Week-6 Resource Scheduling

Lesson: 1:

- Focuss How do we conside resources as input to the Network & what is the kind of alloc^n & levelling operations we can do with the resources.
- Resource
  - Materials, Man-Power, Money, Machines are all the M's & if you manage these properly, you have a good project.
  - Resource Mgmt is the crux of good pjct mgmt.
  - 2 types of resources: (i) Consumable
    (ii) Reusable
  - Influence of Resources on Schedule:-
    (i) Dur^n of activities are dependent on the usage of resources & their availability
    (ii) Resources are a significant component of the project cost.
    (iii) Proper scheduling of resources will have positive impact on the time as well as cost of the project.
    (iv) Improper scheduling resources will result in cost & time overruns.
  - Resource Decisions :-

    Materials
    - Periodic Order Quantities
    - Storage requirements & locations
    - Quantity discounts - multiple sites
    - Custom equipment ordering & delivery

- Manpower
  - Mobiliz^n requirements each period
  - Skill requirements during each period
  - Work planning during non-availability period.
- Machinery
  - When special equipment is needed on site
  - Preparatory works for equipment requirement
  - Sharing equipment with other sites
- Money
  - Cash flow predictions
  - Credit Planning
  - Project Profitability
  - Tax Planning
- Resource loading
  - allocating manpower on basis of Gantt-Chart
- Resource Over-Allocation
  - This problem arises when there is strict barriers of resources and there is no other option rather than delaying the project.

Lesson-2-

- Projects & Resources
  - Single Project – Single Resource
  - Single Project – Multiple Resource } Most common scenario of PM
  - Multiple Project – Single Resource
  - Multiple Project – Multiple Resource } scenario for large companies

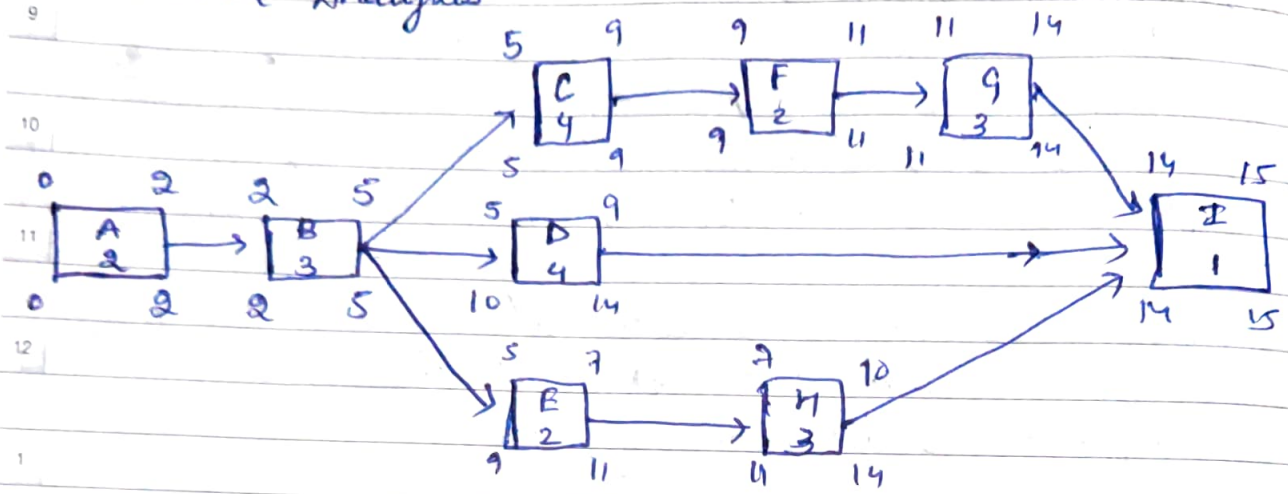
- Various Histograms & Cumulative Resource Graphs are drawn based on availability of Resources and taking cost into consideration

- Exercise:

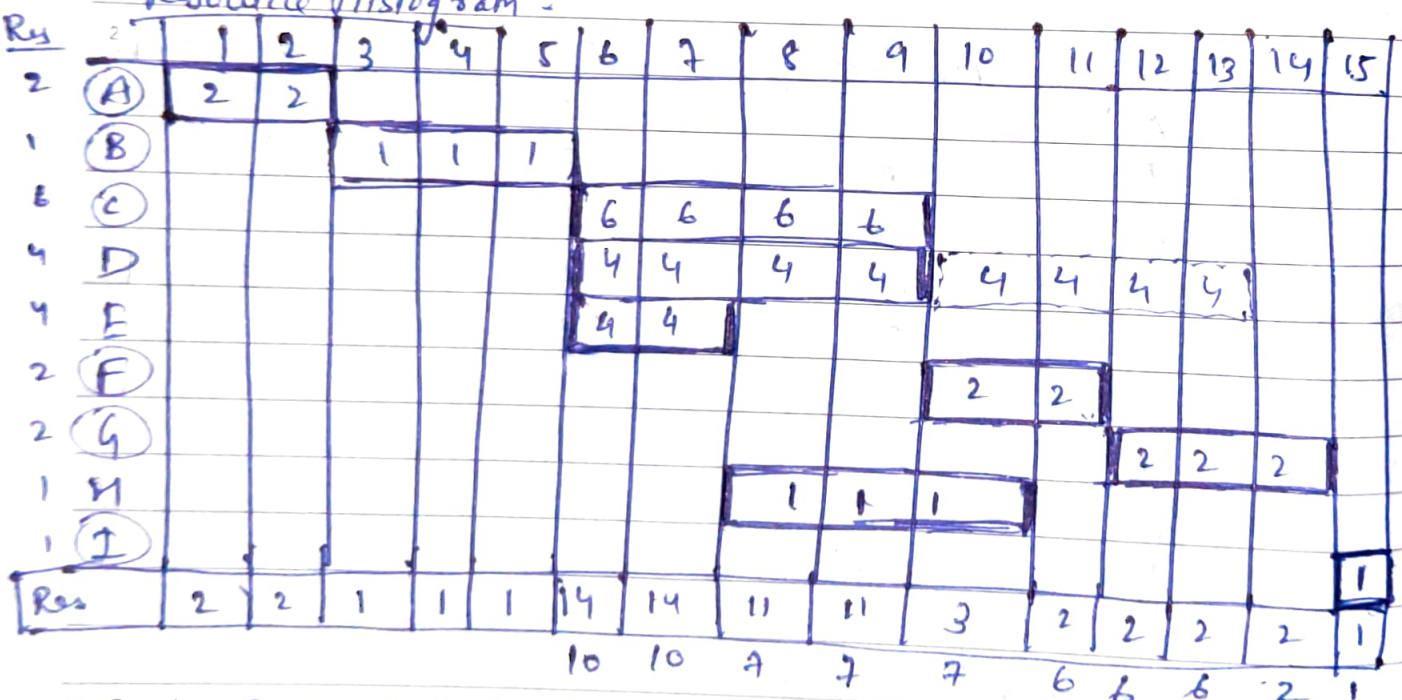
Activity	Preceded by	Duration	Resources
A	–	2	2
B	A	3	1
C	B	4	6
D	B	4	4
E	B	2	4
F	C	2	2
G	F	3	2
H	E	3	1
I	D, G, H	1	1

Plot Resource Histogram
What if only 10 resources are available?

- Network Analysis



- Resource Histogram :



09 Sunday

- Critical Activities cannot be floated i.e. their position cannot be changed, these are fixed
- Here, A, B, C, F, G, I are critical activities
- Suppose D is floated as shown

Lesson : 5 :

- Resolving Resource Allocation Problems :-
  1.) Use float to shift activities
  2.) Increase activity duration - by reducing resource loaded
  3.) Decrease activity duration - by increasing resource & shift activity (s) using float
  4.) Split Activity
  5.) Over-Time / Shift Work (↑ effort)
  6.) Substitute Resources
  7.) Increase Project Duration

- Resource Levelling
  This is done to resolve over allocation problems and resource constraints by applying above techniques to create an ideal resource profile

Lesson 7 :

Minimum Moment Concept

- Moment of the resources / resource histogram about the x-axis is minimum only for a rectangular profile.

$$M = \Sigma (Y * Y/2)$$

- Improvement Function
  x_i : Resource level from which m days of resources are removed
  W_i : Resource level to which m day " " are added
  r : The level of resources.

$$M1 = 1/2 * \sum_{1}^{m} x_i^2 + \frac{1}{2} * \sum_{1}^{m} W_i^2$$

$$M2 = \frac{1}{2} * \Sigma (x_i - r)^2 + \frac{1}{2} * \sum_{1}^{m} (W_i + r)^2.$$

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2 3 4 5 6 7 8 9 10 11 12 13
16 17 18 19 20 21 22 23 24 25 26 27
30
W T F S S M T W T F S S

- $M1 = M2$, or $M1 < M2$ or $\boxed{M1 > M2}$ – ideal activity
- This involves only shifting of one activity
- Improvement factor formula:

$$IF_{A,d} = r\left(\sum_{1}^{m} x_i - \sum_{1}^{m} w_i - mr\right)$$

$IF_{A,d}$ = imp factor for shifting activity A, d days out in time

r = daily resource rate for the activity.

m = min. no. of days that the activity is shifted or the dur^n of the activity

x_i = daily resource sum for the current time frame over which resources will be deducted

w_i = daily resource sum for the time frame over which resources will be added.

- $IF > 0 \Rightarrow$ reduction in moment due to the shift. Then magnitude comes into picture
- Lesson 8: Illustrative example (must see to apply the above formula) (easy)

Rs 2 1 6 4 4 2 2