

## Unit Test 1

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TE B - 20

### Question 1

Define AI? & Enlist & state various applications of AI

- • AI is the study of how to make computers do things which at the moment people can do better.
- AI is the intelligence of machines & a branch of computer science that aims to create it.

Various application areas:

- ① Game playing  
Programming to play against human players.  
Eg. Chess
- ② Expert System  
Programming to make decision in real-life situations.  
Eg. Flight training, Air Traffic, clinical systems.
- ③ Natural Languages  
Programming to understand natural human language.  
Eg. Siri, Alexa, Voice to text
- ④ Neural Network  
That simulates human intelligence by attempting to reproduce the types of physical connections that occur in animal brains.  
Eg. Recognition of text, voice, images, face

## ⑤ Robotics

Deals with development of robots as well their automated system for their control, sensory feedback & info processing.

## Question 2

### Uninformed Search

- ① Called as blind, exhaustive or brute-force search.
- ② Uses no info about the problem to reach goal state.
- ③ It not efficient searching technique.
- ④ Completeness of problem may not always be achieved.
- ⑤ Eg. DFS, BFS, IDFS

### Informed Search

- ① Called as heuristic or intelligent search
- ② Uses info about the problem to reach the goal state.
- ③ Efficient searching technique, usually guesses the distance to a goal state.
- ④ Completeness of the problem would be achieved.
- ⑤ Eg.  $A^*$ ,  $AO^*$ , & Best first search

## Question 3

- In depth bounded search, an unbounded DFS tree with depth can be limited to a certain depth by imposing a limit  $L$  of the DFS tree. This solves the infinite path problem.
- Depth bounded dfs is not complete, solution may not be found in all cases.

- It not optimal.
- Time complexity is  $O(b^l)$   $l = \text{depth limit}$
- Space complexity is  $O(b \cdot l)$

#### Question 4

- Informed Search uses the info about the domain or knowledge about it of the problem to move towards the goal state.  
It was developed to overcome the drawbacks of uniformed search.

- A\* Search

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

$\downarrow$                        $\downarrow$                        $\downarrow$   
 Total cost          actual cost          estimated cost  
                          dist from start          dist from current  
                          & current                      & final

Eg. using 8-puzzle problem

Initial State

-	A	C
H	B	D
G	F	E

Goal State

A	B	C
H	-	D
G	F	E

-	A	C
H	B	D
G	F	E

$g=0$   $h=3$   $f=3$

Down

A	A	C
-	B	D
G	F	E

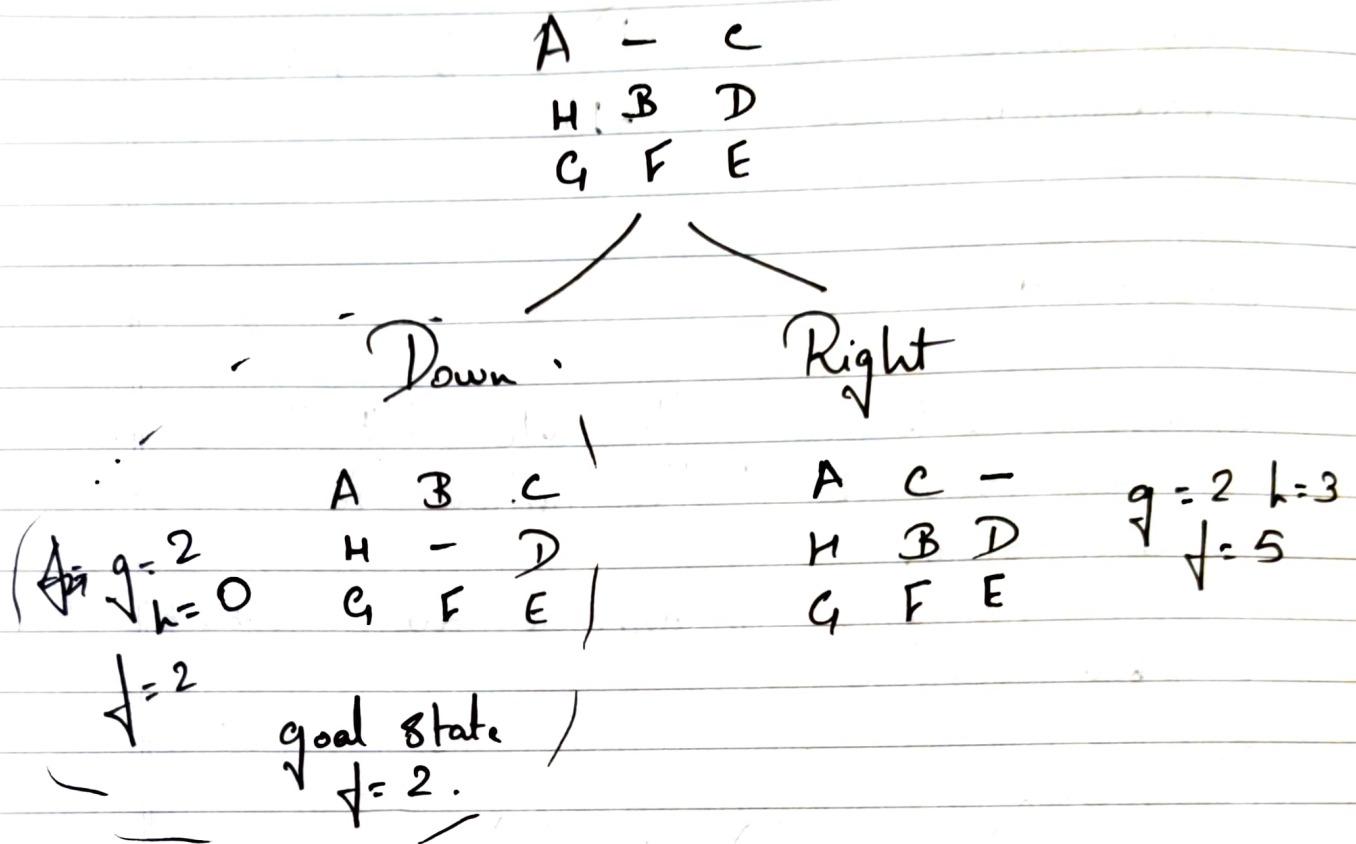
$g=1$   $h=4$   
 $f=5$

Right

A	-	C
H	B	D
G	F	E

$g=1$   $h=2$   
 $f=3$





## Question 6

Tabu Search is a meta-heuristic that guides a local heuristic search procedure to explore solution space beyond local optimality.

### Advantages:

- ① It allows to exit from sub-optimal regions by making non-improving solution to be accepted.
- ② Use of tabu list improves efficiency.

### Disadvantages:

- ① Can't find global optimum in some cases.

### \* Question 5

Hill climbing search is a heuristic search used for ~~mathe~~ mathematical optimization problems. It is a variant of generate & test algorithm and uses greedy approach.

The various problems that can occur in hill-climbing are:

- ① Local maximum : Neighbouring states have values worse than current state.
- ② ~~No~~ Plateau : All neighbours have same values.
- ③ Ridge :