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SEMESTER: BSCS - 7th

COURSE: ARTIFICIAL INTELLIGENCE (AI)

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ASSIGNMENT: 01

Q No. 1. SOLUTION: Using BFS Algorithm:

STEP	FRONTIER	EXPAND	EXPLORED
1	{A}	A	ϕ
2	{(A-D), (A-B), (A-C)}	D	{A}
3	{(A-B), (A-C), (A-D-F), (A-D-C)}	B	{A, D}
4	{(A-C), (A-D-F), (A-D-C), (A-B-E), (A-B-C)}	C	{A, D, B}
5	{(A-D-F), (A-D-C), (A-B-E), (A-B-C), (A-C-E)}	F	{A, D, B, C}
6	{(A-B-E), (A-C-E), ~~(A-D-F-G)~~} [*]	E (Goal state)	{A, D, B, C, F}
7	{(A-C-E)} [+]	E	{A, D, B, C, F, E}
8	ϕ		

Visited path: $A \rightarrow D \rightarrow B \rightarrow C \rightarrow F \rightarrow E$

Founded path: $A \rightarrow B \rightarrow E$

* (+C, +A) not added to Frontier, because they were present in Explored set already.

Q2. SOLUTION: Using Iterative Deepening Search

(i) Depth Bound = 0

Step	Frontier	Expand	Explored
1	{A}	A	ϕ
2	{ }	–	{A}

Since, no goal node found, therefore increasing the depth Bound from 0 to 1, ∴ **Depth Bound = 1**

1	{A}	A	ϕ
2	{(A-B), (A-C), (A-D)}	B	{A}
3	{(A-C), (A-D)}	C	{A, B}
4	{(A-D)}	D	{A, B, C}
5	{ }	–	{A, B, C, D}

Since no goal state found, therefore increasing the Depth bound from 1 to 2 i.e., **Depth Bound = 2**

Step	Frontier	Expand	Explored
1	{A}	A	ϕ
2	{(A-B), (A-C), (A-D)}	B	{A}
3	{(A-B-E), (A-C), (A-D)}	E	{A, B}
4	~~{(A-C), (A-D),}~~ {(A-B-E)}	–	{A, B, E}

Goal found

Visited path: $A \to B \to E$

Founded path: $A \to B \to E$

Hence, the goal node is founded at Depth limit $L = 2$

Q.3 SOLUTION: Using Uniform Cost Search

Step	Frontier	Expand	Explored
1	{(A, 0)}	A	∅
2	{(A-D, 5), (A-B, 10), (A-C, 20)}	D	{A}
3	{(A-B, 10), (A-D-C, 10), (A-D-E, 13)}	B	{A, D}
4	{(A-D-C, 10), (A-D-E, 13), (A-D-E, 15)}	C	{A, D, B}
5	{(A-D-C-E, 11), (A-D-E, 13)}	E	{A, D, B, C}
6	{(A-D-C-E, 11)}	—	{A, D, B, C, E}

Goal state found

Visited path: $A \rightarrow D \rightarrow B \rightarrow C \rightarrow E$

Found path: $A \rightarrow D \rightarrow C \rightarrow E$ (This path has the lowest cumulative cost to reach the Goal)