

④ Assignment 9:

1 ans:

Topological sort is:

→ choose paint color, choose paint type, choose wood type,
purchase paint, purchase wood, paint wood,
cut wood, Assemble

2 ans: Breadth-first search:

starting from A:

A, B, C, E, F, D, G, I, H

starting from I:

I, D, F, H, C, B, G, A, E

J	Known	d	Pv
A	F	∞	0
B	F	∞	0
C	F	∞	0
D	F	∞	0
E	F	∞	0
F	F	∞	0
G	F	∞	0
H	T	0	0
I			

I is known

then D, F and H are at distance 1 from I

V	Known	dv	Pv
A	F	∞	0
B	F	∞	0
C	F	1	H
D	T	∞	0
E	F	1	H
F	T	∞	0
G	F	1	H
H	T	∞	0
I	T	0	0

Now, D is known

then C is known at distance 1 from D

V	Known	dv	Pv
A	F	∞	0
B	F	∞	0
C	T	2	D
D	T	1	I
E	F	∞	0
F	T	1	I
G	F	∞	0
H	T	1	H
I	T	0	0

now, F is known

then B is at distance 1 from F

~~similarly~~ also H is known
~~then~~ ~~it~~
~~is at distance 1 from H~~

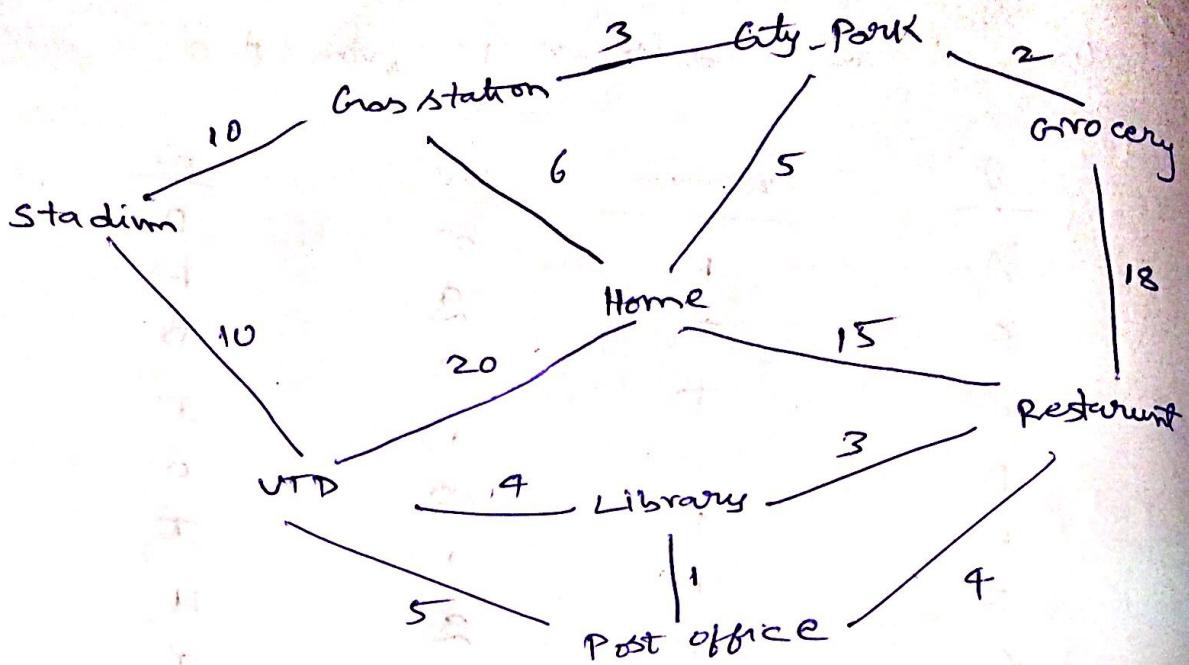
<u>v</u>	<u>known</u>	$\frac{dv}{\infty}$	$\frac{Pr}{O}$
A	F	2	F D H O I H O
B	T	2	
C	T	1	
D	T F	∞	
E	T	1	
F	T	2	
G	T	0	
H	T	0	
I			

Now, c is known
 then A is at distance 1 from c

also, g is known
 then E is at distance 1 from G

<u>v</u>	<u>known</u>	$\frac{dv}{3}$	$\frac{Pr}{C}$
A	T	2	F
B	T	2	D
C	T	1	I G
D	T T	3	I
E	T T	1	H
F	T	2	I
G	T	1	
H	T	0	O.
I			

3 ans. Given graph,



<u>v</u>	<u>Known</u>	<u>d_v</u>	<u>P_v</u>
Home	F	0	0
Stadium	F	∞	0
VTD	F	∞	0
Gas station	F	∞	0
Library	F	∞	0
Restaurant	F	∞	0
Post office	F	∞	0
Stadium	F	∞	0
Gas station	F	∞	0
City Park	F	∞	0
Grocery	F	∞	0

start with home at distance 0.

work as known and update d_v for its adjacent vertices.

i.e., gas station

city park

restaurant

VTD

<u>v</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
UTD	F	20	Home
library	F	∞	0
restaurant	F	15	Home
Post office	F	∞	0
stadium	F	∞	0
Gas Station	F	6	Home
City Park	F	5	Home
grocery	F	∞	0

now select City Park, and mark its adjacent sides

are marked

<u>v</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
UTD	F	20	Home
library	F	∞	0
Restaurant	F	15	Home
Post office	F	∞	0
stadium	F	∞	Home
Gas Station	F	6	Home
City Park	T	5	Home
Grocery	F	7	City Park.

select
now, the gas station and check its adjacent sides,

<u>v</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
UTD	F	20	Home
Library	F	∞	0
Restaurant	F	15	Home
Post office	F	∞	0
Stadium	F	6	Gas Station
Gas Station	T	5	Home
City Park	T	5	Home
Grocery	F	7	City Park.

Now choose grocery as ~~is~~ the next ~~not~~ vertex.

<u>V</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
UTD	F	20	Home
Library	F	∞	0
Restaurant	F	15	Home
Post office	F	∞	0
Stadium	F	16	Gas Station
Gas station	T	6	Home
City Park	T	5	Home
Grocery	T	7	City Park.

next choose restaurant as ~~is~~ vertex.

<u>V</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
UTD	F	20	Home
Library	F	18	Restaurant
Restaurant	T	15	Home
Post office	F	∞	0
Stadium	F	16	Gas Station
Gas station	T	6	Home
City Park	T	5	Home
Grocery	T	7	City Park.

now choose stadium as next vertex.

<u>V</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
UTD	F	20	Home
Library	F	18	Restaurant
Restaurant	T	15	Home
Post office	F	∞	0
Stadium	T	16	Gas Station
Gas station	T	6	Home
City Park	T	5	Home
Grocery	T	7	City Park.

now choose library as next vertex.

<u>v</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
VTD	F	20	Home
Library	T	18	restaurant
Restaurant	T	15	Home
Post office	F	19	restaurant
Stadium	T	16	Gas Station
Gas Station	T	6	Home
City Park	T	5	Home
Grocery	T	7	city park.

now choose post office as the next vertex.

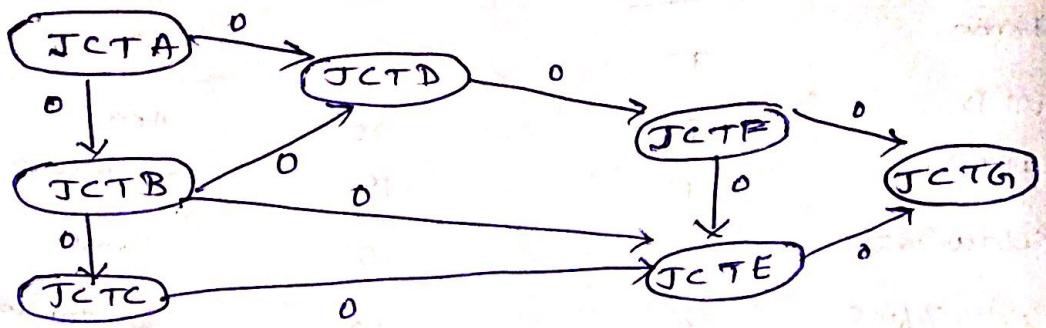
<u>v</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
VTD	F	20	Home
Library	T	18	restaurant
Restaurant	T	15	Home
Post office	T	19	Restaurant
Stadium	T	16	Gas Station
Gas Station	T	6	Home
City Park	T	5	Home
Grocery	T	7	city park

now choose VTD as the next vertex.

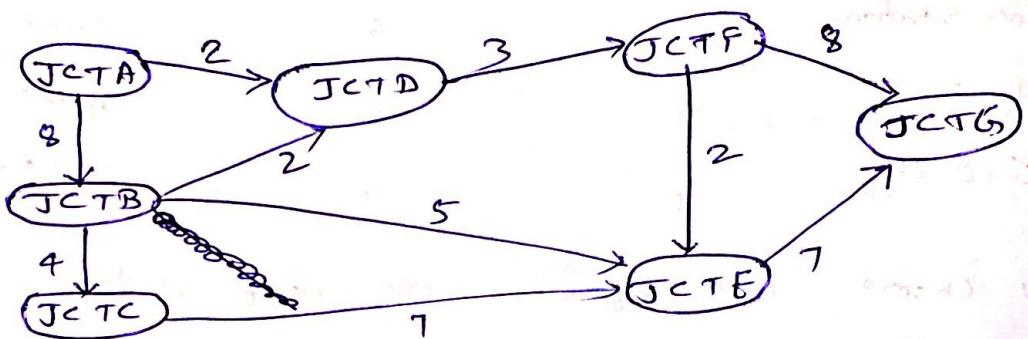
<u>v</u>	<u>Known</u>	<u>dv</u>	<u>PV</u>
Home	T	0	0
VTD	T	20	Home
Library	T	18	restaurant
Restaurant	T	15	Home
Post office	T	19	Restaurant
Stadium	T	16	Gas Station
Gas Station	T	6	Home
City Park	T	5	Home
Grocery	T	7	city park

Ans:

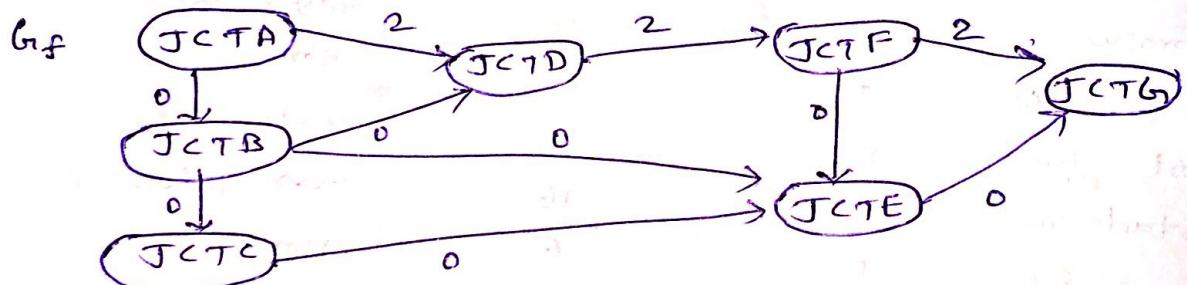
Flow graph, G_f



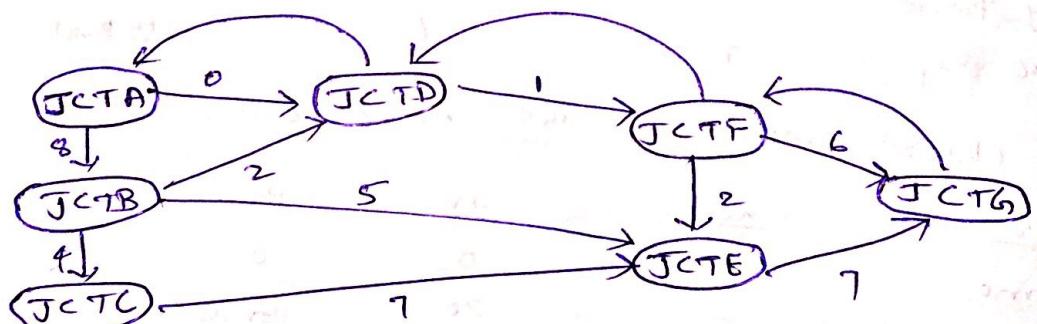
Residual graph, G_r



choose path ADFG, giving a flow of 2 through
this path,

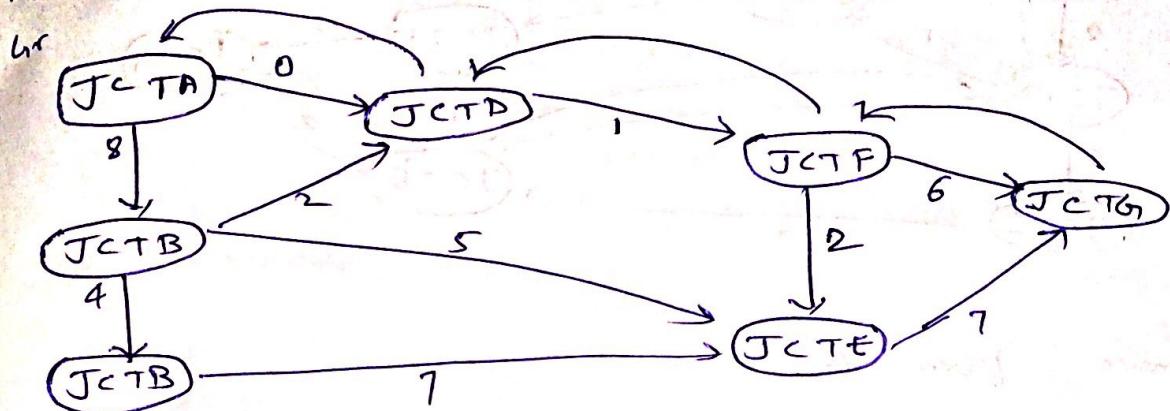


G_r



Add this to G_f , remove from G_r , choose path

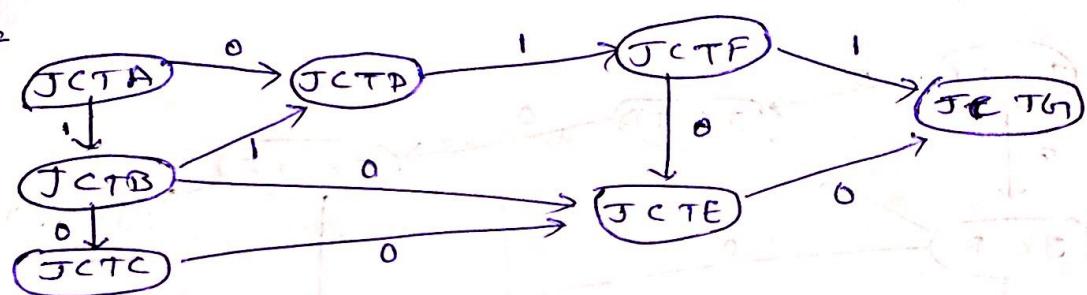
A, B, D, F, G with flow 1



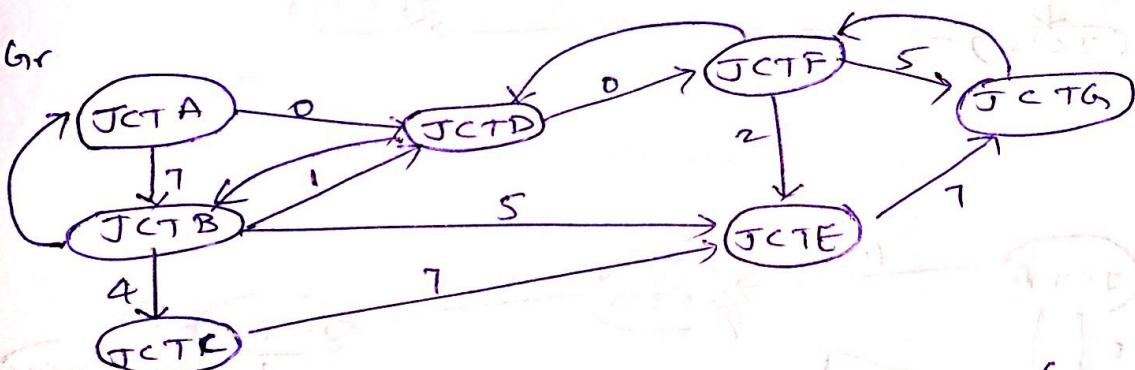
Add this to G_f , remove from G_r , choose path

A, B, D, F, G with flow 1.

G_f

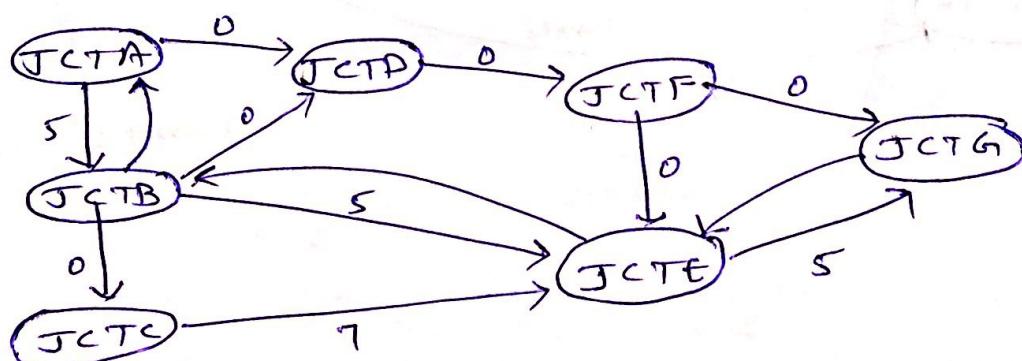


G_r

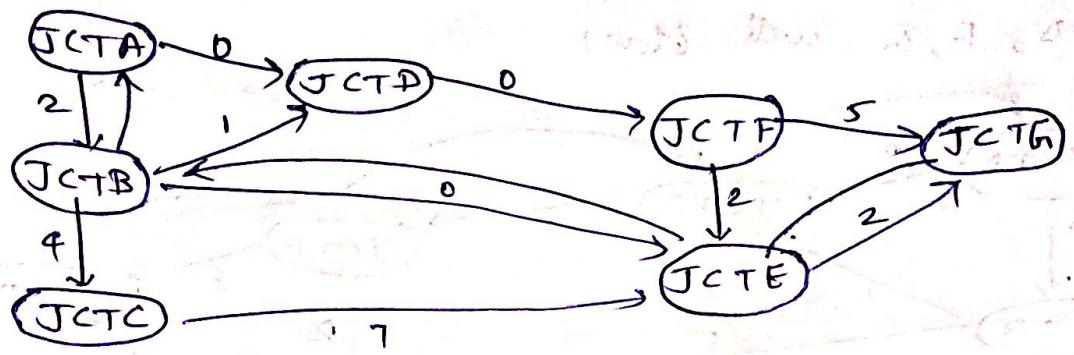


Add this flow to G_f and remove from G_r

choose path A, B, E, G with flow 5



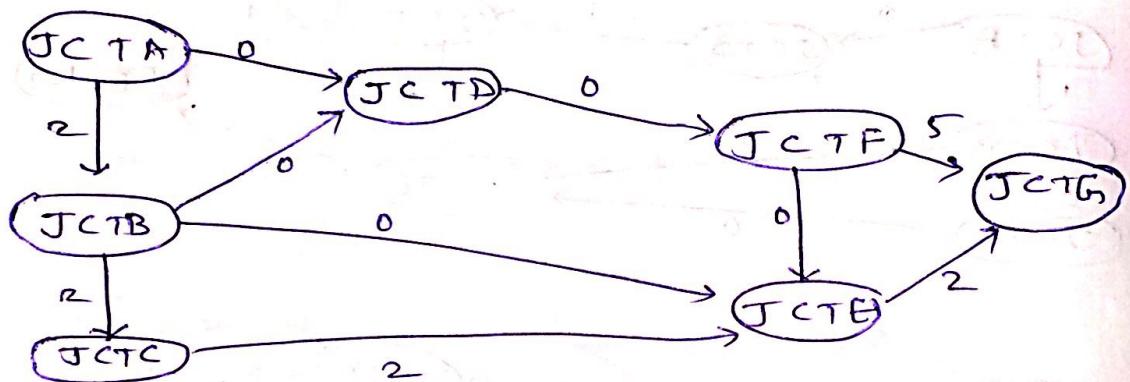
G_r



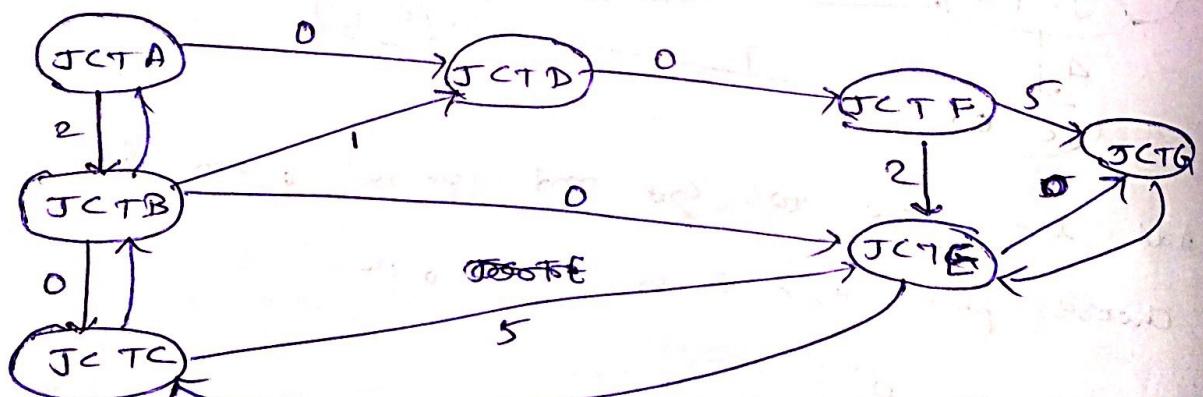
Remove e from G_r

Choose path A, B, C, E, G with flow 2

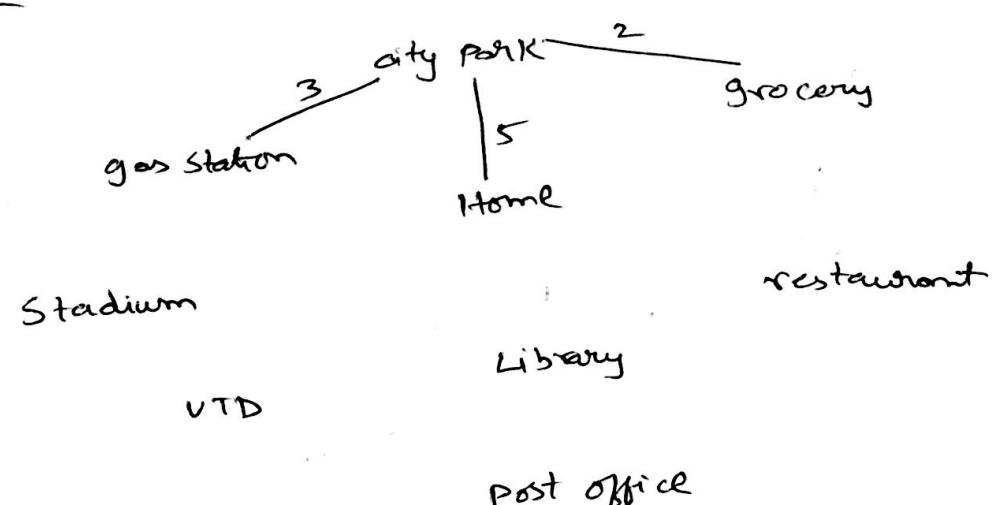
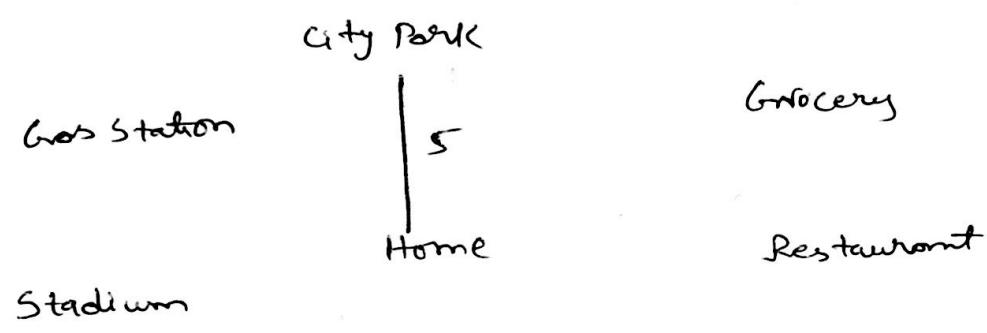
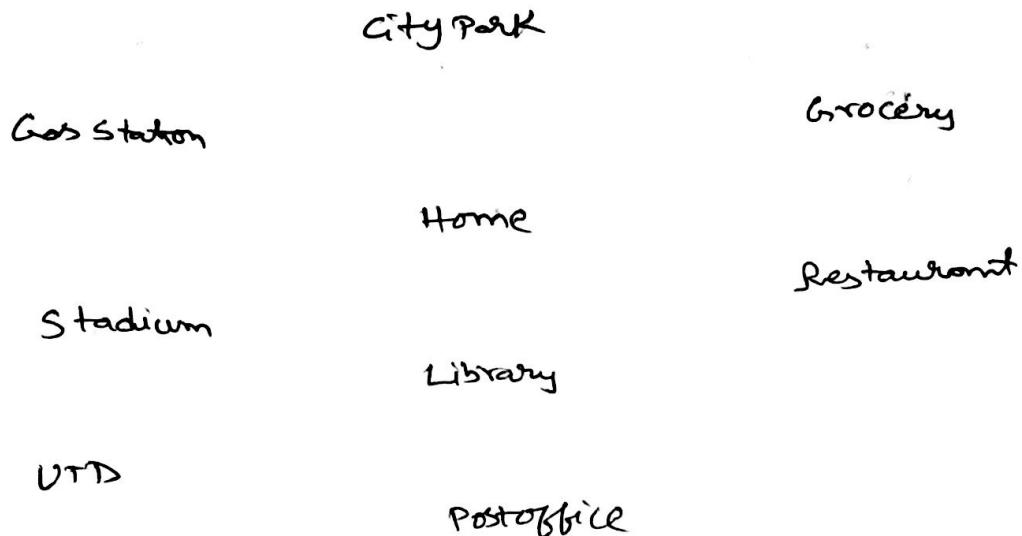
G_F



G_r



Sams:





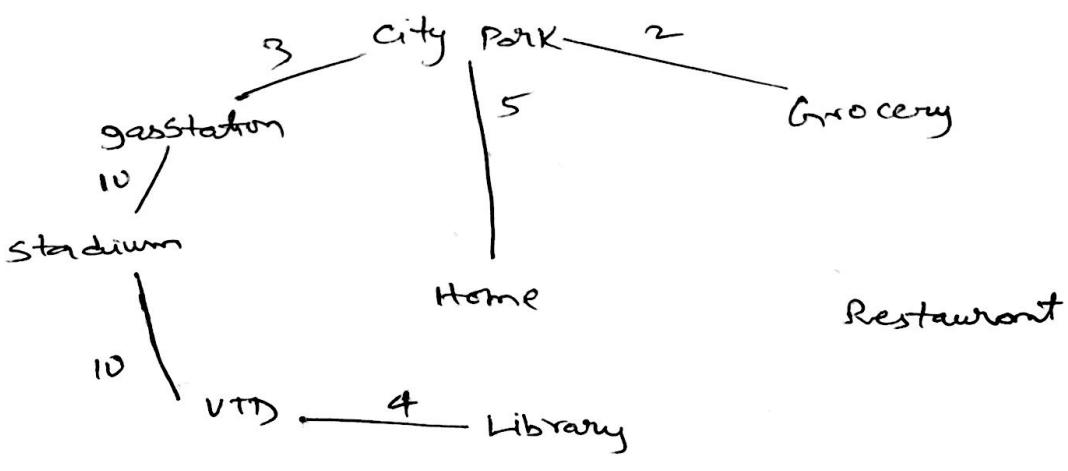
VTD library restaurant

Post office

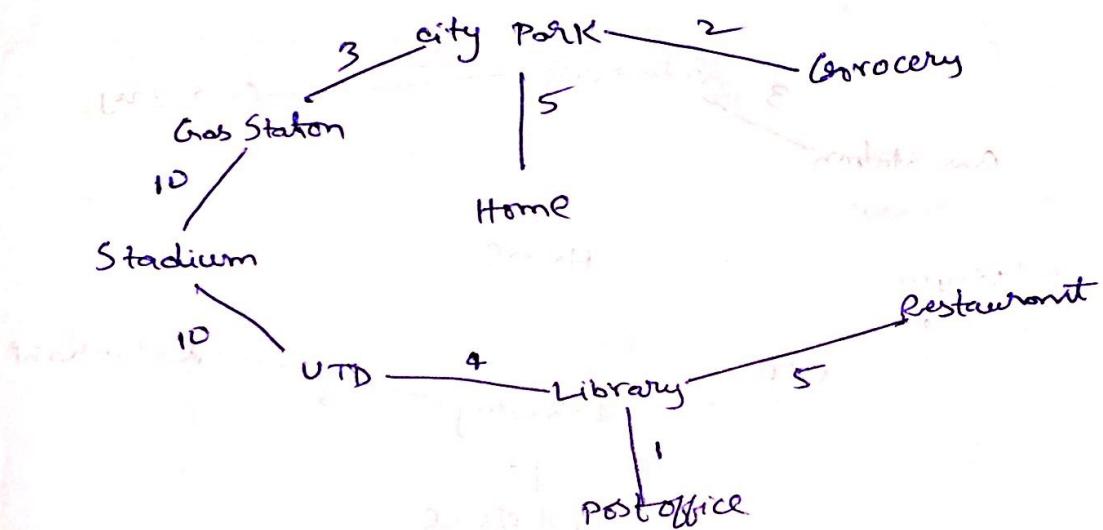
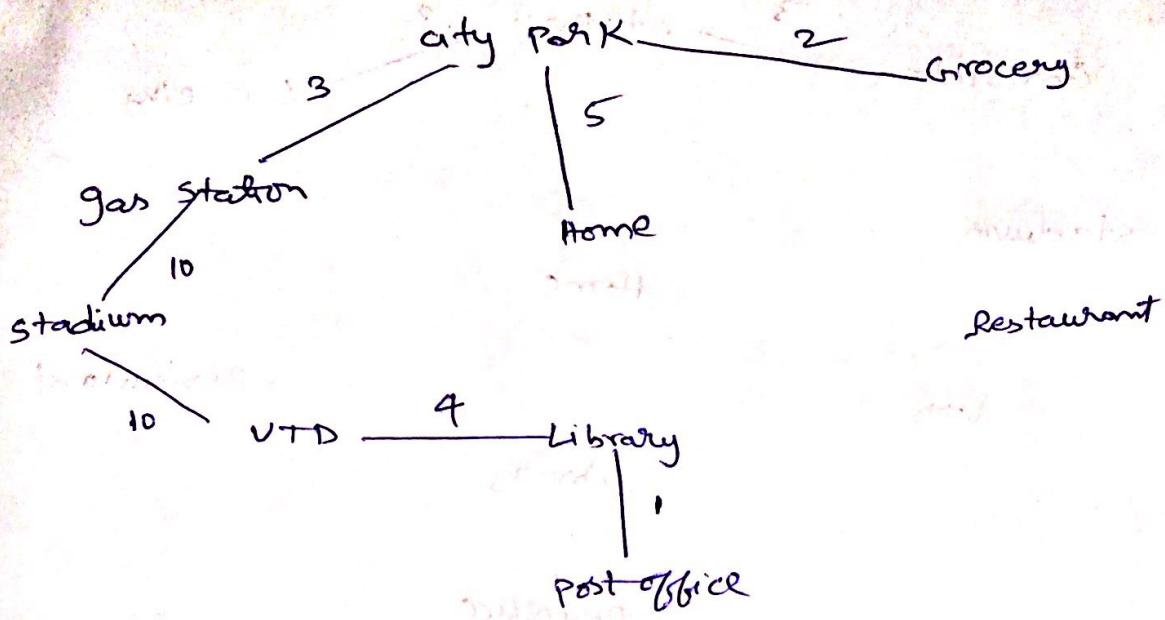


Restaurant

Post office

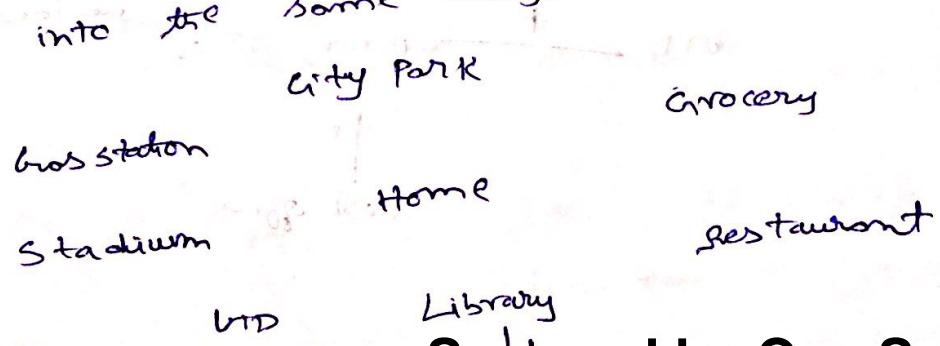


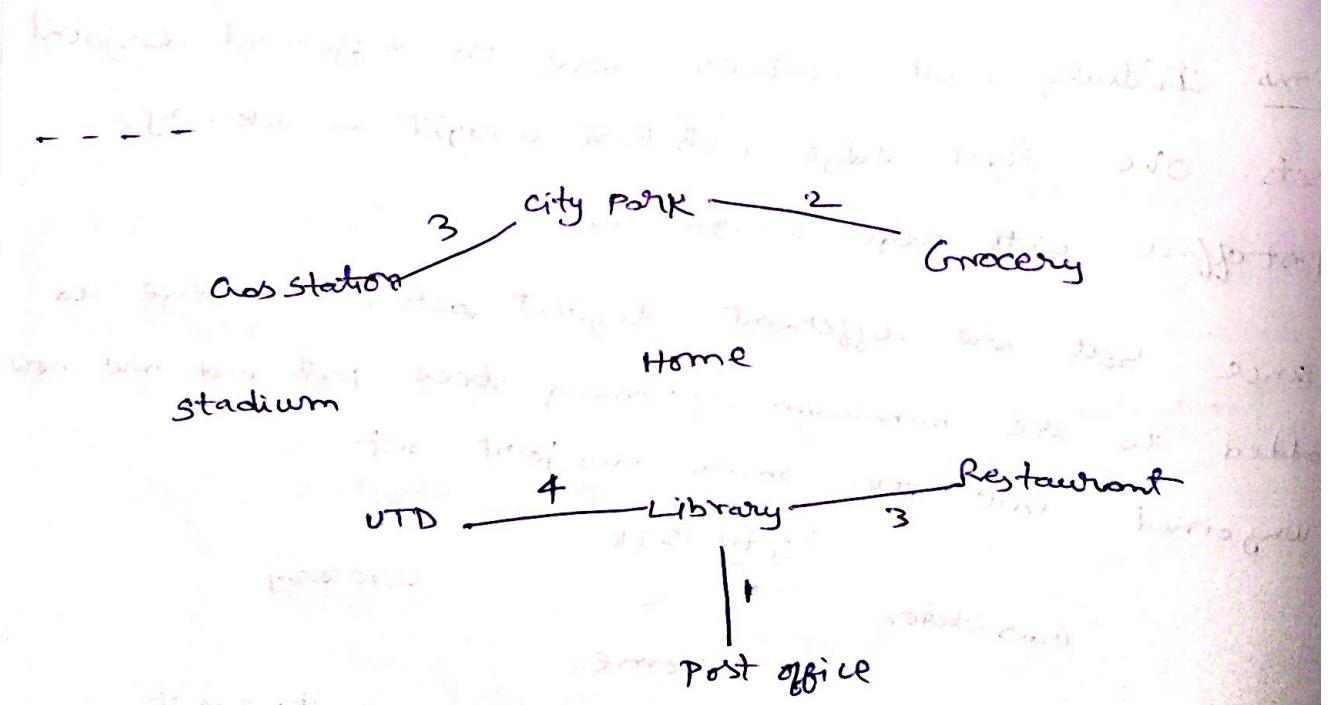
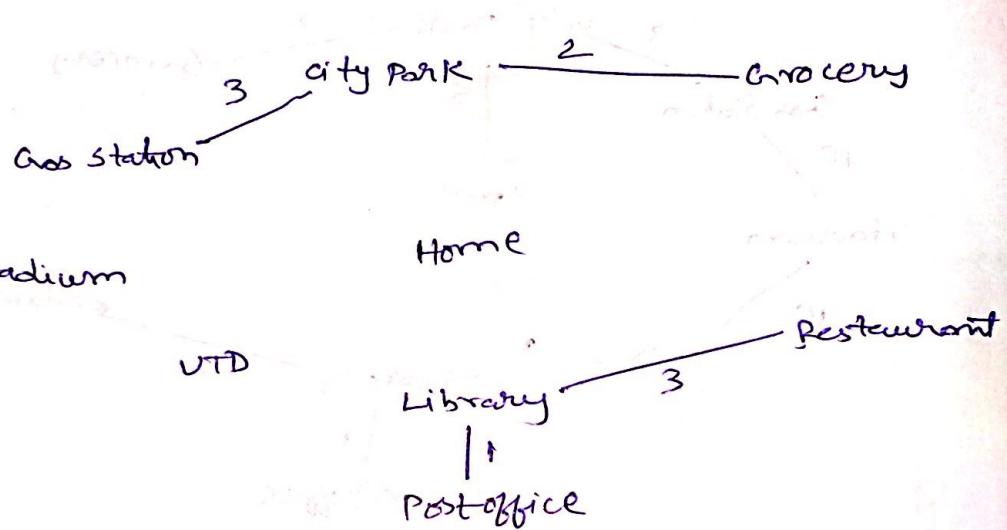
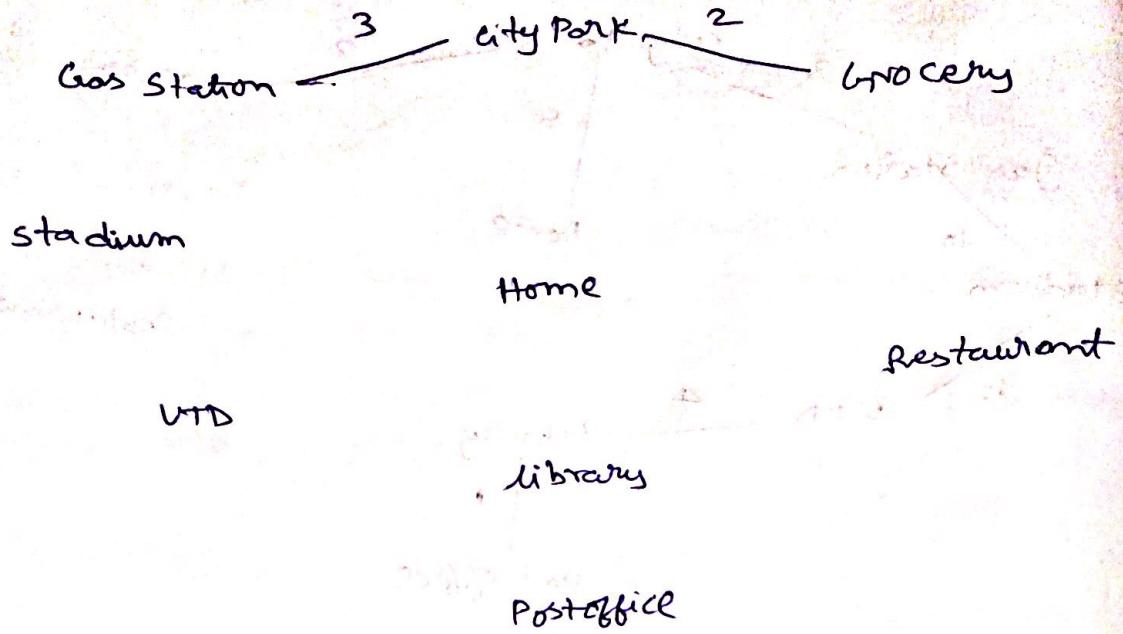
Post office

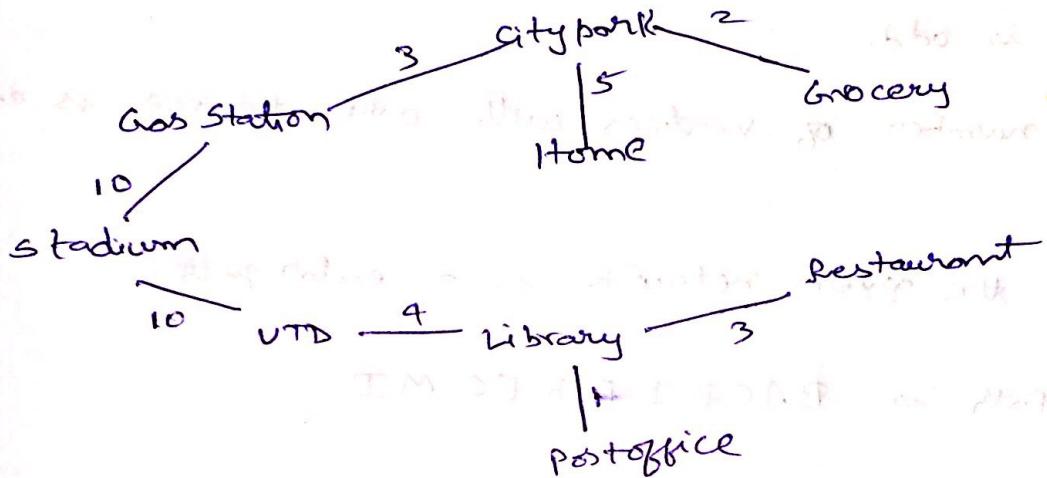
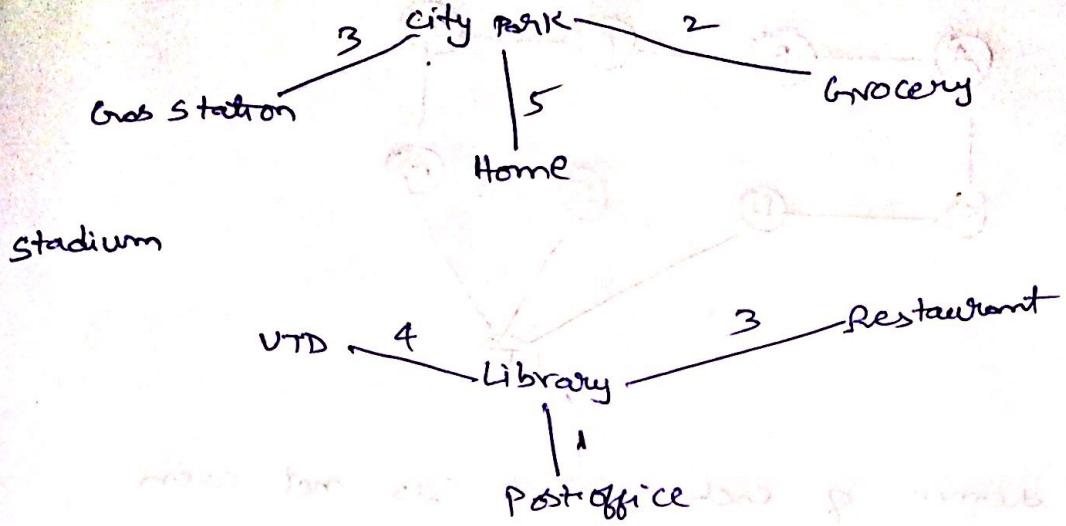


Ans: Initially, all vertices are in different disjoint sets. The first edge with least weight is library, post office with edge weight 1.

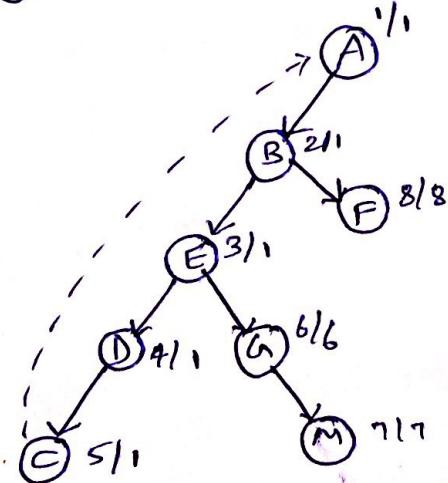
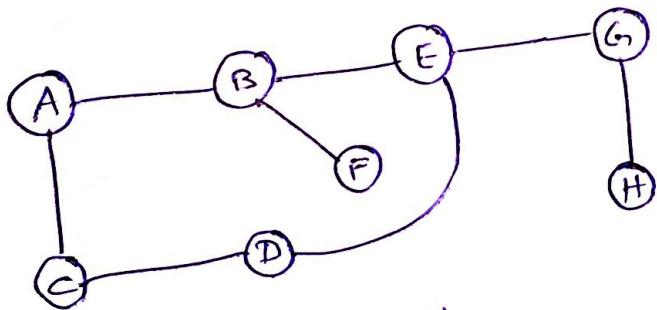
Since both are different disjoint sets, the edge is added to the minimum spanning tree both and are now joined into the same disjoint set.







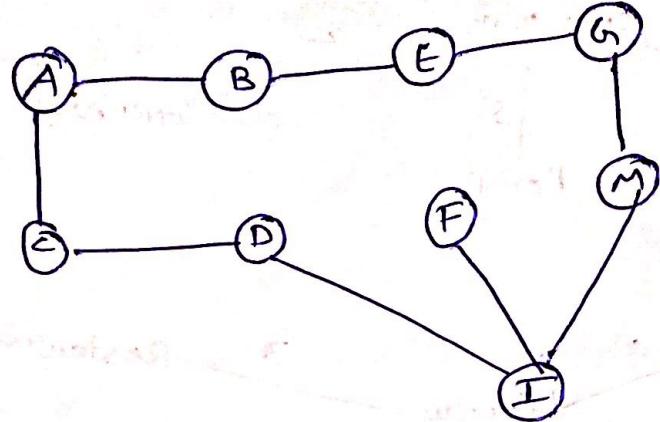
Ans: Depth first spanning tree



Here,
B, E and G are
articulation points.

Low of the vertices is
less than their child's No.

Sons:



The degree of each vertex is not even.

At vertex B and I, the degree of the vertex is

which is odd.

The number of vertices with odd degree is equal to 2.

Hence the given network is a Euler path.

The Path is BACDIFBECMI

This is Euler Path.

