# OPERATIONAL RESEARCH
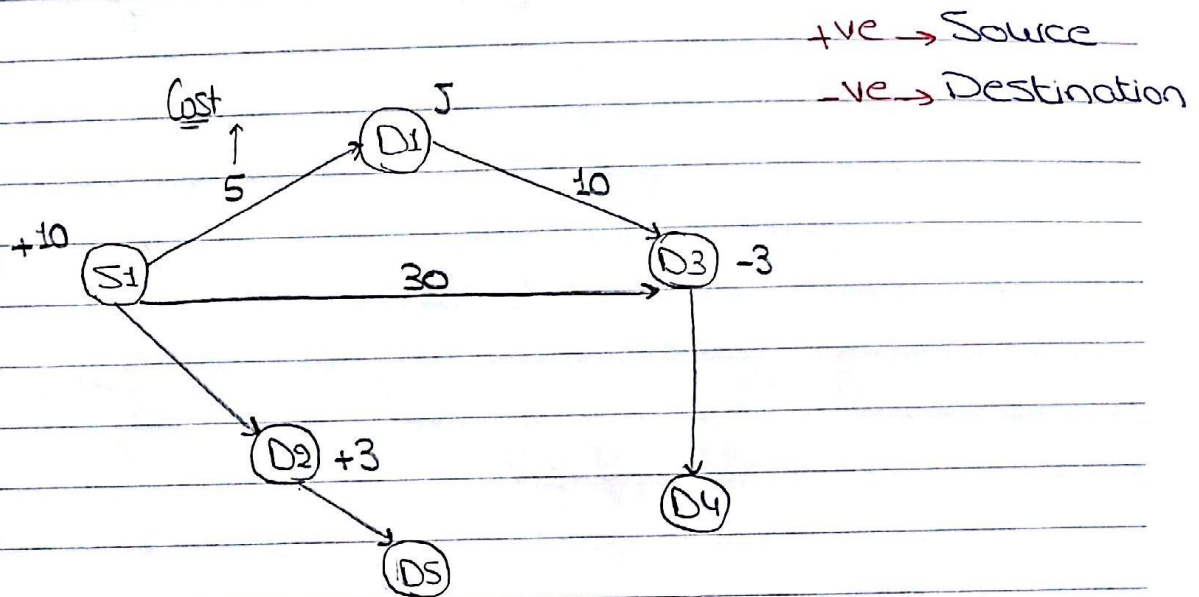
Section 8

# Transhipment Problem:

↳ Same as transportation model problem, but the only difference is that there is non-direct transportation besides the direct one.

+ve → Source
−ve → Destination



## 1. Pure Source
→ Has only out arrows. "S1"

## 2. Pure Destination
→ Opposite of pure source, has only in arrows "D3, D4"

## 3. Pure Junction
→ No Demand, No Supply
Act as source and destination with demand = total demand and Supply = total Supply. "D1"

## 4. Junction + Source
→ Source "has supply"
Supply = its Supply + total Supply and
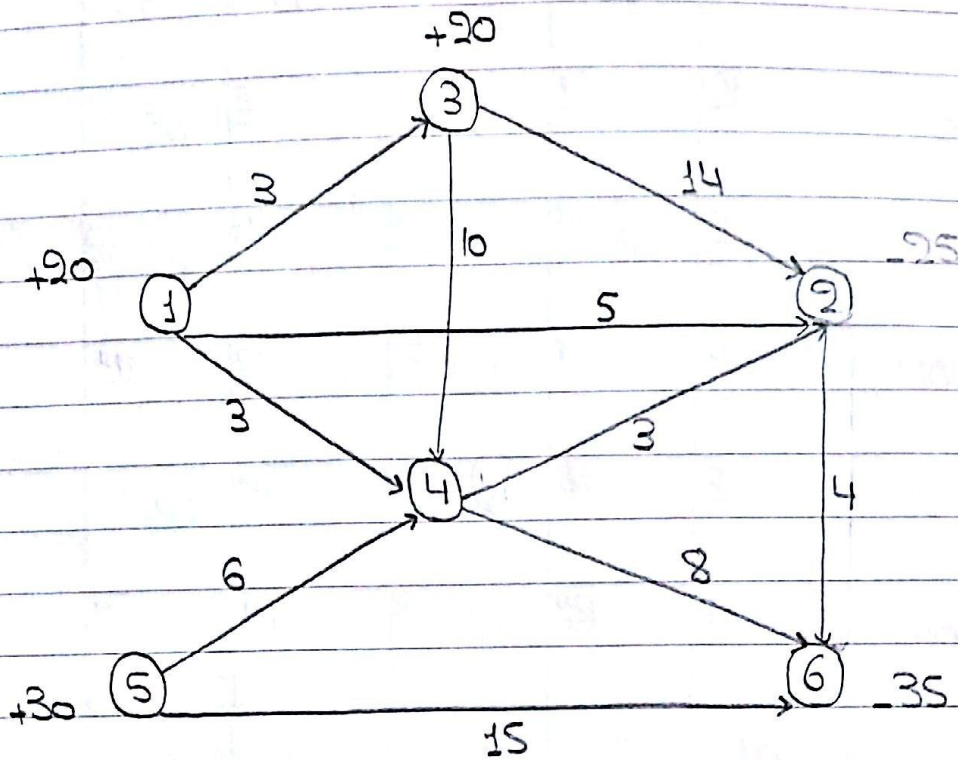
- demand = total demand

5. Junction and destinction:
   → Has demand
   demand = It's demand + total demand and
   Supply = total Supply.

# Example:



**Notes:** +ve → Supply
           -ve → Demand

So, Total Supply = 20 + 20 + 30 = 70
    Total Demand = 25 + 35 = 60

Add Dummy Destination = 70 - 60 = 10

- Pure Source: 1 and 5
- Pure Destination: 6
- Pure Junction: 4 → Total Supply = total demand = 70
- Junction + Source: 3, supply = 70 + 20 = 90, demand = 70
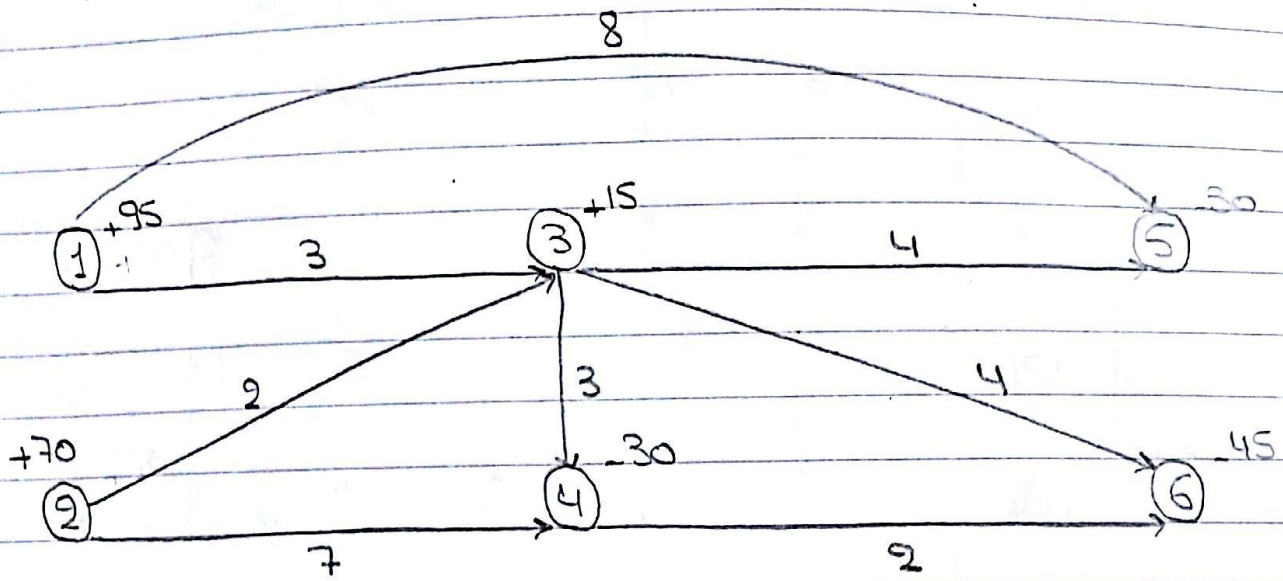- Junction + Destination: 2, Demand = 70 + 25 = 95
                                   Supply = 70

Ⓜ → Cost when there is no direct transportation

| | D2 | D3 | D4 | D6 | Dummy | Supply |
|---|---|---|---|---|---|---|
| S1 | [5] 20 | [3] | [3] | [M] | [0] | 20 |
| S2 | [0] 35 | [M] | [M] | [4] 35 | [0] | 70 |
| S3 | [4] | [0] 70 | [0] 10 | [M] | [0] 10 | 90 |
| S4 | [3] 40 | [M] | [0] 30 | [8] | [0] | 70 |
| S5 | [M] | [M] | [6] 30 | [5] | [0] | 30 |
| Demand | 95 | 70 | 70 | 35 | 10 | |

# Example ? on transhipment problems



*Total Supply $= 95 + 15 + 70 = 180$
 Total demand $= 30 + 30 + 45 = 105$

● So, Add Dummy Destination with demand $= 180 - 105 = 75$

‒ Pure Source → 1,2
‒ Pure Destination → 5,6
‒ Junction →
‒ Junction + Destination → 4 → Supply $= 180$
                               Demand $= 180 + 30 = 210$
‒ Junction + Supply → 3 → Supply $= 180 + 15 = 195$
                               Demand $= 180$

Destinations

| | 3 | 4 | 5 | 6 | Dummy | Supply |
|---|---|---|---|---|---|---|
| 1 | 3 | M | 8 | M | 0 | 95 |
| 2 | 2 | 7 | M | M | 0 | 70 |
| 3 | 0 | 3 | 4 | 4 | 0 | 195 |
| 4 | M | 0 | M | 2 | 0 | 180 |
| Demand | 180 | 210 | 30 | 45 | 75 | |

Source