

CONSTRUCTION PROJECT MANAGEMENT

(إدارة مشاريع التشييد)

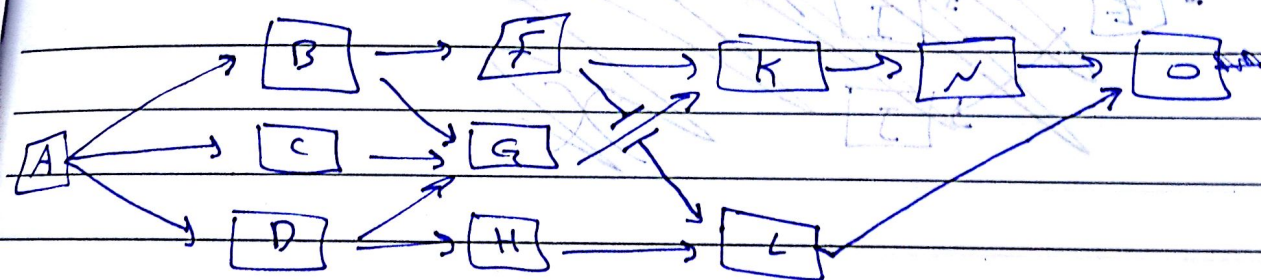
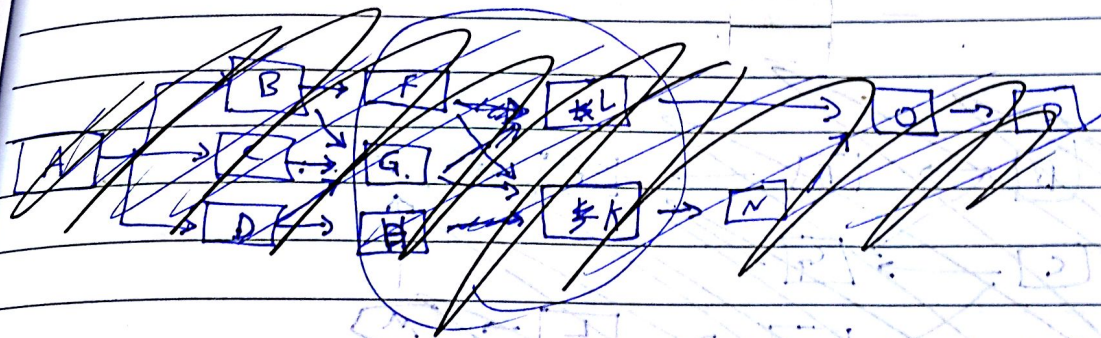
{ إدارة مشاريع (التخطيط) }

Precedence diagram doing?

ex.1

Activity	Dependent on	Activity	Dep. on
A	—	H	D
B	A	K	F, G
C	A	L	F, H
D	A	N	K
F	B	O	L, N
G	B, C, D	P	O

→



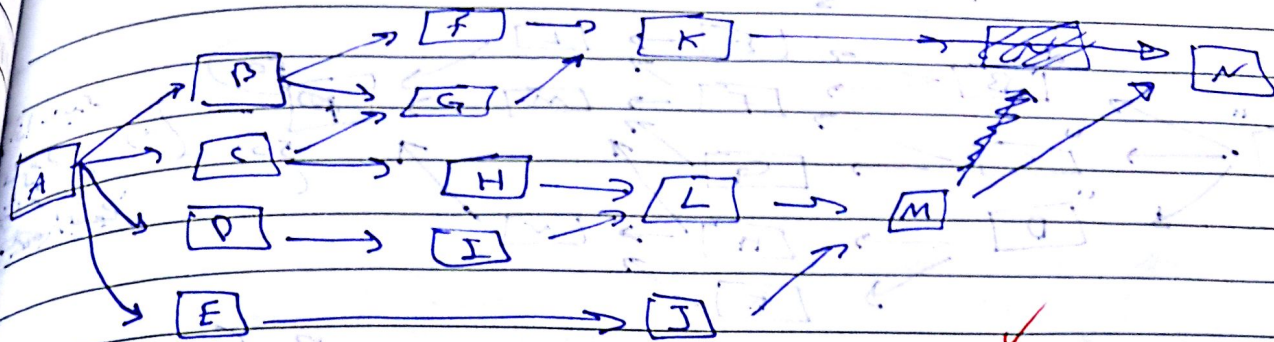
ex 2 Act Successor

A	B, C, D, E
B	F, G
C	G, H
D	I
E	J
F	K
G	K
H	L
I	L
K	N
L	M
J	M
M	N
N	-

2.3



3



ex 3

Act

Successor

A

B, C, D

B

E, F

C

F, G

D

H, K

E

L

F

L, M

G

M

H

M, N

K

N

L

P

M

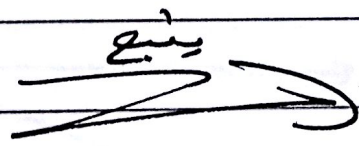
P

N

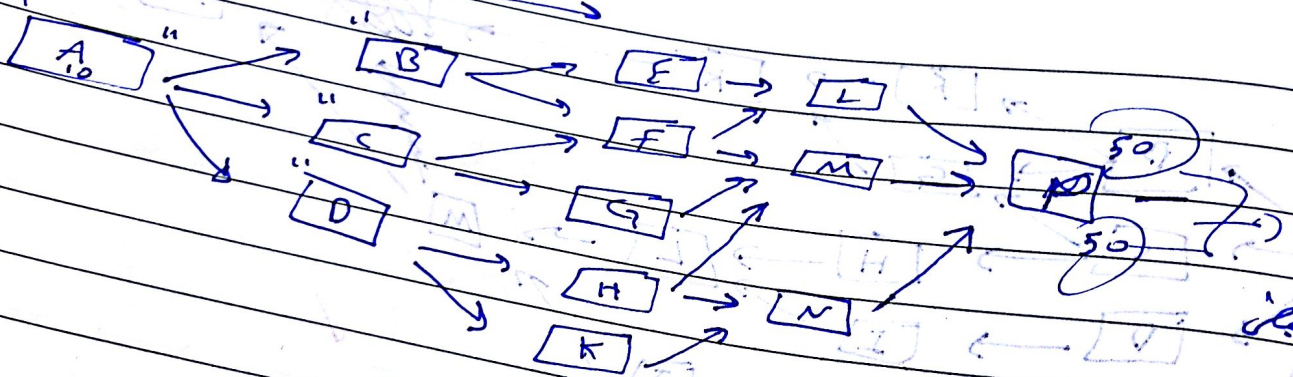
P

P

-

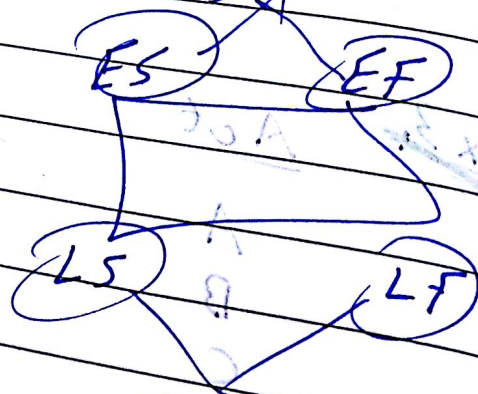


forward pass

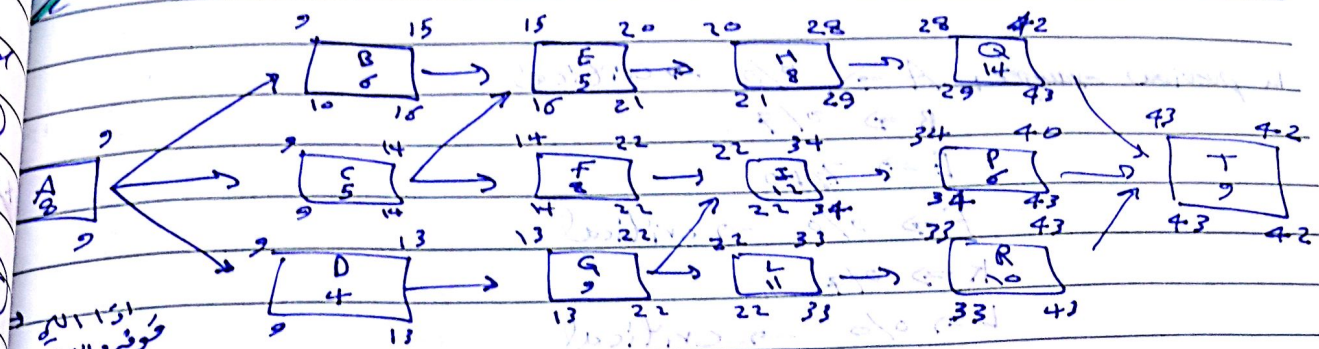


Backward pass

By forward



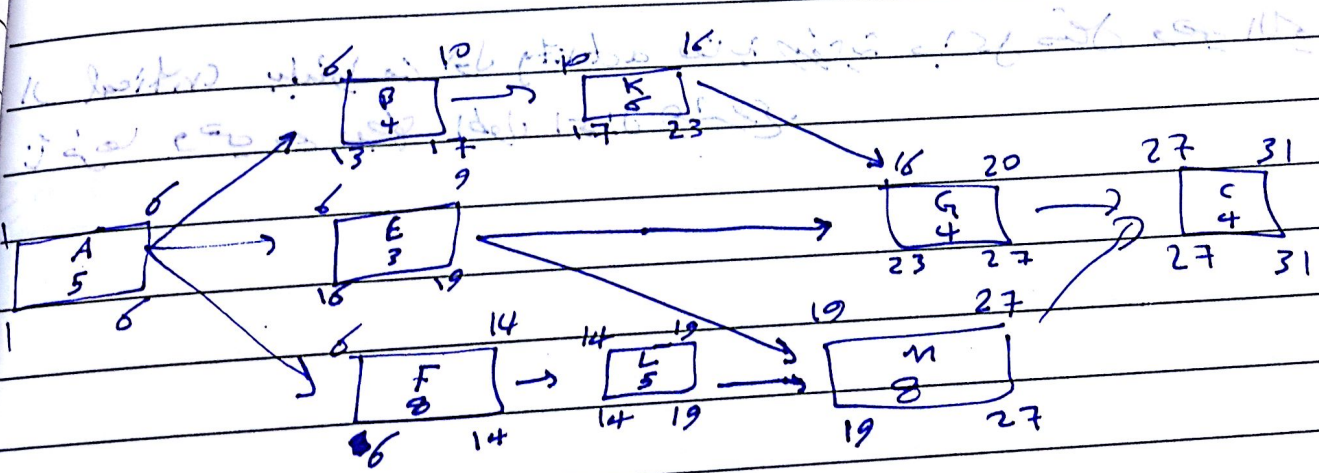
By Backward

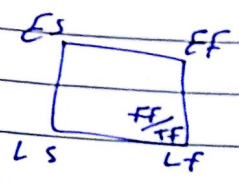


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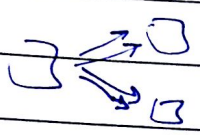
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- In previous example:
- A $\Rightarrow$ 0/0 $\rightarrow$ critical
 - B $\Rightarrow$ 0/7
 - E $\Rightarrow$ 7/10
 - F $\Rightarrow$ 0/0 $\rightarrow$ critical
 - K $\Rightarrow$ 0/7
 - L $\Rightarrow$ 0/0 $\rightarrow$ critical
 - G $\Rightarrow$ 7/7
 - M $\Rightarrow$ 0/0 $\rightarrow$ critical
 - C $\Rightarrow$ 0/0 $\rightarrow$ critical

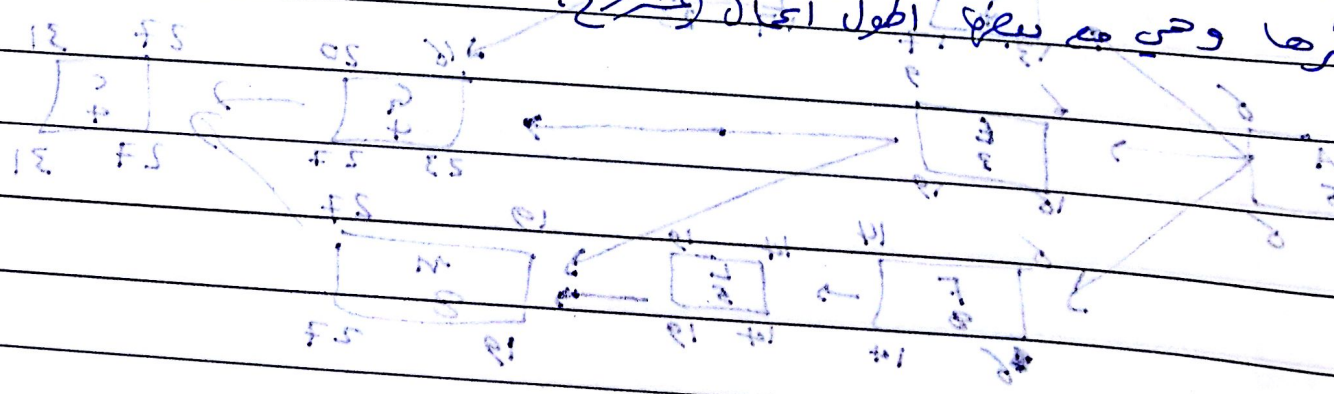


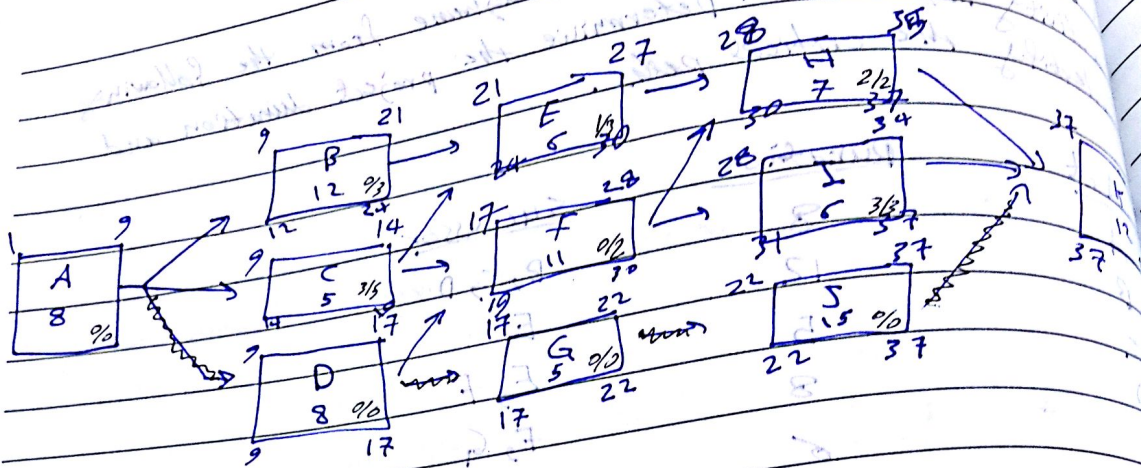
يمكن تمثيل توصيل فوقه arrows بين ال critical paths

الونضيل قائمة على CP: A

CP1: A-F-L-M-C

ار critical يلبثوا من اول activity نهاية نهاية د اكل مثل وصي الاله ما بينفع نأخرها وصي مع بقاء اطول ايمان وشروع.





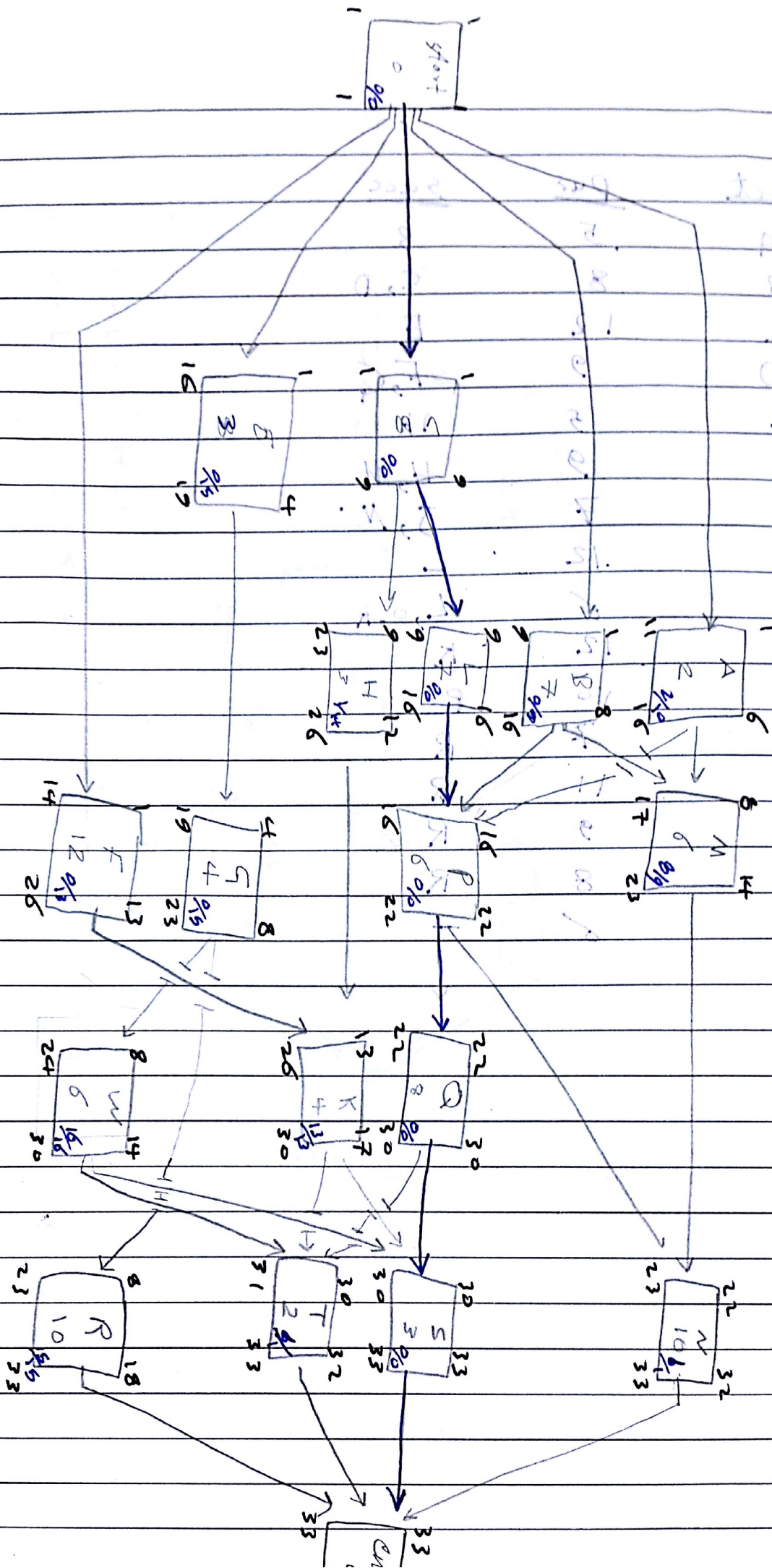
CP1: A-D-G-J-K

Ex: Activity (Duration)

depends on

A(5)	—
B(7)	—
C(8)	—
E(3)	—
F(12)	—
G(4)	E
H(3)	C
K(4)	H, F
L(7)	C
M(6)	A, B
N(10)	M, P
P(6)	A, B, L
Q(8)	P
R(10)	G
S(3)	K, Q, W
T(2)	K, Q, W
W(6)	G

CSJ: start - C - L - P - Q - S - end

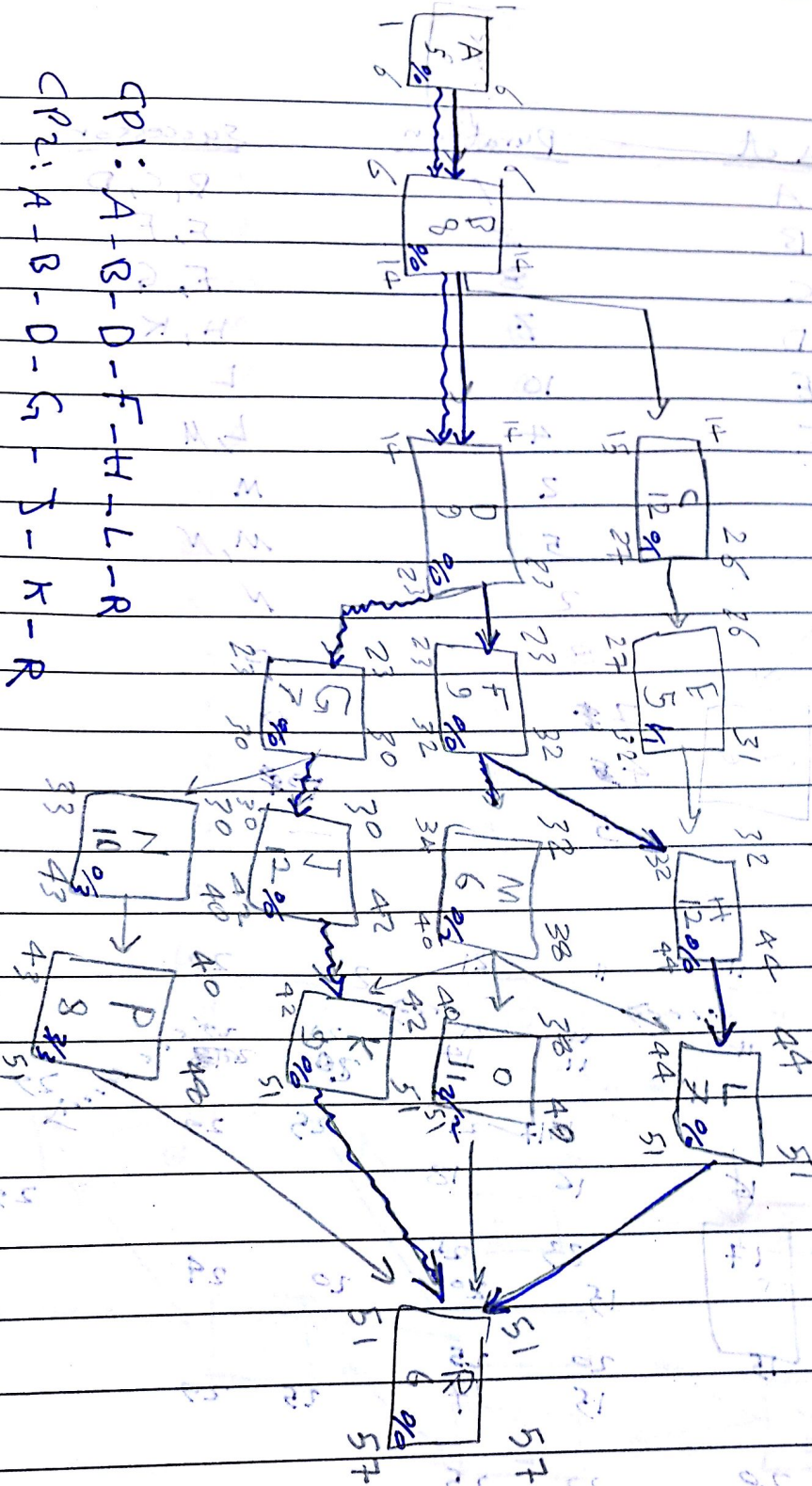


ex

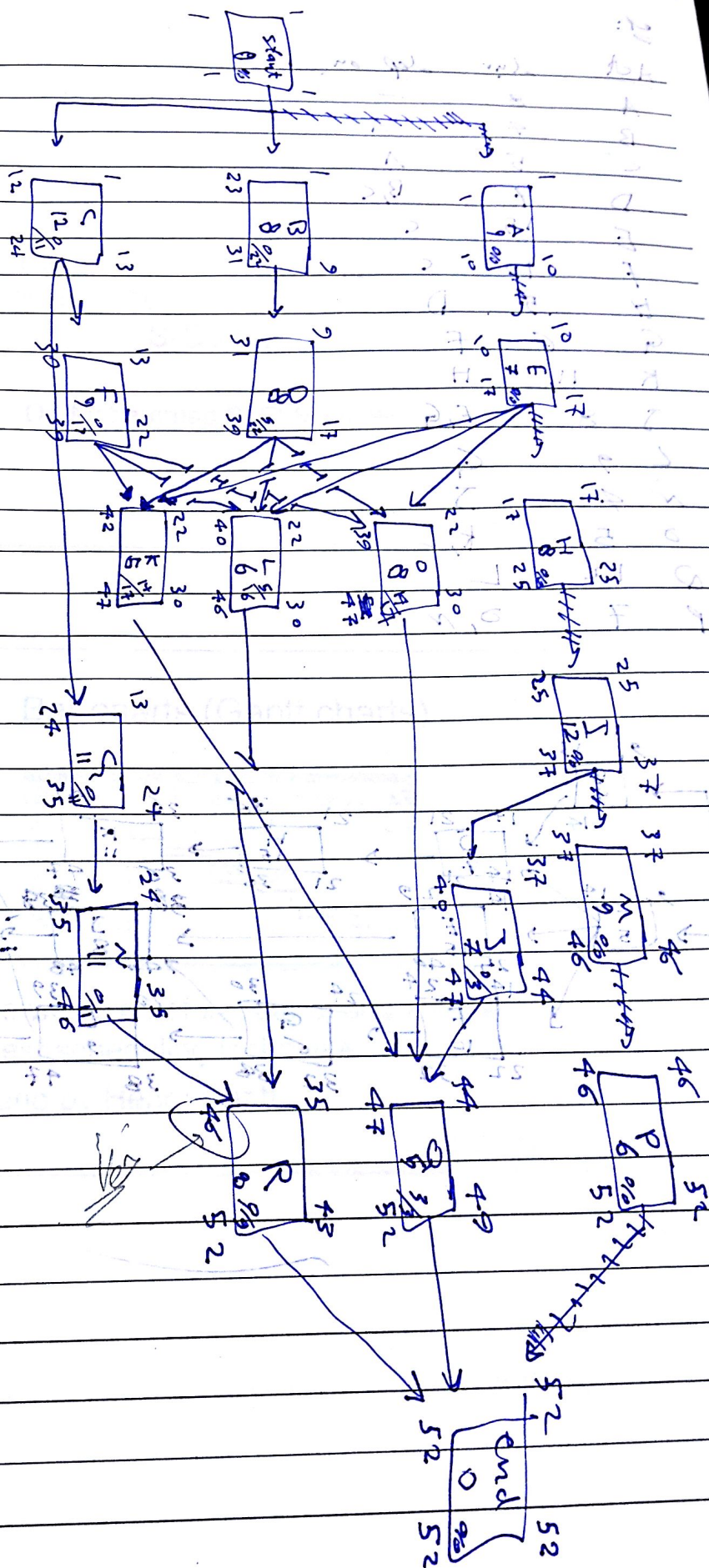
<u>Act</u>	<u>Pur</u>	<u>Succ</u>
A	5	B
B	8	C, D
C	12	E
D	9	F, G
E	5	H
F	9	H, M
G	7	J, N
H	12	L
M	6	V, O, K
J	12	K
N	10	P
L	7	R
O	11	R
K	9	R
P	8	R
R	6	-



CP1: A-B-D-F-H-L-R
 CP2: A-B-D-G-J-K-R



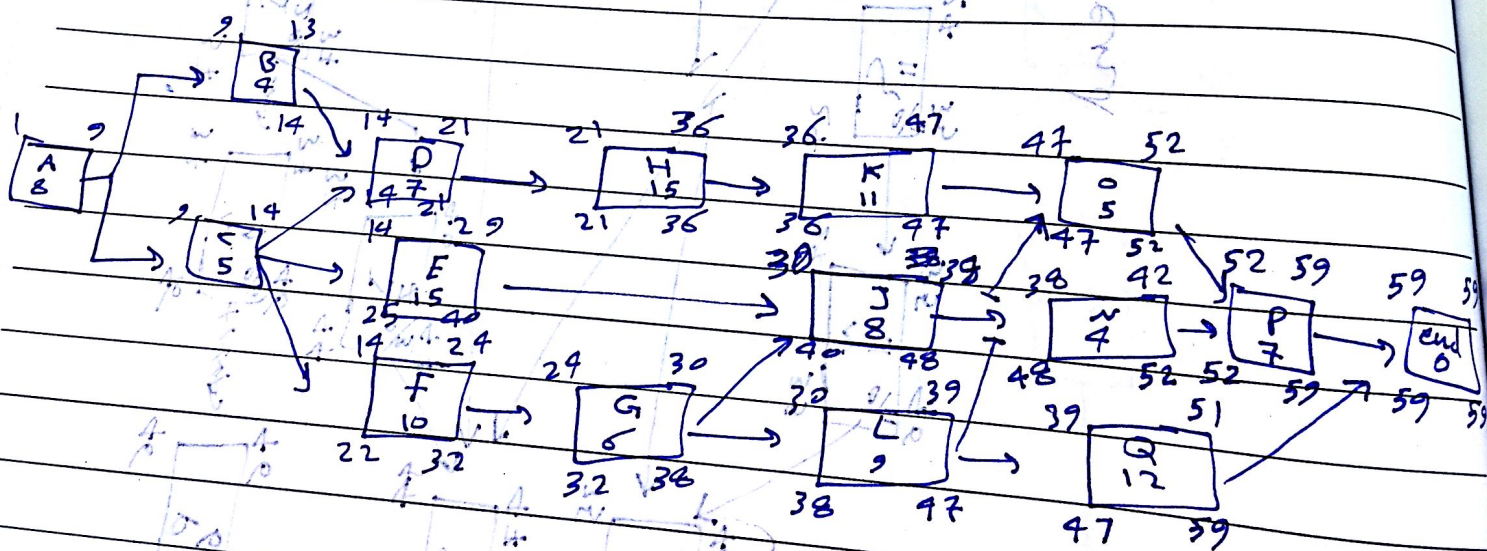
CP1: start-A-E-H-I-M-P-end



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cf:

Act	dur	dep on
A	8	-
B	4	A
C	5	A
D	7	B, C
E	15	C
F	10	C
H	5	D
G	6	F
K	11	H
J	8	E, G
L	9	G
N	4	J
O	5	K, L
Q	12	L
P	7	O, N



* Bar chart (Gantt chart) :-

Ex(12):

Act (Dur)

Dep. on

A(2)

—

B(3)

A

C(1)

A

D(2)

B

F(1)

B, D, C

G(2)

D

H(1)

F, G

K(3)

F, H

L(1)

K

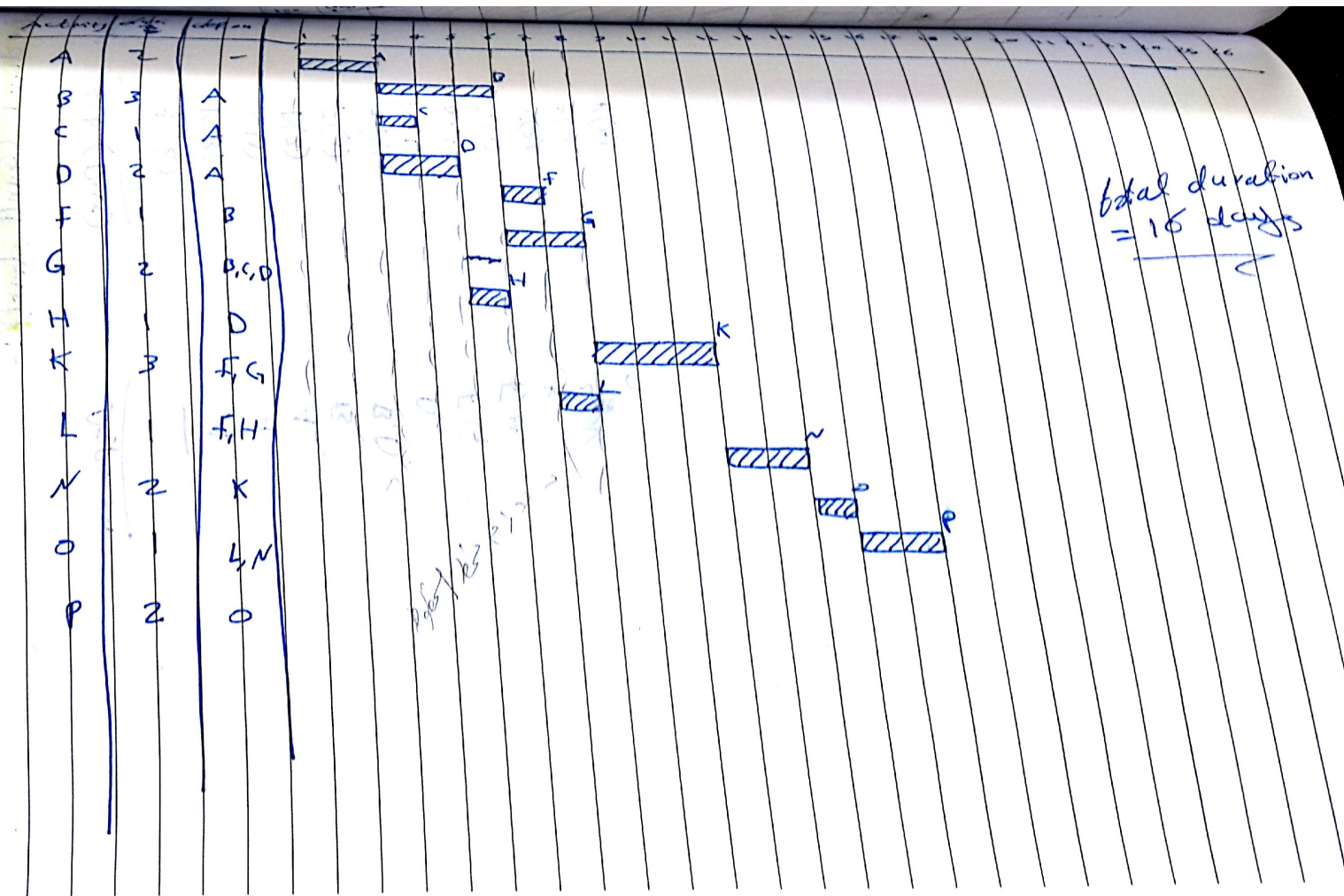
N(2)

L, N

O(1)

O

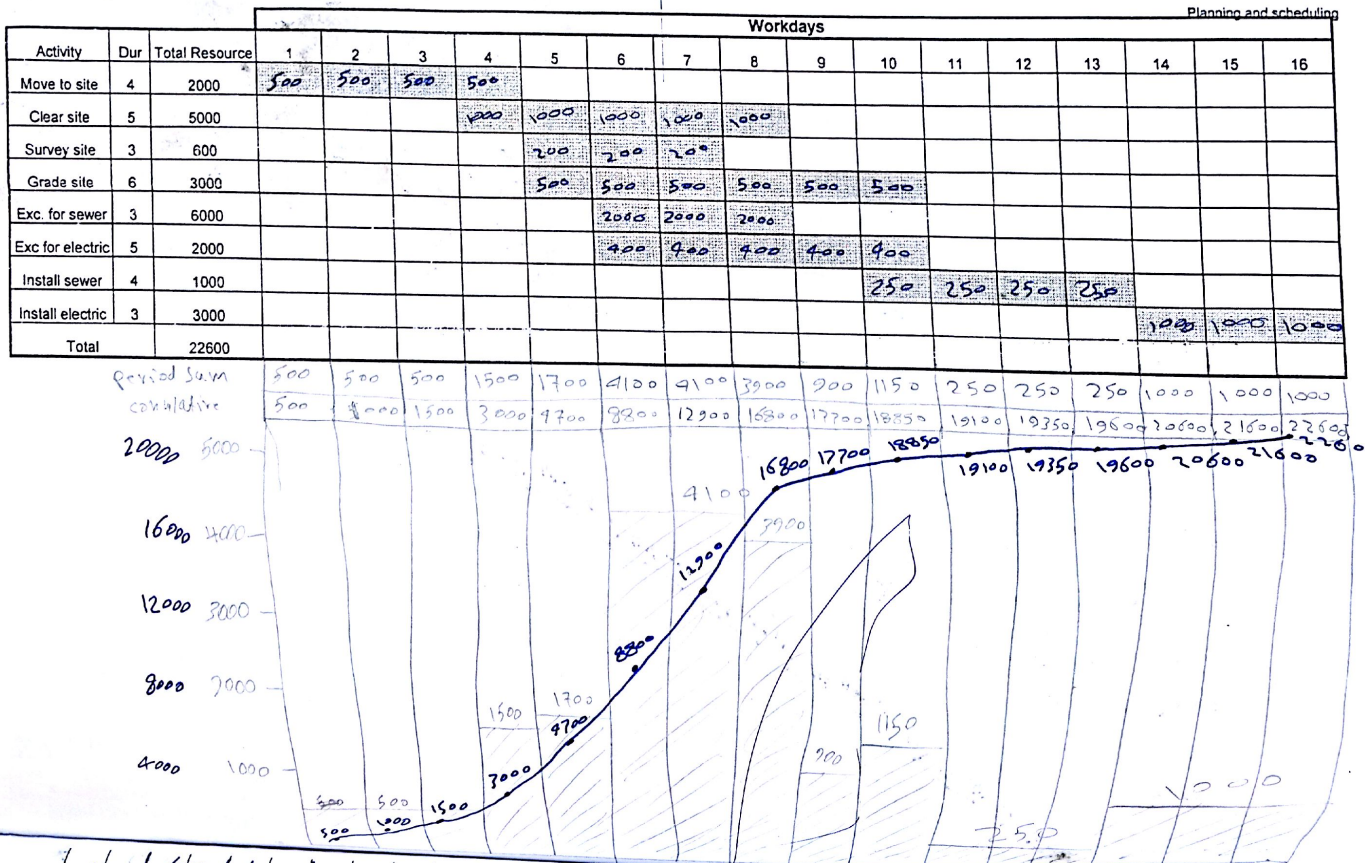
P(2)



total duration
= 16 days

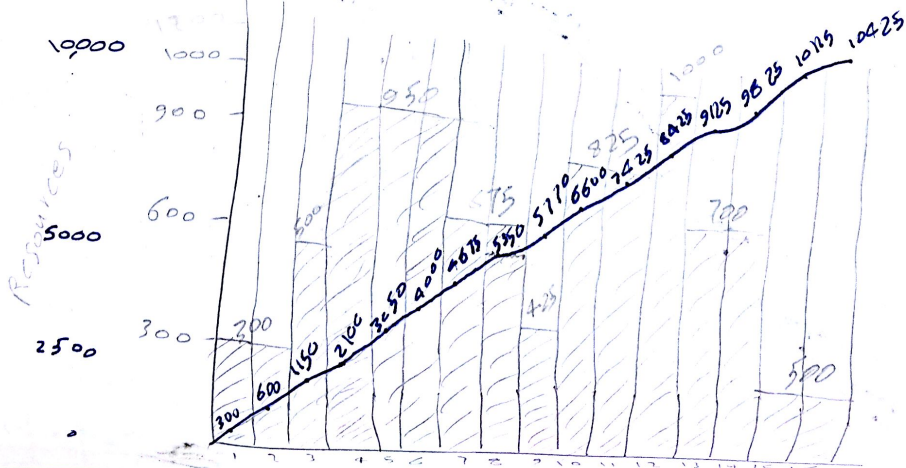
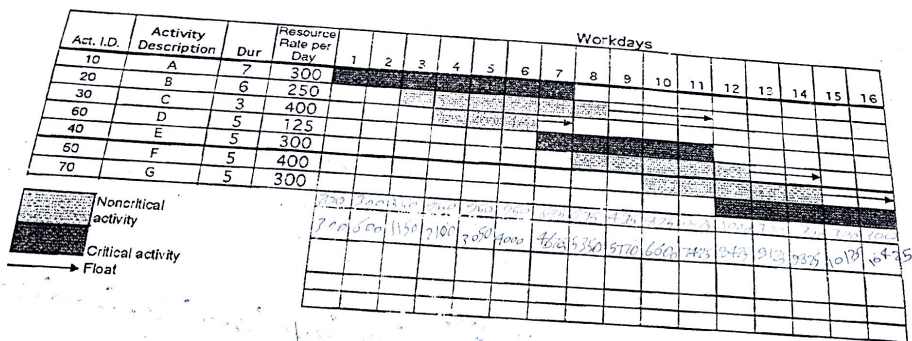
Problem 3, p.34-35

Given the following bar chart, draw the corresponding resource histogram and s-curve. Distribute the resources uniformly over each activity's duration



7. From the bar chart shown with the resources provided, construct an early start histogram. Discuss the final profile. Are the peaks and valleys justifiable? Are they good or bad?

Bar Chart Problem 7



(Advanced Payment): هي دفعة أولية يدفعها مقدمًا المالك للمقاول ، ويغطي مقدارها من آخر المشروع

(GC's Profit): هي نسبة ربح المقاول على تكاليف المشروع (التالية).

(Actual total cost): هي مجموع التكاليف بدون GC's profit

(GC's Proposal): هو المبلغ المطلوب من مالك والذي يشمل مجموع السابقين.

(direct cost): هي تكاليف مُوجَّهة على عمل معين في المشروع من تكاليف مواد وآليات وأجور
مثل ما يبيع الخشب أو الحفر -- الخ

(indirect cost): هي تكاليف عامة للمشروع وليست مخصصة على عمل معين في المشروع ومثلها
أو الروم أو الفور التي تُدفع للمشروع أو -- الخ.

(Resource) ← Materials
← Labors
← Money (cost)
direct & indirect costs ← وكله يعود بالأخير للـ cost.

(Retentions): هي حصص يتم على كل دفعة (رُبي مسكة للمقاول) مقابل أن تدفع للمقاول في آخر دفعة.

* النسب التي ترد في هذا السبتر تكون إحدى بنود العقد بين مالك والمقاول يعني متفق عليها. بينما وكذلك المدة التي ضمنها يتم الدفقات ، ويكون حلقة وصول بين هذين طرفين هو المهندس.

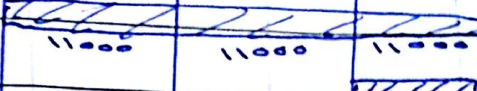
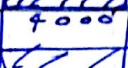
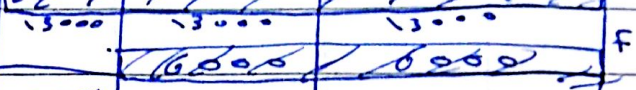
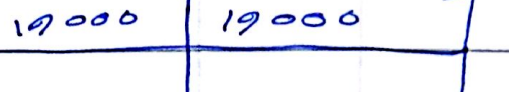
* لزيادة (+) في (S-curve) زيادة أو Advanced Payment
(-) تقليل أو Retention Ratio
(+) زيادة أو Profit

Cash Flow

For the enclosed project, prepare a table showing:
 end of month (EOM), monthly cost, amount billed, amount retained, amount paid, and cumulative payment.

2) Draw the expenses profile and the revenues profile.

???

Act	cost (\$)	month 1	2	3	4	5	6
A	10,000						
B	14,000						
C	33,000						
D	4,000						
E	39,000						
F	12,000						
total monthly cost	100,000	10,000	18,000	18,000	28,000	19,000	19,000
direct " "							

direct cost

Note the following:

Indirect costs = 8% of direct cost

G.C's profit = 12.5% of total cost

See page 1, page 2

	Month 1	2	3	4	5	6
Monthly direct cost	10000	18000	18000	28000	19000	19000
Monthly indirect cost	800	1440	1440	2240	1520	1520
total cost	10800	19440	19440	30240	20520	20520
cumulative cost	10800	30240	49680	79920	100440	120960
						total cost to GC

~~GC's price~~ GC's proposal = $120,960 \times 1.125 = 136,080$

or $120,960 \times 12.5\% = 15,120$

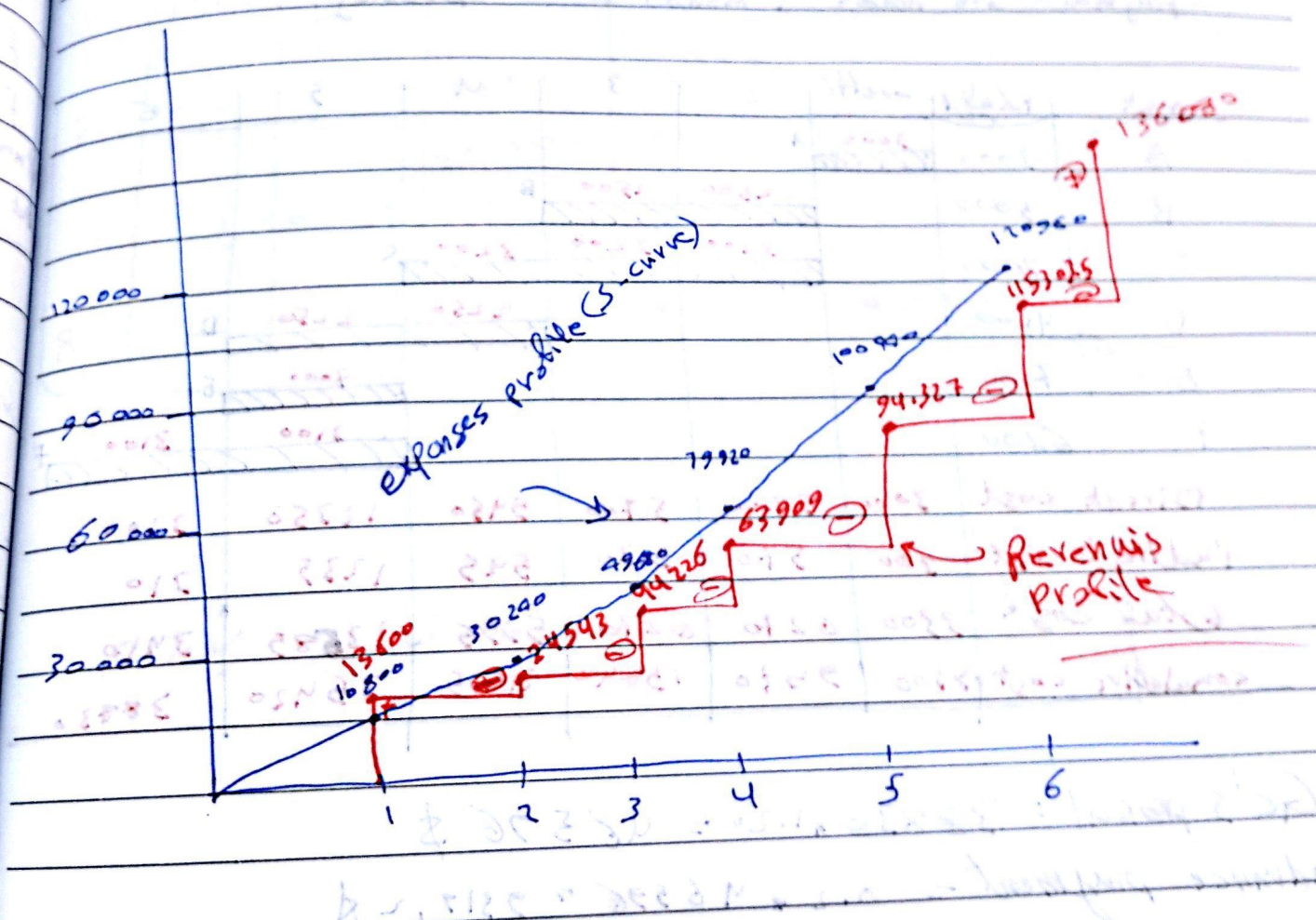
$15,120 + 120,960 = 136,080$

Advance payment = $136,080 \times 0.1 = 13,608$

Year	Addressed cost	Amount billed	Amount retained	Amount paid	cumulative payment
1	10000	12150	—	13600	13600
2	10490	21870	1215	10735	24335
3	10490	21870	2187	10683	35018
4	30200	34020	2187	10683	45701
5	20520	23085	3402	30519	76220
6	20520	23085	2308.5	20736.5	115956.5
7	—	—	2308.5	20736.5 + 13600 - 13600 = 20736.5	136000

120,000
 total cost to CC

Amount X + Insurance Addressed

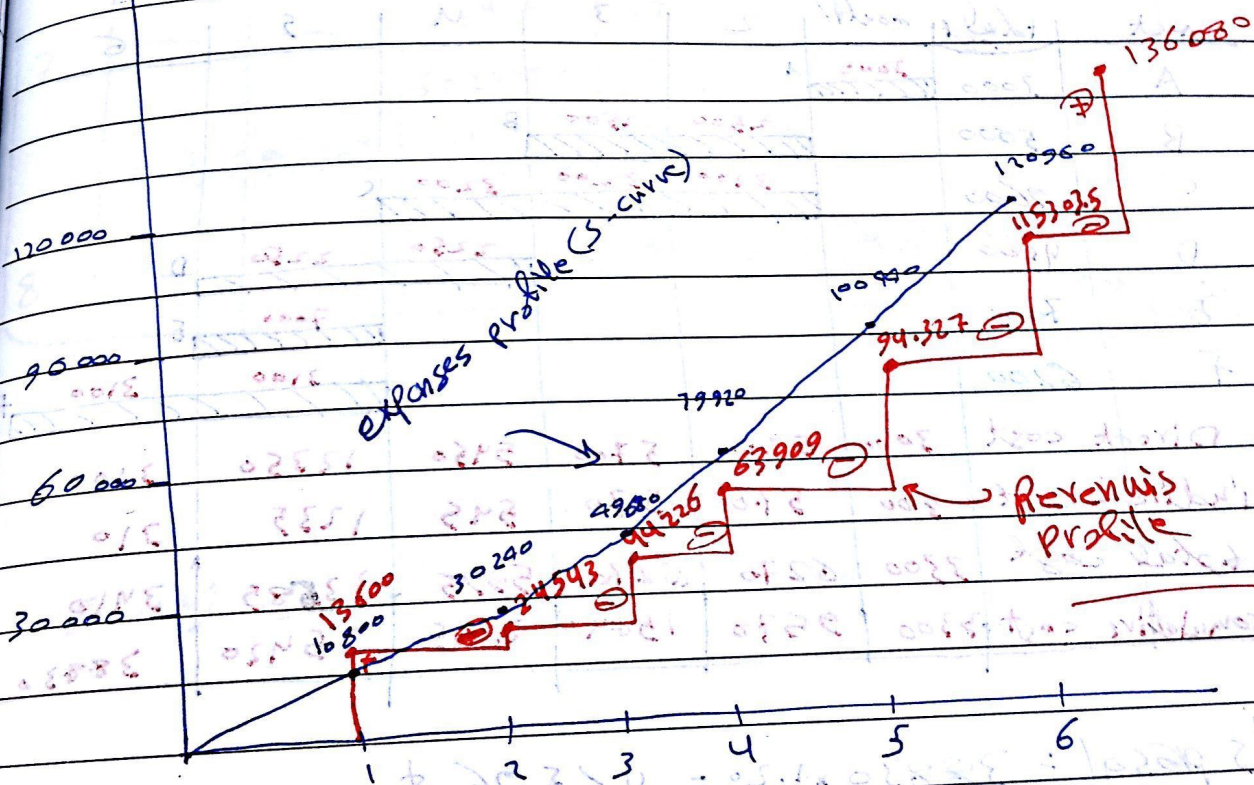


19 Jan
15 Jan
20520
120960
total cost to GC

month 5 months

Month	Monthly cost	Amount billed	Amount retained	Amount paid	cumulative payment
1	10800	12150	—	13608	13608
2	19440	21870	1215	10925	24543
3	19440	21870	2187	19683	44226
4	30240	34020	2187	19683	63909
5	20520	23085	3402	30618	94527
6	20520	23085	2308.5	20776.5	115303.5
7	—	—	2308.5	20776.5 + 13608 - 13608 = 20776.5	136080

Amount X + Retention - Advanced



at 2:

For the project below prepare a table showing EOM, amount billed, amount retained, amount paid, and cumulative payment.

note: - indirect cost = 10% of direct cost

- profit = 20% of total cost

- advance payment = 20% of GC's proposal. It is repaid back with the last interim payment.

- Retention = 5% of every interim payment, it's repaid back to the GC 2 months after the end of project.

- payment are made 1 month after billing

Act	total cost	month 1	2	3	4	5	6
A	3000	3000	A				
B	5000		2500	2500	B		
C	9600		3200	3200	3200	C	
D	4500				2250	2250	D
E	7000					7000	E
F	6200					3100	3100
Direct cost	3000	5700	5700	5450	12350	3100	
indirect cost	300	570	570	545	1235	310	
total cost	3300	6270	6270	5995	13585	3410	
cumulative cost	3300	9570	15840	21835	35420	38830	

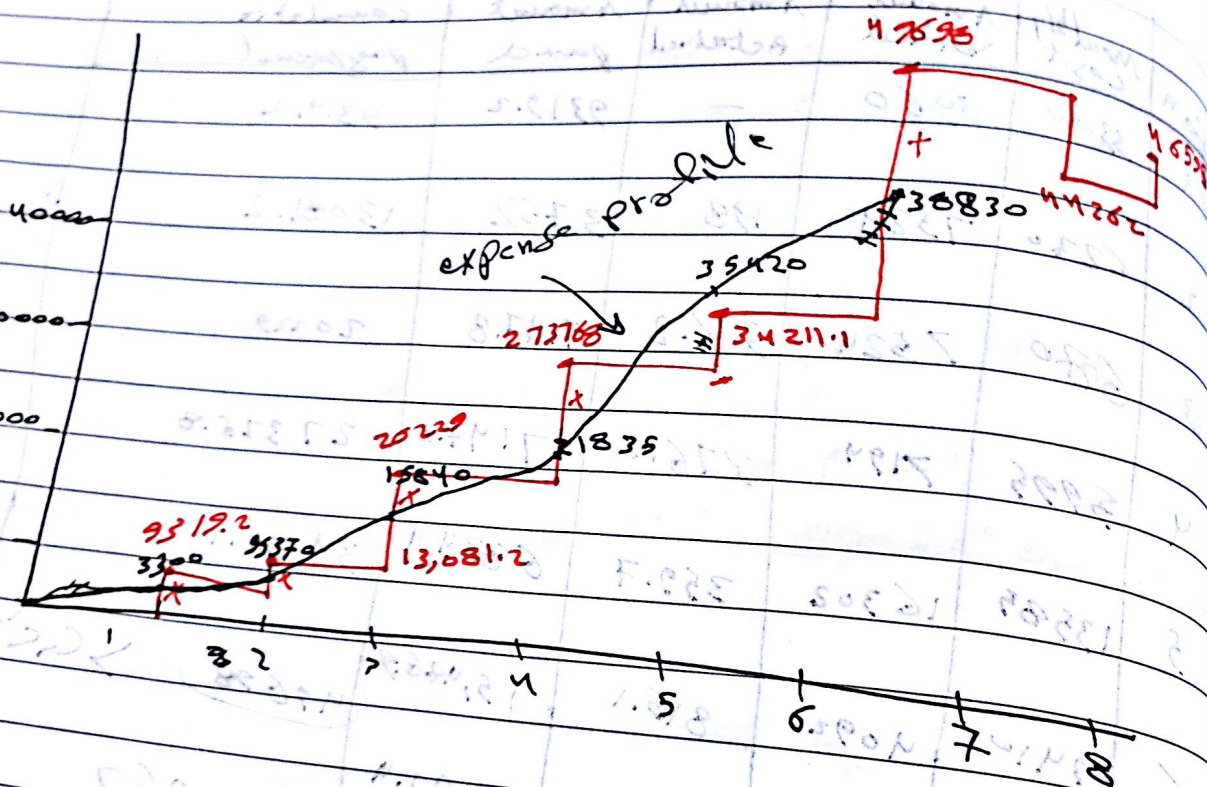
GC's proposal = $38830 \times 1.20 = 46596 \$$

advance payment = $0.2 \times 46596 = 9319.2 \$$

EOM	Month	Cost
1	3300	
2	6270	
3	9570	
4	13585	
5	17000	
6	20410	
7	23820	
8	27230	

Month	Monthly Cost	Amount Billed	Amount Retained	Amount Paid	cumulative payment
1	5300	3960	—	9319.2	9319.2
2	6270	7524	198	3762	13081.2
3	6270	7524	376.2	7147.8	20229
4	5995	7194	376.2	7147.8	27376.8
5	13585	16302	359.7	6834.4	34211.1
6	2410	4092	815.1	15,486.9	49698
7	—	—	204.6	3087.4	52785.4
8	—	—	Σ = 2329.8	9319.2	62104.6
GC's proposal					62104.6
8	—	—	—	18329.8	80434.4

دائماً بنفسي او (Advanced Payment) اذا واصلنا GC's proposal قبل انتهى المدة.



Conceptual cost Estimating for construction projects.

Estimate the cost of a 112000 SF building based on average, inverse, root of product and weighted average calculation.

several similar building have been constructed in past.

Project	cost (\$)	Area	cost/SF
P1	1680000	70000	24
P2	1974000	94000	21
P3	4350000	150000	29

~~Average = $\frac{1680000 + 1974000}{2}$~~

$$\text{Average} = \frac{\frac{1680000}{70000} + \frac{1974000}{94000} + \frac{4350000}{150000}}{3} = \frac{24 + 21 + 29}{3} = \$24.66/\text{SF}$$

~~cost = $24.66 \times 112000 = 2762666.667$~~

$$\text{Inverse} = \frac{3}{\left(\frac{1}{24}\right) + \left(\frac{1}{21}\right) + \left(\frac{1}{29}\right)} = \$24.24/\text{SF}$$

$$\text{Cinder-root} = (24 \times 21 \times 29)^{\frac{1}{3}} = \$24.45/\text{SF}$$

$$\text{Weight} = \frac{21 + 4 \times 24.67 + 29}{6} = \$24.78$$

حسب التقييم، إذا لم يصاري كير بناءً القيمة الأكبر وصحة من تحويل وشرح.

Method	\$/SF	cost of 112000 SF	
avg	24.67	2763040	} $\frac{2763040}{112000} = 24.67$
ind-inverse	24.24	2714880	
index-cost	24.45	2738400	
unit-cost	24.78	2775360	

Ex. 2 $\Rightarrow$ cost information from 5 previously constructed garage project is shown below. use the information to make a cost estimate for a proposed parking garage that contains (90) cars

Project	cost	No. of cars	unit cost \$/car
P1	336560	110	3059.63
P2	162304	50	3246.08
P3	362112	90	4023.46
P4	219220	60	3653.66
P5	259290	70	3704.14

$$SF \cdot NS \$ = \frac{95 + 10 \cdot NS \cdot N + 1.5}{1}$$

Average $\Rightarrow 3537.394$

Inverse $\Rightarrow 3503.585$

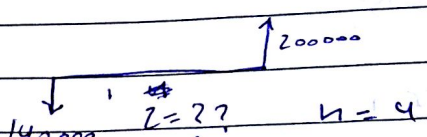
Roxt $\Rightarrow 3520.535$

weighted $\Rightarrow \frac{3059.63 + 4 \times 3537.394 + 11023.46}{6} = 3538.777$

<u>Method</u>	<u>Unit cost</u>	<u>Project cost</u>
Aug	3537.39	318365.1
Inv	3503.52	315316.8
Roxt	3520.53	316847.7
weighted	3537.94	318414.6

Ex 3 To apply the previous equation, let's consider the change in prices for apartments built in Amman between 2010 and 2014. Calculate the rate of change in price (i) based on the shown info.

<u>year</u>	<u>price of 200m² apartment</u>
2010	140,000
2014	200,000



$$F = P(1+i)^n$$

$$200,000 = 140,000(1+i)^4$$

$$i = 9.3\%$$

Ex. 4: Lots by E between

year
2008
2014

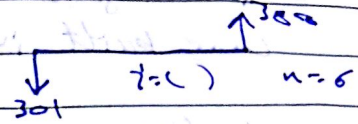
$$\frac{388 - 301}{301}$$

$i =$

Ex. 5:

Ex. 4: Let's assume that we have the following index values published by ENR, calculate the rate of change in construction cost between 2008 and 2014

Year	Index
2008	301
2014	388



$$388 = 301(1+i)^6$$

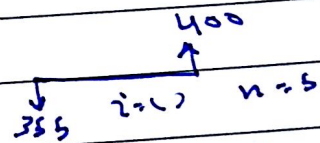
$$\left(\frac{388}{301}\right)^{\frac{1}{6}} - 1 = i$$

$$i = 4.32\%$$

Ex. 5: The Table shows economic indices for building construction projects. prepare a ~~conceptual~~ conceptual cost estimate for a project that is proposed for construction 2 years from now (~~using index 2~~)

- Base your estimate on similar size project that was completed before 2 years for a cost of \$1,712,910

Year	Index
5 yrs ago	355
current year	400



$$400 = 355(1+i)^5$$

$$i = 2.42\%$$

$$\text{New cost} = 1,712,910 \left(1 + \frac{2.42}{100}\right)^5 \Rightarrow \cancel{1,887,364.462}$$

$$= 1,884,836.272$$

Ex: - the location indices for construction costs show the following information.

- prepare a conceptual cost estimate for construction project in city D.

- Base your estimate on a similar size project that was built in city C for a cost of \$ 910,255.

location	Index
city A	1215
" B	1110
" C	1130
" D	1240
" E	1160

project cost in city D = $\frac{\text{index of city D}}{\text{index of city C}} \times \text{cost of city C}$

$$= \frac{1240}{1130} \times 910,255$$

$$= 998,663.89$$

المقارنة والمعادلة
بما يخص

~~1.85 N 830.35~~ $\left(\frac{N}{N+1} \right) 0105111$ $\left(\frac{N}{N+1} \right) 0105111$

ex. 7 $\Rightarrow$ prepare the conceptual cost estimate for a building that has a floor area of 62,700 SF. The building is to be constructed 3 years from now in city B. Base your estimate on a similar type building that cost \$2,197,540 and has a floor area of 38,500 SF. This building was completed 2 years ago in city E.

Location	Index	year	Index
city A	1,025	3 years ago	358
city B	1,170	Current yr	378
city C	1,230		
city D	1,105		
city E	1,250		

$$378 = 358(1+i)^3$$

$$i = 1.82\%$$

proposed project cost = previous cost $\times$ time adj $\times$ location adj $\times$ size adj

$$= 2,197,540 \times \left(1 + \frac{1.82}{100}\right)^3 \times \left(\frac{1,170}{1,250}\right) \times \left(\frac{62,700}{38,500}\right)$$

$$\Rightarrow \$3,695,500.78$$

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ex: prepare a conceptual cost estimate for a building that has a floor area of 24820 SF. The building will be constructed after 2 years in city A. A similar type building was constructed before 4 years in city E. It has an area of 31529 SF, it cost \$ 1,322,540

Location	Index	year	Index
City A	1215	before 4 yrs	302
city E	1160	current yr	324

$$\Rightarrow 1322540 \times \left(\frac{1215}{1160}\right) \times \left(\frac{24820}{31529}\right) \times \left(1 + \frac{1.41}{100}\right)^6$$

$$= 186990.77 \$$$

$$= 118605.11049 \$$$

$$\left(\frac{100}{100}\right) \left(\frac{100}{100}\right) \left(\frac{100}{100}\right) \left(\frac{100}{100}\right) \left(\frac{100}{100}\right) \left(\frac{100}{100}\right)$$

ما ملاحظة في هذا المثال اننا نستخدم نفس المعاملات في كل واحد من هذه
متوسط القيم المتوقعة او الافتراضية انما هي القيمة الحقيقية المتوقعة

equipment costs

Example (1):

Cost ?? $P = \$140,000$, $S = 20,000$, $N = 5$ years
 $n = 2000$ (as default)

$C_{op} = 12$ \$/hr

Q12: given the following information, calculate C_{inv} based on the different average investment approaches

- $P = 240,000$

- value of equipment at end of year 1 - year 5: 200,000, 160,000; 120,000; 80,000; 40,000

- $i = 8\%$

- $n = 2000$ hrs

$$\bar{P} = \frac{P + S}{2} = \frac{240,000 + 40,000}{2} = 140,000$$

$$\text{calculate } C_{inv} \Rightarrow \frac{140,000 \times 0.08}{2000} = \$5.6/\text{hr}$$

Averaging over the useful life

$$\bar{P} = \frac{200,000 + 160,000 + 120,000 + 80,000 + 40,000}{5} = \$120,000/\text{hr}$$

calculate C_{inv}

$$C_{inv} = \frac{\bar{P} \times i}{n} = \frac{120,000 \times 0.08}{2000} = \$4.8/\text{hr}$$

Based on formula 1

$$C_{inv} = \$3.84/\text{hr}$$

Based on formula 2

$$C_{inv} = \$6.4/\text{hr}$$

ex: 3 given : $P = 330\,000$
inflation rate = 4%
useful years of life = 6 years
 $n = 2000$
calculate $C_{esc} ??$

$$C_{esc} = \frac{P_{new} - P_{old}}{n \times n}$$

$$P_{new} = P_{old} \times (1+i)^n$$

$$P_{new} = 330\,000 \times (1+0.04)^6 = \$417,555$$

$$C_{esc} = \frac{417,555 - 330,000}{12,000} = \$7.3/hr$$

$$\$7.3/hr = 80.0 \times 1000 \text{ NI} \leftarrow \text{value}$$

$$1150000 \text{ NI} = 100000 + 150000 + 200000 + 250000 + 300000 + 350000$$

Find the total hourly rate for the following construction equipment

purchase price = \$ 395,000

expected useful life = 6 years

working hours per year = 1500 hrs

salvage value = 20% of initial cost

cost of maintenance = 55% of the original purchase price

cost of fuel = \$ 5 per gallon

fuel consumption rate = 2.5 gallons/hr

oil cost = 15% of fuel cost

cost of driver = \$ 15/hr

Miscellaneous cost = \$ 12/hr

overhead cost = 6%

current interest rate = 7.5%

expected inflation rate = 5.5%

Base your average investment calculations on the following formula: $\{P(N+1) + S(N-1) / 2N\}$
 ???

$$C_{dep} = \frac{P - S}{N \times n} = \frac{395,000 - 79,000}{6 \times 1500} = \$35.11/hr$$

$$\bar{P} = \frac{P(N+1) + S(N-1)}{2N} = \frac{395,000 \times (7) + 79,000 (5)}{2 \times 6} = 263,333.34$$

$$C_{inv} = \frac{\bar{P} \times i}{n} = \frac{263,333.34 \times 0.075}{1500} = 13.16$$

$$C_{osc} = \frac{P_{new} - P_{old}}{N \times n} = \frac{544,642.9 - 395,000}{1500 \times 6} \quad \left| \begin{array}{l} P_{new} = 395,000 (1 + 0.055)^6 \\ = 544,642.9 \end{array} \right.$$

$$= 16.626$$

$$C_{ownership} = 64.896$$

$$C_{\text{maint}} = 0.55 \times \frac{395000}{6 \times 1500} = 21.7250 / 6 \times 1500 = 21.14$$

$$C_{\text{operation}} = C_{\text{oil}} + C_{\text{fuel}} + C_{\text{driver}}$$

$$= 1.875 + 12.5 + 15$$

$$= 29.375$$

$$C_{\text{fuel}} = 12.5$$

$$C_{\text{oil}} = 1.875$$

$$C_{\text{driver}} = 15$$

$$C_{\text{operating}} = \frac{21.14}{21.14} + 29.375 = 53.515$$

$$C_{\text{misc}} = 12$$

$$C_{\text{sum}} = C_{\text{mes}} + C_{\text{ope}} + C_{\text{own}} = 12 + 53.515 + 4.825$$

$$= 130.41$$

$$\text{overhead} = 0.06 \times 130.41 = 7.82$$

$$* \text{total} = 7.82 + 130.41 = 138.235$$

$$130.41 \times 1.06$$

138.235

Ex. 5: Find the total hourly rate for the following construction equipment

- purchase price = \$215,000; expected useful life: 5 years

- working hours per year = 2000 hrs; salvage value = 20% of initial cost

- cost of maintenance = 40% of P

- cost of fuel = \$6 per gallon

- fuel consumption rate = 3 gallons/hr

- oil cost = 10% of fuel cost

- cost of driver = \$10/hr

- Miscellaneous cost = \$8/hr

- overhead cost = 10%

- current interest rate = 6%

- Expected inflation rate = 4%

Base your $\bar{P}$ calculations on $\{P(r+1) + S(r-1)/2N\}$
7.77

$$1) C_{DEP} = \frac{P-S}{N \times n} = \frac{215000 - 43000}{5 \times 2000} = \$17.2/\text{hr}$$

$$2) C_{INT} = \frac{\bar{P} \cdot i}{n} = \frac{146200 \times 0.06}{2000} = \$4.386/\text{hrs}$$

$$3) \bar{P} = \frac{P(n+1) + S(n-1)}{2n} = \frac{215000(6) + 43000(4)}{2 \times 5} = \$146200$$

$$4) C_{ESC} = \frac{P^{new} - P^{old}}{N \times n} ; P^{new} = P^{old} (1+i)^N = 215000(1+0.06)^5 = \$261580.37$$

$$C_{ESC} = \frac{261580.37 - 215000}{10000} = 4.658$$

$$5) C_{mai} = \frac{\% P}{N \times n} = \frac{0.4 \times 215000}{10000} = \$8.6/\text{hr}$$

$$6) C_{ope} = C_{fuel} + C_{oil} + C_{driver}$$

$$C_{fuel} = 6 \times 3 = \$18/\text{hr}$$

$$\therefore C_{ope} = 18 + 0.1 \times 18 + 10 = 29.8$$

Equipment Depreciation Methods

Method ① straight line

The purchase price for a construction equipment is \$330,000 its salvage value at the end of its 6 years of useful life is 10% of its purchase price.

Fill out table with the following headings:-

yr	value @ beginning of year	Dep. amount	value @ end of yr	% Dep
1	330,000	49,500	280,500	16.67%
2	280,500	49,500	231,000	16.67%
3	231,000	49,500	181,500	"
4	181,500	"	132,000	"
5	132,000	"	82,500	"
6	82,500	"	33,000	"

check
adding
✓

$$\begin{aligned} \text{Depreciated amount} &= 330,000 - (0.1 \times 330,000) \\ &= 330,000 - 33,000 \\ &= 297,000 \end{aligned}$$

$$\text{Amt dep. per yr} = \frac{297,000}{6} = \$49,500$$

$$\frac{49,500}{297,000} \times 100\% = 16.67\%$$

$$\boxed{\text{or}} \Rightarrow \frac{1}{N} = \frac{1}{6} = 16.67\%$$

ex 2

$P = 330000$ // $S = 10\%$ of $P = 33000$ // $N = 6$?? { "SOYD" Method? }

$SOYD = 6 + 5 + 4 + 3 + 2 + 1 = 21$

1st year = $\frac{6}{21} = 0.286$

2nd year = $\frac{5}{21} = 0.238$

3rd year = $\frac{4}{21} = 0.19$

4th year = $\frac{3}{21} = 0.143$

5th year = $\frac{2}{21} = 0.095$

6th year = $\frac{1}{21} = 0.048$

Amt. dep = 297000

year	v. beg. of yr.	Dep amount	V. end of year	% Dep
1	236000	84942	245058	28.6%
2	245058	70686	174372	23.8%
3	174372	56430	117942	19%
4	117942	42471	75471	14.3%
5	75471	28215	47256	9.5%
6	47256	14256	33000	4.8%

$(330000 \times 10\%) = 33000$

$33000 \times 0.048 = 1584$

$33000 - 1584 = 31416$

$31416 \times 0.048 = 1508$

$31416 - 1508 = 29908$

$29908 \times 0.048 = 1435$

Ex: 3

Method?

$P = 330,000$

$S = 33,000$

$N = 6 \text{ years}$

Fill the relevant table Based on DB (F=2) Methode

$$P = \frac{1}{N} \times F \Rightarrow \frac{1}{6} \times 2 = \frac{1}{3}$$

depreciation

Year	V at beg. of yr	Am't of dep.	V. end of year	Dep. %
1	330,000	0.333P 110,000	220,110	33%
2	220,110	73,296.63	146,813.37	24.687%
3	146,813.37	48,888.85	97,924.52	16.48%
4	97,924.52	32,608.87	65,315.65	10.98%
5	65,315.65	21,750.11	43,565.54	7.32%
6	43,565.54	14,507.32 10,585.54	29,058.2 33,000	4.8% 3.5%
		$\Sigma = 297,000$		$\Sigma = 100\%$

بعد 6 سنوات من او زادة كمن او ~~Salvage~~

ex: 4

A construction equipment has a total initial cost of 260,000. Its salvage value is 20,000 at the end of its useful life of 6 years.

prepare a table listing the annual cost of depreciation and the book value at the end of 6 years of useful life based on SL, SOYD, & DB "5-2" Methods??

⇒ SL

yr	V at beg of yr	Amount Dep	V at end of yr	% Dep
1	260,000	40,000	220,000	16.67%
2	220,000	40,000	180,000	16.67%
3	180,000	40,000	140,000	16.67%
4	140,000	40,000	100,000	16.67%
5	100,000	40,000	60,000	16.67%
6	60,000	40,000	20,000	16.67%

V = Salvage

$$\text{Amt. Depreciation} = 260,000 - 20,000 = 240,000 \$$$

Amt. dep. = 240000
 Soyd = 5+5+4+3+2+1 = 21
 first year = $\frac{5}{21}$
 2nd " = $\frac{5}{21}$

Soyd

Year	Y at beg of year	Amt. Dep	Y at end of year	% Dep
1	260000	68640	191360	28.57%
2	191360	57120	134240	23.8%
3	134240	45600	88640	19%
4	88640	34320	54320	14.3%
5	54320	22800	31520	9.9%
6	31520	11520	20000	4.8%

DDP

" F = 2"

(0.3333)
Amt. Dep

Y at end of year % Dep

Year	Y at beg of year	Amt. Dep	Y at end of year	% Dep
1	260000	86666.67	173333.33	136.1%
2	173333.33	57777.78	115555.55	
3	115555.55	38518.5	77037	
4	77037	25679	51358	
5	51358	17119.3	34238.7	
6	34238.7	11412.9	22825.8	0.47%
		19470.48	20000	8.1%

Ex: 5 $\Rightarrow$ A construction equipment has a purchase price of 300,000 \$, salvage value after 5 year of useful life is expected to be 15% of its purchase price.

Depreciate the equipment based on depreciation balance as follows:

a) $F=1$

b) $F=3$

$F = \frac{1}{N} \times F = 0.2$
 $f = 0.6$

yr	V at beg. of year	Dep amount	V at end of yr	% Dep
1	300 000	$0.2 \times 300 000 = 60 000$	240 000	23.53%
2	240 000	48 000	192 000	18.82%
3	192 000	38 400	153 600	15.06%
4	153 600	30 720	122 880	12.05%
5	122 880	24 576	98 304	20.54%
	8 2512	24 576	73 728	$\Sigma = 100\%$
	8 2512	32 55000	8 2512	
	8 2512	5 1111	8 2512	
	00005	000000		

• Salvage : 15% of $300 000 = 45 000$

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on balance

SL

<u>Year</u>	<u>V at Beg at year</u>	<u>Amt Dep</u>	<u>V at end of year</u>	<u>% Dep</u>
1	300 000			
2	120 000	180 000		
3	48 000	72 000	120 000	
4	45 000	3 000	48 000	70.59%
5	45 000	0	45 000	28.24%
	<u>225</u>	<u>0</u>	45 000	1.17%
		225 000	45 000	0%
				<u>100%</u>

9 pages Method

SL

% Dep
53%
82%
50%
2.05%
4.62%
0.54%
100%

هذا يعني أننا لا نصل إلى Salvage قبل آخر شهر