

IS333 Assignment 1

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Group 7

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Part A - Activity Duration Calculation

Activity Label	Optimistic	Most Likely	Pessimistic	Duration (Days)	Duration (Days) In Integer
A	1	2	5	2.333333333	2
B	3	4	5	4	4
C	8	10	12	10	10
D	2	6	7	5.5	6
E	6	8	10	8	8
F	5	6	7	6	6
G	3	4	8	4.5	5
H	4	5	7	5.166666667	5
I	10	12	14	12	12
J	3	4	7	4.333333333	4
K	7	8	11	8.333333333	8
L	5	7	9	7	7
M	10	14	16	13.66666667	14
N	9	10	12	10.16666667	10
O	27	32	37	32	32
P	14	16	18	16	16
Q	5	7	9	7	7
R	10	13	16	13	13
S	11	12	14	12.16666667	12
T	18	20	22	20	20
U	9	10	12	10.16666667	10
V	6	7	10	7.333333333	7

Calculations

$$\begin{aligned}\text{A) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{1 + 4(2) + 5}{6} \\ &= 2.333333333 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{B) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{3 + 4(4) + 5}{6} \\ &= 4 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{C) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{8 + 4(10) + 12}{6} \\ &= 10 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{D) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{2 + 4(6) + 7}{6} \\ &= 5.5 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{E) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{6 + 4(8) + 10}{6} \\ &= 8 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{F) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{5 + 4(6) + 7}{6} \\ &= 6 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{G) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{3 + 4(4) + 8}{6} \\ &= 4.5 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{H) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{4 + 4(5) + 7}{6} \\ &= 5.166666667 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{I) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{10 + 4(12) + 14}{6} \\ &= 12 \text{ days}\end{aligned}$$

$$\begin{aligned}\text{J) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{3 + 4(4) + 7}{6}\end{aligned}$$

$$= 4.333333333 \text{ days}$$

$$\begin{aligned} \text{K) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{7 + 4(8) + 11}{6} \\ &= 8.333333333 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{L) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{5 + 4(7) + 9}{6} \\ &= 7 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{M) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{10 + 4(14) + 16}{6} \\ &= 13.66666667 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{N) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{9 + 4(10) + 12}{6} \\ &= 10.16666667 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{O) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{27 + 4(32) + 37}{6} \\ &= 32 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{P) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{14 + 4(16) + 18}{6} \\ &= 16 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{Q) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{5 + 4(7) + 9}{6} \\ &= 7 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{R) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{10 + 4(13) + 16}{6} \\ &= 13 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{S) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{11 + 4(12) + 14}{6} \\ &= 12.16666667 \text{ days} \end{aligned}$$

$$\begin{aligned} \text{T) TE} &= \frac{a + 4m + b}{6} \\ &= \frac{18 + 4(20) + 22}{6} \\ &= 20 \text{ days} \end{aligned}$$

$$\text{U) TE} = \frac{a + 4m + b}{6}$$

$$= \frac{9 + 4(10) + 12}{6}$$

$$= 10.16666667 \text{ days}$$

$$\text{V) TE} = \frac{a + 4m + b}{6}$$

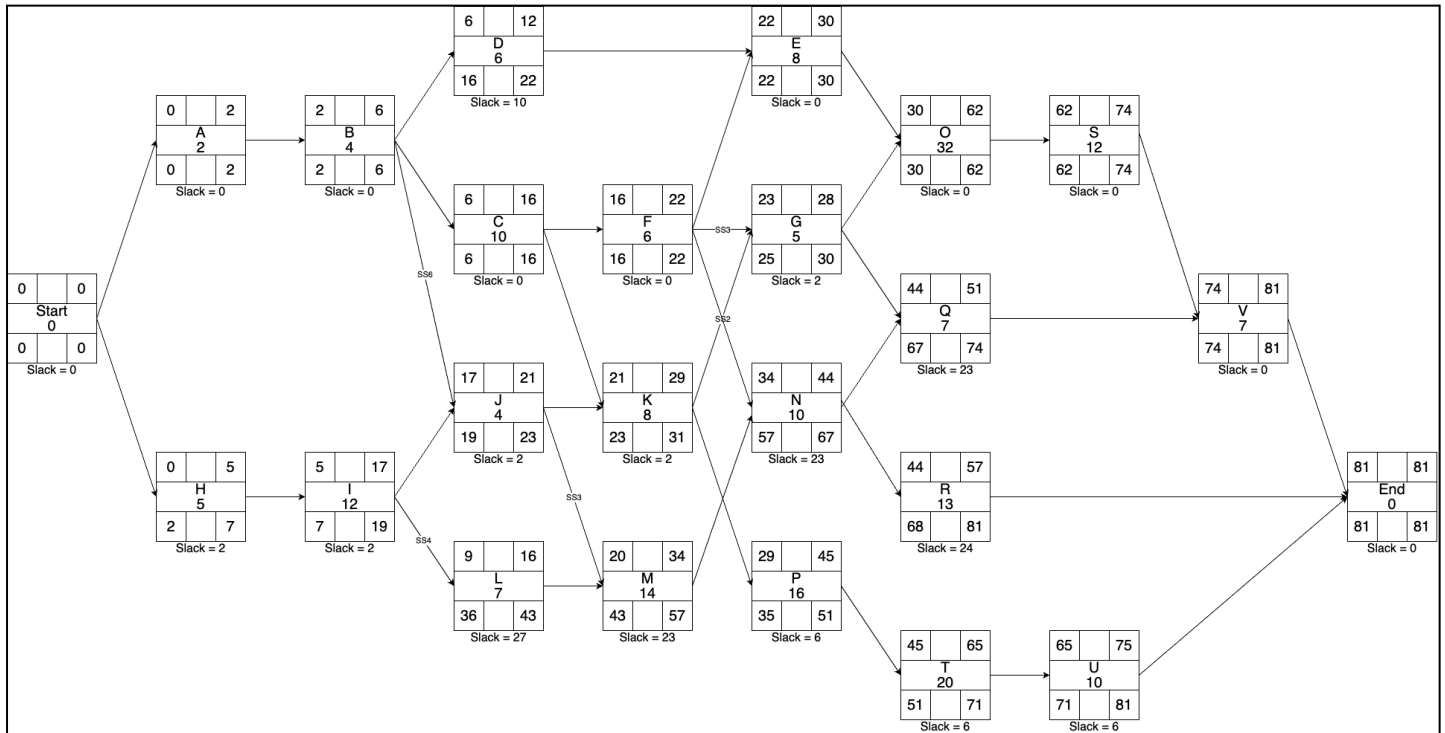
$$= \frac{6 + 4(7) + 10}{6}$$

$$= 7.33333333 \text{ days}$$

Part B - Activity Table

Activity Label	Predecessors	Duration (Days)
A	-	2
B	A	4
C	B	10
D	B	6
E	D,F	8
F	C	6
G	F(SS3),K(SS2)	5
H	-	5
I	H	12
J	B(SS6),I	4
K	C,J	8
L	I(SS4)	7
M	J(SS3),L	14
N	F,M	10
O	E,G	32
P	K	16
Q	G,N	7
R	N	13
S	O	12
T	P	20
U	T	10
V	Q,S	7

Part C - Arrow On Node Network Diagram



Part D - Project Duration And End Date

The project takes 81 days to complete.

It starts on the 31st of march, which is a monday.

It ends on the 1st of August which is a friday.

Week	Days	Start Date	End Date	Holidays	Total
1	5	31/03	04/04	-	5
2	4	07/04	11/04	10/04	9
3	5	14/04	18/04		14
4	4	21/04	25/04	25/04	18
5	5	28/04	02/05	-	23
6	5	05/05	09/05	-	28
7	3	12/05	16/05	12/05	31
8	5	19/05	23/05	-	36
9	4	26/05	30/05	30/05	40
10	5	02/06	06/06	-	45
11	5	09/06	13/06	-	50
12	4	16/06	20/06	18/06	54
13	4	23/06	27/06	27/06	58
14	5	30/06	04/07	-	63
15	5	07/07	11/07	-	68
16	4	14/07	18/07	14/07	72
17	4	21/07	25/07	-	76
18	5	28/07	01/08	-	81

Part E - Project Paths

Path #	Path	Duration
1	A-B-D-E-O-S-V	71
2	A-B-C-F-E-O-S-V	81
3	A-B-C-F-G-O-S-V	75
4	A-B-C-F-G-Q-V	38
5	A-B-C-F-N-Q-V	46
6	A-B-C-F-N-R	45
7	A-B-C-K-G-O-S-V	74
8	A-B-C-K-G-Q-V	37
9	A-B-C-K-P-T-U	70
10	A-B-J-K-G-O-S-V	71
11	A-B-J-K-G-Q-V	33
12	A-B-J-K-P-T-U	66
13	A-B-J-M-N-Q-V	49
14	A-B-J-M-N-R	48
15	H-I-J-K-G-O-S-V	79
16	H-I-J-K-G-Q-V	42
17	H-I-J-K-P-T-U	75
18	H-I-J-M-N-Q-V	58
19	H-I-J-M-N-R	57
20	H-I-L-M-N-Q-V	54
21	H-I-L-M-N-R	53

Part F - Critical Path

Critical Path

A -> B -> C -> F -> E -> O -> S -> V

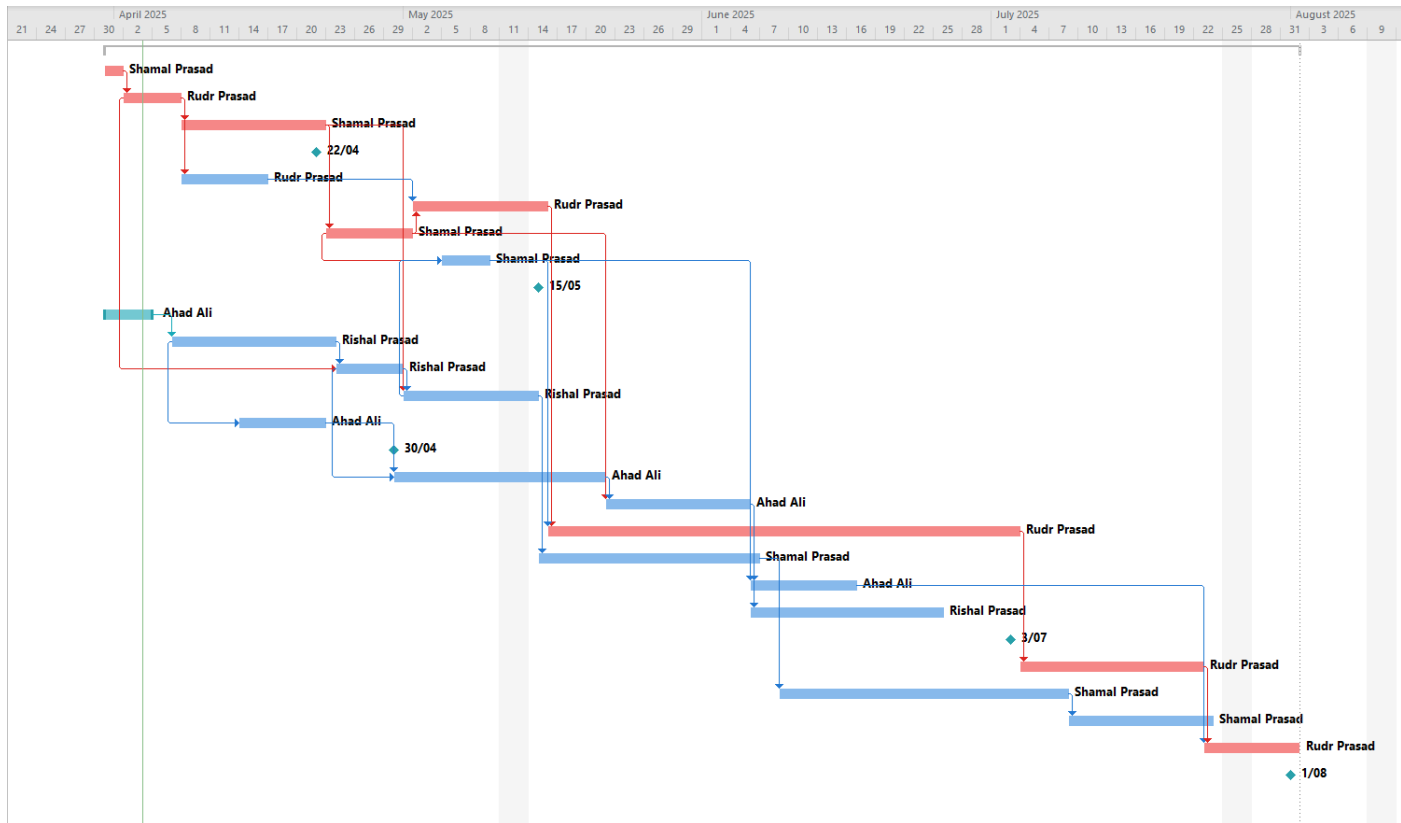
Total duration: 81 days.

Part G - Activities With Float

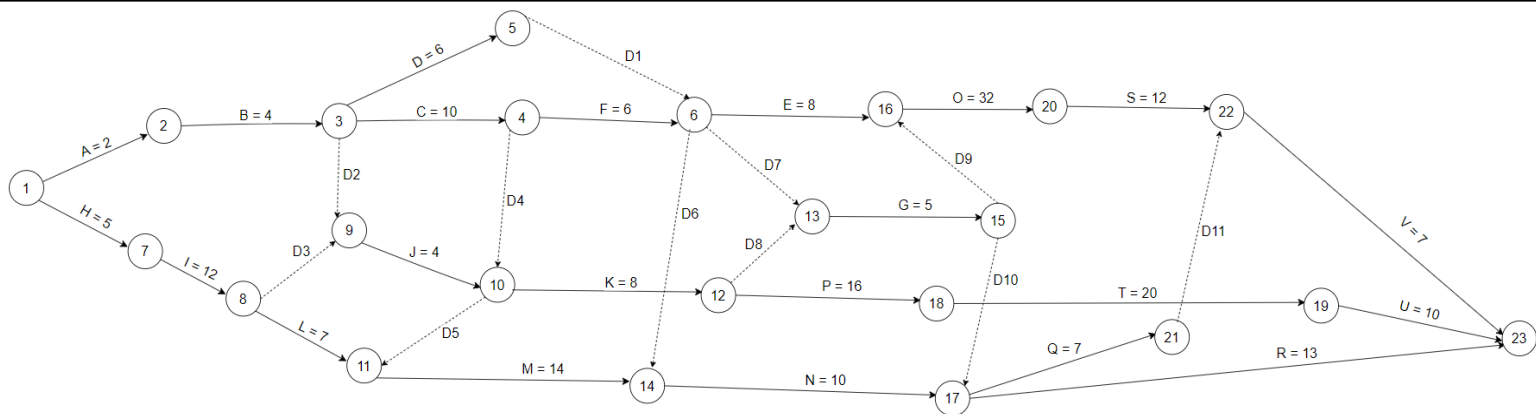
Activity Label	Amount of Slack
D	10
G	2
H	2
I	2
J	2
K	2
L	27
M	23
N	23
P	6
Q	23
R	24
T	6
U	6

Part H - Gantt Chart

	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
0		IS333 A1 Gantt Chart	81 days	Mon 31/03/25	Fri 1/08/25		
1		1 A	2 days	Mon 31/03/25	Tue 1/04/25		Shamal Prasad
2		2 B	4 days	Wed 2/04/25	Mon 7/04/25	1	Rudr Prasad
3		3 C	10 days	Tue 8/04/25	Tue 22/04/25	2	Shamal Prasad
4		4 Milestone	0 days	Tue 22/04/25	Tue 22/04/25		Conceptualization Milestone
5		5 D	6 days	Tue 8/04/25	Wed 16/04/25	2	Rudr Prasad
6		6 E	8 days	Fri 2/05/25	Thu 15/05/25	5,7	Rudr Prasad
7		7 F	6 days	Wed 23/04/25	Thu 1/05/25	3	Shamal Prasad
8		8 G	5 days	Mon 5/05/25	Fri 9/05/25	7SS+3 days,13SS+2	Shamal Prasad
9		9 Milestone	0 days	Thu 15/05/25	Thu 15/05/25		Planing Milestone
10		10 H	5 days	Mon 31/03/25	Fri 4/04/25		Ahad Ali
11		11 I	12 days	Mon 7/04/25	Wed 23/04/25	10	Rishal Prasad
12		12 J	4 days	Thu 24/04/25	Wed 30/04/25	2SS+6 days,11	Rishal Prasad
13		13 K	8 days	Thu 1/05/25	Wed 14/05/25	3,12	Rishal Prasad
14		14 L	7 days	Mon 14/04/25	Tue 22/04/25	11SS+4 days	Ahad Ali
15		15 Milestone	0 days	Wed 30/04/25	Wed 30/04/25		Project Construction Start Milestone
16		16 M	14 days	Wed 30/04/25	Wed 21/05/25	12SS+3 days,14	Ahad Ali
17		17 N	10 days	Thu 22/05/25	Thu 5/06/25	7,16	Ahad Ali
18		18 O	32 days	Fri 16/05/25	Thu 3/07/25	6,8	Rudr Prasad
19		19 P	16 days	Thu 15/05/25	Fri 6/06/25	13	Shamal Prasad
20		20 Q	7 days	Fri 6/06/25	Mon 16/06/25	8,17	Ahad Ali
21		21 R	13 days	Fri 6/06/25	Wed 25/06/25	17	Rishal Prasad
22		22 Milestone	0 days	Thu 3/07/25	Thu 3/07/25		Project Construction Finish Milestone
23		23 S	12 days	Fri 4/07/25	Tue 22/07/25	18	Rudr Prasad
24		24 T	20 days	Mon 9/06/25	Tue 8/07/25	19	Shamal Prasad
25		25 U	10 days	Wed 9/07/25	Wed 23/07/25	24	Shamal Prasad
26		26 V	7 days	Wed 23/07/25	Fri 1/08/25	20,23	Rudr Prasad
27		27 Milestone	0 days	Fri 1/08/25	Fri 1/08/25		Project Closure MileStone



Part I - Activity on Arrow Network Diagram



Part J - Resource Conflicts And Solution

1. Redundant Dependencies (Marked with 'SS').

- Conflict: In this case the 'SS' is redundant because the activity before that is longer than the 'SS' activity and thus we take the longer activity as the predecessor rather than the activity marked with 'SS' for instance, Activity C & D.
- Solution: Remove redundant dependencies and only keep relationships that supersede.

2. Improper Task Sequencing

- Conflict: Some tasks are scheduled to start before their predecessors which is incorrect for instance; Task Q has paths incoming from G,N and R but R is already dependent on N which is incorrect.
- Solution: Use Critical Path Method (CPM) to ensure dependencies are logically implemented for instance; we can make Task Q depend on R only to avoid redundancy.

3. Overlapping Resource Allocation

- Conflict: Multiple tasks end up requiring the same resource which causes resource overlapping. Tasks that occur concurrently will cause overloading for instance; after Tasks B & C, Tasks D, I & L run concurrently.
- Solution: use resource levelling to halt start of either tasks temporarily such as delaying Task D until F completes to prevent over allocation of resources.

4. Parallel Tasks alongside Dependencies

- Conflicts: Few activities are to run in parallel order but have dependencies that require sequential execution first. For instance; Tasks L, M & N run parallel after J & K but if Task N needs decisions from Task M, it should not run in parallel.
- Solution: Applying Fast-Tracking, we can begin dependent tasks earlier by overlapping portions of them, reducing total project time such as Task M's early output will allow Task N to start even before Task M reaches completion.

5. Bottlenecks at Decision Points

- Conflicts: nodes with incoming multiple dependencies means the tasks cannot begin until all of its predecessors are complete which may lead to delays. Nodes like "Q" and "V" have multiple incoming dependencies leading to potential scheduling bottlenecks.
- Solution: Using Crashing which involves additional allocation of resources to reduce delays at bottleneck points. For instance; Task 'V' cannot start until

Tasks Q & S are completed. We can crash either to add more resources to them in order to increase completion rate.

Mark Allocation Sheet

Member ID	Percentage of assignment 1 marks	Task Completed
S11219545	100%	Part A,B,I,H
S11219309	100%	Part C,D,E
S11221529	100%	Part F,G
S11221067	100%	Part J

Signed

Member name	ID	Signature
Shamal Prasad	S11219545	<i>SPrasad</i>
Rudr Prasad	S11219309	<i>RPrasad</i>
Ahad Ali	S11221529	<i>AAli</i>
Rishal Prasad	S11221067	<i>Rprasad</i>