

Tunisian republic

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Higher School of Private Engineers  
of Gafsa

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State-approved Private Higher  
Education Institution Under No. 05-  
2013



الجمهورية التونسية

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المدرسة العليا الخاصة للمهندسين بقفصة

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مؤسسة جامعية خاصة مرخص لها من طرف  
الدولة تحت عدد: 05-2013

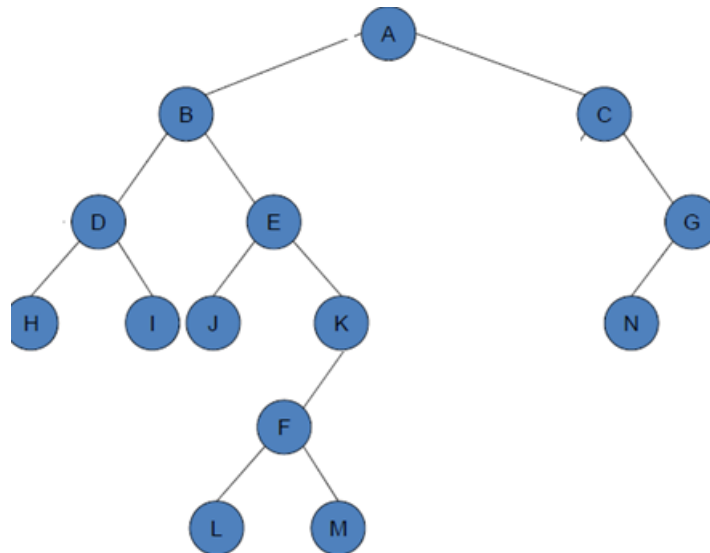
## EXAMEN Session S1

<b>A.U:</b>	2021/2022	<b>Cycle:</b>	Engineering
<b>Module:</b>	Artificiel intelligence	<b>Level:</b>	3rd Level
<b>Time:</b>	09H.00 - 11H.00	<b>Field</b>	ILSI
<b>Date</b>		<b>Duration:</b>	2h
<b>Documents:</b>	Not Authorized	<b>N° pages:</b>	02

<i>Exercise</i>	<i>1(6pts)</i>	<i>2(7pts)</i>	<i>3(7pts)</i>
<i>C.L.Os Assesment</i>	<i>K2, S1, S2</i>	<i>S2, S1, V1</i>	<i>S1, S2, V1</i>

### Exercise 1 (6pts):

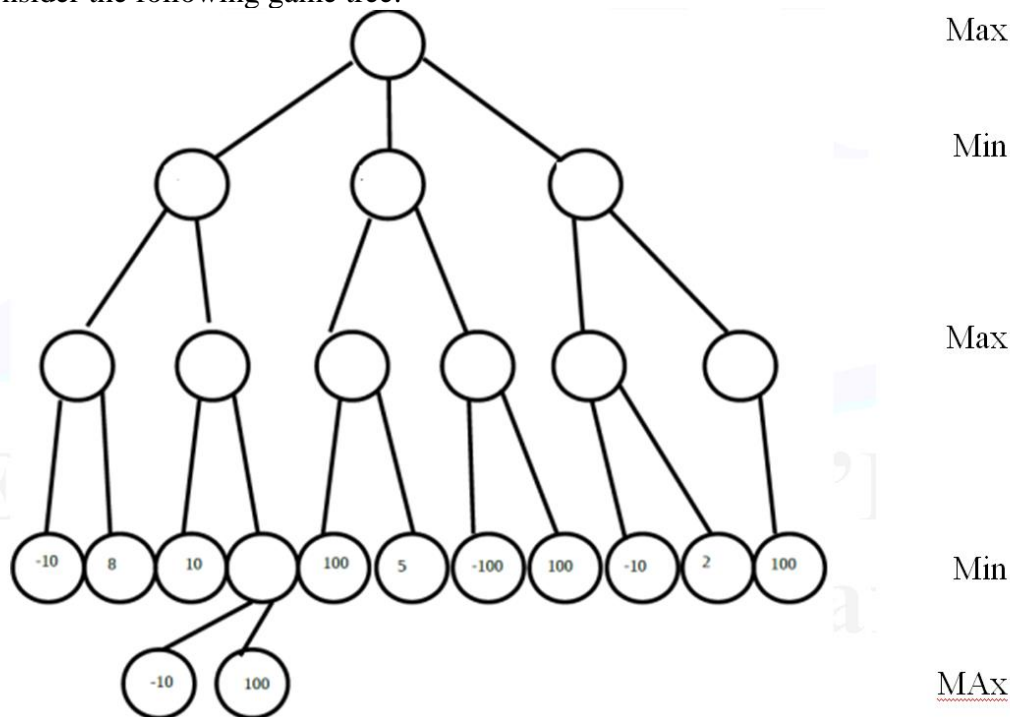
Let G be an undirected graph shown in the following figure:



1. Give a depth-first traversal of the graph G going from M to N (Order of visit) (2pts).
2. Determine the data structure associated with this depth-first traversal with a limit of 2 (2pts).
3. Write the best search algorithm first (1pt).
4. Propose an improvement (in the form of an algorithm) for the Glutton algorithm (1pt).

## Exercise 2 (7pts):

Consider the following game tree:



1. Apply the minimax algorithm to determine the values at the nodes of the graph. (1pts).
2. Apply the  $\alpha$ - $\beta$  algorithm to indicate the intermediate values of  $\alpha$  and  $\beta$ , as well as the branches cut by the algorithm. (3 pts).
3. Represent the result of the graph after the cut-off phase (1pt).
4. Let  $H = \neg q, a \wedge r, r, a \Rightarrow (a \Rightarrow q)$ 
  - a) Define the inference rules: Modus ponens and Modus tollens (1pt).
  - b) Deduce a simplification of formula H. (1pts).

## Exercise 3 (7 pts):

Consider the following rule base (BR):

1. Si  $H$  et  $D$  et  $E$  alors  $F$
2. Si  $G$  et  $D$  alors  $A$
3. Si  $C$  et  $F$  alors  $A$
4. Si  $B$  alors  $X$
5. Si  $D$  alors  $E$
6. Si  $X$  et  $A$  alors  $H$
7. Si  $X$  et  $C$  alors  $A$
8. Si  $X$  et  $B$  alors  $D$

1. Write the forward chaining algorithm (1pt).
2. Apply the forward chaining algorithm from the initial fact base  $BF = \{B, C\}$  to prove that  $F$  (Fact =  $F$ ) is deduced from the knowledge base. (3 pts).
3. Apply the backward chaining algorithm from the initial fact base  $BF = \{B, C\}$  to prove that  $F$  is deduced from the knowledge base (3pts).

**Good work**