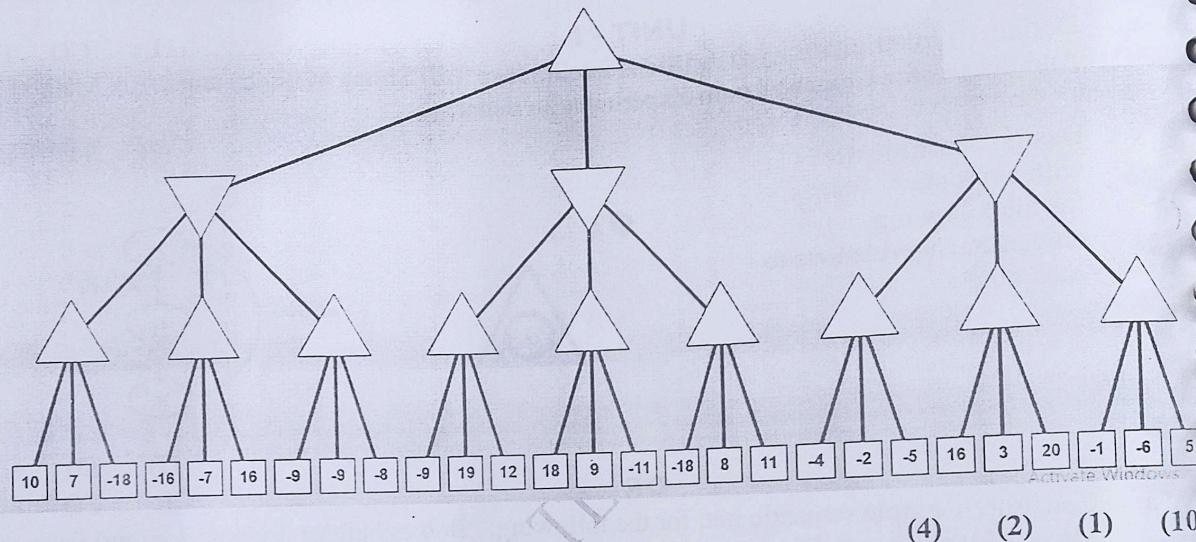
(2) (1) (1) (08)

- b. Develop the various heuristics approaches for 8-puzzle. The puzzle consists of a 3 X 3 grids, with the numbers 1 through 8 on tiles within the grid and one blank square. Tiles can be slid about within the grid, but a tile can only be moved into the empty square if it is adjacent to the empty square.

(3) (2) (2) (12)  
L CO PO M

**UNIT - III**

- 5 a. Apply and analyze alpha beta pruning algorithm on the given graph



(4) (2) (1) (10)  
b. Explain deduction theorem with example. Explain the relationship between universal and existential quantifiers.

(2) (3) (2) (10)

**OR**

- 6 a. Explain with relevant examples why the alpha-beta procedure will always generate the same answer as Minimax without pruning. Why is it useful?

(2) (3) (2) (10)

- b. Prove the following

$$\begin{array}{ll} \text{i)} & (A \rightarrow B) \rightarrow ((B \rightarrow C) \rightarrow ((C \rightarrow D) \rightarrow (A \rightarrow D))) \\ \text{ii)} & (\neg A \rightarrow B) \rightarrow (\neg B \rightarrow A) \end{array}$$

(3) (3) (2) (10)  
L CO PO M

**UNIT - IV**

- 7 a. Solve the phrase to get Conjunctive Normal Form (CNF):  $(A \rightarrow B) \rightarrow C$

(3) (2) (2) (06)

- b. Explain the Resolution Rule and using the Resolution Rule resolve  $\{A, B\}, \{\neg B, C\}$

(2) (1) (1) (06)

- c. With block diagram, explain the architecture of an Expert System.

(2) (1) (1) (08)  
L CO PO M

**OR**

- 8 a. Solve the phrase to get Conjunctive Normal Form (CNF):  $A \leftrightarrow (B \wedge C)$

(3) (2) (1) (06)

- b. Illustrate "Proof by Reputation" using an example.

(2) (2) (1) (06)

- c. Explain how to build a medical expert system using backward chaining in Rule-Based Expert System.

(2) (2) (1) (08)

**UNIT - V****L CO PO M**

- a. Using block schematic, discuss why the blackboard architecture is an effective way to combine information from a number of knowledge sources. Also explain the main components of the blackboard architecture.

(2) (1) (1) (10)

- b. Using block schematic, explain various kinds of problems the Copycat Architecture can solve.

(2) (1) (1) (10)

**OR****L CO PO M**

- a. Define an agent? List and explain five properties of agents. Explain briefly five types of agents.

(2) (1) (1) (10)

- b. Explain with block diagram three-layer subsumption architecture for an agent.

(2) (1) (1) (05)

- c. Compare Horizontal and Vertical agent architectures.

(2) (1) (1) (05)

**Seventh Semester B.E. Semester End Examination, Dec./Jan. 2019-20**  
**ARTIFICIAL INTELLIGENCE**

Time: 3 Hours

Max. Marks: 100

*Instructions: 1. Answer one full question each from the Units*

**UNIT - I**

L CO PO M

- 1 a. Explain Turing test and Chinese room argument experiment. Compare and contrast. (2) (3) (2) (10)
- b. Convert the following information into semantic nets and frames:

Tom is a cat. Tom caught a bird. Tom is owned by John. Tom is ginger in color. Cats like cream. The cat sat on the mat. A cat is a mammal. A bird is an animal. All mammals are animals. Mammals have fur.

(3) (2) (2) (10)

**OR**

- 2 a. Explain the relationship between graphs, semantic nets, semantic trees, search spaces, and search trees. (2) (3) (2) (10)
- b. Design a suitable representation and draw the complete search tree for the following problem.

A farmer is on one side of a river and wishes to cross the river with a wolf, a chicken, and a bag of grain. He can take only one item at a time in his boat with him. He can't leave the chicken alone with the grain, or it will eat the grain, and he can't leave the wolf alone with the chicken, or the wolf will eat the chicken. How does he get all three safely across to the other side?

(5) (3) (2) (10)

**UNIT - II**

L CO PO M

- 3 a. Explain how you implement Depth First Search and Breadth First Search with example code. Compare both search techniques. (2) (3) (2) (10)
- b. Explain with example how you use heuristics for search. Explain the criteria for selecting a good heuristic. (2) (3) (2) (10)

**OR**

- 4 a. Explain different techniques to identify optimal paths. (2) (3) (2) (10)
- b. Implement a greedy-search algorithm. How well does it perform compared with the other methods you have implemented? Invent a 0-1 knapsack problem, and use your search tree implementation to model this problem. Can you model the fractional knapsack problem using a search tree? (5) (2) (1) (10)

**UNIT - III**

L CO PO M

- 5 a. Explain the following terms (i) Game Trees (ii) Minimax (ii) Alpha beta pruning. (2) (2) (3) (12)
- b. What is Logic? Explain Why Logic is used in Artificial Intelligence and explain Logical Operators. (2) (2) (3) (08)

**OR**

- 6 a. Explain the concepts of Translating between English and Logic Notation and explain the following Truth Tables of Not, And, Or, Implies, if, Complex Truth Tables. (2) (3) (2) (12)
- b. Explain deduction Theorem with an example. (2) (4) (4) (08)

**UNIT - IV**

7 a. Consider the following axioms and convert them to clausal form

- a) Every coyote chases some roadrunner.
- b) Every roadrunner who says "beep-beep" is smart.
- c) No coyote catches any smart roadrunner.
- d) Any coyote who chases some roadrunner but does not catch it is frustrated.
- e) (Conclusion) If all roadrunners say "beep-beep", then all coyotes are frustrated.

Prove the conclusion If all roadrunners say "beep-beep", then all coyotes are frustrated

(3) (3) (2) (1)

(2) (3) (2) (1)

- b. Explain with examples resolution in propositional logic.

**OR**

8 a. Explain with examples resolution in predicate logic.

(2) (3) (2) (10)

b. Explain with example backward chaining.

(2) (3) (2) (1)

L CO PO M

**UNIT - V**

9 a. Explain black board architecture with its implementation.

(2) (3) (2) (10)

b. Explain with example Dempster-Shafer theory of evidence.

(2) (3) (2) (10)

**OR**

10 a. List and explain properties of agents.

(2) (1) (2) (10)

b. List and explain types of agents.

(2) (1) (2) (10)

**Seventh Semester B.E. Makeup Examination, January 2019**  
**ARTIFICIAL INTELLIGENCE**

Time: 3 Hours

Max. Marks: 100

- Instructions:* 1. Unit-I and Unit-II are compulsory  
 2. Answer any one full question from each of the remaining units.

- 1 a. Define

**UNIT - I**

L CO PO M

- a. Intelligence
- b. Artificial intelligence
- c. Strong Methods and Weak Methods

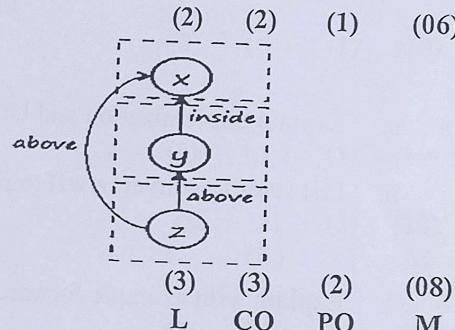
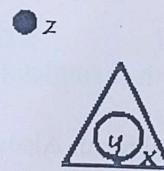
- b. Explain the Chinese Room argument, and

(1) (1) (1) (06)

- a. present some of the arguments against it, and
- b. the counter-arguments.

- c. Which do you find most convincing? How does this affect your view on the overall worth of the study of Artificial Intelligence?

- c. Design Semantic net with appropriate frames for the following objects having relations each other:

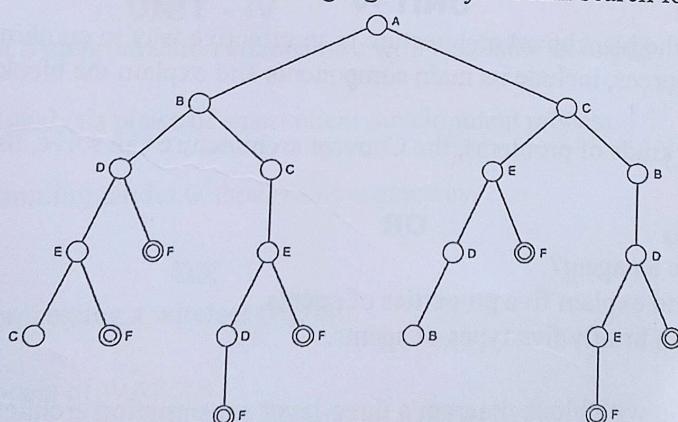
**UNIT - II**

L CO PO M

- 2 a. Explain the differences and similarities between depth-first search and breadth-first search. Give examples of the kinds of problems where each would be appropriate. Mention the time and space complexity of depth-first search and breadth-first search.

(2) (3) (2) (10)

- b. Write implementation of beam search in 'C' language. Analyze beam search for the following tree.

(4) (2) (2) (10)  
L CO PO M**UNIT - III**

- 3 a. Prove the following:
- $\vdash (\forall \rightarrow B) \rightarrow ((B \rightarrow C) \rightarrow ((C \rightarrow D) \rightarrow (\forall \rightarrow D)))$

(3) (2) (1) (06)

- b. Explain the Deduction Theorem, with the rule: if  $A \cup \{B\} \vdash C$  then  $A \vdash (B \rightarrow C)$  (2) (1) (1) (06)
- c. Explain briefly  
 a. Soundness  
 b. Completeness  
 c. Decidability  
 d. Monotonicity (2) (1) (2) (08)

### OR

- 4 a. i. What is Logic?  
 ii. Why Logic is used in Artificial Intelligence?  
 iii. List five Logical Operators. (1) (1) (2) (08)
- b. Translate from English to Logic notations, making use of symbols R=raining, T=Tuesday, N>New York, S=sick, T=tired:  
 i. "It is raining and it is Tuesday"  
 ii. "It is raining in New York"  
 iii. "It is raining in New York, and I'm getting sick or just very tired" (2) (2) (1) (06)
- c. Identify the meaning of Deduction, for the logical expressions: a.  $\frac{A \quad B}{A \wedge B}$  b.  $\frac{A \wedge B}{A}$  c.  $\frac{A \quad A \rightarrow B}{B}$  (3) (2) (2) (06)

### UNIT - IV

L	CO	PO	M
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- 5 a. Explain Skolemization and Unification with examples (2) (3) (2) (10)  
 b. List rules to convert a wff to prenex normal form. Also list the rules to move quantifiers to the front. (1) (3) (2) (10)

### OR

- 6 a. Explain with example forward chaining and backward chaining. (2) (3) (2) (10)  
 b. Write a short note on  
 i) CLIPS  
 ii) CYC (2) (3) (2) (10)

### UNIT - V

L	CO	PO	M
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- 7 a. Explain why the blackboard architecture is an effective way to combine information from a number of knowledge sources, include its main components and explain the block schematic. (2) (1) (1) (10)  
 b. Explain what kinds of problems, the Copycat architecture can solve, using block schematic. (2) (1) (1) (10)

### OR

- 8 a. i. Define an agent?  
 ii. List and explain five properties of agents.  
 iii. Explain briefly five types of agents. (2) (1) (1) (10)  
 b. i. Explain with block diagram a three-layer subsumption architecture for an agent.  
 ii. Compare Horizontal and Vertical agent architectures. (2) (1) (1) (10)

**Seventh Semester B.E. Makeup Examination, January 2020**  
**ARTIFICIAL INTELLIGENCE**

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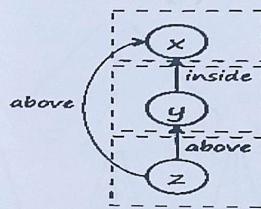
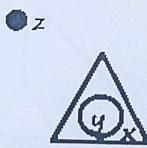
**UNIT - I**

L CO PO M

1. a. Define (i) Intelligence (ii) Artificial intelligence (iii) Strong Methods and Weak Methods  
 And discuss the Chinese Room Experiment in detail.

(1) (1) (1) (12)

- c. Design Semantic net with appropriate frames for the following objects having relations to each other:

**OR**

L CO PO M

2. a. Construct a simple semantic net, for the following: Bob as builder, Fido as dog, and Fang as cat and Mice. Also represent the same using Frames demonstrating the inheritance.

(3) (3) (2) (10)

- b. Explain the properties of Semantic tree. Define the search tree. Build the search tree for the given problem.

Three missionaries and three cannibals are on one side of a river, with a canoe. They all want to get to the other side of the river. The canoe can only hold one or two people at a time. At no time should there be more cannibals than missionaries on either side of the river, as this would probably result in the missionaries being eaten.

L CO PO M

**UNIT - II**

(3) (3) (2) (10)

3. a. Explain DFS and BFS in brief. Also explain the properties of search methods. Build a search tree for Searching for a Gift.

(3) (1) (1) (10)

- b. Write the pseudo code for implementing of depth-first search. And analyze the given tree in Fig.1 using DFS.

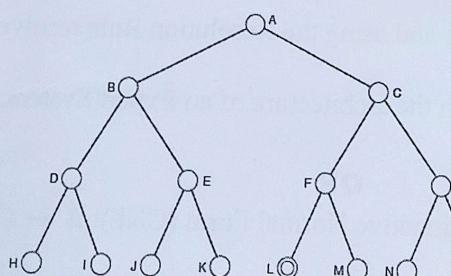


Fig.1. Tree

(3) (1) (1) (10)

**OR**

4 a. List and explain the Properties of Search Methods.

(2) (1) (1) (08)

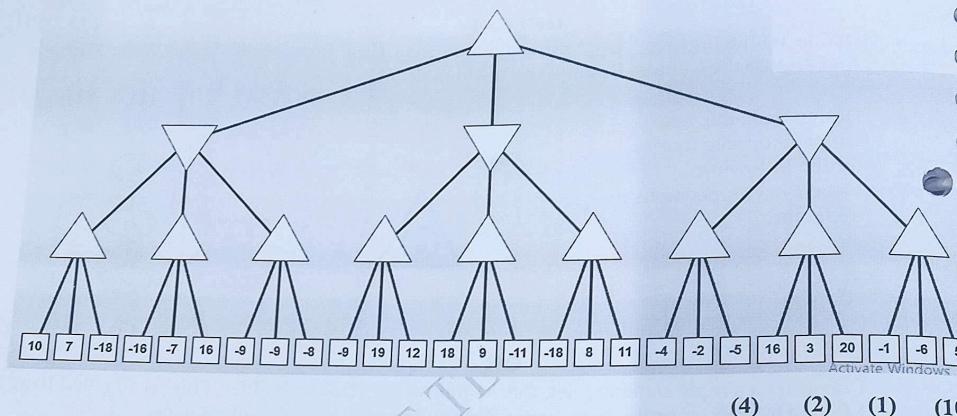
b. Develop the various heuristics approaches for 8-puzzle. The puzzle consists of a 3 X 3 grids, with the numbers 1 through 8 on tiles within the grid and one blank square. Tiles can be slid about within the grid, but a tile can only be moved into the empty square if it is adjacent to the empty square.

(3) (2) (2) (12)

L CO PO M

**UNIT - III**

5 a. Apply and analyze alpha beta pruning algorithm on the given graph



(4) (2) (1) (10)

b. Explain deduction theorem with example. Explain the relationship between universal and existential quantifiers.

(2) (3) (2) (10)

**OR**

6 a. Explain with relevant examples why the alpha-beta procedure will always generate the same answer as Minimax without pruning. Why is it useful?

(2) (3) (2) (10)

b. Prove the following

- i)  $(A \rightarrow B) \rightarrow ((B \rightarrow C) \rightarrow ((C \rightarrow D) \rightarrow (A \rightarrow D)))$
- ii)  $(\neg A \rightarrow B) \rightarrow (\neg B \rightarrow A)$

(3) (3) (2) (10)

L CO PO M

**UNIT - IV**

7 a. Solve the phrase to get Conjunctive Normal Form (CNF):  $(A \rightarrow B) \rightarrow C$

(3) (2) (2) (06)

b. Explain the Resolution Rule and using the Resolution Rule resolve  $\{A, B\}, \{\neg B, C\}$

(2) (1) (1) (06)

c. With block diagram, explain the architecture of an Expert System.

(2) (1) (1) (06)

**OR**

8 a. Solve the phrase to get Conjunctive Normal Form (CNF):  $A \leftrightarrow (B \wedge C)$

(2) (1) (1) (06)

L CO PO M

b. Illustrate "Proof by Reputation" using an example.

(3) (2) (1) (06)

c. Explain how to build a medical expert system using backward chaining in Rule-Based Expert System

(2) (2) (1) (06)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

(2) (2) (1) (08)

- a. Using block schema information from blackboard architecture
- b. Using block scheduling
- c. Define an agent
- d. Explain with bjarne
- e. Compare Horizontal

**UNIT - V**

9. a. Using block schematic, discuss why the blackboard architecture is an effective way to combine information from a number of knowledge sources. Also explain the main components of the blackboard architecture.
- L CO PO M  
(2) (1) (1) (10)
- b. Using block schematic, explain various kinds of problems the Copycat Architecture can solve.
- (2) (1) (1) (10)  
OR  
L CO PO M
10. a. Define an agent? List and explain five properties of agents. Explain briefly five types of agents.
- (2) (1) (1) (10)
- b. Explain with block diagram three-layer subsumption architecture for an agent.
- (2) (1) (1) (05)
- c. Compare Horizontal and Vertical agent architectures.
- (2) (1) (1) (05)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

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**Seventh Semester B.E. Semester End Examination, Dec./Jan. 2019-20**  
**ARTIFICIAL INTELLIGENCE**

Time: 3 Hours

Max. Marks: 100

Instructions: 1. Answer one full question each from the Units

**UNIT - I**

L CO PO M

- 1 a. Explain Turing test and Chinese room argument experiment. Compare and contrast. (2) (3) (2) (10)

- b. Convert the following information into semantic nets and frames:

Tom is a cat. Tom caught a bird. Tom is owned by John. Tom is ginger in color. Cats like cream. The cat sat on the mat. A cat is a mammal. A bird is an animal. All mammals are animals. Mammals have fur.

(3) (2) (2) (10)

**OR**

- 2 a. Explain the relationship between graphs, semantic nets, semantic trees, search spaces, and search trees. (2) (3) (2) (10)

- b. Design a suitable representation and draw the complete search tree for the following problem.

A farmer is on one side of a river and wishes to cross the river with a wolf, a chicken, and a bag of grain. He can take only one item at a time in his boat with him. He can't leave the chicken alone with the grain, or it will eat the grain, and he can't leave the wolf alone with the chicken, or the wolf will eat the chicken. How does he get all three safely across to the other side?

(5) (3) (2) (10)

L CO PO M

**UNIT - II**

- 3 a. Explain how you implement Depth First Search and Breadth First Search with example code. Compare both search techniques. (2) (3) (2) (10)

- b. Explain with example how you use heuristics for search. Explain the criteria for selecting a good heuristic. (2) (3) (2) (10)

**OR**

- 4 a. Explain different techniques to identify optimal paths. (2) (3) (2) (10)

- b. Implement a greedy-search algorithm. How well does it perform compared with the other methods you have implemented? Invent a 0-1 knapsack problem, and use your search tree implementation to model this problem. Can you model the fractional knapsack problem using a search tree? (5) (2) (1) (10)

L CO PO M

**UNIT - III**

- 5 a. Explain the following terms (i) Game Trees (ii) Minimax (ii) Alpha beta pruning. (2) (2) (3) (12)

- b. What is Logic? Explain Why Logic is used in Artificial Intelligence and explain Logical Operators. (2) (2) (3) (08)

**OR**

- 6 a. Explain the concepts of Translating between English and Logic Notation and explain the following Truth Tables of Not, And, Or, Implies, if, Complex Truth Tables. (2) (3) (2) (12)

- b. Explain deduction Theorem with an example. (2) (4) (4) (08)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

**UNIT - IV**

7 a. Consider the following axioms and convert them to clausal form

- a) Every coyote chases some roadrunner.
- b) Every roadrunner who says "beep-beep" is smart.
- c) No coyote catches any smart roadrunner.
- d) Any coyote who chases some roadrunner but does not catch it is frustrated.
- e) (Conclusion) If all roadrunners say "beep-beep", then all coyotes are frustrated.

Prove the conclusion If all roadrunners say "beep-beep", then all coyotes are frustrated

(3) (3) (2) (10) Time: 3

b. Explain with examples resolution in propositional logic.

(2) (3) (2) (10) 1 a.

**OR**

8 a. Explain with examples resolution in predicate logic.

(2) (3) (2) (10) b.

b. Explain with example backward chaining.

(2) (3) (2) (10) 2 a.

**UNIT - V**

9 a. Explain black board architecture with its implementation.

(2) (3) (2) (10) b.

b. Explain with example Dempster-Shafer theory of evidence.

(2) (3) (2) (10) 3 a.

**OR**

10 a. List and explain properties of agents.

(2) (1) (2) (10) b.

b. List and explain types of agents.

(2) (1) (2) (10) 4 a.

Time: 3

1 a.

b.

2 a.

b.

3 a.

b.

6

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**Seventh Semester B.E. Semester End Examination, Dec/Jan 2018-19**  
**ARTIFICIAL INTELLIGENCE**

Time: 3 Hours

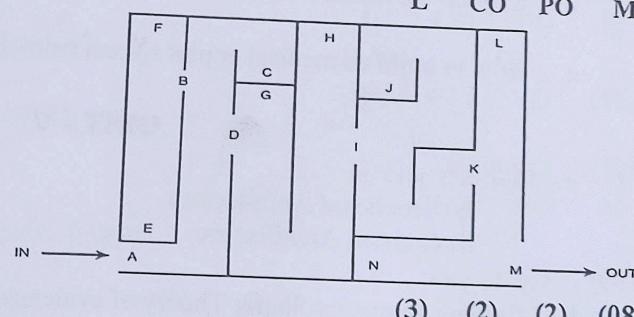
Max. Marks: 100

- Instructions:**
- Unit I and II are compulsory.
  - Readable question's numbers must be in allocated space.
  - Data, if necessary, may be assumed.
  - Sketches, when required, may be drawn.

**UNIT - I**

L CO PO M

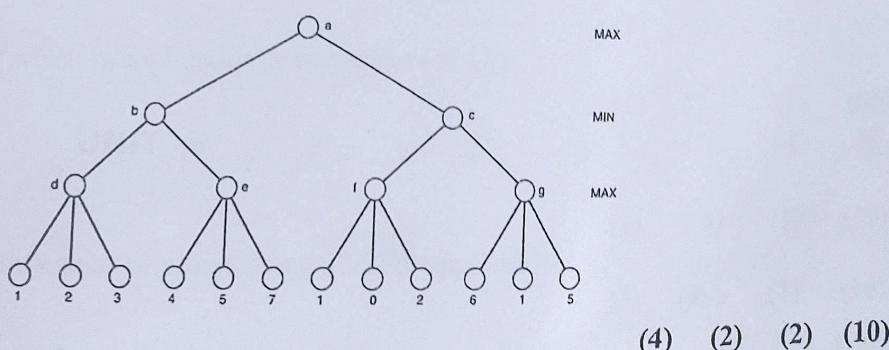
- 1 a. Differentiate between  
 i) Strong methods and weak methods  
 ii) Strong AI and weak AI (3) (3) (2) (05)
- b. Convert the following information into:  
 a) a semantic net  
 b) a frame based representation  
 A Ford is a type of car. Bob owns two cars. Bob parks his car at home. His house is in California, which is a state. Sacramento is the state capital of California. Cars drive on the freeway, such as Route 101 and Highway 81. (3) (3) (2) (10)
- c. Differentiate between a top-down approach and a bottom-up approach to problem solving. In what kind of situations might each be appropriate (3) (3) (2) (10)

**UNIT - II**(3) (3) (2) (05)  
L CO PO M

- b. Summarize the Properties of Search Methods. (3) (2) (2) (08)
- c. Solve the eight-queens problem, using Constraint Satisfaction Search method, list out the steps and chess-board sketch, too. (1) (1) (1) (04)

(3) (2) (2) (08)  
L CO PO M**UNIT - III**

- 3 a. Apply and analyze alpha-beta pruning algorithm for the following game tree.



(4) (2) (2) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

- b. Translate the following sentences in to predicate logic:
- Marcus was a man
  - All Pompeians were Romans
  - Everyone is loyal to someone
  - Marcus tried to assassinate Caesar
  - All men are people
- (2) (2) (2) (10)

### OR

- 4 a. Explain effectiveness of alpha-beta pruning algorithm. Explain how alpha-beta pruning algorithm is implemented with code.
- (2) (3) (2) (10)
- b. Prove the following:
- $(\neg A \rightarrow B) \rightarrow (\neg B \rightarrow A)$
  - $(A \rightarrow B) \rightarrow ((B \rightarrow C) \rightarrow ((C \rightarrow D) \rightarrow (A \rightarrow D)))$
- (3) (3) (1) (10)

L	CO	PO	M
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### UNIT - IV

- 5 a. Solve the phrase to to get Conjunctive Normal Form (CNF):  $(A \rightarrow B) \rightarrow C$
- (3) (2) (2) (06)
- b. Explain the Resolution Rule and using the Resolution Rule resolve  $\{A, B\}, \{\neg B, C\}$
- (2) (1) (1) (06)
- c. Illustrate with block diagram and explain the architecture of an Expert System.
- (2) (1) (1) (08)

L	CO	PO	M
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### OR

- 6 a. Solve the phrase to to get Conjunctive Normal Form (CNF):  $A \leftrightarrow (B \wedge C)$
- (3) (2) (1) (06)
- b. Explain the method of Proof by Reputation using an example.
- (2) (2) (1) (06)
- c. How to build an medical expert system using backward chaining in Rule-Based Expert System.
- (1) (2) (1) (08)

L	CO	PO	M
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### UNIT - V

- 7 a. Write a note on
- Blackboard Architecture
  - Copycat Architecture
- (2) (3) (2) (10)
- b. Explain Dempster Shafer Theory of evidence with an example
- (2) (3) (2) (10)

### OR

- 8 a. Explain properties of agents
- (2) (1) (2) (10)
- b. Explain with block diagram a three-layer subsumption architecture for an agent with suitable examples
- (2) (1) (2) (10)

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**Seventh Semester B.E. Semester End Examination, Dec/Jan 2018-19**  
**ARTIFICIAL INTELLIGENCE**

Time: 3 Hours

Max. Marks: 100

- Instructions:**
1. Unit I and II are compulsory.
  2. Readable question's numbers must be in allocated space.
  3. Data, if necessary, may be assumed.
  4. Sketches, when required, may be drawn.

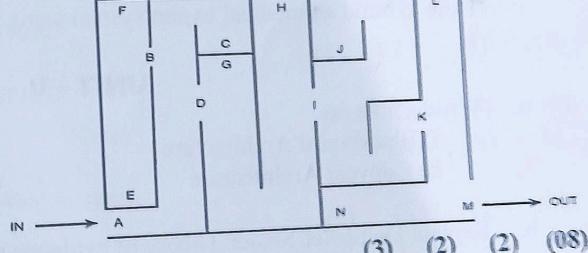
**UNIT - I**

L CO PO M

1. a. Differentiate between
  - i) Strong methods and weak methods
  - ii) Strong AI and weak AI(3) (3) (2) (05)
- b. Convert the following information into:
  - a semantic net
  - b a frame based representation
 A Ford is a type of car. Bob owns two cars. Bob parks his car at home. His house is in California, which is a state. Sacramento is the state capital of California. Cars drive on the freeway, such as Route 101 and Highway 81.
 (3) (3) (2) (10)
- c. Differentiate between a top-down approach and a bottom-up approach to problem solving. In what kind of situations might each be appropriate
 (3) (3) (2) (05)

**UNIT - II**

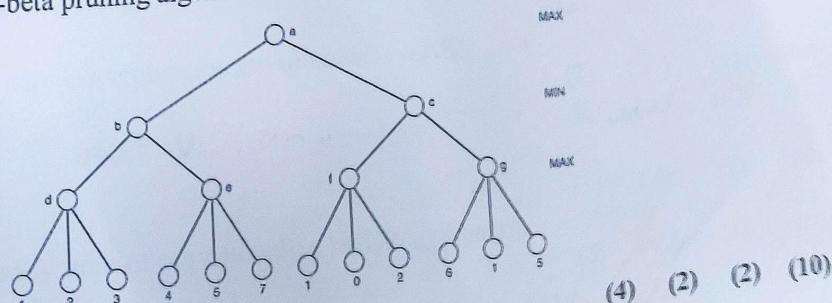
L CO PO M

2. a. Refer to maze, fo entry, exit, dead nodes, decision nodes – identify path from entry to exit, and build an appropriate search tree.
 
(3) (2) (2) (08)
- b. Summarize the Properties of Search Methods.
 (1) (1) (1) (04)
- c. Solve the eight-queens problem, using Constraint Satisfaction Search method, list out the steps and chess-board sketch, too.
 (3) (2) (2) (08)

**UNIT - III**

L CO PO M

3. a. Apply and analyze alpha-beta pruning algorithm for the following game tree.



(4) (2) (2) (10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

- b. Translate the following sentences in to predicate logic:
- Marcus was a man
  - All Pompeians were Romans
  - Everyone is loyal to someone
  - Marcus tried to assassinate Caesar
  - All men are people

(2) (2) (2) (10)

**OR**

- 4 a. Explain effectiveness of alpha-beta pruning algorithm. Explain how alpha-beta pruning algorithm is implemented with code.

(2) (3) (2) (10)

- b. Prove the following:

- $(\neg A \rightarrow B) \rightarrow (\neg B \rightarrow A)$
- $(A \rightarrow B) \rightarrow ((B \rightarrow C) \rightarrow ((C \rightarrow D) \rightarrow (A \rightarrow D)))$

(3) (3) (1) (10)

**UNIT - IV**

L CO PO M

- 5 a. Solve the phrase to get Conjunctive Normal Form (CNF):  $(A \rightarrow B) \rightarrow C$

(3) (2) (2) (06)

- b. Explain the Resolution Rule and using the Resolution Rule resolve  $\{A, B\}, (\neg B, C)$

(2) (1) (1) (06)

- c. Illustrate with block diagram and explain the architecture of an Expert System.

(2) (1) (1) (08)

**OR**

L CO PO M

- 6 a. Solve the phrase to get Conjunctive Normal Form (CNF):  $A \leftrightarrow (B \wedge C)$

(3) (2) (1) (06)

- b. Explain the method of Proof by Reputation using an example.

(2) (2) (1) (06)

- c. How to build an medical expert system using backward chaining in Rule-Based Expert System.

(1) (2) (1) (08)

**UNIT - V**

L CO PO M

- 7 a. Write a note on
- Blackboard Architecture
  - Copycat Architecture

(2) (3) (2) (10)

- b. Explain Dempster Shafer Theory of evidence with an example

(2) (3) (2) (10)

**OR**

- 8 a. Explain properties of agents

(2) (1) (2) (10)

- b. Explain with block diagram a three-layer subsumption architecture for an agent with suitable examples

(2) (1) (2) (10)

**Seventh Semester B.E. Makeup Examination, January 2019**  
**ARTIFICIAL INTELLIGENCE**

Time: 3 Hours

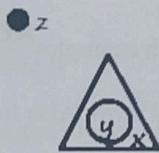
Max. Marks: 100

**Instructions:** 1. Unit-I and Unit-II are compulsory  
 2. Answer any one full question from each of the remaining units.

**UNIT - I**

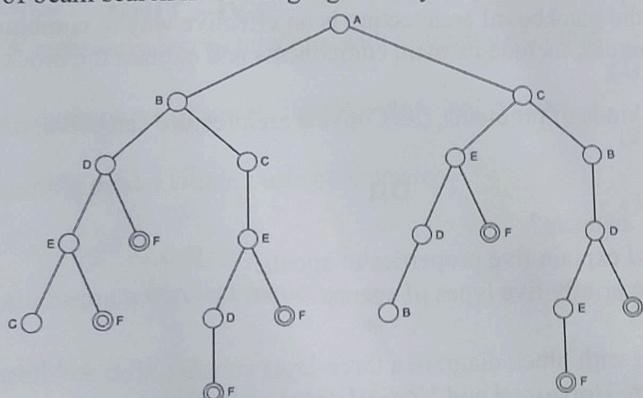
L CO PO M

- 1 a. Define  
 a. Intelligence  
 b. Artificial intelligence  
 c. Strong Methods and Weak Methods (1) (1) (1) (06)
- b. Explain the Chinese Room argument, and  
 a. present some of the arguments against it, and  
 b. the counter-arguments.  
 c. Which do you find most convincing? How does this affect your view on the overall worth of the study of Artificial Intelligence? (2) (2) (1) (06)
- c. Design Semantic net with appropriate frames for the following objects having relations each other: (3) (3) (2) (08)

**UNIT - II**

L CO PO M

- 2 a. Explain the differences and similarities between depth-first search and breadth-first search. Give examples of the kinds of problems where each would be appropriate. Mention the time and space complexity of depth-first search and breadth-first search. (2) (3) (2) (10)
- b. Write implementation of beam search in 'C' language. Analyze beam search for the following tree. (2) (2) (2) (08)

(4) (2) (2) (10)  
L CO PO M**UNIT - III**

- 3 a. Prove the following: $\vdash (\forall \rightarrow B) \rightarrow ((B \rightarrow C) \rightarrow ((C \rightarrow D) \rightarrow (\forall \rightarrow D)))$  (3) (2) (1) (06)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

- b. Explain the Deduction Theorem, with the rule: if  $A \cup \{B\} \vdash C$  then  $A \vdash (B \rightarrow C)$  (2) (1) (1) (06)
- c. Explain briefly  
 a. Soundness  
 b. Completeness  
 c. Decidability  
 d. Monotonicity (2) (1) (2) (08)

### OR

- 4 a. i. What is Logic?  
 ii. Why Logic is used in Artificial Intelligence?  
 iii. List five Logical Operators. (1) (1) (2) (08)
- b. Translate from English to Logic notations, making use of symbols R=raining, T=Tuesday, N=New York, S=sick, T=tired:  
 i. "It is raining and it is Tuesday"  
 ii. "It is raining in New York"  
 iii. "It is raining in New York, and I'm getting sick or just very tired" (1) (2) (2) (1) (06)
- c. Identify the meaning of Deduction, for the logical expressions: a.  $\frac{A \quad B}{A \wedge B}$  b.  $\frac{A \wedge B}{A}$  c.  $\frac{A \quad A \rightarrow B}{B}$  (3) (2) (2) (06)

### UNIT - IV

- 5 a. Explain Skolemization and Unification with examples (2) (3) (2) (10)  
 b. List rules to convert a wff to prenex normal form. Also list the rules to move quantifiers to the front. (1) (3) (2) (10)

### OR

- 6 a. Explain with example forward chaining and backward chaining. (2) (3) (2) (10)  
 b. Write a short note on  
 i) CLIPS  
 ii) CYC (2) (3) (2) (10)

### UNIT - V

- 7 a. Explain why the blackboard architecture is an effective way to combine information from a number of knowledge sources, include its main components and explain the block schematic. (2) (1) (1) (10)  
 b. Explain what kinds of problems, the Copycat architecture can solve, using block schematic. (2) (1) (1) (10)

### OR

- 8 a. i. Define an agent?  
 ii. List and explain five properties of agents.  
 iii. Explain briefly five types of agents. (2) (1) (1) (10)
- b. i. Explain with block diagram a three-layer subsumption architecture for an agent.  
 ii. Compare Horizontal and Vertical agent architectures. (2) (1) (1) (10)