Name: _____   Reg.No. _____

Allowed Time: 1.5 hours   Total Marks: 80

Note: Understanding the questions is a part of the exam. Correct answer without step work will not be graded.

[10+10]

Question-1: HILL Climbing

You are a robot that is playing 8-Puzzle. The only actions are to move the blank cell **UP(U)**, **DOWN(D)**, **RIGHT (R)**, or **LEFT (L)**. The size of the game board is **3x3**.

7	3	2
6	4	8
	5	1

[Start State]

| 1	2	3
4	5	6
7	8	

[Goal State]

a. Which **Heuristic value** will you use to evaluate each state?
b. Write the action that **Hill Climbing** would choose, and draw the resulting state as a new 8-puzzel configuration. Apply the algorithm for next two levels of the state space.

[7+7+6]

Question-2: Uninformed Searching

Consider the following search space, where **S is the initial state** and **G is the goal state**. Each edge represents the cost that takes you from one state to the next state. **Heuristic value** for each state is also given in the table. Give the sequence of the states the following strategies will visit and also mention final solution for each.
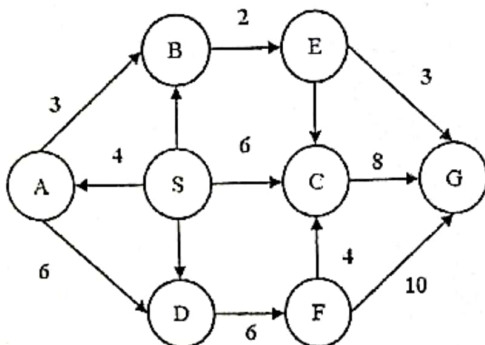

State	h(n)
S	40
A	30
B	35
C	20
D	25
E	10
F	5
G	0

a. Give the sequence of the states that **Depth First Search visits**
b. Give the sequence of the states that **Uniform Cost Search visits**
c. What problems in BFS and DFS strategies does **iterative deepening search** solves and how?

The start node is A, and the goal node is G. The number on the edges indicate the associated path cost i.e. g(n). The number inside the node is the heuristic value i.e. h(n).
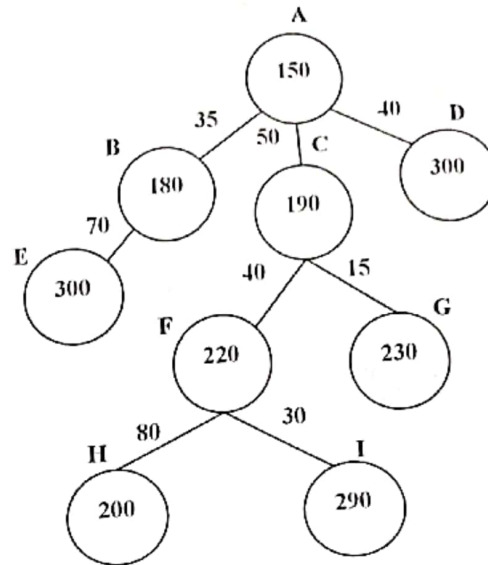
a. Perform the IDA* algorithm on the above graph. Show the iterations with pruned nodes and find out the final value of **threshold(f-bound)**.
b. **Is heuristic admissible?** Give reasons to support your choice
c. **Is heuristic consistent?** Give reasons to support your choice

Question-4: (Attempt this question only on Answer sheet)   [10+10]

a. Fill in the values of the four evaluation criteria for each search strategy shown. Assume a tree search where b is the finite branching factor; d is the depth to the shallowest goal node; m is the maximum depth of the search tree; C* is the cost of the optimal solution; step costs are greater than some positive ε.

Criterion	Complete?	Time Complexity	Space Complexity	Optimal?
Breadth First Search				
Depth First Search				
Uniform Cost Search				
Iterative Deepening DFS				

b. In which scenarios each of the above search strategies mentioned in **part (a)** will outperform the other?

[Good Luck]