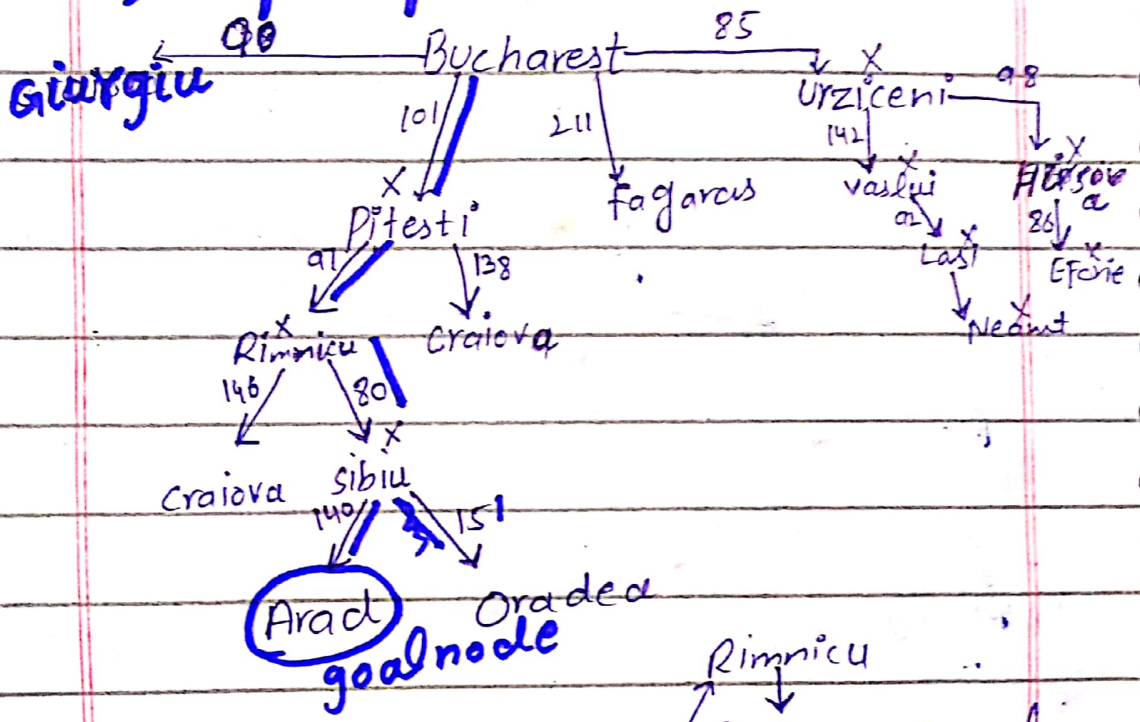
Ayesha Aslam (2020CS625)

Question#01:-

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

a) Depth first Search:



path= Bucharest → pitesti → Sibiu → Arad

cost= 101 + 97 + 80 + 140 = 418

visited = Bucharest, urzecini, Giurgiu, pitesti, hirsova
, Rimnicu, fagaras, vasluii, EForie, sibiu, lasi
, craiova, Neamt, Arad

(b) Uniform Cost Search:-

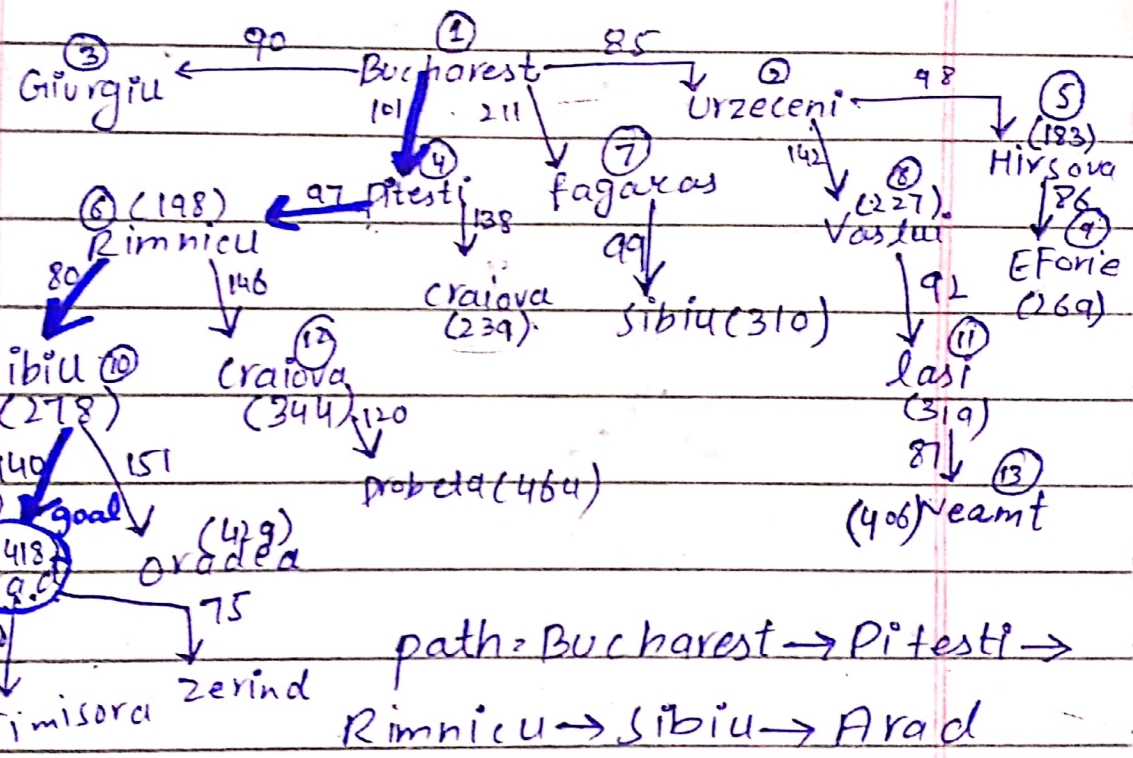
Queue:	Bucharest	urzecini	Giurgiu	pitesti	Hirsova	Fagaras
		85	98	101	183	211

Vasluii
227

hirsova	Rimnicu	fagaras	vasluii	EForie	sibiu	craiova
183	198	211	227	269	278	344

EForie	sibiu	lasi	craiova	Arad	oradea
269	278	319	344	418	429

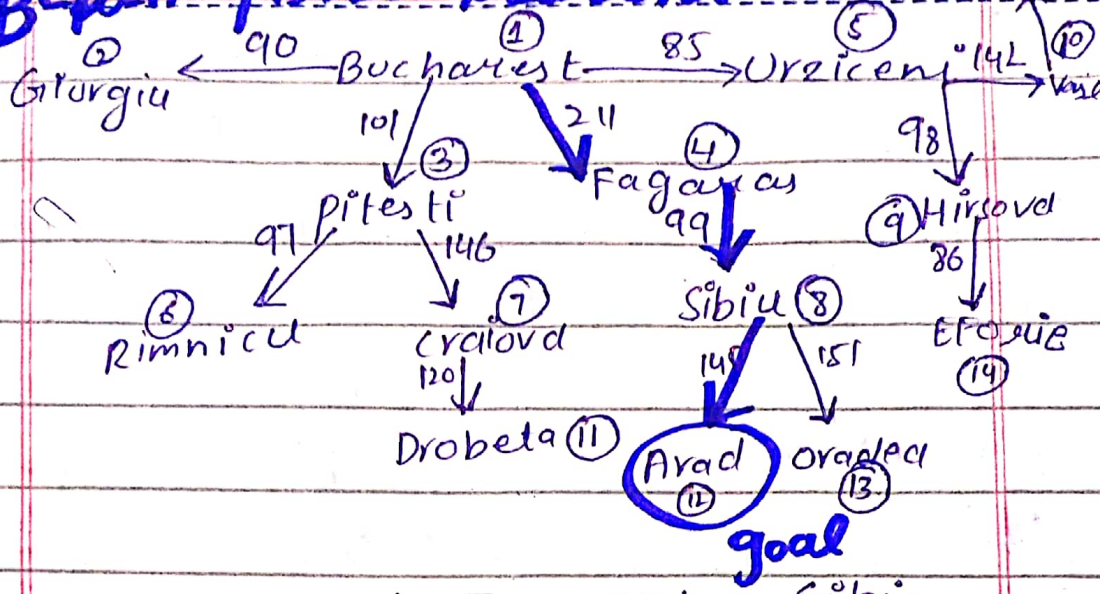
craiova	Neamt	Arad	Oradea	Drobeta
344	406	418	429	464



path = Bucharest → Pitesti → Rimnicu → Sibiu → Arad

Cost = 418

(c) Depth first Search:



path ⇒ Bucharest → Fagaras → Sibiu → Arad.

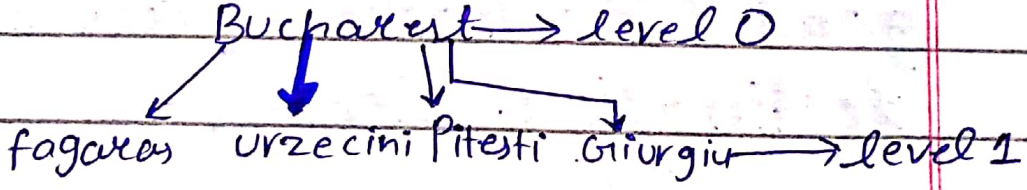
(d) Iterative deepening depth limited search:

threshold value = 3

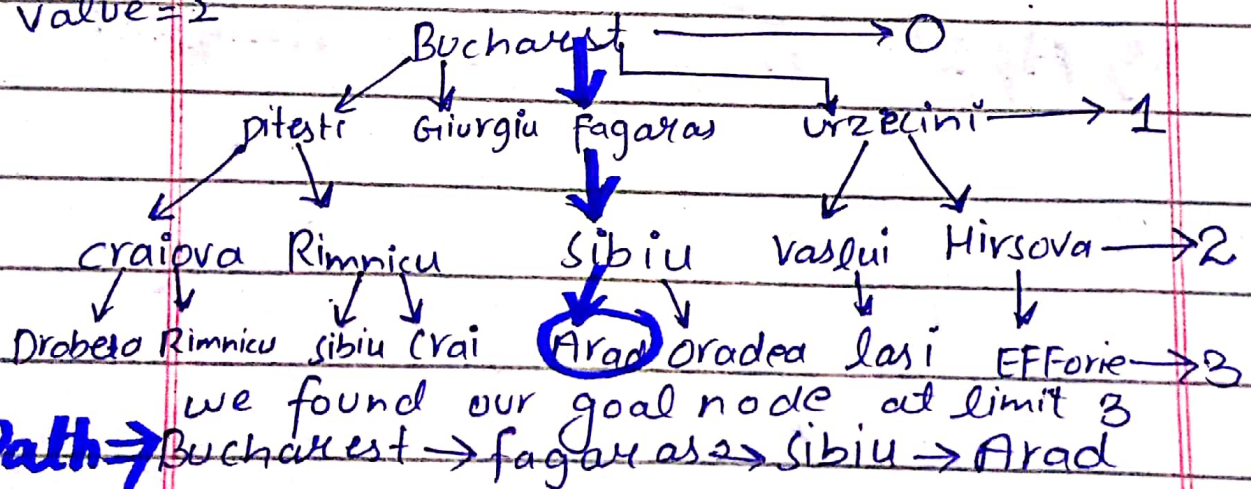
Value = 0

Bucharest → level 0

Value = 1



Value = 2



we found our goal node at limit 3

Path → Bucharest → fagaras → Sibiu → Arad

(e) Compare their performance:-

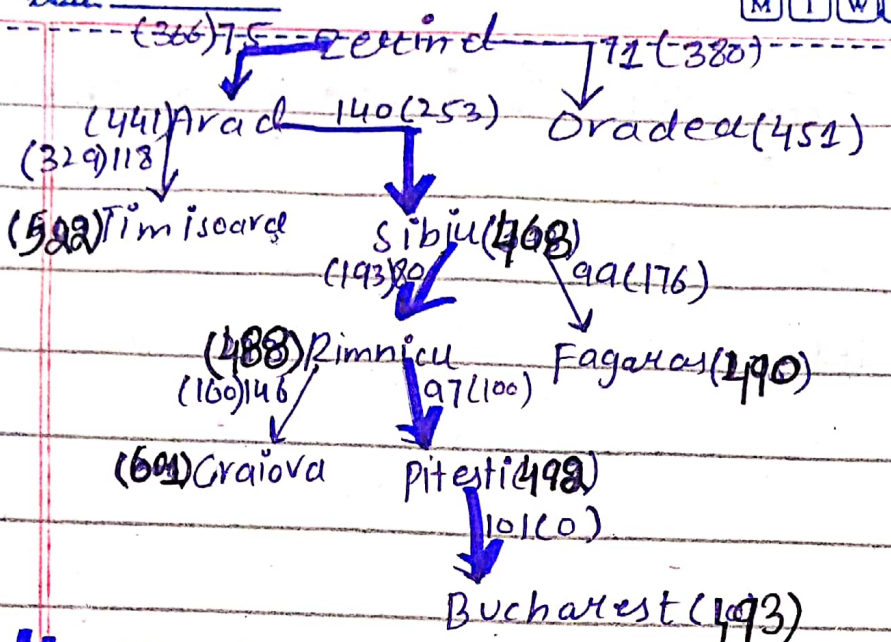
	Completeness	Optimality	Time complexity	Space complexity
DFS	NO	NO	$O(b^m)$	$O(bm)$
BFS	Yes	NO (in general)	$O(b^d)$ ↓ branch factor	$O(b^d)$ ↓ depth
UCS	Yes	Yes	$O(b^{1+(C^*/E)})$	$O(b^{1+(C^*/E)})$
IDDS	NO/Yes[1*] ↓ if b is finite	NO/Yes[2*] ↓ if step cost is identical	$O(b^d)$	$O(bd)$

Question#02:-

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

a) Apply A* search technique:

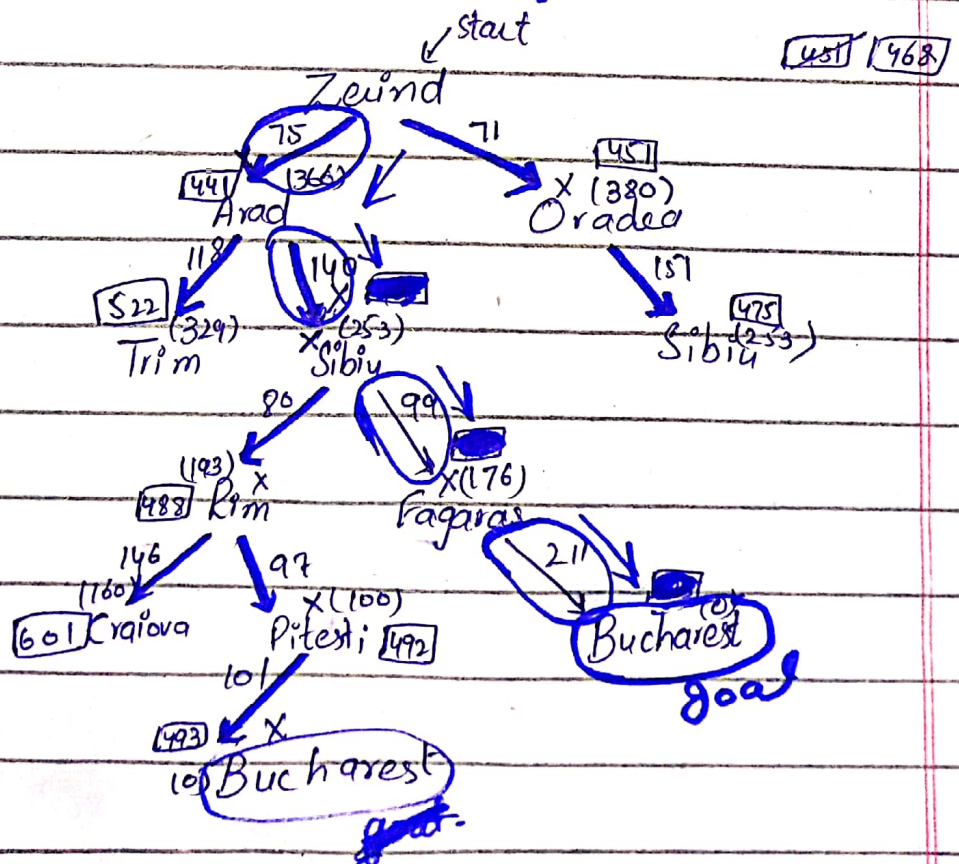
Date: _____ M T W T F S



Path = Zerind → Arad → Sibiu → Rimnicu → pitesti → Bucharest

Cost = 493

(b) Recursive Best First Search:



Path = Zerind → Arad → Sibiu → Fagaras → Bucharest

Scanned with CamScanner

Date: _____ M T W T F S

(C) Compare their perfomance:

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