

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD
End Semester Lab Examination, Monsoon 2022-23

Examination: **III BTech (CSE) & B.Tech (Common)**
Subject: **Data Structures Lab (CSC204)**

Time: **01 Hour 50 Mins**
Max. Marks: **40**

Instructions:

- i. Program file should be named as AdmissionNo_QuestionNo., e.g., 20JE0014_Q1. Save your program files into a folder, named <AdmissionNo_endSem>.
 - ii. Use of Internet is strictly prohibited. You must not copy code from the internet. Plagiarism of the submitted code will be checked and if your code found to be copied from any source, your exam will be cancelled. If your code is found copied from any other student, then both students will get **zero** marks.
 - iii. Submit the code within the time limit.
-

Questions:

1. A directed graph is a graph in which each edge has a direction associated with it. In a directed graph having an edge from the vertex u to v does not guarantee that there will be an edge from the vertex v to u .
 - a. Write a program to read an adjacency matrix as input which represents a directed graph and check whether there exists a path between two given vertices in that graph or not.

Sample Input:

Enter the number of vertices: 7

Enter the 0th row of the adjacency matrix: 0, 1, 0, 0, 0, 0, 0

Enter the 1st row of the adjacency matrix: 0, 0, 1, 0, 1, 0, 0

Enter the 2nd row of the adjacency matrix: 0, 0, 0, 1, 0, 0, 0

Enter the 3th row of the adjacency matrix: 0, 0, 0, 0, 0, 0, 1

Enter the 4th row of the adjacency matrix: 0, 0, 0, 1, 0, 0, 0

Enter the 5th row of the adjacency matrix: 1, 0, 0, 0, 1, 0, 1

Enter the 6th row of the adjacency matrix: 0, 0, 0, 0, 1, 0, 0

Enter the source vertex: 0

Enter the destination vertex: 6

Sample output:

Path exists.

- b. Write a program to print all the vertices v which are not reachable within the distance $D(u, v)$. Here u is the source vertex and the distance $D(u, v)$ is measured as the total number of edges in the path from the vertex u to vertex v .

Sample Input:

Enter the source vertex: 0

Enter the distance: 2

Sample Output:

3, 5, 6

2. A complete binary tree is a binary tree in which except the last level every level will be full and the node will be inserted from left to right. Your task in this problem is to do the followings:
- a. Write a function ***CompBT()*** to create a complete binary tree from the user given keys and then find out the leaf node having minimum value among all the leaf nodes of that created tree.

Sample Input:

Enter the value of nodes: 50, 30, 65, 25, 20, 60, 70

Sample Output: 20

- b. Write a function ***isBST()*** to check whether the tree created in question 2.a is a binary search tree or not? If yes then print **TRUE**, otherwise print **FALSE**.

Sample Output: FALSE