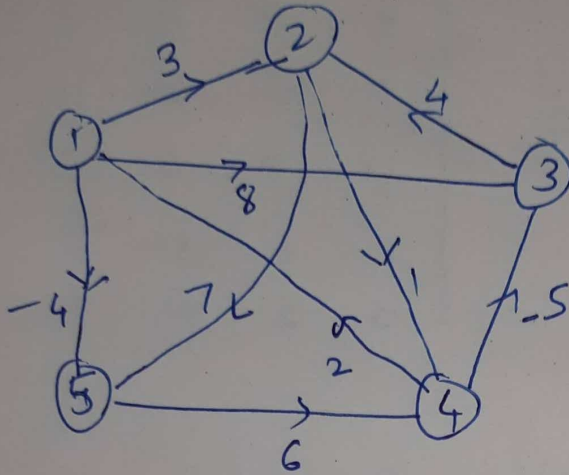


(1)

Floyd Warshall Algo.

$$A[i,j] =$$

$$\min(A[i,j], A[i,k] + A[k,j])$$

Initial

 $A_0$ 

$$\begin{bmatrix} 0 & 3 & 8 & \infty & -4 \\ \infty & 0 & \infty & 1 & 7 \\ \infty & 4 & 0 & \infty & \infty \\ 2 & \infty & -5 & 0 & \infty \\ \infty & \infty & \infty & 6 & 0 \end{bmatrix}$$

 $P_0$ 

$$\begin{bmatrix} - & 1 & 1 & - & 1 \\ - & - & - & 2 & 2 \\ - & 3 & - & - & - \\ 4 & - & 4 & - & - \\ - & - & - & 5 & - \end{bmatrix}$$

K. Vertex 1 inbetween.

Pass 1

$$A_1 = \begin{bmatrix} 0 & 3 & 8 & \infty & -4 \\ \infty & 0 & \infty & 1 & 7 \\ \infty & 4 & 0 & \infty & \infty \\ 2 & \underline{5} & -5 & 0 & \underline{-2} \\ \infty & \infty & \infty & 6 & 0 \end{bmatrix}$$

 $P_1$ 

$$\begin{bmatrix} - & 1 & 1 & - & 1 \\ - & - & - & 2 & 2 \\ - & 3 & - & - & - \\ 4 & \underline{1} & 4 & - & \underline{1} \\ - & - & - & 5 & - \end{bmatrix}$$

Q. No.

(2)

Pass 2

Vertex 2 in between.

$$A_2 \begin{bmatrix} 0 & 3 & 8 & \underline{4} & -4 \\ \infty & 0 & \infty & 1 & 7 \\ \infty & 4 & 0 & \underline{5} & \underline{11} \\ 2 & 5 & -5 & 0 & -2 \\ \infty & \infty & \infty & 6 & 0 \end{bmatrix}$$

$$P_2 \begin{bmatrix} - & 1 & 1 & \underline{2} & 1 \\ - & - & - & 2 & 2 \\ - & 3 & - & 2 & 2 \\ 4 & 1 & 4 & - & 1 \\ - & - & - & 5 & - \end{bmatrix}$$

Pass 3

Vertex 3 in between.

$$A_3 \begin{bmatrix} 0 & 3 & 8 & 4 & -4 \\ \infty & 0 & \infty & 1 & 7 \\ \infty & 4 & 0 & 5 & 11 \\ 2 & \underline{-1} & -5 & 0 & -2 \\ \infty & \infty & \infty & 6 & 0 \end{bmatrix}$$

$$P_3 \begin{bmatrix} - & 1 & 1 & 2 & 1 \\ - & - & - & 2 & 2 \\ - & 3 & - & 2 & 2 \\ 4 & \underline{3} & 4 & - & 1 \\ - & - & - & 5 & - \end{bmatrix}$$

4332

Pass 4

Vertex 4 in between.

$$A_4 \begin{bmatrix} 0 & 3 & \underline{-1} & 4 & -4 \\ \underline{3} & 0 & \underline{-4} & 1 & \underline{-1} \\ 7 & 4 & 0 & 5 & 3 \\ \underline{2} & -1 & -5 & 0 & -2 \\ \underline{8} & \underline{5} & \underline{1} & 6 & 0 \end{bmatrix}$$

$$\begin{array}{l} 1-4, 4-3 \\ 2-4-4-1 \\ 2-4-4-3 \\ 2-5-2-4-1-5 \\ 3-4-4-1 \rightarrow 3-2-4-1 \\ 3-4-1-5 \\ 3-5-1-3-2-1-5 \\ 3-4-2-5 \\ 3-2-4-1-5 \end{array}$$

$$P_4 \begin{bmatrix} - & 1 & \underline{4} & 2 & 1 \\ \underline{4} & - & \underline{4} & 2 & \underline{1} \\ 4 & 3 & 4 & - & \underline{1} \\ 4 & 3 & 4 & - & 1 \\ \underline{4} & \underline{3} & \underline{4} & 5 & - \end{bmatrix}$$

5-1  
5-4-1  
5-2  
5-4-2  
5-3  
5-4-3

Q. No.

(3)

pass 5 Vertex 5 in between

$$A_5 \begin{bmatrix} 0 & \underline{1} & \underline{-3} & \underline{2} & -4 \\ 3 & 0 & -4 & 1 & -1 \\ 7 & 4 & 0 & 5 & 3 \\ 2 & -1 & -5 & 0 & -2 \\ 8 & 5 & 1 & 6 & 0 \end{bmatrix}$$

$$P_5 \begin{bmatrix} - & \underline{3} & \underline{4} & \underline{5} & 1 \\ 4 & - & 4 & 2 & 1 \\ 4 & 3 & - & 2 & 1 \\ 4 & 3 & 4 & - & 1 \\ 4 & 3 & 4 & 5 & - \end{bmatrix}$$

$$\textcircled{1} \quad 1-5-5-2 \quad -$$

$$1-5-3-$$

$$1-5-\underline{3}-2$$

$$1-5-5-3$$

$$1-5-4-3$$

$$1-5-5-4$$

$$1-5-4$$

Path

$$1-2$$

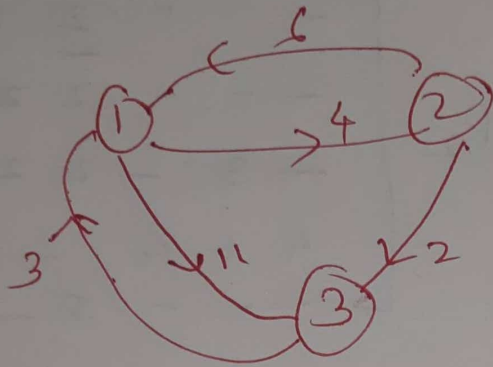
$$1-3-2$$

$$1-4-3-2$$

$$1-5-\underline{4}-3-2$$

Solve by Floyd Warshall's Algo.

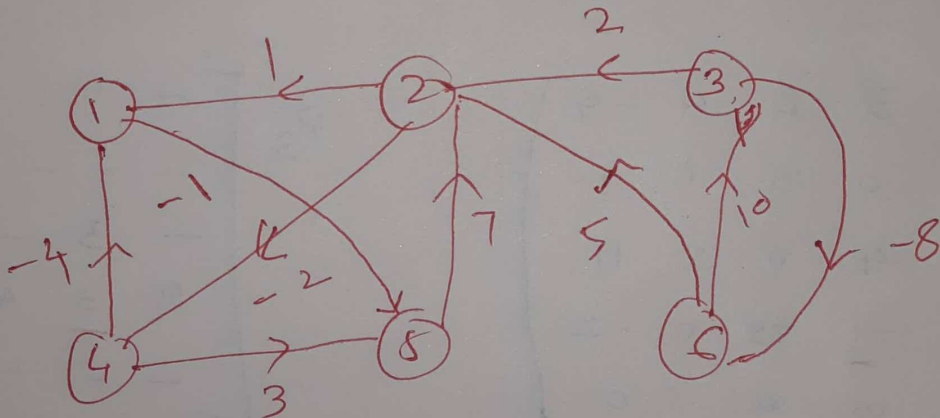
①



$$A_3 = \begin{bmatrix} 0 & 4 & 6 \\ 5 & 0 & 2 \\ 3 & 7 & 0 \end{bmatrix}$$

$$P_3 = \begin{bmatrix} - & 1 & 2 \\ 3 & - & 2 \\ 3 & 1 & - \end{bmatrix}$$

②



$$A_6 = \begin{bmatrix} 0 & 6 & \infty & 4 & -1 & \infty \\ -6 & 0 & \infty & -2 & 0 & \infty \\ -4 & -3 & 0 & -5 & -3 & -8 \\ -4 & 10 & \infty & 0 & -5 & \infty \\ 1 & 7 & \infty & 5 & 0 & \infty \\ -1 & 5 & 10 & 3 & 5 & 0 \end{bmatrix}$$

$$P_6 = \begin{bmatrix} - & 5 & - & 2 & 1 & - \\ 4 & - & - & 2 & 1 & - \\ 2 & 6 & - & 2 & 1 & 3 \\ 4 & 5 & - & - & 1 & - \\ 4 & 5 & - & 2 & - & - \\ 4 & 6 & 6 & 2 & 1 & - \end{bmatrix}$$