**Modern Education Society’s**

**College of Engineering, Pune**

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| **NAME OF STUDENT: CLASS:** |
| **SEMESTER/YEAR: ROLL NO:** |
| **DATE OF PERFORMANCE: DATE OF SUBMISSION:** |
| **EXAMINED BY: EXPERIMENT NO: DSL A-01** |

###### TITLE : Perform various operations on array

**PROBLEM STATEMENT:**  In second year computer engineering class, group A student’s play cricket, group B students play badminton and group C students play football.

Write a Python program using functions to compute following: -

1. List of students who play both cricket and badminton
2. List of students who play either cricket or badminton but not both
3. Number of students who play neither cricket nor badminton
4. Number of students who play cricket and football but not badminton.

(Note- While realizing the group, duplicate entries should be avoided, do not use SET built-in functions)

### **OBJECTIVES:**

1. To understand structure of Array.
2. To understand How Create, Display and perform various operations on array.

### **OUTCOMES:**

1. To analyze the problems to apply suitable algorithm and data structure.
2. To discriminate the usage of various data structures in approaching the problem solution.
3. To understand concept of linear data structure

**PRE-REQUISITES:**

* 1. Knowledge of python programming
  2. Knowledge of array

**APPARATUS:**

**QUESTIONS:**

1. What is structure?
2. How to delete an element from array? (Explain logic)

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| **EXAMINED BY: EXPERIMENT NO: DSL A-02** |

###### TITLE: Perform various operations on array

**PROBLEM STATEMENT:**  Write a Python program to store marks scored in subject “Fundamental of Data Structure” by N students in the class. Write functions to compute following:

1. The average score of class
2. Highest score and lowest score of class
3. Count of students who were absent for the test
4. Display mark with highest frequency

### **OBJECTIVES:**

1. To understand structure of Array.
2. To understand how create, display and perform various operations on array.

### **OUTCOMES:**

1. To analyze the problems to apply suitable algorithm and data structure.
2. To discriminate the usage of various data structures in approaching the problem solution.
3. To understand concept of linear data structure

**PRE-REQUISITES:**

* 1. Knowledge of python programming
  2. Knowledge of array data structure

**APPARATUS:**

**QUESTIONS:**

1. What is static and dynamic memory allocation?
2. Explain difference between list and array in python with an example.

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| **EXAMINED BY: EXPERIMENT NO: DSL A-09** |

###### TITLE : Perform various operations on matrices

**PROBLEM STATEMENT:**  Write a **Python** program to compute following computation on matrix:

a) Addition of two matrices B) Subtraction of two matrices

c) Multiplication of two matrices d) Transpose of a matrix

### **OBJECTIVES:**

1. To understand structure of 2DArray.
2. To understand how to Create, Display and perform various operations on 2D array.

### **OUTCOMES:**

1. To analyze the problems to apply suitable algorithm and data structure.
2. To understand concept of multi-dimensional array.

**PRE-REQUISITES:**

* 1. Knowledge of python programming
  2. Knowledge of 2D array and matrix operations.

**APPARATUS:**

**QUESTIONS:**

* + - 1. What is sparse matrix? Explain with example.
      2. Write algorithm to perform fast transpose on sparse matrix.

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| **EXAMINED BY:** | **EXPERIMENT NO: DSL B-11** |

**TITLE : SEARCHING OPERATIONS**

**PROBLEM STATEMENT :**

1. Write a Python program to store roll numbers of student in array who attended training program in random order. Write function for searching whether particular student attended training program or not, using Linear search and Sentinel search.
2. Write a Python program to store roll numbers of student array who attended training program in sorted order. Write function for searching whether particular student attended training program or not, using Binary search and Fibonacci search

**OBJECTIVES :  
 1.** To understand structure of Array.  
 **2.** To understand How to search given key using different searching operations.

**OUTCOME :** 1. To operate on the various structured data.  
 2. To analyze the problem to apply suitable algorithm and data structure.

**PRE-REQUISITES :  
 1.** Knowledge of Python Programming  
 2. Knowledge of searching methods and array.

**APPARATUS :**

**QUESTIONS :**

1. Compare all searching algorithms with its time complexity.(Write answer in tabular format)

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| **EXAMINED BY:** | **EXPERIMENT NO: DSL B-14** |

**TITLE : SORTING OPERATION**

**PROBLEM STATEMENT :** Write a **Python** program to store first year percentage of students in array. Write function for sorting array of floating point numbers in ascending order using

1. Selection Sort
2. Bubble sort and display top five scores.

**OBJECTIVES :**

**1.** To understand structure of Array.  
 **2.** To understand how to sort elements of given array.

**OUTCOME :** 1. To operate on the various structured data.  
 2. To analyze the problem to apply suitable algorithm and data structure.

**PRE-REQUISITES :**

**1.** Knowledge of Python Programming  
 2. Knowledge of sorting methods and array.

**APPARATUS :**

**QUESTIONS :**

1. Explain Merge sort with example and write C++ program for same.

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| **EXAMINED BY:** | **EXPERIMENT NO: DSL B-16** |

**TITLE : SORTING OPERATION**

**PROBLEM STATEMENT :** Write a Python program to store first year percentage of students in array. Write function for sorting array of floating-point numbers in ascending order using quick sort and display top five scores.

**OBJECTIVES :  
 1.** To understand structure of Array.  
 **2.** To understand How to sort elements of given array.

**OUTCOME :** 1. To operate on the various structured data.  
 2. To analyze the problem to apply suitable algorithm and data structure.

**PRE-REQUISITES :  
 1.** Knowledge of Python Programming  
 2. Knowledge of quick sorting method and array.

**APPARATUS :**

**QUESTIONS :**

1. Explain Merge sort with example and write C++ program for same.

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| **EXAMINED BY: EXPERIMENT NO: DSL C-19** |

**TITLE : TO PERFORM VARIOUS OPERATIONS ON LINK LIST .**

**PROBLEM STATEMENT :**Department of Computer Engineering has student's club named 'pinnacle club' . Students of second ,third and final year of department can be granted membership on request . Similarly on may cancel the membership of club .First node is reserved for the president of the club and last node is reserved for the secretary of club .write C++ program to maintain club members information using singly linked list .store student PRN and Name .Write function to:

a) Add and Delete the members as well as the president or even secretary .

b)Compute total numbers of members of club .

c)Display members .

d)Display list in reverse order using recursion .

e)Two linked lists exists for two divisions .Concatinate two lists .

**OBJECTIVES:**

1. To understand structure of singly linked list .

2. To understand how to Create,Display and perform various operations on singly linked list .

**OUTCOMES:**

1.To analyze the problems to apply suitable algorithm and data structure .

2.To discriminate the usage of various data structures in approaching the problem solution .

3.To understand concepts of Linear Data Structure (singly linked lists ) .

**PRE-REQUISITES:**

1.Knowledge of C++ programming .

2.Knowledge of singly linked lists .

**APPARATUS:**

**QUESTIONS:**

1. What is a linked list ? State it's types .

2. Write applications of SLL.

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| **EXAMINED BY: EXPERIMENT NO:DSL C-22** |

**TITLE : TO PERFORM VARIOUS OPERATIONS ON LINK LIST .**

**PROBLEM STATEMENT :** Second year Computer Engineering class, set A of students like Vanilla ice-cream and set B of students like Butterscotch ice-cream Write C++ program to store two sets using Linked List. Compute and display-

i. Set of students who like both vanilla and butterscotch

ii. Set of students who like either vanilla or butterscotch or not both

iii. Number of students who like neither vanilla nor butterscotch

**OBJECTIVES:**

1. To understand structure of singly linked list .

2. To understand how to Create, Display and perform various operations on singly linked list.

**OUTCOMES:**

1.To analyze the problems to apply suitable algorithm and data structure .

2.To discriminate the usage of various data structures in approaching the problem solution .

3.To understand concepts of Linear Data Structure (singly linked lists ) .

**PRE-REQUISITES:**

1.Knowledge of C++ programming .

2.Knowledge of singly linked lists .

**APPARATUS:**

**QUESTIONS:**

1. What is Generalized Lined List? Explain with example?

2. What are the advantages of Dynamic memory allocation?

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| **EXAMINED BY:** | **EXPERIMENT NO: DSL D-26** |

**TITLE :PERFORM VARIOUS OPERATION ON STACK TO CHECK WELL PARENTHESIZED EXPRESSION**

**PROBLEM STATEMENT :** In any language program mostly syntax error occurs due to unbalancing delimiter such as (),{},[]. Write C++ program using stack to check whether given expression is well parenthesized or not.

**OBJECTIVES :  
 1.** To understand structure of stack.  
 **2.** To understand How to Create, Display and perform various operation on stack.

**OUTCOME :** 1. To use effective and efficient data structure in solving Computer Engineering   
 domain problem.  
 2. To analyze the problem to apply suitable algorithm and data structure.  
 3. To discriminate the usage of various structure in approaching problem solution.

**PRE-REQUISITES :  
 1.** Knowledge of C++ Programming  
 2. Knowledge of stack.

**APPARATUS :**

**QUESTIONS :**1. Explain the types of stack.  
2. Write down the application of stack.

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| **EXAMINED BY:** | **EXPERIMENT NO: DSL D-27** |

**TITLE :PERFORM VARIOUS OPERATION ON STACK AND IMPLEMENT ITS APPLICATION**

**PROBLEM STATEMENT :** Implement C++ program for expression conversion as infix to postfix and its evaluation using stack based on given conditions

i. Operands and operator, both must be single character.

ii. Input Postfix expression must be in a desired format.

iii. Only '+', '-', '\*' and '/ ' operators are expected.

**OBJECTIVES :  
 1.** To understand structure of stack.  
 **2.** To understand How to Create, Display and perform various operation on stack.

**OUTCOME :** 1. To operate on the various structured data.  
 2. To analyze the problem to apply suitable algorithm and data structure.  
 3. To discriminate the usage of various structure in approaching problem solution.

**PRE-REQUISITES :  
 1.** Knowledge of C++ Programming  
 2. Knowledge of stack.

**APPARATUS :**

**QUESTIONS :**1. Evaluate the following postfix expression and show all steps: ab\*c+d-e+  
2. Write an algorithm to prefix to postfix.

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| **EXAMINED BY:** | **EXPERIMENT NO: DSL E-29** |

**TITLE : To add and delete from Job queue.**

**PROBLEM STATEMENT:** Queues are frequently used in computer programming, and a typical example is the creation of a job queue by an operating system. If the operating system does not use priorities, then the jobs are processed in the order they enter the system. Write C++ program for simulating job queue. Write functions to add job and delete job from queue.

**OBJECTIVES :  
 1.** To understand structure of queues.  
 **2.** To understand queue pointers and processing of queue to know how to insert and remove from queue.

**OUTCOME :** 1. To operate on the various structured data.  
 2. To analyze the problem to apply suitable algorithm and data structure.

**PRE-REQUISITES :  
 1.** Knowledge of C++ Programming  
 2. Knowledge of queue without priority.

**APPARATUS :**

**QUESTIONS:**1. Describe queue operations and its usage as job queue.

2. Describe how to implement queue using stack.

3. What do you mean by linear data structures? Give examples of it.

4. Why queue is efficient data structure to assign jobs?

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| **EXAMINED BY:** | **EXPERIMENT NO: DSL E-31** |

**TITLE : To implement double-ended queue.**

**PROBLEM STATEMENT:** A double-ended queue (deque) is a linear list in which additions and deletions may be made at either end. Obtain a data representation mapping a deque into a one- dimensional array. Write C++ program to simulate deque with functions to add and delete elements from either end of the deque.

**OBJECTIVES :  
 1.** To understand structure of double ended queues.  
 **2.** To understand data representation using double ended queue for one-dimensional array.

**OUTCOMES:** 1. To operate on the various structured data.  
 2. To analyze the problem to apply suitable algorithm and data structure.

3. To discriminate the usage of various structure in approaching problem solution.

**PRE-REQUISITES :  
 1.** Knowledge of C++ Programming  
 2. Knowledge of queue and priority queue.

**APPARATUS :**

**QUESTIONS:**1. Describe double ended queue operations.

2. How can we process one-dimensional array using double ended queue?

3. What are advantages of double ended queue over simple queue?

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| **EXAMINED BY:** | **EXPERIMENT NO: DSL E-32** |

**TITLE : To implement circular queue.**

**PROBLEM STATEMENT:** Pizza parlor accepting maximum M orders. Orders are served in first come first served basis. Order once placed cannot be cancelled. Write C++ program to simulate the system using circular queue using array.

**OBJECTIVES :  
 1.** To understand structure of circular queues.  
 **2.** To understand orders processing system using circular queue.

**OUTCOMES:** 1. To operate on the various structured data.  
 2. To analyze the problem to apply suitable algorithm and data structure.

3. To discriminate the usage of various structure in approaching problem solution.

**PRE-REQUISITES :  
 1.** Knowledge of C++ Programming  
 2. Knowledge of queue and double ended queue.

**APPARATUS :**

**QUESTIONS:**1. Describe circular queue operations.

2. How is order processing convenient using circular queue ended queue?

3. Discuss time complexity of circular queue.

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| **DATE OF PERFORMANCE:** | **DATE OF SUBMISSION:** |
| **EXAMINED BY:** | **EXPERIMENT NO: DSL MINIPROJECT** |

**TITLE : Mini project .**

**PROBLEM STATEMENT:**

**OBJECTIVES :  
 1.**

**OUTCOME :** 1. To operate on the various structured data.  
 2. To analyze the problem to apply suitable algorithm and data structure.

3. To discriminate the usage of various structure in approaching problem solution.

**PRE-REQUISITES :  
 1.**

**APPARATUS :**

**QUESTIONS:**1. What are different data structures used in your project?

2. Discuss about time and space complexity of your project.

3. How can this project solve problems in real life applications?