Course Name: B.Sc. Physical Science/ Mathematical Science
Paper Name: Discipline Specific Elective - (DSE) Data Structures (BSCS05A)
Credit: 6
Date: 18 July 2021

Unit	Topic	Sections	Reference	No. of hrs
1	**Arrays** Single, Multi-dimensional, Sparse	Ch-7 (7.1.1), (7.1.2), (7.1.3), (7.1.4) and (7.4.1)	2	16
	Sorting Bubble, Selection, Insertion, Merge, and Quick	Ch-9 (9.1.1), (9.1.2), (9.1.3), (9.3.3), and (9.3.4)	1	
	Searching Linear and Binary	Ch-7 Page 387-388, 394	3	
2	**Stacks** Implementing using array,	Ch-4 (4.1)	1	8
	Prefix, Infix and Postfix expressions, Application of stacks for conversion of infix to prefix and postfix expressions, Evaluation of postfix expressions	Ch-2 (2.3) (upto page 108)	3	
3	**Queues** Implementing simple queue, circular queues, priority queues using array	Ch-4 (4.2), (4.3), and (4.6)	1	8
4	**Linked Lists** Single, double, and circular Implementing Stack and Queue	Ch-3 (3.1), (3.2). and (3.3) Ch-4 (4.4), and (4.5)	1	12
5	**Recursion** Recursive solutions to simple problems and their implementation, Advantages, Limitations	Ch-5 (5.1), (5.2), (5.3), and (5.10)	1	8
6	**Trees** Introduction to tree as a data structure, binary trees, binary search tree- creation and traversal techniques	Ch-6 (6.1), (6.2), (6.4) (upto page 230)	1	8

*All portions are covered excluding analysis of algorithms

18/7/2021   18/07/21   Sakeena 18/7/21

References

1. Drozdek, Adam (2019). Data Structures and Algorithms in C++ (4th edition). Cengage Learning
2. Sahni, Sartaj (2011). Data Structures, Algorithms and Applications in C++ (2nd edition). University Press
3. Tenenbaum, A. M., Augenstein, M. J., & Langsam, Y. (2009). Data Structures using C and C++ (2nd edition). PHI.

Practical List

Implement the following programs in C++:

1. To sort the elements of an array using:
   a. Bubble sort
   b. Selection sort
   c. Insertion sort
   d. Merge sort
   e. Quick sort.

2. To search an element using Linear Search in:
   a. An array
   b. A Linked List

3. To search an element in a sorted array using Binary Search.

4. Write a menu driven program to implement Stack data structure using (I) Array (II) Linked Lists with the following operations:
   a. push()
   b. pop()
   c. peek()
   d. isFull()
   e. isEmpty()
   f. display()

5. Using a stack data structure:
   a. Convert infix expression into prefix expression
   b. Convert infix expression into postfix expression
   c. Evaluate postfix expression

6. Write a menu driven program to implement Queue data structure using (I) Array (II) Linked Lists with the following operations:
   a. enqueue()
   b. dequeue()
   c. peek()
   d. isFull()
   e. isEmpty()
   f. display()

7. Write a menu driven program to implement Circular Queue using array with the following operations:
   a. insert() Or enqueue()

b. delete() Or dequeue()
c. isFull()
d. isEmpty()
e. display()

8. Implement solutions to the following problems using recursion:
   a. Tower of Hanoi
   b. Fibonacci series

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