KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

INSTITUTE OF OPEN LEARNING

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

(INFORMATION TECHNOLOGY)

SIT 305: ARTIFICIAL INTELLIGENCE

DATE: WEDNESDAY, 2ND FEBRUARY 2011 TIME: 2.00 P.M. - 4.00 P.M.

INSTRUCTIONS: **Answer** Question One **and** Any Other Two **questions**

Question 1

1. Define the following terms as used in AI

   i) Rule

   ii) Knowledge

   iii) Intelligent agent

   iv) Expert Systems

   v) Artificial Intelligence [10 Marks]

a) Describe the Turing test in words and a diagram [4 Marks]

b) List THREE objectives of AI [3marks]

c) Discuss FIVE application of AI [5Marks]

d) List FOUR types of agent [2 marks]

e) Define the term search problem [2marks]

f) Discuss FOUR ways on how you can evaluate a search [4marks]

Question 2

a) Search algorithms can be divided into informed and uninformed search methods. Explain what is meant by an informed search method and determine which category the following algorithms belong to: [6 Marks]

   i) Uniform-cost search

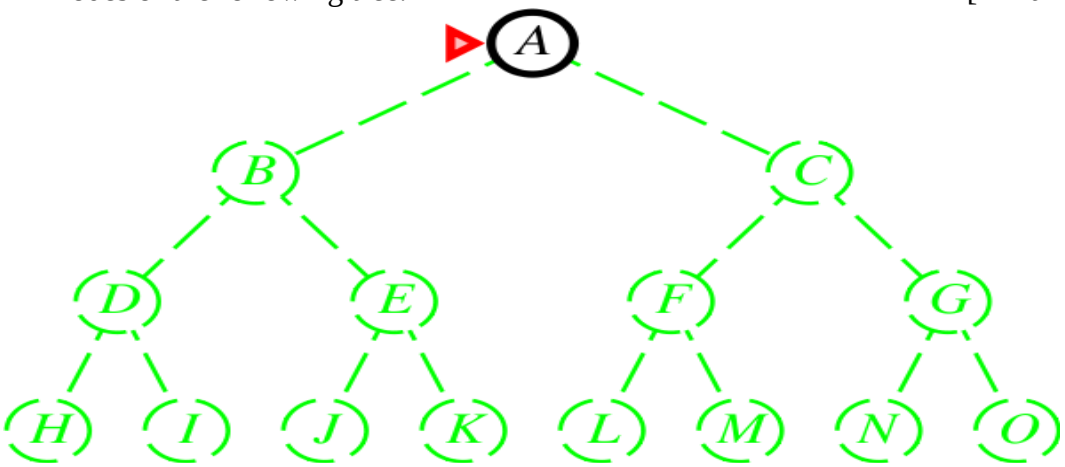
   ii) Iterative-deepening search

   iii) A* search

b)

i) Explain how Depth First Search works; is it complete and/or optimal? [4 Marks]

ii) Illustrate how the algorithm proceeds by writing down the order in which it visits the nodes of the following tree. [2 Marks]



c) Using the three propositional symbols, J means "I get the job," H means "I work hard," and P
means "I get promoted," convert the following English sentences into three sentences in Propositional Logic. [3 Marks]

d) Give an inference rule based on your sentences in (d) and then prove whether or not it is a sound rule of inference. [5 Marks]

- $P \wedge Q \Rightarrow R$

Question 3

a)

i) Describe the architecture of a typical rule based expert system. [6 Marks]

ii) What kinds of problems are appropriate for expert systems? Give an example. [6 Marks]

b) Is the following sentence in Propositional Logic valid, unsatisfiable, satisfiable, or none of these? Explain your answer using part or all of a truth table. [4 Marks]

$(A \Rightarrow \neg B) \Rightarrow (C \Rightarrow B)$

c) For each of the following sentences in English, is the accompanying FOL sentence a good Translation? If your answer is no, explain why not and correct it. [4 Marks]

i) "Any course in Computer Science is harder than some courses in Business."

$\forall x$ (Course(x) $\wedge$ Dept(x, CS)) $\Rightarrow \exists y$ ((Course(y) $\wedge$ Dept(y, Business)) $\Rightarrow$ Harder(x, y))

ii) "If a course is harder than all courses in Math, it must be in Computer Science."

$\forall x$ Course(x) $\wedge$ ("y Course(y) $\wedge$ Dept(y, Math) $\wedge$ Harder(x, y)) $\Rightarrow$ Dept(x, CS)

Question 4

a) What are some ways of handling imprecision and uncertainty in an expert system? What are the pros and cons of each? [9 Marks]

b) Discuss why agents in Artificial Intelligence need not only be software entities. [2 Marks]

c) Indicate for each of the following environments if they are Accessible, Deterministic, or Static

(each environment can have more than one of these characteristics).

i) Playing checkers

ii) Riding a bike to school [4 Marks]

d) State any three methods that are used in solving problems in artificial intelligence. Discuss the main feature of any one of the methods that you have stated [5 Marks]

Question 5

Choose one of the following areas:

Machine Learning, Natural Language Processing or Game Playing and write about 400 words on the topic under the following headings:

a) Definition

b) Explanation of key terms

c) Current examples and applications

d) Challenges [20 Marks]