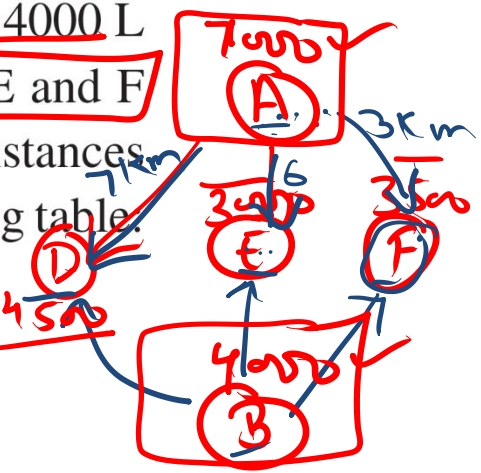
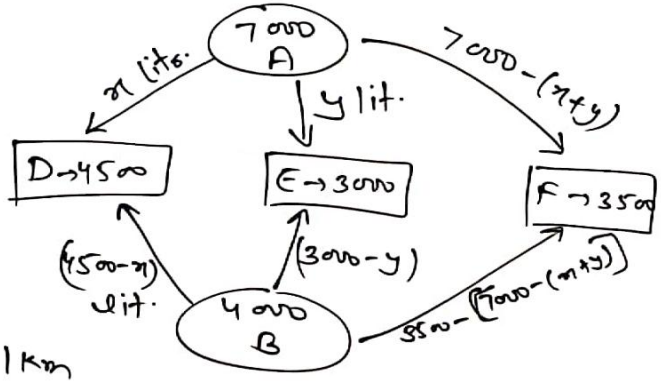
An oil company has two depots A and B with capacities of 7000 L and 4000 L respectively. The company is to supply oil to three petrol pumps, D, E and F whose requirements are 4500L, 3000L and 3500L respectively. The distances (in km) between the depots and the petrol pumps is given in the following table:

Distance in (km.)		
From / To	A	B
D	7	3
E	6	4
F	3	2



Assuming that the transportation cost of 10 litres of oil is Re 1 per km, how should the delivery be scheduled in order that the transportation cost is minimum? What is the minimum cost?

	A	B
From / To		
D	7	3
E	6	4
F	3	2



$\frac{7}{10} - \frac{6}{10} + \frac{2}{10} \quad \frac{3}{10}$

$\frac{8}{10} - \frac{7}{10} + \frac{2}{10} \quad \frac{1}{10}y$

Cost → 10 lit. → 1 Rs / km

→ 1 litre cost → $\frac{1}{10}$ Rs / km

Find → Trans. Cost is minimum.

$$\Rightarrow \text{Cost} = \frac{1}{10}\times 7\times x + \frac{1}{10}\times 6\times y + \frac{1}{10}\times 3\times[7000-(x+y)] + \frac{1}{10}\times 3\times(4500-x) + \frac{1}{10}\times 4\times(3000-y) + \frac{1}{10}\times 2\times(x+y-3500)$$

Let Supply from $A \xrightarrow{10} D = x$ lit.

— " — A to E = y lit.

— " — A to F = $[7000-(x+y)]$ lit.

& Supply from B to D → $(4500-x)$ lit.

B to E → $(3000-y)$ lit.

B to F → $x+y-3500$

$$\Rightarrow Z = \frac{7}{10}x + \frac{6}{10}y + 2100 - \frac{3x}{10} - \frac{3y}{10} + 1350 - \frac{3x}{10} + 1200 - \frac{4y}{10} + \frac{2x}{10} + \frac{2y}{10} - 700$$

$$\Rightarrow Z = 0.3x + 0.1y + 3950 \quad \text{min}$$

Sub. to:- $x \geq 0, y \geq 0$ — (1)

$\rightarrow 7000 - (x+y) \geq 0$

$\rightarrow [(x+y) \leq 7000]$ — (II)

$\Rightarrow 4500 - x \geq 0$

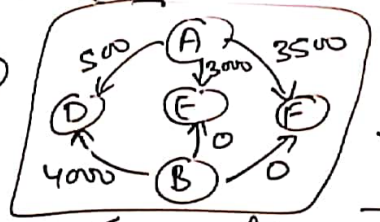
$[x \leq 4500]$ — (3)

$\Rightarrow 3000 - y \geq 0 \rightarrow$ $[y \leq 3000]$ — (4)

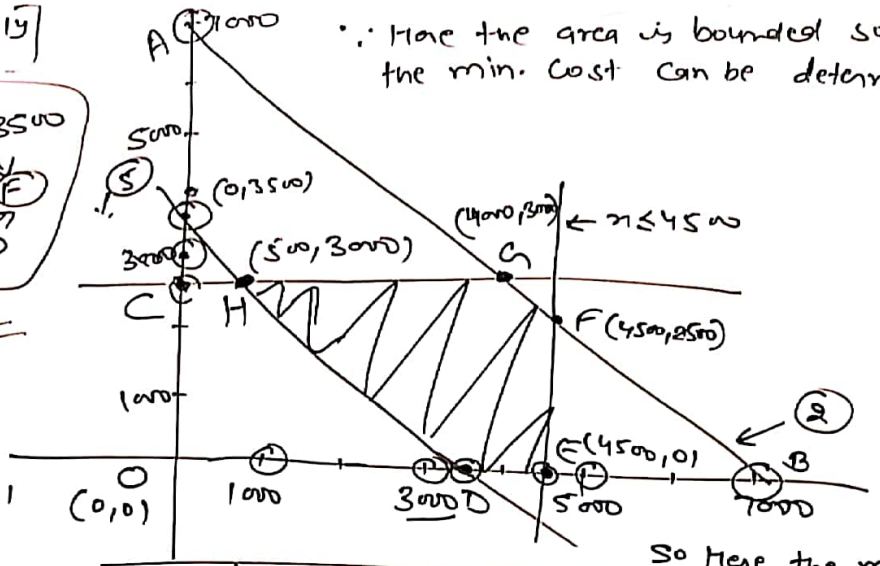
$\Rightarrow (x+y) - 3500 \geq 0$

$\Rightarrow [(x+y) \geq 3500]$ — (5)

$[Z = 0.3x + 0.1y + 3950]$



∴ Here the area is bounded so the min. Cost can be determine.



From (2)

	A	B
x	0	7000
y	7000	0

at (0,0) → True → towards (0,0)

From eq. (5)

	C	D
x	0	3500
y	3500	0

at (0,0) → False.

area away from (0,0)

Point	$Z = 0.3x + 0.1y + 3950$
H(500,3000)	$Z = 4400 \rightarrow$ min
D(3500,0)	$Z = 5000$
E(4500,0)	$Z = 5300$
F(4500,2500)	$Z = 4550$
G(4000,3000)	$Z = 5450$

So Here the min. Cost of Tran. is 4400 Rs when point (500,3000) i.e. $x \rightarrow 500$, $y \rightarrow 3000$