


Mansoura University- Faculty of Engineering		Department: Computers Engineering And Systems Total mark 50	MTE Program BME Program CIE program
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Course Title: Data Structure and algorithms  
Date: May, 2016 (Second term)

Course Code: CSE 153  
Allowed time: 2 hrs

Year: level 100  
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

Data Structure types	Def. and Application	Declaration and creation Statment	Functions
.....			

**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  $n \times n$  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 c'n in ll)
```

```
            Console.Write(ch + " "); Console.WriteLine("\n"); } }
```



**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);
    Console.WriteLine( 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);
    Console.WriteLine( 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 (Iteration, 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