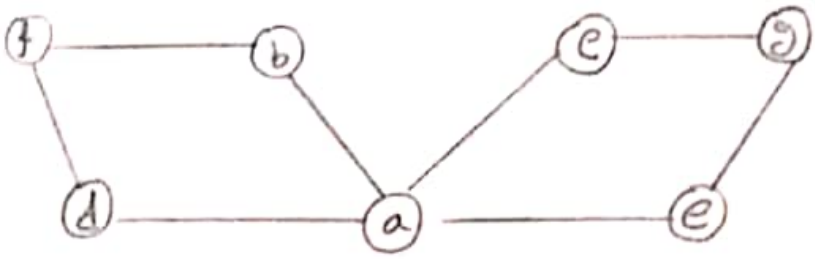
(1)

W = 16

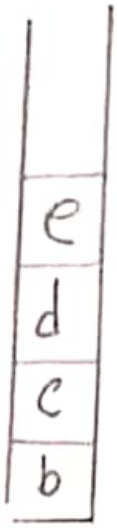
Pi	wi		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	9	1	0	0	0	0	0	0	0	0	0	10	10	10	10	10	10	10	10
6	6	2	0	0	0	0	0	0	6	6	6	10	10	10	10	10	10	16	16
5	7	3	0	0	0	0	0	0	6	6	6	10	10	10	10	11	11	16	16
1	3	4	0	0	0	1	1	1	6	6	6	10	10	10	11	11	11	16	16

Ans: 16

2. Traverse the following graph by breadth-first Search.

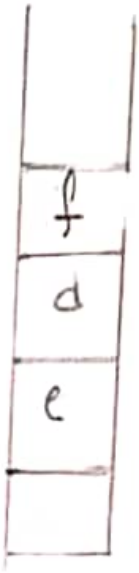


step 1



a

step 2

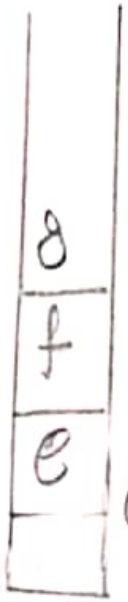


a b

step 3

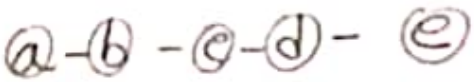
a → b → c

step 4

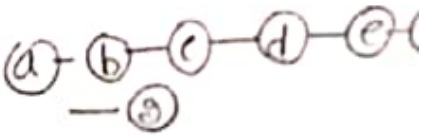


a → b → c →

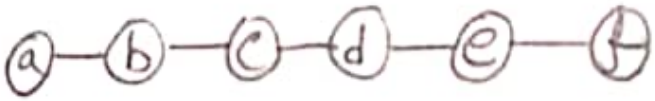
step 5

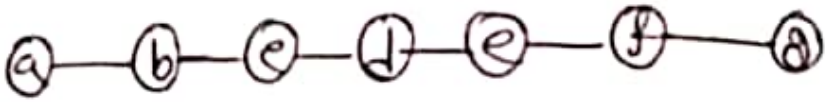


step 7

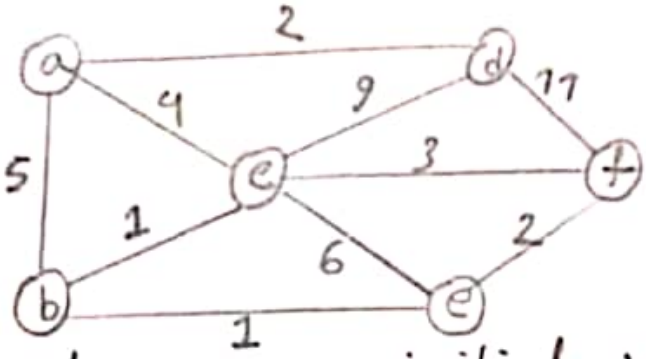


step 6



∴ BFS → 

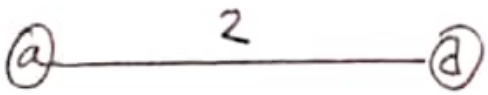
3. Determine the minimum cost spanning tree using prim's algorithm of the weighted graph



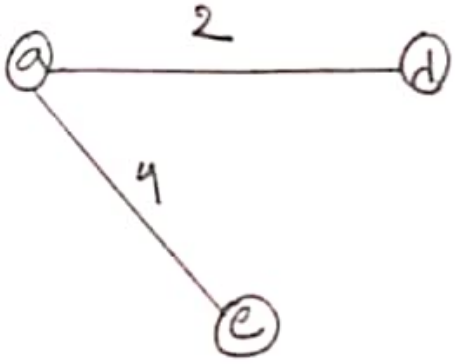
step 1 choose a initial vertex

(a)

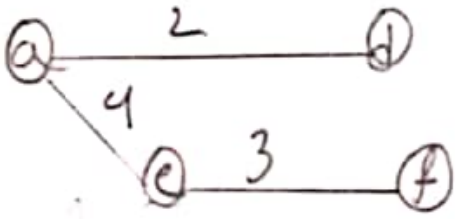
step 2



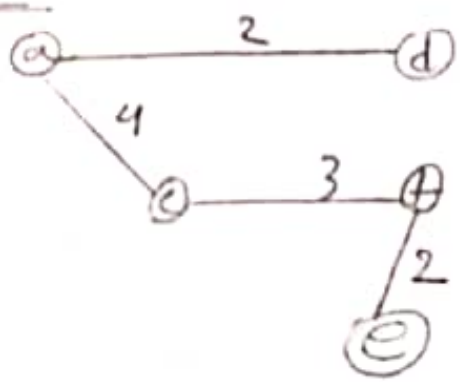
Step 3



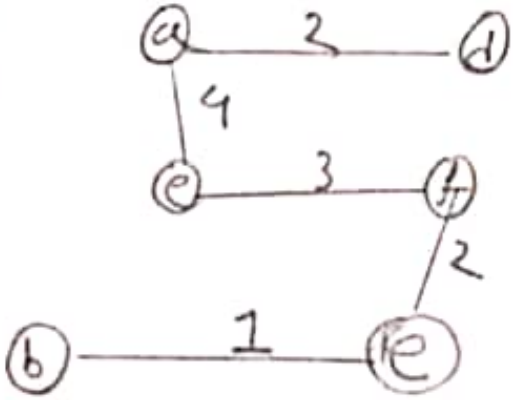
step 4



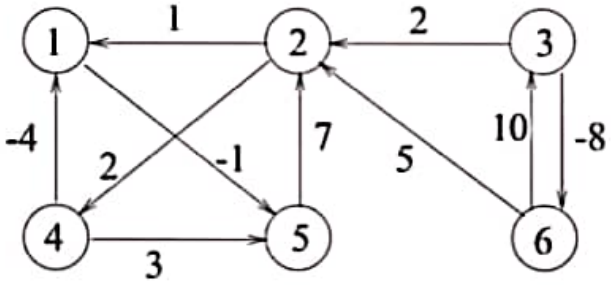
step 5



step 6



∴ Total cost : (2+4+3+2+1) = 12



Solution:

$$D^{(0)} = \begin{bmatrix} 0 & \infty & \infty & \infty & -1 & \infty \\ 1 & 0 & \infty & 2 & \infty & \infty \\ \infty & 2 & 0 & \infty & \infty & -8 \\ -4 & \infty & \infty & 0 & 3 & \infty \\ \infty & 7 & \infty & \infty & 0 & \infty \\ \infty & 5 & 10 & \infty & \infty & 0 \end{bmatrix}$$

$$D^{(1)} = \begin{bmatrix} 0 & \infty & \infty & \infty & -1 & \infty \\ 1 & 0 & \infty & 2 & 0 & \infty \\ \infty & 2 & 0 & \infty & \infty & -8 \\ -4 & \infty & \infty & 0 & -5 & \infty \\ \infty & 7 & \infty & \infty & 0 & \infty \\ \infty & 5 & 10 & \infty & \infty & 0 \end{bmatrix}$$

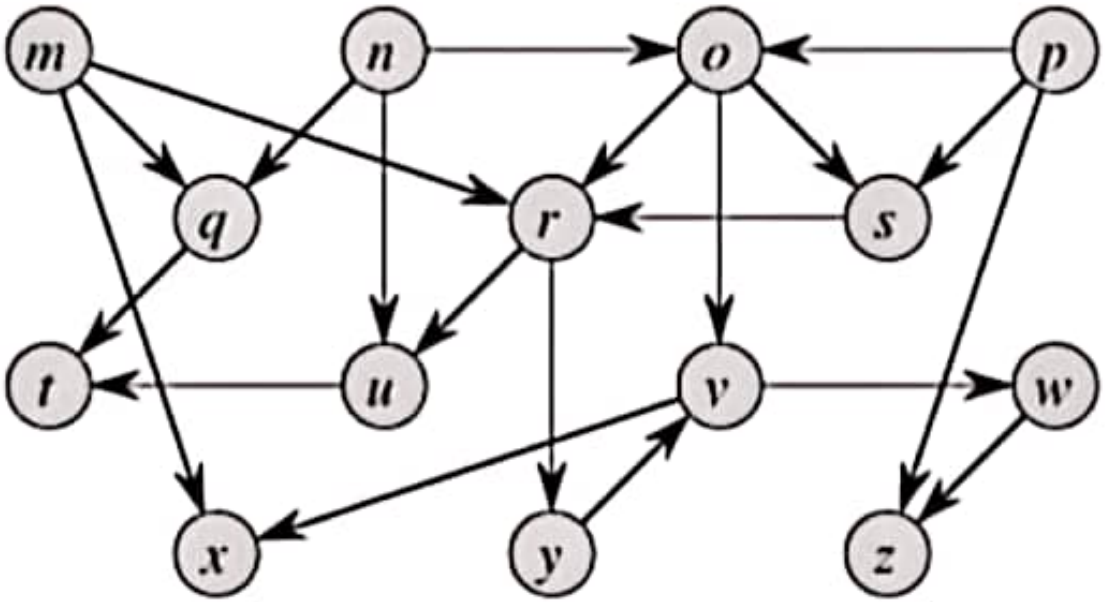
$$D^{(3)} = D^{(2)} = \begin{bmatrix} 0 & \infty & \infty & \infty & -1 & \infty \\ 1 & 0 & \infty & 2 & 0 & \infty \\ 3 & 2 & 0 & 4 & 2 & -8 \\ -4 & \infty & \infty & 0 & -5 & \infty \\ 8 & 7 & \infty & 9 & 0 & \infty \\ 6 & 5 & 10 & 7 & 5 & 0 \end{bmatrix}$$

$$D^{(4)} = \begin{bmatrix} 0 & \infty & \infty & \infty & -1 & \infty \\ -2 & 0 & \infty & 2 & -3 & \infty \\ 0 & 2 & 0 & 4 & -1 & -8 \\ -4 & \infty & \infty & 0 & -5 & \infty \\ 5 & 7 & \infty & 9 & 0 & \infty \\ 3 & 5 & 10 & 7 & 2 & 0 \end{bmatrix}$$

$$D^{(5)} = \begin{bmatrix} 0 & 6 & \infty & 8 & -1 & \infty \\ -2 & 0 & \infty & 2 & -3 & \infty \\ 0 & 2 & 0 & 4 & -1 & -8 \\ -4 & 2 & \infty & 0 & -5 & \infty \\ 5 & 7 & \infty & 9 & 0 & \infty \\ 3 & 5 & 10 & 7 & 2 & 0 \end{bmatrix}$$

$$D^{(6)} = \begin{bmatrix} 0 & 6 & \infty & 8 & -1 & \infty \\ -2 & 0 & \infty & 2 & -3 & \infty \\ -5 & -3 & 0 & -1 & -6 & -8 \\ -4 & 2 & \infty & 0 & -5 & \infty \\ 5 & 7 & \infty & 9 & 0 & \infty \\ 3 & 5 & 10 & 7 & 2 & 0 \end{bmatrix}$$

5. Apply the Topological Sort algorithm in the following DAG.

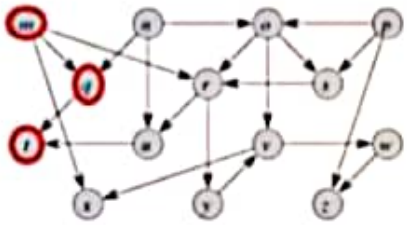


This solution was written by a subject matter expert. It's designed to help students like you learn core concepts.

DFS: Step 1:

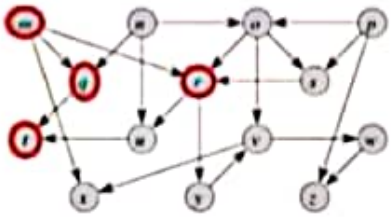
Output: m q

Step 2:



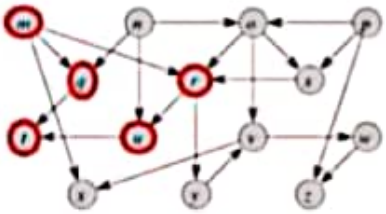
Output: m q t

Step 3:



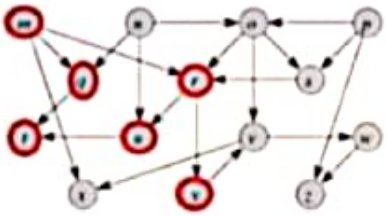
Output: m q t r

Step 4:



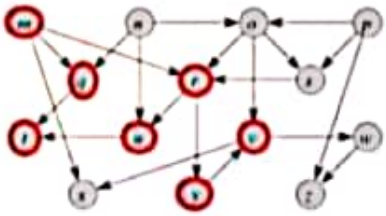
Output: m q t r u

Step 5:



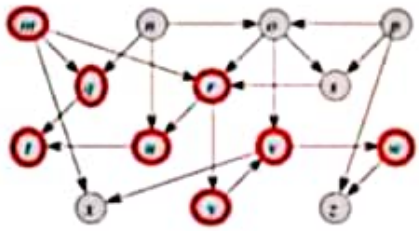
Output: m q t r u y

Step 6:



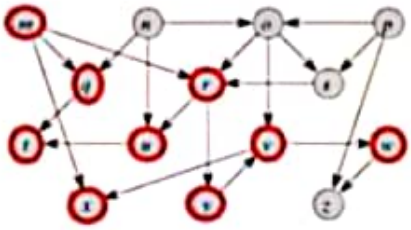
Output: m q t r u y v

DFS: Step 7:



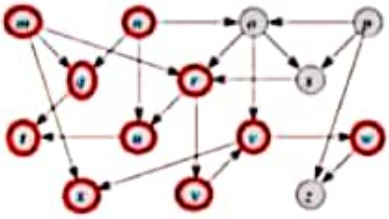
Output: m q t r u y v w

Step 8:



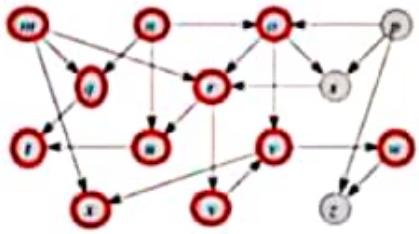
Output: m q t r u y v w x

Step 9:



Output: m q t r u y v w x n

Step 10:

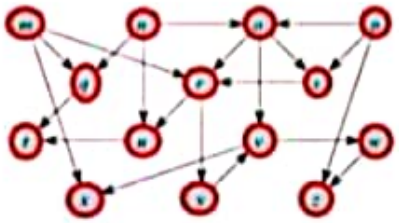


Output: m q t r u y v w x n o

Step 11:

Output: m q t r u y v w x n o s

Step 12:



Output: m q t r u y v w x n o s p z

The DFS of a graph starting at vertex m is m q t r u y v w x n o s p z