Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF INFORMATION SCIENCE
END TERM EXAMINATION - JUN 2023

Semester : Semester IV - 2021 **Date :** 12-JUN-2023
Course Code : CSA3020 **Time :** 1.00PM - 4.00PM
Course Name : Sem IV - CSA3020 - Artificial Intelligence for Game Development **Max Marks :** 100
Program : BCG **Weightage :** 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **(5 X 2 = 10M)**

1. Mention any 2 types of shooting games

(CO3) [Knowledge]

2. Mention any 2 elements of reinforcement learning.

(CO1) [Knowledge]

3. Mention the type of uninformed searching (BFS / DFS) that is done for generating a distance map in a grid.

(CO3) [Knowledge]

4. A Finite State Machine (FSM) is made up of 5 elements - one of which is a finite number of states (S). List the other 4 elements of an FSM.

(CO4) [Knowledge]

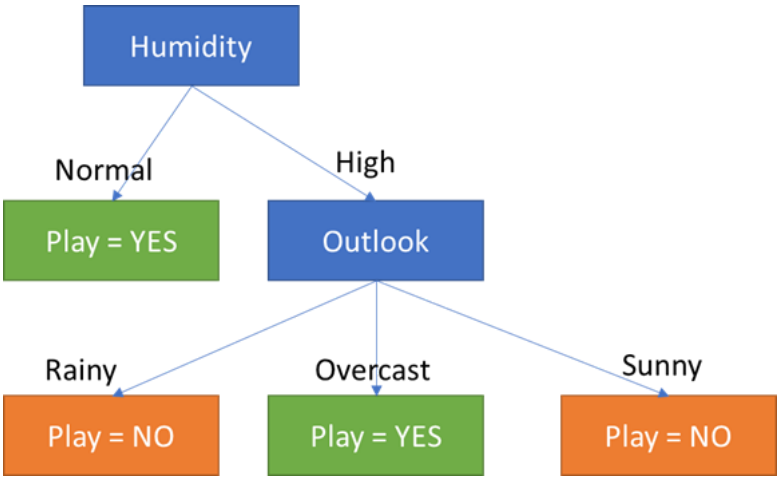
5. Mention the term that describes the entire set of states which are connected to each other in a grid.

(CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **(5 X 10 = 50M)**

6. 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

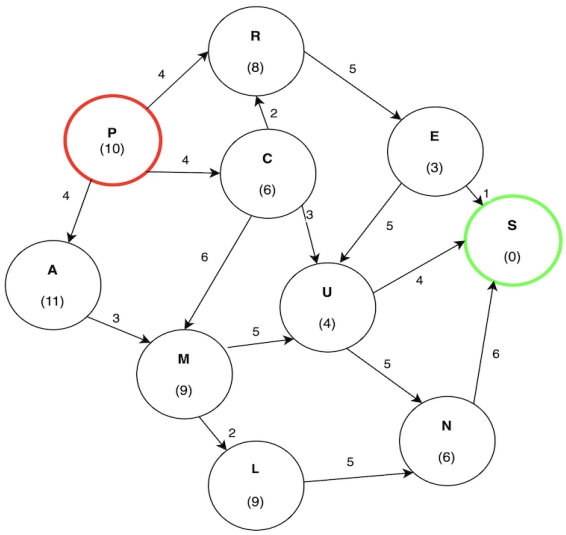
(CO4) [Comprehension]

7. Complete the table based on the type of information (Perfect / Imperfect information) and process (stochastic / deterministic process) of the games:

Game	Type of Information	Type of Process
Hunt the Wumpus		
Tic-Tac-Toe		
Checkers		
Rummy		
Ludo		

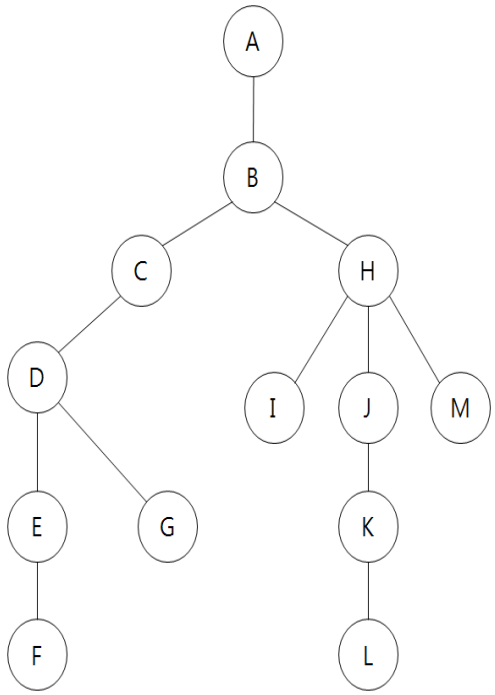
(CO1) [Comprehension]

8. Find the path from the initial state (P) to the goal state (S) using BOTH the Greedy Best First Search algorithm, as well as the A* Search algorithm. Numbers in parenthesis denote the heuristic distances.



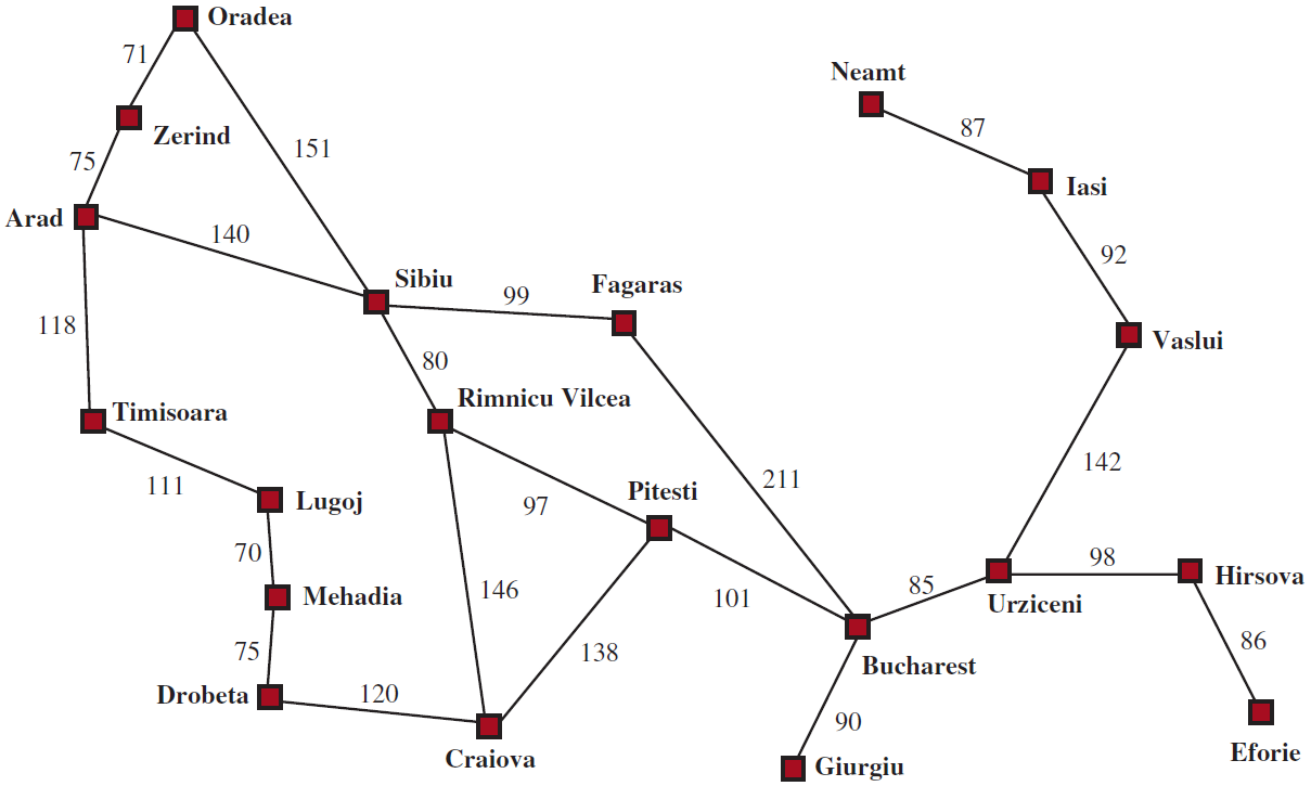
(CO2) [Comprehension]

9. Consider the graph shown here. Find a path to every other vertex using **BOTH** the **BFS** and **DFS** algorithms.



(CO2) [Comprehension]

10. Use Dijkstra's Single Source Shortest Path Algorithm to find the Shortest Path from Bucharest to every other city. Use the following map to do so.



(CO2) [Comprehension]

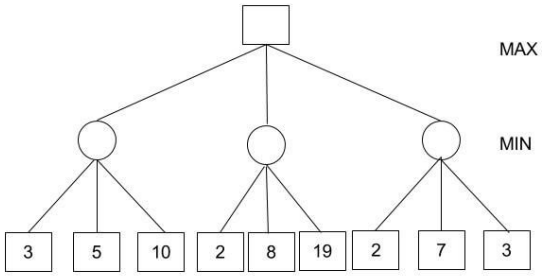
PART C

ANSWER ALL THE QUESTIONS **(2 X 20 = 40M)**

11. For the given image, perform:

- **Minimax** to find out the current expected utility of the player.
- **Alpha-beta Pruning** to prune out unimportant nodes.
- **Ideal ordering** to maximize the pruning.
- **Worst ordering** to ensure that no nodes are pruned.

Assume a left to right DFS type traversal of the game tree.



(CO4) [Application]

12. Tag the following text: "**the fans watch the race**" using the Viterbi algorithm. Assume that you have only **3 tags** - DT, VB, and NN. You can use the following tables:

Emission Probability:

Emission	the	fans	watch	race
DT	0.2	0	0	0
NN	0	0.1	0.3	0.1
VB	0	0.2	0.15	0.3

Transition Probability:

Transition	DT	NN	VB
$(START)	0.8	0.2	0
DT	0	0.9	0.1
NN	0	0.5	0.5
VB	0.5	0.5	0

Draw the trellis. For each **non-zero emission probability** node, calculate the Viterbi probabilities as well as the back probability. Then, you should tag the sentence.

(CO4) [Application]