4. PROJECT MANAGEMENT SCHEDULING TECHNIQUES

PROJECT MANAGEMENT:

1. **Charter:** Persons Who are defining objective. 2. **Stake Holder:** Owner of the Project. 3. **Program Manager:** Persons who handle similar and dissimilar Activities. 4. **Project Manager:** Persons who handle similar Activities. 5. **Function Manager:** Organizes program to fulfil the requirement of the skills.	**GREEN FIELD PROJECT:** Project From the scratch. **BROWN FIELD PROJECT:** Use the existing things.

BAR/ GANTT CHARTS	
• Simplest Project Management chart. • Simple type of activities is representing. • In bar Chart, X-axis represents time, where as activities are presented by horizontal bar.	**Limitations:** • Not used for complex activity representation. • Bar Chart is not able to depict the interdependency of one activity on another.

BASIC CONCEPTS		
ACTIVITY: To complete a project, it needs to be divided into sub-part. This sub part is called activity. **Resource, Time** Consumption is in activity. It's represented by **arrow** in network diagram.	**EVENT:** It's instantaneous phenomenon and it doesn't consume any resource and time. It indicates Start and end of activity. It's represented by **Circle, Nodes, Triangle etc.**	**DUMMY ACTIVITY:** Activity in which doesn't consume any resource or time but it's used to satisfy logical sequence or precedence relationship is called dummy Activity. It's represented by **dotted line**.

DIFFERENT TYPE OF TIME ESTIMATION		
Optimistic Time (t_o)	**Pessimistic Time (t_p)**	**Most Likely Time (t_m)**
It's the minimum time required to complete an activity when the situations are favourable.	It's the maximum time required to complete an activity when the situations are unfavourable.	It's the time required when situations are neither completely favourable not completely unfavourable.

Estimated Time of an activity: $t_e = (t_o + 4t_m + t_p)/6$

	PERT	**CPM**
1	Program Evaluation and review technique	Critical path method
2	It's applicable for new type of projects. E.g. For which data are not available (R&D)	It's applicable for repetitive type of projects. E.g. For which data are available (Construction related activity)
3	It's applicable for probabilistic concepts E.g. Uncertainty is involved in PERT.	It's applicable for deterministic concept.
4	PERT is **event oriented**. E.g. Completion of project depends upon the end results.	CPM is **activity oriented**.
5	In PERT, all three times are used. So, the expected time can be found.	In CPM only time estimate is being done.
6	PERT is control device.	CPM is planning device.

RULES OF NETWORK DIAGRAM (DR. FULKERSON FOUND THE DIAGRAM)			
Arrows are only in one direction.	Two activity can't have same starting & ending event.	Cycling property is not allowed in network diagram.	Dangling property needs to be avoided while drawing the network diagram. (Orphan Branch effect avoid)

EST	LST	t_{ij}	EFT	LFT
i		$\longrightarrow$	j	

FORWARD PASS	**BACK WARD PASS:**
$EST + t_{ij} = EFT$	$LFT - t_{ij} = FST$

SLACK: It's Always defined at event.

+ve Slack: More than enough time you have.	**-ve Slack:** In sufficient time.

t_{ij} = Expected time to complete an event form node "i" to node "j"
i = Start or Tail Event,
j = End or Head Event,
EST = Earlier Start Time,
LST = Late Start Time,
EFT = Earlier Finish Time,
LFT = Late Finish Time,

TAIL EVENT SLACK: $TES = LST - EST$	**HEAD EVENT SLACK:** $HES = LFT - EFT$

CRITICAL PATH: Path has maximum time of operation. So, Sometimes Critical path has zero slack.

NETWORK: It's the minimum time to complete all the activities in network.	**Max.+Network**	**CRITICAL PATH**
PROJECT: It's the maximum time required to complete all activities in a project.	**Min. + Proj.**	

MINIMUM SPANNING TREE:

It's the minimum time in a network for starting node to the ending node & It's not the critical path.

IMPORTANT NOTES:

1. Variance $\sigma^2 = \left({}^{t_p - t_o}/_{6}\right)^2$
2. Standard Deviation of critical path, $\sigma_{CP} = \sqrt{\sum \sigma_{CP}^2}$
3. The overall project duration follows normal distribution or gaussian distribution or bell shape curve or one hump symmetric curve.
   Whereas individual activity follows β −Distribution.
4. $Z = (T_S - T_E)/\sigma_{CP}$

Z = Normal Distribution Value,
σ_{CP}= Standard Deviation of critical path,
T_E= The estimated time of a project (Given in problem)
T_S= Given in the problem.

Z	**Probability**	**Z**	**Probability**
0	50%		
1	84.13%	**-1**	15.87%
2	97.7%	**-2**	2.3%

5. In case, if there are more than one critical path, then in order to determine probability we select the path which is having maximum standard deviation & due to that the probability will be less but we will be on safe side as the project must be completed on time.

FLOAT		
TOTAL FLOAT (F_T)	**FREE FLOAT (F_F)**	**INDEPENDENT FLOAT (F_I)**
	It's that portion of the total float in which compromises predecessor activity. Here, Predecessor is being delayed without affecting successor activity.	It's that portion of total float in which neither affects successor activity nor the predecessor activity.
$F_T = LFT - EST - t_{ij}$	$F_T = F_T - HES$	$F_I = F_T - HES - TES = F_T - TES$

Here, $F_T \geq F_F \geq F_I$

For critical path: $F_T = F_F = F_I = 0$

NOTE: There is another float named as Interference Float.