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Div : B 1

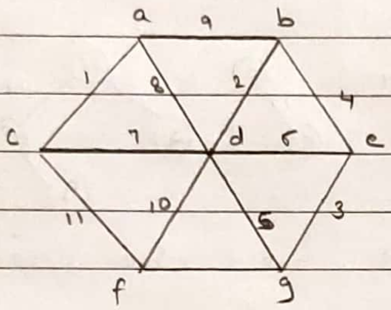
24/01/2022

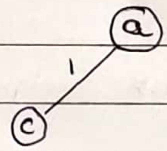
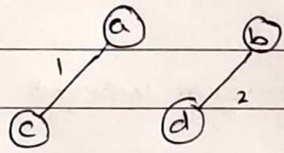
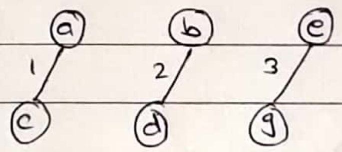
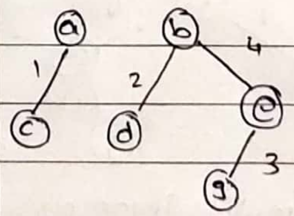
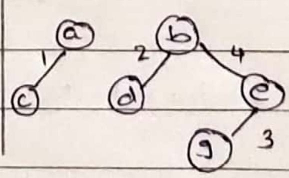
Discrete Structures

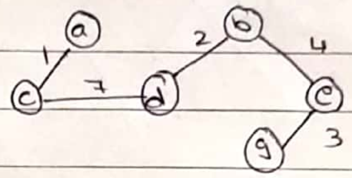
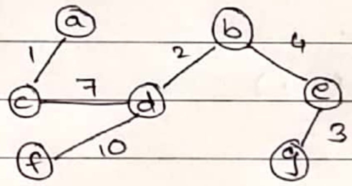
Tutorial - 6

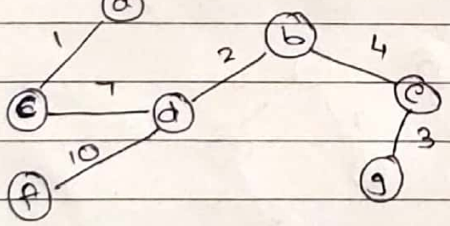
Solutions

→ 1)



Remark	Spanning trees
1) Edge (a,c) has smallest weight. Select (a,c)	
2) Edge (d,b) with weight 2	
3) Edge (e,g) with weight 3	
4) Edge (b,e) with weight 4	
5) edge (d,g) with weight 5	 (d,g) can't be selected as it form cycle

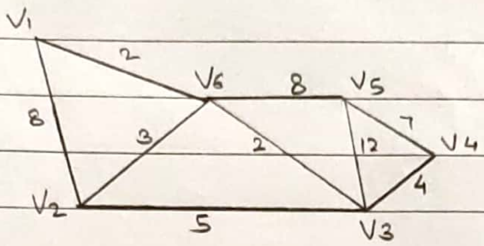
6) edge (d,e) with weight 6	can't be selected as it forms cycle.
7) edge (d,c) with weight 7	
8) edge (a,d) with weight 8	can't be selected as it forms cycle.
9) edge (a,b) with weight 9	can't be selected as it forms cycle.
10) edge (f,d) with weight 10	
11) edge (c,f) with weight 11	can't be selected as it forms cycle.

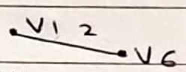
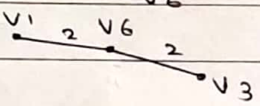
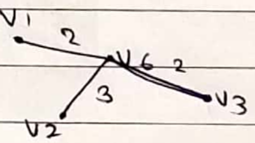
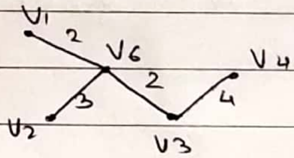
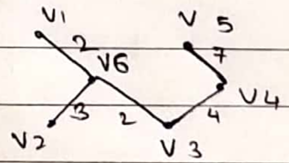


is minimal spanning tree

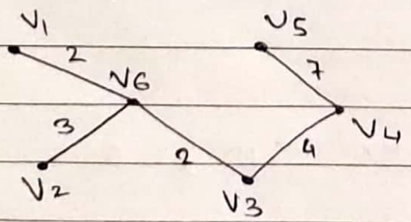
cost MST = 1+2+3+4+10+7 = 27

→ 2)



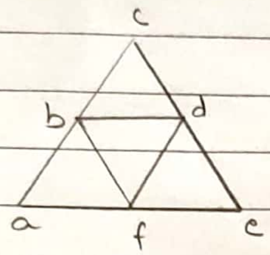
edges consider	edge selected	cost	Spanning tree
1) –	–	–	· V_1
2) (V_1, V_2), (V_1, V_6)	(V_1, V_6)	2	
3) (V_1, V_2), (V_6, V_2) (V_6, V_3), (V_6, V_5)	(V_6, V_3)	2	
4) (V_1, V_2), (V_6, V_2), (V_6, V_5), (V_3, V_2) (V_3, V_5), (V_3, V_4)	$(V_6\ V_2)$	3	
5) (V_1, V_2), (V_6, V_5), (V_3, V_2), (V_3, V_5), (V_3, V_4).	(V_3, V_4)	4	
6) (V_3, V_5), (V_4, V_5)	(V_4, V_5)	7	

∴ Minimum Sponning tree by prim's Algorithm



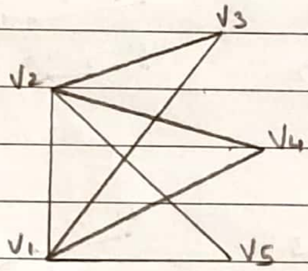
cost MST = 2 + 2 + 4 + 7 + 3 = 18

→ 3) a)



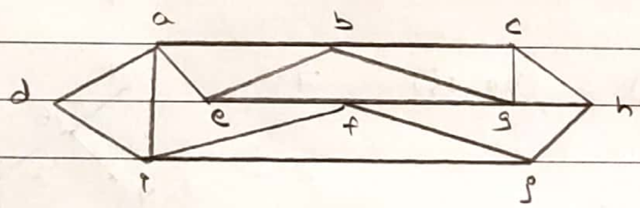
Since vertex a is of odd degree
The given graph does not contain Eulerian circuit.

b)



Since all vertices are of even degree
Hence the graph is Eulerian graph and contain Eulerian circuit.

4)



Number of vertices, $n = 10$

$\therefore \frac{n}{2} = 5$

The degree of each vertex $\geq (\frac{n}{2}) = 5$

Hence by theorem 2, there is no Hamiltonion circuit and hence no hamiltonion region.

∴ The above condition is sufficient but not necessary.