Capital University of Science and Technology

Department of Computer Science

CS4812 – Artificial Intelligence

Final Term Exam (BS CS)

Semester: Spring 2020 **Max Marks:** 40

Date: 03-07-2020 **Time:** 120 mins

Instructor: Ms. Mammona Qudsia (S1)

Instructions:

1. Attempt all questions as instructed.
2. There are four questions in this paper, on three pages.
3. All parts of this exam collectively carry 40% weightage towards the final evaluation.
4. This examination is being conducted in extra ordinary circumstances so we expect that all students will exhibit higher moral standards.
5. Each student shall be required to write his/her Name, Registration Number, Sheet Number, on each page of the answer sheet and sign those answer sheets before submission.
6. At the first page of answer sheets of each part, you must write and sign the following honor statement

> I, ----------, Registration No. ---------- pledge on my honor that I have not given or received any unauthorized assistance during this examination. I understand that in case any such practice is detected, I may be awarded 'F' grade in the course.
>
> Student Sign: _____ Dated: _____

7. After the expiry of the exam time, students shall upload the answer sheets after scanning them carefully.
8. All the images of the answer sheet must be packed as a pdf file with the name of the file as your registration number.
9. Two identical answer sheets may lead to the award of F for both the students in the course.

Name: **Reg. No.**

Question No. 1. **(CLO3)** **(6+4)**

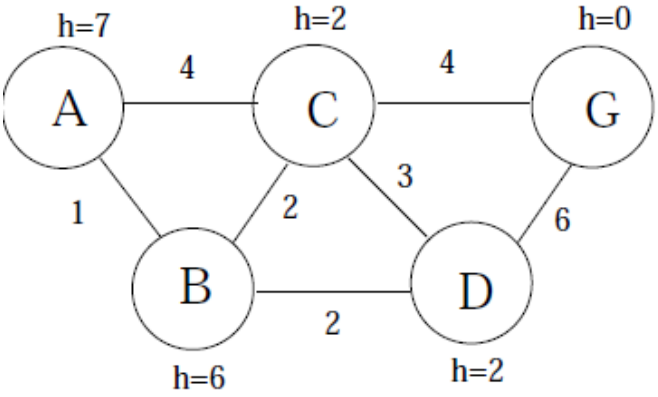

Figure 1

Consider the state space graph shown above. A is the start state and G is the goal state. The costs for each edge are shown on the graph. Each edge can be traversed in both directions. The h values are heuristic values.

1) You have to apply the A* search using graph search. Write down the order in which the nodes are expanded and also write down the path which should be return by A* search.

2) Will A* star search return optimal path? Explain your answer with reason.

Question No. 2. (CLO4) **(5+3+2)**

a) Consider a game of Tic Tac Toe Max = X, Min =O. The current configuration of board is given below

	X	O
	X	
X	O	O

1) Make an exhaustive game tree from this configuration onwards. It's min turn to play.
2) Also use the minmax algorithm to find the optimum score for min.
3) What is likely outcome of game and what is min next move?

Question No. 3. (CLO2) **(6+4)**

a) Convert the following statements in First order Logic.
   i) All girls are beautiful or smart.
   ii) All red apples are tasty.
   iii) Brothers are siblings.

b) Convert the following sentences into prolog.
   i) Sara likes oil painting.
   ii) Oil painting is form of art.
   iii) Every artist like art.

iv) Is Sara artist?

Question No. 4. (CLO3) **(5+5)**

11	**12**	

Example of wrong configuration because adjacent squares have consecutive numbers.

11	**16**	**18**
14	**12**	**15**
19	**17**	**13**

a) Suppose you have to place number (11-19) in the grid below so that squares adjacent vertically or horizontally do not have two consecutive number. A number can appear once.
   1. Formulate this problem as a CSP problem, stating the variables, domains, and constraints. Constraints should be specified formally and precisely.
   2. Solve this problem using backtracking algorithm. (Show Solution to level-4).

b) Define the chromosome and fitness function for above problem in genetic algorithm.

Good Luck 😊