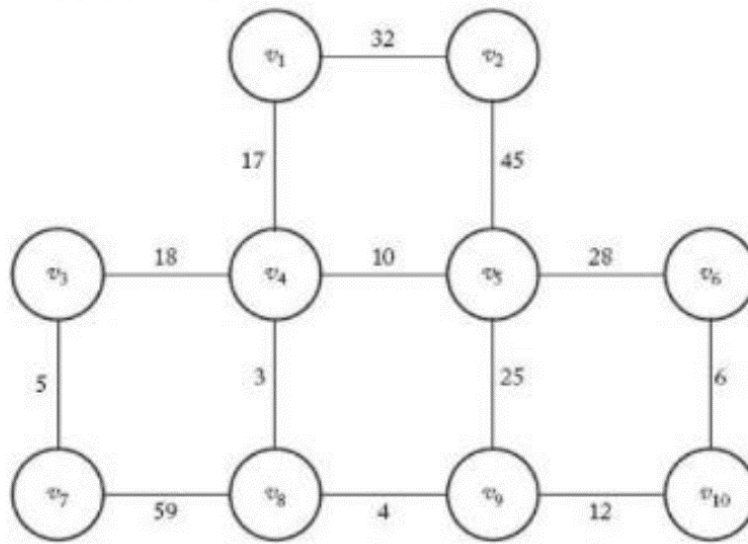


Textbook exercises



Adjacency matrix:

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

Using Prim's algorithms

Step 1 selects 3 as is the lowest number, then in each other step the following available nodes are highlighted as well

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

7. Using Kruskal algorithm the vertex is added as long as a cycle is not formed

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

N	1	2	3	4	5	6	7	8	9	10
1	0	32		17						
2	32	0			45					
3			0	18			5			
4	17		18	0	10			3		
5		45		10	0	28			25	
6					28	0				6
7			5				0	59		
8				3			59	0	4	
9					25			4	0	12
10						6			12	0

13. Using Djiskra algorithm find the shortest path from v4 to every other vertex

From 4 the nearest is 8 so 3 is selected:

$$4 \text{ to } 8 = 4, 8 = 3$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

Using intermediates now {8} the shortest path from 4 goes to 9

$$4 \text{ to } 9 = 4, 8, 9 = 7$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

From 4 having intermediates {8,9} 5 is the shortest:

$$4 \text{ to } 5 = 4, 5 = 10$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

From 4 intermediates {5,8,9} 10 is shortest:

$$4 \text{ to } 10 = 4, 8, 9, 10 = 19$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

From 4 intermediates {5,8,9,10} 6 is shortest:

$$4 \text{ to } 6 = 4, 8, 9, 10, 6 = 25$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

From 4 intermediates {5,8,9,10,6} 1 is shortest:

$$4 \text{ to } 1 = 4, 1 = 17$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

From 4 intermediates {5,8,9,10,6,1} 3 is shortest:

$$4 \text{ to } 3 = 4, 3 = 18$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

From 4 intermediates {5,8,9,10,6,1,3} 7 is shortest:

$$4 \text{ to } 7 = 4, 3, 7 = 23$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

From 4 intermediates {5,8,9,10,6,1,3,7} 2 is shortest:

$$4 \text{ to } 2 = 4, 1, 2 = 49$$

		1	32	2		
		17		45		
3	18	4	10	5	28	6
5		3		25		6
7	59	8	4	9	12	10

19. Find the minimum amount of time spent in the system

Job	time
1	7
2	3
3	10
4	5

Job order				Time in system			
1st	2nd	3rd	4th	1st	2nd	3rd	4th
1	2	3	4	7	10	27	49
1	2	4	3	7	10	22	49
1	3	2	4	7	17	27	56
1	3	4	2	7	17	29	56
1	4	2	3	7	12	22	51
1	4	3	2	7	12	29	51
2	1	3	4	3	10	23	41
2	1	4	3	3	10	18	41
2	3	1	4	3	13	23	44
2	3	4	1	3	13	21	44
2	4	1	3	3	8	18	39
2	4	3	1	3	8	21	39
3	1	2	4	10	17	30	62
3	1	4	2	10	17	32	62
3	2	1	4	10	13	30	58
3	2	4	1	10	13	28	58
3	4	1	2	10	15	32	60
3	4	2	1	10	15	28	60
4	1	2	3	5	12	20	47
4	1	3	2	5	12	27	47
4	2	1	3	5	8	20	43
4	2	3	1	5	8	23	43
4	3	1	2	5	15	27	50
4	3	2	1	5	15	23	50

MIN= 39

22. Using the algorithm 4.4 to maximize the profit

Job	Deadline	Profit
1	2	40
2	4	15
3	3	60
4	2	20
5	3	10
6	1	45
7	1	55

Sorted in decreasing order of profit:

Job	Deadline	Profit
3	3	60
7	1	55
6	1	45
1	2	40
4	2	20
2	4	15
5	3	10

$S = \{\emptyset\}$

$S = \{3\}$

$S = \{3, 7\}$ with order $[7, 3]$

$S = \{3, 7, 6\}$ UNFEASABLE

$S = \{3, 7, 1\}$ with order $[7, 1, 3]$

$S = \{3, 7, 1\}$ with order $[7, 1, 3]$

$S = \{3, 7, 1, 4\}$ UNFEASABLE

$S = \{3, 7, 1, 2\}$ with order $[7, 1, 3, 2]$

$S = \{3, 7, 1, 2, 5\}$ UNFEASABLE

Answer:

$S = \{3, 7, 1, 2\}$ with order $[7, 1, 3, 2] = 170$ profit