



Daffodil International University

Department of Computer Science and Engineering

Faculty of Science and Information Technology

Mid-Term Examination

Semester: Fall 2019

Course Code: CSE 412 (DAY)

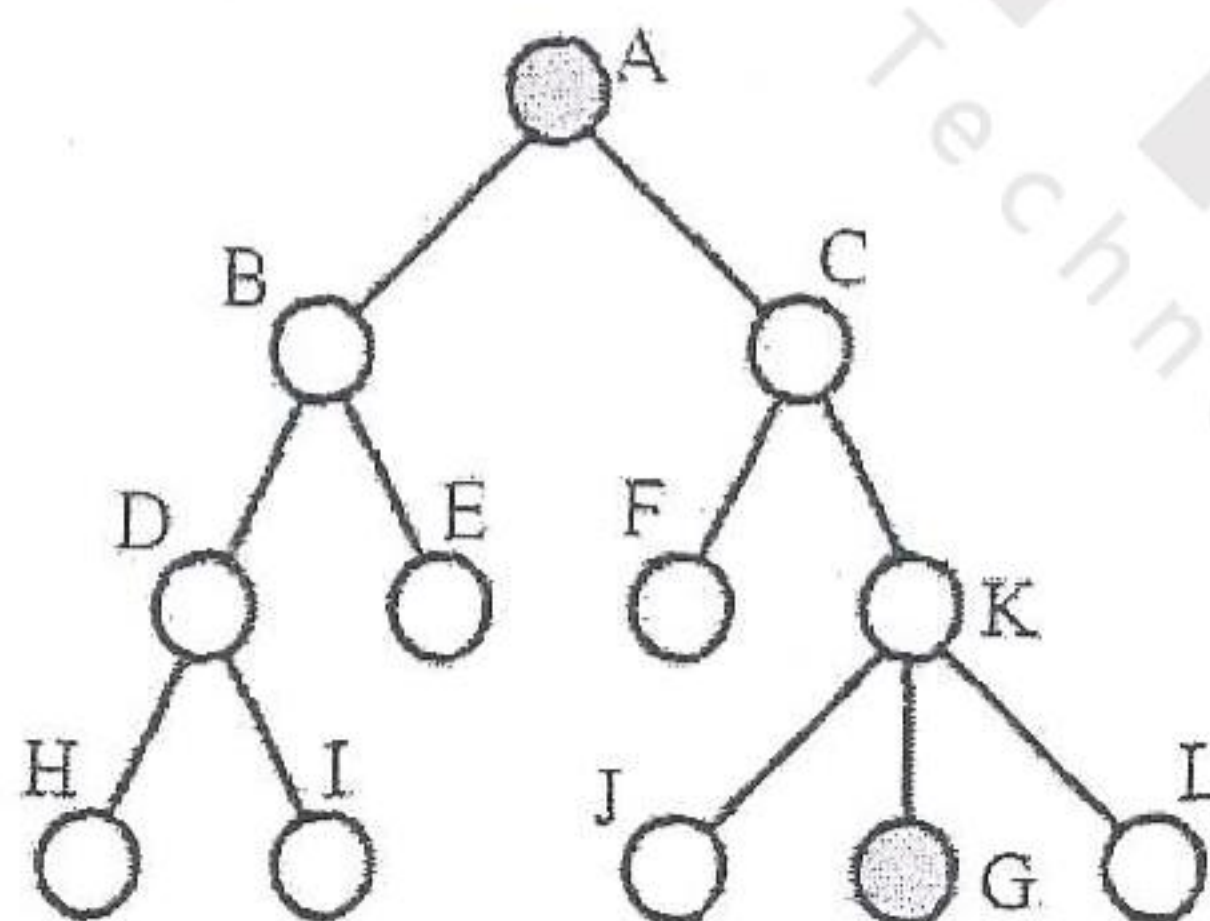
Course Title: Artificial Intelligence

Time: 1.5 hours

Full Marks: 25

Answer any **four** (including Question 5) of the following **five** questions.
Figures in the right-hand margin indicate full marks.

1. Consider a closed room, where windows and doors are made with glasses. There is an Air conditioner (AC) placed in the top of the room, which works for 'Temperature Controlling System (TMP)' for this room. If the desired temperature set for the room is more than the current temperature, TMP adjusts temperature by dissipating cool air. If the desired temperature set for the room is less than the current temperature, TMP adjusts temperature by dissipating hot air. If the desired temperature set for the room equals the current temperature, TMP performs no operation.
- Answer the following questions based on the above scenario.
- (a) What is the PEAS description of the task environment for an agent? 2
 - (b) Give PEAS description of the task environment for TMP. 2
 - (c) What is the size of the state space for this TMP problem? 2
2. (a) Derive the time and space complexity of breadth-first search. 2
- (b) Consider the following search tree, where *A* and *G* are the initial and goal node, respectively. 4



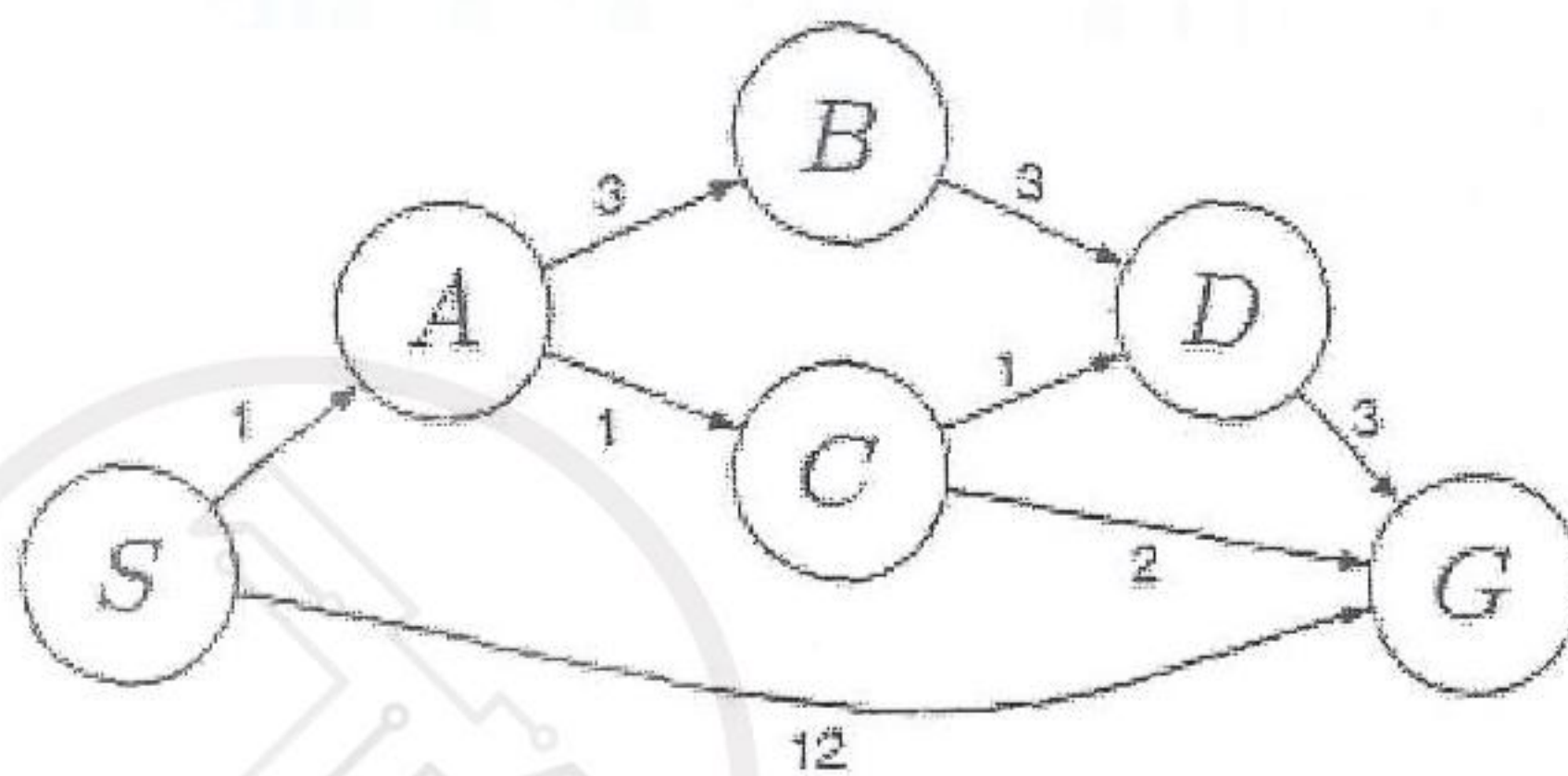
Now, perform the following searches on this tree.

- (i) Breadth-first search (BFS).
- (ii) Depth-limited search (depth limit, $l = 2$).

3. (a) Define and exemplify heuristic.

2

(b) Consider the following scenario, where start node is S and goal node is G .



State, n	Heuristic function, $h(n)$
S	11
A	2
B	5
C	1
D	2
G	0

Now, perform the following two searches separately.

(i) Greedy best-first search.

2

(ii) Uniform-Cost search.

2

4. (a) What do you think about Artificial Intelligence as a subject? Discuss with the help of diagram.

3

(b) What is artificial intelligence? Differentiate between natural and artificial intelligence.

3

5. Write the answer to the following questions in a single sentence.

(a) What is the diameter of a state space?

1

(b) Why may we have a search graph rather than tree?

1

(c) If the environment of vacuum world consists of n squares and 2 cleaners, how many states will there be in the state space?

1

(d) When does depth-first search run faster than breadth-first search even if $m \gg d$?

1

(e) Can depth-first search be viewed as a special case of depth-limited search for which value of l ?

1

(f) When does bidirectional search become incomplete and does not return an optimal solution?

1

(g) For which search, no node is expanded that is not on the solution path?

1