

1. a) Explain task domains of artificial intelligence. 6
- b) You are given two jugs, a 4 gallon and a 3 gallon are neither has any measuring marks an it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into a 4 gallon jug ? Discuss the problem in view of AI. 7

OR

2. a) Explain different problem characteristics in detail. 7
- b) Discuss AI technique in detail. 6
3. a) Trace the constraint satisfaction procedure for solving the following cryptarithmetic problem 7

$$\begin{array}{r} \text{C R O S S} \\ + \text{R O A D S} \\ \hline \text{D A N G E R} \end{array}$$

3. a) Trace the constraint satisfaction procedure for solving the following cryptarithmetic problem

$$\begin{array}{r} \text{C R O S S} \\ + \text{R O A D S} \\ \hline \text{D A N G E R} \end{array}$$

- b) Write a note on Best-First search and depth first search.

OR

4. a) Explain A* Algorithm with example. 7
- b) Explain AO* Algorithm with example. 7
5. a) Define semantic network and state its properties. 7
- b) Differentiate between procedural and declarative knowledgebase. 6

5. a) Define semantic network and state its properties.

7

b) Differentiate between procedural and declarative knowledgebase.

6

OR

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P.T.O

6. a) Write an unification Algorithm.

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b) Write a note on :

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6. a) Write an unification Algorithm. 7

b) Write a note on : 6

i) Frames 3

ii) Scripts

7. a) Discuss how to resolve the issue of uncertain knowledge. 7

b) Indetail explain Axiom probability. 6

OR

8. a) Define and explain Baye's Theorem. 6

b) Write a note on Bayesian Network. 7

9. a) What is learning ? Explain Rate learning. 7

8. a) Define and explain Baye's Theorem. 6
b) Write a note on Bayesian Network. 7
9. a) What is learning ? Explain Rate learning. 7
b) Discuss learning by Analogy. 6

OR

10. a) What is meant by learning by taking advice. 7
b) Draw and explain the important modules of general learning model. 6
11. a) What is expert system shell ? Explain in components of expert system. 7
b) Explain forward chaining and backward chaining with example. 7

10. a) What is meant by learning by taking advice. 7
- b) Draw and explain the important modules of general learning model. 3
11. a) What is expert system shell ? Explain in components of expert system. 7
- b) Explain forward chaining and backward chaining with example. 7

OR

12. a) State and explain characteristics features of expert systems. 7
- b) Explain natural language processing. 7

1. a) Explain the task domains of artificial intelligence.

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b) Explain problem characteristics with suitable example.

7

OR

2. a) Compare & contrast between BFS and DFS.

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b) A hungry monkey find himself in a room in which a bunch of bananas is hanging from the ceiling. The monkey, unfortunately can not reach to bananas. However in room there are also a chair and stick. The monkey know how to use the chair & stick to take bananas. What is the best sequence of action for the monkey to take the bananas for lunch.

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3. a) What is simulated Annealing? Explain in brief.

7

b) Explain hill climbing algorithm.

7

OR

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4. a) Explain A* algorithm in detail. 7
b) Explain Means-end analysis. 7
5. a) What is constrain satisfaction? Trace the constrain satisfaction procedure by solving the following cryptarithmetic problem. 7

APPLE + LEMON = BANANA

- b) Explain with neat diagram the mapping between facts and representation. 6

OR

6. a) Write a short note on. 6
i) Inheritable knowledge.
ii) Difference approaches of knowledge representation.

- b) Consider following sentences & convert-into formulas in predicate logic.
- i) Apples are food.
 - ii) Chicken is food.
 - iii) Bill eats apple & is still alive.
 - iv) Sue eats everything Bill eats.
7. a) Discuss how to resolve the issue of uncertain knowledge.
- b) Write a short note on Bayesian Network.

OR

8. a) Discuss Bayes theorem of probability in detail.
- b) What is semantic net? Draw semantic net for following also find $V(S)$, $A(S)$ and $\lambda(S)$.
- "Heart is a part of cardiovascular system"
- "Artery is a part of cardiovascular system"
- "large artery is an artery".
9. a) Draw & explain block diagram of learning models.

- b) Explain the types of learning with example.

7

OR

10. a) What are the factors affecting learning performance explain in detail.

5

- b) Explain the advantages of keeping knowledge base separate from control module in knowledge based system.

7

11. a) Explain knowledge acquisition process with the help of block diagram.

7

- b) With the help of block diagram explain components of typical expert system.

6

OR

12. a) What is expert system shell? Also explain the use of metaknowledge in expert system inference.

7

- b) Explain natural language processing and types of grammar used in NLP.

6

12. a) What is expert system shell? Also explain the use of metaknowledge in expert system inference.
- b) Explain natural language processing and types of grammar used in NLP.

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1. a) What is Artificial Intelligence? Explain various applications of AI. 5
- b) You are given 20 gallon, 13 gallon and 7 gallon water jugs. The 20 gallon jug is full of water. Neither of them has measuring mark on it. How can you get exactly 10 gallon of water in 20 gallon and 13 gallon jug? Write down production rules and steps followed. 9
- OR**
2. a) For each of the following AI problems, analyze 7 problem characteristics **any three**. 6
- i) Travelling salesman problem ii) Tower of Hanoi
iii) Chess iv) Missionaries and cannibals
- b) What is knowledge? Explain different types of knowledge. 9
3. a) Write and explain Hill Climbing algorithm explain the terms: 7
- i) Ridge ii) Plateau iii) Local Maximum
- b) Write the difference between BFS and DFS. At what circumstances BFS is better than DFS? Also discuss its advantages and disadvantages. 6
- OR**

4. a) Write AO* algorithm explain it with example. 7
- b) Explain Informed and un-informed search techniques in detail. 6
5. a) Write and explain different approaches to knowledge representation. Also explain its properties. 5
- b) Consider the following statements: 8
- i) Mona likes all kinds of food.
 - ii) Apples are food.
 - iii) Chicken is food
 - iv) Anything anyone eats and is it killed are food
 - v) Satyam eats peanuts and is still alive.
 - vi) Ashu eats everything Satyam eats
- * Translate the above statements in predicate logic.
- * Prove that Mona likes peanuts using backward chaining.
- OR**
6. a) Write down a script on "College Picnic" 6

- b) What is semantic network? Represent the following statements using semantic network. 7
- The dog bit the mail carrier.
 - Every dog has bitten a mail carrier.
7. a) Explain Bayesian Networks with example. 7
- b) Write short notes on: 7
- Axioms of probability
 - Fuzzy logic
 - Un-certain knowledge
- OR**
8. a) What is TMS? (Truth Maintenance System) Draw its diagram and explain. 6
- b) What is reasoning? What are its types? What is the difference between Monotonous and Non-Monotonous reasoning? 7
9. a) What is Learning? Draw a general block diagram of learning system and explain it in detail. 7

- b) Write short notes on:
- 1) Learning by induction. 2
 - 2) Learning by taking advice. 2
 - 3) Explanation based learning. 3

OR

10. a) What is Natural language understanding? What are levels of knowledge used in NLU? Explain phases of NLU. 7
- b) What are transition networks? Explain Augmented Transition Networks (ATNs) & RTN's (Recursive Transition Networks) in brief. 7
11. a) What is expert systems? Explain different components of expert system. 7
- b) Explain various steps to develop an expert systems. 6
- OR**
12. a) What is Meta-knowledge? Explain how it is used in expert system with example. 6

1. Learning by induction.

- 2) Learning by taking advice.
- 3) Explanation based learning.

2
3**OR**

10. a) What is Natural language understanding? What are levels of knowledge used in NLU? Explain phases of NLU.
- b) What are transition networks? Explain Augmented Transition Networks (ATNs) & RTN's (Recursive Transition Networks) in brief.

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11. a) What is expert systems? Explain different components of expert system.
- b) Explain various steps to develop an expert systems.

7

6

OR

12. a) What is Meta-knowledge? Explain how it is used in expert system with example.
- b) Explain expert system shell with example.

6

7

1. a) Define Artificial Intelligence. Explain the task domains of AI. 5
- b) Define production system. Explain its characteristics and give the production system for a water Jug problem. 8

OR

2. a) Explain different problem characteristics in detail. 8
- b) Define state space and explain with example. 5
3. a) Illustrate the Breadth first search algorithm & differentiate between Breadth first and depth first search. 8
- b) Explain A* Algorithm. 6

OR

4. a) Describe Best-first search. Explain the use of OR Graphs. 8

4. a) Describe Best-first search. Explain the use of OR Graphs. 8
- b) Explain Means-end analysis. 6
5. a) Write an unification Algorithm. 7
- b) Consider the following sentences. 6
- i) John Likes all kinds of food.
 - ii) Apples are food.
 - iii) Chicken is food.
 - iv) All employees earning rupees two lakhs or more pay taxes.
 - v) Everyone likes ice cream menus there is no one who does not like ice cream.
 - vi) Brothers are siblings.
- Translate these sentences into formulas in predicate logic.

OR

6. a) Write an Algorithm for propositional logic. Write the disadvantages of it. 7

b) Write short note on **any three**.

- i) Backward Chaining
- ii) Semantic nets
- iii) Frames
- iv) Scripts

7. a) Discuss how to resolve the issue of uncertain knowledge. 7

9

b) Describe Bayesian Network. 6

OR

8. a) Discuss Baye's Theorem of Probability in detail. 7

b) Explain Fuzzy logic with example. 6

9. a) Explain different types of learning with example. 7

9. a) Explain different types of learning with example. 7

b) Draw and explain block diagram of General Learning model. 6

OR

10. a) Define Learning. Explain Rote learning technique in detail. 7

b) Explain the factors affecting learning performance. State its performance measures. 6

9

11. a) Define expert system. Write its characteristic features. Also give the block diagram architecture of expert system. 8

b) Discuss expert system shell and state its advantages. 6

OR

12. a) Explain Natural language processing and types of grammar used in Natural language processing. 8

12. a) Explain Natural language processing and types of grammar used in Natural language processing. 8
- b) Write short note on **any three**.
- i) Knowledge Based system. 2
 - ii) Automated Reasoning. 2
 - iii) Knowledge Engineering. 2
 - iv) Knowledge Acquisition. 2

1. a) What is AI ? Explain the task domains of AI.
b) Discuss AI technique in detail.

8
5**OR**

2. a) Discuss the role of production system in problem solving system.
b) Explain different problem characteristics in detail.
3. a) Explain Steepest - Ascent Hill climbing in detail with example.
b) Write a note on Best-First search. Also explain the use of OR Graphs.

5
8
8
10
6**OR**

4. a) Trace the constraint satisfaction procedure solving the following cryptarithmetic problem.

8

CROSS
+ ROADS

4. a) Trace the constraint satisfaction procedure solving the following cryptarithmetic problem. 8

CROSS
+ ROADS

DANGER

- b) Show how means-end analysis could be used to solve the problem of getting from one 6

place to another. Assume that the available operators are walk, drive, take the bus, take a cab, and fly.

5. a) Explain with neat diagram the mapping between facts and representations. 6

- b) Write a note on inheritable knowledge. 7

OR

10

6. Consider the following sentences :

- i) John likes all kinds of food.
- ii) Apples are food.
- iii) Chicken is food
- iv) Anything anyone eats and isn't killed by is food.
- v) Bill eats peanuts and is still alive.
- vi) Sue eats everything Bill eats.

I. Translate these sentences into formulas in predicate logic.

6

II. Prove that John likes peanuts using resolution.

7

7. a) Write a note on nonmonotonic reasoning.

7

11

b) Write a note on Bayesian Network.

6

OR

8. a) Discuss Baye's Theorem of probability in detail.

7

b) Explain the significance of certainty factor in designing rule based system.

6

8. a) Discuss Baye's Theorem of probability in detail. 7
b) Explain the significance of certainty factor in design of rule based system. 6
9. a) What is learning ? Explain Rote learning technique in detail. 7
b) Explain Winston's learning program in detail. 6

OR

10. a) Write a note on Explanation Based Learning. 7
b) Discuss learning by Analogy. 6
11. a) With the help of neat block diagram explain different components of an expert system 10
b) Write a note on Decision Tree Architecture. 4

OR

12. a) Give and explain the characteristic features of Expert systems. Also state its application. 8
- b) Illustrate knowledge engineering process with the help of block diagram. 6

1. a) What are different Artificial Intelligence problem domain ? Discuss different examples for each domain and analyze these examples with the help of seven characteristics of AI Problem. 9
- b) State the advantages and disadvantages of DFS and BFS. 5

OR

2. a) State A* algorithm. Explain with example. 7
- b) Explain AO* algorithm with an example. 7
3. a) Explain Best first searching with example. Also give its advantages and disadvantages. 12
- b) Explain Generate and test in detail. 6

OR

4. a) Explain Hill - climbing algorithm. Discuss its advantages and disadvantages. 7

4. a) Explain Hill - climbing algorithm. Discuss its advantages and disadvantages. 7
- b) What is mean by problem reduction? Explain with example. 6
5. a) Consider the following sentences : 10
- i) John likes all kinds of food.
 - ii) Apples are food.
 - iii) Chicken is food.
 - iv) Anything anyone eat and isn't killed by is food.
Bill eats peanuts and is still alive. Sue eats everything Bill eats.
- a) Translate these sentences into predicate logic.

- b) Convert the formulas of part into clause form.
c) Prove that John likes peanuts using resolution or back word chaining.
b) Explain the concept of conceptual dependency in short.

3

OR

6. a) What are semantic network? What are the Properties of semantic N/W?

7

b) Differentiate between procedural and declarative knowledgebase.

6

7. a) How to resolve the issue of uncertain knowledge?

7

b) What is rational decisions? For what purpose it is used?

7

13

OR

8. a) Explain Baye's rule in detail.

7

8. a) Explain Baye's rule in detail. 7
- b) Write short note on :-
1) Fuzzy logic.
2) Axioms of probability.
3) Bayesian Networks. 7
9. a) Draw and explain the important models of general learning model. 7
- b) Draw a block diagram of knowledge acquisition process and components. 6
- OR**
10. a) What is rate learning? Explain in detail. 7
- b) Explain what is meant by "learn by examples". 6
11. a) Define expert system? Write its characteristic features. Also give the block diagram 7

11. a) Define expert system? Write its characteristic features. Also give the block diagram architecture of expert system. 7
- b) Give an example of the use of metaknowledge in expert system inference. 6

OR

12. a) Explain different components of expert system. 7
- b) What is expert system shell? Explain in detail. 6

1. a) Define AI. Explain typical Task Domains of AI. 7
b) What is production system? Explain its characteristics. 6

OR

2. a) Explain different problem characteristics with example. 8
b) What is state space? Explain with example. 5
3. a) Differentiate between Breadth first and Depth first search. 6
b) State the difference between simple hill climbing and steepest ascent hill climbing. 7

OR

4. a) Explain when would best first search be worse than simple breadth first search. 6
b) What is Heuristic search? Explain in detail. 7 14
5. a) Write short note on predicate and propositional logic. 6
b) What is knowledge? Explain the types of knowledge. 8

5. a) Write short note on predicate and prepositional logic. 6
b) What is knowledge? Explain the types of knowledge. 8

OR

6. a) Expl in with the help of block diagram, different components of a knowledge – based system. 8
b) Write short note on : **any three.** 6
1) Backward chaining. 2) Semantic nets.
3) Frames. 4) Scripts.
7. a) How to resolve the issue of uncertain knowledge? 7
b) What is rational decisions? For what purpose it is used? 6

14

OR

8. a) Explain Baye's Rule. 6

- b) Write short note on: 7
1) Axioms of probability.
2) Bayesian Networks.
3) Fuzzy Logic.
9. a) What is learning? Draw and explain the block diagram of general learning model. 9
b) What are factors affecting learning performance? State its performance measures. 5

OR

10. a) Explain learning by discovery. 6
b) What are the different types of learning? Explain each one with example. 8
11. a) What do you mean by expert system shell? State its advantages 7
b) Why it is important that an expert system to be able to explain "why and how question related to problem solving session?" 6

12. a) Give applications of expert system.

5

b) Write short note on **any four.**

1) Knowledge Based System.

2

2) Automated Reasoning.

2

3) Natural Language Processing.

2

4) Knowledge Engineering.

2

5) Knowledge Acquisition

2

1. a) Explain task domains of artificial intelligence. 7
b) Explain problem characteristics with example. 7

OR

2. a) Compare and contrast between Depth first search and Breadth first search. 7
b) You are given two jugs, a 4-gallon and a 3-gallon one. Neither has any measuring marks on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2-gallons of water into a 4-gallon jug? Discuss the problem in view of A.I. 7

3. a) Explain simple hill climbing algorithm. 6
b) What is simulated Annealing? Explain in brief. 7

OR

4. a) Explain uniformed search techniques in detail. 6
b) What is constraint satisfaction? Trace the constraint satisfaction procedure solving the following cryptarithmic problem. 7

CROSS

4. a) Explain uniformed search techniques in detail. 6
b) What is constraint satisfaction? Trace the constraint satisfaction procedure solving the following cryptarithmic problem. 7

CROSS
ROADS
—————
DANGER

5. a) Explain different approaches to knowledge representation. 5
b) Consider following sentences 8
- John likes all kind of food
 - Apples are food
 - Chicken is a food
 - Anything any-one 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 resolution.
iii) Use resolution to answer the question "What food does sue eat?"

5. a) Explain different approaches to knowledge representation. 5
- b) Consider following sentences 8
- John likes all kind of food
 - Apples are food
 - Chicken is a food
 - Anything any-one eats and isn't killed by is food.
 - Bill eat 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 resolution.
iii) Use resolution to answer the question "What food does sue eat?"

OR

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6. a) Explain knowledge based system with help of block diagram.
b) Write a note on forward vs backward reasoning.

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7. a) Explain Bay's rule in detail.

7

- b) Explain the role of fuzzy logic in AI.

6

OR

8. a) Explain Bayesian Networks with example.

7

- b) Explain Axiom probability in detail.

6

9. a) What is learning? Explain the different types of learning with example.

7

- b) Explain machine learning with the help of block diagram.

6

OR

8. a) Explain Bayesian Networks with example. 7
b) Explain Axiom probability in detail. 6
9. a) What is learning? Explain the different types of learning with example. 7
b) Explain machine learning with the help of block diagram. 6

OR

10. a) Explain what is mean by learning by taking advic ? 7
b) "Leaving by problem solving" explain in d tail. 6
11. a) What is the role of meth knowledge in expert syst m. 7
b) Explain expert system shell in detail. 7

- b) Explain machine learning with the help of block diagram. 6

OR

10. a) Explain what is mean by learning by taking advic ? 7

- b) "Leaving by problem solving" explain in d tail. 6

11. a) What is the role of meth knowledge in exp rt syst m. 7

- b) Explain expert system shell in detail. 7

OR

12. a) Explain various aspects in knowledge engineering. 6

- b) Draw a neat diagram of expe t system architecture and explain it in detail. Enlist applications of expe t systems. 8