**CSE 221: Algorithms Mid­TermExamination : Summer 2016 Duration: 1 hour ​Total Marks: 40**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Section:\_\_\_\_\_\_\_\_\_**

**MCQ: [ 5 X 1 = 5 ]**

1. If there are n elements in an array the height of a heap structure will be:

A. logn B. nlogn c. ​2​n d. ​2​nlogn

2. Which algorithm can be used to detect cycle detection algorithm in directed graph?

A.BFS B.DFS C.BFS+DFS D.none of the above

3. If there are V vertices and E edges, the time complexity of BFS will be

a. O(V\*E) b. O(V+E) c. O(V^2) d. O(VlogE)

4. What is generally true for Adjacency List and Adjacency Matrix representation of

graphs?

a. Lists require less space than matrices and they are faster to find the weight of an edge (v1,v2) a. Lists require more space than matrices but they are faster to find the weight of an edge (v1,v2) a. Lists require less space than matrices and they take longer to find the weight of an edge (v1,v2) a. Lists require more space than matrices and they take longer to find the weight of an edge (v1,v2)

5. Which of the following is not true for Dijkstra’s algorithm:

a. Also applicable for un­weighted graph b. Priority queue is used for implementation c. Can deal with negative weighted edges

d. Can deal with cyclic graphs

6.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Weight | 4 | 6 | 8 | 10 |
| Benefit | 6 | 14 | 4 | 18 |

W = 10. Find the max benefit that can be placed in W.

**True/False: [ 5 X 1 = 5 ]**

1. Dijkstra’s algorithm is the most efficient deterministic algorithm for finding the shortest

path between two vertices in a directed graph, where the weights of all edges are equal

2. An array sorted in descending order follows Min­Heap property

3. For Heap algorithm, tree does not have to be complete

4. If there are N nodes in a graph, there will be at least N\*N nodes in the adjacency list

5. Depth first search is the shortest path algorithm that works on Directed graphs

**Simulation/Descriptive Questions:**

[ 5X6 = 30 ]

1. Consider the graph with the adjacency matrix given below:

**A C B D E**

A 0 4 6 0 0

B 2 0 8 0 2

C 0 2 0 6 2

D 0 0 2 0 0

E 4 4 0 2 0

We want to find the shortest paths starting from node 0 to all vertices. Which algorithm is applicable here? Show every step of simulation.

2. For the following adjacency­list, draw the graph and show its adjacency matrix. If you are asked to find whether (2,3) contains an edge or not which representation will give faster result?

1 ­> 5 ­> 4­>3 2 ­> 4 ­>3 3 ­> 6 ­> 4 4 ­>2 5 ­>5

4. Is a Heap structure complete or full binary tree ? Construct Min­Heap for below array(Show every step)

36 8 12 67 5 10 15 18

5. Find the shortest path using the appropriate formula. Take the source to be A.

