MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

SIT 305: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Date: 9/8/2016 **Time: 8:30 – 10:30 AM**

INSTRUCTIONS

Answer Question One and Other Two Questions.

QUESTION ONE (30 MARKS) [COMPULSORY]

a) Distinguish between Knowledge and Artificial Intelligence (3 marks)

b) Briefly describe four approaches/views of AI: (8 marks)

c)

i). Write a logical expression that describes the following sentence: *If I pass the test and I pass the coursework then I will pass the course* . State the meaning of any terminology you introduce. (2 marks)

ii). Build the truth table for the expression (4 marks)

d)

i). State four attributes of an intelligent agent (2 marks)

ii). Suppose you were to design an agent for a Collision Avoidance Agent (CAA). Construct and fill-in the table below with the setting of each of the item

Goals	
Environment	
Percepts	
Sensors	
Actions	
Effectors	

(6 marks)

e) Discuss the Turing Test and explain its significance. (5 marks)

QUESTION TWO (20 MARKS)

a) Answer the following questions
   i) Write the following sentence as a wff. "All fishes except mudfish breath through gills" Use *Universal quantification* (2 marks)
   ii) Write the following sentence as a wff: "All goats are bearded except desert Billy goats" *Use Existential quantification* (2 marks)

b) Explain the principal components of a Production System. (6 marks)

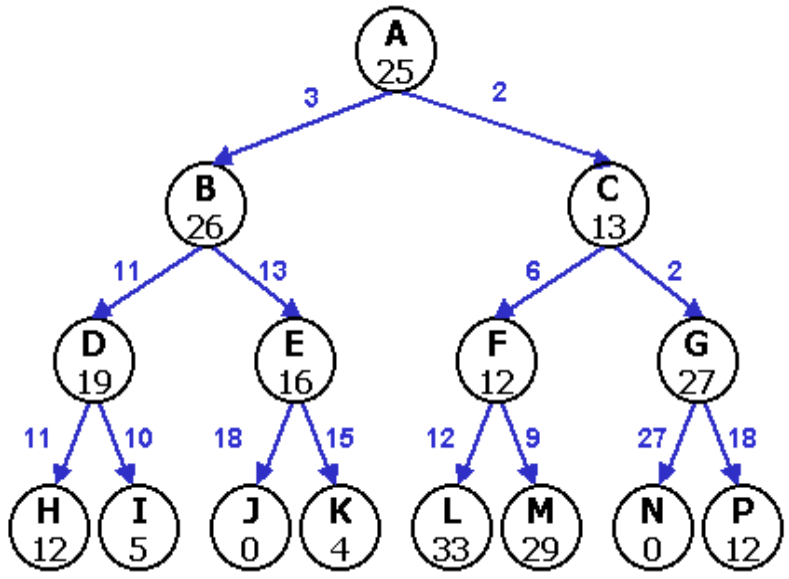
c) Explain the following reasoning mechanisms
   i) Case based Reasoning
   ii) Expectation driven processing
   iii) Model-Based Reasoning
   iv) Modus Tollens.
   v) Resolution. (10 marks)

QUESTION THREE (20 MARKS)

a) Distinguish between Blind Search and Heuristic Search in AI (4 marks)

b) State four branches of AI (4 marks)

c) A search tree is shown below where each circle represents a node corresponding to a state in the search space. The estimated cost (i.e. h function) for finding a solution from a node is shown in its circle. The two nodes with h = 0 are goal states and the other terminal es are dead-ends. (i.e. states that can never



reach a goal). Actual link costs are marked on the links between the nodes. Thus the path cost (i.e. g function) of a node is equal to the sum of the link costs from the root to that node.

   i) Using the (blind) depth-first search algorithm, give the sequence of nodes expanded before a goal state is reached.

(2 marks)

ii) Using the greedy search algorithm, give the sequence of nodes expanded before a goal state is reached. What is the solution path and what is its path cost?

(6 marks)

d) Explain four search strategies in AI (4 marks)

QUESTION FOUR (20 MARKS)

a) Explain three components of an expert system (6 marks)

b) Show the validity of the following statements using truth tables.

i). $((P \vee H) \wedge \neg H) \Rightarrow P$

ii). $P \wedge (Q \wedge R) \Leftrightarrow (P \wedge Q) \wedge R$

iii). $P \wedge Q \Leftrightarrow Q \wedge P$

(6 marks)

c) Carefully read the statement below and answer the question that follows :

Tom, Ken and Hellon belong to the Hoofers Club. Every member of the Hoofers club is either a skier or a mountain climber or both. No mountain climber likes rain, and all skiers like snow. Hellon dislikes whatever Tom likes and likes whatever Tom dislikes. Tom likes rain and snow.

Required:

Identify sentences from the above and then translate them into sentences in First Order Predicate Logic (FOPL)

(8 marks)

QUESTION FIVE (20 MARKS)

a) Explain three hill climbing techniques (6 marks)

b) Discuss two ways in which AI can be applied in medicine and industry. (4 marks)

c) You have been selected to be part of the team that is assigned the task of developing a knowledge based system. Describe the phases your team must undertake in the process of acquiring knowledge for the system. (10 marks)