



Course Title: Introduction to Data structure  
Date: June, 6, 2018 (First Term)

Course Code: CSE 153  
Allowed time: 2 hrs

2<sup>nd</sup> level  
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-C)** 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 ?

- A. Way to organize data
- B. Accessing of data elements in specified manner
- C. Organization of mathematical and logical concepts

**D. All 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

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

2) The value of first linked list address is ?

**a. 0**

- a. -1
- b. 1
- c. 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

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);
    }
}
```

Message One  
Message Two  
Message Three  
Message Four

**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;
    }
}
```

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**Question No. (2) (18 Marks)**

**Q2-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);
```

797 43 3 -37 320 064 820 -792 96

```
Consol.WriteLine(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.

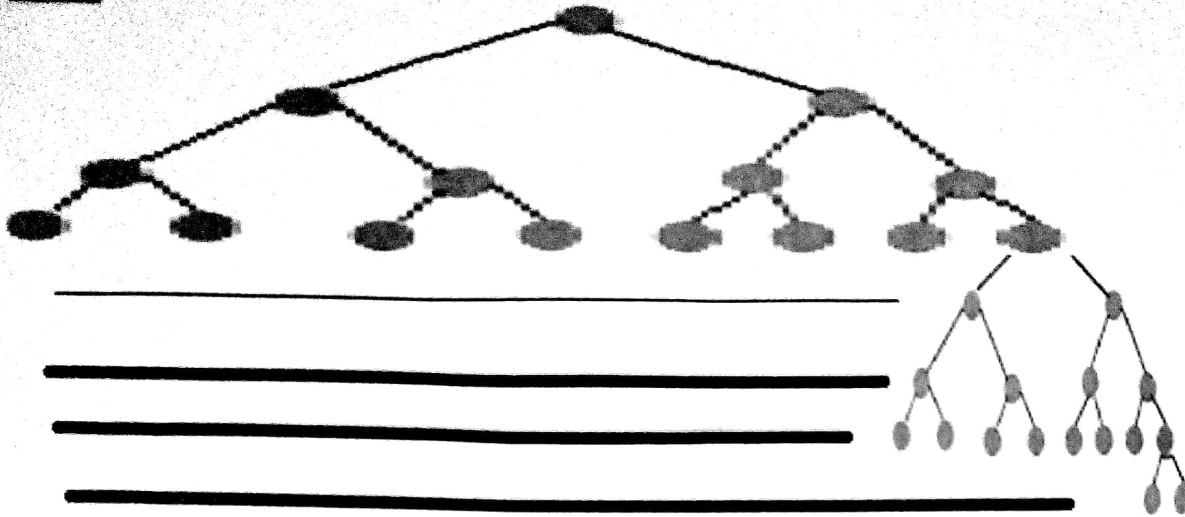
**Q3-B)** Here is an array of the following integers: 5 11 3 8 9 1 7 15 0 2 6 13 4  
Use four Sorting algorithms for; each determine the no of iterations and the no of swaps (validate your answer by draft sketch)

**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

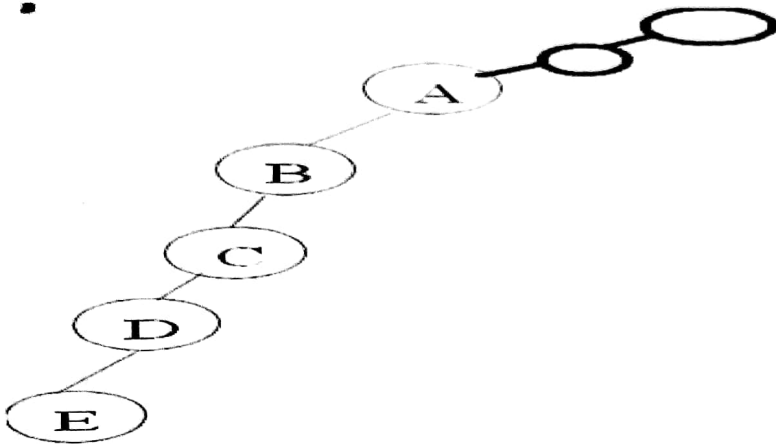
**Q2-B)**



A full binary tree of a given height  $k$  has  $2^{k+1}-1$  nodes.

$$K = 7$$

$$So = 2^{7+1}-1$$



**2- C)** Objects which are stored in a stack are kept in a pile. The last item put into the stack is on the top. When an item is pushed into a stack, it is placed at the top of the pile. When an item is popped, it is always the top item which is removed