

**BITS, Pilani – Dubai Campus**  
Knowledge Village, Dubai  
First Semester 2006 – 07

Course Number & Title	:	EAUC461 – Artificial intelligence
Component Name	:	Comprehensive Examination (Closed Book)
Weightage	:	40 %
Duration	:	3 hours
Date & Day	:	24-12-2006, Sunday
Max. Marks	:	40 Marks

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1. What is meant by the critical path ? What is meant by scheduling with resource constraints ? 3M
2. What is meant by partial order planning .Explain with an example 3M
3. a. Explain the significance of the Bayesian Network and the Dempster-Shafer Theory. How are they similar and how do they differ. 2+2M  
b. Explain the organization of a DAG for predicting the possibility of “ getting a driving license on a particular day in Dubai”.
4. Explain the concept of learning with respect to
  - a. Version spaces
  - b. Decision trees 4M
5. Explain the three layer architecture in Robotics 3M
6. a. Explain the similarity between the organization of a Neuron and a perceptron with a figure. Why must weights be used in a Neural Network ?  
b. Explain the organization of a multilayer perceptron and explain its working with the help of the backpropogation algorithm. 2+3M
7. What is the significance of search in AI, are heuristics required in search. Discuss any two uninformed search techniques. 3M
8. What is an agent ? Discuss the three different types of agents found in AI. 3M
9. Write a LISP program to find if a given LIST is a palindrome. 3M
10. Represent the following statements in predicate logic 1.5X3 = 4.5M
  - a. Individuals with inadequate savings account should always make increasing the amount saved their first priority.
  - b. Individuals with an adequate savings account and an adequate income should consider a riskier but potentially more profitable investment in the stock market.
  - c. Individuals with a lower income who already have an adequate savings account may consider splitting their saving account between savings and stock, to increase the cushion in savings while attempting to increase their income through stocks.
11. Write short notes on each of the following
  - a. An application of Neural Networks 1.5X3=4.5M
  - b. Genetic algorithms
  - c. AI used in game playing

\*\*\*\*\*ALL THE BEST\*\*\*\*\*

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**Artificial Intelligence EAUC 461 Test 2(Open book)**

**MAKE-UP PAPER**

Duration : 50 Mins      Max marks : 20      Weightage : 20%      Date : 18-12-05

1. Construct partitioned semantic net representation for the following

- a) Every batter hit a ball
- b) All batters like the pitcher      (2 X 2 = 4 marks)

2. Use a frame representation to represent a hospital setup 4 marks

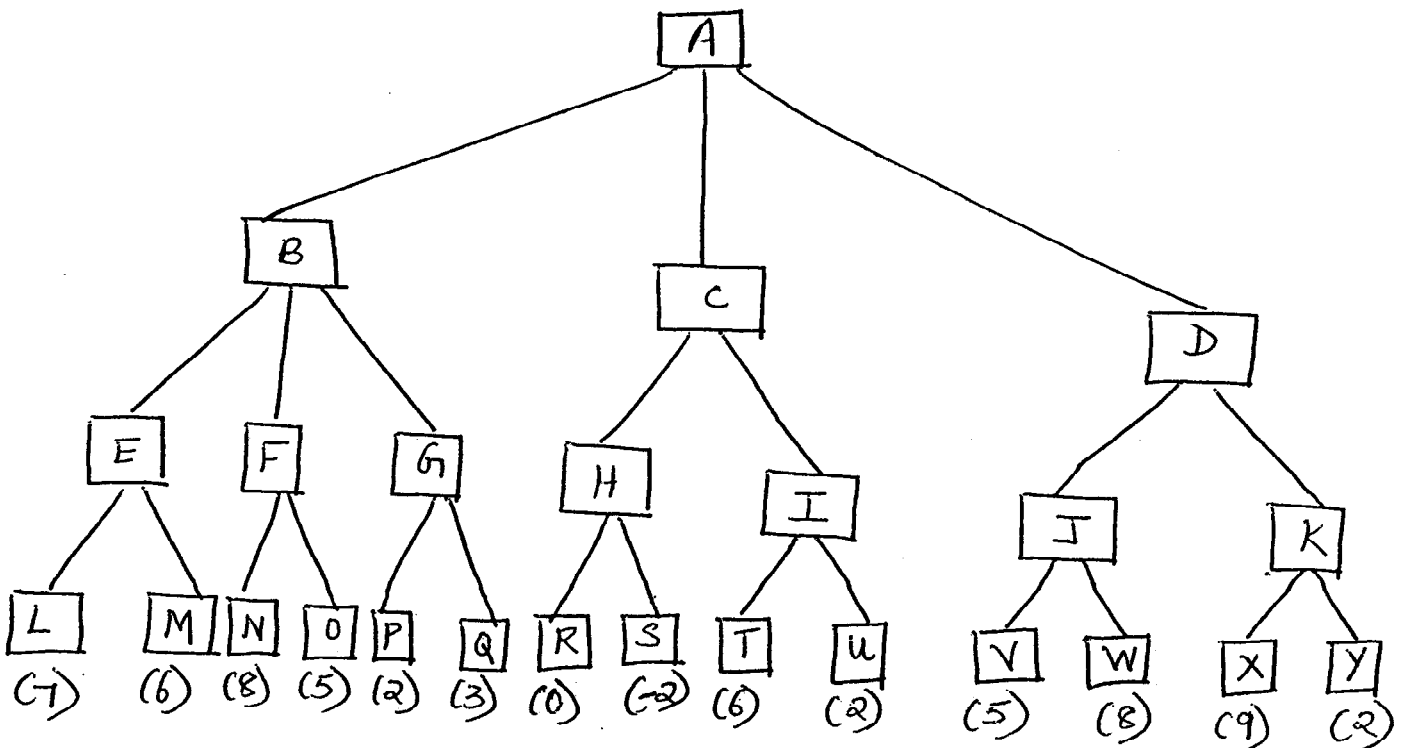
3. Show the conceptual dependency representation for the sentence  
John begged Mary for a pencil

How does this representation make it possible to answer the question?

Did John talk to Mary ? 3 marks

4. Explain the working of the Bayesian network 3 marks

5. Construct the following game tree in which the static scores are all from the first players point of view.



- a) Suppose the first player is the maximizing player, what move should be chosen. 0.5 marks
- b) What nodes would not need to be examined using  $\alpha$ - $\beta$  pruning procedure 2 marks
- c) Why does search in a game playing program always proceed forward from the current position rather than backward from the goal state? 1 mark
- d) Is min-max a depth first or a breadth first procedure? Explain 0.5 marks

6. Write short notes on the following

- a) Compare the working of the neurons in the human brain and the neural networks
- b) Working of the Hopfield network 2 marks

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**Artificial Intelligence EAUC 461 Test 1(Closed Book)**

**Duration : 50 Mins Max marks : 20 Weightage : 20% Date : 10-11-05**

**MAKE UP PAPER**

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1. Explain the working of the breadth first and the depth first algorithm. Compare the two 4 marks
2. Explain the working of inheritable knowledge with an example 3 marks
3. Explain the working of the AO\* algorithm 4 marks
4. Represent the following sentence using predicate logic
  - a) There is a barber who shaves all men who do not shave themselves 2 marks
  - b) Suppose we are attempting to resolve the following clauses
    1. loves(father(a),a)
    2.  $\neg$  loves(y,x) $\vee$ loves(x,y)What will be the result of the unification algorithm when applied to clause 1 and 2 2 marks
5. Write LISP programs for the following
  - a) Write a program to convert centigrade to Fahrenheit 2 marks
  - b) Write a program to raise a number to a given power. 2 marks
6. Explain the logic followed in Constraint satisfaction 1 mark

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Artificial Intelligence

EAUC 461

Test 2(Open Book)

Duration : 50 Mins

Max marks : 20

Weightage : 20%

Date : 26-11-06

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Note : Answer all questions.

1. What does it mean for a planning graph to level off? Under what circumstances does this happen and why? 1M

2. If we can guarantee that a search control rule prunes nodes from a planner's search space, does this guarantee that the time (in seconds) to generate a plan will also be reduced? Why or why not? 2M

3. Assume you have the following 3 operators:

• o1: pre: a  
eff:  $\neg a \wedge b$  i.e., o1 has proposition a as precondition, and its effects are to add b and delete a.

• o2: pre:  $a \wedge c$   
eff:  $\neg a \wedge b \wedge \neg c$

• o3: pre:  $b \wedge c$   
eff:  $\neg c \wedge d$

Show the first three layers (proposition, action, proposition) of the planning graph starting from an initial state where only a and c are true. Include all the mutual exclusion relations (mutex) and justify each of them with a brief explanation. 4M

4. Write a set of STRIPS – style operators that might be used, when you describe the operators, take into account such considerations like

- Cleaning the stove or the refrigerator will get the floor dirty.
- To clean the oven it is necessary to apply oven cleaner and then to remove the cleaner.
- Before the floor can be swept the garbage must be taken out. 2X3=6M

5. Write a LISP program to find the squares of the quadratic equation. The squares are given by the formula 2M

6. Consider the following given statements.
- a. All people who are not poor and are smart are happy.
  - b. All people who read are smart.
  - c. John can read and is not poor.
  - d. Happy people have exciting lives.

2M

Now given these statements , prove Can anyone be found with an exciting life ? 3M

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**Artificial Intelligence EAUC 461 Test 1(Closed Book)**

Duration : 50 Mins Max marks : 20 Weightage : 20% Date : 8-10-06

1. Give four categories of definition of Artificial Intelligence, with an explanation of each which lists the most important motivation and disadvantage of each. (4M)
2. An intelligent anesthetist agent is being designed to assist during complex surgical operations. The system will be informed of a patient case history from case notes in advance and will have access to sensor reading during the operation, minor changes in drug and oxygen administration can be made by the agent, it can present the medical staff with information about the patients state and warn of impending problems, it can explain the reasons of its action in natural language, if needed
  - i) describe the agents percepts, actions goals and environment
  - ii) What would be the advantages and disadvantages of introducing adaptive behavior to the agent (2+1M)
3. Describe the behavior of a depth first, breadth first search; compare relative advantages and disadvantages using a binary tree as an example. Compare in terms of space, time, optimal solution and completeness. (2+2M)
4. You have 3 jugs measuring 12, 8 and 3 gallons and a water pipe, you can fill the jugs up or empty them from one to the other or onto the ground. You must finally be left with one gallon in any of the jugs. Devise a solution for the problem and clearly give the state space representation. (1+2M)
5. Give the working of a the first three moves of a three ply game with players being A,B,C (2M)
6. Write short notes for the following
  - a. Deterministic versus Stochastic
  - b. Genetic Algorithms (2+2M)

\*\*\*\*\* ALL THE BEST \*\*\*\*\*