(Knowledge for Development)

KIBABII UNIVERSITY
(KIBU)

UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
FIRST YEAR SECOND SEMESTER

FOR MASTER OF SCIENCE DEGREE IN
(INFORMATION TECHNOLOGY)

COURSE CODE: MIT 823

COURSE TITLE: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM

DATE: 26/11/2021 **TIME:** 2.00 P.M- 5.00 P.M.

INSTRUCTIONS

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [20 MARKS]

(a) (i) Explain heuristic search as used in artificial intelligence   (3 Marks)

(ii) Draw the frame of a cow whose skin colour is black and is named "Machuma".

(4 Marks)

(b) Illustrate, with the help of a diagram, components that facilitate the display of Artificial Intelligent Systems' behaviour   (3 Marks)

(c) Discuss each of the following types of Hill Climbing Algorithms in Artificial Intelligence (AI)

(i) Simple Hill Climbing   (3 Marks)

(ii) Steepest Ascent Hill Climbing   (3 Marks)

(iii) Stochastic Hill Climbing   (4 Marks)

QUESTION TWO [20 MARKS]

(a) Discuss the following different approaches to knowledge representation:

(i) Simple Relational Knowledge   **(4 Marks)**

(ii) Inheritable Knowledge   **(5 Marks)**

(iii) Inferential Knowledge   **(3 Marks)**

(b) Create a network that defines the casual connections among nodes from the following scenario: **(8 Marks)**

If my car cannot start, it is likely that:

- battery is flat

- starting motor (starter) is broken

In order to decide whether to fix the car myself or send it to the garage, I make the following decisions:

- if the headlights do not work, the battery is likely to be flat so I fix it myself.

- if the starting motor is defective, then send the car to the garage.

- if battery and starting motor both gone, send the car to the garage.

QUESTION THREE [20 MARKS]

(a) Explain the five types of knowledge in Artificial Intelligence (AI)   **(10 Marks)**

(b) Explain the five levels of Model of Statistical Reasoning   **(10 Marks)**

QUESTION FOUR [20 MARKS]

(a) Distinguish between Forward Chaining and Backward Chaining as used in expert systems. **(4 Marks)**

(b) Discuss the different components of the cycle of Knowledge Representation in Artificial Intelligence (AI). **(4 Marks)**

(c) Consider a symmetric travelling salesperson problem with 5 cities A, B, C, D, E. The distances between cities are as follows:

City	City	Distance
A	B	7
A	C	7
A	D	3
A	E	8
B	C	7
B	D	5
B	E	3
C	D	8
C	E	5
D	E	7
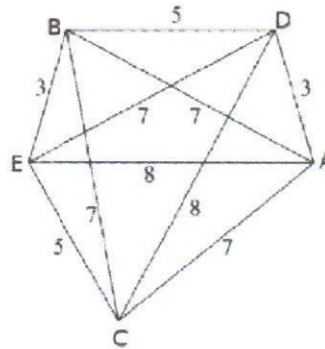
The travelling salesperson must visit every city exactly once and return to the starting city covering the lowest cost (shortest distance / shortest travelling time / using the least fuel).

Find the optimal path **(5 Marks)**

(d) By considering the following figure, use the A* Search Algorithm to determine the optimal path that gives the least cost. **(7 Marks)**
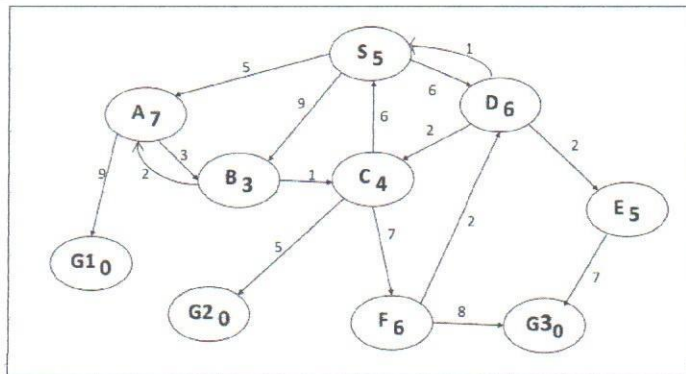
QUESTION FIVE [20 MARKS]

(a) (i) Discuss three semantic techniques which computers rely on in natural language processing. **(3 Marks)**

(ii) Explain the concept of knowledge representation in artificial intelligence (AI).

(2 Marks)

(b) Describe an agent and its environment, giving three examples of agents.

(2 Marks)

(c) Describe each of the following types of intelligence:

    (i)   Linguistic intelligence   **(2 Marks)**

    (ii)   Spatial intelligence   **(2 Marks)**

    (iii) Interpersonal intelligence   **(2 Marks)**

(c) **(i)** Briefly describe what uninformed and informed searches are, giving examples of each of the search strategies in lists and trees.   **(4 Marks)**

    (ii) Briefly describe the breadth-first and the depth-first search for trees.

(3 Marks)