07/04/21

AOA

TT-2

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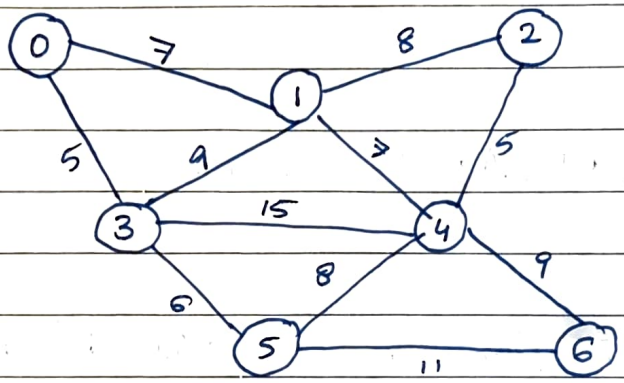
Q1

ANS



Arrange in increasing order of weights

(A,D) = 5
(C,E) = 5
(D,F) = 6
(A,B) = 7
(B,C) = 8
(E,F) = 8
(B,D) = 9
(E,G) = 9
(G,F) = 11
(D,E) = 15

SETS:- $X = \phi$

{A} {B} {C} {D} {E} {F} {G}

1 $A \neq D$

$\therefore X = \{(A,D)\}$ {A,D} {B} {C} {E} {F} {G}

2 $C \neq E$

$\therefore X = \{(A,D),(C,E)\}$ {A,D} {C,E} {B} {F} {G}

3 $D \neq F$

$\therefore X = \{(A,D), (C,E), (D,F)\}$ $\{A,D,F\}\{C,E\}\{G\}\{B\}$

4 $A \neq B$

$\therefore X = \{(A,D), (C,E), (D,F), (A,B)\}$ $\{A,B,D,F\}\{C,E\}\{G\}$

5 $B \neq E$

$\therefore X = \{(A,D), (C,E), (D,F), (A,B), (B,E)\}$ $\{A,B,C,D,E,F\}\{G\}$

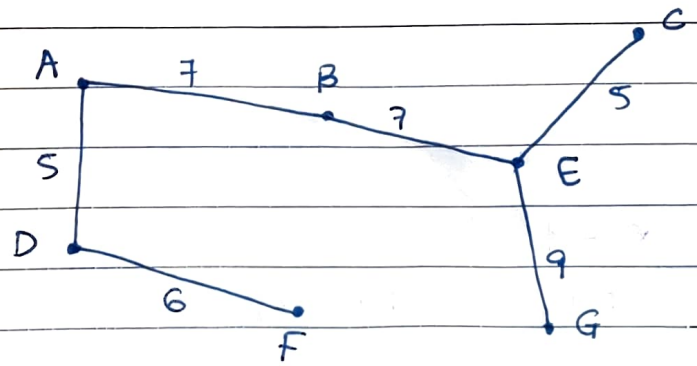
$B = C$ No change

$E = F$ No change

$B = D$ No chang

$E \neq G$ $\therefore X = \{(A,D), (C,E), (D,F), (A,B), (B,E), (E,G)\}$

$\therefore$ MST



$\therefore$ Total cost = 39.

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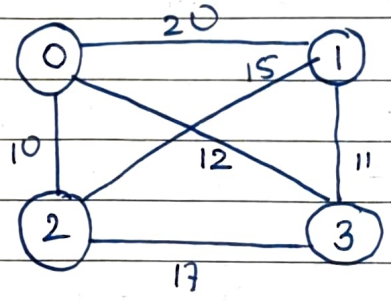
Q4



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

Starting sending vertex = 0

ITERATION 1

$g(0, \phi) = 0$
$g(1, \phi) = 20$
$g(2, \phi) = 10$
$g(3, \phi) = 12$

ITERATION 2: [Taking one vertex at a time]

$g(1, \{2\}) = 1 \to 2 \to 0 = (c_{12} + g(2, \phi)) = 15 + 10 = 25$
$g(1, \{3\}) = 1 \to 3 \to 0 = (c_{13} + g(3, \phi)) = 11 + 12 = 23$

$g(2, \{1\}) = 2 \to 1 \to 0 = (c_{21} + g(1, \phi)) = 15 + 20 = 35$
$g(2, \{3\}) = 2 \to 3 \to 0 = (c_{23} + g(3, \phi)) = 17 + 12 = 29$

$g(3, \{1\}) = 3 \to 1 \to 0 = (c_{31} + g(1, \phi)) = 11 + 20 = 31$
$g(3, \{2\}) = 3 \to 2 \to 0 \quad (c_{32} + g(2, \phi)) = 17 + 10 = 27$

ITERATION 3 [Taking 2 vertices at a time]

$g(1,\{2,3\}) \rightarrow = c_{12} + g(2,\{3\}) = 15 + 29 = 44$
$\rightarrow = c_{13} + g(3,\{2\}) = 11 + 27 = 38$

min of $g(1,\{2,3\}) = \min(38, 45) = 38$

$g(2,\{1,3\}) = c_{21} + g(1,\{3\}) = 15 + 23 = 38$

$g(2,\{1,3\}) = c_{23} + g(3,\{1\}) = 17 + 31 = 48$

$\min(38, 48) = 38$ [2 → 1 → 3 → 0]

$g(3,\{1,2\}) \Rightarrow 3 \rightarrow 1 \rightarrow 2 \rightarrow 0 = c_{31} + g(1,\{2\}) = 11 + 25 = 36$
$g(3,\{1,2\}) \Rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 0 = c_{32} + g(2,\{1\}) = 17 + 35 = 52$
$\min(36, 52) = 36$ [3 → 1 → 2 → 0]

ITERATION 4 [Taking 3 vertices]

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

$c_{02} + g(2,\{1,3\}) = 10 + 38 = 48$
$c_{03} + g(3,\{1,2\}) = 12 + 36 = 48$

min $g(48, 48, 58) = 48$
Two paths possible
0 → 2 → 1 → 3 → 0
0 → 3 → 1 → 2 → 0

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Q5 Using finite automata, solve

P : RSTP

T : PSTPSQSTRRSTPQP

ANS Define state : 0 : Entry state

R : starting state with R

RS : starting with RS

RST : Stating with RST

RSTP : Stating with RSTP

language = {P, Q, R, S, T}

STATE		P	Q	R	S	T
0	0	0	0	1	0	0
1	R	0	0	1	2	0
2	RS	0	0	1	0	3
3	RST	4	0	1	0	0
4	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

Hence we reach the final state 4 once.

∴ Pattern RSTP is present in the text only one time