Machakos University College

(A Constituent College of Kenyatta University)

UNIVERSITY EXAMINATIONS 2013/2014

SCHOOL OF COMPUTING AND APPLIED SCIENCES

SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE

SCO 205: FOUNDATIONS OF ARTIFICIAL INTELLIGENCE

DATE: Monday, 31st March, 2014 TIME: 11.00a.m. – 1.00 p.m.

Attempt Question ONE and any OTHER TWO Questions

Question One - Compulsory [30 marks]

a) Define the following terms: [4 marks]

i. Intelligence

ii. Cognitive characteristic

iii. Artificial Intelligence

iv. Prolog

b) Describe the Turing Test of intelligence. [4 marks]

c) State and explain any four characteristics that can be used in describing intelligence [4 marks]

d) Assume you are the project leader of a team tasked with the design and development of an expert system to be used in the diagnosis and treatment of a certain medical condition. Provide guidance on how this task is going to be accomplished. [5 marks]

e) A China company has released a robot that can drive a car for a considerable distance on a road. From the perspective of machine learning and in light of this robot identify and explain:

i. Experience. [2 marks]

ii. Training Example [2 marks]

f) Explain the following types of intelligence. [8marks]

iii. Intrapersonal Intelligence

iv. Spatial Intelligence

v. Bodily Kinesthetic Intelligence

g) Explain your understanding of the term *Robotics*. [1 mark]

Question Two [20 marks]

a) Define the term intelligent agent. [2 marks]

b) Explain five characteristics of an agent. [5 marks]

c) Consider the google search engine. Explain the context in which it can be considered an intelligent agent. [5 marks]

d) With a diagram, discuss the structure of a typical expert system. [8 marks]

Question Three [20 marks]

Suppose you are given the following search space:

State	Next	Cost
A	B	4
A	C	1
B	D	3
B	E	8
C	C	0
C	D	2
C	F	6
D	C	2
D	E	4
E	G	2
F	G	8

a) Draw the state space of this problem. [5 marks]

b) Assume that the initial state is A and the goal state is G. Show how each of the following search strategies would find a path from the initial state to the goal state.

i. Breadth First Search. [4 marks]

ii. Depth First Search. [4 marks]

c) With example of a reasoning scenario, differentiate between Modus Ponens and Modus Tollens reasoning techniques. [5 marks]

d) What is heuristic search? [2 marks]

Question Four [20 marks]

a) Write the following statements in well-formed formulas. [3 marks]

i. Janet is beautiful

ii. All bats are mammals and can fly

iii. Everybody knows someone with a computer

b) Outline the knowledge engineering process? [5 marks]

c) Explain three challenges a knowledge engineer might face in collecting knowledge. [3 marks]

d) Explain in detail the strategies adopted in reasoning using forward chaining and backward chaining [5 marks]

e) Explain Fuzzy logic in relation to Bayesian Theory. [4 marks]

Question Five [20 marks]

a) Assume you have been given the task of developing an expert system to manage traffic around Nairobi City.

i. Describe three knowledge representation techniques you would use. [6 marks]

ii. Discuss how you would build your knowledge base for such a purpose. [5 marks]

iii. Describe the environment in which such a system will be operating in. [4 marks]

b) Discuss five foundations of Artificial Intelligence. [5 marks]