University Of Central Punjab

Faculty of Information Technology

Course Title: Artificial Intelligence
Mid Term Examination(Sample)

Name: Registration Number

INSTRUCTIONS

1. Write your name and registration number on the Question Paper and Answer Sheet in the spaces provided
2. Write with blue/black permanent ink pen
3. Avoid corrections in objective section of the exam paper
4. Try to finish your exam within prescribed time

50

Marks Allowed

Marks Obtained

Instructor Signature

Section: Agents **[Total Marks: 10]**

Q 1: **[5+5=10 Marks]**

(A) In this question, you will answer questions about an intelligent agent that is playing tic-tac-toe against the computer. For each part below, write the choice which best describes the environment. Write a one or two sentence justification.

1. Fully Observable or Partially Observable

2. Deterministic or Stochastic

3. Episodic or Sequential

4. Static, Semi-dynamic, or Dynamic

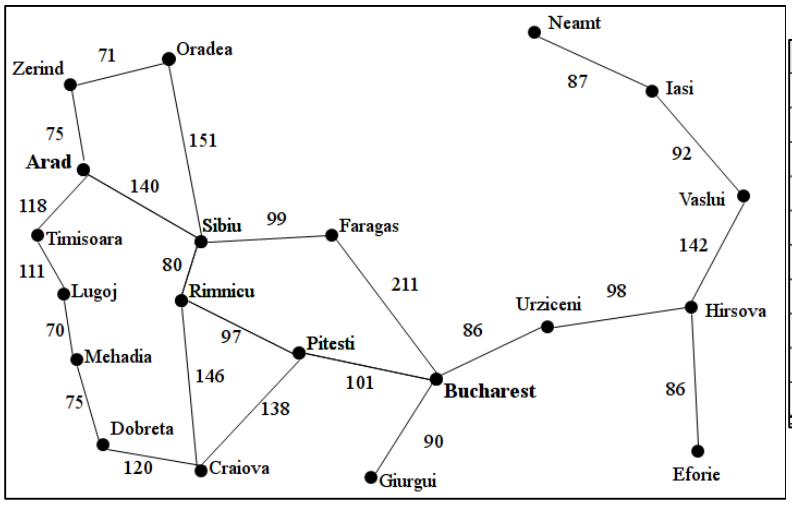
5. Discrete or Continuous

(B) What is utility-based agent? Explain it with examples and diagram.

Section: Search **[Total Marks: 28]**

Q 2: **[5+10+1+3=19 Marks]**

Consider the following map:



Town	SLD	Town	SLD
Arad	366	Mehadai	241
Bucharest	0	Neamt	234
Craiova	160	Oradea	380
Dobreta	242	Pitesti	98
Eforie	161	Rimnicu	193
Fagaras	178	Sibiu	253
Giurgiu	77	Timisoara	329
Hirsova	151	Urziceni	80
Iasi	226	Vaslui	199
Lugoj	244	Zerind	374

Using the A* algorithm work out a route from town **Arad** to town **Bucharest**. Use the following cost functions.

- g(n) = The cost of each move as the distance between each town (shown on map).
- h(n) = The Straight Line Distance (SLD) between any town and town **Bucharest**. These distances are given in the table at right.

a) Provide the search tree for this problem. You can write the same state more than once in your tree. But do not add a parent node as child.

b) Fill the following table showing the intermediate steps towards your solution. You should not re-visit a town that you have just come from.

Step	Frontier	Expand	Explored

c) State the route you would take and the cost of that route.

d) What is an admissible heuristic? Is SLD an admissible heuristic?

Q 3 **[4+2=6 Marks]**

a) Explain the difference between state-space search algorithms and local search algorithms. What is the main reason for using local search?

b) Write down two shortcoming of hill climbing algorithm.

Q 4 **[2+1=3 Marks]**

Suppose you are using a **Genetic Algorithm**. Two individuals in the current generation are given by 8-digit sequences: 1 4 6 2 5 7 2 3 and 8 5 3 4 6 7 6 1.

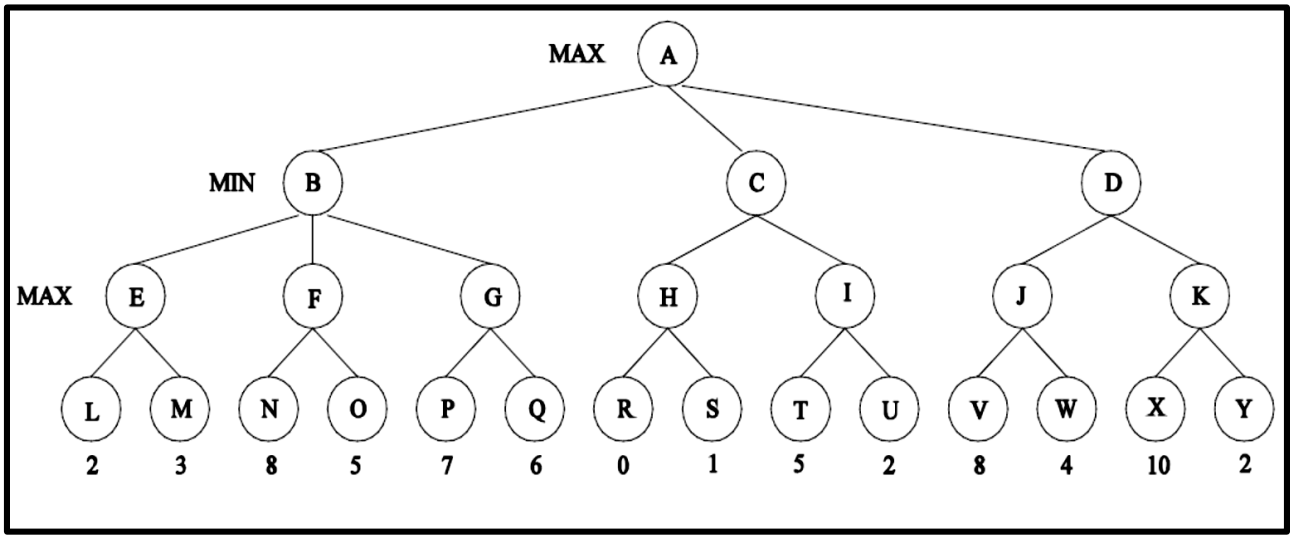
(A) What is the result of performing 2-point crossover with a cross-point starting from index 3? (Assume that index starts from 0)

(B) Now apply mutation on 8-digit sequence that you produced in (A) above, by changing all 6 to 3.

Section: Adversarial Search **[Total Marks: 12]**

Q 5 **[5+2+5=12 Marks]**

Consider the following game tree in which the root corresponds to a MAX node and the values of a static evaluation function, if applied, are given at the leaves.



(a) What are the **minimax values** computed at each node in this game tree? Write your answers to the *LEFT* of each node in the tree above.

(b) What move should MAX choose?

(c) Which nodes are ***not*** examined when **Alpha-Beta Pruning** is performed? Assume children are visited left to right.

Extra Sheet

End of Paper