a. **Considered a Project (Anomaly Detection in Electrocardiogram Signals based on Deep Learning Network). Formulated network model for project using CPM Conventions Provided CPM network diagram.**

b. **Performed Forward Pass**

c. **Provided CPM network diagram after forward pass**

d. **Provided Activity Table after forward pass**

e. **Performed Backward Pass**

f. **Provided CPM network diagram after backward pass**

g. **Provided Activity Table after backward pass**

h. **Identified Critical Path and drew a critical path diagram.**

Project Scope

Our proposed model anomaly detection in ECG Signals based on a deep learning network can predict anomalies efficiently from various test datasets with one fixed threshold value with a very low false-positive rate. We are using MATLAB tool and python to complete this project. The experimental setup is freely available on the internet as we are using open-source software, if possible, hardware will be used i.e., GPU, Ram 32 GB, and core i7 for efficient results. These hardware's will be used for fast training and testing purposes.

The activities are involved as follows:

1. Selection of a topic for Final Year Project i.e., Anomaly Detection in ECG Signals based on Deep Learning Network
2. The supervisor is required related to this project. For this, we made the proposal regarding this project and after approval of our project, the team discuss the updates with the supervisor and present the proposal in front of university personnel.
3. Analyze the Requirements i.e., Requirement Specifications and interface design and layout
4. Prepare design document i.e., we made a flow chart of proposed algorithm i.e., BLSTM generic flow chart and made five interfaces' screen/pages of HTML and CSS responsive pages
5. We start the implementation by reading the dataset from MIT BIH in MATLAB and then will start working on the proposed algorithm i.e., BLSTM in python
6. Then we will remove errors most probably with the help of supervisors which arises during project construction
7. Then we will do testing of code

8. Documentation is also required i.e., Software Requirement Specification, Software Quality plan, and project plan.
9. Making of website.
10. The final presentation in front of faculty and externals and then will wind-up our project round about June-July.

Activity	Duration (Days)	Precedents
Start		----
Select Project	2	----
Select Supervisor	1	A
Analyze Requirements	6	B
Design	8	C
Proposed Algorithm	10	D
Removing Errors	1	B, C, D, E
Testing	3	E, F
Documentation	2	G
Making Website	2	H
Final Presentation	1	I
End of the Project		----

Table 1. Anomaly Detection Project Specification with estimated activity durations and precedence

- **CPM Convention:**

One of the common conventions is labelling nodes and the one which is adopted here, is to divide the node circle into quadrants and use those quadrants to show the event number, the latest and earliest dates by which the event should occur, and the event slack.

a. Provide CPM network diagram.

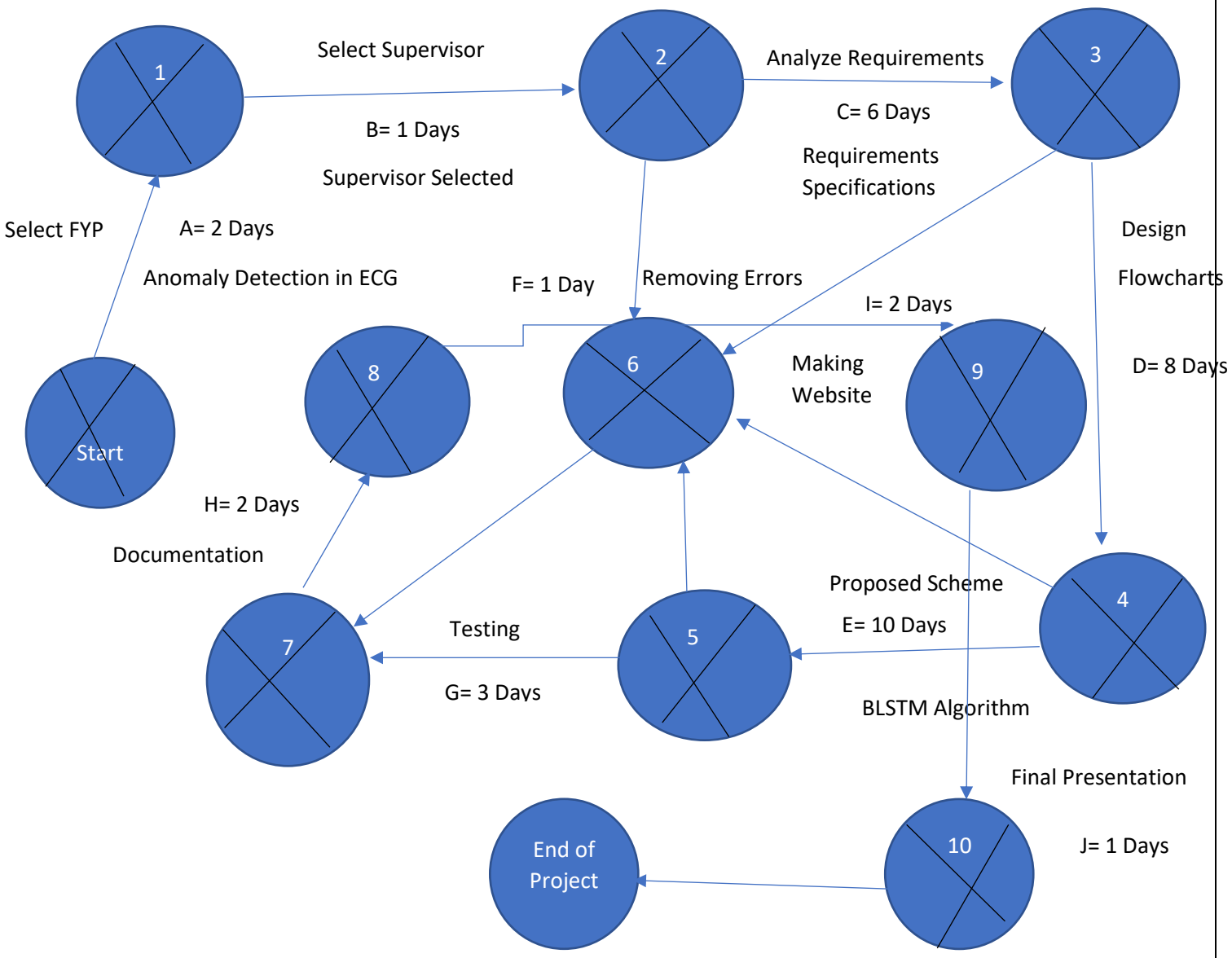


Figure 1. The CPM Network Diagram for the Anomaly Detection in ECG Signals based on the Deep Learning Network. Figure 1 illustrates the network for the project specified in Table 1.

The possible paths in Fig 1

- First path is Start (S) 1-2-6-7-8-9-10 End (E') the duration of this path is 12 days
- The second path is (S) 1-2-3-6-7-8-9-10 (E') the duration of which is equal to 18 days
- The third path is (S) 1-2-3-4-6-7-8-9-10 (E') the duration of this path is 26 days
- The fourth path is (S) 1-2-3-4-5-7-8-9-10 (E') the duration of this path is equal to 35 days
- Fifth path is (S) 1-2-3-4-5-6-7-8-9-10 (E') the duration of this path is equal to 36 days (Critical)

- **On MS Project:**

Task Mode	Task Name	Duration	Start	Finish	Predecessors
	Start	1 day	Tue 12/1/20	Tue 12/1/20	
	Select FYP	2 days	Thu 12/3/20	Fri 12/4/20	
	Select Supervisor	1 day	Mon 12/7/20	Mon 12/7/20	2
	Analyze Requirements	6 days	Mon 12/14/20	Mon 12/21/20	3
	Design	8 days	Wed 1/13/21	Fri 1/22/21	4
	Proposed Algorithm	10 days	Mon 1/25/21	Fri 2/5/21	
	Removing Error	1 day	Mon 2/8/21	Mon 2/8/21	3,4,5,6
	Testing	3 days	Wed 2/10/21	Fri 2/12/21	6,7
	Documentation	2 days	Wed 2/17/21	Thu 2/18/21	8
	Making Website	2 days	Tue 3/2/21	Wed 3/3/21	9
	Final Presentation	1 day	Wed 7/7/21	Wed 7/7/21	10
	End of Project	1 day	Thu 7/8/21	Thu 7/8/21	11

Fig 2 illustrates Table 1 i.e. task names, duration, start, finish, predecessors

- **Gantt Chart:**

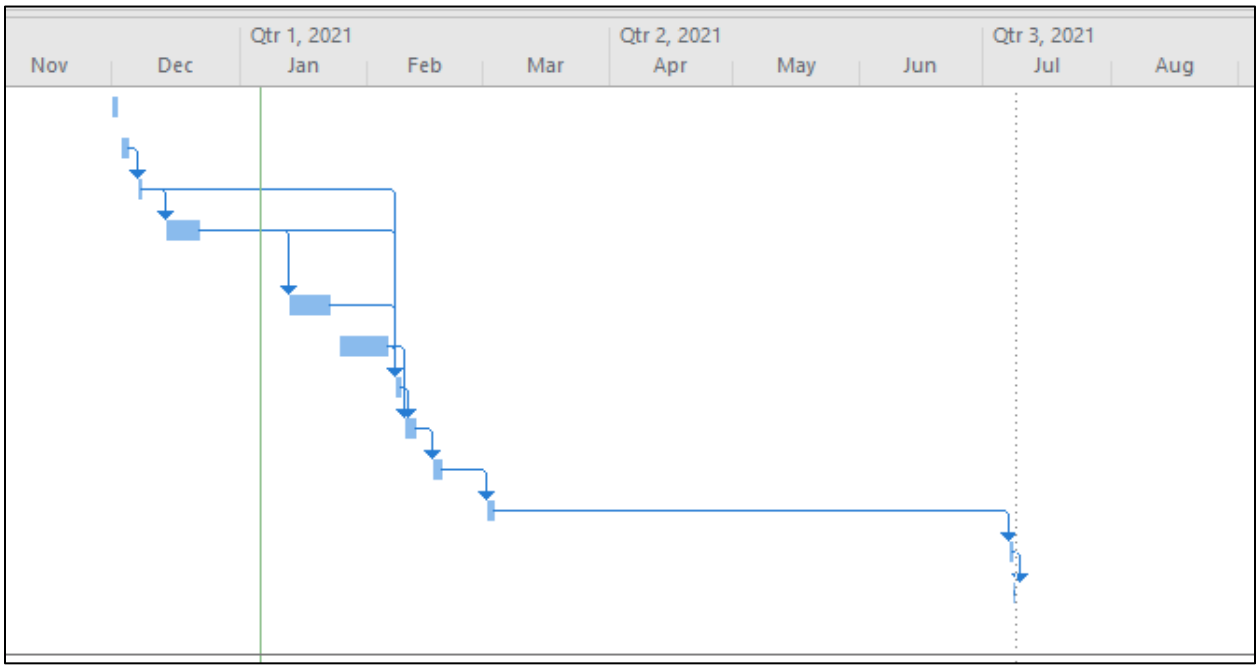
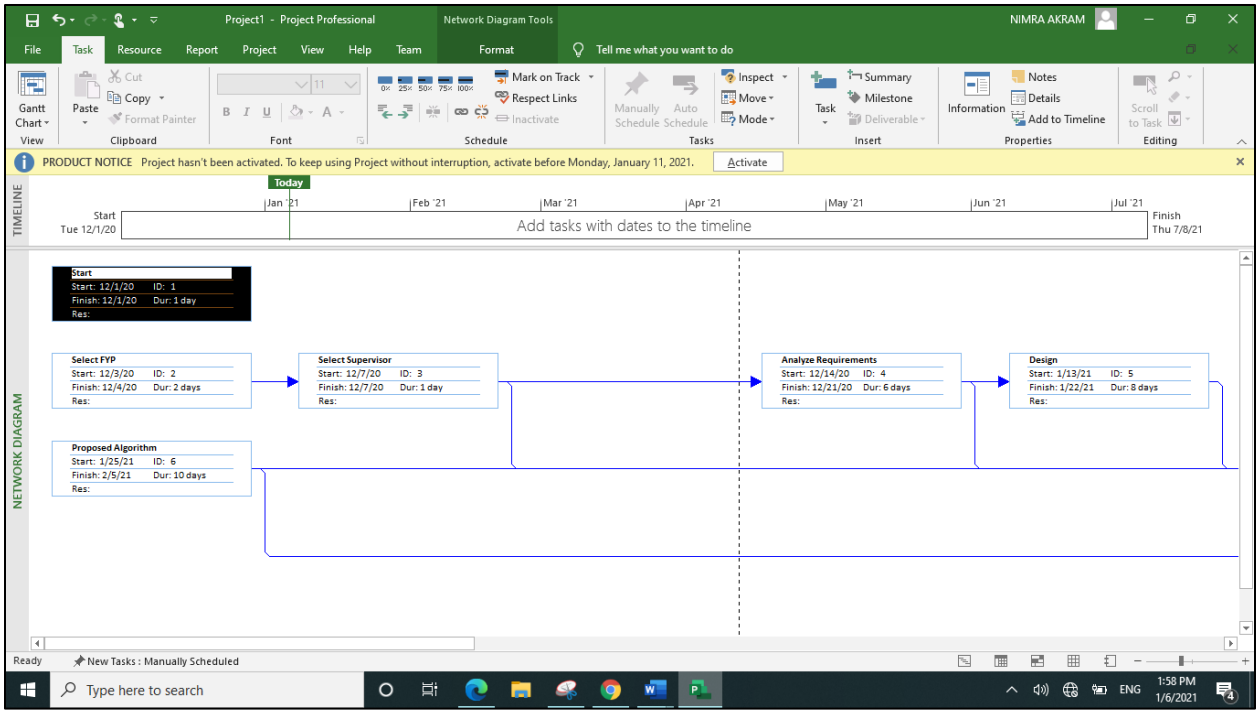


Figure 3 illustrates Gantt Chart

- **Network Diagram on MS Project**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Network Diagram Tools
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Activate
TIMELINE
Today
Start Tue 12/1/20
Add tasks with dates to the timeline
Finish Thu 7/8/21
NETWORK DIAGRAM
Start
Start: 12/1/20 ID: 1
Finish: 12/1/20 Dur: 1 day
Select FYP
Start: 12/3/20 ID: 2
Finish: 12/4/20 Dur: 2 days
Select Supervisor
Start: 12/7/20 ID: 3
Finish: 12/7/20 Dur: 1 day
Analyze Requirements
Start: 12/14/20 ID: 4
Finish: 12/21/20 Dur: 6 days
Design
Start: 1/13/21 ID: 5
Finish: 1/22/21 Dur: 8 days
Proposed Algorithm
Start: 1/25/21 ID: 6
Finish: 2/5/21 Dur: 10 days
Ready
New Tasks : Manually Scheduled
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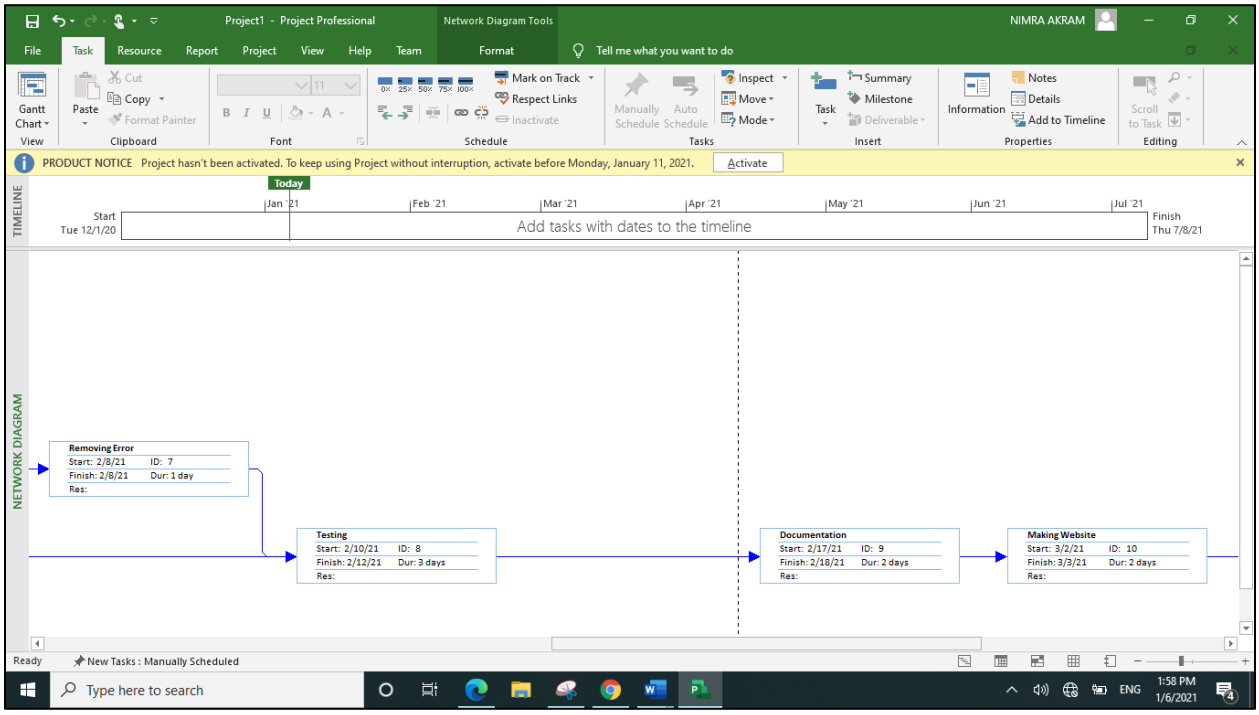
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Finish Thu 7/8/21
NETWORK DIAGRAM
Removing Error
Start: 2/8/21 ID: 7
Finish: 2/8/21 Dur: 1 day
Testing
Start: 2/10/21 ID: 8
Finish: 2/12/21 Dur: 3 days
Documentation
Start: 2/17/21 ID: 9
Finish: 2/18/21 Dur: 2 days
Making Website
Start: 3/2/21 ID: 10
Finish: 3/3/21 Dur: 2 days
Ready
New Tasks : Manually Scheduled
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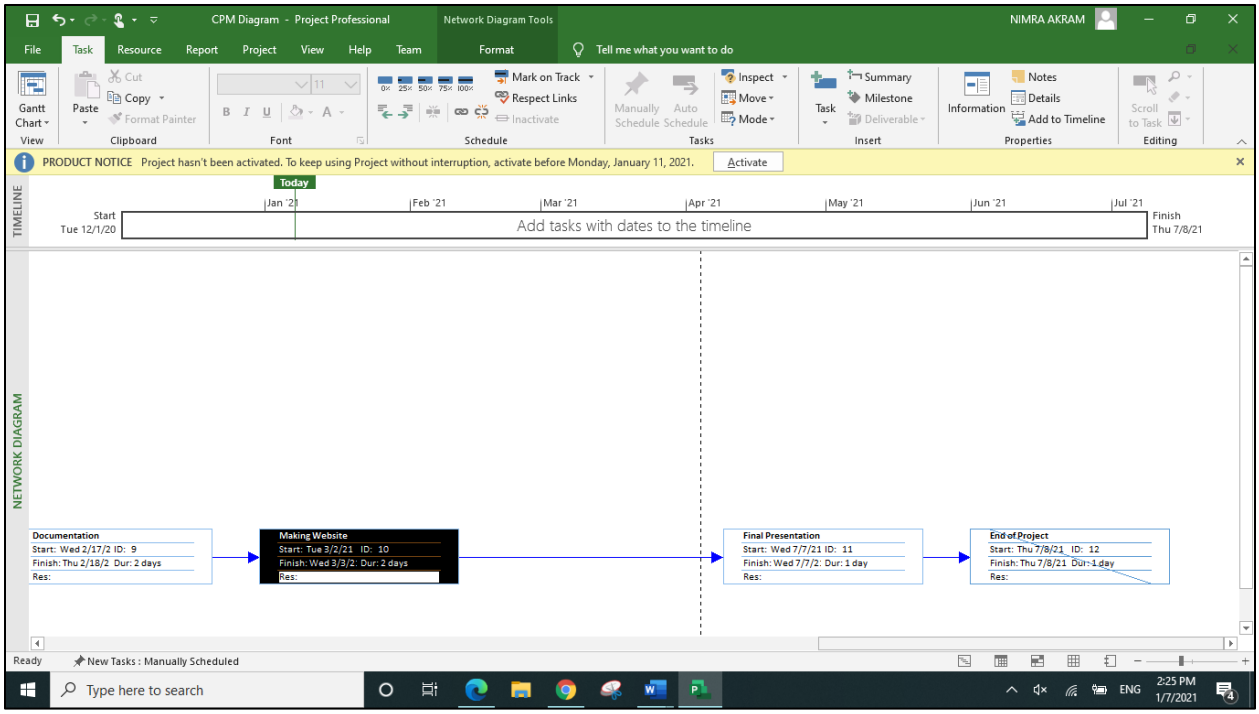


Figure 4 shows CPM Network Diagram on MS Project

b. Perform Forward Pass

The forward pass is carried out to calculate the earliest date on which event may be achieved and earliest date on which each activity may be started and completed. The earliest date of an event is the earliest date by which all activities upon which it can depends can be completed. By convention the project is starting in week zero. The forward pass and calculation of earliest start dates is calculated according to following reasons:

1. Activity A (FYP Selection) starts immediately so the earliest date of event 1 is zero. So, the earliest start date is zero and earliest it can finish in 2 days. (Earliest Start + Duration= Earliest Finish) i.e. (0+2=2)

Earliest Start	Duration	Earliest Finish
0	2	2
Activity A		

2. The earliest finish of Activity A will become earliest start of Activity B (Supervisor Selection) which will take 1 day, so the earliest start is 2 days and earliest finish is 3 days. (Earliest Start + Duration= Earliest Finish) i.e. (2+1=3)

Earliest Start	Duration	Earliest Finish
2	1	3

Activity B

3. The earliest finish of Activity B will become earliest start of Activity C (Analyze Requirements) which will take 3 days, so the earliest start is 3 days and earliest finish is 9 days. (Earliest Start + Duration= Earliest Finish) i.e. (3+6=9)

Earliest Start	Duration	Earliest Finish
3	6	9
Activity C		

4. The earliest finish of Activity C will become earliest start of Activity D (Design) which will take 9 days, so the earliest start is 9 days, and the earliest finish is 17 days. Earliest Start + Duration= Earliest Finish) i.e. (9+8=17)

Earliest Start	Duration	Earliest Finish
9	8	17
Activity D		

5. The earliest finish of Activity D will become earliest start of Activity E (Proposed Algorithm) will take 17 days, so the earliest start is 17 days and earliest finish is 27 days. Earliest Start + Duration= Earliest Finish) i.e. (17+10=27)

Earliest Start	Duration	Earliest Finish
17	10	27
Activity E		

6. The earliest finish of Activity E will become earliest start of Activity F (Removing error) will take 27 days, so the earliest start is 27 days and earliest finish is 28 days. Earliest Start + Duration= Earliest Finish) i.e. (27+1=28). Event 6 will be completed when B, C, D and E will be completed.

Earliest Start	Duration	Earliest Finish
27	1	28
Activity F		

Event 6 is connected with four arrows; hence, we will calculate and take the maximum value at ES.

2+1=3, 3+6=9, 9+8=17, 17+10=27 we will pick 27 as ES.

7. The earliest finish of Activity F will become earliest start of Activity G (Testing) will take 28 days, so the earliest start is 28 days and earliest finish is 31 days. Earliest Start +

Duration= Earliest Finish) i.e. (28+3=31). Event 7 will be completed when E and F will be finished.

Earliest Start	Duration	Earliest Finish
28	3	31
Activity G		

Event 7 is connected with two arrows; hence, we will calculate and take the maximum value at ES.

17+10=27, 27+1= 28 we will pick 28 as ES.

8. The earliest finish of Activity G will become earliest start of Activity H (Documentation) will take 31 days, so the earliest start is 31 days and earliest finish is 33 days. Earliest Start + Duration= Earliest Finish) i.e. (31+2=33).

Earliest Start	Duration	Earliest Finish
31	2	33
Activity H		

9. The earliest finish of Activity H will become earliest start of Activity I (Making Website) will take 33 days, so the earliest start is 31 days and earliest finish is 35 days. Earliest Start + Duration= Earliest Finish) i.e. (33+2=35).

Earliest Start	Duration	Earliest Finish
33	2	35
Activity I		

10. The earliest finish of Activity I will become earliest start of Activity J (Final Presentation) will take 35 days, so the earliest start is 35 days and earliest finish is 36 days. Earliest Start + Duration= Earliest Finish) i.e. (35+1=36).

Earliest Start	Duration	Earliest Finish
35	1	36
Activity J		

- **ON MS Project:**

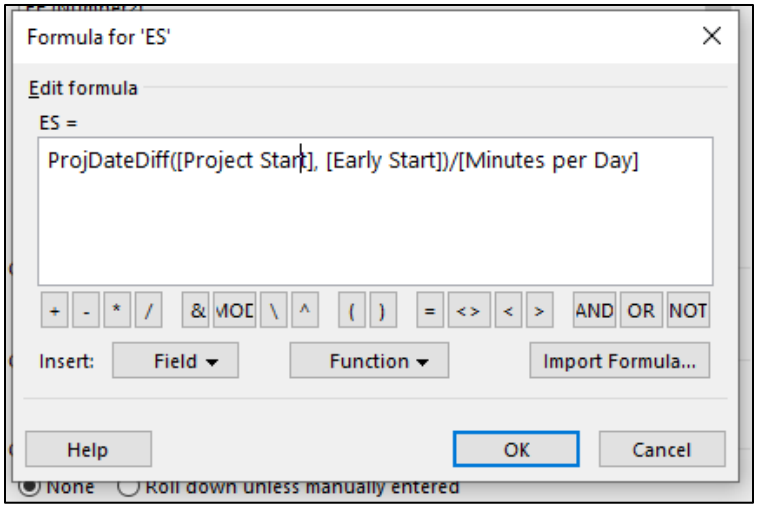


Fig 5 illustrates ES (Earliest Start) on MS Project

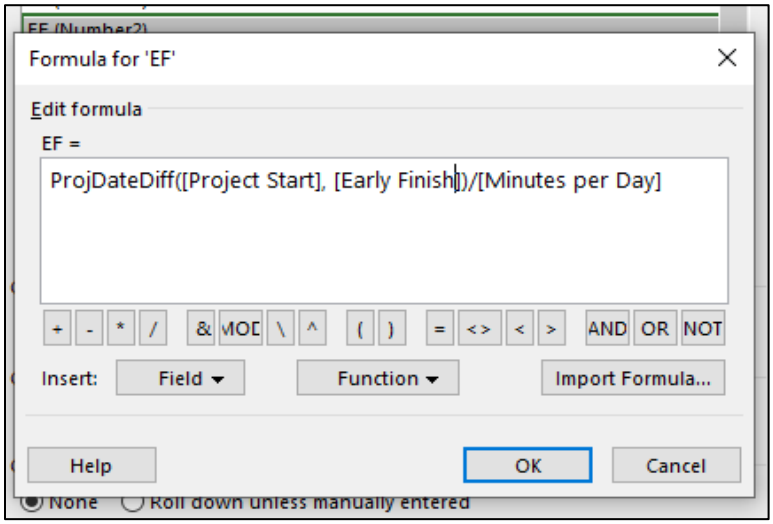


Fig 6 illustrates EF (Earliest Finish) on MS Project

Finish	Predecessors	ES	EF
Tue 12/1/20		0	0
Fri 12/4/20		0	2
Mon 12/7/20	2	2	3
Mon 12/21/20	3	3	9
Fri 1/22/21	4	9	17
Fri 2/5/21		17	27
Mon 2/8/21	3,4,5,6	27	28
Fri 2/12/21	6,7	28	31
Thu 2/18/21	8	31	33
Wed 3/3/21	9	33	35
Wed 7/7/21	10	35	36
Thu 7/8/21	11	0	0

Fig 7 illustrates calculated ES and EF on MS Project

c. Provide CPM network diagram after forward pass

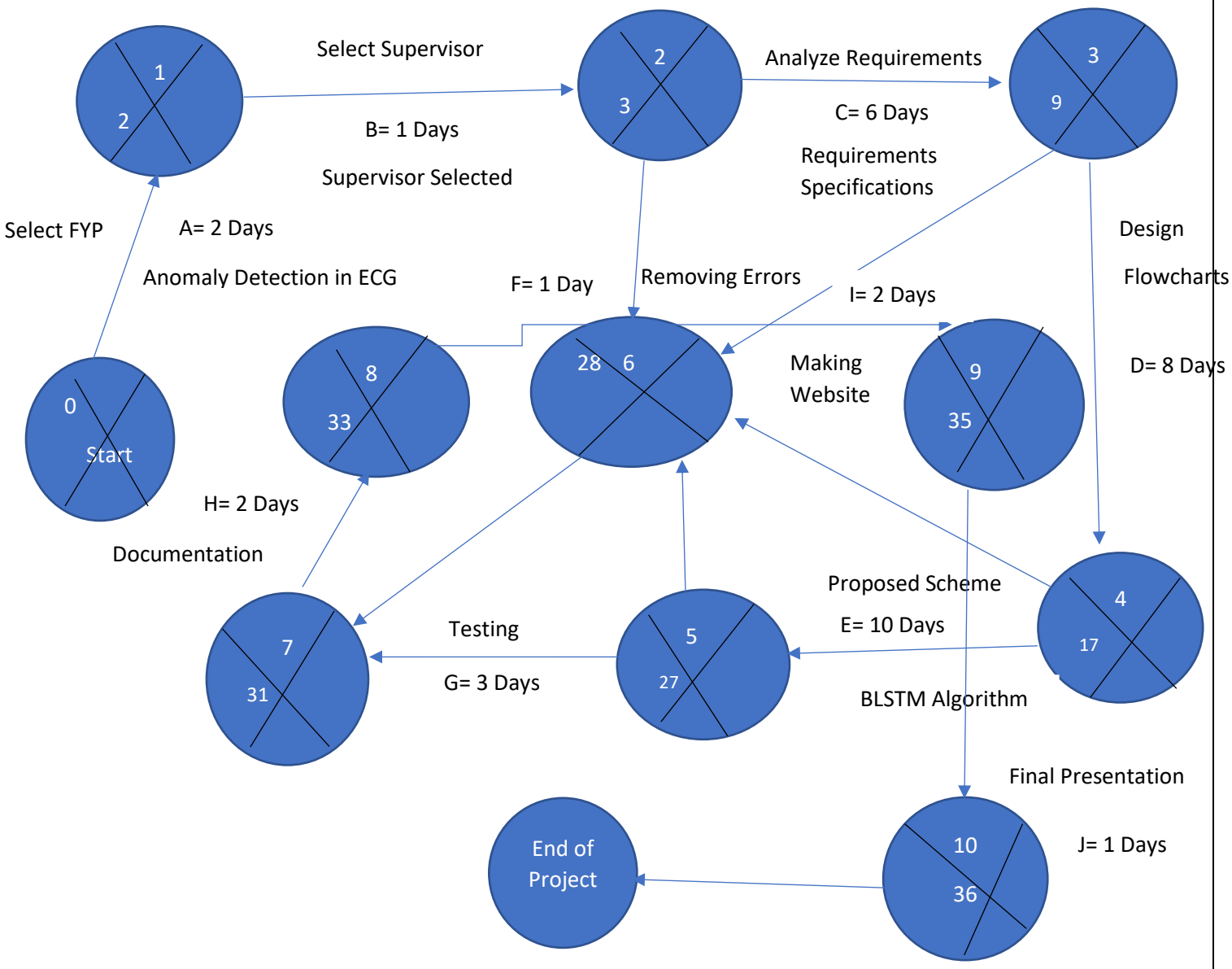
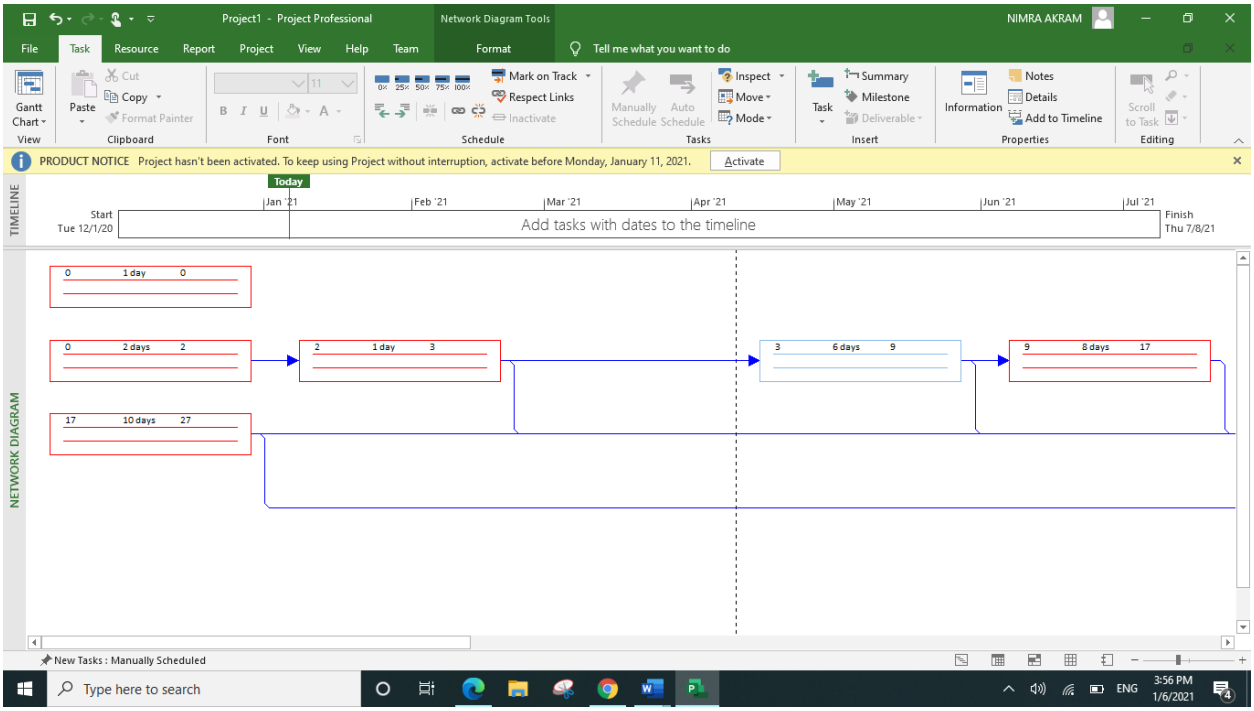


Figure 8 shows after forward pass CPM Diagram.

The rule of forward pass is that the earliest date of an event is the earliest finish date for all the activities terminating at that event. Where more than one activity terminates at a common event, we take the latest of the earliest finish dates for those activities.

- **After Forward Pass CPM Diagram**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Respect Links
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Inspect
Move
Mode
Manually Schedule
Auto Schedule
Summary
Milestone
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NETWORK DIAGRAM
0 1 day 0
0 2 days 2
2 1 day 3
3 6 days 9
9 8 days 17
17 10 days 27
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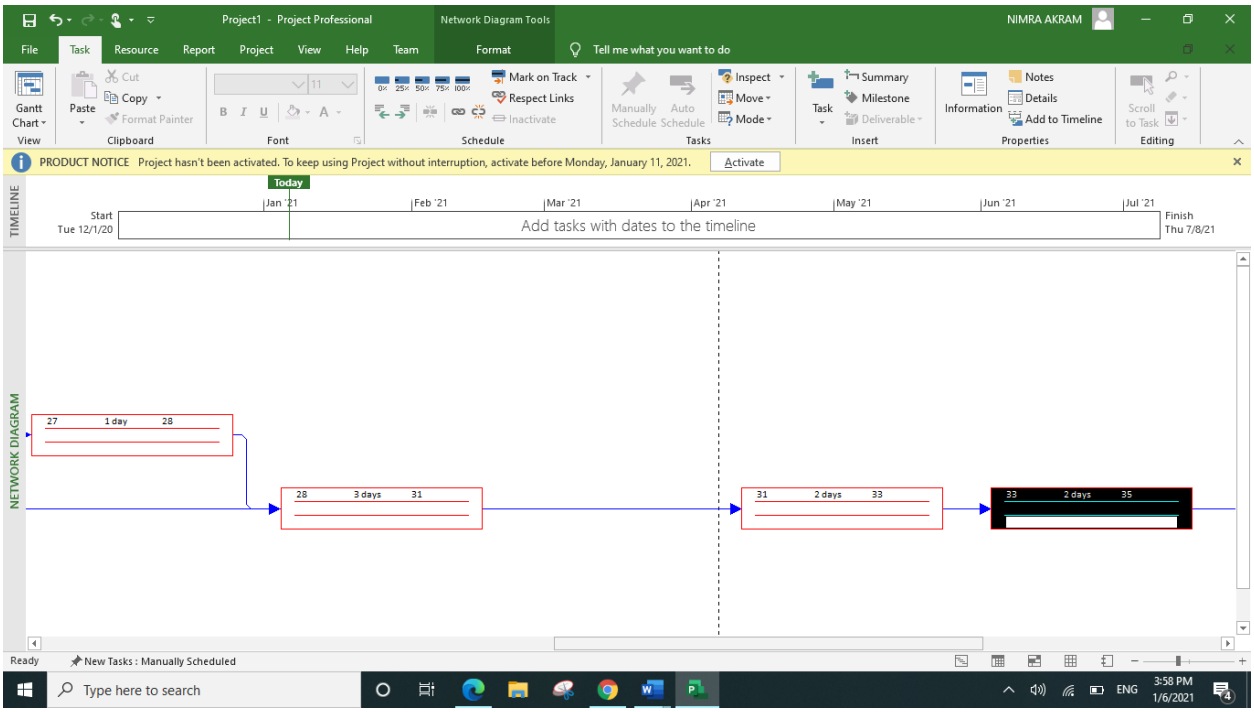
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Mar '21
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May '21
Jun '21
Jul '21
Start Tue 12/1/20
Add tasks with dates to the timeline
Finish Thu 7/8/21
NETWORK DIAGRAM
27 1 day 28
28 3 days 31
31 2 days 33
33 2 days 35
Ready
New Tasks : Manually Scheduled
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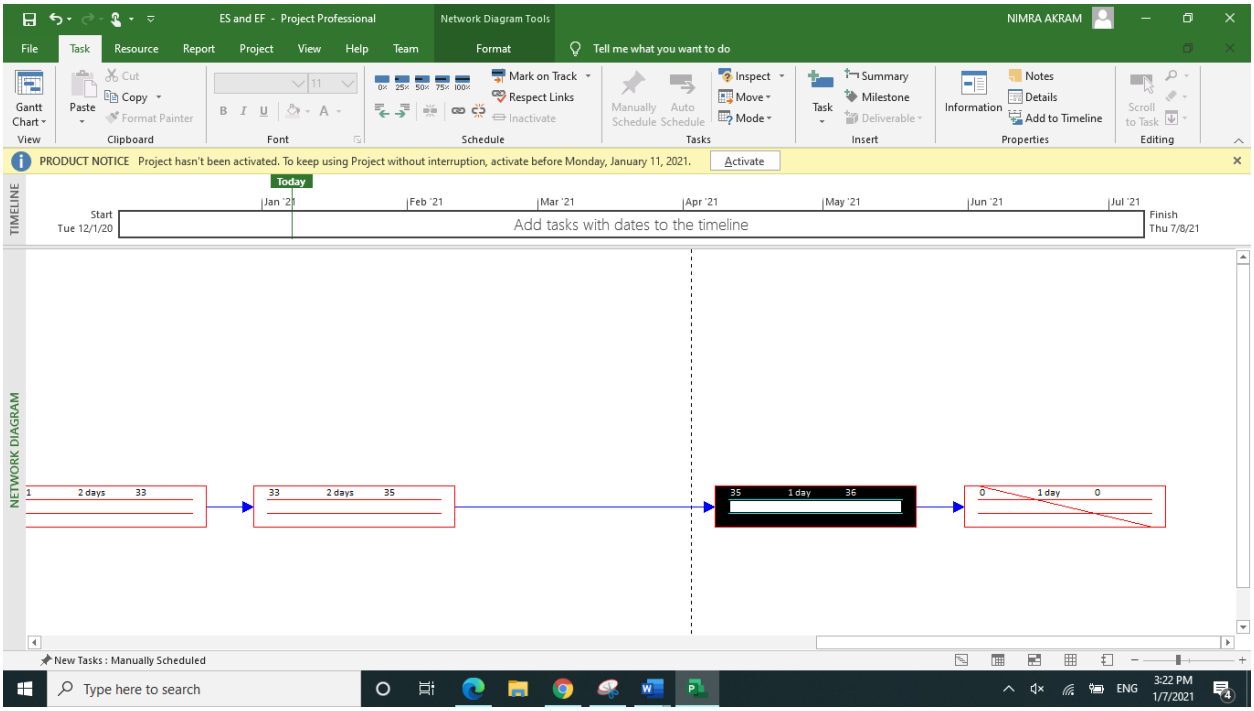


Figure 9 shows after forward pass CPM Diagram on MS Project

d. Provide Activity Table after forward pass

Activity	Duration (Days)	Earliest Start Date	Latest Start Date	Earliest Finish Date	Latest Finish Date	Total Float
A	2	0		2		
B	1	2		3		
C	6	3		9		
D	8	9		17		
E	10	17		27		
F	1	27		28		

G	3	28		31		
H	2	31		33		
I	2	33		35		
J	1	35		36		

Table 2 illustrates activity table after forward pass

- **On MS Project**

Task Mode	Task Name	Duration	Start	Finish	Predecessors	ES	EF
	Start	1 day	Tue 12/1/20	Tue 12/1/20		0	0
	Select FYP	2 days	Thu 12/3/20	Fri 12/4/20		0	2
	Select Supervisor	1 day	Mon 12/7/20	Mon 12/7/20	2	2	3
	Analyze Requirements	6 days	Mon 12/14/20	Mon 12/21/20	3	3	9
	Design	8 days	Wed 1/13/21	Fri 1/22/21	4	9	17
	Proposed Algorithm	10 days	Mon 1/25/21	Fri 2/5/21		17	27
	Removing Error	1 day	Mon 2/8/21	Mon 2/8/21	3,4,5,6	27	28
	Testing	3 days	Wed 2/10/21	Fri 2/12/21	6,7	28	31
	Documentation	2 days	Wed 2/17/21	Thu 2/18/21	8	31	33
	Making Website	2 days	Tue 3/2/21	Wed 3/3/21	9	33	35
	Final Presentation	1 day	Wed 7/7/21	Wed 7/7/21	10	35	36
	End of Project	1 day	Thu 7/8/21	Thu 7/8/21	11	0	0

Figure 10 shows activity table on MS Project

e. Perform Backward Pass

After forward pass we have to carry out the backward pass to calculate the latest date at which each event may be achieved and each activity started and finished, without delaying the end date of the project. The latest date for an event is the latest date by which all immediately following activities must be started do the project to be completed on time. In calculating the latest dates, we assume that the latest finish date for the project is the same as the earliest finish date that is, we wish to complete the project as early as possible.

1. For Activity J the earliest finish of Activity J becomes late finish and then we move backward. Late finish – Duration = Late Start i.e. (36-1=35)

Earliest Start	Duration	Earliest Finish
35	1	36

Activity J		
Late Start	Float	Late Finish
35		36

2. The late start of activity J will become late finish of Activity I Late finish – Duration = Late Start i.e. (35-2=33)

Earliest Start	Duration	Earliest Finish
33	2	35
Activity I		
Late Start	Float	Late Finish
33		35

3. The late start of activity I will become late finish of Activity H Late finish – Duration = Late Start i.e. (33-2=31)

Earliest Start	Duration	Earliest Finish
31	2	33
Activity H		
Late Start	Float	Late Finish
31		33

4. The late start of activity H will become late finish of Activity G Late finish – Duration = Late Start i.e. (31-3=28)

Earliest Start	Duration	Earliest Finish
28	3	31
Activity G		
Late Start	Float	Late Finish
28		31

5. The late start of activity G will become late finish of Activity F Late finish – Duration = Late Start i.e. (28-1=27)

Earliest Start	Duration	Earliest Finish
27	1	28
Activity F		
Late Start	Float	Late Finish
27		28

6. The late start of activity F will become late finish of Activity E Late finish – Duration = Late Start i.e. (27-10=17). E is the point where more than one activity commences at a common event; we take the earliest of the latest start dates for those activities i.e. 35-2 =33 and 28-1 =27 we will pick minimum value i.e. 27.

Earliest Start	Duration	Earliest Finish
17	10	27

Activity E		
Late Start	Float	Late Finish
17		27

7. The late start of activity E will become late finish of Activity D Late finish – Duration = Late Start i.e. (17-8=9). D is also the point where more than one activity commences at a common event; we take the earliest of the latest start dates for those activities i.e. 28-1 =27 and 17-8 =9 we will pick minimum value i.e. 9.

Earliest Start	Duration	Earliest Finish
9	8	17
Activity D		
Late Start	Float	Late Finish
9		17

8. The late start of activity D will become late finish of Activity C. Late finish – Duration = Late Start i.e. (9-6=3). Activity C: C is the point where more than one activity commences at a common event; we take the earliest of the latest start dates for those activities i.e. 28-1 =27 and 17-18 =9 we will pick minimum value i.e. 9.

Earliest Start	Duration	Earliest Finish
3	6	9
Activity C		
Late Start	Float	Late Finish
3		9

9. The late start of activity C will become late finish of Activity B Late finish – Duration = Late Start i.e. (3-1=2). B is the point where more than one activity commences at a common event; we take the earliest of the latest start dates for those activities i.e. 28-1 =27 and 9-6 =3 we will pick minimum value i.e. 3

Earliest Start	Duration	Earliest Finish
2	1	3
Activity B		
Late Start	Float	Late Finish
2		3

10. The late start of activity B will become late finish of Activity A Late finish – Duration = Late Start i.e. (2-2=0)

Earliest Start	Duration	Earliest Finish
0	2	2
Activity A		
Late Start	Float	Late Finish
0		2

- **On MS Project:**

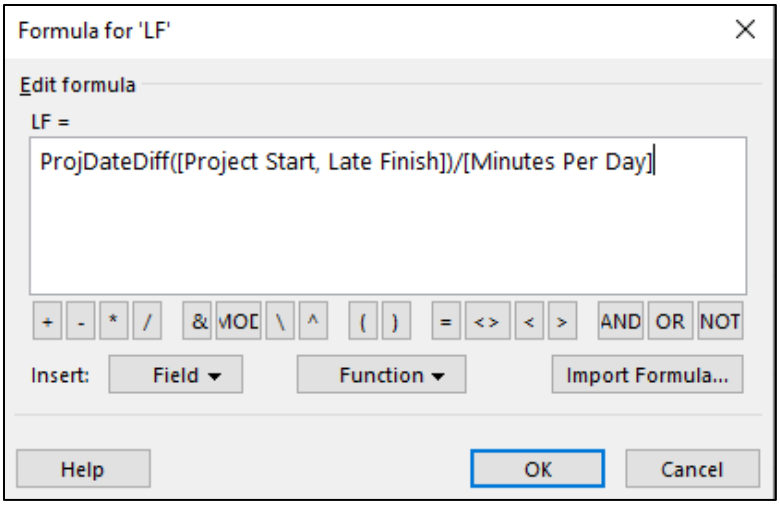


Fig 11 shows Late Finish Formula on MS Project

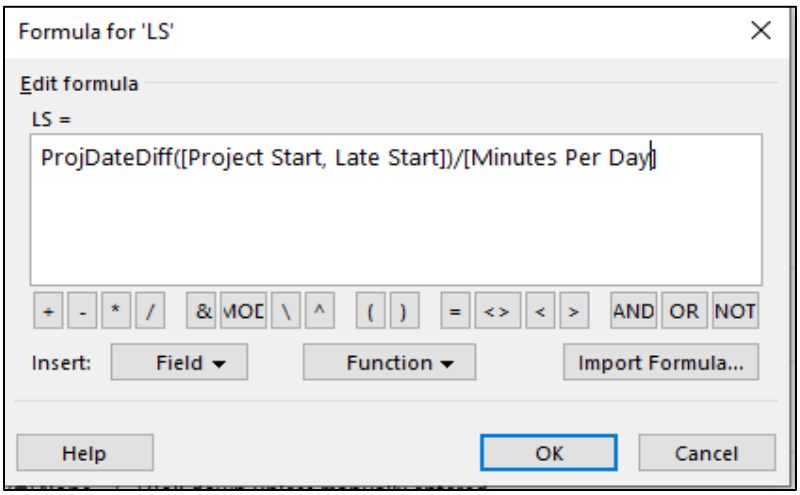


Fig 12 shows Late Start Formula on MS Project

Duration	Start	Finish	Predecessors	ES	LS	EF	LF
1 day	Tue 12/1/20	Tue 12/1/20		0	0	0	0
2 days	Thu 12/3/20	Fri 12/4/20		0	0	2	2
1 day	Mon 12/7/20	Mon 12/7/20	2	2	2	3	3
6 days	Mon 12/14/20	Mon 12/21/20	3	3	3	9	9
8 days	Wed 1/13/21	Fri 1/22/21	4	9	9	17	17
10 days	Mon 1/25/21	Fri 2/5/21		17	17	27	27
1 day	Mon 2/8/21	Mon 2/8/21	3,4,5,6	27	27	28	28
3 days	Wed 2/10/21	Fri 2/12/21	6,7	28	28	31	31
2 days	Wed 2/17/21	Thu 2/18/21	8	31	31	33	33
2 days	Tue 3/2/21	Wed 3/3/21	9	33	33	35	35
1 day	Wed 7/7/21	Wed 7/7/21	10	35	35	36	36
1 day	Thu 7/8/21	Thu 7/8/21	11	0	0	0	0

Fig 13 shows calculated LS and LF on MS Project.

f. Provide CPM network diagram after backward pass

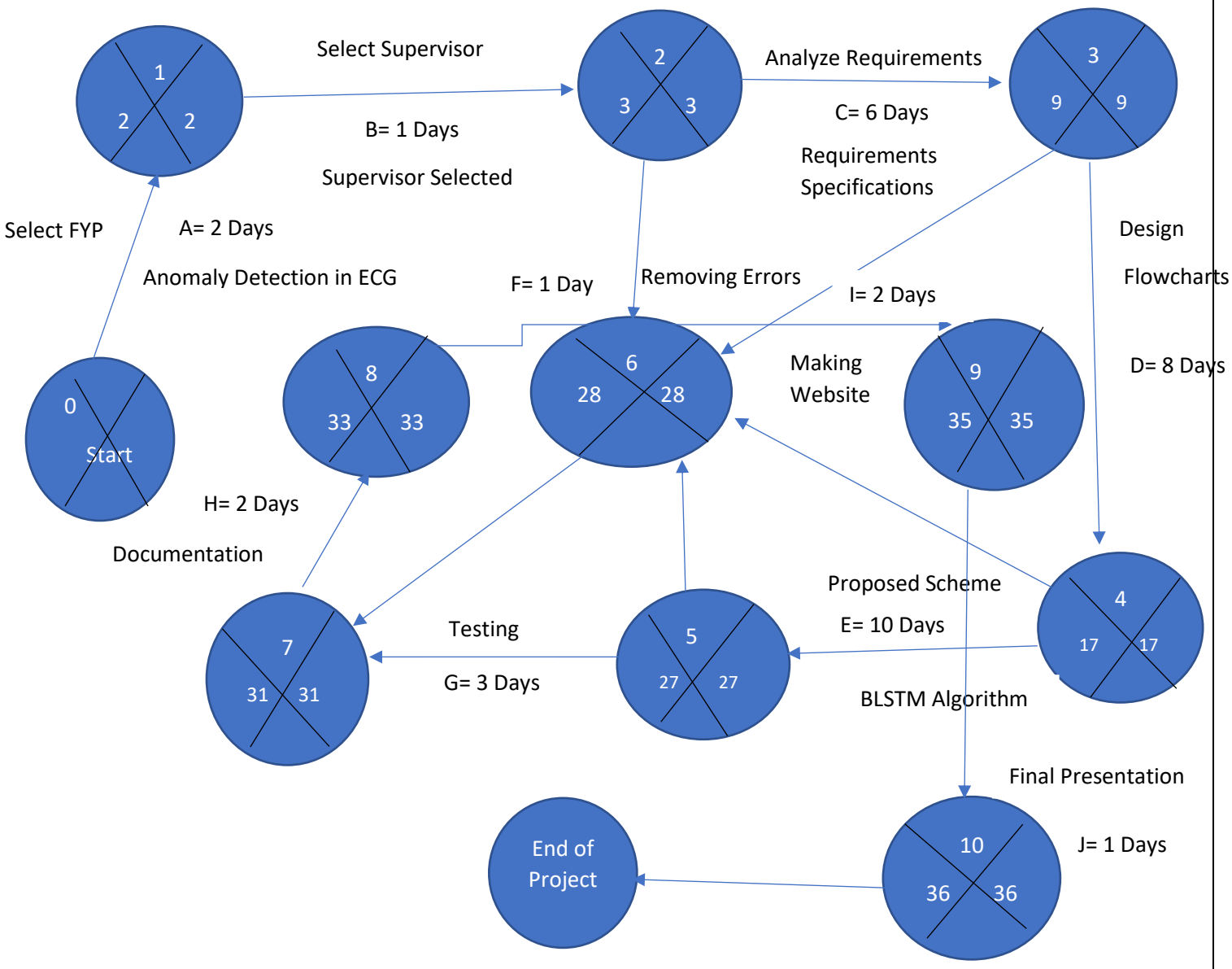
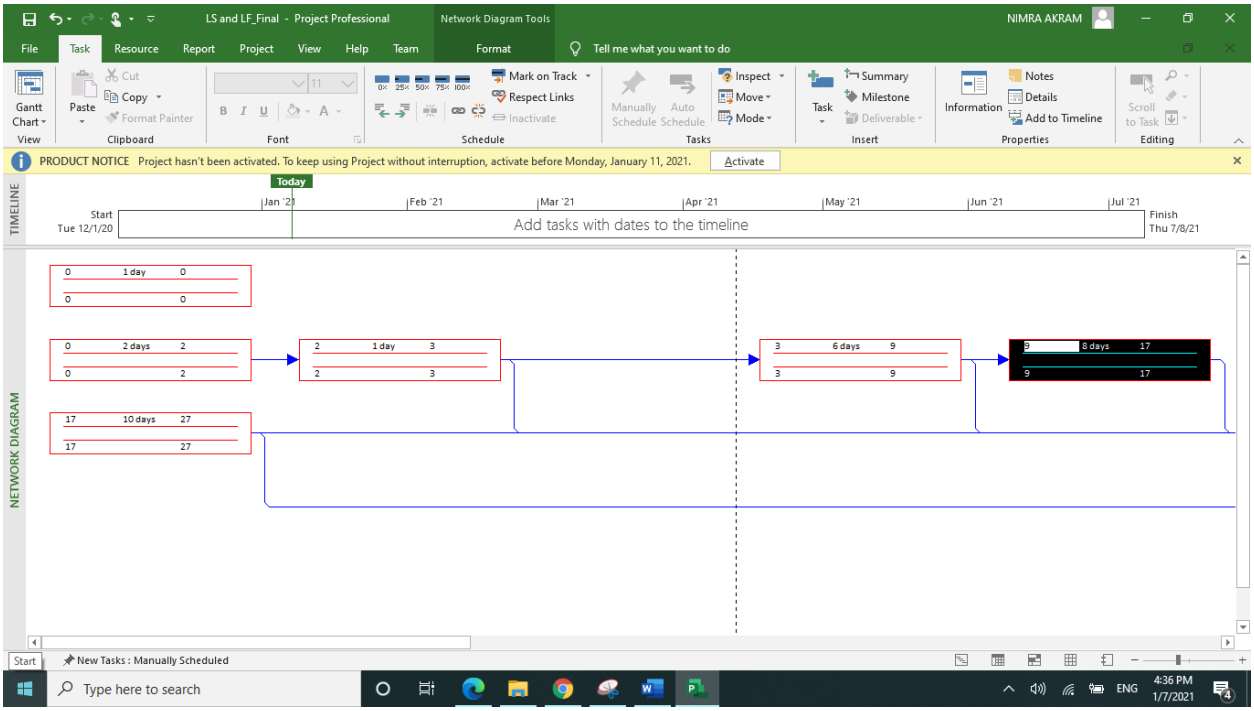


Fig 14 shows after backward pass CPM Network Diagram

The rule of backward pass is that the latest date for an event is the latest start date for all the activities that may commence from that event. Where more than one activity commences at a common event, we take the earliest of the latest start dates for those activities.

- **After Backward Pass CPM Diagram on MS Project:**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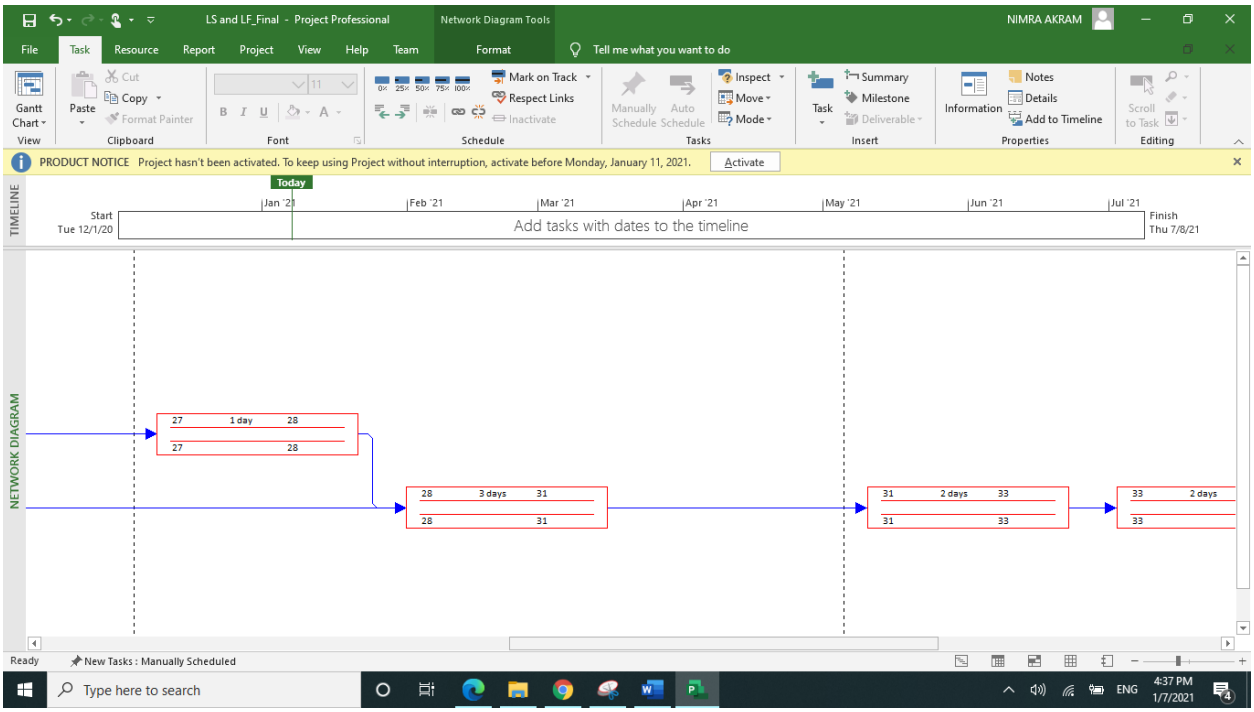
Project
View
Help
Team
Format
Tell me what you want to do
Gantt Chart
Paste
Cut
Copy
Format Painter
Mark on Track
Respect Links
Inactivate
Manually Schedule
Auto Schedule
Inspect
Move
Mode
Task
Summary
Milestone
Deliverable
Information
Notes
Details
Add to Timeline
Scroll to Task
PRODUCT NOTICE Project hasn't been activated. To keep using Project without interruption, activate before Monday, January 11, 2021.
Activate
TIMELINE
Today
Jan '21
Feb '21
Mar '21
Apr '21
May '21
Jun '21
Jul '21
Start
Tue 12/1/20
Add tasks with dates to the timeline
Finish
Thu 7/8/21
NETWORK DIAGRAM
0 1 day 0
0 0
0 2 days 2
0 2
2 1 day 3
2 3
3 6 days 9
3 9
9 8 days 17
9 17
17 10 days 27
17 27
Start
New Tasks : Manually Scheduled
Type here to search
ENG
4:36 PM
1/7/2021


LS and LF_Final - Project Professional
Network Diagram Tools
NIMRA AKRAM
File
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Tell me what you want to do
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Add tasks with dates to the timeline
Finish
Thu 7/8/21
NETWORK DIAGRAM
27 1 day 28
27 28
28 3 days 31
28 31
31 2 days 33
31 33
33 2 days
33
Ready
New Tasks : Manually Scheduled
Type here to search
ENG
4:37 PM
1/7/2021

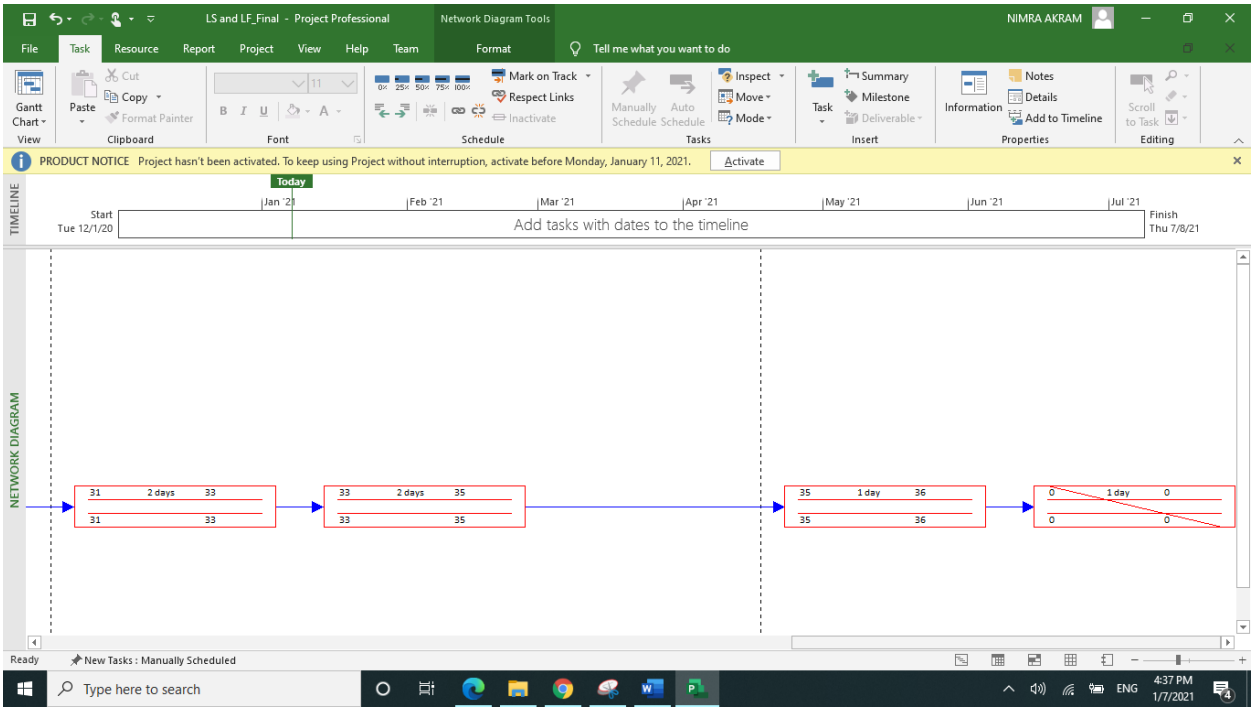


Fig 15 illustrates Backward Pass CPM Diagram on MS Project

g. Provide Activity Table after backward pass

Activity	Duration (Days)	Earliest Start Date	Latest Start Date	Earliest Finish Date	Latest Finish Date	Total Float (EF-LF)
A	2	0	0	2	2	
B	1	2	2	3	3	
C	6	3	3	9	9	
D	8	9	9	17	17	
E	10	17	17	27	27	
F	1	27	27	28	28	

G	3	28	28	31	31	
H	2	31	31	33	33	
I	2	33	33	35	35	
J	1	35	35	36	36	

Table 3. shows activity table following the backward pass

- **On MS Project**

Duration	Start	Finish	Predecessors	ES	LS	EF	LF
1 day	Tue 12/1/20	Tue 12/1/20		0	0	0	0
2 days	Thu 12/3/20	Fri 12/4/20		0	0	2	2
1 day	Mon 12/7/20	Mon 12/7/20	2	2	2	3	3
6 days	Mon 12/14/20	Mon 12/21/20	3	3	3	9	9
8 days	Wed 1/13/21	Fri 1/22/21	4	9	9	17	17
10 days	Mon 1/25/21	Fri 2/5/21		17	17	27	27
1 day	Mon 2/8/21	Mon 2/8/21	3,4,5,6	27	27	28	28
3 days	Wed 2/10/21	Fri 2/12/21	6,7	28	28	31	31
2 days	Wed 2/17/21	Thu 2/18/21	8	31	31	33	33
2 days	Tue 3/2/21	Wed 3/3/21	9	33	33	35	35
1 day	Wed 7/7/21	Wed 7/7/21	10	35	35	36	36
1 day	Thu 7/8/21	Thu 7/8/21	11	0	0	0	0

Fig 16. Activity Table following the backward pass on MS Project

h. Identify Critical Path and draw critical path diagram also.

- **1st Method (if slack =0)**

  Any delay in the critical path will delay the project. The difference between the earliest date and latest date for an event is known as slack. Any event with a slack of zero is critical in the sense that any delay in achieving that event will delay the completion date of the project as a whole. There will be at least one path through the network joining those critical events. This path is known as critical path.

- **2nd Method (By Calculating Paths and their Duration)**

The path with longest duration is the critical path. The following indicates description of all the paths.

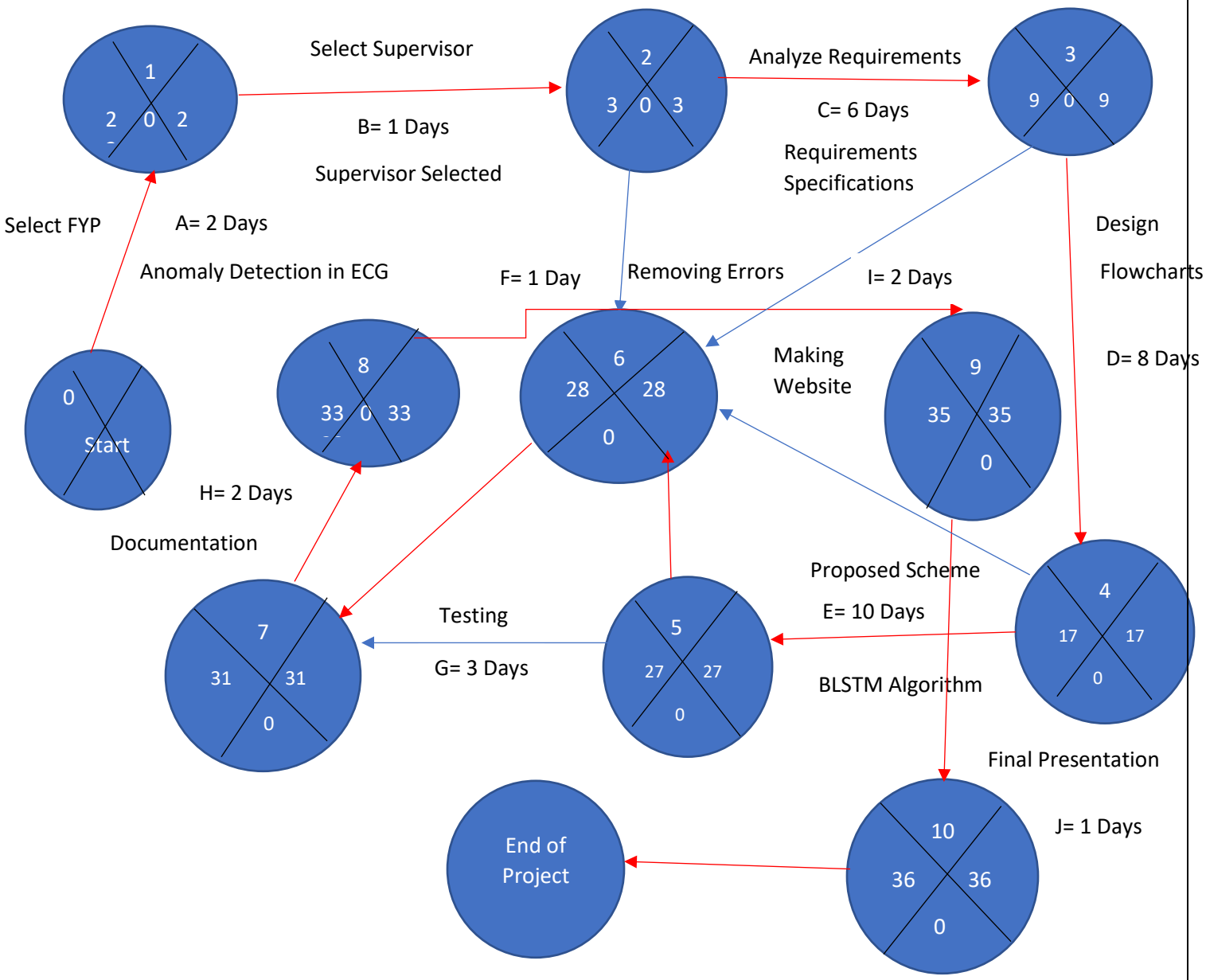
- First path is Start (S) 1-2-6-7-8-9-10 End (E') the duration of this path is 12 days

- The second path is (S) 1-2-3-6-7-8-9-10 (E') the duration of which is equal to 18 days
- The third path is (S) 1-2-3-4-6-7-8-9-10 (E') the duration of this path is 26 days
- Fourth path is (S) 1-2-3-4-5-7-8-9-10 (E') the duration of this path is equal to 35 days
- Fifth path is (S) 1-2-3-4-5-6-7-8-9-10 (E') the duration of this path is equal to 36 days

The longest path in the network above is (S) 1-2-3-4-5-6-7-8-9-10 (E') with a duration of 36 days. Hence it is the critical path of the above schedule network diagram.

- **Indicate the Critical Path in CPM Network Diagram**

I indicate the critical path on the network diagram with red line. The network diagram with critical path will look as follows: (The critical path is the longest path in the network)



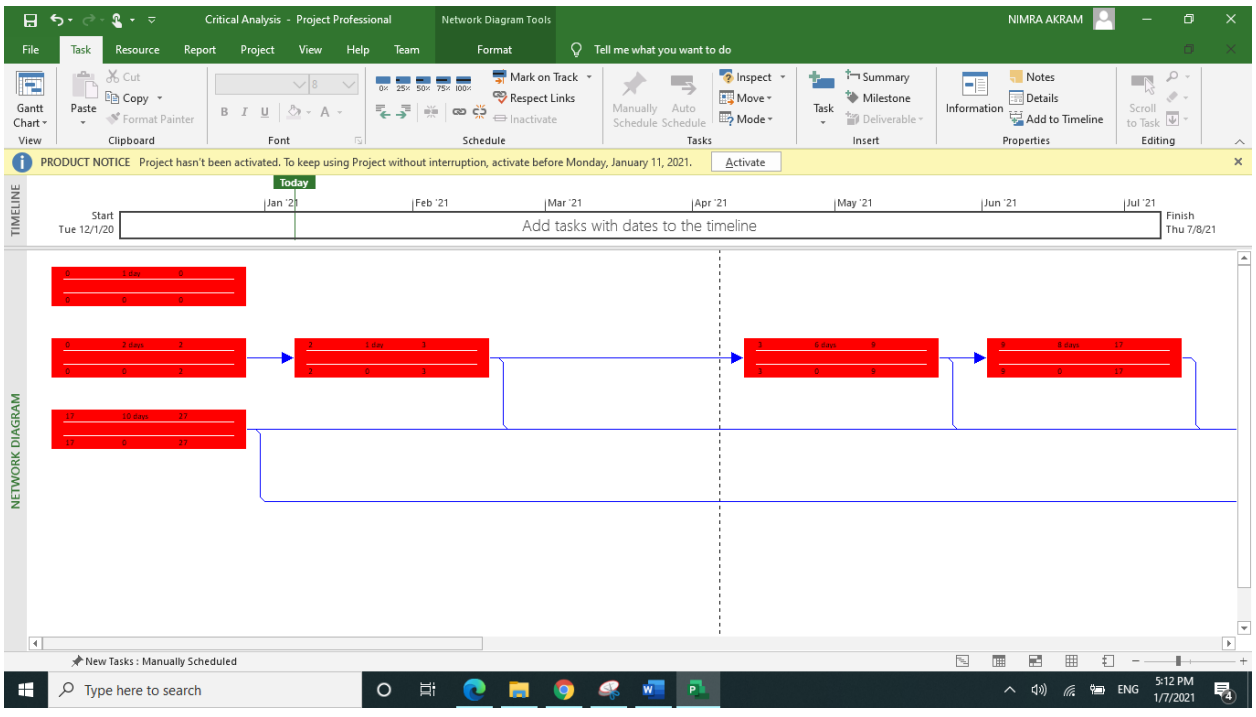
On MS Project:

ES	LS	EF	LF	Critical Analysis	Slack
0	0	0	0	Yes	0
0	0	2	2	yes	0
2	2	3	3	yes	0
3	3	9	9	yes	0
9	9	17	17	yes	0
17	17	27	27	yes	0
27	27	28	28	yes	0
28	28	31	31	yes	0
31	31	33	33	yes	0
33	33	35	35	yes	0
35	35	36	36	yes	0
0	0	0	0	yes	0

Fig 17 Critical Path Analysis on MS Project

In managing the project, we must pay particular attention to monitoring activities on the critical path so that the effects of nay delay or resource unavailability are detected and corrected at the earliest opportunity. In planning the project, it is the critical path that must be shorten if we are to reduce the overall duration of the project.

- **Critical Path Diagram on MS Project:**



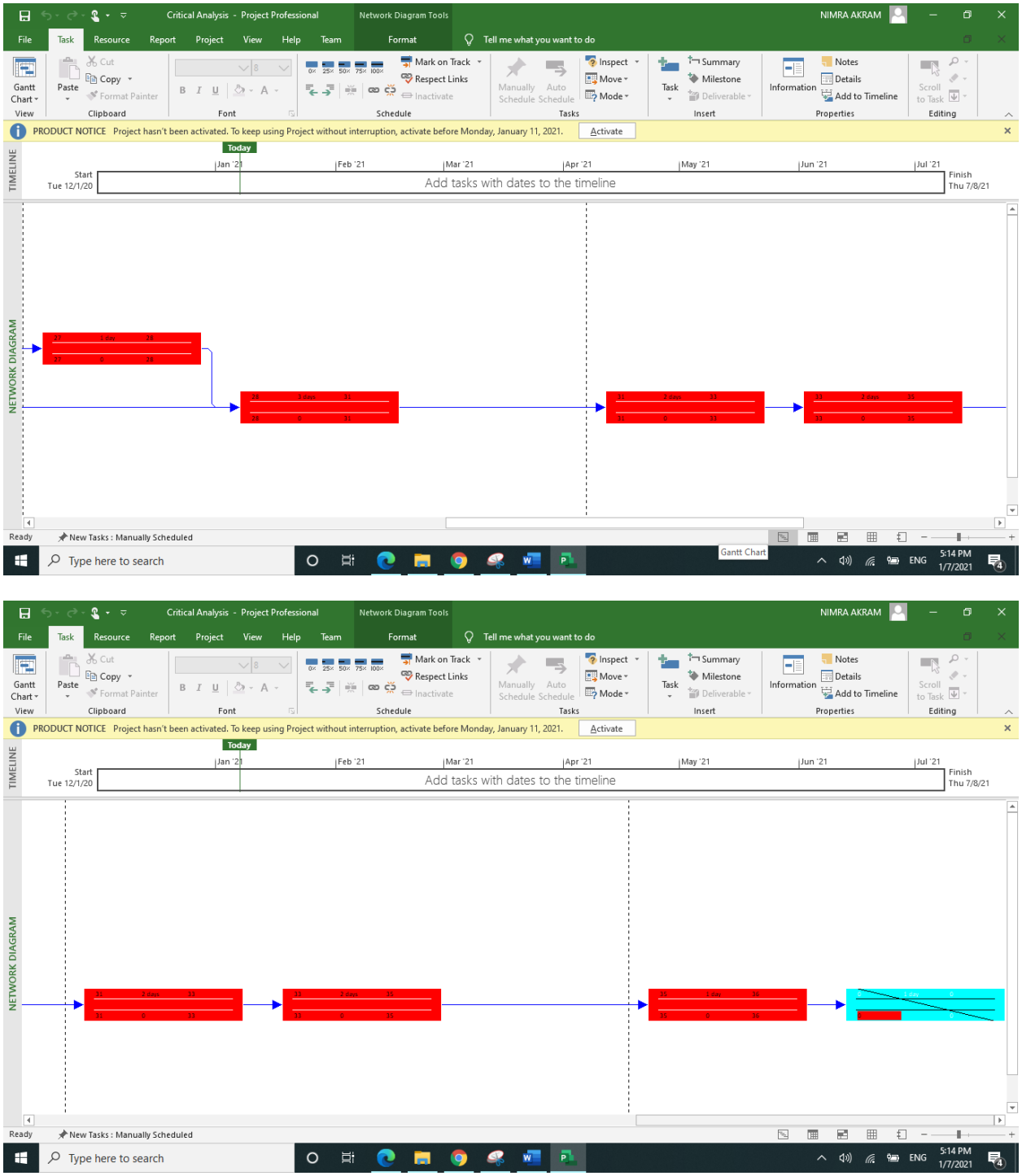


Fig 18 shows the Critical Path Diagram

The red color shows that the path is the longest path in the network, and it is critical. Any delay in the critical path will delay the project

- **Activity Float:**

Whereas events have slack, activities posses float. The total float is the difference between earliest start date of an activity and its latest start i.e. (EF-LF). It tells us about how long the activity's start and the completion may be delayed without affecting the end date of the project.

Activity	**Duration (Days)**	**Earliest Start Date**	**Latest Start Date**	**Earliest Finish Date**	**Latest Finish Date**	**Total Float (EF-LF)**
A	2	0	0	2	2	2-2=0
B	1	2	2	3	3	3-3=0
C	6	3	3	9	9	9-9=0
D	8	9	9	17	17	17-17=0
E	10	17	17	27	27	27-27=0
F	1	27	27	28	28	28-28=0
G	3	28	28	31	31	31-31=0
H	2	31	31	33	33	33-33=0
I	2	33	33	35	35	35-35=0
J	1	35	35	36	36	36-36=0

Table 4 illustrates the activity schedule showing the total float for each activity

- **On MS Project (Total Float):**

ES	LS	EF	LF	Critical Analysis	Slack	Total Float
0	0	0	0	Yes	0	0
0	0	2	2	yes	0	0
2	2	3	3	yes	0	0
3	3	9	9	yes	0	0
9	9	17	17	yes	0	0
17	17	27	27	yes	0	0
27	27	28	28	yes	0	0
28	28	31	31	yes	0	0
31	31	33	33	yes	0	0
33	33	35	35	yes	0	0
35	35	36	36	yes	0	0
0	0	0	0	yes	0	0

Fig 19 shows the total float on MS Project

Conclusion:

To summarize, critical path analysis reveals network information such as critical path, total float, and activity float. This data forms the basis for further project execution. Moreover, other advanced schedule analysis techniques use output of critical path analysis. Today, Critical Path Method (CPM) is the most popular schedule network analysis technique. Project scheduling tools like MS Project generate critical path with utmost ease. However, it is necessary to understand the critical path analysis calculations. Understanding basic concepts of critical path analysis helps the project managers.

References

1. https://www.kornevonline.net/ITIL/Mcgraw.Hill.Software_Project_Management_2nd_Edition.pdf
2. https://www.youtube.com/watch?v=2DmPwND6dWE&t=197s