City University

Faculty of Science & Engineering

Department of Computer Science and Engineering

Program: B.Sc. in CSE

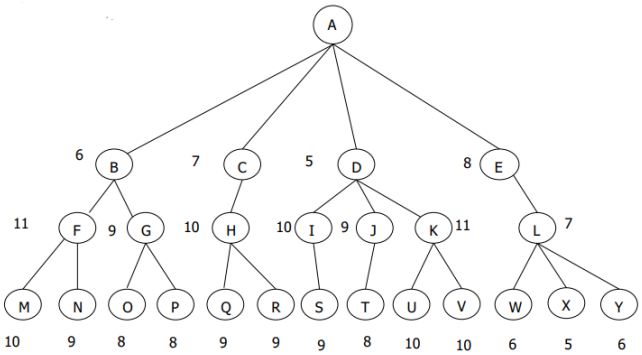
Midterm Examination Semester: Spring 2018

Course Code: CSE 417 Course Title: Artificial Intelligence

Total Marks: 30 Duration: 1 hour 30 Minutes

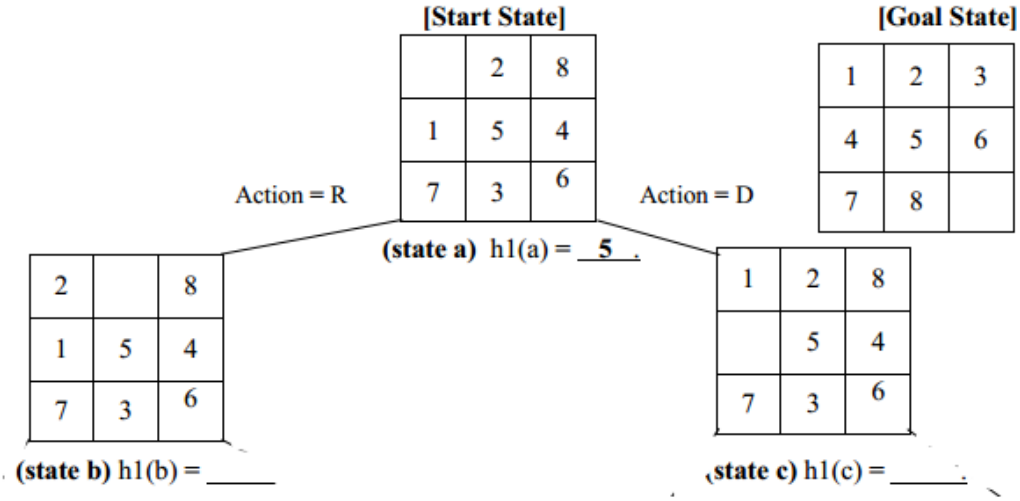
Answer any 3(three) questions ***3 X 10 =30***

1(a) Consider the following tree as part of a search space. The numbers = estimated distance to the goal. Draw the search tree and write the order of expansion of the nodes when applying ***4***
i. Hill climbing search.
ii. Best first Search.



(b) Artificial intelligence (AI) has been one of the most controversial domains of inquiry in computer science since it was first proposed in the 1950s. Since then computer science has been contributing too many roles in AI. Consequently, Computer Science becomes one of the strongest foundations of AI. As a computer Science student do you think you can contribute something that will make a better future of AI? You can share your idea in yours own words. ***4***

(c) Suppose 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. The Start and Goal states are shown below. The heuristic value of a state is its number of misplaced tiles from the goal state (h1), which is the sum over each tile of {if it is in its goal position 0, else 1}. For instance, tile number 1 in the Start state is not in its goal position so counts 1, while tile number 2 is in its goal position so counts 0. The heuristic value of the Start State is: h1(Start) = 1 + 0 + 1 + 1 + 0 + 1 + 0 + 1 = 5. ***2***
Fill in heuristic h1(n) values below (n = current node). The first is done for you.



2(a) What answers do you get for below queries for given program. ***4***

Program :

```
man(jose).
man(james).
woman(lucy).
woman(alina).
likes(Man,Woman) :- man(Man),woman(Woman).
loves(Who, Whom) :- likes(Who,Whom).
```

Queries :

```
?- likes(jose,Woman).
?- loves(alina, Whom).
?- likes(jose, lucy).
?- loves(Whom, alina).
```

(b) The heuristic path algorithm is a best-first search in which the objective function is ***3***

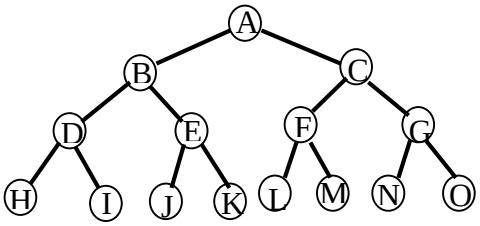
$$f(n) = (2 - w)g(n) + wh(n)$$

What kind of search does this perform when w = 0? When w = 1? When w = 2?

(c) Surely animals, humans, and computers cannot be intelligent-they can do only what their constituent atoms are told to do by the laws of physics~ the later statement true, and does it imply the former? ***3***

3(a) Differentiate between Deterministic agent and stochastic and with example. ***2***

(b) Explain step-by-step Iterative Deepening search for following graph where G is the goal node ***4***



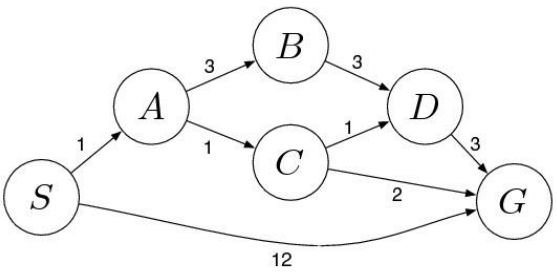
(c) The major four criteria for evaluating search methods are: time complexity, space complexity, optimality, and completeness. Using one or more of these criteria, attempt to justify the following statements:

i. Iterative deepening search is preferred over breadth-first search. ***2***

ii. Breadth-first search is preferred over Depth-first search. ***2***

4(a) Artificial intelligence can exceed human intelligence. It will solve mysteries that were never solved! Do you agree with that? Give your own opinions. ***2***

(b) The state space description for a problem is shown below, with A being the start state and D being the goal state. Shown on the graph are path costs between states. The table lists the estimated distance from a state to the goal. Assume these estimates are admissible. Perform an A* search for this problem. Recall that f (n)= g (n)+h (n). ***4***



State	h1	h2
S	4	3
A	2	2
B	6	5
C	2	1
D	3	2
G	0	0

(c) What is the aim of Turing test towards understanding intelligence? To pass the Turing test a computer need to possess some capabilities. Now mention these capabilities. ***4***