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Class : **TY - BTech**   Division : **CSE - D**   Roll No.: **PD-47**   Academic Year : 2019 -2020

Subject : **AI**   Assignment / ~~Test No.~~ : **Theory - 1**   Date : **28/03/2020**

Q. No.	1	2	3	4	5	6	7	8	9	10	Total
Marks/Grade											

Name & sign of the faculty Member

(Please start writing assignment/ test from here)

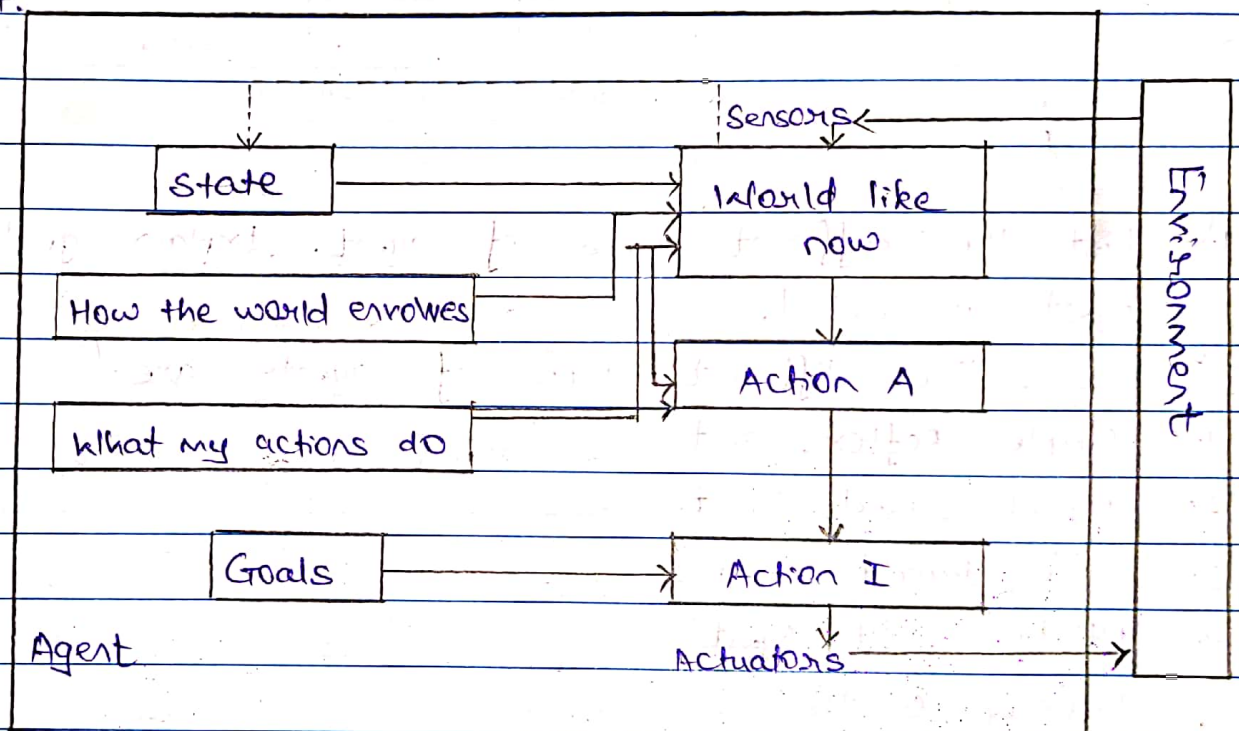**1)** List the different types of agent. Explain goal - based agent in detail.

→ The different types of agents are -

1. Simple Reflex Agent
2. Model Based Agent
3. Goal Based Agent
4. Utility Based Agent
5. Learning Agents

• **Goal Based Agents :**

A goal based agent has flexibility to adjust its actions based on successfully reaching a goal.

It operates based on a goal in front of it and makes decisions based on how best to reach that particular goal.

- A goal based agent is capable of thinking beyond the present moment to decide the best actions to take it in order to achieve goal.
- A goal-based agent operates as a search and planning function, it targets the goal ahead and finds the right action in order to reach it.

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- These kind of agents take decision based on how far they are currently from their goal.
- Their every action is intended to reduce its distance from the goal.
- This allows the agent a way to choose among multiple possibilities, selecting the one which reaches the goal state.

2) What are informed search methods? Explain any one informed search method in detail.

→ - The informed search algorithm is more useful for large space search.
- Informed search algorithm uses an idea of heuristic, so it is also called Heuristic search.
- The informed search discusses 2 main algorithms:

1. Best First Search Algorithm (Greedy Search)

2. A^u search Algorithm.

Greedy search :
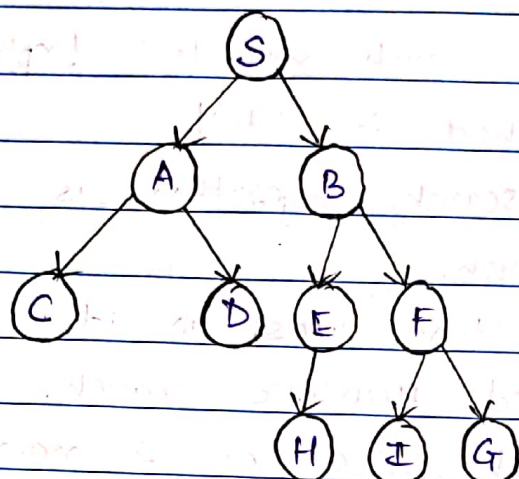- Greedy Best First search Algorithm always selects the path which appear best at that moment.
- It is the combination of depth-first search and breadth-first search.
- In the best first search algorithm, we expand the node which is closest to the goal node and the closest cost is estimated by heuristic function $F(n) = g(n)$

Advantage - Efficient than BFS and DFS
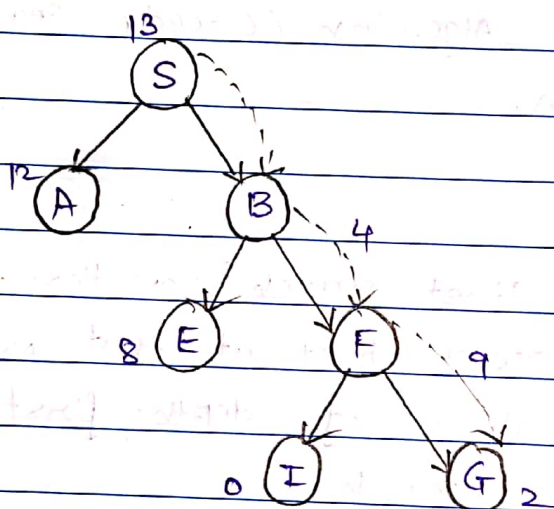

Disadvantage - Not an optimal algorithm.

Ex —

Node	H(n)
A	12
B	4
C	7
D	3
E	8
F	2
H	4
I	9
S	13
G	0

* Time complexity — $O(b^m)$

* Space Complexity — $O(b^m)$

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3.) Explain A* Algorithm with example. Write any two heuristic functions for solving 8-puzzle problem.

- A* Algorithm is one of the best and popular techniques used for path finding and graph traversals.

- A* Algorithm extends the path that minimize the following function -

$$f(n) = g(n) + h(n)$$

- The implementation of A* Algorithm involves maintaining two lists - OPEN and CLOSED.

- OPEN contains those nodes that have been evaluated by the heuristic function but have not been expanded into successors yet.

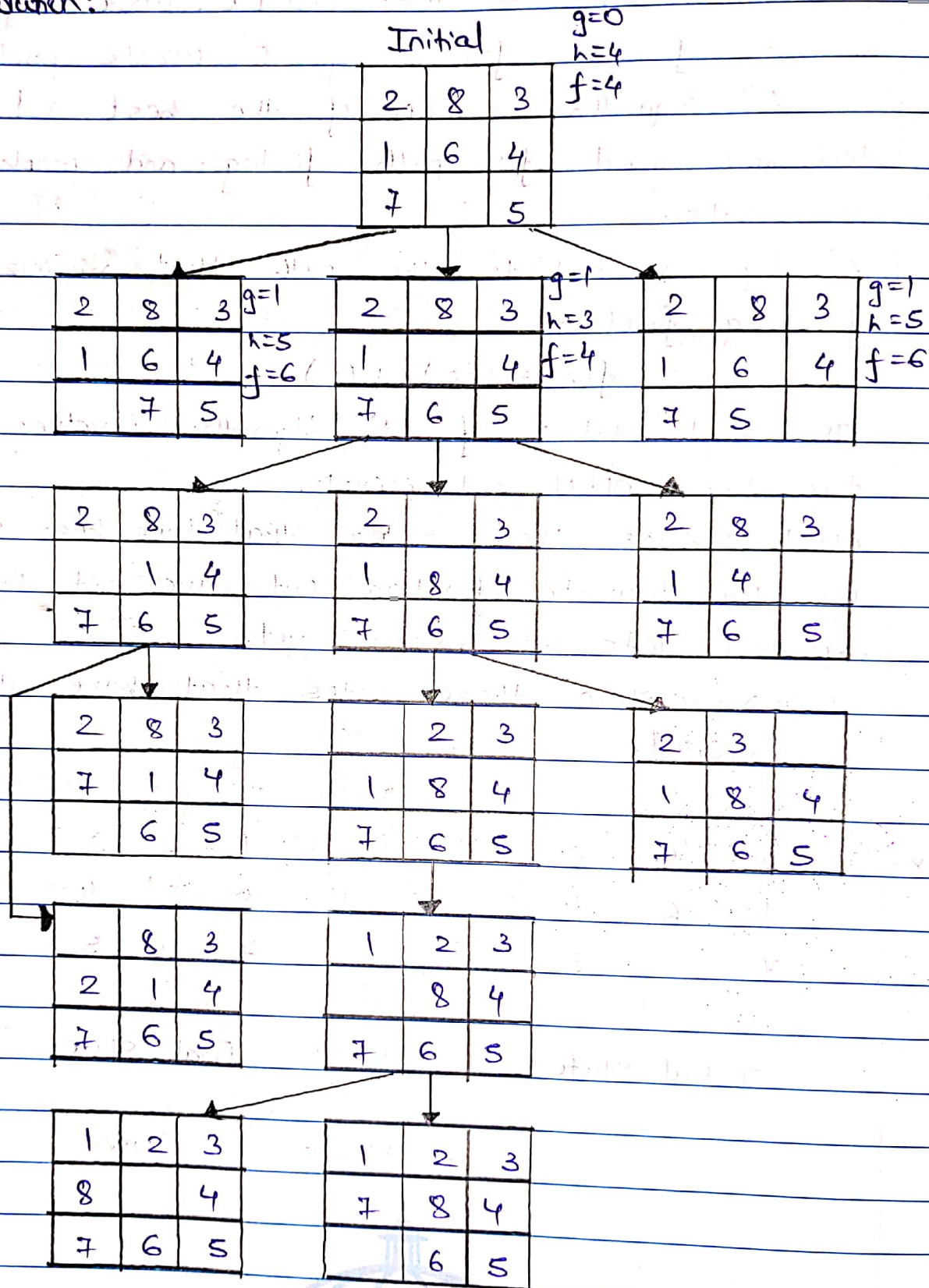- CLOSED contain those nodes that have already been visited.

Ex -

2	8	3
1	6	4
7		5

Initial State

1	2	3
8		4
7	6	5

Final State

Solution:

Initial   g=0, h=4, f=4

2	8	3
1	6	4
7		5

g=1, h=5, f=6

2	8	3
1	6	4
	7	5

g=1, h=3, f=4

2	8	3
1		4
7	6	5

g=1, h=5, f=6

2	8	3
1	6	4
7		5

2	8	3
	1	4
7	6	5

2		3
1	8	4
7	6	5

2	8	3
1		4
7	6	5

2	8	3
7	1	4
	6	5

2		3
1	8	4
7	6	5

2	3	
1	8	4
7	6	5

	8	3
2	1	4
7	6	5

1	2	3
	8	4
7	6	5

1	2	3
8		4
7	6	5

1	2	3
7	8	4
	6	5

- The heuristic function is used to generate heuristic value.
- Different heuristic functions can be designed depending on searching problem.