

ASSIGNMENT 9

SUBMITTED BY :

NAME : SAI KIRAN TADURI

NET ID : SXT161730

① Topological order

Given graph,

Choose paint color

Choose paint type → Purchase paint

Choose wood type → Purchase wood

Paint wood

Cut wood

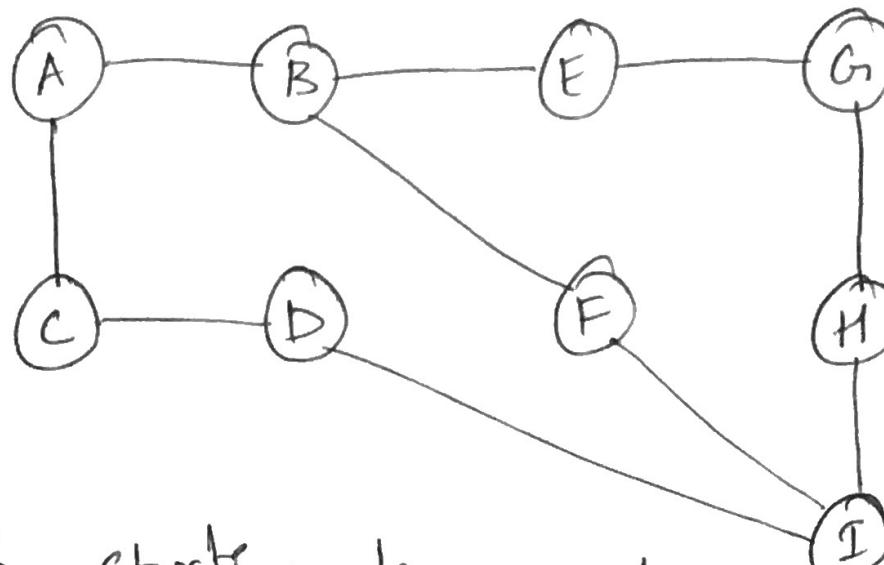
Assemble

Select a vertex that has indegree zero.

$S = \{ \text{choose paint color, choose paint type,}$
 $\text{choose wood type, purchase paint,}$
 $\text{purchase wood, paint wood, cut wood,}$
 $\text{Assemble} \}$.

② Breadth - first search :

Given graph.



BFS starting from vertex I.

Adjacent vertices of I are D, F, H.

Add them to the path and mark as visited.

Now consider adjacent vertices of D, F, H.

Adjacent vertices of D, F, H are C, B, G

Add them to the path and mark as visited.

Now consider adjacent vertices of C, B, G.

Adjacent vertices of C, B, G are A, E

Add them to the path and mark as visited.

Therefore, the path of a breadth-first search, starting from vertex I.

Path = { I, D, F, H, C, B, G, A, E } .

Length = 3

	V	known	dv	pv		V	known	dv	pv	(2)
Home	F	0	0		Home	T	0	0		
Gas station	F	∞	0		Gas station	F	6	Home		
City Park	F	∞	0		City Park	F	5	Home		
Grocery	F	∞	0	→	Grocery	F	∞	0		
Restaurant	F	∞	0		Restaurant	F	15	Home		
Post Office	F	∞	0		Post Office	F	∞	0		
UTD	F	∞	0		UTD	F	20	Home		
Stadium	F	∞	0		Stadium	F	∞	0		
Library	F	∞	0		Library	F	∞	0		

	V	known	dv	pv		V	known	dv	pv
Home	T	0	0		Home	T	0	0	
Gas station	T	6	Home		Gas station	F	6	Home	
City Park	T	5	Home		City park	T	5	Home	
Grocery	F	7	City Park	←	Grocery	F	7	City Park	
Restaurant	F	15	Home		Restaurant	F	15	Home	
Post Office	F	∞	0		Post office	F	∞	0	
UTD	F	20	Home		UTD	F	20	Home	
Stadium	F	16	Gas station		Stadium	F	∞	0	
Library	F	∞	0		Library	F	∞	0	

	V	known	dr	PV		V	known	dr	PV
Home	T	0	0		Home	T	0	0	
Gas Station	T	6	Home		Gas Station	T	6	Home	
City Park	T	5	Home		City Park	T	5	Home	
Grocery	T	7	City Park	→	Grocery	T	7	City Park	
Restaurant	F	15	Home		Restaurant	T	15	Home	
Post Office	F	00	0		Post Office	F	19	Restaurant	
UTD	F	20	Home		UTD	F	20	Home	
Stadium	F	16	Gas Station		Stadium	F	16	Gas Station	
Library	F	00	0		Library	F	18	Restaurant	

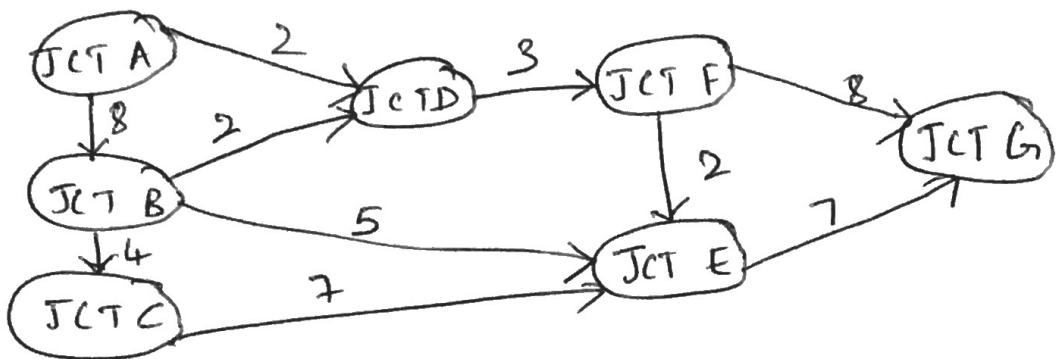


	V	known	dr	PV		V	known	dr	PV
Home	T	0	0		Home	T	0	0	
Gas Station	T	6	Home		Gas Station	T	6	Home	
City Park	T	5	Home		City Park	T	5	Home	
Grocery	T	7	City Park	←	Grocery	T	7	City Park	
Restaurant	T	15	Home		Restaurant	T	15	Home	
Post Office	F	19	Restaurant		Post Office	F	19	Restaurant	
UTD	F	20	Home		UTD	F	20	Home	
Stadium	T	16	Gas Station		Stadium	T	16	Gas Station	
Library	T	18	Restaurant		Library	F	18	Restaurant	

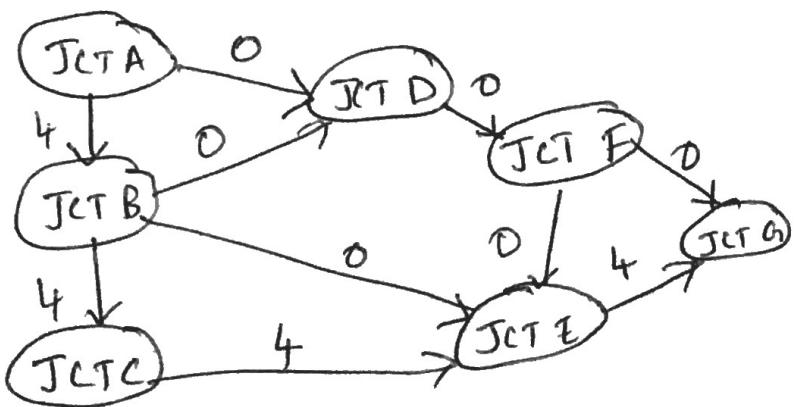


	known	dr	pv		known	dr	pv	(3)
Home T	0	0	Home	T	0	0	0	
Gas Station T	6	Home	Gas Station	T	6	Home	0	
City Park T	5	Home	City Park	T	5	Home	0	
Grocery T	7	City Park	Grocery	T	7	City Park	0	
Restaurant T	15	Home	→ Restaurant T		15	Home	0	
Post Office T	19	Restaurant	Post Office T		19	Restaurant	0	
VTD F	20	Home	VTD T		20	Home	0	
Stadium T	16	Gas Station	Stadium T		16	Gas Station	0	
Library T	18	Restaurant	Library T		18	Restaurant	0	

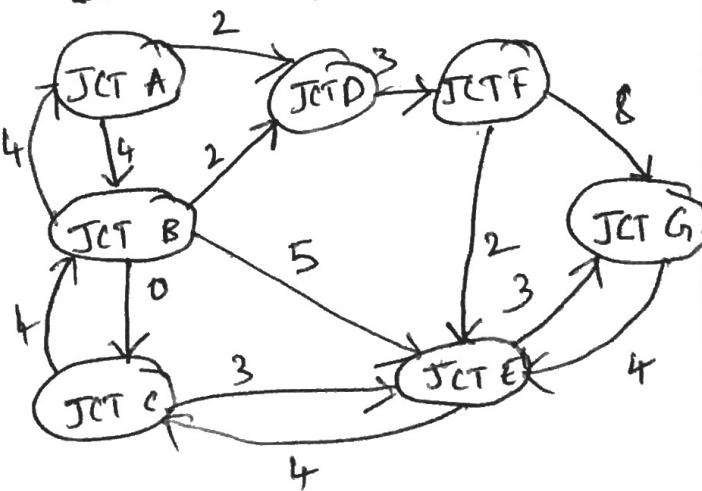
(4)



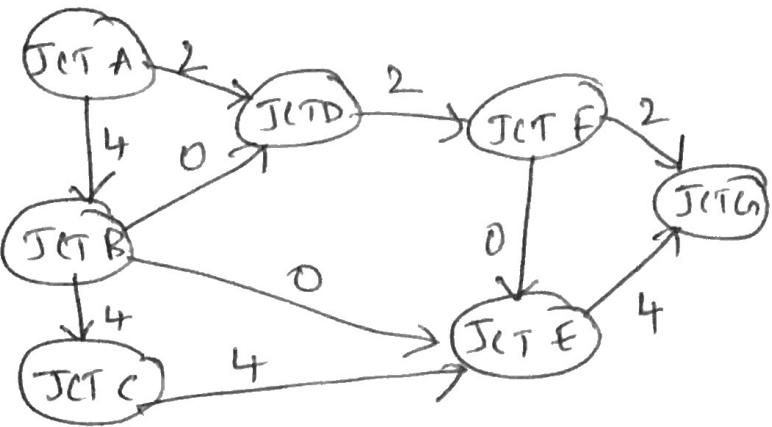
Flow Graph



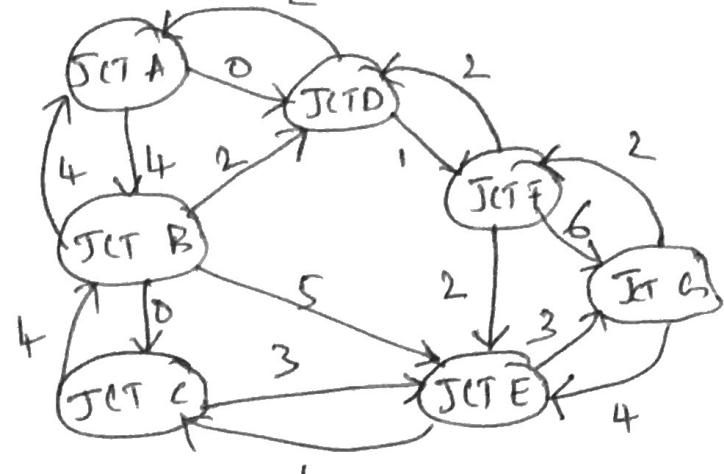
Residual Graph



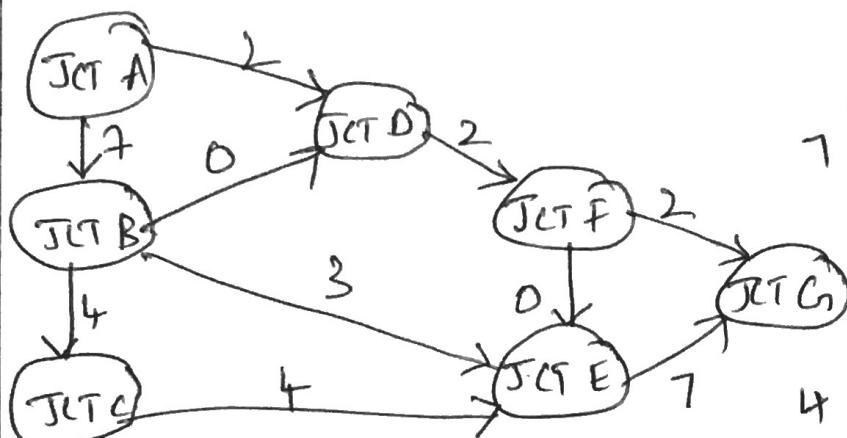
Flow Graph



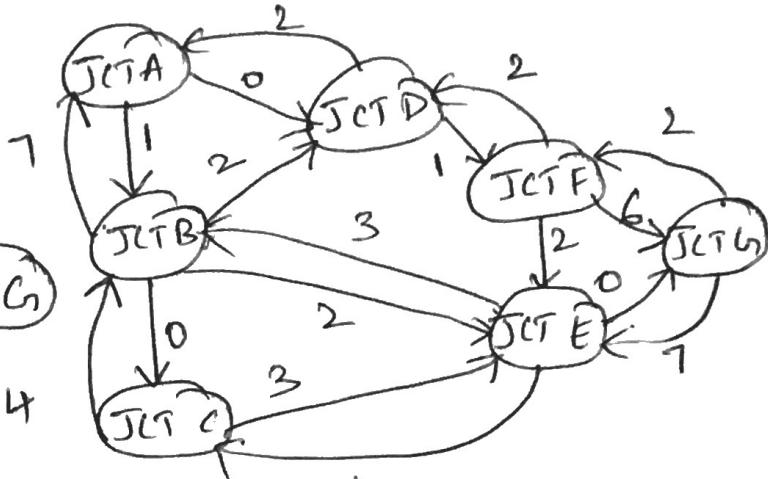
Residual Graph



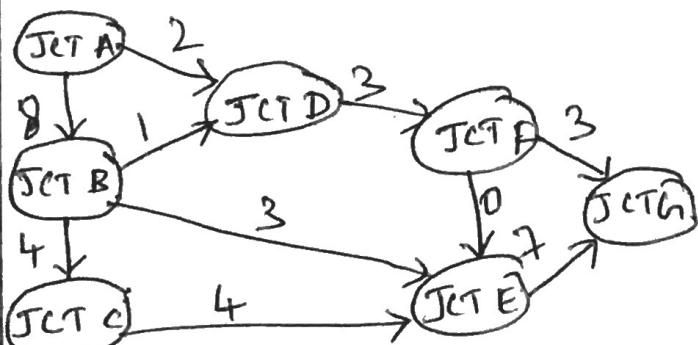
Flow Graph



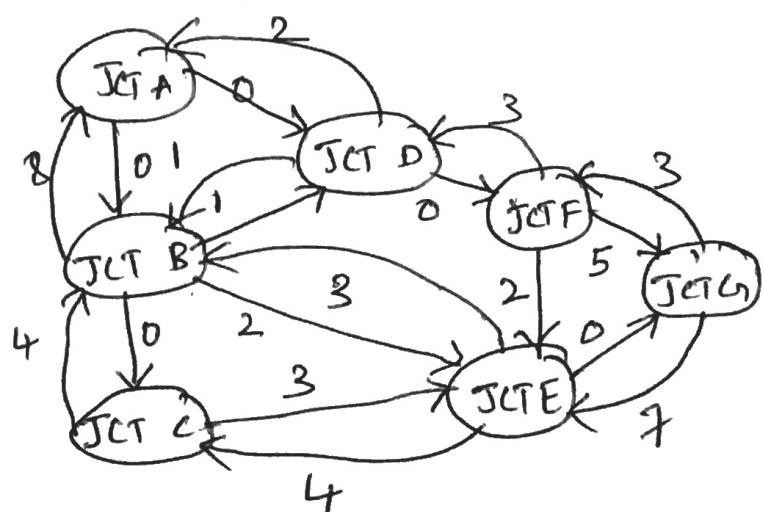
Residual Graph



Flow Graph



Residual Graph

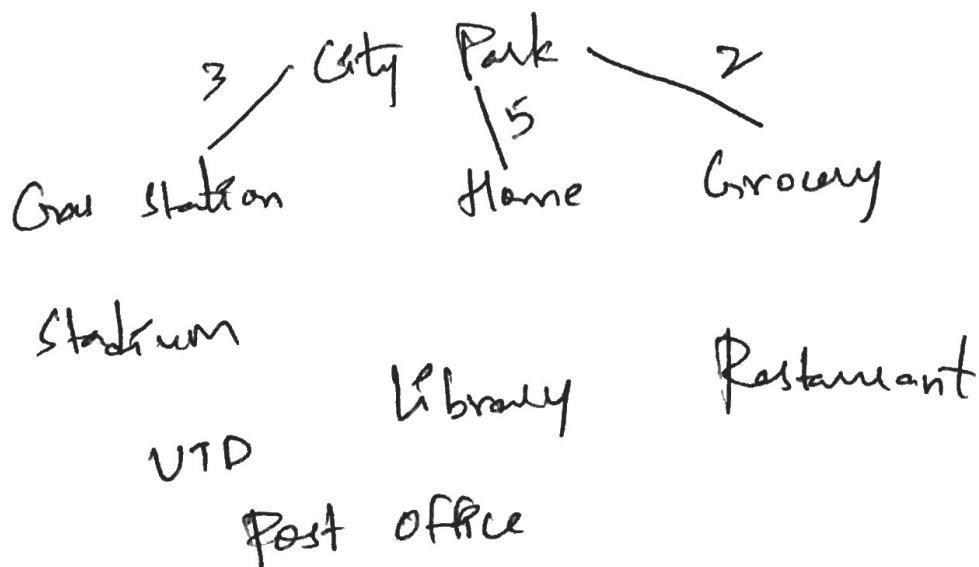
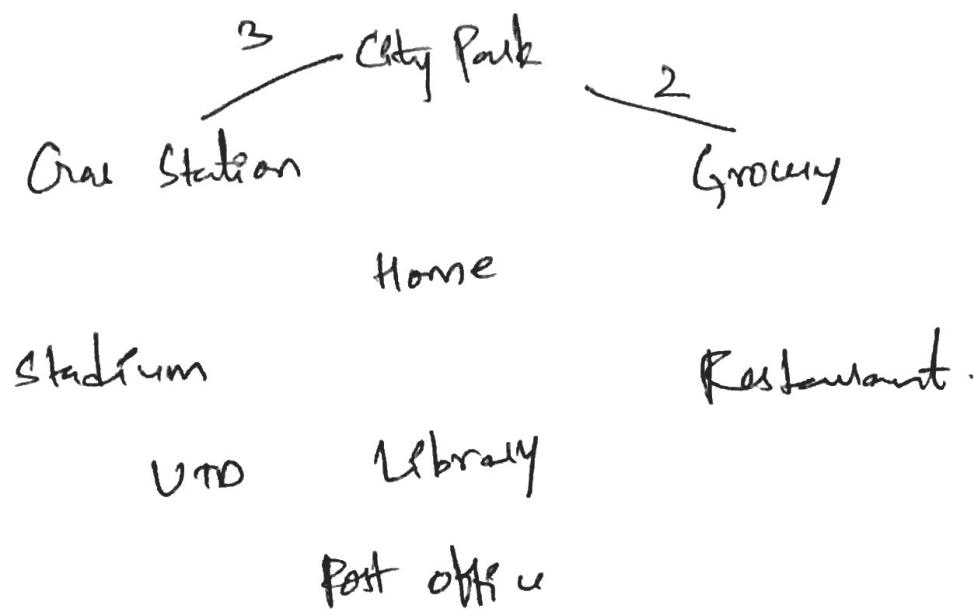
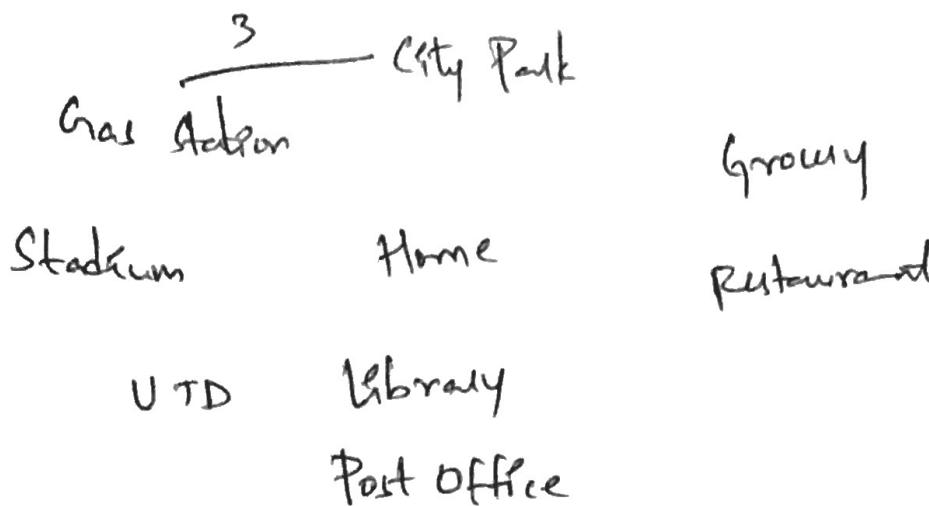


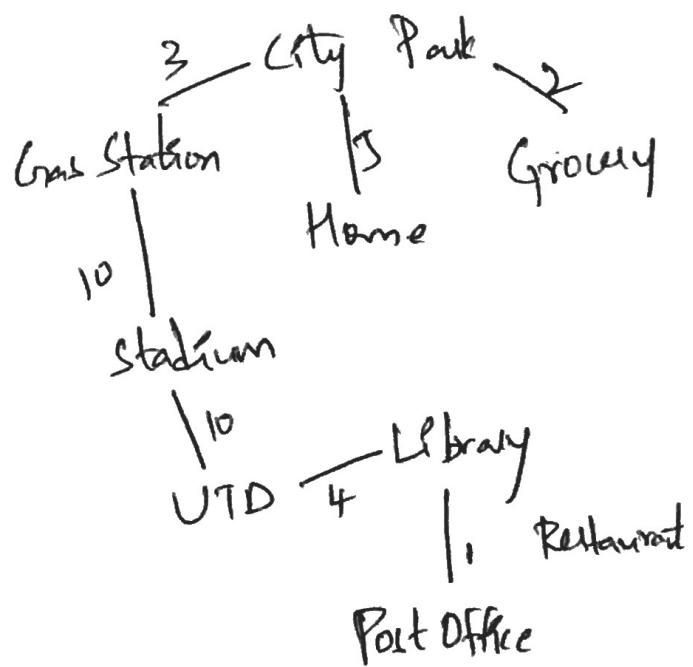
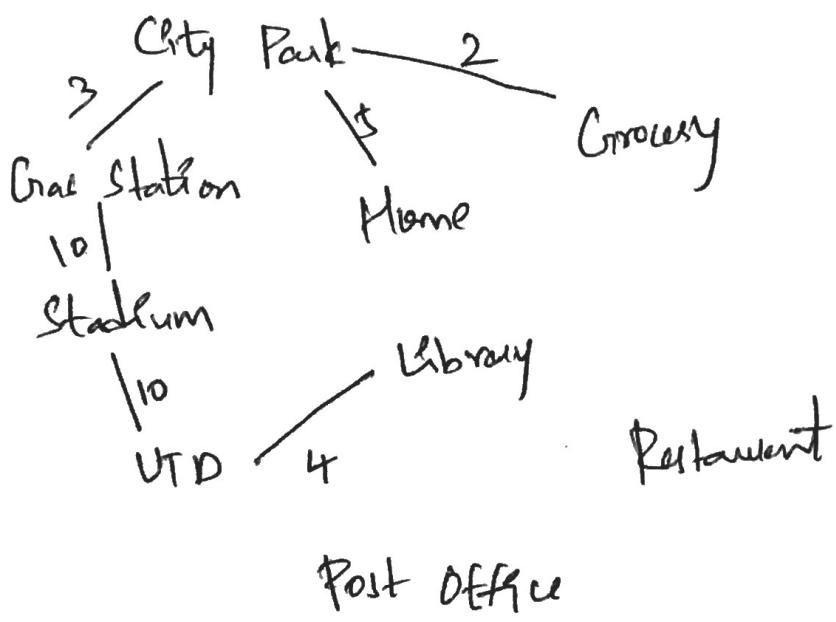
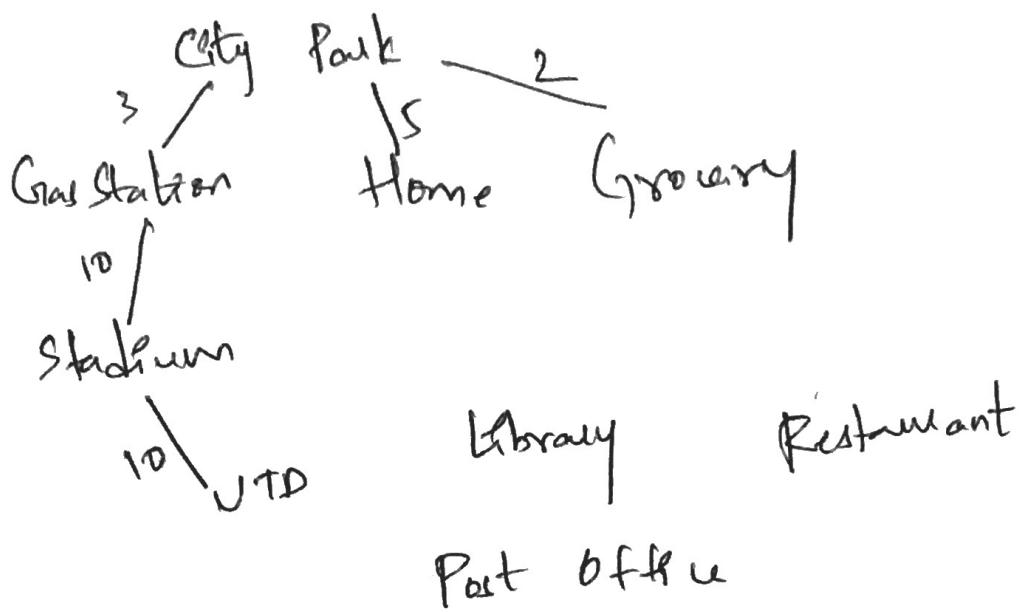
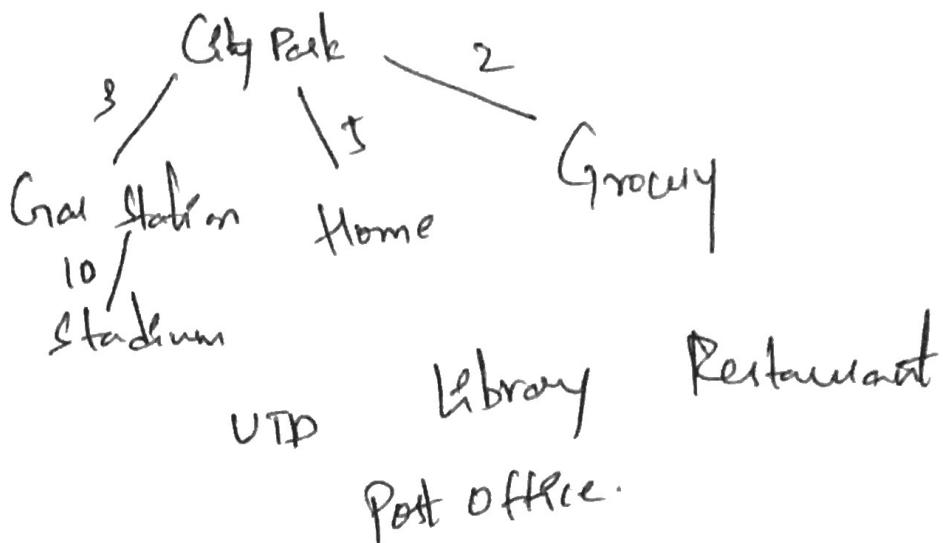
Maximum Flow =
Min-Cut = 10

5

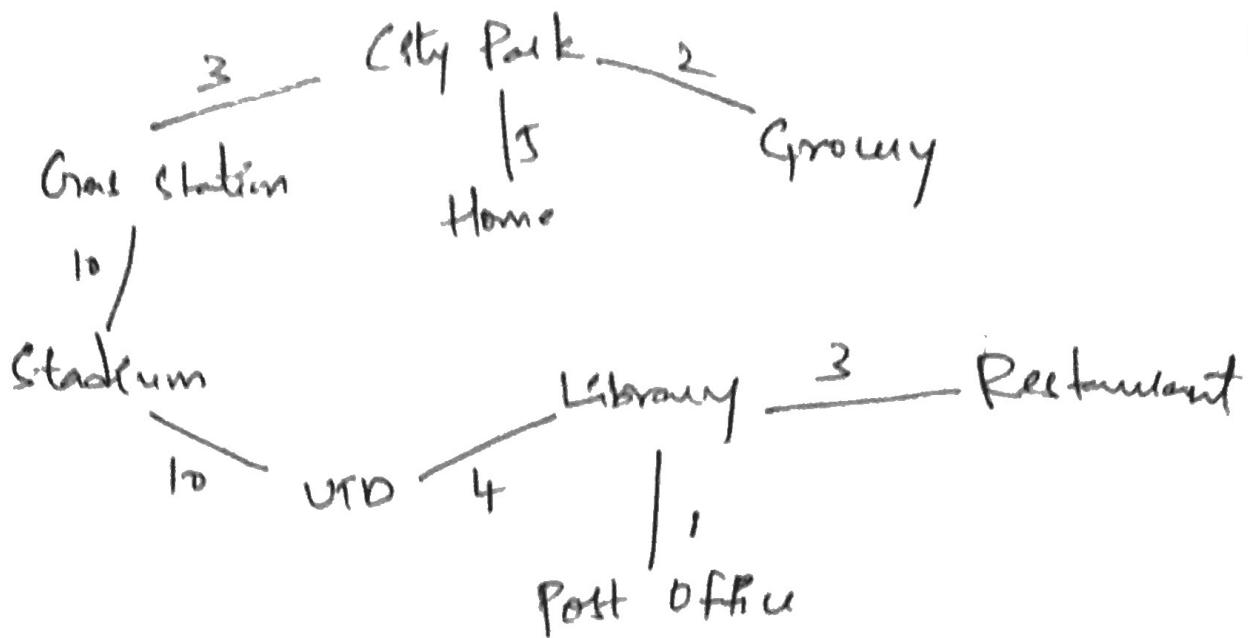
Prim's Algorithm

4

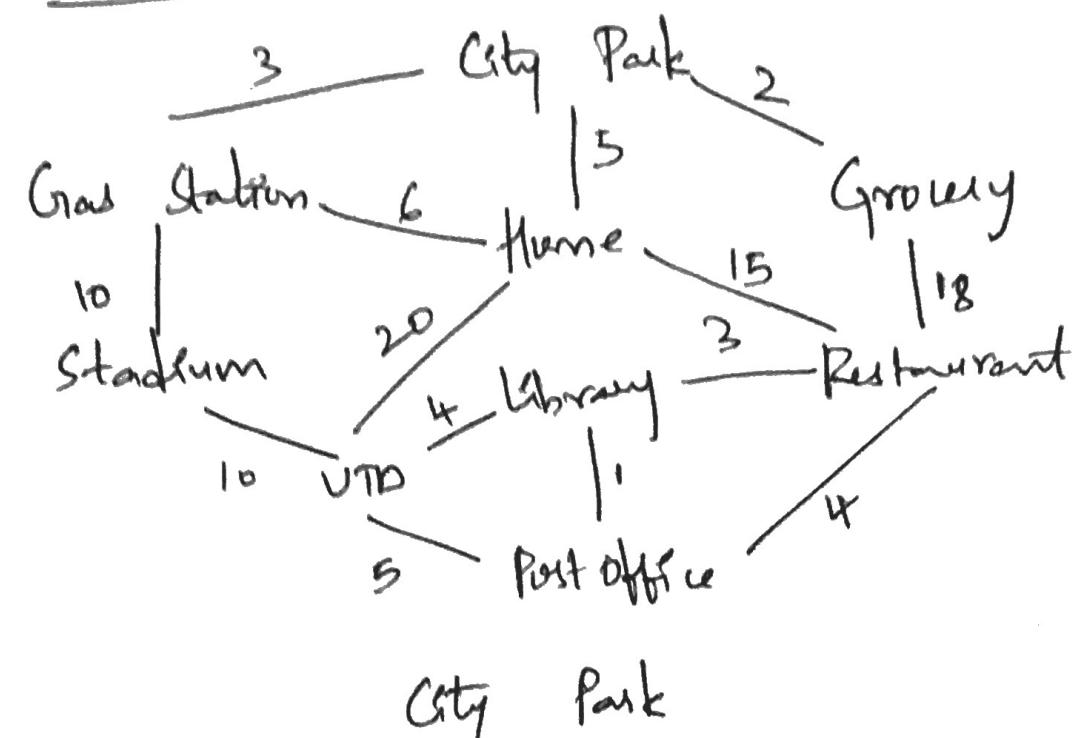


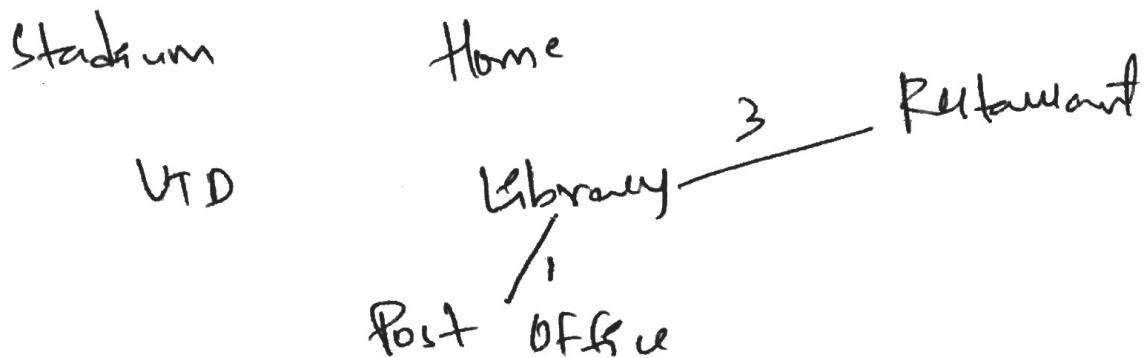
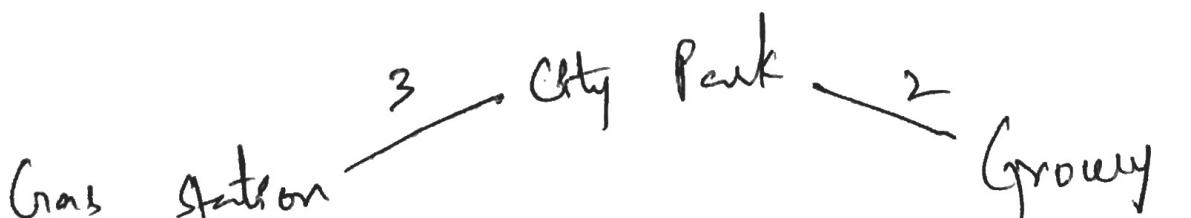
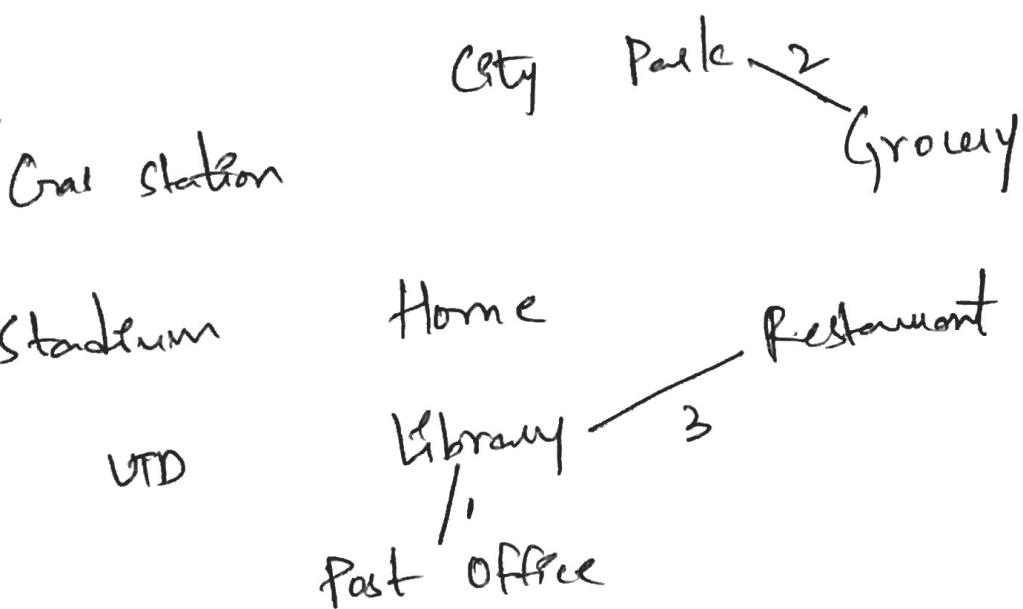
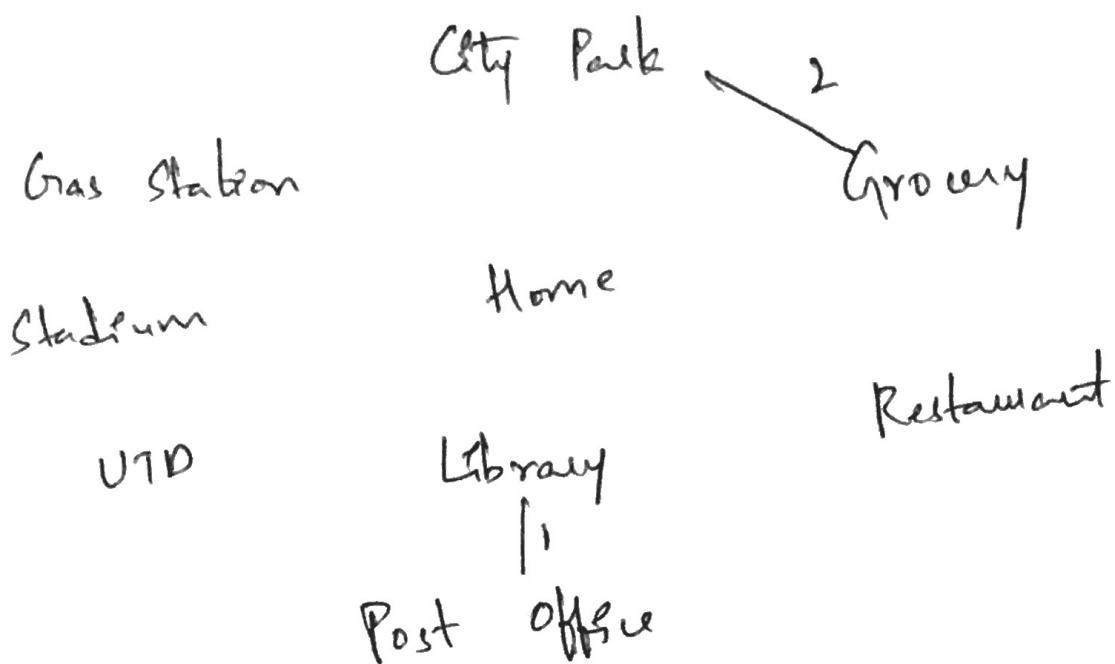


(5)

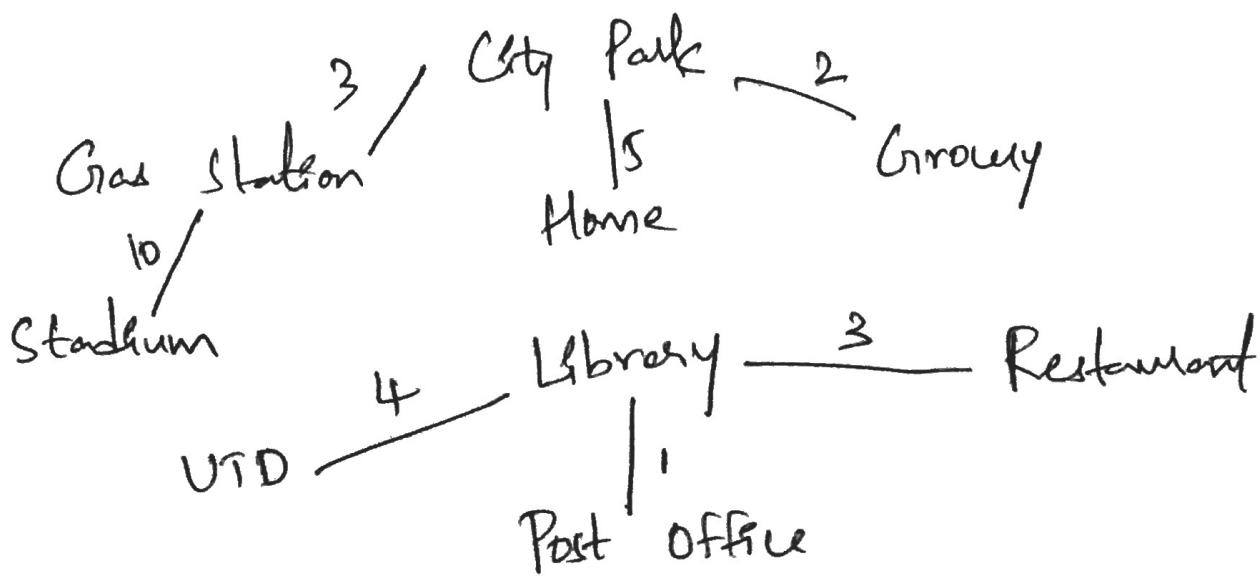
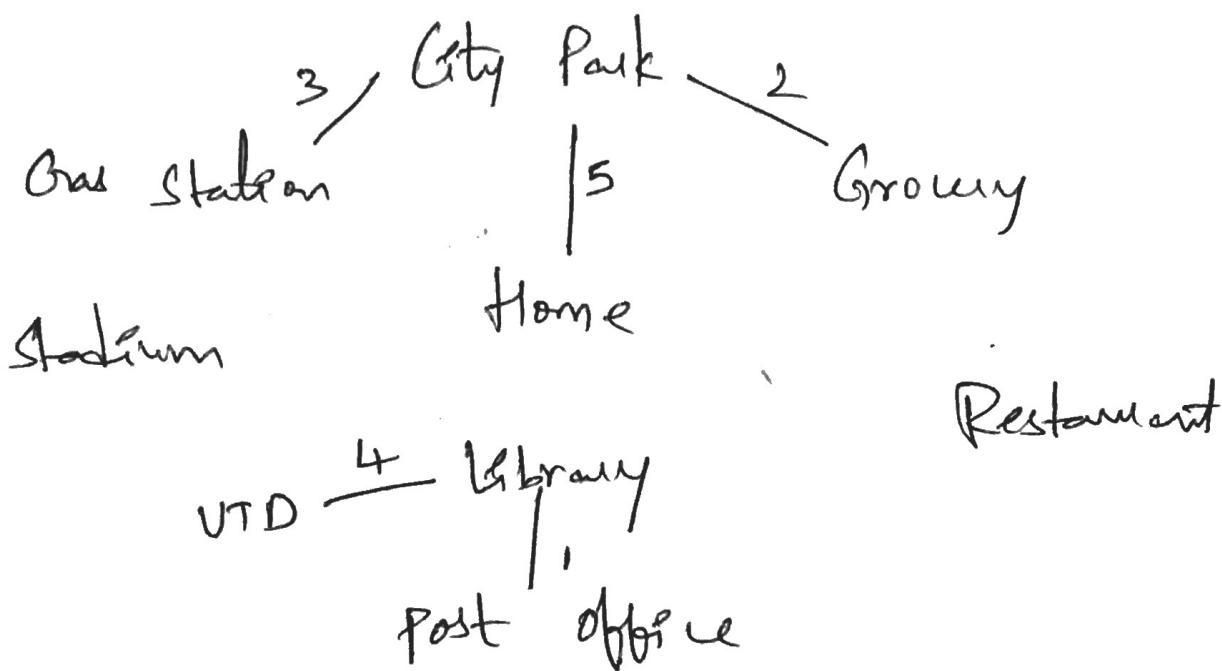
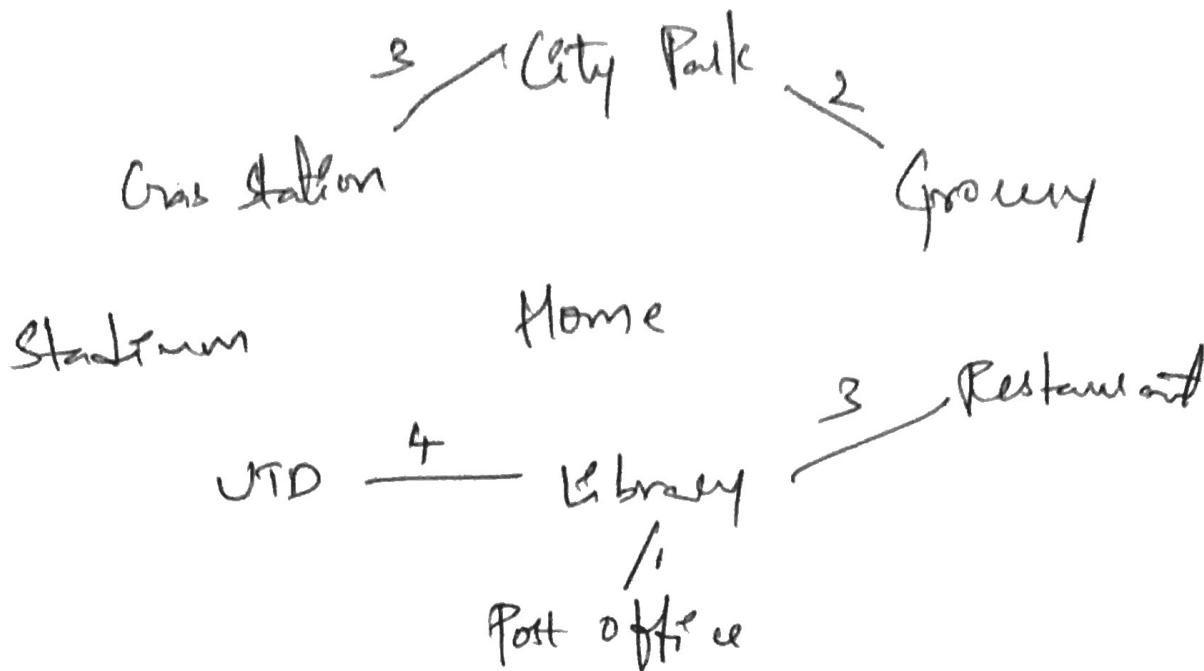


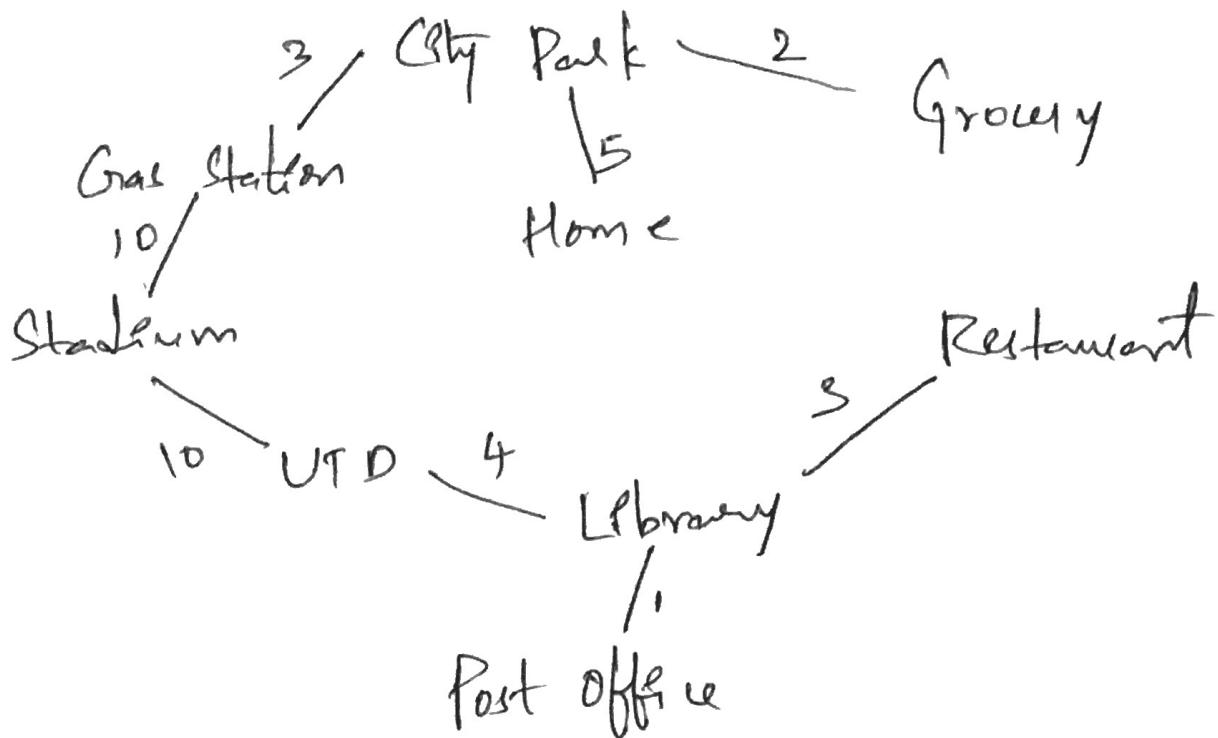
⑥ Kruskal's algorithm : Given graph,





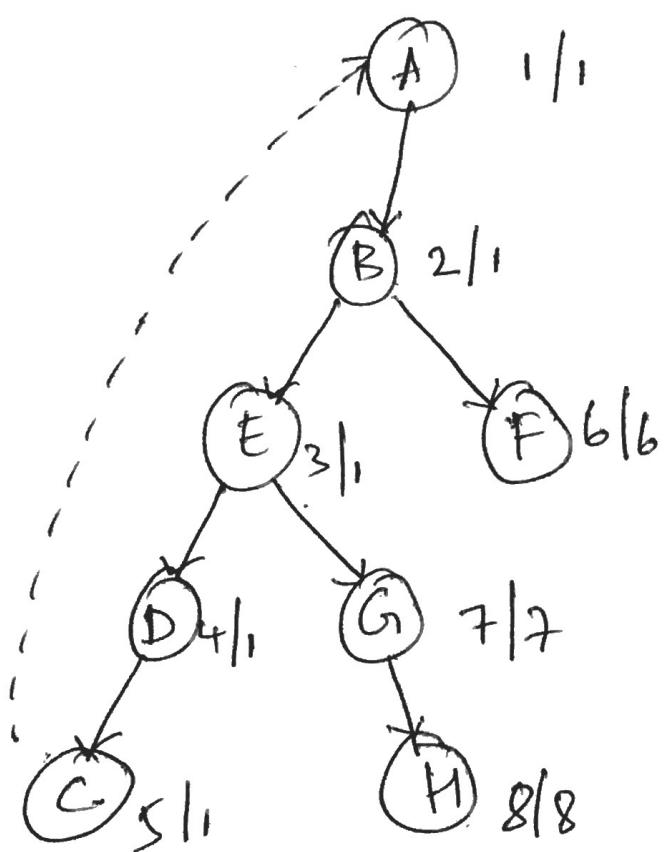
⑥





Total MST distance = 38

7



$\text{Low}(F) > \text{Num}(B)$
Therefore B is a
articulation point.

Similarly,
E and G are
also articulation
points.

Therefore,
B, E and G are
articulation points.

(8) An undirected graph is an Eulerian, if all the vertices in the graph has even degree.

If the graph has no more than two vertices with odd degree, it has an Euler path.

The given graph has an Euler path because the graph has no more than two vertices with odd degree.
(B and I).

Path: $B \rightarrow A \rightarrow C \rightarrow D \rightarrow I \rightarrow H \rightarrow G \rightarrow E \rightarrow B \rightarrow F \rightarrow I$