29 TUESDAY OCTOBER

Unit 4.

Project Management

Project management involves project planning, project scheduling and project controlling.

Project planning and project scheduling is the two steps which must be performed before the starting of the project and project controlling starts as the execution of the project is done.

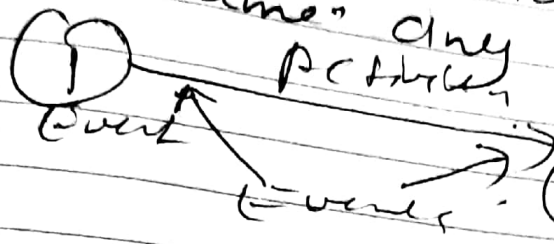
A network is symbolic representation of essential characteristics of the project. CPM and PERT are two most widely used techniques of n/w analysis.

Terms used in Network Analysis

1. Activity: Physically identifiable part of a project which consumes time as well as resources for its execution.

WEDNESDAY 30

2. Event :- It is represented as beginning and finishing points of an activity. Event does not consume any time.



3 Path :- An unbroken chain of activity arrows connecting the initial event to some other event is called a path

4. Network diagram :- It is the graphical representation of logically and sequentially connected arrows and nodes (representing activities and events) of the project.

5 Predecessor activities :-

In constructed n/w diagram, the activity which required to be completed before starting a particular activity is called predecessor activity.

01 FRIDAY
NOVEMBER

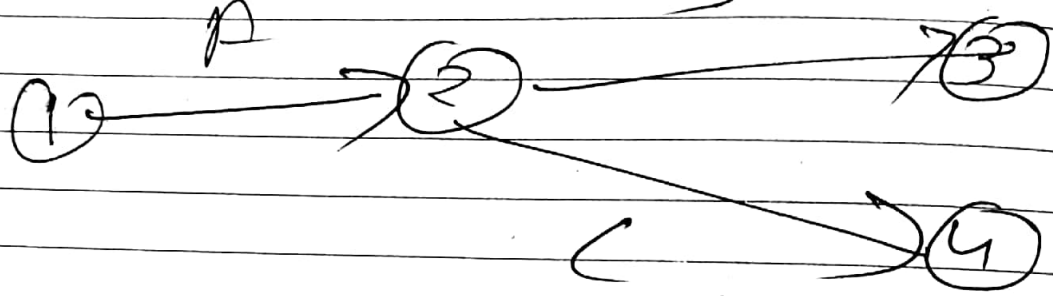
(305-060) WK 44

6 Successor Activities:-

In constructed the diagram, the activity which must follow any particular activity is called successor activity.

Network models are of two types:-

1. Activity on Arrow (AOA)



AOA diagram

2. Activity on Node AON

AON diagram

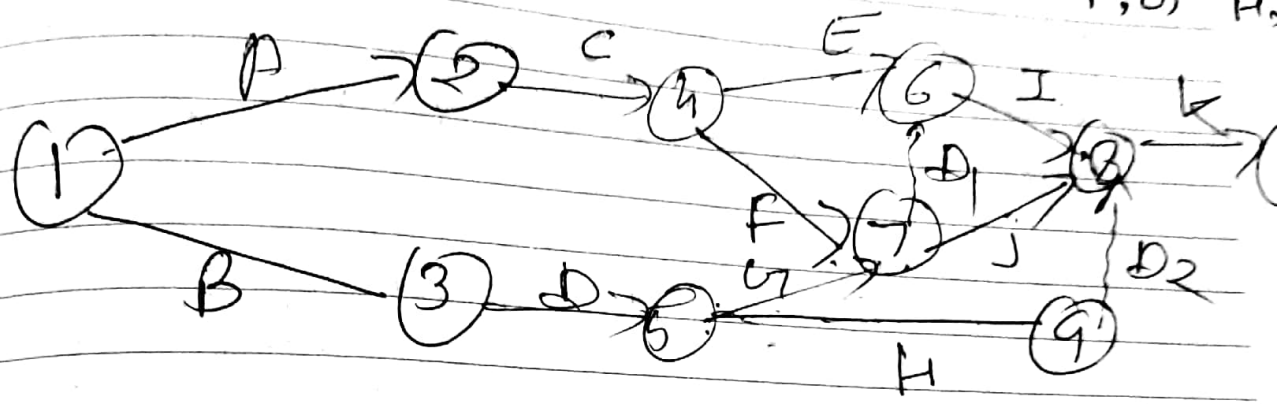
2 Thousand

following activities and Precedence relationships. —

SATURDAY 02
NOVEMBER WK 44 (306-059)

Activity : A B C D E F G H I J

predecessor : — — A B C C D D E, F F, G H.



SUND

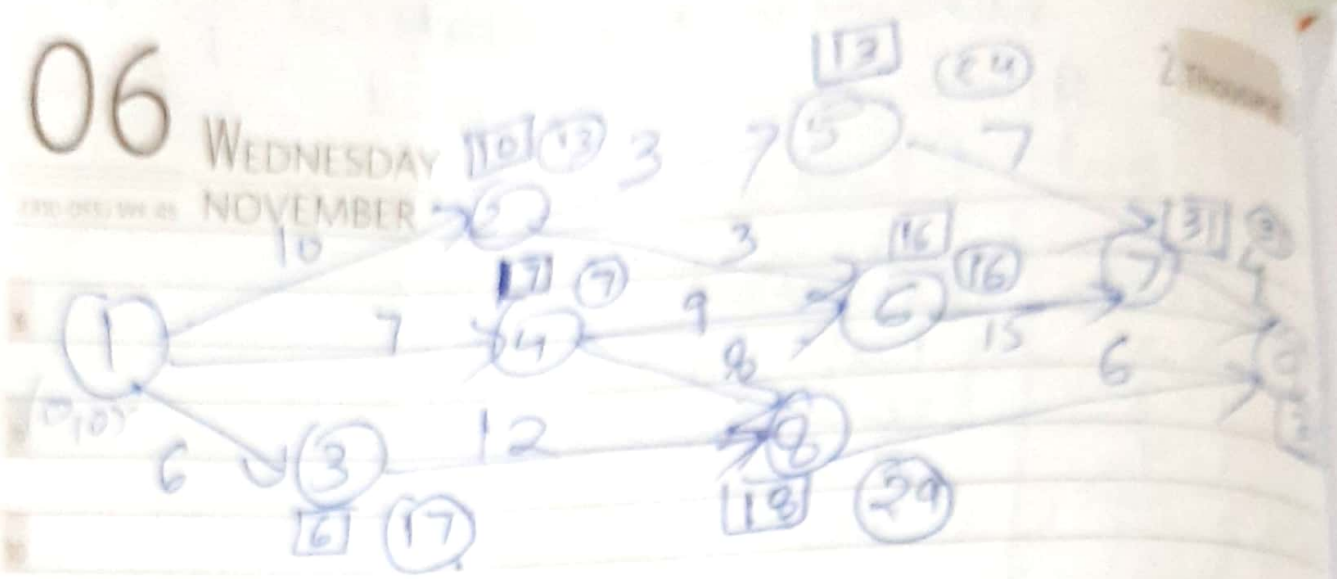
Critical path method:—

Each activity of the project requires pre-assumed time for completion. If the time of any activity can be estimated perfectly then this activity is called "Deterministic activity". But if any activity is performed first time, the uncertainty is high, so pre assumed time may vary on any side. These activities are called "variable activities".

* For evaluating the network having all activities as "deterministic activities", the technique used is called "Critical path method (CPM)".

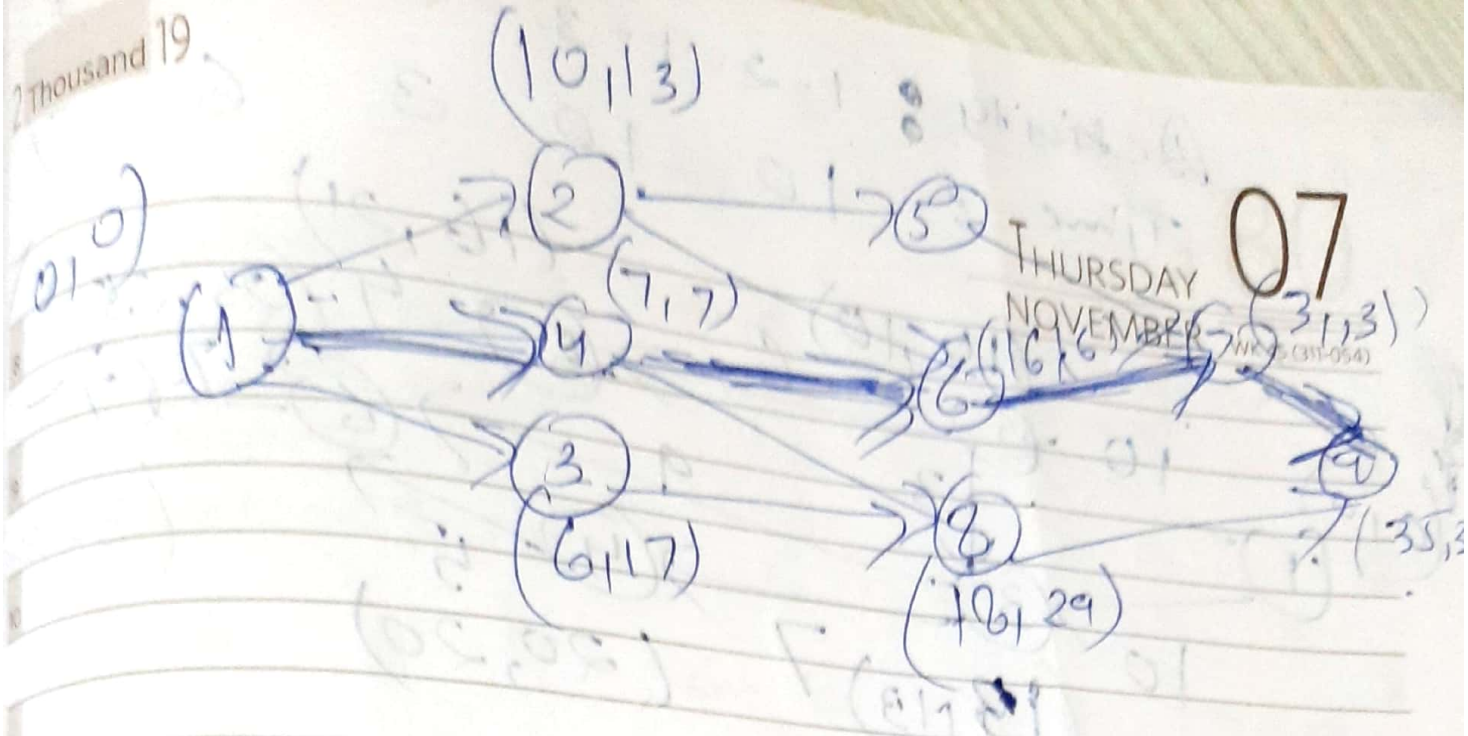
* On the other hand analyzing the "net" diagram having "variable activities", the technique used is called "project Evaluation and Review Technique (PERT)".

06 WEDNESDAY NOVEMBER



Using given data we prepare following table, to find out Critical path:

activity	dur	EST	EFT	LFT	LST	Total
1-2	10	0	10	13	3	3
1-3	6	0	6	17	11	11
1-4	7	0	7	7	0	0
2-5	3	10	13	24	21	11
2-6	3	10	13	16	13	3
3-8	12	6	18	29	17	11
4-6	9	7	16	16	7	0
4-8	8	7	15	29	21	14
5-7	7	13	20	31	24	11
6-7	15	16	31	31	16	0
7-9	4	31	35	35	31	0
8-9	6	18	24	35	29	11

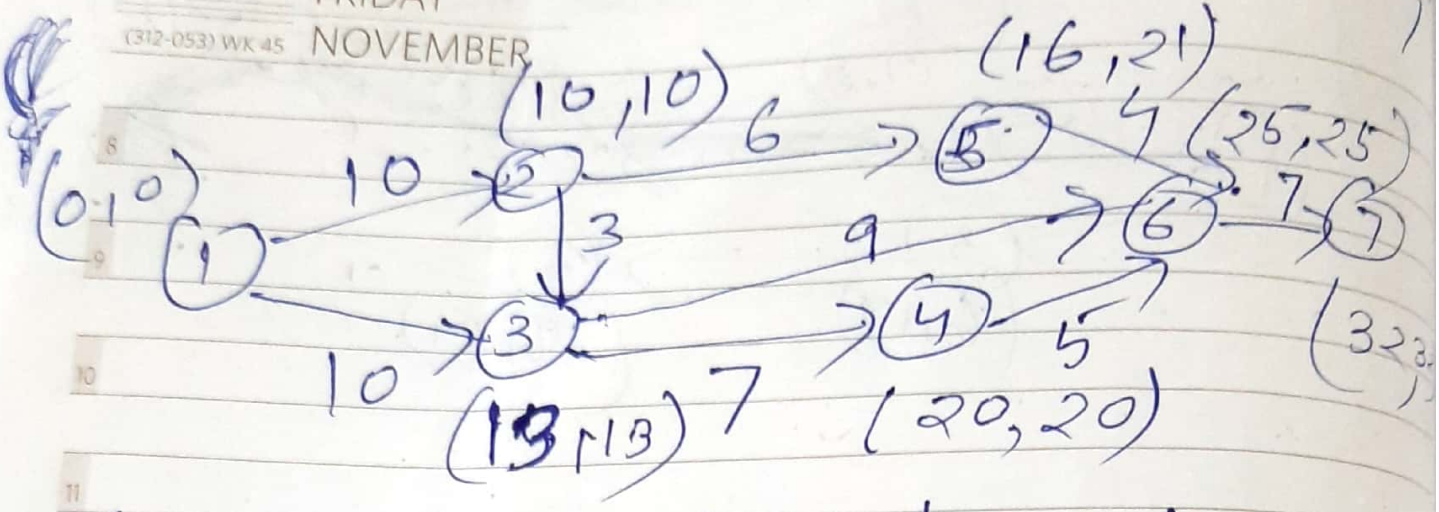


1 → 4, 4 → 6, 6 → 7, 7 → 9 → 35

08 FRIDAY NOVEMBER (312-053) WK 45

Activity : 1-2 1-3 2-3 2-5 3-4 3-6 4-6 5-6 6-7

Time : 10 10 3 6 7 9 5 4 7



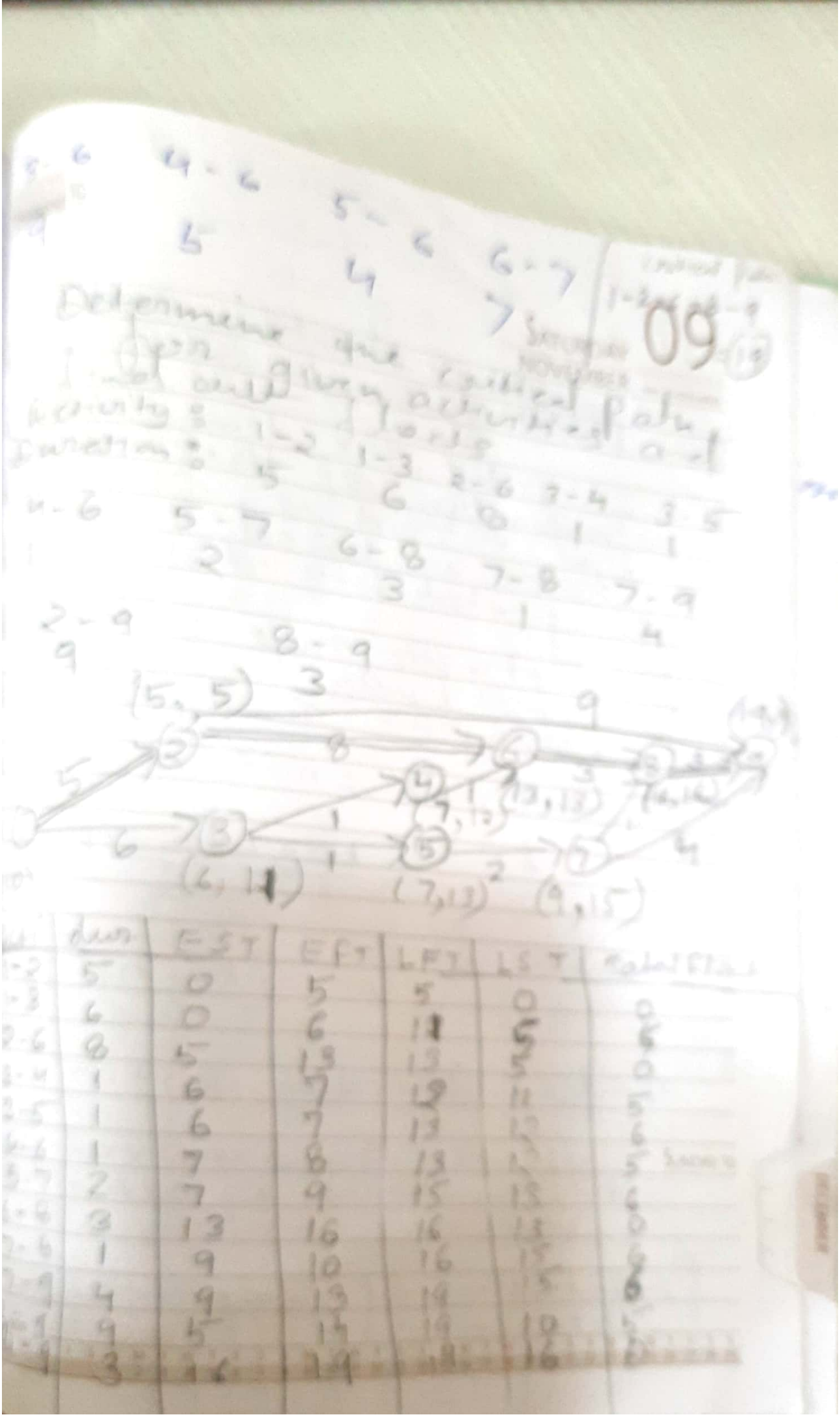
Activity	Time	EST	EFT	LFT	LST	Total Float
1-2	10	0	10	10	0	0
1-3	10	0	10	13	3	3
2-3	3	10	13	13	10	0
2-5	6	10	16	21	15	5
3-4	7	13	20	20	13	0
3-6	9	13	22	25	16	3
4-6	5	20	25	25	20	0
5-6	4	16	20	25	21	5
6-7	7	25	32	32	25	0

Critical path

1-2-3-4-6-7

32

Scanned with CamScanner



Scanned with CamScanner

11 MONDAY NOVEMBER

(315-050) WK 46

2 Thousand

Program Evaluation and Review Technique (PERT):-

In PERT, the time is a combination of three different time estimations. PERT System is based on usual β probability distribution.

→ Optimistic Time estimate (to)
→ Most Likely " " (tm)
→ Pessimistic Time Estimate (tp)

Expected time OR (avg time)

$$te = \frac{to + 4tm + tp}{6}$$

variance (v) :

$$v = \left(\frac{tp - to}{6}\right)^2$$

Standard deviation (σ) :-

It is square root of the summation of activities variance.

Probability of completion of project (Z) :

$$Z = \frac{T - \sum CP}{\sigma}$$

(1)

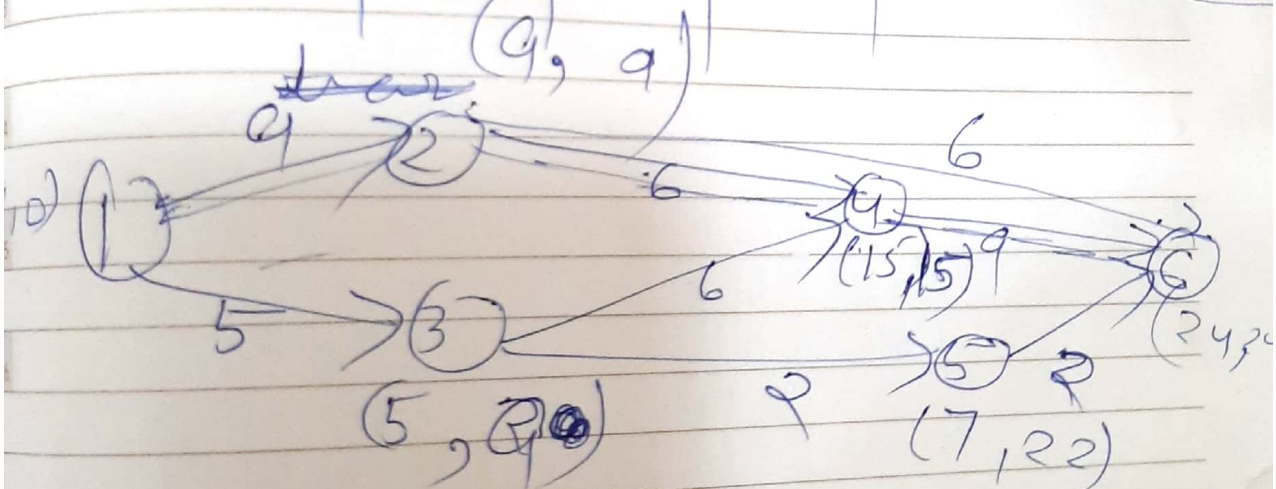
Critical Path using PERT

(1) Calculate variance and for each activity

Calculate the probability of completing the project in 26 days:

TUESDAY 12 NOVEMBER WK 46 (316-049)

activity	to	tm	tp	$\frac{u}{3} = 1.3$ te	variance
1-2	6	9	12	9	1
1-3	3	4	11	5	1.778
2-4	2	5	14	6	4
3-4	4	6	8	6	0.444
3-5	1	1.5	5	2	0.444
2-6	5	6	7	6	0.111
4-6	7	8	15	9	1.778
5-6	1	2	2	2	0.111



Critical path = 1-2-4-6

= 26 days

Probability of completing the project $z = \frac{t - tp}{}$

13 WEDNESDAY
NOVEMBER

Standard deviation is Calculated for the activities on critical path.

$$\sigma = \sqrt{1 + 41.778} = 2.6634$$

$$Z = \frac{26 - 24}{2.6634} = 0.7509$$

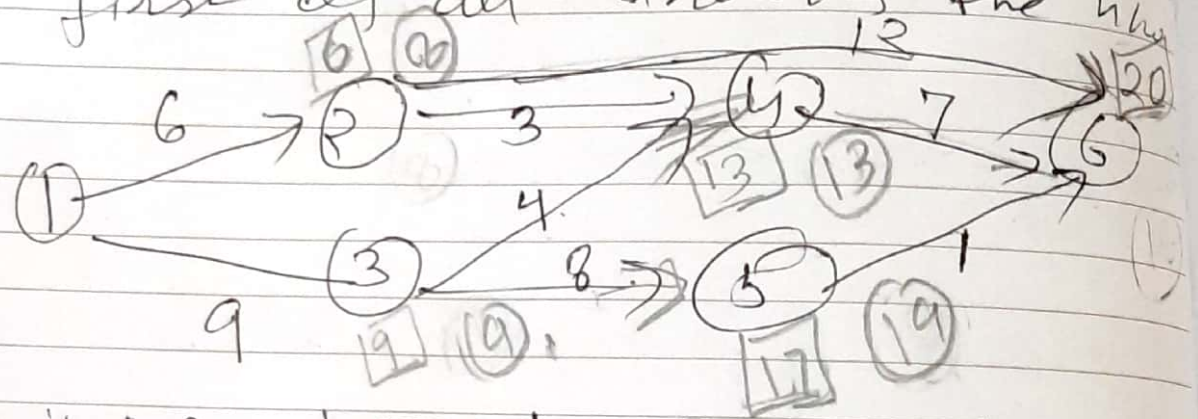
probability is 77.82% ≈

Consider the following given data and based on that find out critical path for the given project;

Activity :	1-2	1-3	2-4	3-4	3-5
Time (Days) :	6	9	3	4	8

2-6	4-6	5-6	
12	7	1	

Based on the given information first of all drawing the network

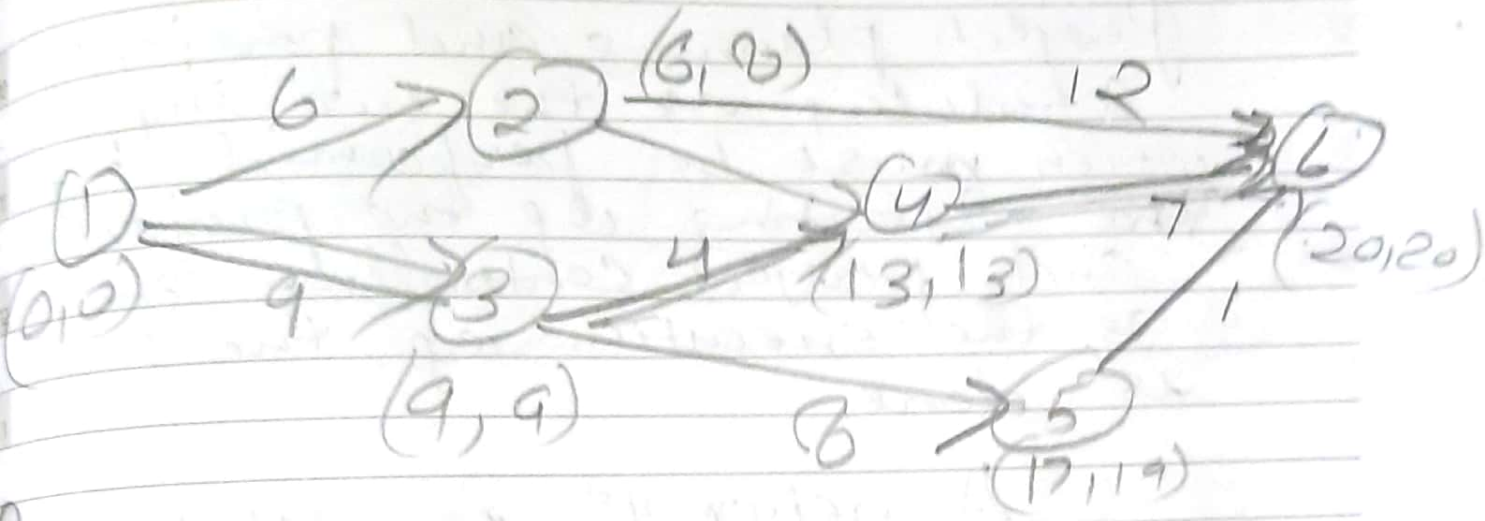


Activity	Dur.	EST	EFT	LFT	LST	TF
1-2	6	0	6	8	2	2
1-3	9	0	9	9	0	0
2-4	3	6	9	13	10	4
3-4	4	9	13	13	9	0
3-5	8	9	17	19	11	2
2-6	12	6	18	20	8	2
4-6	7	13	20	20	13	0
5-6	1	17	18	20	19	2

Critical path

1-3, 3-4, 4-6,

1-3-4-6 time = 20 days



02 THURSDAY MAY (122-243) WK 18

Unit-4.

Job sequencing

Jobs — Tasks

Machines — Resources

Try to finish jobs before they, deliver.

Sequence :- Order is Sched
Schedule :- time table

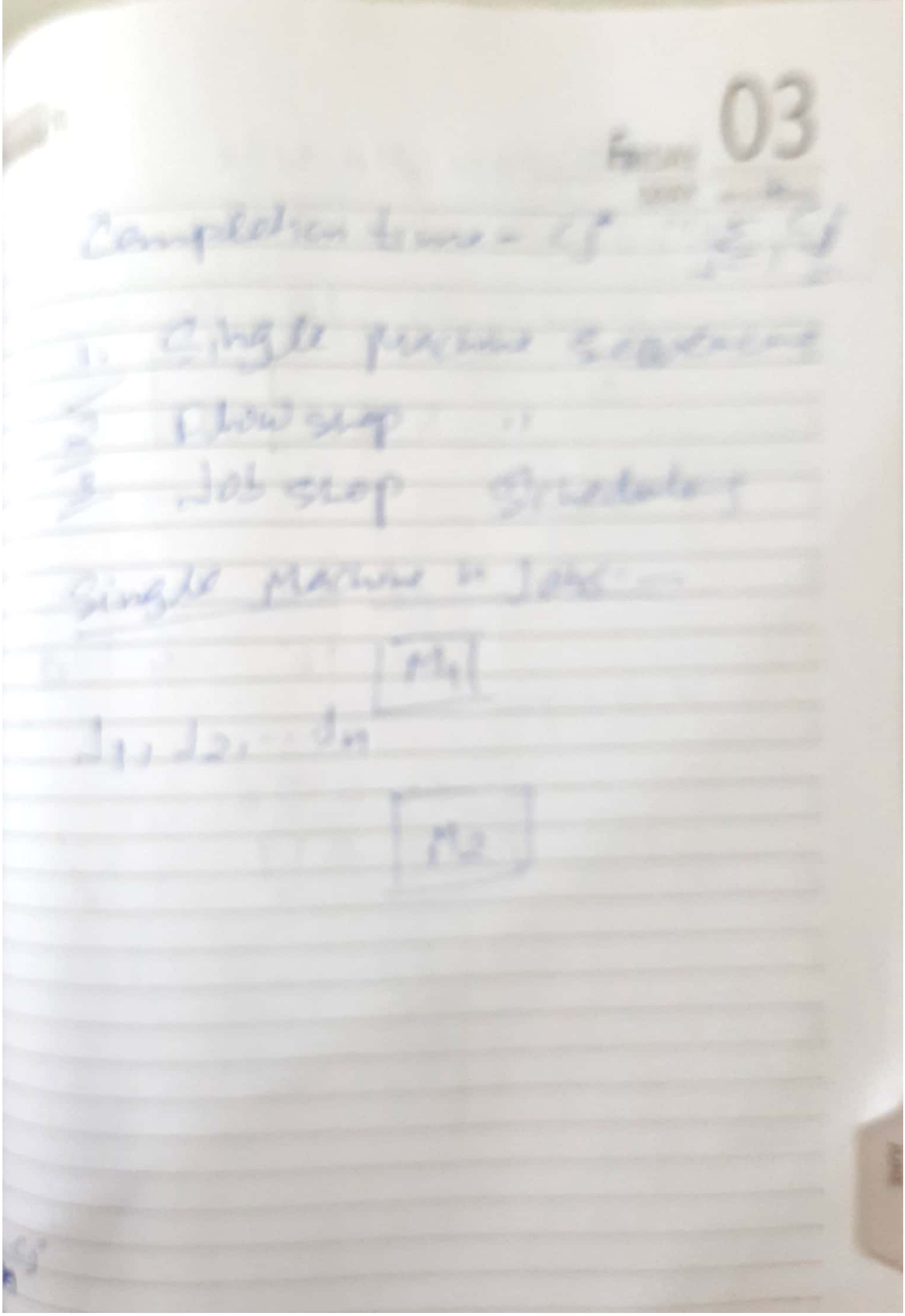
Objectives :, Assumptions

1. Machines are available the time;
2. Jobs are available a $t = 0$.
3. NO job splitting -
4. NO Job interruption
5. processing time are kn
6. Setup time.

Objectives :-

1. Makespan : Minimize
2. flowtime :

n jobs



Scanned with CamScanner

07 TUESDAY MAY

N Jobs and 3 machines

Assumptions.

→ Three machines M_1, M_2 & M_3

→ Each Job has to go through three machines.

Job no. Processing time Due

Type of Job Sequencing problems:—

* Problem with 'n' Jobs through One machines
* problem with 'n' Jobs through two machines
* problem with 'n' Jobs through n- machines

Assumptions:—

* No machine can process more than one job at a time
* The processing times on different machines are independent of order in which they are processed.

* All machines are different types,
* All jobs are completely known and are ready for processing
* A job is processed as soon as possible but only in order specified.

Processing 'N' jobs through Two machines:-

* Let 'n' jobs each of which is to be processed through two machines they A & B,

Step-1. Select the smallest processing time occurring in list Pi or Bi, if there is tie select either one of the smallest processing time.

Step-2. If the smallest time is on machine A, then place it at first place if it is for B machine place the corresponding job at last. Cross off that job

Step-3 If there is tie for min time on both the machines then select machine A first & machine B last and if there is tiee for min on machine A then select any one of these jobs first and if there is tie for min on machine B also and select any of these job as the last.

In a factory, there are six jobs to process, each of which should go to machines A & B in the order AB. The processing timings in minutes are given, determine the optimal sequencing & total elapsed time.

Jobs	1	2	3	4	5	6
Machine A	7	4	2	5	9	8
Machine B	3	8	6	6	4	1

Sol"

3	2	4	5	[illegible]	6

Total elapsed time .T is Obtained as under

Mac A	Mac B	Machine A In	Machine A Out	Machine B In	Machine B Out	Idle time for each A, B
2	6	0	2	2	6	
4	8	2	6	8	16	
5	6	6	11	16	22	
9	4	11	20	22	26	
7	3	20	27	27	36	
8	1	27	35	35	36	

Job	1	2	3	4	5	[illegible]
Mac A	3	12	15	6	10	[illegible]
mac B	8	10	10	6	12	[illegible]

Step 2 In both machine min time is 1 min for Job 6

						6

Step-2 The min time is 3 min, for mac A, Job 1 and mach B for Job 7

1					7	6

Step-3 The min 6 min for mach A and B for Job 4

1	4	5	3	2	7	6

(or)

12 SUNDAY

1	5	3	2	4	7	6

Step-4 To [illegible] for [illegible]
10.h-[illegible]

Calculations of Total elapsed time and idle time for machines

Job	Machine A		Machine B		Idle time for Machine B
1	0	3	3	11	
4	3	9	11	17	
5	9	19	19	31	
3	19	34	34	44	
2	34	46	46	56	
7	46	55	56	59	
6	55	66	66	67	