



CV4011 Dec 2020

Date

No.

1 (a) Quantity Surveyor

- taking off quantities for tendering;
- pricing of bills & quantities
- evaluation of subcontractor's claims and preparation of payment certificate for sub-con.
- provide advice on contractual claims

~~Construction manager~~

- ~~- provide overall directions in setting time, cost and quality standards~~
- ~~- handles project schedule & technical matters~~
- 

Contracts manager

- lead and guide quantity surveying team in contracts administration to ensure quality and timeliness in delivery of their assigned tasks and responsibilities
- advise and resolve requests for equitable adjustment, contract disputes and contract claims.
- ~~prepare~~ prepare tender and contract documents in accordance to the building and construction regulations

Planning manager

- prepare histograms, tables, S-curves, resource logs (Manpower, Material, Equipment) and develop construction programs
- liaise, consult and coordinate with all supervisors and managers to incorporate relevant information that will affect the implementation of project schedule

Structural Engineer

- Obtain planning or building regulations approval
- make calculations about pressures, load and stresses to determine the appropriate quantity of materials required.
- perform civil/structural engineering design and BIM process

~~(b) Refer to PYP 2019 Dec Q1(a). Exact same qns.~~



1 (b)

### Qualified person (design)

- designs structural drawing, reports and submit building plans to BCA
- obtains permit to carry out structural works

### Qualified person (supervision)

- works with a trusted team of resident engineers and residential technical officers to ensure critical works like casting and construction of earth retaining works are prescribed in the building regulations.
- consults with government bodies with regards to deviation in ~~the~~ building plans and submits progress reports to BCA.

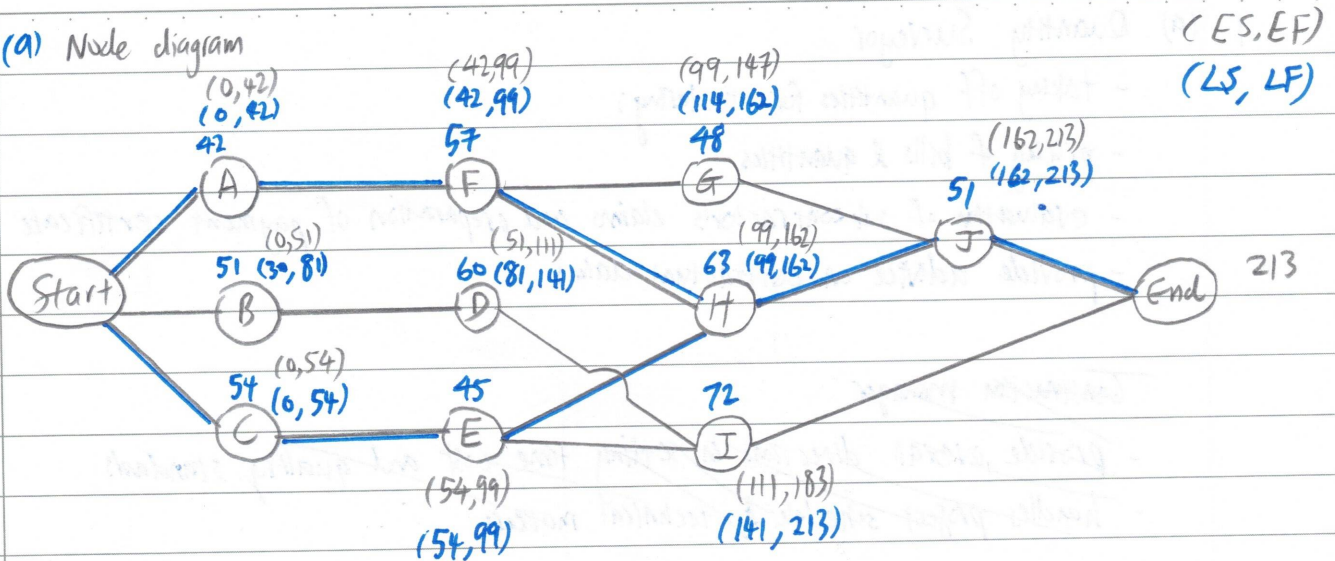
QP (design) and QP (supervision) should not be performed by the same PE.

There will be conflict of interests if QP (design) and QP (supervision) are hired by different parties which is usually the case. A professional engineer should exercise complete fidelity which will be hard to exercise if he is hired by different parties.





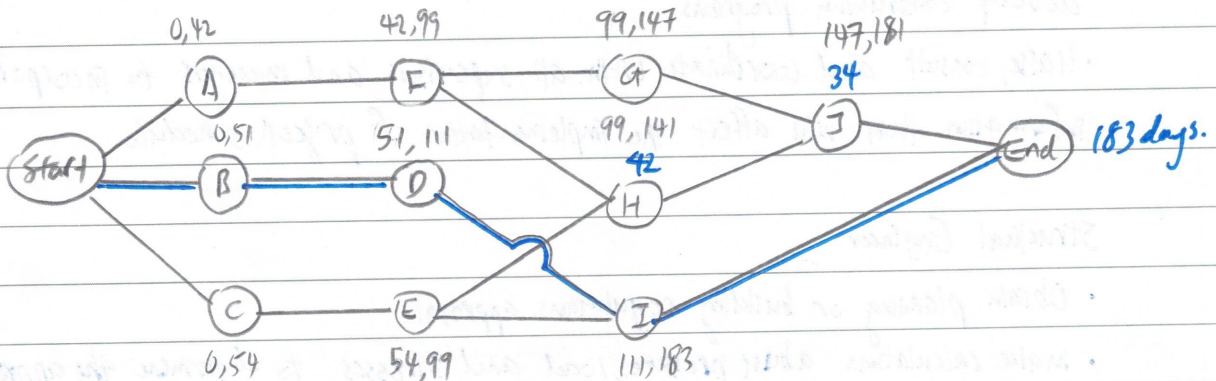
2 (a) Node diagram



Critical paths: A-F-H-J  
C-E-H-J.

Overall project duration: 213 days

(b) For overall project duration to be shorten, we must compress <sup>activities</sup> from the critical paths. We select H & J for compression as they are the common activities for the 2 critical paths. i.e. (H) - 42 days, (J) - 34 days



Reduction in number of days:  $213 - 183 = 30$  days\*

New overall project duration: 183 days\*

New critical path: B-D-I (If you can't get this answer, do the LS, LF for all activities)

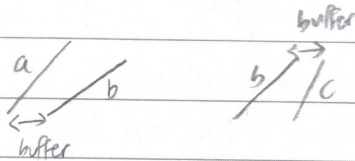
R=4  
N=68  
d=6  
h=8  
B=3

Date

No.

3	(a)	Act	M	Q	$G = \frac{RM}{hd}$	g	$U = \frac{gR}{G}$	$n = \frac{g}{G}$	$T = \frac{M}{Qh}$	$S = \frac{(N-1)d}{U}$	B
		A	320	5	26.67	25	3.75	5	8	107.2	3
		B	450	7	37.5	35	3.73	5	8.04	107.8	3
		C	190	4	15.83	16	4.04	4	5.94	99.5	3
		D	180	3	15	15	4	5	7.5	100.5	3
		F	230	6	19.17	18	3.76	3	4.79	106.9	3

Unit	AS	AF	BS	BF	CS	CF	DS	DF	FS	FF
1	0	8	11	19	30.3	36.2	39.2	46.7	49.7	54.5
68	107.2	115.2	118.8	126.8	129.8	135.7	139.7	147.2	156.6	161.4

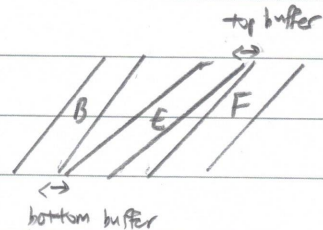


plot LOB using data from here.

Total duration required: 162 days\*

(b) For act. E not to affect the overall duration, A-B-C-D-F must be the critical path.

Unit	BS	BF	ES	EF	FS	FF
1	11	19	22	①	49.7	54.5
68	118.8	126.8	②	153.6	156.6	161.4



Act	M	Q	$T = \frac{M}{Qh}$	$G = \frac{RM}{hd}$
E	860	8	13.4	71.67

$\therefore \textcircled{1} = 22 + 13.4 = 35.4$   
 $S_E = 153.6 - 35.4 = 118.2$

Since  $S_E = \frac{(N-1)d}{U_E}$ ,  
 minimum  $U_E = \frac{(67)(6)}{118.2} = 3.40$

Since  $U_E = \frac{gR}{G}$ ,  $g = \frac{U_E G}{R} = \frac{(3.4)(71.67)}{4} = 60.9$

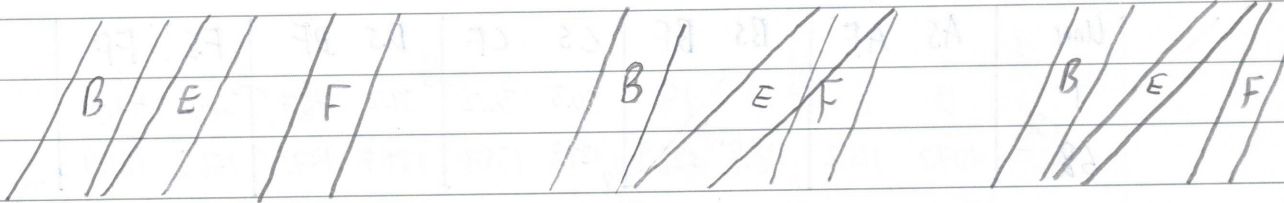


(b) minimum  $g = 60.9$

Hence, we use 8 teams of 8 men  $\times$  ( $n=8, Q=8, g=64$ )

Target build rate for act. E :  $U_E = \frac{gR}{G} = \frac{(64)(4)}{71.67} = 3.57 \text{ units/week}$   $\times$

FYI: (As long as target build rate for  $U_E$  is more than minimum  $U_E = 3.40$ , A-B-C-D-F will remain as the critical path & the project overall duration will not be affected.)



IF  $U_E > 3.4$

- overall duration not affected
- there will be some floats available for activity E.
- not optimal as more manpower is required to complete activity E

IF  $U_E < 3.4$

- overall duration extended as activity F have to be delayed

IF  $U_E = 3.4$

- optimal situation whereby the time taken for B-C-D-F is the same as B-E-F



Q3(a)

UAPTS ↑

Index No.

Name

Date

Class

Subject

70

60

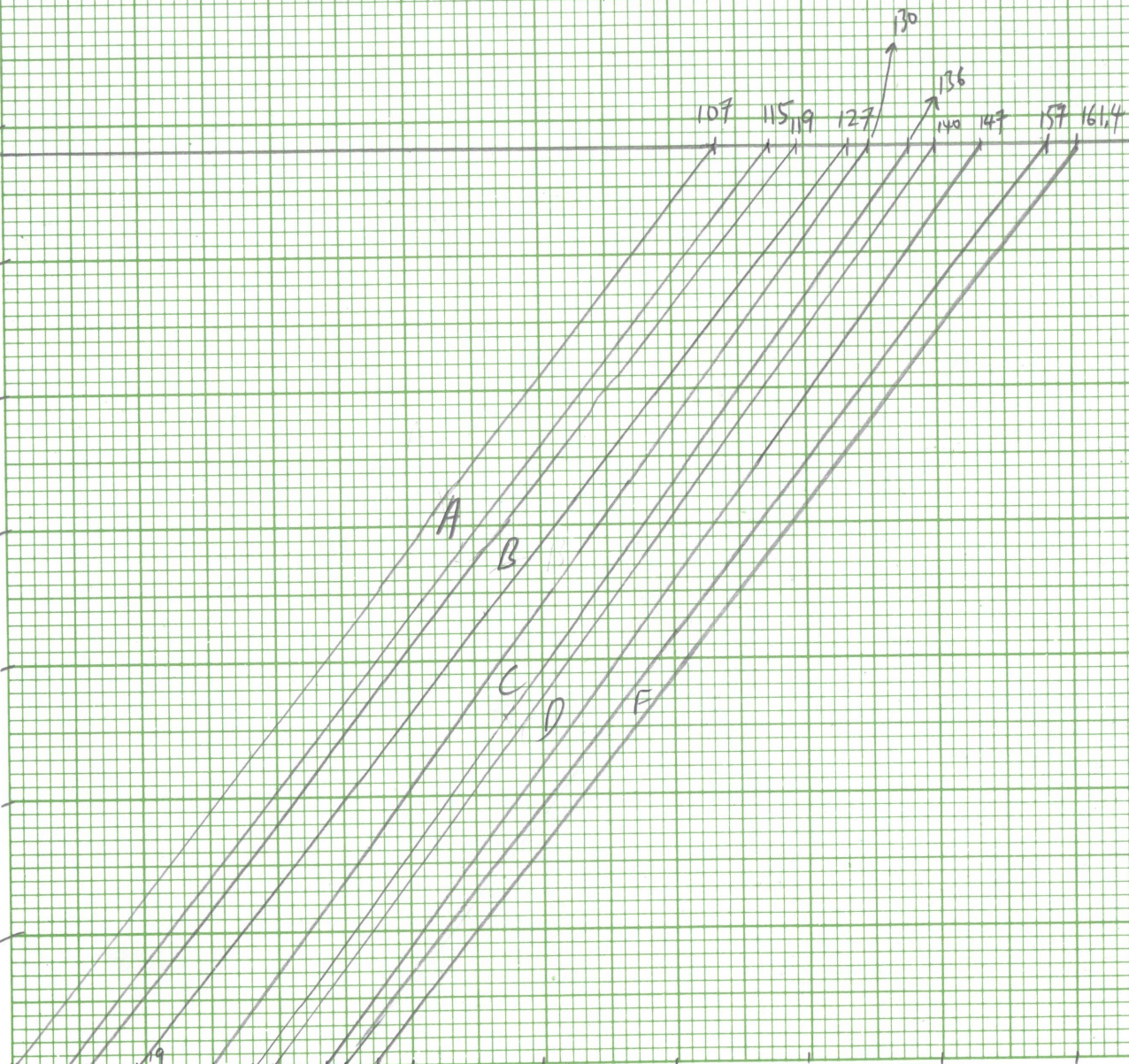
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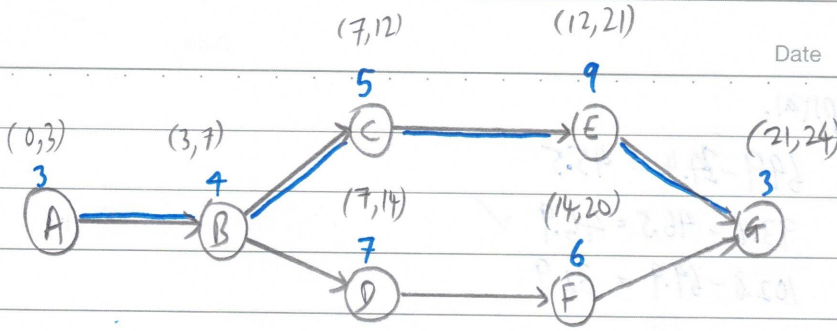


68 UAPTS





4. (a)



total duration : 24 weeks

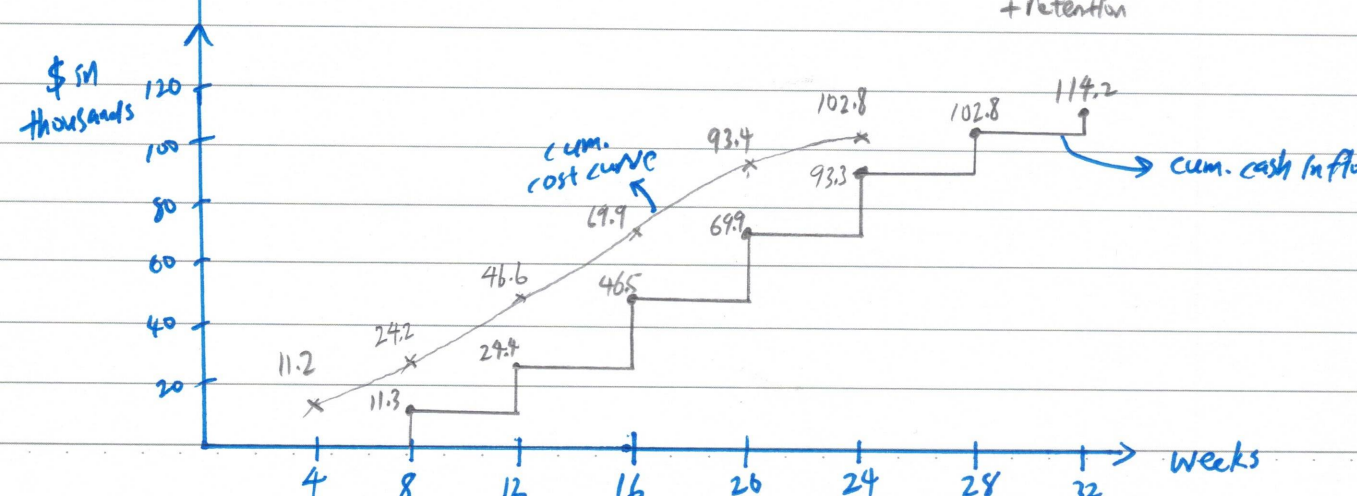
∴ CRITICAL path : A-B-C-E-G

	Week	4	8	12	16	20	24	28	32
Direct cost	Act								
	Dur								
	A*	3	7200 <sup>3</sup>						
	B*	4	2000 <sup>1</sup>	6000 <sup>3</sup>					
	C*	5		2700 <sup>1</sup>	10800 <sup>4</sup>				
	D	7		2371 <sup>1</sup>	<del>9486</del> <sup>4</sup> 4743 <sup>2</sup>				
	E*	9			11555 <sup>4</sup>	11556 <sup>4</sup>	2889 <sup>1</sup>		
F	6			5000 <sup>2</sup>	10000 <sup>4</sup>				
G*	3						4500 <sup>3</sup>		
Indirect cost		2000	2000	2000	2000	2000	2000		
Total cost		11200	13071	22286	23298	23556	9389		
cum. cost (S-curve)	0	11200	24271	46557	69855	93411	102800		
Monthly value		12580	14566	24665	25811	26089	10497		
cum. value	0	12580	27146	51811	77622	103711	114208		
10% cum. retention	0	1258	2715	5281	7762	10371	11421		
cum. payment received (cash in flow)	0	0	11322	24431	46530	69860	93340	102787	114208

markup  
\* 15%  
others 8%

markup

10%





Date

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(b) Max working capital.

$$\text{At week 16, } 69.9 - 24.4 = 45.5$$

$$\text{week 20, } 93.4 - 46.5 = 46.9 \checkmark$$

$$\text{week 24, } 102.8 - 69.9 = 32.9$$

max. working capital required is at week 20 with a value of \$46,900 #