

**III B.Tech II Semester Supplementary Examinations,  
November/December 2005  
ARTIFICIAL INTELLIGENCE  
(Electronics & Computer Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions  
All Questions carry equal marks**

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1. (a) Write down the state space representation, production rules, and any two solutions for the water jug problem. [2+4+2]  
(b) Explain problem characteristics with examples. [6+2]
2. Explain constraint satisfaction with the help of a crypt arithmetic problem. [10+6]
3. (a) Explain how the Herbrand's theorem forms the basis of resolution. [5]  
(b) What are the shortcomings of the resolution process? Explain with examples. [5+3]  
(c) Assume the following facts  
Steve only likes easy courses  
Science courses are hard  
All courses in fine arts department are easy.  
FA 101 is a fine arts course.  
Use resolution to answer the question "Name a course that Steve likes" [4+2]
4. What are procedural subframes? Explain the linking of procedural subframes for the functioning of your Computer center. [6+10]
5. (a) Compare the conventional reasoning system with non-conventional reasoning system.  
(b) Discuss the different key issues with respect to non-monotonic reasoning system. [8+8]
6. (a) What is hierarchical planning?  
(b) Explain with relevant examples.  
(c) What is constraint satisfaction? [5+6+5]
7. (a) Differentiate between language understanding and language generation.  
(b) Discuss the problems in developing a program which is capable of carrying on a dialog with a group of people. [8+8]
8. Write short notes on any two of the following:  
(a) Decision trees in learning  
(b) Riddle of the utility problem

(c) Rote learning-checker's game

(d) Knowledge system Building tools

[4X4]

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1. Describe with necessary diagrams, a suitable state space representation for 8 puzzle problem and explain how the problem can be solved by state space search. Show how heuristic can improve the efficiency of search. [2+6+4+4]
2. (a) Explain with example AND / OR graphs.  
(b) Write down the algorithm for generate and test search. [12+4]
3. (a) Explain how the Herbrand's theorem forms the basis of resolution. [5]  
(b) What are the shortcomings of the resolution process? Explain with examples. [5+3]  
(c) Assume the following facts  
Steve only likes easy courses  
Science courses are hard  
All courses in fine arts department are easy.  
FA 101 is a fine arts course.  
Use resolution to answer the question "Name a course that Steve likes" [4+2]
4. Write short notes on:  
(a) Semantic net  
(b) Frames  
(c) Conceptual dependency  
(d) Scripts [4+4+4+4]
5. (a) What is CWA? What are the merits of CWA? Explain with example, the disadvantages of CWA. [2+2+4]  
(b) Describe the differences between the JTMS and LTMS. [4]  
(c) Write short note on circumscription. [4]
6. (a) Search in game playing programs always proceed forward from current state to goal state. Why? Explain. [2+6]  
(b) The minimax procedure is depth first and depth limited. Explain examples. [4+4]
7. (a) What is natural language processing?

- (b) Write Production rules necessary to check the syntax of an English noun. The Grammar shall include both proper and common nouns? [6+10]
8. Define and explain the concept of “Learning” Describe the features of the following methods of Learning. [2+4]
- (a) Memorization (Rote learning)
  - (b) Direct Instruction (Taking advice)
  - (c) Analogy (By example)
  - (d) Induction
  - (e) Deduction. [4X4]

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1. (a) Show that the **Tower of Hanoi** problem can be classified under the area of AI. Give a state space representation of the problem. [4+4]  
(b) What are the characteristics of a production system? [8]
2. With an example, show how Means-Ends analysis can be applied to solve AI problems? [6+10]
3. (a) What are Terms, Quantifiers, Free and Bound variables in Predicate logic? Explain. [4+4]  
(b) Explain the methodology for converting predicate logic formula into prenex normal form. [8]
4. (a) What are Semantic networks? Explain its features with sample semantic net. [2+6]  
(b) Explain the classification of nodes in Semantic net. [8]
5. (a) List the key reasoning operations that are performed by JTMS. [8]  
(b) An example of nonmonotonic reasoning involves birds and flying. Consider the following facts:  
-Most things do not fly  
-Most birds do fly, unless they are too young or lean or have a broken wing  
-Penguin and ostriches do not fly  
-Magical ostriches fly  
-Tweety is a bird  
-Chirpy is either a penguin or an ostrich  
-Feathers is a magical ostrich  
Use one or more nonmonotonic reasoning systems answer the following:  
i. Does Tweety fly?  
ii. Does Chirpy fly?  
iii. Does Feathers fly?  
iv. Does Paul fly? [2X4]
6. (a) Illustrate the minimax search for the tic-tac-toe game, with initial position.  
(b) How Alpha-Beta method helps greatest pruning improvement in the above game? [8+8]

7. (a) What is natural language processing?  
(b) Write Production rules necessary to check the syntax of an English noun. The Grammar shall include both proper and common nouns? [6+10]
8. Discuss in a comparative manner (in detail) the important characteristics of  
(a) Deterministic Decision function approach  
(b) probabilistic Decision function approach in pattern Recognition problems. Give examples where each approach is more appropriate. [8+8]

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1. Describe with necessary diagrams, a suitable state space representation for 8 puzzle problem and explain how the problem can be solved by state space search. Show how heuristic can improve the efficiency of search. [2+6+4+4]
2. Explain constraint satisfaction with the help of a crypt arithmetic problem.[10+6]
3. (a) Given a set of rules, is it always possible to search in either forward or backward direction (We presume that we are not much bothered about the efficiency of the system at this stage). If not, what factors limit the freedom? Give specific examples to illustrate your answer. [2+4+4]  
(b) If a problem solving search program were to be written to solve each of the following problems, determine whether you would proceed in forward or backward direction. Why?
  - i. Water Jug problem
  - ii. Blocks world
  - iii. Natural Language understanding. [2+2+2]
4. (a) Convert the following statements to Conceptual Dependencies.  
Since smoking can kill me, I stopped  
I heard a tiger in the forest. [6+6]  
(b) What difficulties are encountered while converting a general English sentence to Conceptual Dependencies. [4]
5. (a) Compare the conventional reasoning system with non-conventional reasoning system.  
(b) Discuss the different key issues with respect to non-monotonic reasoning system . [8+8]
6. (a) What is planning?  
(b) Enumerate various solution strategies of planning. [4+12]
7. (a) What is natural language processing?  
(b) Write Production rules necessary to check the syntax of an English noun. The Grammar shall include both proper and common nouns? [6+10]
8. (a) Define and Explain "Learning" . Describe in detail, the range of activities covered by the concept "Learning". Justify the statement -that "Learning is the most important characteristic of Intelligence" [2+2+4].

- (b) Describe and discuss in detail, the important aspects of
- i. Rote Learning
  - ii. Learning by taking advice. Illustrate answer with the help of relevant examples. [4+4]

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