Mansoura University		Communication & Information Engineering Program CIE Total Marks: 50 Marks	Faculty of Engineering

Course Title: Introduction to Data structure	Course Code: CSE 153	2nd level
Date: June, , 2018 (Second Term)	Allowed time: 2 hrs	No. of Pages: (2)

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

Question No. (1) (15 Marks)

Q1-A) What is meant by computer program (give some example in your field) , then state the factors that effect on its running time (compare between program , flow chart and algorithm) (3 points)

Q1-B) 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] ; (3 points)

Q1-C) State the Correct Answer You will get 0.5 point for each correct answer, -1 point for each incorrect answer (3 points)

1)What is Data Structure ? A. Way to organize data B. Accessing of data elements in specified manner C. Organization of mathematical and logical concepts D. All of Above	**2) The value of first linked list address is ?** A. 0 B. -1 C. 1 D. None of Above
3. Which of the following data structures are indexed structures? a. linear arrays b. linked lists c. both of above d. none of above	**4) Two dimensional arrays are also called?** a. Matrix Array b. Table Array c. Both a and b d. None of the Above
5. Which of the following is not a limitation of binary search algorithm? a. must use a sorted array b. requirement of sorted array is expensive when a lot of insertion and deletions are needed c. there must be a mechanism to access middle element directly d. binary search algorithm is not efficient when the data elements are more than 500	**6) The restriction while using the binary search is ?** a. List should be small in number b. List should be large in number c. List should be sorted d. No restriction

Q1-D) Find the output of the following code

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

(3 points)

Q1-E) State the function of the following code

```
bool isSymmetric = true;

for (int i=0; i<(array.Length+1)/2; i++)
{
   if (array[i] != array[n-i-1])
   {
      isSymmetric = false;
   }
}
```

(3 points)

Question No. (2) (18 Marks)

Q 2 -A) 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, " ");
}
```

(5 points)

Q2-B) Answer the following questions about binary trees. (3 points)

- Draw a binary tree with height 7 and maximum number of leaves.
- What is the minimum number of leaves for a binary tree with height h? Justify your answer and draw an example tree for h=7.
- What is the maximum number of leaves for a binary tree with height h? Justify your answer and draw an example tree for h=7.

Q2-C) A stack is called a LIFO structure. What does this mean? (2 points)

Q2-D) Give an example of an application of the stack.

Q2-E) ***Fill in the blank*** (4 Points)

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.
3. In a ..... list, the last node has a pointer to the first node.
4. The ..... element saved onto a stack is the first one retrieved.
5. The two primary stack operations are ..... and .....
6. The **_First_** element saved in a queue is the first one retrieved.
7. The two primary queue operations are ..... and .....

(3 Points)

Q2-F) ***True or False***

1. The programmer must know in advance how many nodes will be needed in a linked list.
2. In physical memory, the nodes in a linked list may be scattered around.
3. When the head pointer points to NULL, it signifies an empty list.
4. Deleting a node in a linked list is a simple matter of using the delete operator to free the node's memory.
5. The push operation inserts an element at the end of a stack.
6. The pop operation retrieves an element from the top of a stack.

Question No. (3) (24 Marks) (4 points each)

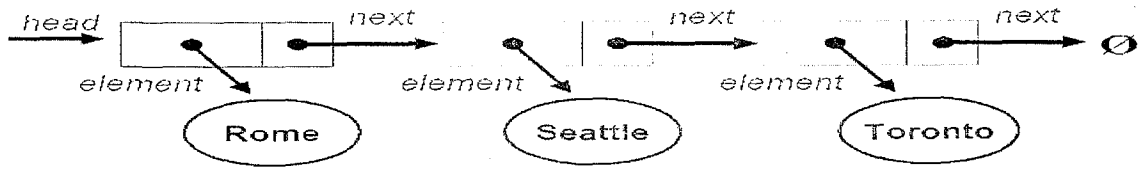
Q3-A) Write a program that creates a list, inserts the integers 1 through 10, and then iterates through the list twice, printing its contents.

Q3-B) Here is an array of the following integers: `5 11 3 8 9 1 7 15 0 2 6 13 4`
Use four Sorting algorithms for; each determine the no of iterations and the no of swaps (validate your answer by draft sketch)

Q3-C) 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] ;

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

Q3- E) write a piece of code that creates such linked list For the following linked list



Q3-F) Sort the array [7, 2, 5, 3, 10, 4, 9, 8, 1, 6] with the iterative merge sort algorithm. Show all steps in determining your answer.

Q3-G) Sort the array [7, 2, 5, 3, 10, 4, 9, 8, 1, 6] with the quick sort algorithm using the median of three rule for pivot selection. Show all steps in determining your answer.

Q3-H) Apply the Merge sort algorithm for the following items - 56,29,35,42,15,41,75,21

Q3-I) 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")