# Pandit Deendayal Energy University

## School of Technology

### Department of Computer Science & Engineering

Odd Semester 2021-2022

**PRACTICAL EXAM – DATA STRUCTURES**

**Date: 21/11/2022**

**List of Practicals**

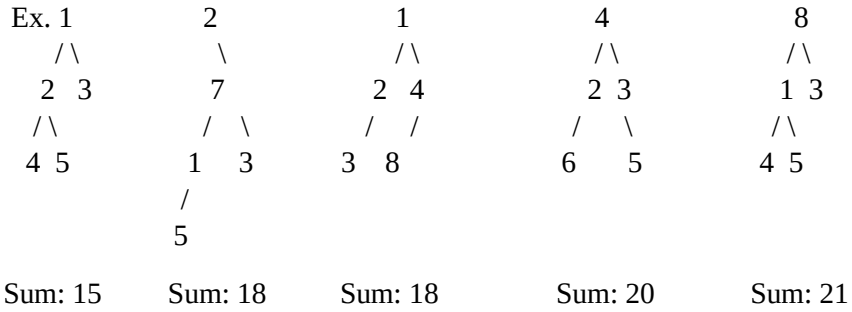
All the students are expected to do **ONE** of the following experiments based on the **Number Written on their Answer Sheets**.

1. **Linked List:** Create a linked list of 5 numbers. Write a function to swap the number with its successor number in the list. Your program should have following three functions. You may write other functions if required. However, these three are mandate.
   a. createList(): This function creates the linked list of 5 numbers.
   b. printfList(): This function prints the linked list.
   c. swapNumber(): This function takes the number 'n' as input and swap the $n^{th}$ number with $(n+1)^{th}$ number in the list.
   **Test Case**: Input: 1 => 2 => 3 => 4 => 5 Output: if n=1 then function should swap $1^{st}$ and $2^{nd}$ number (2 => 1 => 3 => 4 => 5). If n=3 then function should swap $3^{rd}$ and $4^{th}$ number (1 => 2 => 4 => 3 => 5)

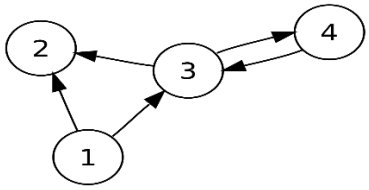
2. **Stack:** Create a stack with functions like push(), pop(), empty, full(), and print(). Write a function to delete the middle element of stack without using any additional data structures.
   **Test Cases:** Input = [1, 2, 3, 4, 5] then Output = [1, 2, 4, 5]
   Input = [1, 2, 3, 4, 5, 6] then Output = [1, 2, 4, 5, 6]

3. **Queue**: Create a queue of 5 numbers using operations like enqueue(), dequeue(), empty(), full(), print(). Write a program to reverse the numbers present in queue.
   **Test Cases**: Input = [10, 20, 30, 40, 50] then Output = [50, 40, 30, 20, 10]

4. **Trees:** Create a binary tree of 5 numbers. You can create any structure of tree as given below. Your task is to write a function that prints the sum of all the nodes
   **Test cases:**




5. **Graph:** Take the following directed graph as an input (either by adjacency matrix or adjacency list method). Take any two vertices (v1 and v2) as an input from user. Print "**Yes**" is there is a path from v1 to v2 else print "**No**".




   **Test Cases**: v1 = 1 and v2 = 4 then print "Yes"
   v1 = 4 and v2 = 1 then print "No"
   v1 = 2 and v2 = 4 then print "No"
   v1 = 3 and v2 = 2 then print "Yes"