Exam2013

Question 1 [20 marks]

A) Select the correct answer (4 marks)

1- The search strategy which is complete, i.e., always finds a solution if there is one.
a) Breadth-first search b) Depth-first search

2- The search strategy which is optimal, i.e., always finds the best solution.
a) Greedy search b) Uniform search

3- In constraints satisfaction problems, the heuristic which orders the variable to consider is
a) Minimum remaining value b) Degree heuristic

4- In game playing, a function used to evaluate each move "board configuration" to decide what is the best single move to make next is called
a) Utility function b) heuristic function

B) Compare between the following (6 marks)

Search Strategy	Informed search strategies	Uninformed search strategies
Techniques		
Advantage		
Dis-advantage		

Exam is only 7 pages

B) State True/False (Explain in case of false) [10 marks]

1- The class precedence list is used by the inference mechanism in semantic network

2- The *primary* purpose of the OPEN list in search is to produce the path from the goal node found back to the initial state

3- Algorithm A* = Uniform Cost Search + Greedy Search

4- In semantic networks, nodes are used to represent relationships between the objects

5- Unlike standard search problem, CSP is consider the state as a "black box"

6- Informed search requires domain-specific knowledge about the problem

7- The backtracking technique used for solving a CSP apply breadth first with single variable assignment at each level

8- In order to improve the efficiency of generated and test algorithms, heuristic is used to select the variables

9- Alpha-Beta is a breath first search algorithm

10- Any ***knowledge representation language*** is defined by only syntax and sematic aspects

Exam is only 7 pages

Question 2 [20 marks]

2.1 Find a proposition with three variables p, q, and r that is true when p and r are true and q is false, and false otherwise. **[1 marks]**

2.2 Find a proposition with three variables p, q, and r that is never true. **[1 marks]**

2.3 Determine whether $p \rightarrow (q \rightarrow r)$ and $p \rightarrow (q \wedge r)$ are equivalent. **[1 marks]**

2.4 Determine whether this proposition is a tautology: $((p \rightarrow \neg q) \wedge q) \rightarrow \neg p$. **[2 marks]**

2.5 A student is asked to give the negation of "all bananas are ripe". **[3 marks]**

a) The student responds "no bananas are ripe". Explain why this is not correct.

b) Another student says that the negation of the statement is "some bananas are ripe". Explain why this is not correct.

c) Give the correct negation.

2.6 Consider the following sentences:

- The members of Giza Club are Mohamed, Mona, and Iman.
- Mohamed is married to Mona.
- Amir is Iman's brother.
- The partner (husband/wife) of every married person in the Club is also in the Club.
- The last meeting was at Mohamed's house.

a) Translate these (premises) sentences into Predicate Logic using the following predicates: member/1. married/2 , brother/2, lastmeeting/1 **[4 marks]**

b) Convert the premises into conjunctive normal form (CNF). **[4 marks]**

c) Prove the following sentence is true given the premises using **Proof by Resolution**: **[4 marks]**

- The last meeting of the Club was at Mona's house.

Note that the sentence should be proved to be true. If you cannot reach this conclusion, then add the necessary sentence to your knowledge base and then construct the proof.

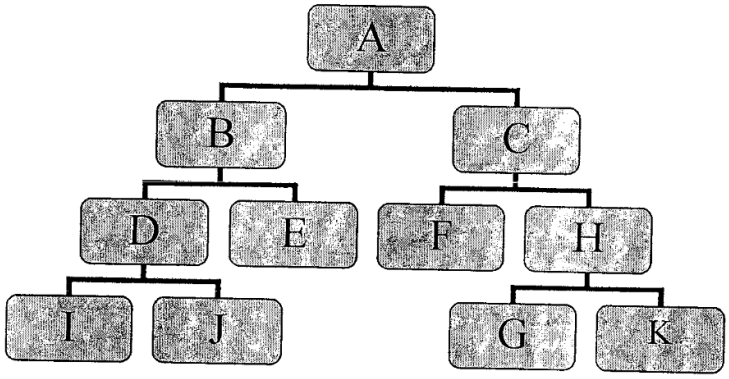
Question 3 [20 marks]

A) In the search tree below, the G node is a goal node, List the nodes created by:

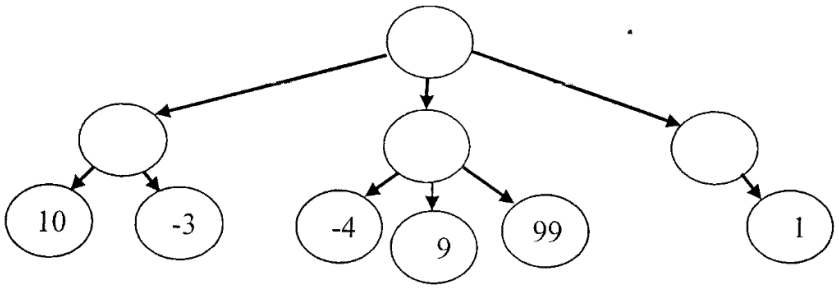
1- Breadth Depth

2- The iterative-deepening algorithm **[4 marks]**

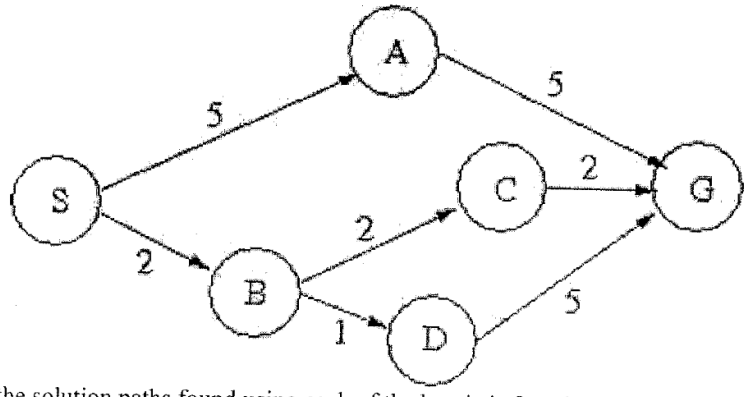
Exam is only 7 pages



B] Apply the *minimax* algorithm to the partial game tree below, where it is the maximum's turn to play. Write the estimated values of the intermediate nodes inside their circles, and indicate the proper move of the maximum by circling one of the root's outgoing arcs. Then, list leaf nodes which could be pruned when using Alpha-Beta. **[4 marks]**



C) Consider the following search space where we want to find a path from the start state S to the goal state G. The following table shows two different heuristic functions *h1*and *h2*. **[12 marks]**



NODE	*H1*	*H2*
A	3	5
B	4	2
C	2	5
D	5	3
G	0	0

Give the solution paths found using each of the heuristic functions, for the following search algorithms:

1- Greedy Best-First
2- Uniform Cost
3- A* algorithm

Greedy Best-First

Exam is only 7 pages