(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
YEAR ONE SEMESTER ONE EXAMINATIONS

FOR THE DEGREE OF MASTER OF COMPUTER SCIENCE

COURSE CODE : MCS 814

COURSE TITLE : ADVANCED ARTIFICIAL INTELLIGENCE

DATE: 01/10/2022 TIME: 02.00 P.M – 05.00 P.M

INSTRUCTIONS TO CANDIDATES

ANSWER ANY THREE QUESTIONS

QUESTION ONE [20 MARKS]

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

(i) Simple Relational Knowledge (4 Marks)

(ii). Inheritable Knowledge (4 Marks)

(b) Distinguish beween Dynamic programming and Greedy methods (4 Marks)

(c) Differentiate Time Efficiency and Space Efficiency in search algorithms (2 Marks)

(d) Explain each of the following concepts, giving an example in each case.

(i) 0/1 knapsack problem (3 Marks)

(ii) Fractional knapsack problem (3 Marks)

QUESTION TWO [20 MARKS]

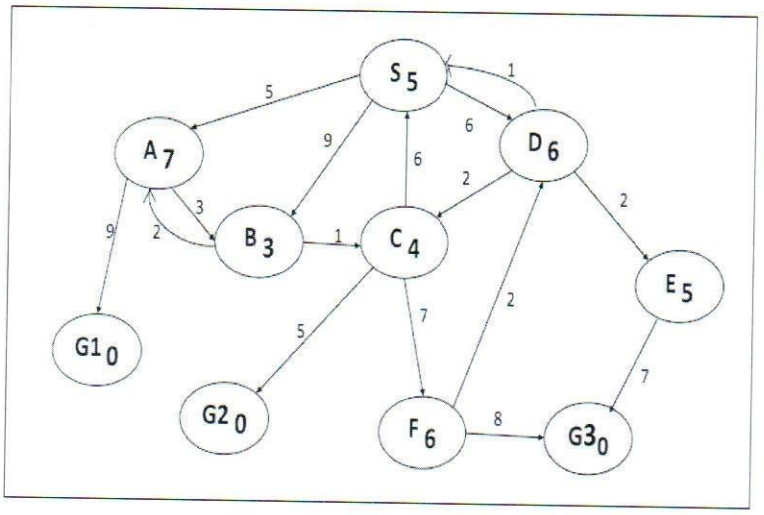
(a) Distinguish between frames and scripts as used in artificial intelligence. (3 Marks)

(b) In a certain country, 53% of the adults are males. One adult is randomly selected for a survey involving credit card usage.

(i) Find the prior probability that the selected person is a female (2 Marks)

(ii) It is later learned that the selected survey subject was smoking a cigar. Also 8.3% of males smoke cigars, whereas 2.1% females smoke cigars. Use this additional information to find the probability that the selected person is male. (4 Marks)

(c) By considering the following figure, use the A* Search Algorithm to determine the optimal path that gives the least cost. (7 Marks)



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

QUESTION THREE [20 MARKS]

(a) A thief breaks into a house to steal. He can carry a maxim weight of 15 kg into his bag. There are 7 items in the house with the following weights and values.

Item No.	Weight	Value ($)
1	2	10
2	3	5
3	5	15
4	7	7
5	1	6
6	4	18
7	1	3

Use the Greedy Search Algorithm to determine how the bag (Knapsack) should be filled so as to maximize the profit given that the items are divisible. (5 Marks)

(b) A factory production line is manufacturing PC keyboards using three machines, X, Y and Z. Of the total output, machine X is responsible for 28%, machine Y for 32% and machine Z for the rest.

It is known from previous experience with the machines that 7% of the output from machine X is defective, 5% from machine Y and 3% from machine Z. A keyboard is chosen at random from the production line and found to be defective. Compute the probability (to 5 d.p.) that it came from:

(i) Machine X (5 Marks)

(ii) Machine Y (5 Marks)

(ii) Machine Z (5 Marks)

QUESTION FOUR [20 MARKS]

(a) Explain three real-world applications of Artificial Intelligence (6 Marks)

(b) Discuss different types of artificial intelligence based on:

(i) Capabilities (6 Marks)

(ii) Functionalities (8 Marks)

QUESTION FIVE [20 MARKS]

(a) Explain the minimax algorithm along with the different terms. (6 Marks)

(b) Discuss a heuristic function as used in search algorithms (4 Marks)

(c) Discuss how artificial intelligence can be useful in fraud detection. (10 Marks)