60004190032
Dhruvi Jodhawat
SE Comps A/A2

TT2

AOA

3. Solution:

Edges of graph

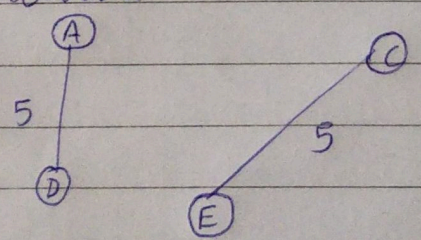
| | | | |
|---|---|---|---|
| A - B → 7 | B - C → 8 | D - E → 15 | F → G → 11 |
| A - D → 5 | B - E → 7 | D - F → 6 | E - G → 9 |
| B - D → 9 | C - E → 5 | E - F → 8 | |

Now arranging the edges in ascending order

A - D → 5
C - E → 5
D - F → 6
A - B → 7
B - E → 7
B - C → 8
E - F → 8
E - G → 9
B - D → 9
F - G → 11
D - E → 15

Now, creating a graph with edges having minimum length of no circuit forms and all the edges are included.

Step 1:




(A - D)

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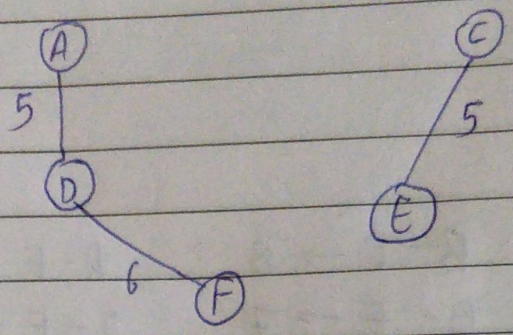
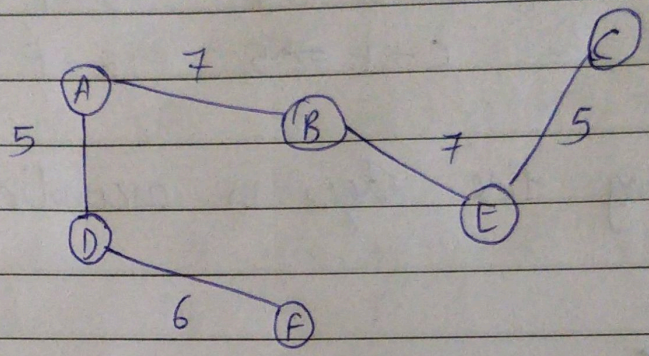
Step 2:



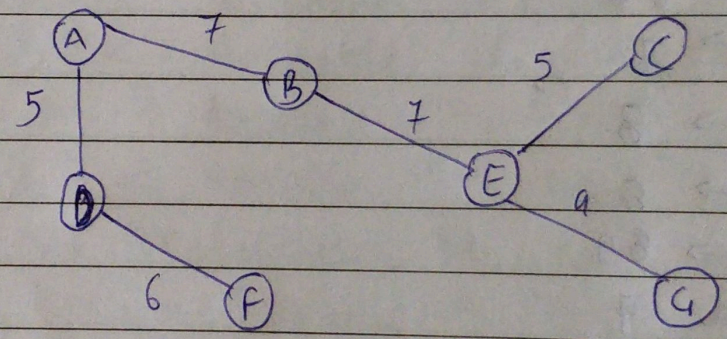

(C – E)

Step 3:




(D – F)
(B – C)

Step 4:




(E – F)
(E – 4)

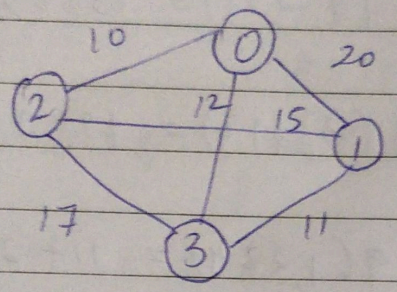
Min. cost of the graph = 5 + 6 + 7 + 7 + 5 + 9
= 39.

4. Using formula

$$g(1, V-\{1\}) = \min\{ C_{ik} + g(k, V-\{1-k\}) \}$$
$$2 \le k \le n$$

for $i \in S$

$$g(i, S) = \min\{ C_{ij} + g(j, S-\{j\}) \}$$
$$\therefore (j \in S)$$




| | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 0 | 0 | 20 | 10 | 12 |
| 1 | 20 | 0 | 15 | 11 |
| 2 | 10 | 15 | 0 | 17 |
| 3 | 12 | 11 | 17 | 0 |

Iteration 1:

$g(1, \phi) = C_{10} = 20$
$g(2, \phi) = C_{20} = 10$
$g(3, \phi) = C_{30} = 12$

Iteration 2: (intermediate)

$g(1, \{2\}) = C_{12} + g(2, \phi) = 15 + 10 = 25$
$g(1, \{3\}) = C_{13} + g(3, \phi) = 11 + 12 = 23$

$g(2, \{1\}) = C_{21} + g(1, \phi) = 15 + 20 = 35$
$g(2, \{3\}) = C_{32} + g(3, \phi) = 17 + 12 = 29$

$g(3, \{1\}) = C_{31} + g(1, \phi) = 11 + 20 = 31$
$g(3, \{2\}) = C_{32} + g(2, \phi) = 17 + 10 = 27$

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Iteration 3: ($2^{nd}$ intermediate)

$g(1, \{2,3\}) = \begin{cases} c_{12} + g(2,\{3\}) = 15+29 = 44 \\ g(3,\{23\}) \\ c_{13} + g(3,\{2\}) = 11+27 = 38 \quad \checkmark \text{ min} \end{cases}$

$g(2, \{1,3\}) = \begin{cases} c_{21} + g(1,\{3\}) = 15+23 = 38 \quad \checkmark \text{ min} \\ c_{23} + g(3,\{1\}) = 17+31 = 48 \end{cases}$

$g(3, \{1,2\}) = \begin{cases} c_{31} + g(1,\{2\}) = 11+25 = 36 \quad \checkmark \text{ min} \\ c_{32} + g(2,\{1\}) = 17+35 = 52 \end{cases}$

Iteration 4:

$g(0, \{1,2,3\}) = c_{01} + g(1,\{2,3\}) = 20+38 = 58$

$c_{02} + g(2,\{1,3\}) = 10+38 = 48$

$c_{03} + g(3,\{1,2\}) = 12+36 = 48$

∴ Min cost is 48.

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5. Using finite automata,

P = RSTP

T = PSTPSQSTRRSTPQP

Define state : 0 :
R :
RS :
RST :
RSTP :

Language : {P, Q, R, S, T}

| | P | Q | R | S | T |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 0 | 0 |
| R | 0 | 0 | 1 | 2 | 0 |
| RS | 0 | 0 | 1 | 0 | 3 |
| RST | 4 | 0 | 1 | 0 | 0 |
| RSTP | 0 | 0 | 1 | 0 | 0 |

T : P S T P S Q S T R R S T P Q P
0 0 0 0 0 0 0 0 1 1 2 3 4

~~Match~~ Present

Hence we reach the final state 4 once.

∴ pattern RSTP is present in the text only one time.