



322811(22)

B. E. (Eighth Semester) Examination,
April-May, 2009

(CSE Engg. Branch)

ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) from each unit is compulsory.
Solve any two from part (b), (c) & (d) from
each unit.

Unit-I

1. (a) What is AI technique? 2
(b) What are the various problem characteristics for
Heuristic Search? 7

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- (c) How AI technique is used to solve tic.tac.toe problem? 7
(d) Explain BFS and DFS. Also develop algorithm for
any one. 7

Unit-II

2. (a) Give the problems that are necessary to solve in
order to have access to right structure for describing
particular solution. 2
(b) What are the different levels of Knowledge
Representation? 7
(c) Describe the meaning of knowledge manipulation and
knowledge acquisition. 7
(d) Explain Frame Problem. 7

Unit-III

3. (a) What is Rule Based System? 2
(b) State Baye's theorem alongwith example. 7
(c) Explain general learning model. Also give the factors
affecting learning performance. 7
(d) Explain Fuzzy matching algorithm. 7

Unit-IV

4. (a) Give general approaches to Natural Language
Process. 2

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- (b) Explain basic parsing technique. 7
(c) Give syntactic analysis for the statement "I want to
print Bill's .init file". 7
(d) What do you understand by forward chaining? Explain
with example. 7

Unit-V

5. (a) Give characteristics features of Expert System. 2
(b) What are the components of typical expert system? 7
(c) Explain Knowledge Acquisition Process. 7
(d) What do you understand by Expert System Shell? 7

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on one side of a river. There is one boat that can carry either one or two persons. How can they all cross the river such that there are never less missionaries than cannibals on either side of the river?

14

- (1) How would you represent a state of that search problem?
- (2) Draw the complete search tree for that problem.

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BE (8th Semester)

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- (1) Attempt questions from all units.
- (2) Questions carrying 2 marks and 4 marks are compulsory.
- (3) Attempt any two from questions carrying 7 marks.

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- (4) Attempt any one from questions carrying 10 marks.
- (5) Attempt any one from questions carrying 14 marks.

Unit-I

- Q. 1. Which storage structure is preferable chosen for node representation in OPEN list, while performing best-first search over a state space and why?
- Q. 2. Describe the heuristics implemented through constraint satisfaction and propagation state the same for solving crypt arithmetic problem : 10

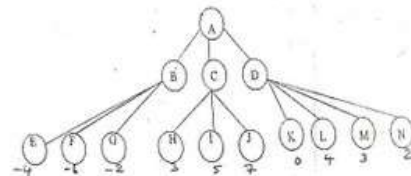
CROSS + ROADS = DANGER

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Q. 3. Consider the 2-ply search as shown below : 10

- (i) If the first player is a maximizing player, what move should be chosen under the mini-max strategy.
- (ii) What nodes should not be needed to be examined using α - β pruning technique.



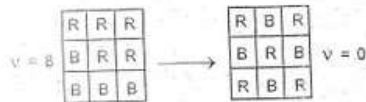
- Q. 4. How do heuristics help in performing effective search techniques? Design an appropriate heuristic function for solving the classical red-blue color problem using hill-climbing technique. 4

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Unit-2

Q. 1. What is Conflict-Resolution ? Illustrate with an example in any production system. 2

Q. 2. Define unifying literals. Encode the unifying algorithm. Identify the most general unifier (if one exists) for the following pairs of formulas. Constants are illustrated as capitals, variables as lower case letters. 14

(1) Older(Father(y), y), Older(Father(x), John)

(2) Q(y, G(A, B)), Q(G(x, x), y)

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Q. 3. The unicorn is a mammal if it is horned. If the unicorn is either immortal or a mammal, then it is horned. If the unicorn is mythical, then it is immortal, but if it is not mythical, then it is a mortal mammal. 14

(1) Encode these statements in propositional logic.

(2) Use resolution to prove that the unicorn is a mammal.

Unit-3

Q. 1. Describe the various operations available in Fuzzy Logic. 2

Q. 2. What is Dempster-Shafer Theory ? Compare it with Bayesian Reasoning ? 7

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Q. 3. Explain different AI learning models. Compare supervised and unsupervised learning methods. 7

Q. 4. Explain Non-Monotonic Reasoning techniques with illustrated examples. 7

Unit-4

Q. 1. Illustrate the de-clobbering step used in a Planning system with constraint posting technique with a situation example. 2

Q. 2. What is Conceptual Parsing ? How does it help to produce the correct parse, revealing the correct semantics of the following pair of sentences ? Hence, translate the correct CD structures of the same. 14

- John went to the park with the girl.
- John went to the park with the fountain.

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Q. 3. Explain the suitable steps involved in generating a STRIPS-style plan for the following block world problem Start: ON((C,A) \wedge ONTABLE (B) \wedge ARMEMPTY GOAL : ON (A, B) \wedge ON (B, C). 14

Unit-5

Q. 1. Enumerate the phases of a typical Expert System Life cycle. 2

Q. 2. Explain product system Architectures. Distinguish between the forward and backward chaining and under what condition each would be best to use for a given set of problems. 14

Q. 3. Design a set of production rules for solving the following classical AI problem : Three missionaries and three cannibals are all together

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any two questions from (b), (c) and (d). All

questions carry equal marks.

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- Q. 1. (a) What is A.I. ? 2
- (b) What is a state-space problem ? Explain the various states & conditions required to solve 8 puzzle problem. 7
- (c) Explain the Depth First Search with algorithm. What are the draw back of DFS ? 7
- (d) When Best First Search algorithm, will be applicable ? With a suitable algorithm and example explain the best first search. 7

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- Q. 2. (a) What is knowledge agent ? 2
- (b) What is a semantic net ? What are the types of semantic net ? Give semantic representation for following facts : 7
- (i) Ram is taller than Hari.
- (ii) Every dog has bitten a policeman.
- (iii) Every dog has bitten every policeman.
- (c) What is a frame ? Explain the frame problem with a suitable example. 7

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(d) Write short notes on :

(i) Forward Chaining Vs Backward

Chaining.

3

(ii) Resolution Algorithm.

4

Q. 3. (a) What is probabilistic reasoning ?

2

(b) Explain the truth maintenance system with a

neat diagram.

7

(c) Write short notes on :

(i) Decision tree

3

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(ii) Supervised & Unsupervised learning. 4

(d) Write short notes on :

(i) Learning by induction.

3

(ii) Learning using neural networks.

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Q. 4. (a) Why parsing is used ?

2

(b) Explain the different components of a

planning system.

7

(c) Explain the block-world problem.

7

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(d) Write short notes on :

(i) Planning agent.

3

(ii) State goal & action representation.

4

Q. 5. (a) What is the need of Expert System ?

2

(b) With a neat diagram, explain the architecture

of expert system.

7

(c) What is rule based system & when it is

used ? With a neat diagram explain the rule

based system.

7

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(d) Write short notes on :

(i) Knowledge acquisition.

4

(ii) Back tracking in prolog.

3

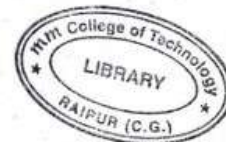
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- (c) Describe MYCIN expert system. 7
- (d) Write a program in prolog to calculate factorial of any number. 7

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BE (8th Semester)

Examination, Nov.-Dec., 2009

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ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

Time allowed : Three Hours

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Minimum Marks : 28

Note : 1. Attempt all question.

2. Question (a) is compulsory and attempt any two question from (b), (c) and (d) question.

Q. 1. (a) Write down major components of AI. 2

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- (2)
- (b) Give state space representation of Missionaries and Cannibals problem. 7
- (c) Explain A* algorithm. 7
- (d) Explain Minimax procedure with suitable example. 7
- Q. 2. (a) What do you mean by knowledge representation? 2
- (b) What is propositional logic and how knowledge is represented using propositional logic? 7
- (c) Write short on semantic nets. 7
- (d) Explain frame with suitable example. 7
- Q. 3. (a) State Baye's theorem. 2
- (b) Explain Bayesian Networks. 7

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- (3)
- (c) What do you mean by learning? Explain supervised and unsupervised learning with example. 7
- (d) Describe Dempster Shafer theory. 7
- Q. 4. (a) Write down name of two major method of natural language processing analysis. 2
- (b) Derive parse tree for the sentence "Mohan slept on the bench" using natural language grammar. 7
- (c) Write short notes on recursive transition networks (RTN). 7
- (d) Explain block world problem? 7
- Q. 5. (a) Write down name of four expert system. 2
- (b) Give structure of expert system. Explain its components. 7

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- (b) Explain the various components of Planning System. How can you represent a Planning Action? 8
- (c) What is parsing? Compare top down and bottom-up parsing using suitable example. 8

Unit-V

- Q. 5. (a) What is List in Prolog? Write a prolog program to concatenation of two list. 8
- (b) What is Expert System? What are the characteristics of expert system? Give some examples of expert system. 8
- (c) Write short notes on: 8
- (i) Knowledge Acquisition
 - (ii) Backtracking

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Unit-I

- Q. 1. (a) What is searching ? Compare informed and uninformed search. Describe BFS algorithm. 8

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- (b) Define constraint satisfaction problem. Solve the given crypt-arithmetic problem : 8

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- (c) Describe the Water-Jug Problem. Give a solution strategy. 8

Unit-II

- Q. 2. (a) Describe different knowledge representation techniques. What are the properties of a knowledge ? 8
- (b) Construct CD representation of the following : 8
- (i) John pushed the bike.
 - (ii) John went to market from home.
 - (iii) Ravi ate ice cream with spoon.
 - (iv) The plants grow.

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- (c) Define the following : 8
- (i) WFF
 - (ii) Resolution Principle
 - (iii) Rule Based System
 - (iv) Frame

Unit-III

- Q. 3. (a) Explain the source and types of uncertainty. State Bayes Theorem. 8
- (b) Write short notes on : 8
- (i) Bayesian Belief Network
 - (ii) Dempster-Shafer Theory
- (c) Compare supervised and unsupervised learning ? Describe the learning using Neural Network. 8

Unit-IV

- Q. 4. (a) What is Machine Translation ? Describe the basic steps of natural language processing. 8

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