

A. Course Handout (Student & Faculty)

| | | | |
|--------------------------------|---|----------------|-----------------------|
| Institute/School/College Name | Chitkara University Institute of Engineering & Technology | | |
| Department/Centre Name | Department of Electronics and Communication Engineering | | |
| Programme Name | Bachelor of Engineering (B.E.)- Electronics & Communication Engineering | | |
| Course Name | Data Structures Lab | Session | 2019-20 |
| Course Code | CSP2210 | Semester/Batch | 6 th /2017 |
| Lecture/Tutorial (Per Week) | 0-0-2 | Course Credit | 1 |
| Course Expert | Mr. Rajvir Singh | | |
| Course coordinator Name (SPOC) | Dr. Meenu Garg | | |

B.

1. Scope & Objective of the Course:

- To understand the elementary data structures and the basic operations on data structures.
- To understand the time and memory complexity of basic algorithms constructs.
- To understand the basic algorithms for insertion, deletion, and traversal in elementary data structures.
- To understand the basic searching and sorting algorithms for various data structures

2. Course Learning Outcome:

On successful completion of this course, student should be able to:

- **CLO01:** Understand the basic types for data structure, implementation and application.
- **CLO02:** Determine time and memory complexity of basic algorithm constructs.
- **CLO03:** Implement algorithms for the creation, insertion, deletion, and traversal of each data structure.
- **CLO04:** Solve problems based on searching and sorting algorithms.
- **CLO05:** Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures

3. Recommended Books (Reference Books/Text Books):

- **B1:** Thareja R. Data structures using C. Oxford University Press, Inc.; 2011 Mar 25, Second Edition.
- **B2:** Lipschutz, S., 2003. Schaum's outline of Data Structures with C. Tata McGraw-Hill Companies, Inc.2011.
- **B3:** Langsam Y, Augenstein MJ, Tenenbaum AM. Data Structures using C and C++. Prentice-Hall of India; 2000, Second Edition.
- **B4:** Gilberg RF, Forouzan BA. Data Structures. Thomson India Edition. 2005, Second Edition.

4. Other readings & relevant websites:

| S. No. | Link of Journals, Magazines, websites and Research Papers |
|--------|---|
| 1 | https://www.geeksforgeeks.org/data-structures/ |
| 2 | https://www.w3schools.in/data-structures-tutorial/intro/ |
| 3 | http://www.cs.cmu.edu/~adamchik/15-121/lectures/Stacks%20and%20Queues/Stacks%20and%20Queues.html |
| 4 | http://www.cs.sunysb.edu/~skiena/214/lectures/ |
| 5 | http://www.haskell.org/haskellwiki/Research_papers/Data_structures |

5. Recommended Tools and Platforms:

Software: Examly Platform

6. Lab Plan

| S. No. | Experiment Detail |
|--------|---|
| 1 | Write a menu driven program that implements following operations on a linear array: <ul style="list-style-type: none"> • Insert a new element at a specified position • Delete an element either whose value is given or whose position is given • To find the location of a given element • To display the elements of the linear array |
| 2 | Write a program to accept N numbers from the user and store them in an array. Then, accept another number from the user and search that using Linear Search. |
| 3 | Write a program to accept N integers from the user and store them in an array. Sort the array in ascending order using Bubble sort. Then accept another number from the user, search whether that number exists in the array using Binary Search. If it does, display its index and if it doesn't, then print that the number is not found in the array. |
| 4 | Write a menu driven program that implements the following operations on a doubly and Circular linked list : <ul style="list-style-type: none"> • Insert a new element at the beginning ,end and in-between the given list • Delete an existing element • Search an element • Display all the elements |
| 5 | Write a menu driven program that implements the following operations on a Stack(either implement as Linear array and as Linked list) : <ul style="list-style-type: none"> • Push • Pop • Display Top of the stack |
| 6 | Write a program to demonstrate the use of stack in converting arithmetic expression from infix notation to postfix notation and in evaluating arithmetic postfix expression. |
| 7 | Menu driven Program to demonstrate the implementation of various operations on a Circular queue (using a linear array and a linked list) |
| 8 | Write a program to accept N numbers in an array, and then sort the array using Insertion Sort. Then accept a number from the user and insert it in the array according to the sequential order |
| 9 | Write a program to accept N numbers in an array, and then sort the array using Quick Sort. |
| 10 | Write a program to accept N numbers from the user in one array and M numbers in another array. Then, sort the arrays using Selection Sort and then merge these two arrays using Merge Sort. |
| 11 | Write a menu driven program that implements the following operations on a Binary search tree : <ul style="list-style-type: none"> • Insert a new element • Delete an existing element • Traversing the tree <ul style="list-style-type: none"> ○ Pre-order Traversal ○ In-order Traversal ○ Post-order Traversal |
| 12 | Sort the list of integers using heap tree (Heap sort) |
| 13 | Program including all Operations on Graph and illustrate the traversals using DFS and BFS |

7. Evaluation Scheme and Components:

| Evaluation Component | Type of Component | No. of Assessments | Weightage of Component | Mode of Assessment |
|----------------------|------------------------------|--------------------|------------------------|--------------------|
| Component 1 | Lab Performance* / File work | 04 | 40% | Online |
| Component 2 | Internal Viva – Voce | 01 | 20% | Online |
| Component 3 | End Term Viva-Voce** | 01 | 40% | Online |
| Total | | | 100% | |

*Lab Performance will be evaluated periodically.

**The End Term examination for practical courses is held at the end of semester and includes conduct of experiment and an oral examination (viva voce). The mandatory requirement of 75% attendance in all lab classes is to be met for being eligible to appear in this component

This Document is approved by:

| Designation | Name | Signature |
|---------------------------|---------------------|-----------|
| Course Coordinator (SPOC) | Dr. Meenu Garg | |
| Course Expert | Mr. Rajvir Singh | |
| Programme In-charge | Mr Gurjinder Singh | |
| Dy. Dean/Dean | Dr Shivani Malhotra | |
| Date (DD/MM/YYYY) | 06/01/2020 | |