

UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: November 2017

Module Number: CE8328

Module Name: Construction Management (Old Curriculum)

[Three Hours]

[Answer all questions, each question carries twelve marks]

Q1.

- Discuss two situations where a project has to be accelerated during the construction stage.
[1.0 Mark]
- Explain the relationship between the project cost and time with necessary sketches.
[2.0 Marks]
- Table Q1 represents the planned time and cost for different activities of a project with possible crashing information. Figure Q1 represents the corresponding network diagram. Carry out the crashing procedure using minimum cost slope method. You are required to do crashing only for three stages. Assume an indirect cost of Rs. 90.00/week.
[5.0 Marks]
- Suggest the best total project cost and the optimum project duration among the three stages in the Q1 (c).
[1.0 Mark]
- Write down the linear programming model to find the corresponding cost if it is necessary to finish the project within 25 days.
[3.0 Marks]

Q2.

- Explain how bar charts and site meeting can be used as project monitoring tools.
[2.0 Marks]
- Figure Q2(a) shows a typical Earn Value Chart. Explain the terms used there and how this earn value chart can be used for project monitoring purpose.
[4.0 Marks]
- Figure Q2(b) represents the progress bar chart for a building construction project. Planned project duration is 18 months. Now the project is in its end of month 10. The actual cost spent upto the end of month 10 is given in Table Q2. Client of the project wants to see the progress in terms of cost and the schedule. You may assume that corresponding cost for each activity is spent equally in each month.
 - With necessary calculation, explain how the client can be informed regarding the progress of the project.
 - Calculate the additional cost and the additional time needed to complete the project based on the available data at the end of month 10.
[6.0 Marks]

Q3.

- a) Explain the followings in relation with ICTAD standard bidding document (SBD01).
- i Eligible bidders
 - ii One bid per bidder
 - iii Pre-bid meeting
- [6.0 Marks]
- b) After submitting of a bid by a bidder, he has requested clarification on the relevant bid. How the client can response to the bidder according to the guideline given in SBD01.
- [3.0 Marks]
- c) One of the government institutions called tenders using ICTAD standard bidding documents (SBD01) for construction of a building project. Several bidders have submitted bids. During the bid opening process following three cases were identified. Assume that you are the procurement officer and state your decisions and give reasons on each case.
- i One contractor has submitted the bid without the bid bond.
 - ii Another contractor has submitted two sets of documents; but without marking as "ORIGINAL" and "COPY".
 - iii Two bids were submitted by one contractor.
- [3.0 Marks]

Q4. One of your clients is having an idea to invest his money. He has two alternatives in his mind. One is to construct a **three storey building to rent out** and next is to construct a **Fuel Station**. The relevant cash flows are shown in Table Q4. The client is asking your help to select the best option. For that purpose carry out following.

- a) Why is it important to carry out a feasibility study for this client description?
- [2.0 Marks]
- b) What is the difference between the feasibility study and the business plan?
- [2.0 Marks]
- c) What is the best option considering only the economic feasibility? Assume the discount rate as 12%.
- [6.0 Marks]
- d) What are the other factors that have to be considered other than the economic feasibility?
- [2.0 Marks]

Q5.

- a) Explain the benefits that a contractor can gain by preparing a cash flow forecast for a construction project.
- [3.0 Marks]
- b) Tables Q5(a), Q5(b) and Q5(c) represent three options of cash flow considering margin, over measurements and under measurements for a contractor. Discuss are the advantages that the contractor can get from each option. Use same Tables Q5(a), Q5(b) and Q5(c) for necessary calculations.
- [6.0 Marks]

- c) Consider following cash information for a construction project with the project duration of 12 months. Draw corresponding cash flow diagram. You may name only the transaction and values are not required.

Contractor has taken a bank loan at the beginning of June/2014 and he started the construction at the beginning of July/2014. Contractor received an advance payment from the client at the beginning of July/2014. At the end of every month after starting the construction, contractor is receiving payments from the client and at the same time contractor should pay for wages, interest on bank loan, pay for subcontractors and material supplies.

[3.0 Marks]

Table Q1: Details of time and cost for normal and crash situations

Activity	Time in Weeks		Cost in (Rs.)	
	Normal	Crash	Normal	Crash
A	7	5	500	650
B	9	6	450	600
C	10	8	420	580
D	11	8	1100	1400
E	4	4	250	-
F	6	5	700	750
G	4	4	320	-
H	4	3	400	470
I	12	9	2250	2400
J	9	7	1000	1200

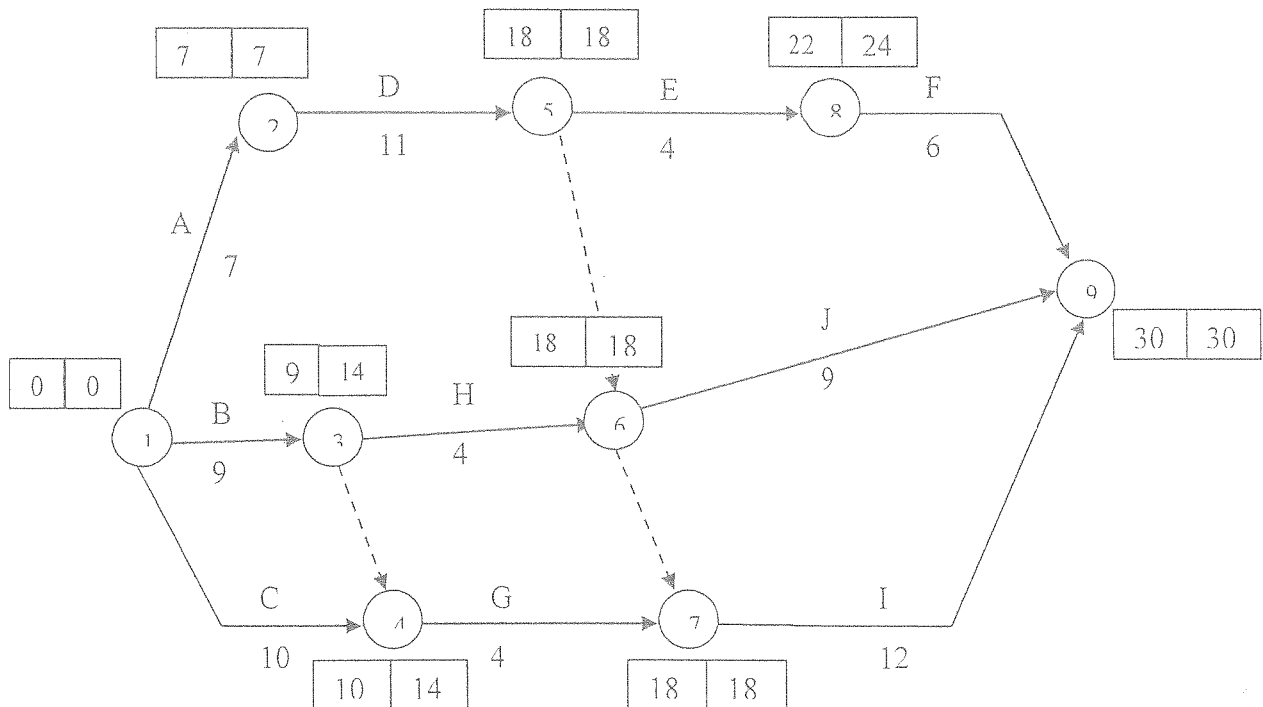


Figure Q1: Activity Relationships

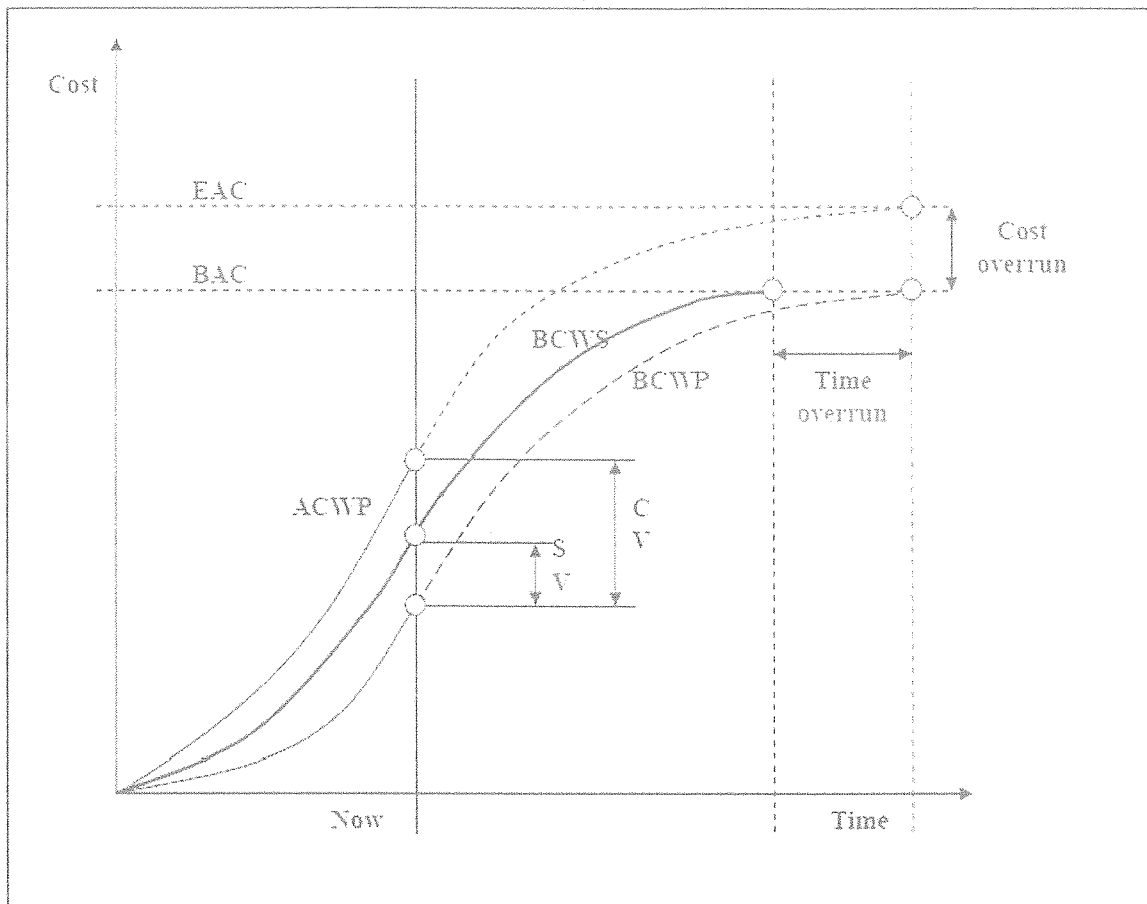
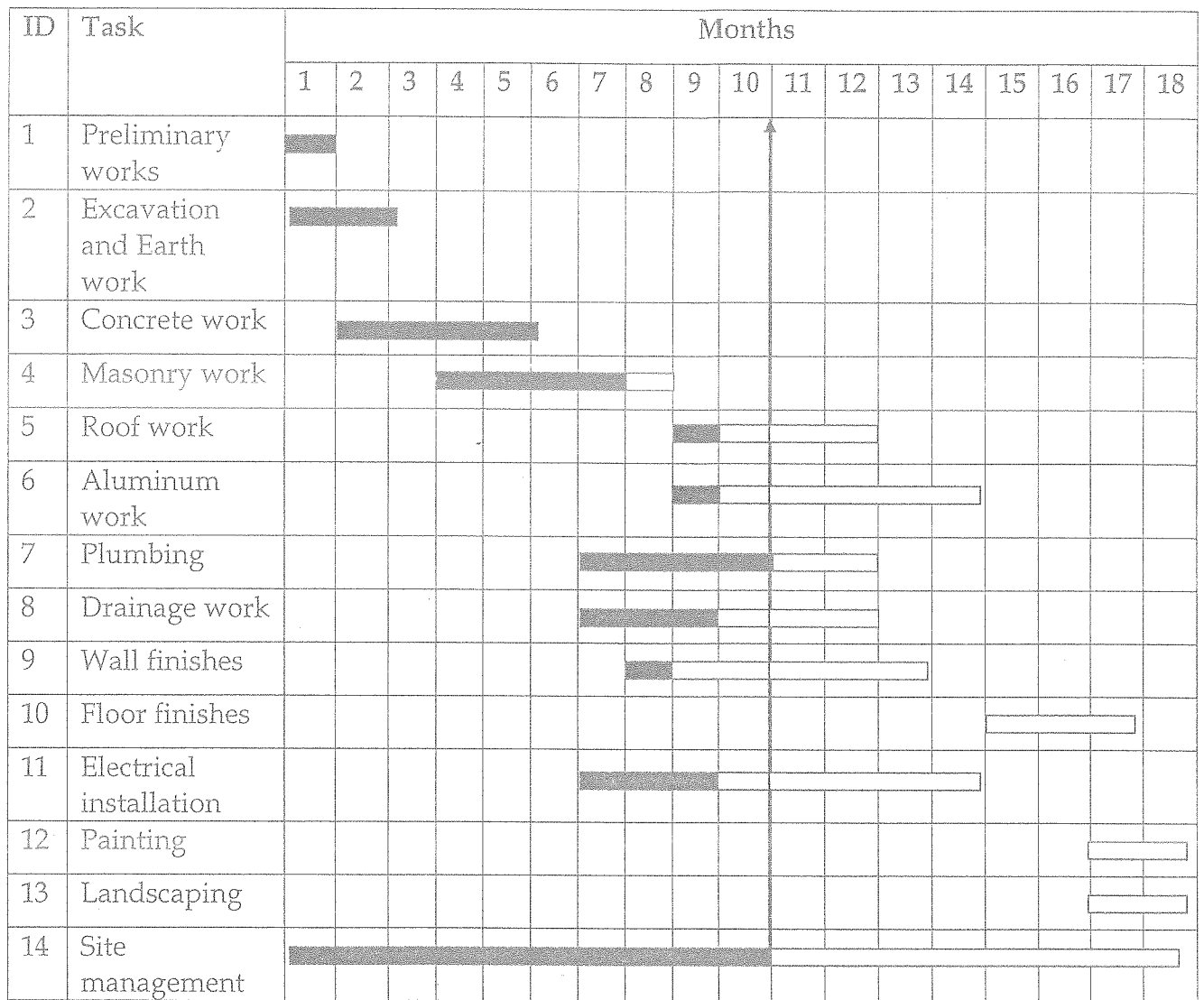


Figure Q2(a): Earn Value Chart

Table Q2: Planned and actual cost information

Item	Description	Planned Cost Amount	Actual Cost at the end of month 10
		(Rs ,000.00)	(Rs ,000.00)
1	Preliminaries	456	460
2	Excavation and earth work	2,990	3,000
3	Concrete work	75,000	80,000
4	Masonry work	1,190	1,150
5	Roof work	4,900	2,400
6	Aluminum Work	12,000	1,500
7	Plumbing	3,900	2,650
8	Drainage Work	1,500	900
9	Wall Finishes	6,000	2,500
10	Floor Finishes	6,000	-
11	Electrical Installation	1,000	400
12	Painting	1,400	-
13	Landscaping	500	-
14	Site Management	360	200



Completed work
 Remaining work

Figure Q2(b): Progress Bar Chart

Table Q4: Cash flow information

Investment cash flow	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Proposed project	Three storey Building								
Cash inflows (Rs. 000.00)	0	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760
Cash outflows (Rs. 000.00)	16,000	275	275	275	275	350	350	350	350
Proposed project	Fuel Station								
Cash inflows (Rs. 000.00)	0	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Cash outflows (Rs. 000.00)	2,450	18,300	18,300	18,300	18,300	18,300	18,300	18,300	18,300

Table Q5(a):Effect of Margin

Month	1	2	3	4	5	6
Cost (Rs.)	225	200	250	210	175	150
Margin	10%	10%	10%	10%	10%	10%
Bill for the client						
Retention by the client	5%	5%	5%	5%	5%	5%
Money received by the client						
Profit						

Table Q5(b):Effect of Margin and Over Measurements

Month	1	2	3	4	5	6
Cost (Rs.)	225	200	250	210	175	150
Margin	10%	10%	10%	10%	10%	10%
Actual value						
Bill for the client	310	260	280	220	155	96
Retention by the client	5%	5%	5%	5%	5%	5%
Money received by the client						
Profit						

Table Q5 (c): Effect of Margin and Under Measurements

Month	1	2	3	4	5	6
Cost (Rs.)	225	200	250	210	175	150
Margin	10%	10%	10%	10%	10%	10%
Actual value						
Bill for the client	200	180	240	240	235	236
Retention by the client	5%	5%	5%	5%	5%	5%
Money received by the client						
Profit						