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CPM & PERT

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Syllabus

1) Basics of Project Management
2) Elements of Network.
3) Analysis of Network → PERT / CPM
4) Time-Cost Model (Crashing)
5) Miscellaneous Topics.

BASICS OF PROJECT MGNT.

PROJECT:

A Project is a set of related activities undertaken to achieve a particular goal or objective within specific constraint.

PROJECT MANAGEMENT

It is an art of achieving the project objectives by utilizing all d resources as effectively as possible. The resources includes human resources, machine, material resources, financial resources, space etc.

"A Project is said to be complete only when all d activities involved in d project r 100%. complete".

Objectives of PM

1) It must be completed in Min. Time.
2) It ——, ——, —— Min. Capital Investment
3) It must utilise d resources as sparingly as possible.

Basic Elements of PM

1) Planning: It is d 1st stage in wch d resource r analyse & the feasibility of attaining d objectives is determine.
2) Scheduling: It is d stage in wch various resour -ces r assigned to various activities within specific constraints.
In this phase times r allotted to various activities in a logical or in a sequential manner.

NOTE: Both Planning & Scheduling r done before d Actual Start of project.

Methods of Scheduling (1)

- Network Methods
  - PERT
  - CPM
  - UNETICS, PRIMAVERA, TOPS, SPYDER SCANS etc.
- Charts
  1) Bar chart
  2) Linked Bar chart — "MS-PROJECT"
  3) Mild Stone Bar Chart

3) Monitoring & Controlling :

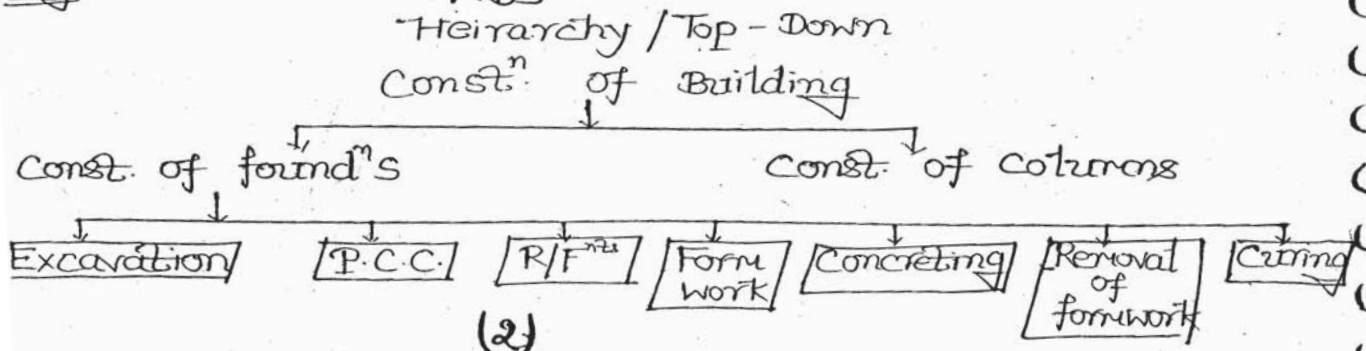
It is d execution of planning & scheduling. If there is any deviation from d proposed plan & schedule, it also deals with Rescheduling.

* WORK BREAKDOWN STRUCTURE (WBS)

→ WBS is a systematic, Heirarchical top-down approach in wch d ultimate objective is broken down into a no of small & easily manageble unit.

→ Resource identification & resource Mgmt can be easily accompalished with d help of WBS.

Eg



(2)

ELEMENTS OF A NETWORK

NETWORK :

- A Network is a Graphical representation of d whole project. The Network can be of d foll types —

1) Activity on Arrow (AOA) → CPM / PERT
2) Activity on Node (AON) → CPM (Representation)

- For Analysis purposes, AOA Network is adopted.
- For easy Representation ", AON " —, —.
- AOA Network is used in both PERT & CPM whereas AON Network —, — only CPM (for representation purposes).

1) AOA Network

- The AOA Network has foll. 2 basic elements —
  1) Event
  2) Activity / Job / Task

1) Event: An event is a specific instant of time where a particular task can be started or a particular task can get completed.
It is a delieverable recognise at a specific instant of time.
It is represented by Node, usually circle.

= ✓, □, ▭, △, ⬭ etc.

NOTE The occurance of an event neither consumes time nor any resources.

2) Activity: It is an actual performance of an operation in a particular project wch require Time as well as Resources.
It is represented by "Arrow (⟶)".

Tail —(Activity Description / Activity Duration)→ Head

(8:30 PM) —(Movie / 2:30h)→ (11:00 PM)

(i) —(i-j / i, j / t_{ij})→ (j)

- Types of Event
  1) Tail Event
  2) Head Event
  3) Dual Role Event

1) Tail event: The event wch marks d starting of an activity is c/d as its Tail Event.
If d event marks d starting of d- project, it is c/d as Initial Event.

NOTE: An activity can start only when its tail event has occurred.

2) Head event: The event wch marks the completion or finishing of a activity is c/d as its head event
If d head event marks d completion of the project, it is c/d as Final or Finish event.

NOTE: A Head event occur only when all d activities leading to it r Complete.

3) Dual Role event: The event wch marks d starting of an activity & d finishing of some other activities is c/d as Dual Role event.

NOTE: Except initial & final event, all d intermedi-ate events r dual role event.

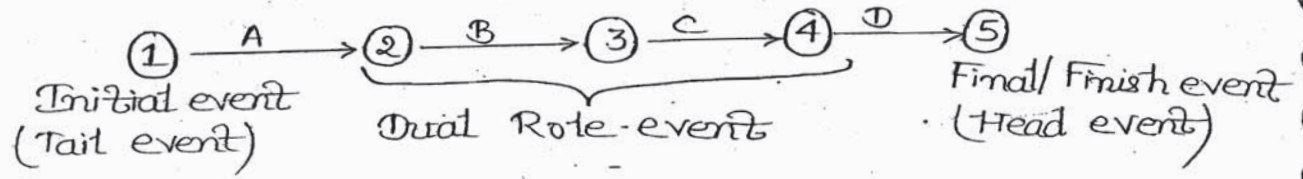
- Types of Activities:

1) Serial Activities (Dependent): It is d grp of those activities wch r necessrily dependent upon each other.

2) Parallel Activities (Independent): It is a grp of activities wch r independent on each other i.e. the occurance of these activities do not depend upon d occurance of other activities.

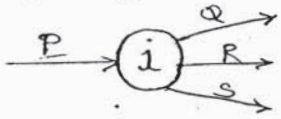
Examples →

1) Linear Network



(A, B, C, D) ⟶ Serial acts

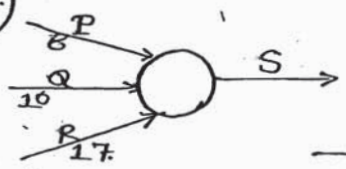
2) Parts of a Network



As soon as P get completed, Q, R & S can get started.

- (P,Q) → Serial
- (P,R) → Serial
- (P,S) → Serial
- (Q,R,S) → 11st acts
  - → Concurrent activities ④
  - → Burst activities

3.)

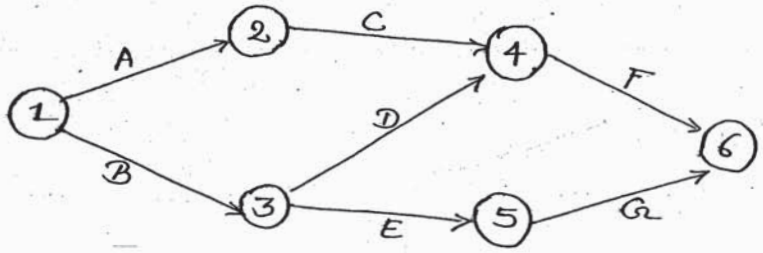


S can be started only when all the three.
P, Q & R get completed.
→ S can be started only after 17 days.

→ (P,Q,R)
- 11el activities
- Concurrent activities
- Merge activities

(P,S) → Serial
(Q,S) → Serial
(R,S) → Serial

4.)



(A,B) – initial activities
(F,G) – final "
(A,C) – Serial
(C,D) – 11el/Concurrent/Merge
(D,E) – 11el/Concurrent/Burst
(A,E) – 11el

(G,C) – 11el
(F,B) – Serial

NOTE: A: All 11el activities r concurrent activities. ✗
R: All concurrent activities r 11el activities. ✓

DUMMY ACTIVITY

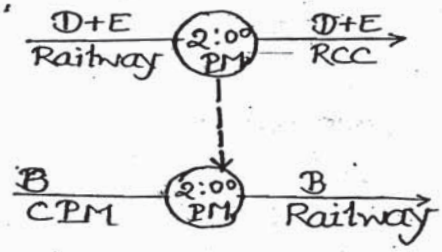
A Dummy activity is d one wch neither requires time nor any resource for its completion but is used to establish a relⁿ wch is not existing in the network.

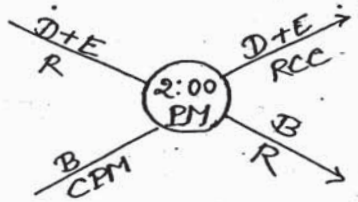
A Dummy is represented by "Dashed Arrow (- - - →)".

- **Logical Relationship**

Dummies r used to establish logical relationship in a network i.e. they r use to maintain uniqueness of dependency in d network.

Ex: 1)

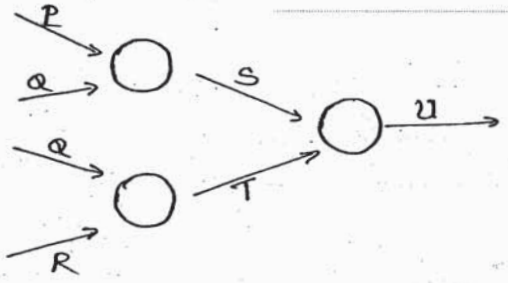




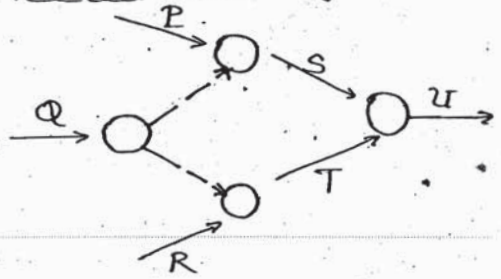
Wrong

2.) Part of a Network :

Wrong



Corrected Part of Network



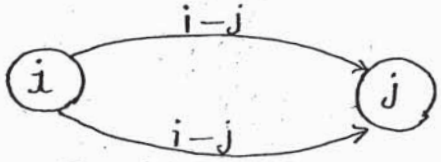
An activity can occur only once in a network.

- **Grammetical Relationship**

Dummy is use to established grammetical relship in the network i.e. it is used to established uniqueness of identity in d network.

Ex:

1)



Duplicate Activities

2)