ACADEMY OF TECHNOLOGY

Lab Assignment (Day 3)

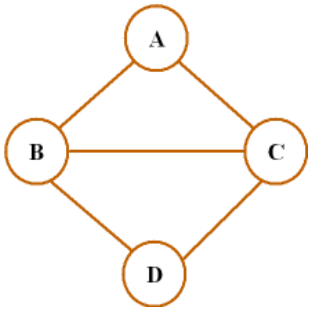
Paper name: Design and Analysis of Algorithms Lab

Code: PCC-CS494 **Semester: 4^{th}**

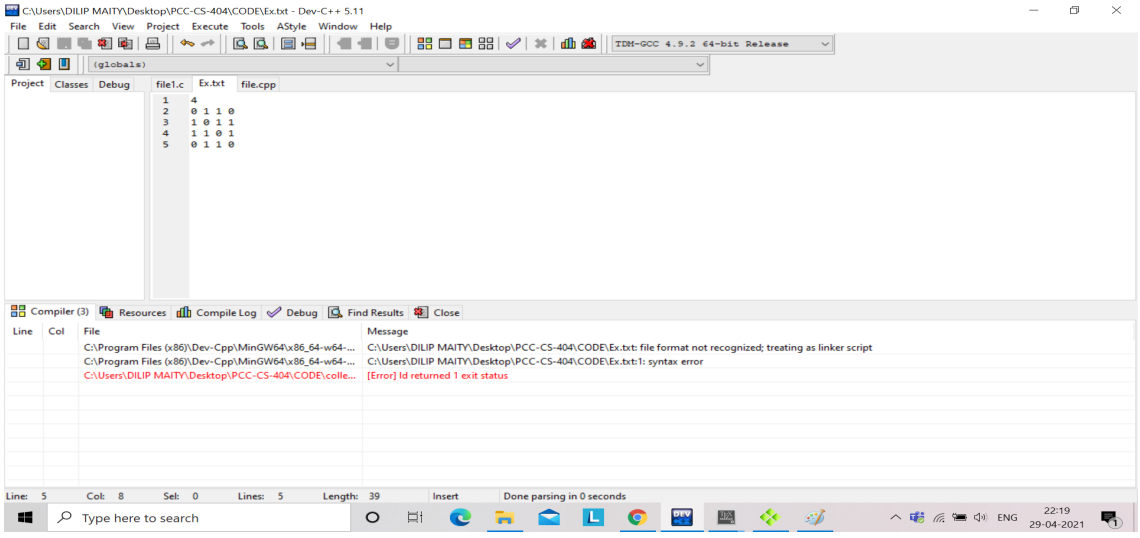
Discipline: CSE **Time: 2 Hours**

Date: April 30, 2021

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
//C code
#include <stdio.h>
#include <stdlib.h>

int main () {
   FILE *fp;    //create a pointer to a file
   fp= fopen ("Ex.txt", "r"); //open a file in read mode, ex.txt must exist in the same directory
                  //oherwise it is requir to mention the absolute path
   if (fp == NULL) {         //if file open failed then fopen() returns NULL
      printf("\nError to open the file\n");
      exit (1);
   }

   int n;
   fscanf(fp,"%d",&n); //fscanf function read a data (in specified format as scanf())
          //from file pointed by the pointer fp
   int graph[10][10];
   int i,j;
   for(i=0;i<n;i++){
      for(j=0;j<n;j++){
        fscanf(fp,"%d",&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");
   }
   fclose (fp);  //to close the file
   return 0;
}
```

```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.