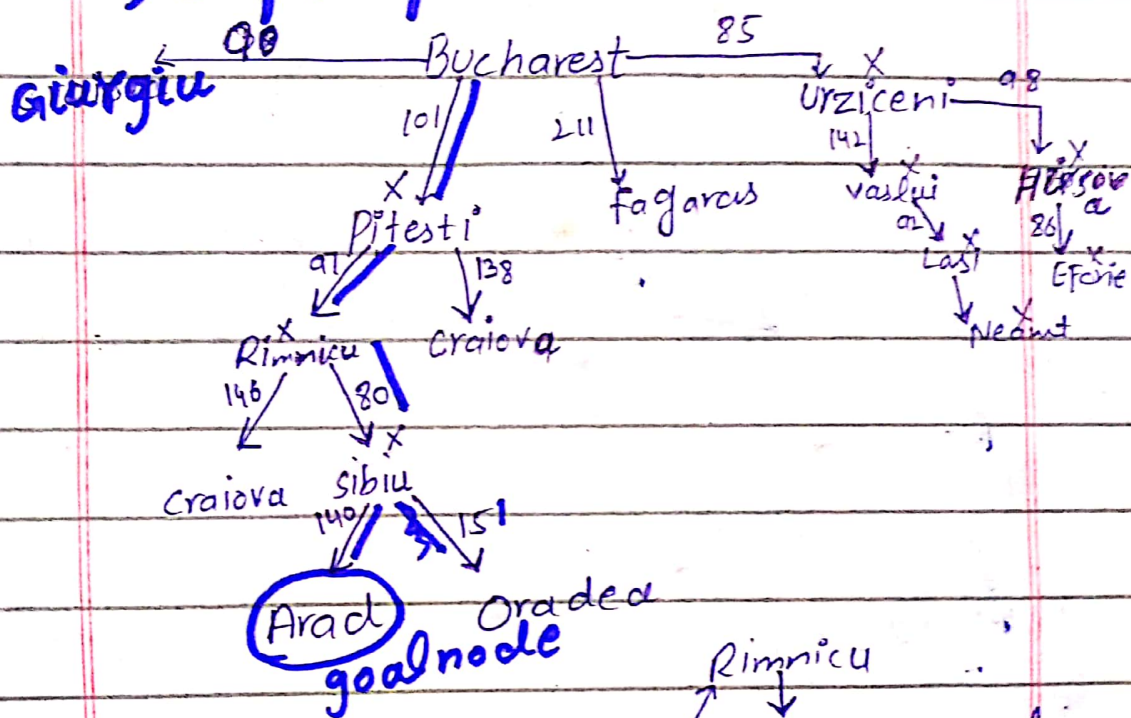


Agesha Aslam (2020CS625) F S

Question #01:-

Apply uninformed search techniques to reach the goal from Arad to Bucharest to Arad:-

a) Depth first Search:



path = Bucharest \rightarrow Pitesti \rightarrow Sibiu \rightarrow Arad

$$\text{cost} = 101 + 97 + 80 + 140 = 418$$

(b) ¹²Uniform Cost Search:-

verluis
227

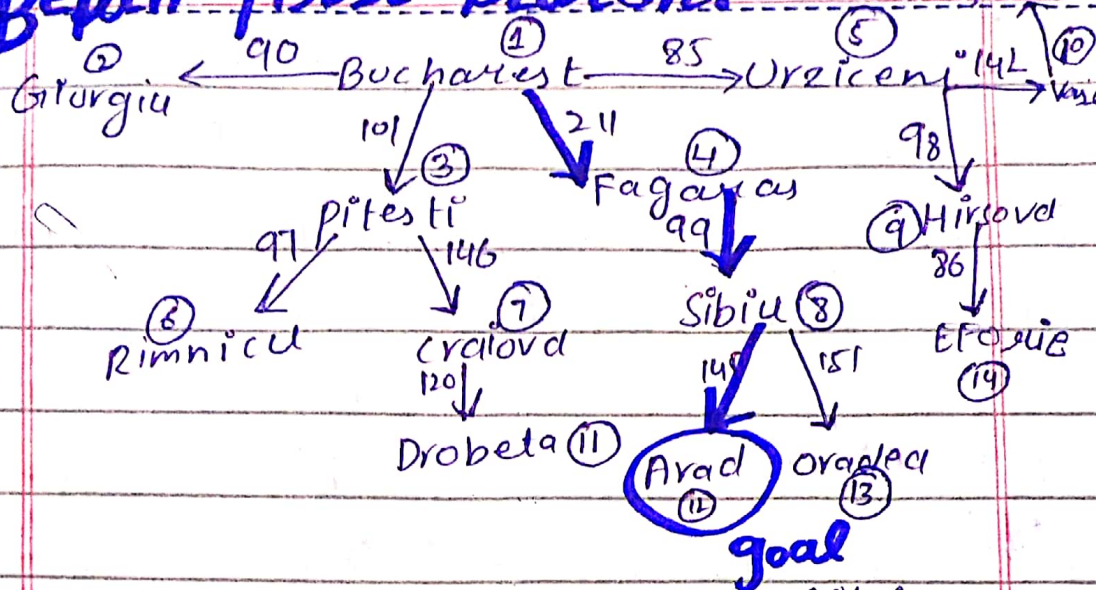
E Fokis	Sibiu	Iasi	Cluj-Napoca	Arad	Oradea
269	278	319	344	418	429

Diagram illustrating a network of cities and distances (in kilometers) between them, starting from Bucharest (1) as the source:

- Bucharest (1) is connected to Giurgiu (3) (90 km), Urzeleni (6) (85 km), Pitesti (4) (101 km), and Fagaras (7) (211 km).
- Urzeleni (6) is connected to Hirsova (5) (98 km) and Vaslui (8) (142 km).
- Pitesti (4) is connected to Rimnicu (6) (97 km) and Craiova (12) (138 km).
- Fagaras (7) is connected to Sibiu (10) (99 km).
- Hirsova (5) is connected to Eforie (9) (86 km).
- Vaslui (8) is connected to Iasi (11) (92 km).
- Rimnicu (6) is connected to Sibiu (10) (80 km) and Craiova (12) (146 km).
- Sibiu (10) is connected to Iasi (11) (151 km) and Urzeleni (6) (140 km).
- Craiova (12) is connected to Drobeta (13) (120 km).
- Iasi (11) is connected to Neamt (13) (81 km).
- Drobeta (13) is connected to Urzeleni (6) (140 km).
- Goal is reached from Sibiu (10) (40 km) and Drobeta (13) (429 km).

Cost = 418

(c) Depth first Search: M T W T F S S 13



path \Rightarrow Bucharest \rightarrow Fagaras \rightarrow Sibiu \rightarrow Arad.

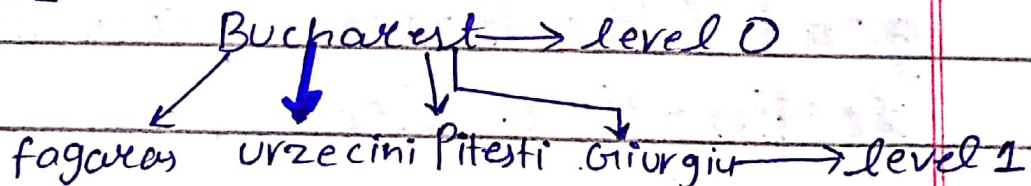
(d) Iterative deepening depth limited search:

threshold value = 3

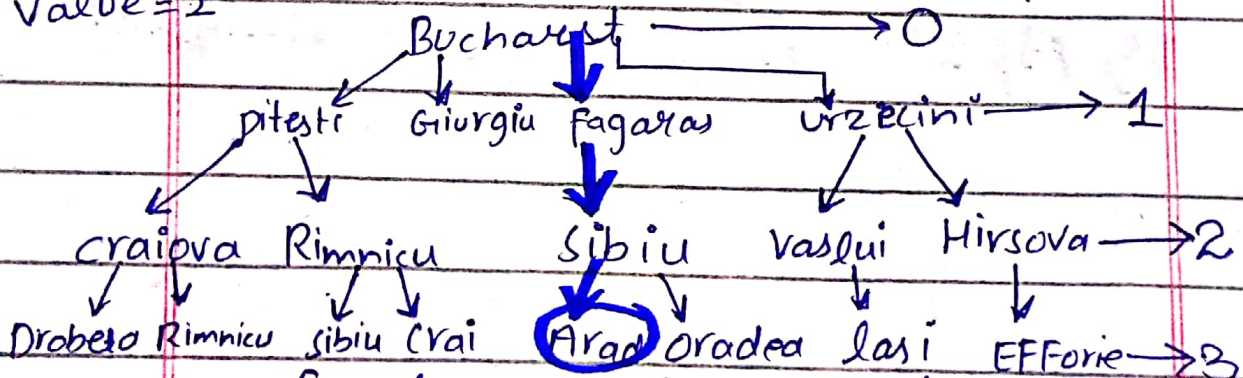
value = 0

Bucharest \rightarrow level 0

value = 1



value = 2



we found our goal node at limit 3

Path \Rightarrow Bucharest \rightarrow fagaras \rightarrow Sibiu \rightarrow Arad

(e) Compare their performance: M T W T F S

	Completeness	Optimality	Time Complexity	Space complexity
DFS	No	NO	$O(b^m)$	$O(bm)$
BFS	Yes	No (in general)	$O(b^d)$ ↓ branch factor	$O(b^d)$ ↓ depth
UCS	Yes	Yes	$O(b^{1+(C^*/E)})$	$O(b^{1+(C^*/E)})$
IDDS	No/Yes ^{1*} ↓ if b is finite	No/Yes ^{2*} ↓ if step cost is identical	$O(b^d)$	$O(b^d)$

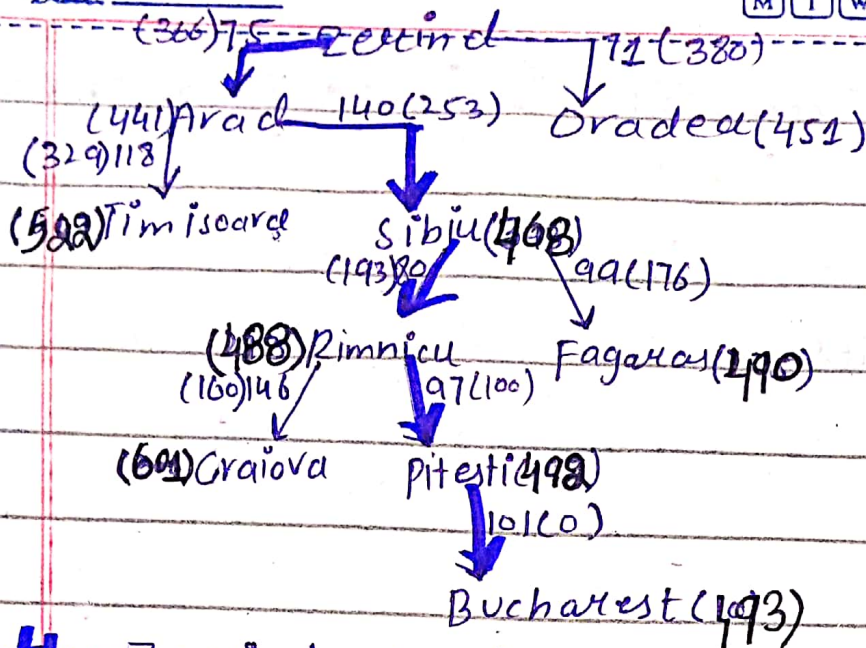
Question #02:-

Apply following informed search techniques to reach goal (Bucharest) from starting destination (Zerind).

a) Apply A* search technique:

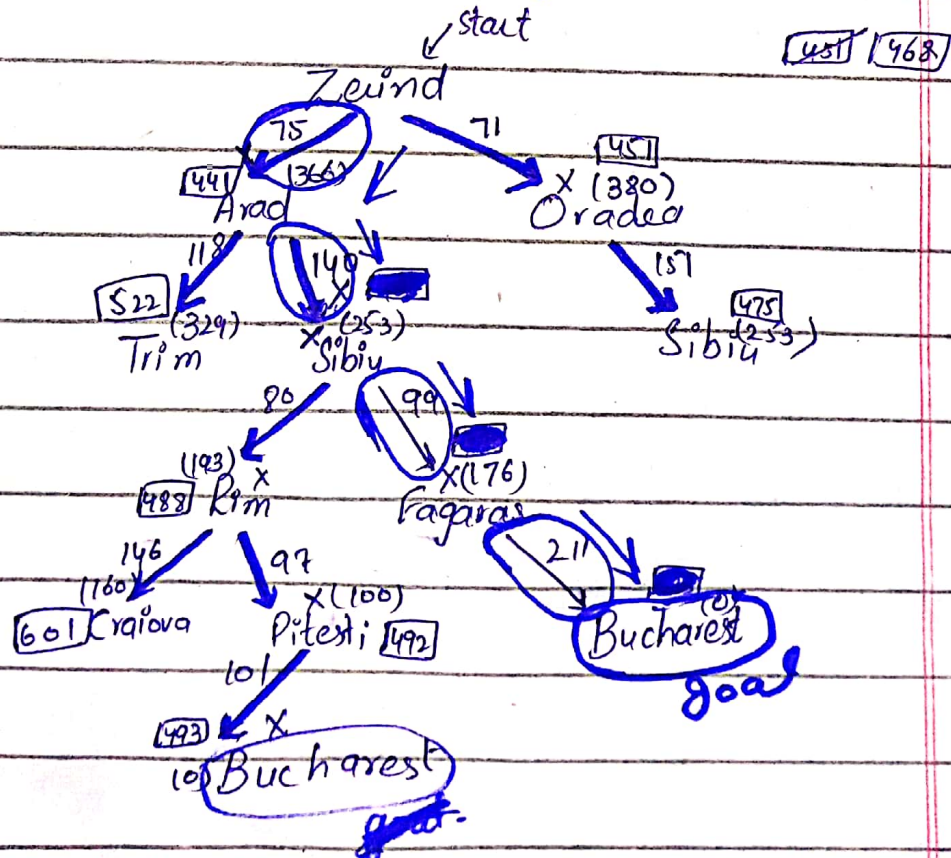
Date: _____

M T W T F S



path = Zerind → Arad → Sibiu → Rimnicu
→ Pitesti → Bucharest
Cost = 493

(b) Recursive Best First Search:



Path = Zerind → Arad → Sibiu → **Fagaras** → Bucharest

Date: _____

M T W T F S

(C) Compare their performance:

	completeness	Optimality	Time complexity	space complexity
A*	Yes	Yes	$O(b^d)$ worst case	$O(b^d)$
RBFS	Yes	Yes	$O(b^d)$	$O(bd)$