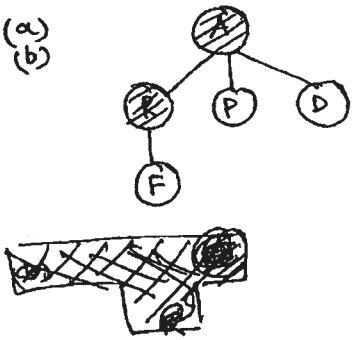
HW 1 Solution
CS 771
[redacted]

1.(a) Partially observable, stochastic, sequential, dynamic, multi-agent.
(b) partially observable, stochastic, episodic, dynamic, single agent.
(c) fully observable, deterministic, sequential, static, single agent.
(d) Fully observable, deterministic, sequential, static, single agent.

2. A simple reflex agent selects an action based on the current percept, ignoring the percept history. Since any agent of this type does not have any memory, it works well only if the environment is fully observable based on the current percept. In most of the situations, this is not the case. Thus partial observability causes a problem for this kind of agents and often infinite loops are unavoidable for simple reflex agents working under partially observable environment.
A model based agent handles partial observability by maintaining some sort of internal state that depends on percept history and is u[updated when required.

3. The problem with goal based agent is that goal alone is not sufficient to generate high quality behavior of an agent in most environments. Also, there can be more than one goal or sometime conflicting goals, for example in case of taxi-driver agent, conflicting goals are driveling safely vs driving as fast as possible.
Utility based agents solve this problem by assigning utility for each goals and then selecting the goal that maximizes the utility.

5. (a)
(b)



: visited/ expanded.
: frontier

(c) Node F

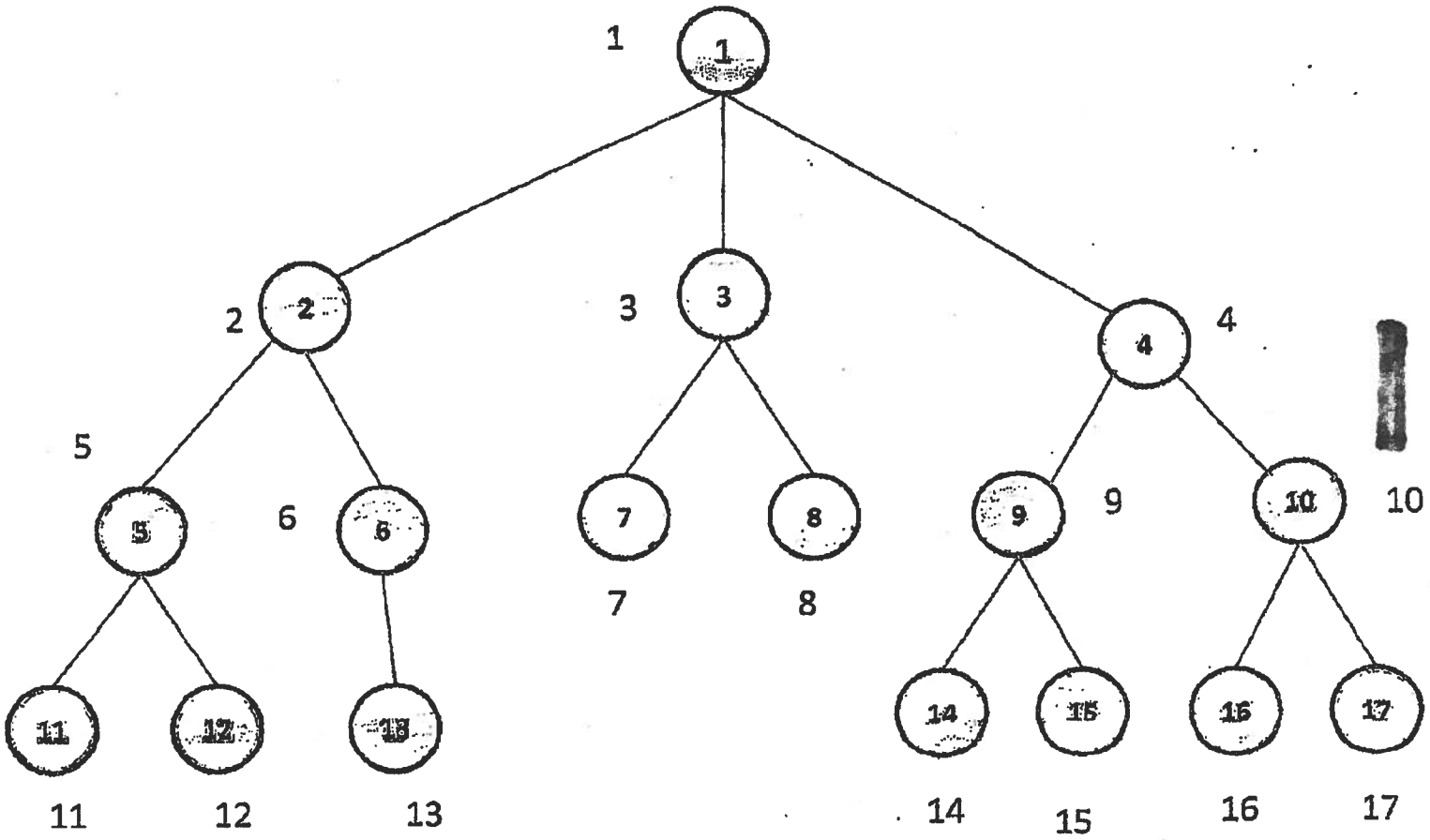
(d) Node P or Node D. Both are at a same depth.

(e) At this stage cost associated with the nodes at frontier are as follows:

F	P	D
4	4	3

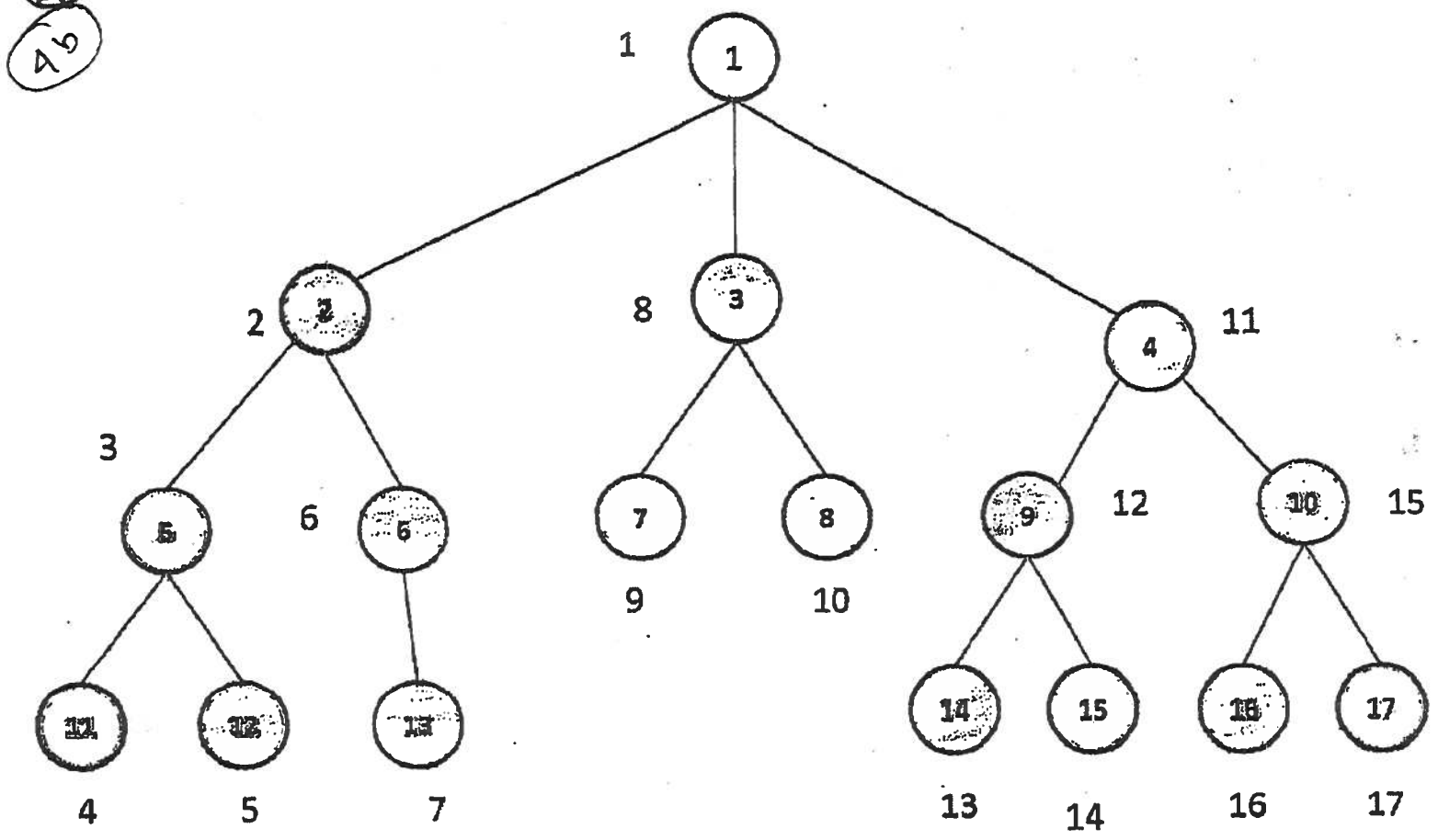
Therefore uniform cost search will expand node D which has min-cost.

Breath-First Search



Order: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

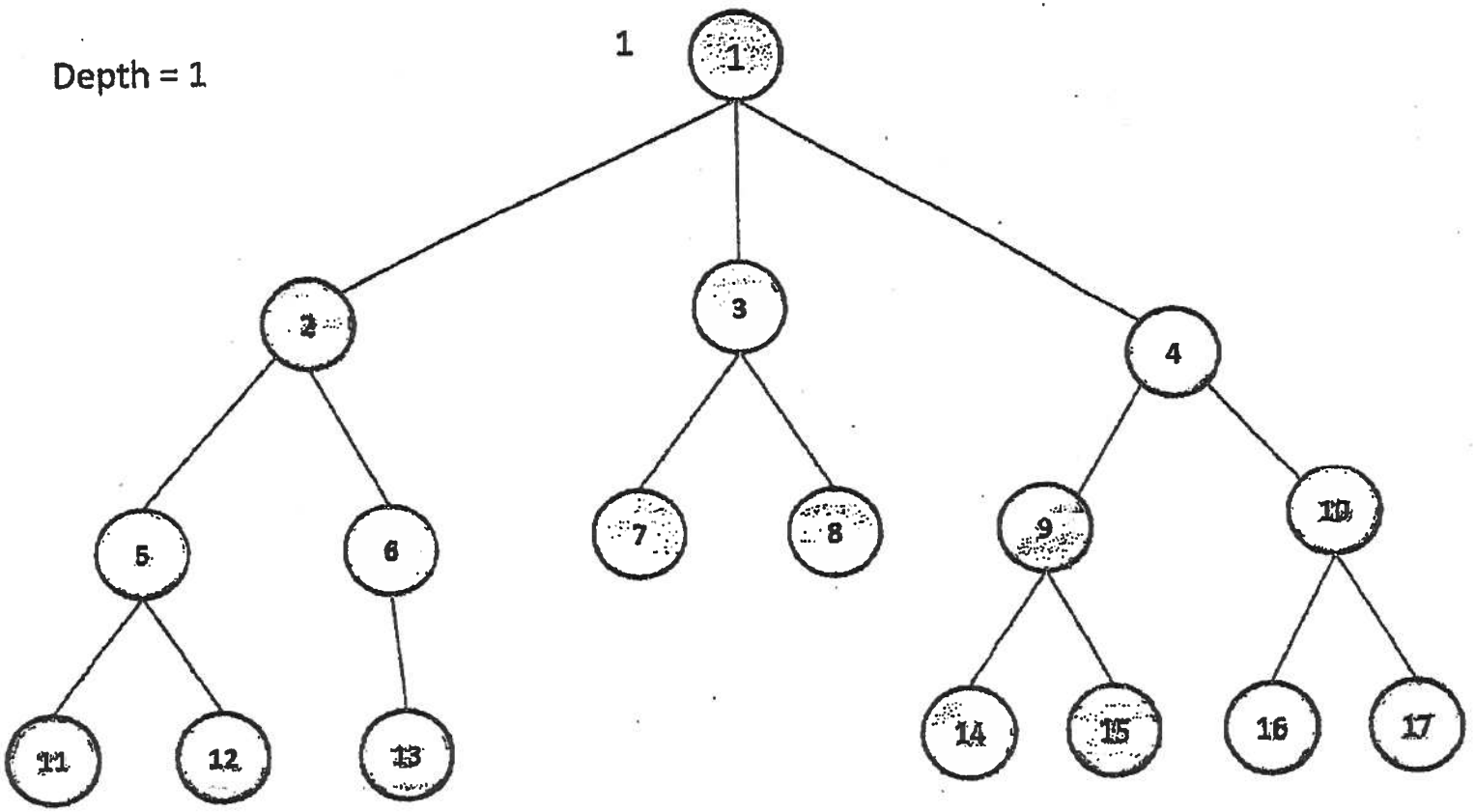
Depth-First Search



Order: 1, 2, 5, 11, 12, 6, 13, 3, 7, 8, 4, 9, 14, 15, 10, 16, 17

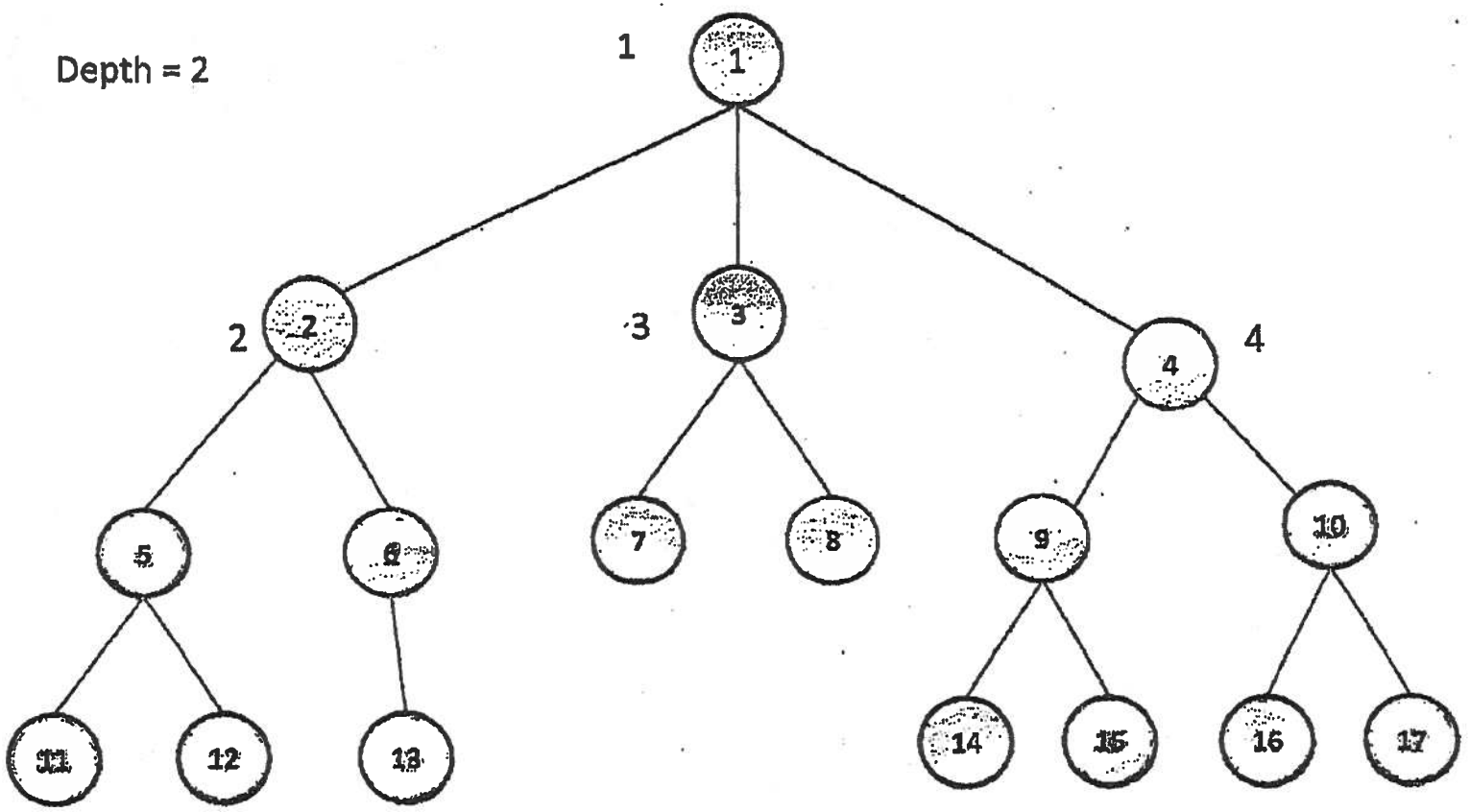
Depth-First Iterative-Deepening Search

Depth = 1



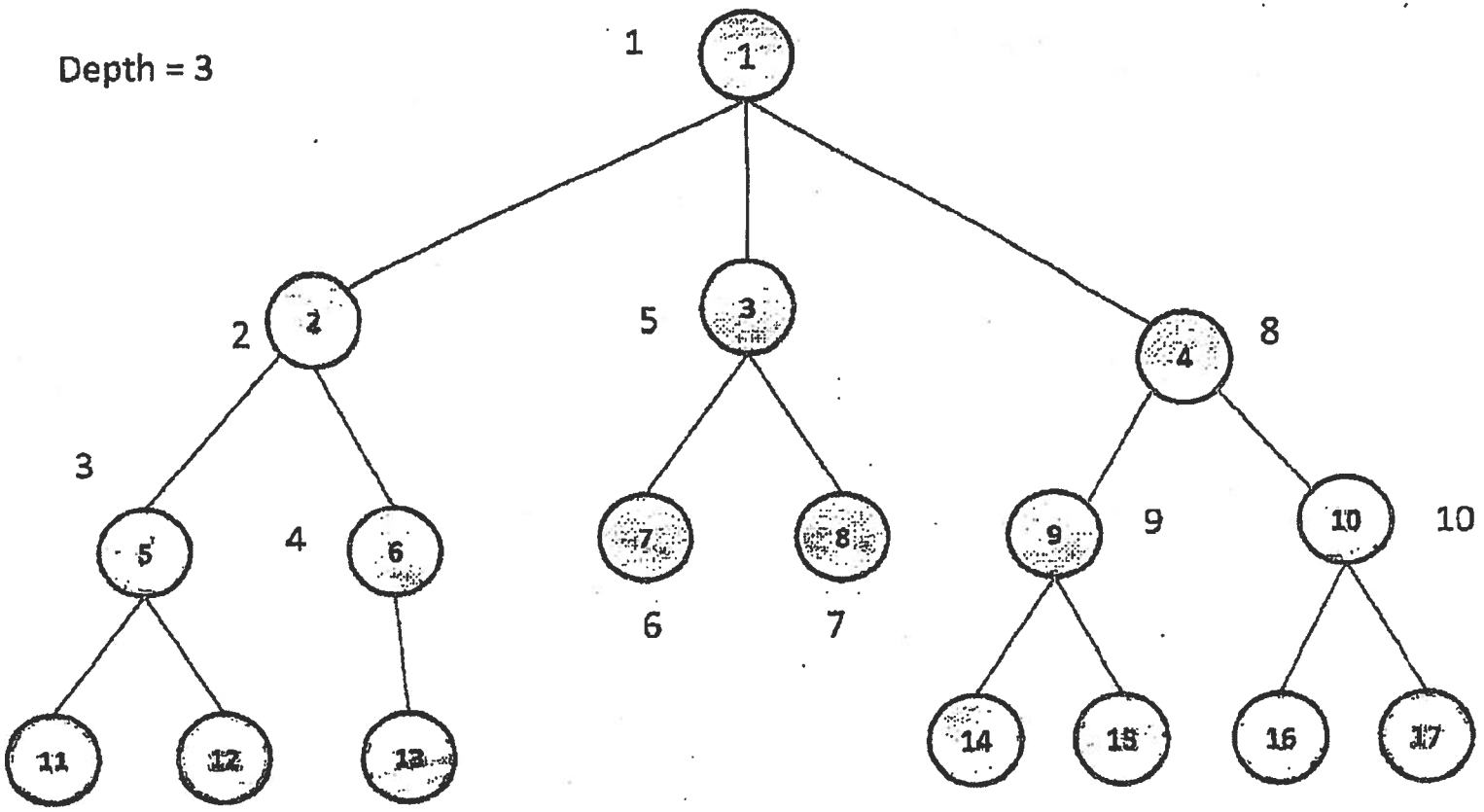
Order: 1

Depth-First Iterative-Deepening Search



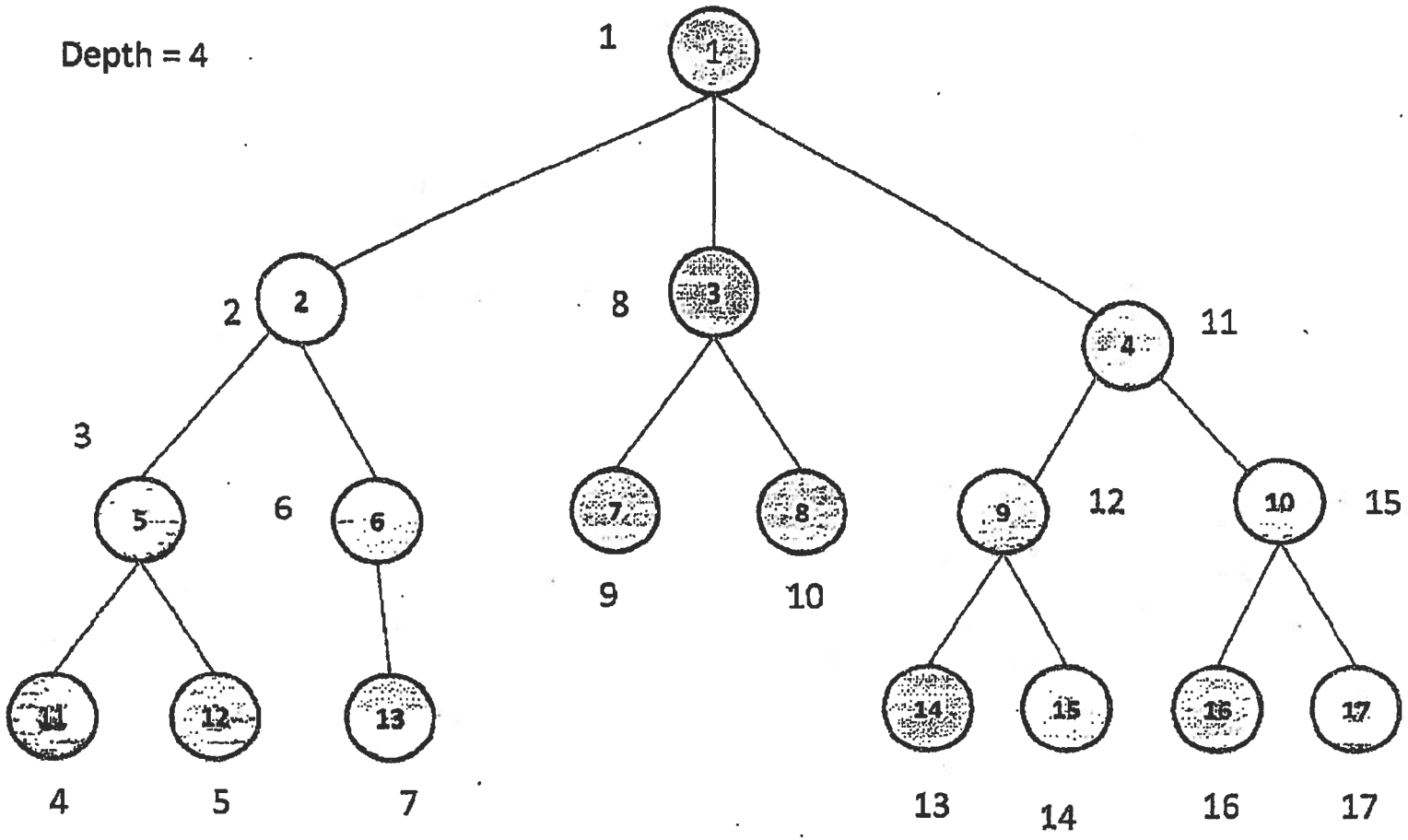
Order: 1, 2, 3, 4

Depth-First Iterative-Deepening Search



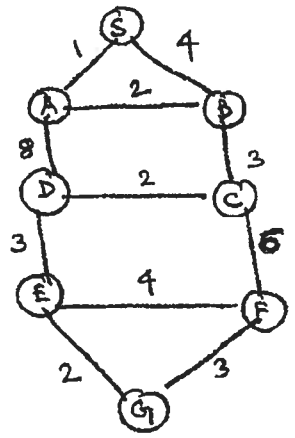
Order: 1, 2, 5, 6, 3, 7, 8, 4, 9, 10

Depth-First Iterative-Deepening Search



Order: 1, 2, 5, 11, 12, 6, 13, 3, 7, 8, 4, 9, 14, 15, 10, 16, 17

(6)



V: visited , F: frontier

V: S F: | A | B |
|---|---|
| 1 | 4 |

V: S A F: | B | D |
|---|---|
| 3 | 9 |

B is updated.

V: S A B F: | C | D |
|---|---|
| 6 | 9 |

V: S A B C F: | D | F |
|---|---|
| 8 | 12 |

D is updated.

V: S A B C D F: | E | F |
|---|---|
| 10 | 12 |

V: S A B C D E F: | G | F |
|---|---|
| 13 | 12 |

F is not updated. since alternate path is more expensive.

V: S A B C D E F G F: | G |
|---|
| 13 |

G is not updated since alternat path is more expensive.

V: S A B C D E F G

Path From Start to Goal

S A B C D E G.

Path Cost : 13