Mansoura University- Faculty of Engineering		Department: Computers Engineering And Systems Total mark 50	MTE Program BME Program CIE program

Course Title: Data Structure and algorithms	Course Code: CSE 153	Year: level 100
Date:May , 2016 (Second term)	Allowed time: 2 hrs	No. of Pages: (2)

Remark: Assume any Missing Data.

Question No 1 16 points

Q1-A) [2 Points] What is meant by computer program Then state State the factors that affect Running Time
Q1-B) {2 points } What is Meant by the data structure concept? Then State the different areas in which data structures are applied extensively?
Q1-C) **[2 Points]** How to calculate the storage space required for an array and list?
Q1-D) **[2 Points]** what is meant by double linked list
Q1-E) [2 Points] Which of the following statements is wrong?
Names[2] = "Worng"; - int Sales[19] = 23123.3; - myName = names[2];
Q1-F) **[2 Points]** *Complete the following table*

ata Structure types	*ef. and Application*	*eclearation and reation Statment*	*unctions*
……			

Q1-G) **[2 Points]** *Compare between (Array and List- Algorithm and Flow Chart- Stack and Queue-* Sequential search and linear search *)*
Q1-H) {2 points } Consider A is an array of order n*n stored in a Row Major order. If the address of the first element in the array is K which is there at A[0, 0], then What is the address of A[i, j]?

Question No 2 12 points

Q2-A) {2 points } Find the output of the following code

```
static void Main()
{
   Queue<string> queue = new Queue<string>();
   queue.Enqueue("Message One ");
   queue.Enqueue("Message One");
   queue.Enqueue("Message One ");
   queue.Enqueue("Message One ");
   while (queue.Count < 0)
   {
      string message = queue.Dequeue();
      Console.WriteLine(message);
   }
}
```

```
class MainClass {
 public static void Main() {
  LinkedList<char> ll = new LinkedList<char>();
  Console.WriteLine("Adding 5 elements.");
 ll.AddFirst('A');   ll.AddFirst('B');  ll.AddFirst('C');   ll.AddFirst('D');    ll.AddFirst('E');
  ll.AddLast('X');   ll.AddLast('Y');  ll.AddLast('Z');
  Console.WriteLine("Contents after addition to end: ");
  foreach(char ch in ll)
    Console.Write(ch + " ");    Console.WriteLine("\n");  } } }
```

Mansoura University		Biomedical Engineering Program BME Total Marks: 50 Marks	Faculty of Engineering

Course Title: Introduction to Data structure	Course Code: CSE 153	2nd level
Date: June, 2015 (Second Term)	Allowed time: 2 hrs	No. of Pages: (2)

Remarks: (Answer the following questions… assume any missing data)

Question No. (1) (15 Marks)

Q(1-A) For the following declaration

int y[3] [4] = { 3,5,3,4,0,14,8,6,7,11,12,08}

what is the value of : y[2][0], y[0][3] y[2][2], y[1][3]

Q(1-B) How many elements are in the following array? float sales [6] [4];

Q(1-C) Name the different operations which can be performed on a stack.

Q(1-D) A stack is called a LIFO structure. What does this mean?

Q(1-E) Show the stack elements after the following operations have all been completed: (Draw the final picture of s.elements[] and show the value of s.top)

1. s.push(20) 2. s.push(51) 3. s.pop() 4. s.push(43)

Q1- F) for the following declaration long[ ] row = new long[4]; what are the values of row.Rank, row.Length

Question No. (2) (18 Marks)

Q(2-A) Suppose **q** is an instance of the Queue class and assume that the previous array implementation is used. Also, assume that the size of the array is 5. Show **q** after all of the following operations have been completed assuming the queue is empty to start with. Show how the **front**, **rear** and **elements** change.

q.enqueue(39); q.enqueue(22); item1 = q.dequeue(); q.enqueue(59);
item2 = q.dequeue(); item3 = q.dequeue();

Q(2-B) Fill in the blank

1. The _____ points to the first node in a linked list.
2. _____ a node means adding it to the end of a list.
3. _____ a node means adding it to a list, but not necessarily to the end.
4. In a _____ list, the last node has a pointer to the first node.
5. In a _____ list, each node has a pointer to the one before it and the one after it.
6. The _____ element saved onto a stack is the first one retrieved.
7. The two primary stack operations are _____ and _____.
8. The _____ element saved in a queue is the first one retrieved.
9. The two primary queue operations are _____ and

Q(2-C) Suppose the following operations are performed on an empty queue:
enqueue(5); enqueue(7); enqueue(9); enqueue(12);
Insert numbers in the diagram below to show what will be sored in the static stack after the operations above have executed.

Front					Rear

Q(2-D) What problem is overcome by using a circular

Q2-E) State 5 operations used with Array Data structure for each give an example

Q2-F) Draw the Arithmetic Expression Tree for the next expersion

a x (b + c) - (d - (e + g / h))

Question No. (2) **(28 Marks)**

Q(3-A) show the output for the following piece of code

```
using System;
using System.Collections;
using System.Collections.Generic;
using System.Text;
class Program {
  static void Main(string[] args) {
   Queue alphabet = new Queue();
   alphabet.Enqueue("A");  alphabet.Enqueue("B");  alphabet.Enqueue("C");
   Console.Write("First Iteration: ");
    foreach (string item in alphabet) {
       Console.Write(item);      }
    Console.WriteLine("\nItem pulled from collection: " +
      alphabet.Dequeue().ToString());
    Console.Write("Second iteration: ");
    foreach (string item in alphabet) {
      Console.Write(item);
    } } }
```

Q(3-B) A stack of integers **aStack** has the following private data: Items: 800 47 10 -34 323 067 823 -789 99; What is the output of the following code? Top = 800

```
int x;
while (!aStack.isEmpty()){
aStack.pop(x);
Consol.writeln( x-3,  " ");
}
```

Q3-C) Inserting the integers 3, 5, 2, 8, 4, 7,9 , 13 and 1 into a binary search tree

Q3-D) {5 points } Use *Bubble Sort algorithm for* a given string array shown below, then specify the number of (**Sweep, exchanges) and the final order.**
("ahmad Adel", "ahmad saad", "Reham Abdo", "basem Ali", Hesham Arafat")

Q3-E) Write a C# program that accept a 2-D array , the output of the program is Largest value located at the diagonal.

Q(3-F)Write a program that creates a list, inserts the integers 1 through 10, and then iterates through the list twice, printing its contents.

Q3-F) Write a program using (10X10) matrix of integer numbers to:

- Enter the elements of the matrix and calculate the sum of all elements.
- Find the maximum number of in the matrix diagonal and its location.
- Find the minimum number in the 5^{th} row.

Q3-G) Write a C# program that accepts a 5 elements within a linked list (A,B,C,D,E) , then displays the number of elements and Display the linked list contents

Q2-B) {2 points } A stack of integers a Stack has the following private data: Items: 800 47 10 -34 323 067 823 -789 99; What is the output of the following code? Top = 800

```
int x;
while (!aStack.isEmpty()){
aStack.pop(x);
Consol.writeln( x, " "); }
```

Q2-C) {2 points } Write a C# program that accept a 2-D array , the output of the program is Largest value located at the diagonal

Q2-D) {4 points } **If there is no error,** What do the following program segments display

```
Int [] a = new int[3];
a[0] = 5; a[1] = 10; a[2] = 150;
Console.WriteLine("{0} {1} {2}", a[0], a[1],
a[2]);
a[0] += 5; a[1] = 20;
a[2] = a[0] + a[1];
Console.WriteLine("{0} {1} {2}", a[0], a[1], [2]);
```

```
int [] prices = new int [] {10, 29, 35, 67, 42};
int v = 0;
foreach(int p in prices)
  if(p > v)
    v = p;
Console.WriteLine(v);
```

Question No 3- 10 points

Q3-A) {2 points } **Given an array scores of doubles, write a C# program that compute the sum of all elements in the array; store the result in variable total. Write one program using while loop; Write another program using for loop**

Q3-B) {2 points } A stack of integers a Stack has the following private data: Items: 800 47 10 -34 323 067 823 -789 99; What is the output of the following code? Top = 800

```
int x;
while (!aStack.isEmpty()){
aStack.pop(x);
Consol.writeln( x, " ");}
```

Q3-C) {3 points } Write a C# program that accepts a 5 elements within a linked list (A,B,C,D,E) , then displays the number of elements and Display the linked list contents

Q3-D) {3 points } **Select the suitable answer [right selection 0.5 wrong selection -1) Use the attached sheet in the answer**

(1) How many nodes does a complete binary tree of level 5 have?

(2) The suitable data structure to represent the IDs of employees is

Question No 4 18 points

Q4-A) {5 points } Sort the array [m, Z, k, M, A, b, 3, r, D, H, h, m] with the iterative ***Bubble*** sort algorithm. Show all steps in determining your answer. then specify the number of (Itration, **exchanges) and the final order.**

Q4-B) {3 points } Sort the array [7, 2, 5, 3, 10, 4, 9, 8, 1, 6] with the Merg sort algorithm using the median of three rule for pivot selection. Show all steps in determining your answer.

Q4-C) {3 points } Apply the Merge sort algorithm for the following items - 56,29,35,42,15,41,75,21

Q4-D) {4 points } Use *Bubble and Merg Sort algorithm for* a given string array shown below, then specify the number of **(Sweep, exchanges) and the final order.**

("ahmad Adel", "ahmad saad", "Reham Abdo", "basem Ali", Hesham Arafat")

Q4-E) {3 points } Write a C# program that accept a two-dimensional array as an argument and display its contents on the screen. The program should work with any of the following arrays: int hours [5] [7] ; int stamps [8] [7] ; int autos [12] [7] ; int cats [50] [7] ;

Best wishes **Prof. Dr Hesham Arafat**