



PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF INFORMATION SCIENCE

TEST 1

Winter Semester: 2021 - 22

Course Code: BCA 217

Course Name: Artificial Intelligence for Gaming

Program & Sem: BCA & IV Sem

Date: 9<sup>th</sup> May 2022

Time: 11:30 AM to 12.30 AM

Max Marks: 30

Weightage: 15%

**Instructions:**

- (i) Read the all questions carefully and answer accordingly.
- (ii) There are no negative marks for Part A. All questions in Part A are worth 2 marks.
- (iii) For Part A, write only the correct option / correct options (some questions may have multiple correct choices). You will get 2 marks **only** if you write all the correct options.
- (iv) For Part A, **no marks will be awarded** if you write an incorrect option!

**Part A [Memory Recall Questions]**

Answer all the Questions. Each question carries TWO marks.

(5Q x 2M = 10M)

1. Which of the following result in **no pruning**?

- a) Minimizing
- b) Alpha-Beta Pruning
- c) Ideal Ordering
- d) Worst Ordering

(C.O.1) [Knowledge Level]

2. Most card games are imperfect information stochastic process games. The opposite (i.e. perfect information **and** deterministic process) for this rule is:

- a) Freecell
- b) Spider Solitaire
- c) Pyramids
- d) Tripeaks

(C.O.1) [Knowledge Level]

3. With respect to alpha-beta pruning, mark **all** the correct statements:

- a) The value of alpha only changes in the max node.
- b) The value of beta only changes in the max node.
- c) The value of alpha only changes in the min node.
- d) The value of beta only changes in the min node.

(C.O.1) [Knowledge Level]

4. Select **all** the algorithms which are examples of uninformed search:

- a) A\* Search
- b) Breadth First Search
- c) Cheapest First Search
- d) Depth First Search

(C.O.1) [Knowledge Level]

5. Which of the following statements is true with respect to breadth first search (BFS) and depth first search (DFS)?

- a) Both BFS and DFS use stack
- b) Both BFS and DFS use queue
- c) BFS uses stack and DFS uses queue
- d) BFS uses queue and DFS uses stack

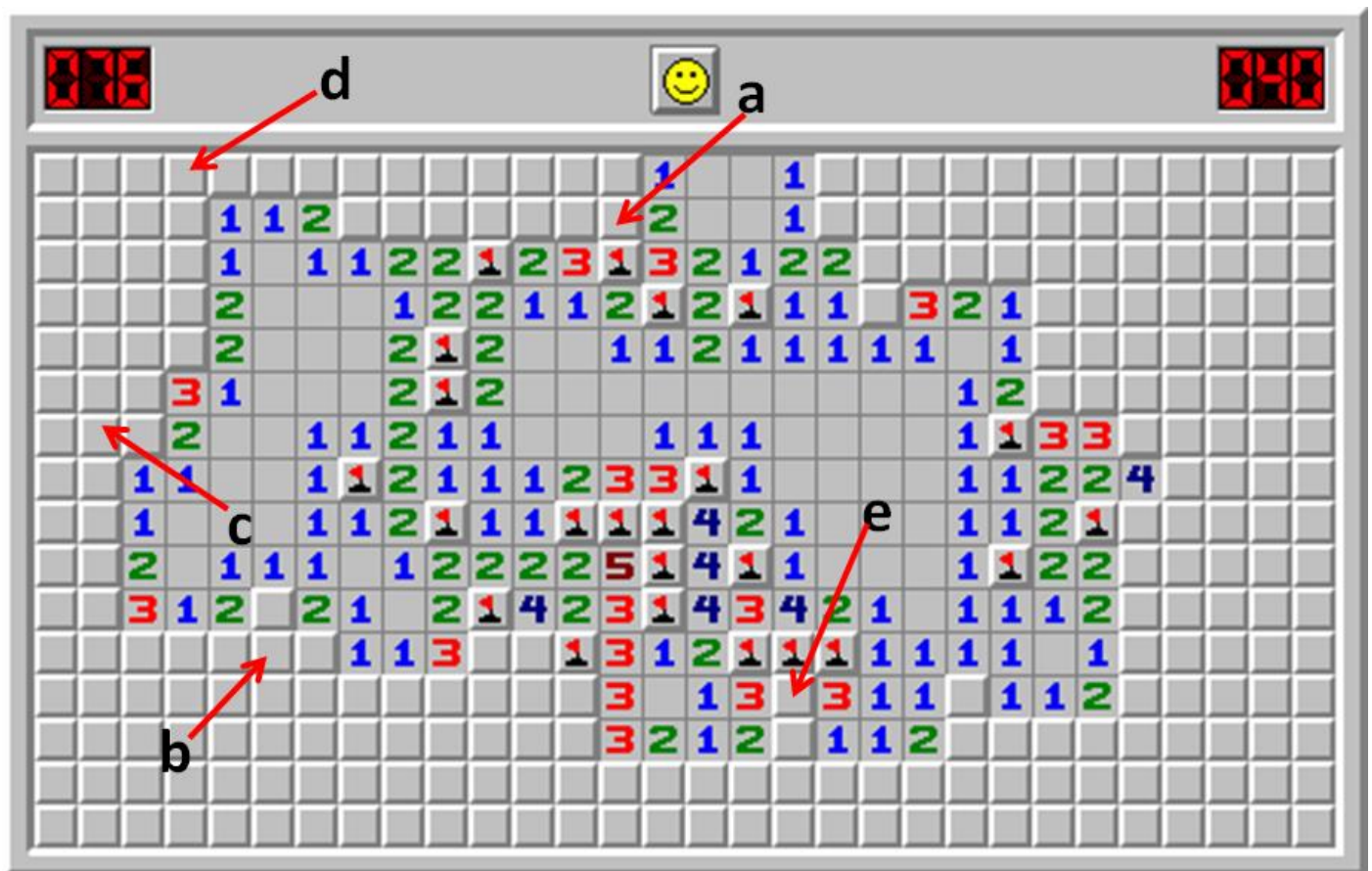
(C.O.No.1) [Knowledge level]

**Part B [Thought Provoking Questions]**

Answer both the Questions. Each question carries FIVE marks.

(2Q x 5M = 10M)

6. Consider the following situation in *Minesweeper*. For each of the locations (lettered (a) to (e)), state whether you should explore the cell (i.e. there's no mine there), flag the cell (there's probably a mine there), or do nothing (i.e. there's no advice possible).



(C.O.2) [Application level]

7. Complete the following table with respect to the classification of different board games based on the amount of information (Perfect vs. Imperfect Information) and process (Deterministic vs. Stochastic Process):

| Game       | Information | Process |
|------------|-------------|---------|
| Battleship |             |         |
| Scrabble   |             |         |

|                  |  |  |
|------------------|--|--|
| Monopoly         |  |  |
| Backgammon       |  |  |
| Chinese Checkers |  |  |

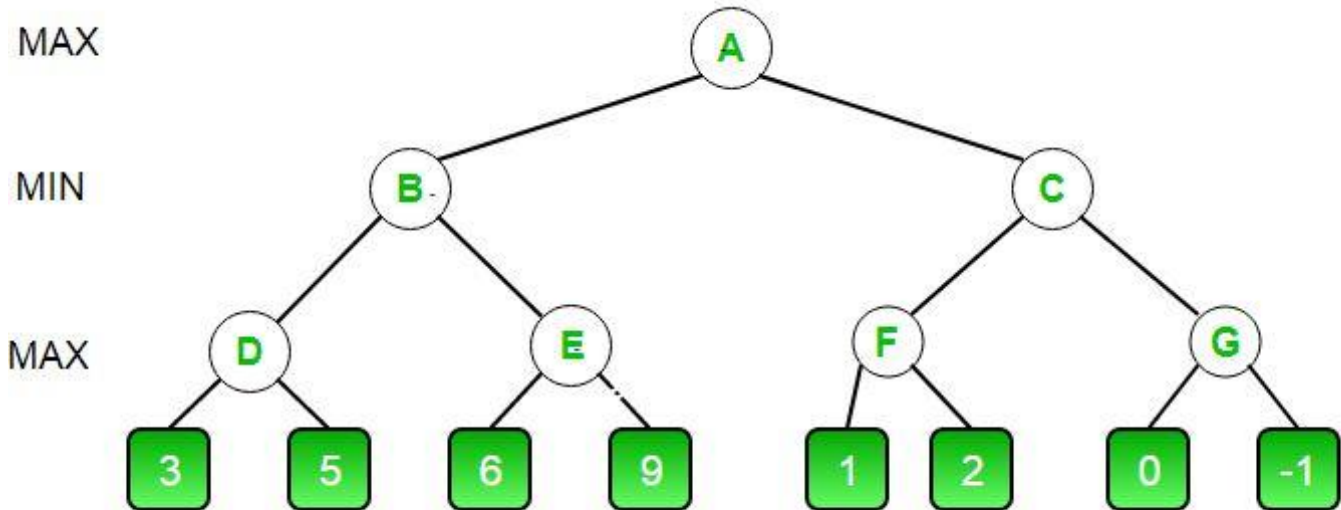
(C.O.1) [Comprehension Level]

**Part C [Problem Solving Questions]**

**Answer the Question. Question carries TEN marks.**

**(1Q x 10M = 10M)**

8. Consider the following game tree:



- (a) Evaluate the game tree using the Minimax algorithm, to find out the player's expected utility (i.e. what is the value at node A).
- (b) Perform alpha-beta pruning on the game tree.
- (c) **Reorder** the leaf nodes of the game tree, so as to get the ideal ordering.

[ (C.O.2) [Application Level]



|         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST- 2**

**Winter Semester:** 2021 - 22

**Course Code:** BCA 217

**Course Name:** Artificial Intelligence for Gaming

**Program & Sem:** BCA-ARVR & 4<sup>th</sup> Semester

**Date:** 1<sup>st</sup> June 2022

**Time:** 10.00 AM to 11.00 AM

**Max Marks:** 30

**Weightage:** 15%

**Instructions:**

(v) Read the all questions carefully and answer accordingly.

(vi) There are no negative marks for Part A. All questions in Part A are worth 3 marks.

(vii) For Part A, write only the correct option / correct options (some questions may have multiple correct choices). You will get 3 marks **only** if you write all the correct options.

(viii) For Part A, **no marks will be awarded** if you write an incorrect option!

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries Three marks.**

**(5 Q x 3 M = 15 Marks)**

- Which of the following is used for A\* search?
  - Actual cost of the path from start to current node
  - Heuristic distance between the current node to destination
  - Heuristic distance between the start to destination
  - Actual cost of the path from the current node to the destination. [3 M] (C.O. 1) [Knowledge]
- Which of the following options describe the initial condition for Dijkstra's Single-Source Shortest Path Algorithm?
  - Distance of the source vertex is infinity
  - Distance to every non-source vertex is 0
  - Distance to every non-source vertex is infinity
  - Distance of the source vertex is 0 [3 M] (C.O. 1) [Knowledge]
- Which type of decision-making system consists of **only** IF-THEN-ELSE conditions?
  - Finite State Machines
  - Behaviour Trees
  - Production Rules
  - Decision Trees [3 M] (C.O. 1) [Knowledge]
- Each ghost in Pac-Man tries to reach a particular point in the game world. What is that point called?
  - Power Point
  - Testing Tile
  - Pac-Man Point
  - Target Tile [3 M] (C.O. 4) [Knowledge]

5. What type of decision-making is used in real-time strategy games?

- a. Inductive
- b. Deductive
- c. Reactive
- d. Reflective

[3 M] (C.O. 1) [Knowledge]

### Part B [Thought Provoking Questions]

Answer the Question. The question carries Five marks.

(1 Q x 5 M = 5 Marks)

6. Recall that noise takes place when we have the **same set of input attributes** mapping to **more than one output value**. Consider the following situation. We have the following set of attributes  $A = \{\text{Outlook, Temperature, Humidity, Wind}\}$ . Each attribute takes on the following values:

- a. Outlook = {Sunny, Overcast, Rainy}
- b. Temperature = {Hot, Medium, Cold}
- c. Humidity = {High, Low}
- d. Wind = {Strong, Mild}

Find the **maximum number of rows** possible in the decision table so that there is **no noise**.

[5 M] (C.O. 4) [Comprehension]

### Part C [Problem Solving Questions]

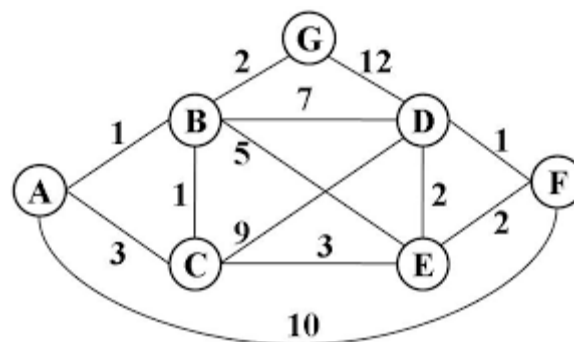
Answer the Question. The question carries Ten marks.

(1Qx10M=10M)

7. Find the **Single-Source Shortest Path** lengths to all the vertices starting from the vertex **A**.

Show **all the working**.

[10 M] (C.O. 2) [Application]





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**END TERM EXAMINATION**

**Winter Semester:** 2021 - 22

**Course Code:** BCA 217

**Course Name:** Artificial Intelligence for Gaming

**Program & Sem:** BCA & IV Sem

**Date:** 28<sup>th</sup> June 2022

**Time:** 01:00 PM to 04:00 PM

**Max Marks:** 100

**Weightage:** 50%

**Instructions:**

- (i) *Read the all questions carefully and answer accordingly.*
- (ii) *For Part A, you have 4 options for each question. You get 1 mark for each correct option written, and 1 mark for each incorrect option not written.*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries FOUR marks.**

**(5QX4M=20 M)**

1. Which of the following is used for Greedy Best-First search?
  - a. Actual cost of the path from start to current node
  - b. Heuristic distance between the current node to destination
  - c. Heuristic distance between the start to destination
  - d. Actual cost of the path from the current node to the destination

(C.O. 1) [Knowledge]
  
2. Which attribute do we choose in the decision tree?
  - a. The one that maximizes the entropy
  - b. The one that maximizes the information gain
  - c. The one that minimizes the information gain
  - d. None of the above

(C.O. 1) [Knowledge]
  
3. Which of the following is part of the Finite State Machine model for Game AI?
 

|                            |                        |
|----------------------------|------------------------|
| a. Finite Number of States | b. Transition Function |
| c. Start State             | d. Error Function      |

(C.O. 1) [Knowledge]
  
4. Select all the algorithms which are examples of informed / heuristic search:
 

|                          |                         |
|--------------------------|-------------------------|
| a. A* Search             | b. Breadth First Search |
| c. Cheapest First Search | d. Depth First Search   |

(C.O. 1) [Knowledge]
  
5. Select the statements which are true for alpha-beta pruning.
 

|                                 |                                 |
|---------------------------------|---------------------------------|
| a. Prune if $\alpha \leq \beta$ | b. Prune if $\alpha < \beta$    |
| c. Prune if $\alpha > \beta$    | d. Prune if $\alpha \geq \beta$ |

(C.O. 1) [Knowledge]

## Part B [Thought Provoking Questions]

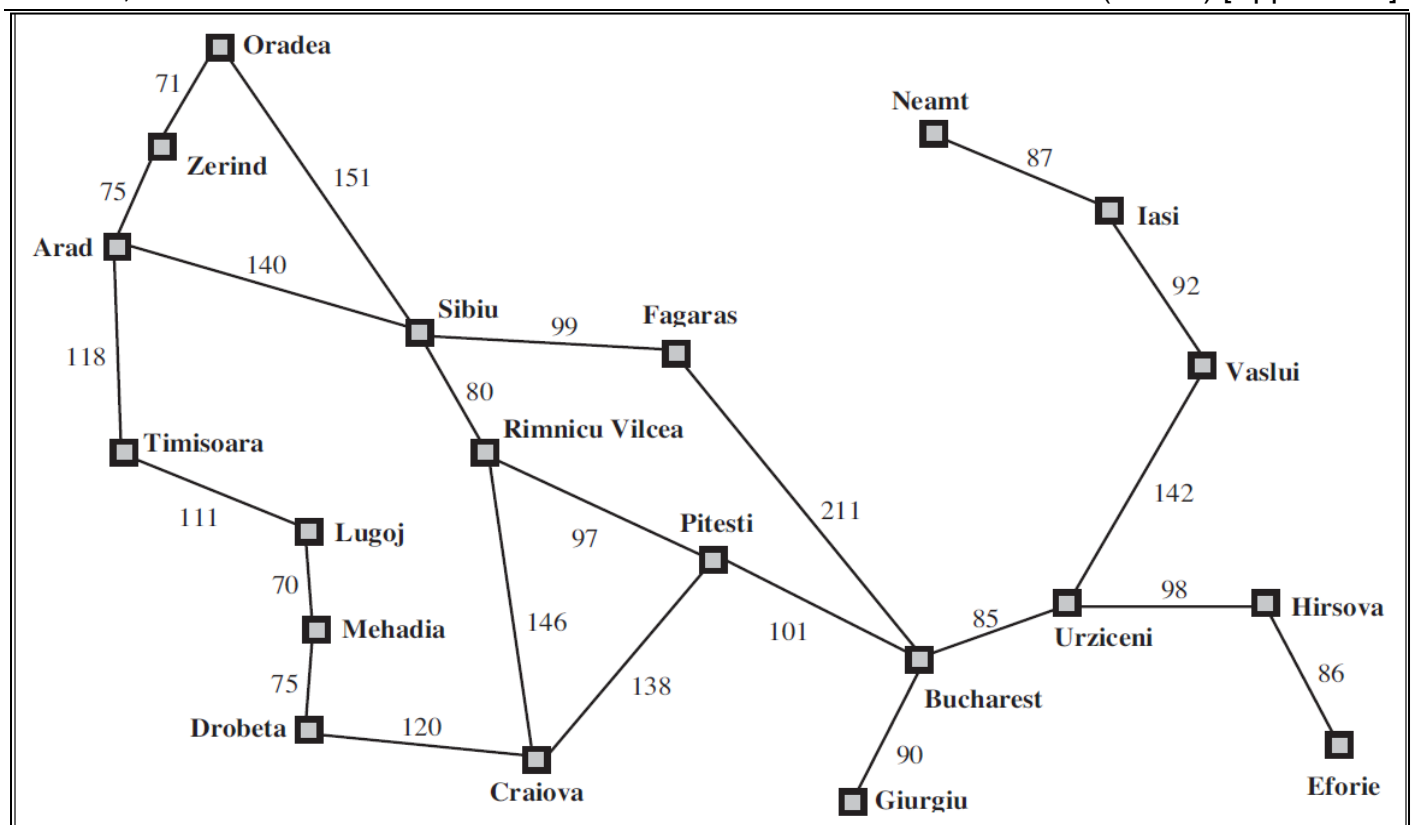
Answer all the Questions. Each question carries EIGHT marks.

(4QX8M=32M)

6. Design / Visualize an FSM for a security guard that patrols a school at night. If it sees a player, it needs to seek the player and give them a lecture till the player can slip away. Otherwise, it should switch between Idle (do nothing) and Patrol (for 5 seconds). (C.O. 2) [Comprehension]

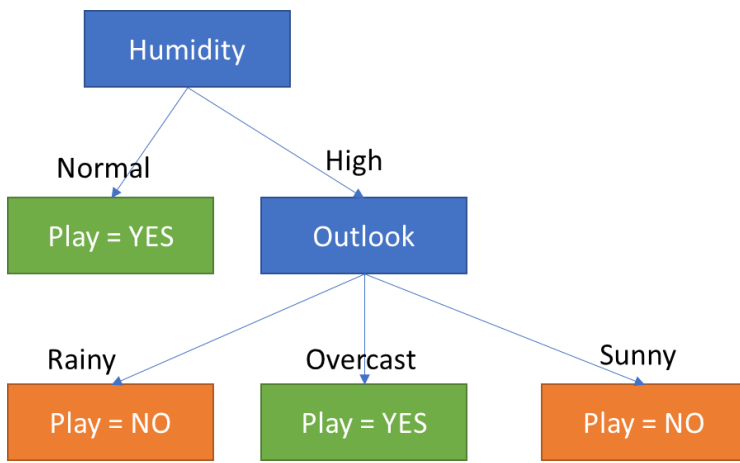
7. Consider the following map of cities in Romania. Evaluate whether the following routes between Arad and Bucharest which are possible using a breadth-first search. Show the working (i.e. the breadth-first search traversal) wherever it is possible. **Ties are broken randomly.**

- a) Arad, Sibiu, Timisoara, Zerind, Fagaras, Oradea, Rimnicu Vilcea, Lugoj, Bucharest.
  - b) Arad, Zerind, Timisoara, Sibiu, Oradea, Lugoj, Rimnicu Vilcea, Fagaras, Mehadia, Pitesti, Craiova, Bucharest.
  - c) Arad, Sibiu, Timisoara, Zerind, Fagaras, Lugoj, Oradea, Mehadia, Rimnicu Vilcea, Bucharest.
  - d) Arad, Timisoara, Zerind, Sibiu, Lugoj, Oradea, Rimnicu Vilcea, Craiova, Pitesti, Mehadia, Drobeta, Bucharest.
- (C.O. 2) [Application]



8. The accuracy of a classifier is defined as the number of instances which the classifier has correctly classified the data in the test set. Consider the following decision tree classifier, which has been trained on a number of examples. For each of the 8 rows of the testing values (Instance1 to Instance8), find out what the decision tree will predict, and hence, calculate the accuracy of the decision tree on the **test set**.

**Decision Tree:**



**Testing Data:**

| Instance  | Outlook  | Temperature | Humidity | Windy | Play? |
|-----------|----------|-------------|----------|-------|-------|
| Instance1 | Sunny    | Hot         | High     | False | No    |
| Instance2 | Sunny    | Hot         | High     | True  | No    |
| Instance3 | Overcast | Hot         | High     | False | Yes   |
| Instance4 | Rainy    | Mild        | High     | False | Yes   |
| Instance5 | Rainy    | Cool        | Normal   | False | Yes   |
| Instance6 | Rainy    | Cool        | Normal   | False | Yes   |
| Instance7 | Rainy    | Cool        | Normal   | True  | No    |
| Instance8 | Overcast | Cool        | Normal   | True  | Yes   |

(C.O. 4) [Application]

9. Match the following game types with the corresponding examples.

| Game Name         | Game Type                        |
|-------------------|----------------------------------|
| 1. Contra         | A. First Person Shooter          |
| 2. Doom           | B. Puzzle                        |
| 3. Go             | C. Multi-player Turn-based Game  |
| 4. Minesweeper    | D. Real-Time Strategy Game       |
| 5. Pac-Man        | E. Run and Gun Game              |
| 6. Scotland Yard  | F. Shoot-em up Game              |
| 7. Solitaire      | G. Single-player Turn-based Game |
| 8. Space Invaders | H. Two-Player Turn-based Game    |

(C.O. 1) [Knowledge]

**Part C [Problem Solving Questions]**

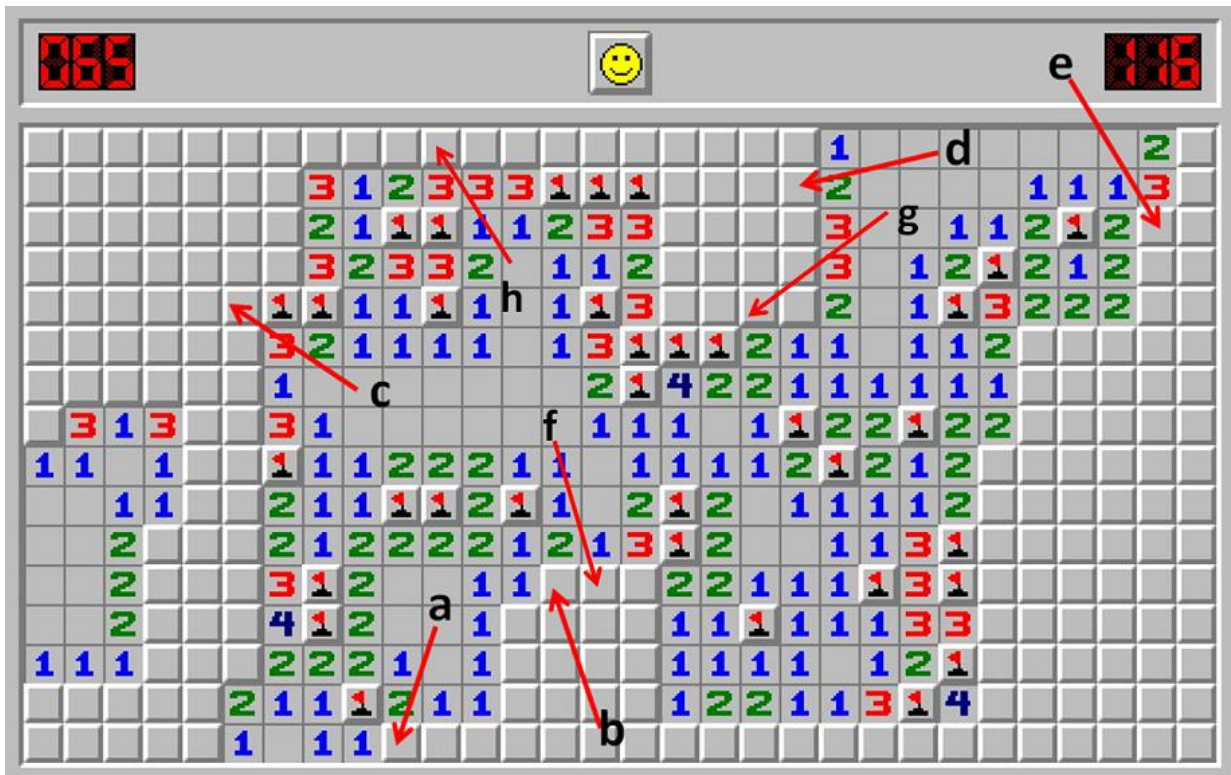
Answer all the Questions. Each question carries SIXTEEN marks.

(3QX16M =48M)

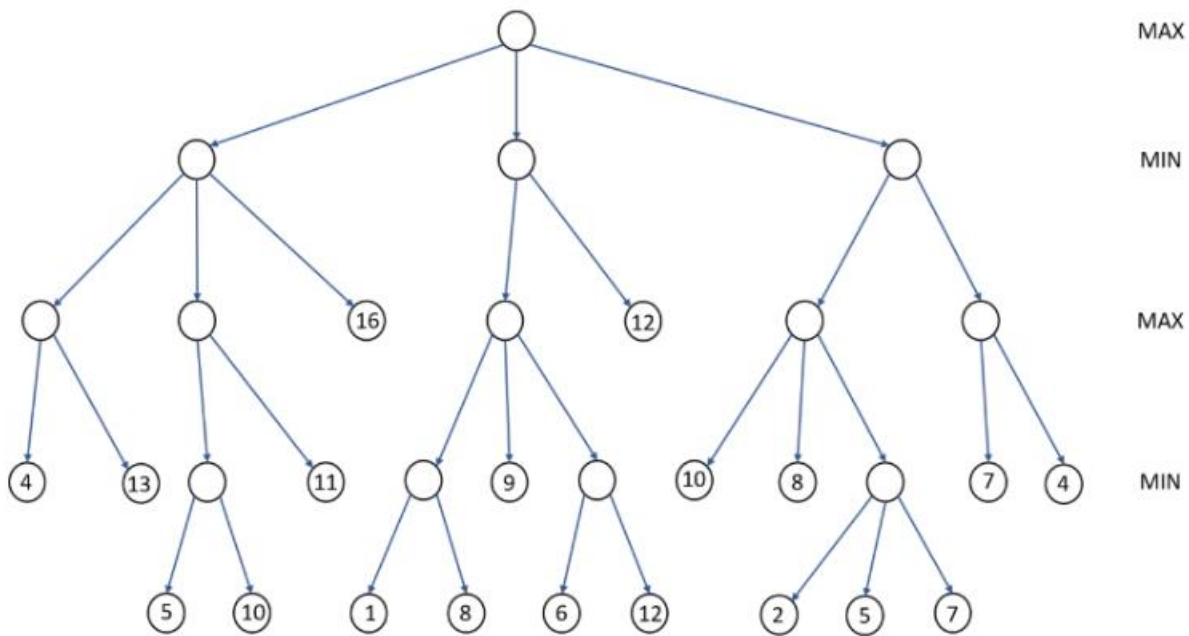
10. Consider the following board of *Minesweeper*. For each of the cells marked (a) to (h), state the action that a player should do between **Explore**, **Flag**, or **Can't Say / No advice possible**.

(C.O. 2) [Application]





11. Consider the following game tree, whose **terminal node values** are given:



- Draw the tree and find the player's **expected utility** by filling in all the blank nodes using the minimax algorithm.
- Perform **alpha-beta pruning** on the game tree.
- Assume that the nodes are processed from **left to right**. Then, **reorder the terminal nodes** in order to achieve maximum pruning. (You don't need to show the pruning, only the reordered terminal nodes from left to right). (C.O.2) [Application]

12. One of SAM's friends wants to travel around Romania. He lands in Bucharest, and would like to visit Timisoara, Iasi, Craiova, Oradea, Arad, Pitesti, and Sibiu. Refer to the map in **Question #7**, and find the length shortest paths he would need to visit each of these cities **from Bucharest**. (C.O. 2) [Application]

