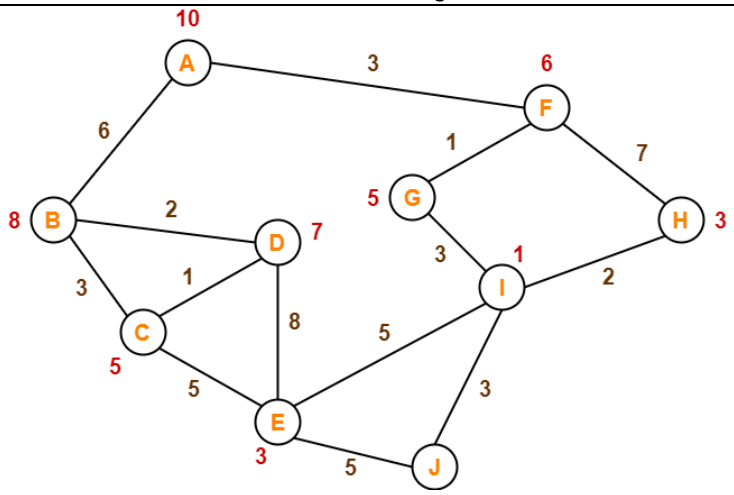
	B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19 (Autonomous Institute, Affiliated to VTU) **Department Name: Computer Science and Engineering**

INTERNALS-1		
Course Code : 20CS56PCAIP	**Course Title : Artificial Intelligence**	
Semester : V	**Maximum Marks: 40**	**Date: 21/10/2020**
Faculty Handling the Course:	**Dr. Jyothi S Nayak and Dr. Kavitha Sooda**	
Instructions:	**Instructions: *Internal choice is provided in Part C.***	

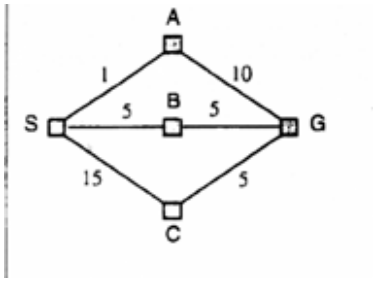
PART –A (5 marks)

No.	Question	Marks
1	Describe the interaction with vacuum cleaner agent with its environment.	5

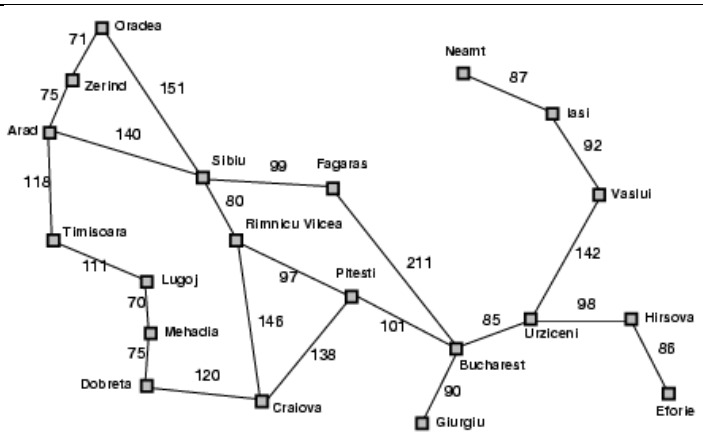
PART –B (15 marks)

No.	Question	Marks
2.a)	 Find the most cost-effective path to reach from start state 'A' to final state 'J' by applying A* Algorithm. The numbers written on edges represent the distance between the nodes. The numbers written on nodes represent the heuristic value. Note since 'J' is the destination node, the heuristic value =0.	5
2.b)	Analyze how consistent heuristics result in optimal solution in A* Search algorithm.	5
2.c)	Provide the standard formulation for 8-queens problem, (i). if queen placed initially at random, (ii). If queen placed the top left most position initially Discuss the state space reduction in case (i) and (ii)	5

PART –C (20 marks)

<table>
<tr><th>No.</th><th>Question</th><th>Marks</th></tr>
<tr><td>3.a)</td><td>Apply the Greedy Best First search algorithm for 8 Puzzle problem with Start state and Goal state shown below. Also draw the states resulted from the Start state to the Goal state.
<table>
<tr><td>3</td><td>1</td><td>2</td></tr>
<tr><td></td><td>4</td><td>6</td></tr>
<tr><td>7</td><td>5</td><td>8</td></tr>
</table>
Start state
<table>
<tr><td>1</td><td>2</td><td>3</td></tr>
<tr><td>4</td><td>5</td><td>6</td></tr>
<tr><td>7</td><td>8</td><td></td></tr>
</table>
Goal state</td><td>10</td></tr>
<tr><td colspan="3">OR</td></tr>
<tr><td>3.b)</td><td> 

Discuss the Frontier queue style, Whether it is complete and optimal? What is the time and space complexity? How is it better than Breadth first search?</td><td>10</td></tr>
</table>

4.a)	 Straight–line distance to Bucharest Arad 366 Bucharest 0 Craiova 160 Dobreta 242 Eforie 161 Fagaras 176 Giurgiu 77 Hirsova 151 Iasi 226 Lugoj 244 Mehadia 241 Neamt 234 Oradea 380 Pitesti Rimnicu Vilcea 193 Sibiu 253 Timisoara 329 Urziceni 80 Vaslui 199 Zerind 374 Apply recursive Best first search and discuss the properties with respect to completeness and optimality? Consider Pitesti's SLD as 150.	10
OR		
4.b)	You are given two jugs, a 4-litre one and a 3-litre one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 liters of water into 4-litre jug. Give the initial state, Goal state, operators and path cost function for the problem. Also write the state space diagram.	10