**SEOOAD LAB EX:-4A**

**CRITICAL PATH METHOD**

AIM:- To DEVELOP TIME LINE CHART AND PROJECT TABLE USING CPM SCHEDULING METHODS:

**Theory :**

**Critical Path Method (CPM)**

Critical Path Method (CPM) is a method used in project planning, generally for project scheduling for the on-time completion of the project. It helps in the determination of the earliest time by which the whole project can be completed. There are two main concepts in this method namely critical task and critical path.

**Critical task :** It is the task/activity that can’t be delayed otherwise the completion of the entire project will be delayed. It must be completed on time before starting the other dependent tasks.

## **Critical path :** It is a sequence of critical tasks/activities and is the largest path in the project network. It gives us the minimum time which is required to complete the entire project. The activities in the critical path are known as critical activities and if these activities are delayed then the completion of the entire project is also delayed.

A path in the activity network graph is any set of consecutive nodes and edges in this graph from the starting node to the last node. A critical path consists of a set of dependent tasks that need to be performed in a sequence and which together take the longest time to complete.

critical paths involves calculating the following quantities:

**Minimum Time(MT):**

It is the minimum time required to complete the project. It is computed by determining the maximum of all paths from start to finish.

**Earliest Start(ES):**

It is the time of a task is the maximum of all paths from the start to this task. The ES for a task is the ES of the previous task plus the duration of the preceding task.

**Earliest finish time (EF):**

The EF for a task is the sum of the earliest start time of the task and the duration of the task.

**Latest finish (LF):** LF indicates the latest time by which a task can finish without affecting the final completion time of the project. A task completing beyond its LF would cause project delay. LF of a task can be obtained by subtracting maximum of all paths from this task to finish from MT.

**Slack time (ST):** The slack time (or float time) is the total time that a task may be delayed before it will affect the end time of the project. The slack time indicates the ”flexibility” in starting and completion of tasks. ST for a task is LS-ES and can equivalently be written as LF-EF.

**Find the critical tasks and critical path of the given project**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Activity** | **1-2** | **1-3** | **1-5** | **2-3** | **2-4** | **3-4** | **3-5** | **3-6** | **4-6** | **5-6** |
| **To** | **8** | **7** | **12** | **4** | **10** | **3** | **5** | **10** | **7** | **4** |

**Procedure :**

**Step 1: Identify all tasks required to complete the project**

**Step 2: Determine the sequence of tasks**

**Step 3: Estimate the duration of each task**

**Step 4: Draw a network diagram**

**Step 5: Identify the critical path**

**Step 6: Calculate the float**

**Step 7: Monitor the critical path**

* A project network should have only one start node
* A project network should have only one end node
* “Precedents” are the immediate preceding activities
* Time moves from left to right in the project network
* A network should not contain loops

A network should not contain dangles

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ACTIVITY | Duration | **ES** | **EF** | **LS** | **LF** | **slack** |
| 1-2 | 8 | **0** | **8** | **0** | **8** | **0** |
| 1-3 | 7 | **0** | **7** | **8** | **15** | **8** |
| 1-5 | 12 | **0** | **12** | **9** | **21** | **9** |
| 2-3 | 4 | **8** | **12** | **11** | **15** | **3** |
| 2-4 | 10 | **8** | **18** | **8** | **18** | **0** |
| 3-4 | 3 | **12** | **15** | **15** | **18** | **3** |
| 3-5 | 5 | **12** | **17** | **16** | **21** | **4** |
| 3-6 | 10 | **12** | **22** | **15** | **25** | **3** |
| 4-6 | 7 | **18** | **25** | **18** | **25** | **0** |
| 5-6 | 4 | **17** | **21** | **21** | **25** | **4** |

CRITICAL PATH

CRITICAL TAKS

MINIMUM TIME TO FINISH THE PROJECT

**RSSULT :**