

- DEC 2024

[07 BENG-3144]

III/IV B.Tech. DEGREE EXAMINATION

First Semester

Computer Science and Engineering

ARTIFICIAL INTELLIGENCE

(Effective from the admitted batch of 2022-2023)

Time : Three hours

Maximum : 70 marks

First Question is Compulsory.

Answer any FOUR questions from the remaining questions

All questions carry equal marks.

1. (a) List two characteristics of a good AI problem-solving technique. (2)
- (b) What is problem reduction in heuristic search? (2)
- (c) Differentiate between forward and backward reasoning. (2)
- (d) What is the purpose of a truth maintenance system? (2)
- (e) Define a partitioned semantic net. (2)
- (f) What is the purpose of semantic analysis in NLP? (2)
- (g) Define rule-based expert systems. (2)

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  - (e) Define a partitioned semantic net. (2)
  - (f) What is the purpose of semantic analysis in NLP? (2)
  - (g) Define rule-based expert systems. (2)



2. (a) Describe breadth-first search and depth-first search algorithms with an example for each. (7)
- (b) Discuss the characteristics of a heuristic search problem and explain its role in AI. (7)
3. (a) Compare and contrast the A\* algorithm and best-first search. (7)
- (b) Explain how heuristic search techniques help solve constraint satisfaction problems, providing examples. (7)
4. (a) Explain the representation of "instance" and "is-a" relationships in knowledge representation with examples. (7)
- (b) Describe the RETE algorithm and its role in conflict resolution in rule-based systems. (7)
5. (a) Explain non-monotonic reasoning with an example and its importance in handling uncertainty. (7)
- (b) Derive Bayes theorem and explain its application in probabilistic inference with an example. (7)
6. (a) Explain how slots in frames can be treated as full-fledged objects, and discuss their advantages. (7)
- (b) Discuss the concept of property inheritance in semantic nets, including the challenges posed by tangled hierarchies. (7)
7. (a) Compare and contrast non-linear planning with linear planning, using examples. (7)
- (b) Discuss hierarchical planning and its benefits in complex problem-solving scenarios. (7)
8. (a) Describe the steps involved in the development of an expert system. (7)
- (b) Explain the advantages and limitations of frame-based expert systems with examples. (7)

**[07 BENG -3133]**

III/IV B.Tech. DEGREE EXAMINATION.

First Semester

Computer Science and Engineering

ARTIFICIAL INTELLIGENCE

(Common with Information Technology)

(Effective from the admitted batch of 2021-2022)

Time : Three hours

Maximum : 70 marks

Answer question No. 1 Compulsory.

Answer any other FOUR questions from remaining.

All questions carry equal marks.

1. (a) Differentiate BFS and DFS  
(b) List the various informed search strategy.  
(c) What is meant by Turing test?  
(d) Define an inference procedure.  
(e) Why does uncertainty arise?  
(f) Give the Baye's rule equation.  
(g) Define knowledge based inductive learning.
2. Explain in detail with examples  
(a) Recursive Best First Search (RBFS)  
(b) Heuristic Functions
3. Define the following problems. What types of control strategy is used in the following problem?  
(a) The Tower of Hanoi  
(b) Crypto-arithmetic  
(c) The Missionaries and cannibals problems  
(d) 8-puzzle problem
4. Explain semantic net and frames with proper example.
5. Explain partitioned semantic net with example.
6. Discuss in detail about algorithm for constraint satisfaction by taking some problem.
7. Explain the hill climbing, local maximum and plateau with diagram.
8. How the performance of a learning algorithm is assessed? Draw a learning curve for the decision tree algorithm.



DEC 2023

[ 07 BENG - 3133 ]

III/IV B.Tech. DEGREE EXAMINATION  
Computer Science and Engineering  
First Semester

**ARTIFICIAL INTELLIGENCE**

(Common with Information Technology)

(Effective from the admitted batch of 2021 - 2022)

Time : 3 Hours

Max. Marks : 70

*Question No. 1 is compulsory.**Answer any FOUR questions from the remaining.**All questions carry equal marks.**Answer all parts of any question at one place.*

1. (a) Give example problems for Artificial Intelligence.  
(b) Define Heuristic function.  
(c) Give the drawbacks of DFS.  
(d) Define the term utility.  
(e) Explain Fuzzy Logic and its applications.  
(f) Mention the criteria for the evaluation of search strategy.  
(g) Define Augmentation.
2. Explain the following uniformed search strategies with examples.
  - (a) Breadth First Search
  - (b) Uniform Cost Search
  - (c) Depth First Search
  - (d) Depth Limited Search.

(P.T.O)

DEC 2023

[ 07 BENG - 3133 ]

III/IV B.Tech. DEGREE EXAMINATION

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  - (d) Depth Limited Search.

(P.T.O)



[ 07 BENG - 3133 ]

3. Enumerate Classical "Water jug Problem". Describe the state space for this problem and also give the solution.
4. Define Artificial Intelligence and discuss about underlying assumptions about Physical Symbol system.
5. Consider the following sentences:
  - (i) Jack owns a dog
  - (ii) Every dog owner is an animal lover.
  - (iii) No animal lover kills an animal.
  - (iv) Either jack or curiosity killed the cat, who is named tuna.
  - (a) Express the original sentences in the first order logic.
  - (b) Convert each sentence to implicative normal form.
  - (c) State whether curiosity killed the cat, using resolution with refutation.
6. Explain why it is a good heuristic to choose the variable that is most constrained, but the value that is least constraining in a CSP search.
7. Define 'certainty factor'. How does certainty factor help in dealing with uncertainty? Explain with reference to rule based system.
8. (a) Explain stages in the development of an expert systems.  
(b) Explain the expert system life cycle.

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2. (a) Explain  
(b) Discuss

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DEC 2023

[ 07 BENG - 3121 ]

III/IV B.Tech. DEGREE EXAMINATION  
Computer Science and Engineering  
First Semester

ARTIFICIAL INTELLIGENCE

(Effective from the admitted batch of 2020 - 2021)

Time : 3 Hours

Max. Marks : 70

*Question No. 1 is compulsory.*

*Answer any FOUR questions from the remaining.*

*All questions carry equal marks.*

*Answer all parts of any question at one place.*

1. (a) Define Artificial Intelligence.  
(b) Write briefly about DFS.  
(c) Explain procedural knowledge and Declarative knowledge.  
(d) Define First order Predicate logic.  
(e) Explain Bayesian networks.  
(f) What is meant by Natural language processing?  
(g) What is an Expert System shell? Explain its use.
2. (a) Explain about the categorization of AI definitions.  
(b) Discuss any four successful applications of AI.
3. What are the problems encountered during hill climbing and what are the ways available to deal with these problems?

(P.T.O)

DEC 2023

[ 07 BENG - 3121 ]

III/IV B.Tech. DEGREE EXAMINATION  
Computer Science and Engineering  
First Semester

ARTIFICIAL INTELLIGENCE

(Effective from the admitted batch of 2020 - 2021)

Time : 3 Hours

Max. Marks : 70

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- (a) Explain about the categorization of AI definitions.
- (b) Discuss any four successful applications of AI.

What are the problems encountered during hill climbing and what are the ways available to deal with these problems?

(P.T.O)



[ 07 BENG - 3121 ]

4. Write A\* algorithm and discuss briefly the various observations about algorithm.
5. Consider there are three jugs of 12 gallons, 8 gallons and 3 gallons. How will we get 1 gallon of water in 12 gallon jug? Design solution of the problem.
6. (a) Explain about Representations and Mappings with neat diagram.  
(b) Differentiate between forward and backward reasoning.
7. (a) Explain in detail about Breadth First Search implementation of Non - Monotonic Reasoning.  
(b) With neat sketch explain the architecture, characteristic features and roles of Expert System.
8. (a) Explain the basic components and applications of Expert System.  
(b) Define Expert System. Explain the architecture of an Expert System in detail with a neat diagram and an example.

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[07 BENG - 3121]

III/IV B.Tech. DEGREE EXAMINATION.

First Semester

Computer Science and Engineering

ARTIFICIAL INTELLIGENCE

(With effective from the admitted batch of 2020-2021)

Time : Three hours

Maximum : 70 marks

First question compulsory.

Answer any FOUR from the remaining questions.

All questions carry equal marks.

1. (a) What is meant by consistent and admissible heuristic?
- (b) What is monotonic and non-monotonic reasoning?
- (c) Define the terms inferential efficiency and Acquisitional efficiency.
- (d) Convert the following wff into clause form  
 $\forall x \exists y [postman(y) \wedge bite(x, y) \rightarrow dog(x)]$
- (e) What is partitioned semantic net?

(d) Logic programming  
(e) Expert system shells



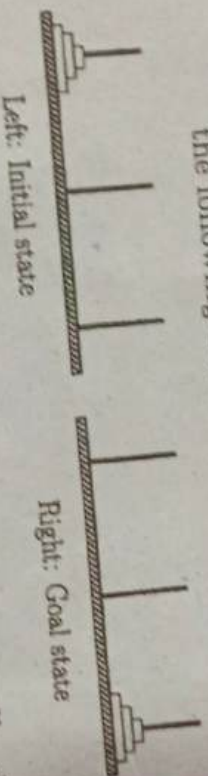
(f) Define pragmatic processing and discourse integration.

(g) Write about expert system shell.

(a) How are production system and control strategies applied in solving AI problems?

(b) Explain depth first search (DFS) and breadth first search (BFS) with suitable example. Why is 'depth limited search' necessary in DFS?

3. (a) Using Best - first search algorithm solves the following Towers of Hanoi problem.



The cost of moving the small disk is 1, Moving the middle sized disk is 2, and moving the large disk is 3. Hence the average cost is 2. The heuristic function he follows:

2 x numbers of disks not on the rightmost peg

(b) Illustrate means - ends analysis with robot navigation problem.

(a) What is partial matching? Explain with suitable example.

(b) Describe various issues in knowledge representation.

(a) Represent the following sentence into partitioned semantic nets

(i) Every man has beaten the thief  
(ii) All persons in the party loved every child.

(b) Discuss various components of script. Give an example of each component.

(a) Illustrate resolution algorithm in predicate logic with example.

(b) Explain about Dempster's - Safer theory with suitable example.

(a) What is an expert system? Describe the components of expert systems.

(b) Show that how STRIPS would solve the following goal stack planning problem

A	C
B	D

C	A
B	D

Start: ON (C, D) A ON (A, B) A  
ON TABLE (B) A ON TABLE (D)  
ARM EMPTY

Goal: ON (C, B) A ON (A, D) A  
ON TABLE (B) A ON TABLE (D)

8. (a) Write about knowledge acquisition and validation techniques.

(b) Derive parse tree for the sentence "Bill loves the Cat" where the following rules are used:  
 $S \rightarrow NP \mid VP$ ,  $DET \rightarrow \text{The}$ ,  $NP \rightarrow$   
 $V \rightarrow \text{loves}$ ,  $NP \rightarrow DET \ N$ ,  $N \rightarrow \text{Bill} \mid \text{CAT}$ .

Modify the grammar to allow NP to have zero to many adjectives.

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JUL 2022

[07 BENG - 3217]

III/IV B.Tech. DEGREE EXAMINATION.

Second Semester

Computer Science and Engineering

Elective - III (1) ARTIFICIAL INTELLIGENCE

(Common for CSE & IT)

(Effective from the admitted batch of 2019-2020)

Time : Three hours

Maximum : 70 marks

First Question is Compulsory.

Answer any FOUR from the remaining questions.

All questions carry equal marks.

Answer all parts of any question at one place.

Answer the following in brief :

- (a) Define the terms 'fact' and 'rule'.
- (b) State space search.
- (c) Bayes theorem.
- (d) Goal stack planning.

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- (e) Non-monotonic reasoning.
  - (f) Reactive systems
  - (g) Expert system shell.
2. (a) Write an algorithm for Hill Climbing.  
(b) Discuss A\* algorithm with suitable example.
  3. (a) Compare Backward Vs Forward reasoning.  
(b) How knowledge can be represented using declarative vs backward reasoning?
  4. (a) What is the relation between semantic network and predicate logic? Explain with example.  
(b) Explain the concept of partitioned semantic net with an example.
  5. (a) Explain RETE matching algorithm.  
(b) Give overview of PROLOG and Production System in PROLOG.
  6. (a) Define certainty factor? What are the components of certainty factor? Explain.  
(b) Draw the functional block diagram of rule based system and explain.

- (a) What are the general approaches to natural language processing? Discuss.
  - (b) Describe about systematic grammars and semantic grammars.
- Write short notes on the following :
- (a) Dempster-Shafer theory
  - (b) Black-board architectures
  - (c) Types of expert systems.
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III/IV B.Tech. DEGREE EXAMINATION

Second Semester

Computer Science and Engineering

Elective III (1) - ARTIFICIAL INTELLIGENCE

(Common for CSE & IT)

(Effective from the admitted batch of 2019-2020)

Time : Three hours

Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR from the remaining questions.

All questions carry equal marks.

1. Answer the following in brief :

- (a) Heuristics search
- (b) Best first search
- (c) Truth maintenance systems
- (d) Logic programming
- (e) Expert system shells
- (f) Reactive Systems
- (g) Syntactic processing

2. (a) What is production system? List and explain the characteristics of production systems.  
(b) Discuss about water jug problem in terms of artificial intelligence.

3. (a) Discuss about AO\* algorithm. How it is not suitable for searching in And-OR graphs? Explain.  
(b) Explain in detail about Constraint Satisfaction algorithm.

4. (a) How Unification algorithm is used for reasoning under predicate logic? Explain with an example.  
(b) What are the various approaches to knowledge representation? Discuss.

5. (a) What is Expert System? Explain the structure of an Expert System.  
(b) Write a detailed note on Knowledge building system tools.

6. (a) What is the role of knowledge in language understanding? Explain.  
(b) Explain Goal Stack Planning procedure.

7. (a) Explain Dempster-Shafer Theory.  
(b) Describe RETE matching algorithms.

2 [07 BENG - 3217]

- (a) Syntax and semantics of PROLOG.  
(b) Fuzzy logic.  
(c) Augmented Transition Nets.

3

[07 BENG]



DEC 2023

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IV/IV B.Tech. DEGREE EXAMINATION  
Computer Science and Engineering

First Semester

ARTIFICIAL INTELLIGENCE

(Common with Information Technology)

(Effective from the admitted batch of 2020-2021)

Time : 3 Hours

Max. Marks: 70

Question No.1 is compulsory.

Answer any FOUR from the remaining questions.

All questions carry equal marks.

Answer all parts of any question at one place.

(7 × 2 = 14)

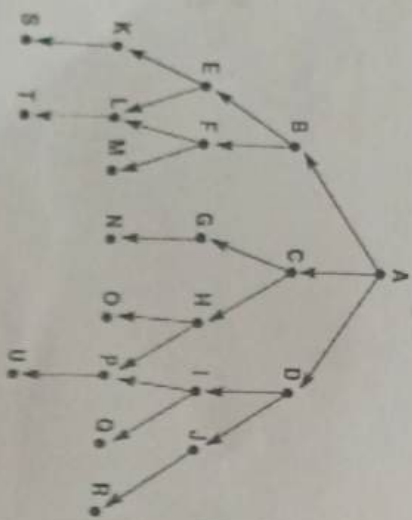
1. (a) Define state space search problem.
- (b) List the issues in the design of search programs.
- (c) Differentiate between procedural and declarative knowledge.
- (d) How can you represent the resolution in predicate logic?
- (e) What is non - monotonic reasoning?
- (f) List the steps in Natural Language processing.
- (g) What are expert system shells?

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7. (a) Explain Dempster-Shafer theory.
- (b) Describe RETE matching algorithms.

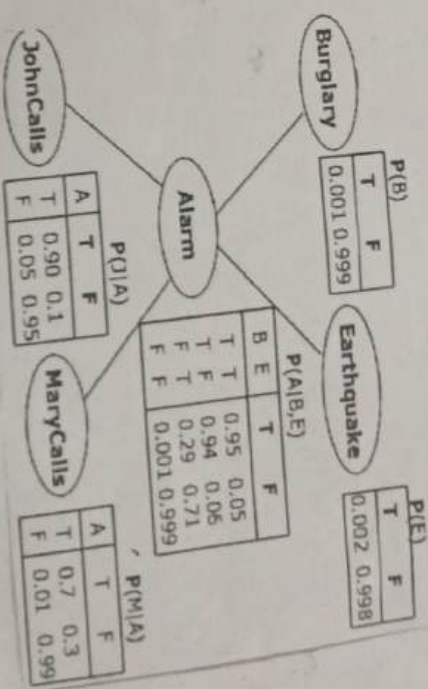
2. (a) Is AI as science, or is it engineering? Or neither or both? Explain.
- (b) Three missionaries and three cannibals want to cross a river. There is a boat on their side of the river that can be used by either one or two persons. How should they use this boat to cross the river in such a way that cannibals never outnumber missionaries on either side of the river? If the cannibals ever outnumber the missionaries then the missionaries will be eaten. How can they cross the river without anyone being eaten? Write the production rules for this problem and create the search tree.

3. (a) Explain the effect of overestimation and underestimation on A\* algorithm with an example.
- (b) Explain Depth-First search with the help of the following graph and show the contents of open and closed lists. Here U is the goal state.



4. (a) Discuss about the search strategies in LISP.
- (b) Discuss about production system in PROLOG.
5. (a) For the Belief Network given below and the corresponding probabilities, compute the following probabilities.  
 $P(B, E, A, J, M)$   
 $P(\text{John Calls} | \text{Burglary})$

**Bayesian belief network.**



- (b) Discuss in detail about the Dempster-Shafer theory of evidence.
6. (a) What is unification? Attempt to unify the following pairs of expressions. Either show their most general unifiers or explain why they will not unify.
  - (i)  $p(X, Y)$  and  $p(a, Z)$
  - (ii)  $p(X, X)$  and  $p(a, b)$
  - (iii) Ancestor  $(X, Y)$  and ancestor (bill, father(bill)).





[ 07BENG - 4103 ]

- (b) Translate each of the following into predicate calculus, conceptual dependencies and conceptual graphs:
- (i) "Jane gave Tom an ice cream cone".
  - (ii) "Basketball players are tall".
  - (iii) "Paul cut down the tree with an axe."
7. (a) What are the components of a planning system? Explain.
- (b) Discuss about non - linear planning using constraint posting.
8. (a) Explain with an example how a rule based expert system work.
- (b) Discuss about knowledge acquisition and validation techniques.

\* \* \*



5. (a) What are frames? Give a sample frame of a Computer department of a college? (8)
- (b) Draw a Semantic Network representing the following knowledge:  
Every human and animal are living things who can breathe and eat. All birds are animals and can fly. Every man and woman are human who have two legs. A cat has fur and is an animal. All animals have skin and can move. A giraffe is an animal and has long legs and is tall. A parrot is a bird and is green in color. (6)
6. (a) Specify the characteristics of Measure of Belief, Measure of Disbelief, and Certainty Factor. (7)
- (b) Write a short note on Crisp sets and fuzzy sets. (7)
7. (a) Enumerate the steps involved in natural language processing with an example. (7)
- (b) Discuss about non-linear planning using constraint posting. (7)
8. (a) Briefly explain about the expert system in the domain of medicine using suitable case study. (7)
- (b) Discuss in detail about knowledge acquisition and validation techniques. (7)

[07 BENG - 4103]

IV/IV B.Tech. DEGREE EXAMINATION.

First Semester

Computer Science Engineering

ARTIFICIAL INTELLIGENCE

(Common with Information Technology)

(Effective from the admitted batch of 2015-2016)

Time : Three hours

Maximum : 70 marks

Question No.1 is compulsory.

Answer any FOUR questions from the remaining.

Answer all parts of any question at one place.

(7 × 2 = 14)

1. (a) Suppose you design a machine to pass the Turing test. What are the capabilities such a machine must have?
- (b) What are the problems in Hill climbing algorithm.
- (c) Differentiate between procedural and declarative knowledge.

(d) Find the resolvent of the clauses in the set  
 $\{A \vee C, \sim C \vee B, \sim B, \sim A \vee S, \sim U\}$

(e) Suppose by observing  $E_1$  and  $E_2$ , we confirm our belief in  $H$  with  $MB[H, E_1] = 0.6$  and  $MD[H, E_1] = 0.2$ ,  $MB[H, E_2] = 0.3$  and  $MD[H, E_2] = 0.0$ . Then compute the following.

(i)  $MB[H, E_1 \text{ and } E_2]$

(ii)  $MD[H, E_1 \text{ and } E_2]$

(f) List the components of a planning system.

(g) What are knowledge system building tools?

(4 × 14 = 56)

2. (a) Explain about AI technique with the help of Tic-Tac-Toe game. (7)

(b) You have three jugs measuring 12 gallons, 8 gallons and 3 gallons, and a water faucet 7M to fill the jugs with water. You need to measure out exactly one gallon. (Start state: All three jugs are empty; Goal State(s): Some jug contains exactly one gallon). Write the production rules and show the solution path. (7)

3. (a) Write AO\* algorithm. How AO\* algorithm is used for problem reduction? Explain SM with an example. (8)

(b) Explain constraint satisfaction and solve the following cryptarithmic problem  
 SEND + MORE = MONEY (6)

2 [07 BENG - 41031]

4. (a) Write a Prolog program to find gcd of two numbers. Explain the program with an example by constructing search tree. (8)

(b) Consider the following Prolog program. (6)

```

/* Rules */
gfather(X, Z) :- father(X, Z),
parent(Z, Y). (1)
parent(X, Y) :- father(X, Y). (2)
parent(X, Y) :- mother(X, Y). (3)

/* Facts */
father(james, robert) (4)
father(mike, william) (5)
father(william, james) (6)
father(robert, hency) (7)
father(robert, cris) (8)

```

Draw search or proof trees for the following queries.

(i) ?- gfather(james, hency).

(ii) ?- gfather(william, x).

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(8) Write a program to construct search tree example numbers. Explain the program. (a) 4

$P(A)$	$= 0.4$
$P(B A)$	$= 0.5$
$P(B \sim A)$	$= 0.1$
$P(C A)$	$= 0.6$
$P(C \sim A)$	$= 0.3$
$P(D A, B)$	$= 0.8$
$P(D A, \sim B)$	$= 0.3$
$P(D \sim A, B)$	$= 0.3$
$P(D \sim A, \sim B)$	$= 0.05$

- (b) Write a note on fuzzy inferences and fuzzy systems. (6)
7. (a) Explain in detail the concept of STRIPS planning systems. (7)
- (b) Discuss the steps in natural language understanding process. (7)
8. (a) Write and explain in detail the decision tree algorithm. (8)
- (b) Explain how rule based expert system work. (6)

[07 BENG - 4103]

IV/IV B.Tech. DEGREE EXAMINATION.

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First Question is compulsory.

Answer any FOUR questions from the remaining questions.

Answer ALL parts of any question at One place.

(7 × 2 = 14)

1. (a) List the techniques of AI. (7)
- (b) Define Admissibility of A\*.
- (c) Write Prolog rules to define the following relations :
  - (i) Grandfather
  - (ii) Uncle.

(d) Show that the following is a valid argument:  
*If it is humid then it will rain and since it is humid today it will rain.*

(e) State and prove Bayes' theorem.

(f) List the components of a planning system.

(g) What is an expert system?

2. (a) Explain the characteristics of a problem with the help of an example. (6)

(b) Write the production rules for the following water-jug problem. You are given two jugs, a 4-gallon one and a 3-gallon one, a pump which has unlimited water which you can use to fill the jug, and the ground on which water may be poured. Neither jug has any measuring markings on it. How can you get exactly 2 gallons of water in the 4-gallon jug? (8)

3. (a) Write about under estimation and over estimation in  $A^*$ . (6)

(b) Illustrate a possible result of a heuristic search procedure by defining a suitable heuristic function for an eight-puzzle problem. (8)

4.

(a) Discuss about RETE matching algorithm with an example. (8)

(b) Write a note on forward and backward reasoning. (6)

5. (a) Explain resolution refutation algorithm in propositional logic. (7)

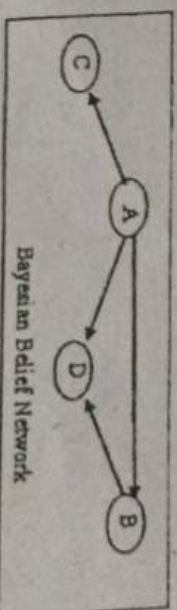
(b) Define Semantic Network. Draw a Semantic Network representing the following knowledge: (7)

"Every vehicle is a physical object. Every car is a vehicle. Every car has four wheels. Electrical system is a part of car. Battery is a part of electrical system. Pollution system is a part of every vehicle. Vehicle is used in transportation. Suzuki is a car".

6. (a) Discuss about Bayesian Belief Networks. For the Bayesian network given in below Fig. and the corresponding probabilities, generate the conditional probability table, and also compute the following probabilities: (8)

(i) Joint probability  $P(A, B, C, D)$

(ii)  $P(A | B, C)$ .





[07 BENG - 4103]

IV/IV B. Tech. DEGREE EXAMINATION

First Semester

Computer Science Engineering

ARTIFICIAL INTELLIGENCE

(Common with Information Technology)

(With effective from the admitted batch of 2015-2016)

Time : Three hours

Maximum : 70 marks

First question is compulsory.

Answer any FOUR from the remaining questions.

All questions carry equal marks.

Answer all parts of any question at one place.

1. (a) What is monotonic production system?
- (b) Will Breadth First Search always in find minimal solution? Why?
- (c) Differentiate forward and backward reasoning.
- (d) List any three methods to select an initial structure knowledge representation.

[07 BENG - 4103]

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[07 BENG - 4103]

2

- (e) Given  $P(A)=0.3$ ,  $P(A/B)=0.4$  and  $P(B)=0.5$ , compute  $P(B/A)$ .
- (f) List the components of scripts.
- (g) What are the common mechanisms supported in an expert system shell?
- (a) List the problem characteristics that need to be considered for selecting appropriate heuristics for a given class of problems.
- (b) Explain the state space representation of Water - jug problem.
3. Discuss Constraint Satisfaction problem with an algorithm for solving a Cryptarithmic problem.
4. Write about RETE matching algorithm. Discuss briefly about Conflict Resolution.
5. Consider the following sentences:  
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.

[07 BENG - 4103]

3

- (a) Translate these sentences into formulas in predicate logic.
- (b) Convert the formulas of part a into clause form.
6. (a) Describe the morphological analysis in natural language processing with suitable example.
- (b) Write the properties of fuzzy sets. Give Applications of fuzzy sets for project scheduling.
7. (a) What are the steps in natural language processing? List and explain them briefly.
- (b) Compare and contrast syntactic processing with semantic processing.
8. Write a detailed note on expert systems including representation, usage of domain knowledge, reasoning and explaining.



09/07/2021  
[07 BENG - 4103]

JUL 2021

IV/IV B.Tech. DEGREE EXAMINATION.

Computer Science Engineering

First Semester

ARTIFICIAL INTELLIGENCE

(Common with Information Technology)

(Effective from the admitted batch of 2015-2016)

Time : Three hours

Maximum : 70 marks

First question is compulsory.

Answer any FOUR from the remaining questions.

All questions carry equal marks.

Answer all parts of any question at one place.

(7 × 2 = 14)

1.
  - (a) What is Artificial Intelligence?
  - (b) Specify what is A\* algorithm.
  - (c) What are the features of LISP?
  - (d) Write a short note on Frames.
  - (e) How can knowledge be used to help resolve conflicts when there are several in consistent nonmonotonic inferences that could be drawn?

(f) Explain about Isolated-Word error correction.

(g) Mention about the components of a typical expert system.

$$(4 \times 14 = 56)$$

2. (a) State Water Jug problem. Construct state space tree for this problem. (8)

(b) Discuss in detail about production system characteristics. (6)

3. (a) Consider trying to solve the 8-puzzle using hill climbing. Can you find a heuristic function that makes this work? Make sure it works on the following example: (7)

Start			Goal		
1	2	3	1	2	3
8	5	6	4	5	6
4	7		7	8	

(b) Give an example of a problem for which breadth-first search would work better than depth-first search. (7)

(a) Illustrate the differences between Procedural vs Declarative Knowledge. (8)

(b) Write a short note on Production System in Prolog. (6)

[07 BENG-4103] 2

5. Briefly discuss about Semantic Nets and Conceptual Dependency. (14)

(a) State and explain Bayes theorem. (7)

(b) Discuss in detail about Fuzzy Inferences and Fuzzy systems. (7)

7. (a) Enumerate the process of Lexical processing in semantic analysis. (6)

(b) List and explain any two components of a planning system. (8)

8. (a) Identify and describe two good application areas for expert systems within a university environment. (8)

(b) Give three examples of applications for which the use of analogical architectures would be suitable in expert systems. (6)



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09/07/2021 17 JUL 2021

[07 BENG - 4103] (C-19)

IV/IV B.Tech. DEGREE EXAMINATION.

First Semester

Computer Science Engineering

ARTIFICIAL INTELLIGENCE

(Common with Information Technology)

(Effective from the admitted batch of 2015-2016)

(For the Academic Year 2020-21 batch only)

Time : Three hours Maximum : 70 marks

First question is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

Answer all parts of any question at one place.

1. (a) What are the capabilities should the computer possess to pass the Turing Test?
- (b) Define the nature of heuristic function in Hill climbing. Give the limitations of hill climbing.
- (c) What is clausal form? How is it useful?

2 [07 BENG - 4103] (C-19)

4. (a) When does simulated annealing algorithm behave like Hill climbing? Explain.  
(b) Differentiate forward and backward reasoning.

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3. (a) Illustrate Best-First search algorithm with example.  
(b) Solve the following crypt arithmetic constraint satisfaction problem.
2. (a) Give the solution for water jug problem with capacity of two jugs as 3 and 4 liters and Measure 2 liters of water by 4 liters of jug. Derive all production rules and construct state space tree.  
(b) Explain desirable characteristics of control strategies as used in production systems.  
(c) Illustrate Best-First search algorithm with example.  
(d) Solve the following crypt arithmetic constraint satisfaction problem.

3 [07 BENG - 4103] (C-19)

5. What is matching? Discuss different matching techniques.
6. (a) State and explain unification algorithm with example.  
(b) Convert the following statements into clause form and using Resolution show that "John likes peanuts"
- (i)  $\neg \text{Food}(x) \vee \text{Like}(\text{john}, x)$   
(ii)  $\text{Food}(\text{Apples})$   
(iii)  $\text{Food}(\text{Chicken})$   
(iv)  $\neg (\text{Eat}(x, y) \wedge \neg \text{Killed}(x)) \vee \text{Food}(y) \Rightarrow$   
(v)  $\text{Eats}(\text{Bill}, \text{Peanuts}) \wedge \text{Alive}(\text{Bill})$   
(vi)  $\neg (\text{Eats}(\text{Bill}, x)) \vee \text{Eats}(\text{Sue}, x)$
7. (a) What is structure of frame? How design frame for particular player in Baseball game?  
(b) What are the various components of script? Write a script for restaurant problem.
8. (a) Explain about Dempster - Safer theory with suitable example.  
(b) Explain about dependency directed backtracking with suitable example.



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107 BENG - 4103(C-19) FEB 2022

IV/IV B.Tech. DEGREE EXAMINATION.

First Semester

Computer Science Engineering

ARTIFICIAL INTELLIGENCE

(Common with Information Technology)

(Effective from the admitted batch of 2015-2016)

(For the academic year 2020-2021 batch only)

Time : Three hours

Maximum : 70 marks

First question is compulsorily.

Answer any FOUR from the remaining.

All questions carry equal marks.

Answer all parts of any question at one place.

1. (a) List a few of the task domains of AI.
- (b) Define monotonic and non-monotonic reasoning problems.
- (c) What is meant by consistent and admissible heuristic?
- (d) Define AND - OR graph. Give an example.

2 [07 BENG - 4103](C-19)

- (c) What is the principle of unification?  
 (f) Give the partitioned semantic net for "Every dog bites Mail - carrier".  
 (g) What is significance of certainty factor?
2. (a) Discuss the various characteristics needed to AI problems.  
 (b) State Tic-Tac-Toe problem? Construct state space tree for this problem.
3. (a) Consider the three puzzle problem show as follows:

Initial State		Goal State	
1	2	3	1
	3	1	2

- (i) Last down the operators  
 (ii) Select heuristic function  
 (iii) Solve the problem by A\* algorithm.  
 (b) Compare and contrast hill climbing and best — first search procedures.  
 (a) Explain the Means-ends analysis with robot navigation problem.  
 (b) Describe different features of AI programming languages.

3 [07 BENG - 4103](C-19)

5. (a) Briefly explain declarative and procedural knowledge with example.  
 (b) Write about RETE matching algorithm with example.
6. (a) What are well formed formulae? What are the steps involved in bringing acknowledge to clause form.  
 (b) Consider the following axioms  
 (i)  $P$   
 (ii)  $(P \wedge Q) \rightarrow R$   
 (iii)  $(S \vee T) \rightarrow Q$   
 (iv)  $T$   
 Convert them into clause form and derive R using resolution.
7. (a) Draw a Conceptual dependency form of the following statements:  
 (i) John gave a coin to the beggar.  
 (ii) Paul cut down the tree with an axe.  
 (b) Develop the script for a "Fast food restaurant".  
 (a) State and explain Bayesian Network with example.  
 (b) Write about justification with maintenance systems with suitable example.



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III/IV B.Tech. DEGREE EXAMINATION

Second Semester

Computer Science and Engineering

Elective III (1) – ARTIFICIAL INTELLIGENCE

(Common for CSE & IT)

(Effective from the admitted batch of 2019–2020)  
Maximum : 70 marks

Time : Three hours

Question No. 1 is compulsory.

Answer any FOUR from the remaining questions.

All questions carry equal marks.

1. Answer the following in brief :

- (a) Heuristics search
- (b) Best first search
- (c) Truth maintenance systems
- (d) Logic programming
- (e) Expert system shells
- (f) Reactive Systems
- (g) Syntactic processing

2. (a) What is production system? List and explain the characteristics of production systems.  
(b) Discuss about water jug problem in terms of artificial intelligence.
3. (a) Discuss about AO\* algorithm. How it is not suitable for searching in And-OR graphs? Explain.  
(b) Explain in detail about Constraint Satisfaction algorithm.
4. (a) How Unification algorithm is used for reasoning under predicate logic? Explain with an example.  
(b) What are the various approaches to knowledge representation? Discuss.
5. (a) What is Expert System? Explain the structure of an Expert System.  
(b) Write a detailed note on Knowledge building system tools.
6. (a) What is the role of knowledge in language understanding? Explain.  
(b) Explain Goal Stack Planning procedure.
7. (a) Explain Dempster-Shafer Theory.  
(b) Describe RETE matching algorithms.

8. Write short notes on the following:  
(a) Syntax and semantics of FOPL.  
(b) Fuzzy logic.  
(c) Augmented Transition Nets.



**107 BENG - 41031**

**IV/IV B. Tech. DEGREE EXAMINATION**

**First Semester**

**Computer Science Engineering**

**ARTIFICIAL INTELLIGENCE**

**(Common with Information Technology)**

**(With effective from the admitted batch of 2015-2016)**

**Time : Three hours**

**Maximum : 70 marks**

**First question is compulsory.**

**Answer any FOUR from the remaining questions.**

**All questions carry equal marks.**

**Answer all parts of any question at one place.**

1. (a) What is monotonic production system?
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- (d) List any three methods to select an initial structure knowledge representation.

- (e) Given  $P(A)=0.3$ ,  $P(A|B)=0.4$  and  $P(B)=0.5$ , compute  $P(B|A)$ .
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6. (a) Describe the morphological analysis in natural language processing with suitable example.
- (b) Write the properties of fuzzy sets. Give Applications of fuzzy sets for project scheduling.
7. (a) What are the steps in natural language processing? List and explain them briefly.
- (b) Compare and contrast syntactic processing with semantic processing.
8. Write a detailed note on expert systems including representation, usage of domain knowledge, reasoning and explaining.