Daffodil International University
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Midterm Exam Examination, Fall 2021 @ DIU Blended Learning Center
Course Code: CSE 412 (Day), Course Title: Artificial Intelligence
Level: 4   Term: 1   Section: All
Instructor: All   Modality: Open Book Exam
Date: Wednesday 17 November, 2021   Time: 09:00 am - 11:30 am
Two and half (2.5 *hrs*) to support online open/case study based assessment   Marks: 25

Directions:
- **Students need to go through the CASE STUDY shown in this exam paper.**
- **Analyze and answer specific section based on your own thinking and work.**
- **Do not share as this will be treated as plagiarism by Blended Learning Center.**
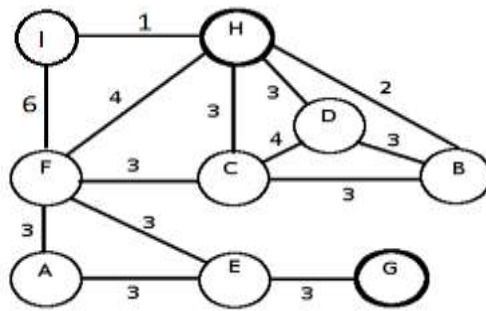
Answer all of the following questions. Figures in the right-hand margin indicate full marks.

1. Let us consider the well-known virtual assistant **Alexa** as our intelligent agent of interest. **Alexa** can regarded as a typical example of an intelligent agent. It uses sensors to detect a user's request and then collects data from the Internet without the user's assistance. They can be used to collect information about the environment it perceives, such as the weather and time.

   Now answer the following questions based on the above scenario.

   a) Formulate it as an AI problem   3

   b) What are task environments of **Alexa**?   4

   c) Give PEAS description of the task environment for **Alexa**.   3

2. Consider the following scenario, where start node is **H** and goal node is **G**. Now simulate the following searches and based on the simulation mention nodes visited order and solution path for each of the searches.

a)	Uniform-cost search.	**5**
b)	Modified uniform-cost search, which uses step cost rather than path cost.	**5**

3. Write the answer to each of the following questions in *a single sentence*.

a)	Write the time and space complexity of the modified uniform-cost search in **Question No. 2.b**.	**1**
b)	What is/are used as the fringe/frontier in the modified uniform-cost search in **Question no. 2.b**?	**1**
c)	If the environment of the vacuum world consists of *n* squares and *m* cleaners, how many states will there be in the state space?	**1**
d)	Suppose you are using depth-limited search on the scenario in Question no. 2. Find a suitable value of *l*.	**1**
e)	If the environment of vacuum world consists of n squares and 2 cleaners, how many states will there be in the state space?	**1**