Crashing in Project Management —

Crashing is a schedule compression technique used to reduce or shorten the project schedule.

Activity	Normal time (T_n)	Crash time (T_c)	Normal cost (C_n)	Crash cost (C_c)	
1-2	9	6	640	700	
1-3	8	5	500	575	
1-4	15	10	400	550	
2-4	5	3	100	120	
3-4	10	6	200	260	
4-5	2	1	100	140	

overhead cost Rs. 60 per day

(i) Draw the Network diagram.

(ii) Determine minimum total time and corresponding cost.

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1-2	9	6	640	700	20
1-3	8	5	500	575	25
1-4	15	10	400	550	30
2-4	5	3	100	120	10
3-4	10	6	200	260	15
4-5	2	1	100	140	40
			1940		

overhead cost Rs. 60 per day

(i) Draw the Network diagram.

(ii) Determine minimum total time and corresponding cost.

Activity	Normal time (Tn) (days)	Crash time (Tc)	Normal cost (Cn) (Rs)	Crash cost (Cc)	cost slope = $\frac{Cc - Cn}{Tn - Tc}$
1-2	9	6	640	700	20 Rs./day
1-3	8	5	500	575	25
1-4	15	10	400	550	30
2-4	5	3	100	120	10
3-4	10	6	200	260	15
4-5	2	1	100	140	40
		Total	1940		

overhead cost Rs. 60 per day

(i) Draw the Network diagram.

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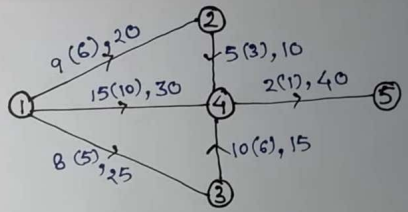
Network diagram



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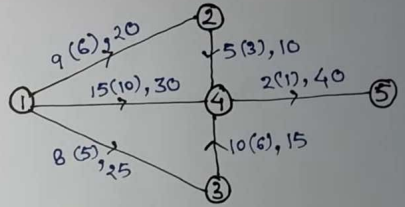
4-5	2	1	100	140	40
		Total	1940		

Overhead cost Rs. 60 per day

Networke diagram



(i) Draw the Network diagram.

(ii) Determine minimum total time and corresponding cost.

various path

(i) 1-2-4-5 = 16 (C.P)

(ii) 1-4-5 = 17

(iii) 1-3-4-5 = 20

CT
10
11
12

Project Duration = 20 days

Total Normal cost = 1940 + 0 + 20×60

= 3140 Rs.

Activity	Normal time (T_n) (days)	Crash time (T_c)	Normal cost (C_n) (Rs)	Crash cost (C_c)	cost slope $= \frac{C_c - C_n}{T_n - T_c}$
1-2	9	6	640	700	20 Rs/day
1-3	8	5	500	575	25
1-4	15	10	400	550	30
2-4	5	3	100	120	10
3-4	10	6	200	260	15
4-5	2	1	100	140	40
		Total	1940		

overhead cost Rs. 60 per day

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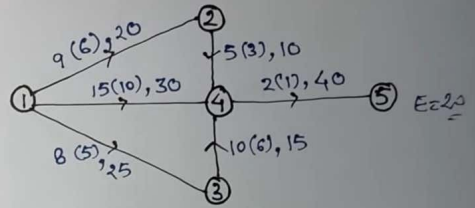
Network diagram



various path

	P.D
(i) 1-2-4-5	16
(ii) 1-4-5	17
(iii) 1-3-4-5	20

CT
10
11
12

1st crashing -

CP: 1-3-4-5

CA: 1-3, 3-4 (15), 4-5

Activity 3-4 crashed by 3 days

Activity	Normal time (T_n) (days)	Crash time (T_c)	Normal cost (C_n) (Rs)	Crash cost (C_c)	cost slope $= \frac{C_c - C_n}{T_n - T_c}$
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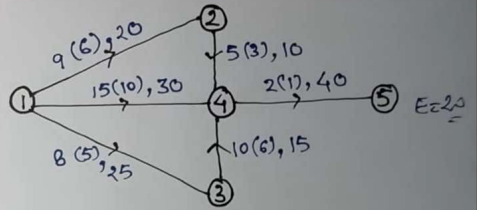
3-4	10	6	200	260	15
4-5	2	1	100	140	40
		Total	1940		

Networks diagram



overhead cost Rs. 60 per day

various path

P.P

CT

(i) Draw the Network diag

(ii) Determine minimum t
and corresponding cos

1st crashing -

CP: 1-3-4-5

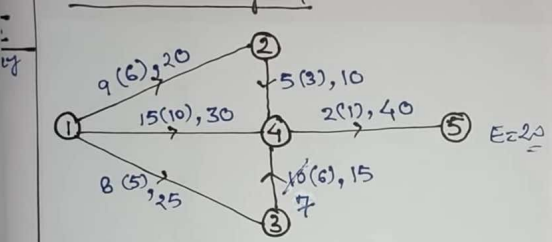
CA: 1-3, 3-4, 4-5
15

Activity 3-4 crashed by 3 days

New cost = previous cost + crash cost - overhead cost

= 3140 + 3×15 - 3×60

= 3005 Rs.



various path

1-2-4-5 = ~~16~~ 16 (P.P)

1-4-5 = ~~17~~ 17

1-3-4-5 = ~~20~~ 17

CT
10
11
(12)

ject Duration = 20 days

al Normal cost = 1940 + 0 + 20×60

= 3140 Rs.

CP: 1-3-4-5

CA: 1-3, 3-4 (15), 4-5

Activity 3-4 crashed by 3 days

New cost = previous cost + crash cost − overhead cost

= 3140 + 3×15 − 3×60

= 3005 Rs.

2nd

CP: 1-4-5 , 1-3-4-5

CA: 1-4, 4-5 1-3, 3-4, 4-5

(i) 4-5 ⇒ 40 ✓

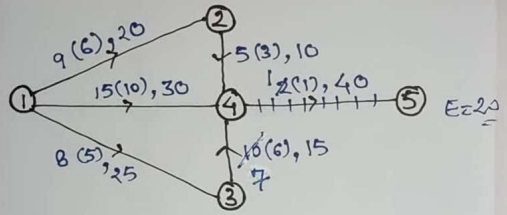
(ii) 1-4, 1-3 ⇒ 30+25=55

(iii) 1-4, 3-4 ⇒ 30+15=45

Activity 4-5 crashed by 1 day

New cost = 3005 + 1×40 − 1×60

= 2985 Rs.



various path

				CT
1-2-4-5	=	16	16 15	10
1-4-5	=	17	17 16	11
1-3-4-5	=	30	17 16	(12)

P.P

ject Duration = 20 days

al Normal cost = 1940 + 0 + 20×60

= 3140 Rs.

CP: 1-3-4-5

CA: 1-3, 3-4 (15), 4-5

Activity 3-4 crashed by 3 days

New cost = previous cost + crash cost − overhead cost

= 3140 + 3×15 − 3×60

= 3005 Rs.

2nd

CP: 1-4-5 , 1-3-4-5

CA: 1-4, 4-5 1-3, 3-4, 4-5

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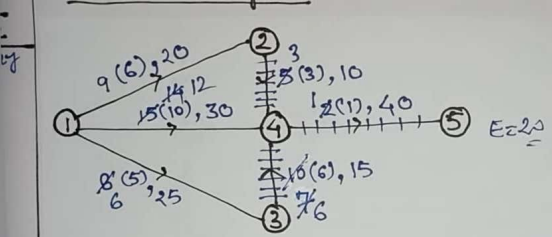


various path

							CT
1-2-4-5	=	~~16~~	~~16~~	~~15~~	~~15~~	13	10
1-4-5	=	~~17~~	~~17~~	16	~~15~~	13	11
1-3-4-5	=	~~20~~	~~17~~	~~16~~	~~15~~	13	(12)

ject Duration = 20 days

al Normal cost = 1940 + 0 + 20×60

= 3140 Rs

4th

cp: 1-2-4-5 | 1-4-5 | 1-3-4-5

CA: 1-4, ~~4-5~~ 1-3, 3-4, ~~4-5~~

(i) 1-4, 1-3 ⇒ 30+25 = 55

(ii) 1-4, 3-4 ⇒ 30+15 = 45 ✓

Activity 1-4, 3-4 crashed by 1 day

Newcost = 2985 + 1×45 − 1×60

= 2970 Rs.

5th

cp: 1-2-4-5 | 1-4-5 | 1-3-4-5

CA: 1-2, 2-4 ~~4-5~~ | 1-4 ~~4-5~~ | 1-3, ~~3-4~~, ~~4-5~~

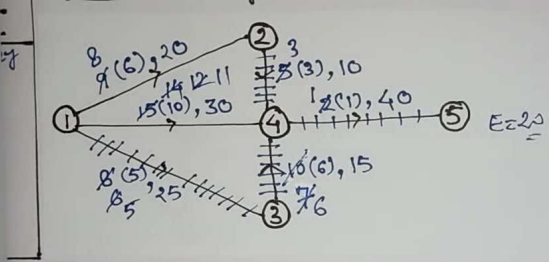
(i) 1-2, 1-4, 1-3 ⇒ 20+30+25 = 75

(ii) 2-4, 1-4, 1-3 ⇒ 10+30+25 = 65 ✓

Activity 2-4, 1-4, 1-3 crashed by 2 days

New cost = 2970 + 2×65 − 2×60

= 2980 Rs.



various path

			CT
1-2-4-5	= 16	16 15 15 13 12	10
1-4-5	= 17	17 16 15 13 12	11
1-3-4-5	= 20	17 16 15 13 12	(12)

Project Duration = 20 days

Total Normal cost = 1940 + 0 + 20×60

= 3140 Rs.

(i) 1-2, 1-4, 1-3 ⇒ 20+30+25 = 75

(ii) 2-4, 1-4, 1-3 ⇒ 10+30+25 = 65 ✓

Activity 2-4, 1-4, 1-3 crashed by 2 days

New cost = 2970 + 2×65 − 2×60

= 2980 Rs.

5th

CP: 1-2-4-5 | 1-4-5 | 1-3-4-5

1-2, 2-4 | 1-4 | 1-3, 3-4

4-5 | 4-5 | 4-5

(i) 1-2, 1-4, 1-3 ⇒ 20+30+25 = 75 ✓

Activity 1-2, 1-4, 1-3 crashed by 1 day

New cost = 2980 + 1×75 − 1×60

= 2995 Rs.

5th

cp: 1-2-4-5 | 1-4-5 | 1-3-4-5

1-2, 2~~/4~~ | 1-4 | 1-3, 3~~/4~~

4~~/5~~ | 4~~/5~~ | 4~~/5~~

(i) 1-2, 1-4, 1-3 ⇒ 20+30+25 = 75 ✓

Activity 1-2, 1-4, 1-3 crashed by 1 day

New cost = 2980 + 1×75 − 1×60

= 2995 Rs.

Project Duration	20	17	16	(15)	13	12
cost	3140	3005	2985	2970	2980	2995

(1) optimum duration = 15 days
correspondence cost = 2970 Rs.

(2) Minimum duration = 12 days
correspondence cost = 2995 Rs