Experiment NO: 05 Date: 27/10/2021

Aim: To develop time-line chart and project table using PERT and CPM project scheduling methods.

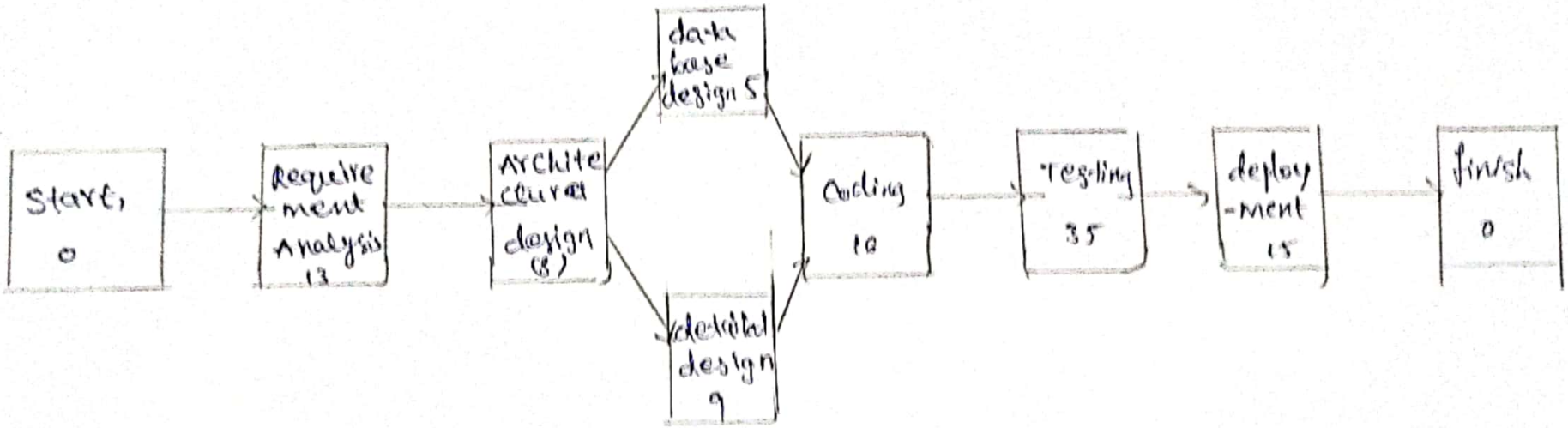
PERT - CPM method:

A project is composed of a set of tasks or activities that hava some kind of relationship with each other. PERT is a network-based representation of tasks or activities to determine the task interdependency.

The construction rules of a PERT diagram are

1. Each task is represented as a node in boxes
2. Arrows show the dependecies between tasks or activities.
3. There is a start node and end.
4. An arrow pointing to a node comes from its predecessor activity, which must be completed before a task can begin. Arrow pointing out of a task box go into its successor tasks, which cannot start until at least this task is completed.
5. There is no cycle in activity network diagram

Activity Network diagram



Estimation of time for following phase

Consider the following phases and the time estimation is as follows.

Requirement analysis - 13
Design - 22
coding - 16
Testing - 35
deployment = 15

Total time = 13 + 22 + 16 + 35 + 15 = 100

Calculation of earliest start time (T_{ES}) and earliest finish time (T_{EF})

Starting time of project = 0

start node: $T_{ES} = 0$
$T_{EF} = 0$

Requirement analysis: $T_{ES} = 0$
$T_{EF} = T_{ES}$ + Activity duration = 0 + 13 = 13

Architectural design: $T_{ES} = T_{EF}$ for requirement analysis
$T_{ES} = 13$
$T_{EF} = 13 + 8 = 21$

Database design: $T_{ES} = T_{EF}$ for Architectural design
$T_{ES} = 21$
$T_{EF} = 21 + 5 = 26$

Detailed Design: $T_{ES} = 21$

$T_{EF} = 21 + 9 = 30$

Coding: $T_{ES} = 30$

$T_{EF} = 30 + 16 = 46$

Testing: $T_{ES} = 46$

$T_{EF} = 46 + 35 = 81$

Deployment: $T_{ES} = 81$

$T_{EF} = 81 + 15 = 96$

finish: $T_{ES} = 96$

$T_{EF} = 96 + 0 = 96$

Calculation of ~~earliest~~ Latest start time (T_{LS}) and Latest finish time (T_{LF}):

T_{LS}: $T_{LS} = T_{LF}$ - Activity duration

T_{LF}: T_{LF} = min (T_{LS} of immediate successors)

finish node; $T_{LF} = 96$

$T_{LS} = 96 - 0 = 96$

Deployment: $T_{LF} = 96$

$T_{LS} = 96 - 15 = 81$

Testing; $T_{LF} = 81$

$T_{LS} = 81 - 35 = 46$

coding; $T_{LF} = 46$

$T_{LS} = 46 - 16 = 30$

Detailed Design: $T_{LF} = 30$

$T_{LS} = 30 - 9 = 21$

Database Design: $T_{LF} = 30$

$T_{LS} = 30 - 5 = 25$

Architectural design: $T_{LF} = 21$ (minimum of successor)

$T_{LS} = 21 - 8 = 13$

Requirement analysis: $T_{LF} = 13$

$T_{LS} = 13 - 13 = 0$

Start Node: $T_{LF} = 0$

$T_{LS} = 0$

Slack time (T_S):- the slack time for an activity is the difference between its latest finish time and its earliest finish time.

$$T_S = T_{LF} - T_{EF} = T_{LS} - T_{ES}$$

T_S for Requirement analysis : $T_{LF} - T_{EF} = T_{LS} - T_{ES}$

$13 - 13 = 0 - 0 = 0$

T_S for Architectural design : $T_{LF} - T_{EF} = T_{LS} - T_{ES}$

$21 - 21 = 13 - 13 = 0$

T_S for Database design : $T_{LF} - T_{EF} = T_{LS} - T_{ES} = 30 - 26 = 25 - 21 = 4$

T_S for Detailed design : $T_{LF} - T_{EF} = T_{LS} - T_{ES} = 30 - 30 = 21 - 21 = 0$

T_S for Coding : $T_{LF} - T_{EF} = T_{LS} - T_{ES} = 46 - 46 = 30 - 30 = 0$

T_S for Deployment : $T_{LF} - T_{EF} = T_{LS} - T_{ES} = 96 - 96 = 81 - 81 = 0$

T_S for Testing : $T_{LF} - T_{EF} = T_{LS} - T_{ES} = 81 - 81 = 46 - 46 = 0$

T_S for finish : $T_{LF} - T_{EF} = T_{LS} - T_{ES} = 96 - 96 = 96 - 96 = 0$

Critical path :

Start > requirement analysis > Architectural design > Detailed design > coding > Deployment > Testing > finish

In this nodes we observes the slack time as 0 (zero). So, this path is consider as critical path.

PERT with the critical Path