ACADEMY OF TECHNOLOGY
Lab Assignment (Day 3)
Paper name: Design and Analysis of Algorithms Lab
Code: PCC-CS494   **Semester: 4th**
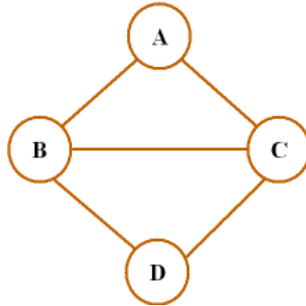**Discipline: CSE**   **Time: 2 Hours**
Date: March 08, 2023

1. Write a program in C or C++ to read a graph from file and to store the graph in adjacency matrix. Implement the following operations.

    1. Find the number of edges of the graph.

    2. Find the total degree of the graph.

    3. Display the adjacent of a given vertex.

    4. Display the graph.

The information of the above graph is stored in a file **Ex.txt**. The first line indicates the number of vertices of the graph. Rest four lines show the adjacency information of the graph.

The following C and CPP codes read the graph from the file and store the graph in adjacency matrix.

```c
1   //C code
2   #include <stdio.h>
3   #include <stdlib.h>
4
5   int main () {
6      FILE *fp;     //create a pointer to a file
7      fp= fopen ("Ex.txt", "r"); //open a file in read mode,
          ex.txt must exist in the same directory
8                     //oherwise it is requir to mention the absolute
                        path
9      if (fp == NULL) {          //if file open failed then fopen()
          returns NULL
10        printf("\nError to open the file\n");
11        exit (1);
12     }
13
14     int n;
15     fscanf(fp,"%d",&n); //fscanf function read a data (in
          specified format as scanf())
16              //from file pointed by the pointer fp
17     int graph[10][10];
18     int i,j;
19     for(i=0;i<n;i++){
20        for(j=0;j<n;j++){
21           fscanf(fp,"%d",&graph[i][j]); //read a graph from file
22        }
23     }
24     for(i=0;i<n;i++){
25        for(j=0;j<n;j++){
26           printf("%3d",graph[i][j]); //read a graph from file
27        }
28      printf("\n");
29     }
30     fclose (fp);   //to close the file
31     return 0;
32  }
```

```cpp
//C++ code

#include<iostream>
#include<fstream>
using namespace std;
int main () {
    fstream infile;    //create aa object of fstream class
    infile.open("Ex.txt", ios::in); //open a file in read mode
        (ios::in), ex.txt must exist in the same directory
                    //oherwise it is require to mention the
                        absolute path
    if (!infile) {          //to check whether the file is opened
        successfully
      printf("\nError to open the file\n");
      exit (1);
    }
    int n;
    infile>>n; //to read number of vertices from file
    int graph[10][10];
    int i,j;
    for(i=0;i<n;i++){
       for(j=0;j<n;j++){
         infile>>graph[i][j]; //read a graph from file
     }
    }
    for(i=0;i<n;i++){
       for(j=0;j<n;j++){
         printf("%3d",graph[i][j]); //read a graph from file
       }
     printf("\n");
    }
    infile.close ();   //to close the file
    return 0;
}
```

2. Write a program in C or C++ to read a graph from file and store it in adjacency list. Then implement the following operations.

    1. Find the number of edges of the graph.

    2. Find the total degree of the graph.

    3. Display the adjacent of a given vertex.

    4. Display the graph.