**Arab Academy For Science and Technology & Maritime Transport**



**College of Engineering & Technology**

**Computer Engineering Department**

**EXAMINATION PAPER REVISION**

Course Title: Data Structures

Course Code: CC215

Date: Mon. Jan, 5-2015 Lecturer: Dr. Manal Helal

Time allowed: 2 Hours Start Time: 10:30 a.m.

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| Student's name: Reg.# : |

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| **Question #** | **Marks** | |
| **Available** | **Actual** |
| Stack | 5 |  |
| Queue | 5 |  |
| Trees | 5 |  |
| Balanced Trees | 5 |  |
| Hashing | 5 |  |
| Graphs | 15 |  |
| **Total** | **40** |  |
| **Lecturer** | Name : Dr. Manal Helal | |
| Signature : | |
| Date: | |

**MPC6/1-1**

**Stack & Queue: [10 points]**

1. Discuss the advantages and disadvantages of the link list and array-based implementations of a queue.
2. Describe three “real life” applications of a queue and a stack.
3. Using the operations of the stack and queue, write a function that determines if a string is a palindrome (i.e. reads the same backward and forward; e.g. “level”). The prototype for this function is given below.

bool isPalindrome(String theString )

**Trees: [5 points]**

**4) Tree Definitions:**

1. Define tree.
2. Define k-ary tree.
3. For any tree, T, define the following
   1. path in T
   2. length of a path in T
   3. height of a node in T
   4. depth of a node in T
   5. height of T
   6. depth of T
   7. internal node
   8. leaf

**5) Suppose that you have two traversals from the same binary tree. Draw the tree.**

pre-order: A D F G H K L P Q R W Z

in-order: G F H K D L A W R Q P Z

**Balanced Trees: [5 points]**

**6) AVL Tree Definitions:**

1. Define a Balance Factor of a node
2. Define imbalance outside cases
3. Define imbalance inside cases
4. Define a single rotation
5. Define a double rotation

**Hashing: [5 points]**

7)What is a **hash** function? Name two desirable properties of a hash function.

8) Define **collision** in a hash table.

9) What is the **clustering** problem in hash tables? And How it is solved?

10) Describe the **separate chaining** collision resolution method.

11) Describe the **open addressing** collision resolution method

**Graphs: [15 points]**

12) Define the following terms

1. Graph
2. Weighted Graph
3. Directed Graph
4. Undirected Graph
5. Path
6. Length of a Path
7. Connected Undirected Graph
8. Connected Components
9. Adjacency Matrix
10. Adjacency List
11. Directed Acyclic Graph
12. Cycle