ACADEMY OF TECHNOLOGY
Lab Assignment (Day 11)
Paper name: Design and Analysis of Algorithms Lab
Code: PCC-CS494   **Semester: 4th**
Discipline: CSE   **Time: 2 Hours**
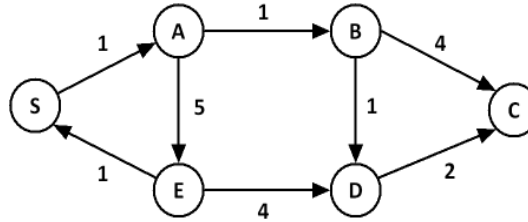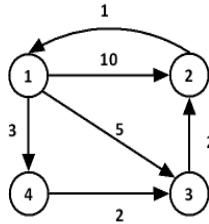*Date: July 1, 2021*

1. (a) Write a C or C++ program to find the single source shortest path (SSSP) from the source node **S** of the following graph using Bellman ford algorithm.

   (b) What happens if we change the weight of the edge (A, E) from **5** to **-5**?

2. (a) Write a C or C++ program to find the all pair of shortest path (APSP) of the following graph using Floyd-Warshall algorithm.

   Solution:

$$D^0 = \begin{bmatrix} 0 & 10 & 5 & 3 \\ 1 & 0 & \infty & \infty \\ \infty & 2 & 0 & \infty \\ \infty & \infty & 2 & 0 \end{bmatrix}$$

$$D^1 = \begin{bmatrix} 0 & 10 & 5 & 3 \\ 1 & 0 & 6 & 4 \\ \infty & 2 & 0 & \infty \\ \infty & \infty & 2 & 0 \end{bmatrix} \quad D^2 = \begin{bmatrix} 0 & 10 & 5 & 3 \\ 1 & 0 & 6 & 4 \\ 3 & 2 & 0 & 6 \\ \infty & \infty & 2 & 0 \end{bmatrix} \quad D^3 = \begin{bmatrix} 0 & 7 & 5 & 3 \\ 1 & 0 & 6 & 4 \\ 3 & 2 & 0 & 6 \\ 5 & 4 & 2 & 0 \end{bmatrix} \quad D^4 = \begin{bmatrix} 0 & 7 & 5 & 3 \\ 1 & 0 & 6 & 4 \\ 3 & 2 & 0 & 6 \\ 5 & 4 & 2 & 0 \end{bmatrix}$$

   (b) Using Print-All-Pairs-Shortest-Path algorithm find the shortest path from a given vertex to another given vertex.

   (c) What happens if we change the weight of the edge $(1, 2)$ from **10** to **-10**?