KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
THIRD YEAR, SECOND SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE

KCS 309 – ARTIFICIAL INTELLIGENCE

Date: 14th December, 2022
Time: 11:30am – 1:30pm

INSTRUCTIONS TO CANDIDATES
ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Define the term Artificial intelligence on the basis of "System that think rationally" and "System that act like humans". State two real-world applications of Artificial Intelligence
. (4 Marks)
b) Differentiate between Blind Search and Heuristic Search. (3 Marks)
c) Distinguish between procedural and declaration knowledge. (2 Marks)
d) Covert the first order logic into English sentences

$\forall x$ gardener(x) $\rightarrow$ likes (x, Sun). (1 Marks)
$\forall x$IsAstudent(x) $\wedge$ IsTakingAI(x)$\Rightarrow$Is Cool(x). (1 Marks)
$\forall x\ \exists t$ (person(x) $\rightarrow$ time(t) $\wedge$can-fool (x, t)). (1 Marks)

e) Consider the following graph. If there is ever a decision between multiple neighbor nodes in the BFS or DFS algorithms, assume we always choose the letter closest to the beginning of the alphabet first.
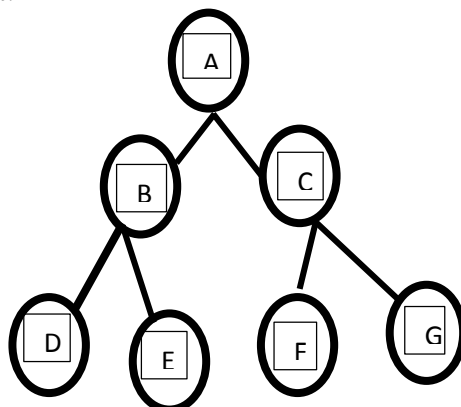
i) In what order will the nodes be visited using a Breadth First Search? (2 Marks)
ii) In what order will the nodes be visited using a Depth First Search? (2 Marks)
iii) State one advantages of breadth-first search over depth-first search. (1 Mark)

f)   For each of the following, state what the acronym stands for and state their Motivation in
         i)   Artificial Intelligence.
         ii)   NLP   (2 Marks)
         iii) HPSG   (2 Marks)
g)   Humans developed AI systems by introducing into them every possible intelligence they
      could, for which the humans themselves now seem threatened. State three threat in Artificial
      intelligence.   (3 Marks)
h)   Differentiate between supervised and unsupervised learning. Give example of each.   (3 Marks)
i)   State the significance of using heuristic functions?   (1 Mark)
j)   Write down the basic syntactic elements of first order logic   (2 Marks)

QUESTION TWO (20 MARKS)

a)   Explain the meaning of the term "knowledge representation".   (2 Marks)
b)   Briefly explain three different types of knowledge.   (6 Marks)
c)   with a well labelled diagram showing the interaction of an Artificial intelligence system with
      the real world and the components involved in showing intelligence. Discuss how Cycle of
      knowledge representation works.   (12 Marks)

QUESTION THREE (20 MARKS)

a)   Describe Alpha-Beta pruning and give the other modifications to minmax procedure to improve its
      performance with suitable example.   (14
      Marks)
b)   Highlight four properties of Minimax algorithm.   (4 Marks)
c)   State limitation of the minimax Algorithm.   (2 Marks)

QUESTION FOUR (20 MARKS)

a)   Explain Backward and forward Chaining, with example in logic representation. Also mention
      advantages and disadvantages of both the algorithms.   (10 Marks)
b)   Explain Machine learning. Illustrate learning model. Mention some factors that affect the
      learning.   (10 Marks)

QUESTION FIVE (20 MARKS)

a)   Discuss four of the problems which arise in NLP for autonomous machines like
      robots, intelligent computers.   (8 Marks)
b)   Discuss how useful is AI in game playing techniques. Describe what is adversarial search?
                                                                                          (8 Marks)
c)   Define the term logic. What is the role of logic in Artificial Intelligence? Compare
      Propositional logic with First order logic (Predicate Calculus).   (4 Marks)