

DEFINITIONS

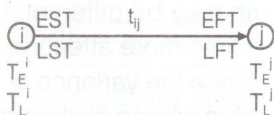
CPM stands for critical path method. This is based on deterministic approach in which only one time estimate is made for activity completion.

1. A network diagram in CPM is activity oriented.
2. Cost is the most important criteria. Minimum cost is found corresponding to optimum time.
3. There is only single time estimate for each activity.
4. The probability of completion of activity in this estimated duration is 100%.
5. It is based on deterministic approach.
6. Suitable for repetitive type of work.
7. Normal distribution is followed.

ACTIVITY TIMES

(i) Earliest start time

$$EST = T_E^i$$



(iii) Latest finish time

$LFT = T_L^j$ of head event

$$LFT = T_L^j$$

(ii) Earliest finish time

$EFT = EST + \text{Activity time}$

$$EFT = T_E^j + t_{ij}$$

(iv) Latest start time

$LST = LFT - t_{ij}$

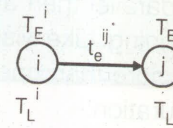
$$LST = T_L^j - t_{ij}$$

FLOAT

Float denotes the range within which activity time or its finish time may fluctuate without effecting the completion of the project.

(i) Total Float (F_T) :

$$F_T = LST - EST \quad \text{or} \quad F_T = LFT - EFT$$



$$F_T = T_L^j - T_E^i - t_{ij}$$

(ii) Free Float (F_F) :

$$F_T = T_E^j - T_E^i - t_{ij} \quad \text{or} \quad F_F = F_T - S_j$$

where S_j = Head event slack

(iii) Independent Float (F_{ID}) :

$$F_{ID} = T_E^j - T_L^i - t_{ij} \quad F_{ID} = F_F - S_i \quad F_{ID} = F_T - S_i - S_j$$

where S_i = Tail event slack

$F_T = 0$ - for Critical path

$F_T > 0$ - for Subcritical path

$F_T < 0$ - for Supercritical path

(iv) Interfering float (F_{IN})

It is the another name of head event slack.

$$F_{IN} = S_j = F_T - F_F$$



Trick to memorise float formula:

	j	i	ij	
F_T	L	E	t_{ij}	$\Rightarrow F_T = T_L^j - T_E^i - t_{ij}$
F_F	E	E	t_{ij}	$\Rightarrow F_F = T_E^j - T_E^i - t_{ij}$
F_{ID}	E	L	t_{ij}	$\Rightarrow F_{ID} = T_E^j - T_L^i - t_{ij}$

CPM SYSTEMS

Mainly two systems are used in CPM analysis:

1. A-O-A system (Activity on arrow system)

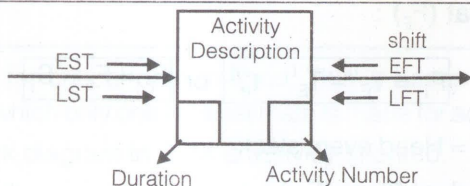
An activity is graphically represented by an arrow.

The tail end and head end of arrow represent start and finish of an activity respectively.

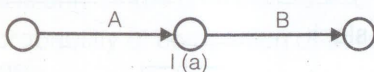
2. A-O-N System (Activity on node system or precedence diagram).

Activity is represented by circle or node. Events have no places. Arrows are used only to show the dependency relationship between activity nodes.

When two or more activities start parallel then an activity called DEBUT (D_0) is provided at the beginning. Like wise a finish activity (F_0) is provided at the end when more than one activities finish parallel. Activity D & F have zero duration.



A-O-A system



A-O-N system

