| Mansoura University | | Communication & Information Engineering Program CIE<br>Total Marks: 50 Marks | Faculty of Engineering |
|---|---|---|---|

| | | |
|---|---|---|
| Course Title: Introduction to Data structure | Course Code: CSE 153 | 2nd level |
| Date: June, 2018 (First 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 , then state the factors that affect on its running time**

**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] ;

**Q1-A)** State the Correct Answer You will get 0.5 point for each correct answer, -1 point for each incorrect answer

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

**Q1-E)** 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);
  }}
```

**Q1-F)** 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;
   }
}
```

**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, " ");
}
```

**Q2-B)** Answer the following questions about binary trees.

- 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?

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

**Q2-E)** ***Fill in the blank***

1. The _**head**_ points to the first node in a linked list.
2. __**AddLast**_ a node means adding it to the end of a list.
3. ___**insert**_ a node means adding it to a list, but not necessarily to the end.
3. In a _**Circular** _ list, the last node has a pointer to the first node.
4. The _**Last**__ element saved onto a stack is the first one retrieved.
5. The two primary stack operations are __**Push**_____ and _**PoP**_____.
6. The _**First**_ element saved in a queue is the first one retrieved.
7. The two primary queue operations are ___**Enqueue**____ and **Dequeue**

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

1. T **F** The programmer must know in advance how many nodes will be needed in a linked list.
2. **T** F In physical memory, the nodes in a linked list may be scattered around.
3. **T** F When the head pointer points to NULL, it signifies an empty list.
4. **T** F Deleting a node in a linked list is a simple matter of using the delete operator to free the node's memory.
5. T **F** The push operation inserts an element at the end of a stack.
6. **T** F The pop operation retrieves an element from the top of a stack.

**Question No. (3) (24 Marks)**

**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 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