UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: November 2016

Module Number: CE8328

Module Name: Construction Management (Old Curriculum)

[Three Hours]

[Answer **all questions**, each question carries twelve marks]

Q1. a) Explain how bar charts and site meeting can be used as project monitoring tools

[2.0 Marks]

b) Figure Q1(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]

c) Figure Q1(b) represents an Earn Value Chart for a project updated at the end of month 6.

i With necessary calculation, explain the progress of the project.

ii Based on the available data at the end of month 6, calculate the additional cost and the additional time needed to complete the project.

[6.0 Marks]

Q2. a) Explain the advantages of using time-cost optimization method during planning stage and construction stage.

[2.0 Marks]

b) Table Q2 represents the planned time and cost for different activities of a project with possible crashing information. Figure Q2 represents the corresponding network diagram. Carry out the crashing procedure using compression logic for two compressions. Hence suggest the best total project cost and the optimum project duration among the three stages assuming an indirect cost of Rs. 100.00/week

[7.0 Marks]

c) Write down the linear programming model to find the corresponding cost if it is necessary to finish the project within 38 weeks.

[3.0 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) 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.

[6.0 Marks]

Q4. a) What are the information needed by the contractor to prepare a meaningful cash flow statement?

[2.0 Marks]

b) Discuss the advantages and disadvantages of cash flow diagram over the tabular format cash flow statement.

[2.0 Marks]

c) Table Q4 comprises the expected payments and receipts for a contractor. Prepare a cash flow forecasting considering following factors. You may use the data sheet provided in Page 07 when answering and attach with the answer booklet.

i Contractor is responsible for paying wages weekly.
ii Material suppliers will be paid at the end of each month. But contractor has to keep Rs. 50,000.00 deposit to the material supplier at the beginning of the construction and the deposit will be re-funded at the beginning of the last month of the construction.
iii Client will pay to the contractor in the same month keeping 10% retention.
iv Sub-contractors will be paid with one month delay keeping 10% retention.
v Half retention will be released to both contractor and sub-contractors after two months of the last payment and second half of the retention will be released at the end of the year.
v Contractor is expecting to receive a payment of Rs. 75,000.00 at the end of April from another project and he wish to use it in this project.

[8.0 Marks]

Q5. 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 **filling station**. The relevant cash flows are shown in Table Q5. 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?

[3.0 Marks]

b) What is the difference between the feasibility study and the business plan

[3.0 Marks]

c) What is the best option considering only the economic feasibility? Consider the discount rate as 12%.

[6.0 Marks]

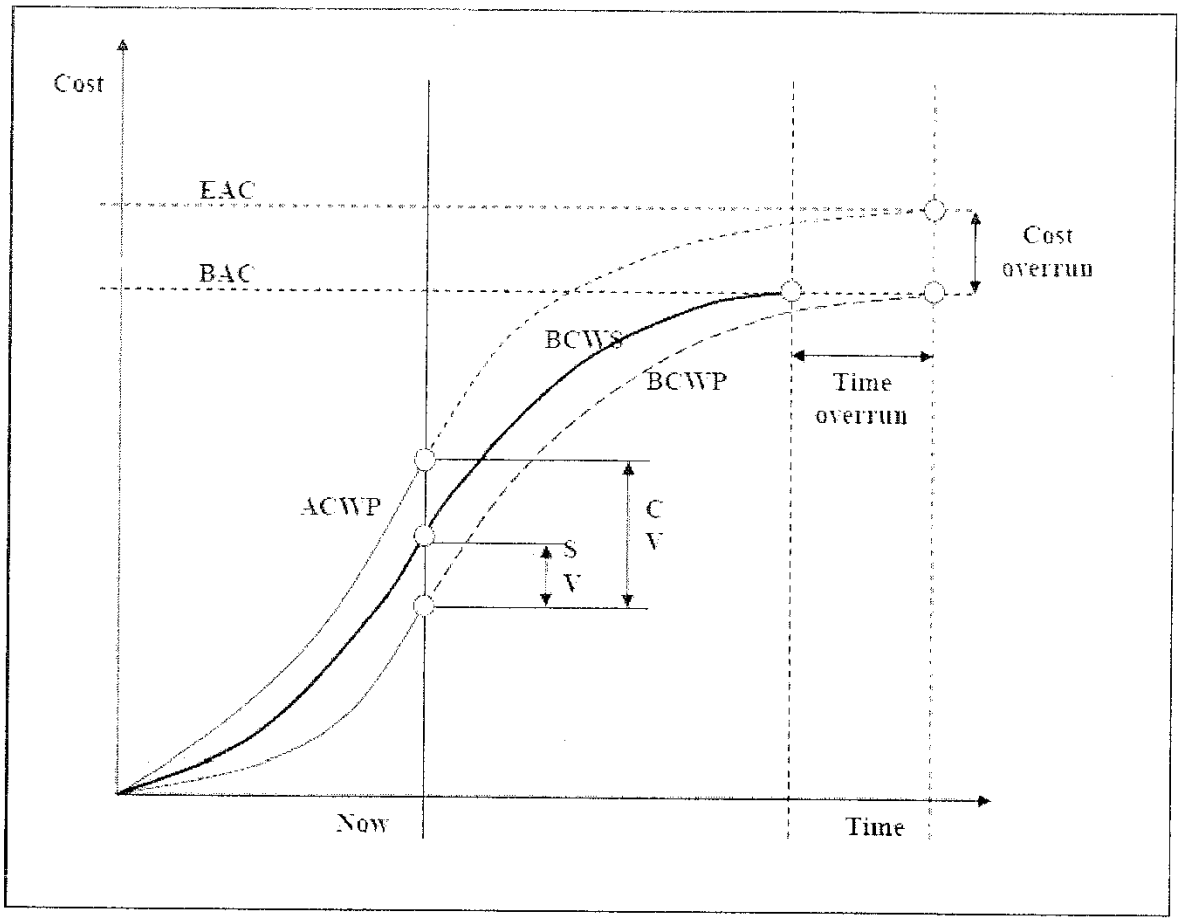

Figure Q1 (a): Typical Earn Value Chart

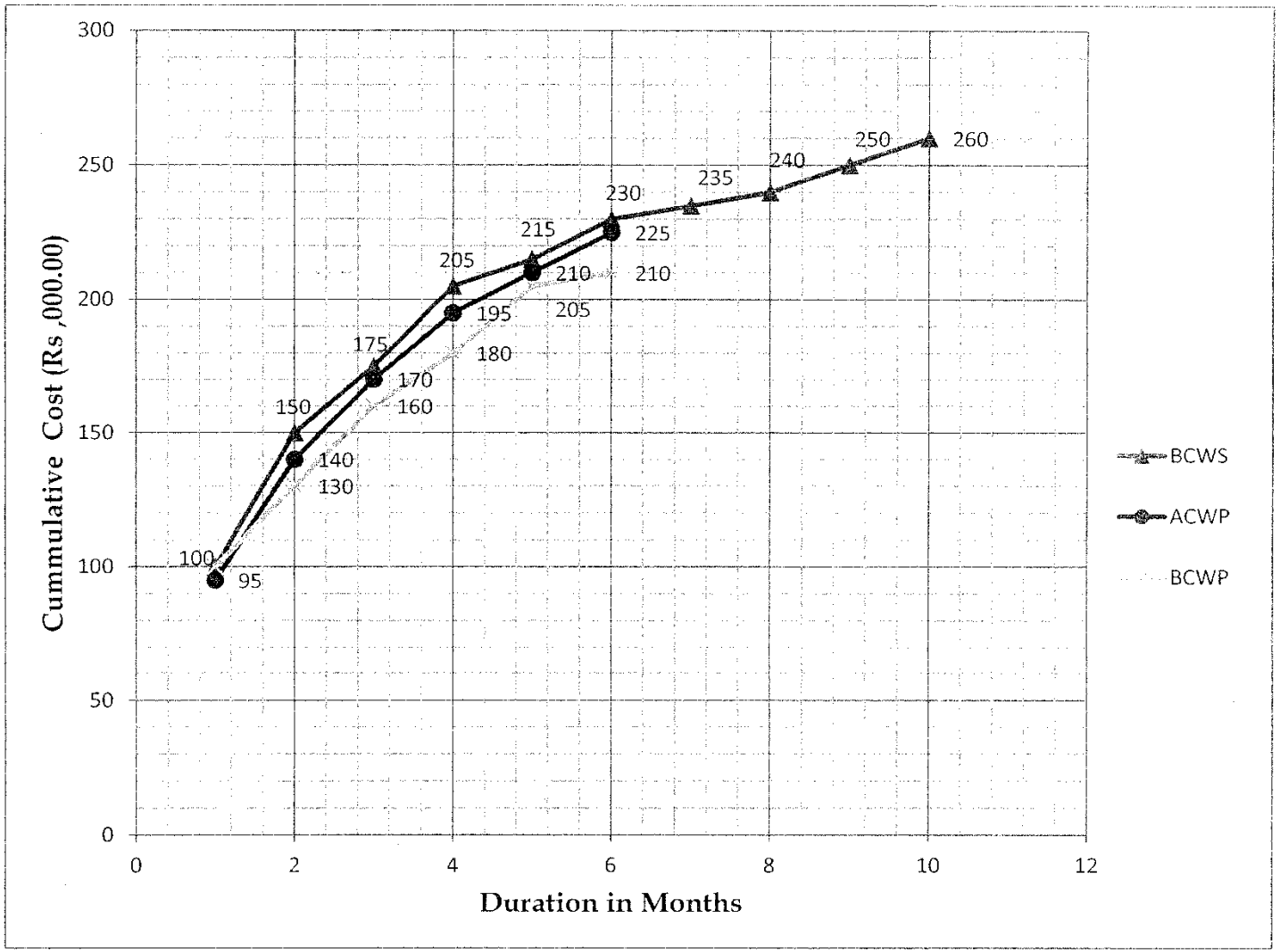

Figure Q1(b): Earn Value Chart

Table Q2: Details of time and cost for normal and crash situations

Activity	Time in Weeks		Cost in (Rs.)	
	Normal	Crash	Normal	Crash
1-2	5	5	500	-
1-3	3	1	450	600
2-4	7	5	420	580
2-5	9	7	1100	1400
3-5	7	4	1000	1600
4-6	4	2	700	1200
5-6	6	4	320	500
5-7	10	7	400	700
6-7	13	9	2200	3000

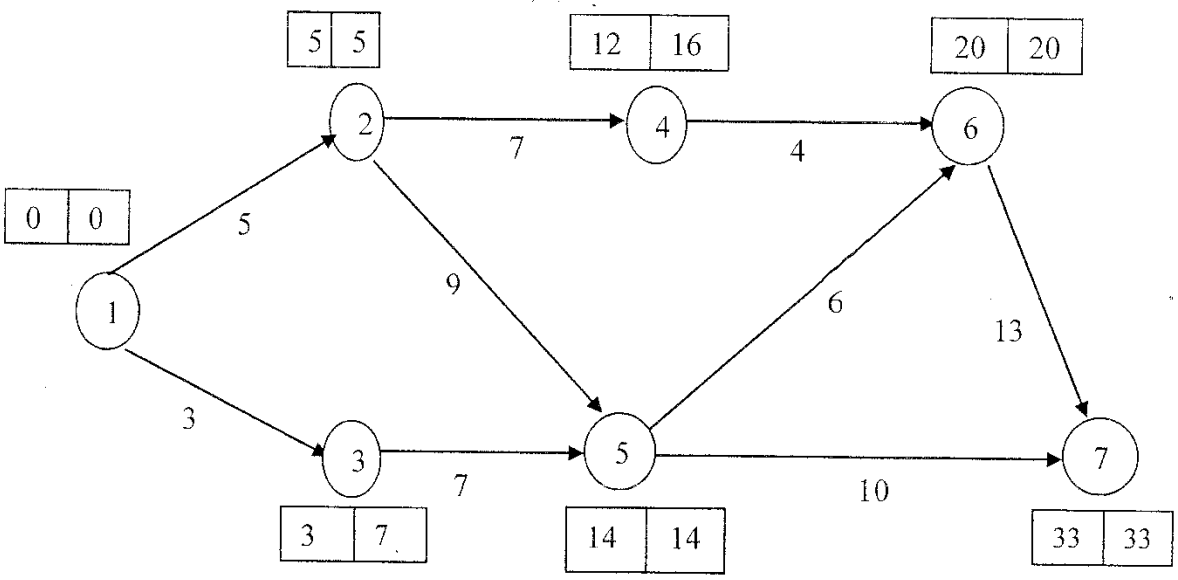

Figure Q2: Activity relationships

Table Q4: Contractor's Payments and Receipts

Month	Week No	Wages, plant hire and Overheads	Materials delivered	Sub Contractors accounts received	Total prime cost and overheads	QS valuation
January	1	3,000	5,500			
	2	3,500	5,000			
	3	3,000	4,000			
	4	2,500	4,000			
	5	2,500	4,000		37,000	35,000
February	6	3,000	3,000			
	7	3,000	5,000			
	8	2,000	6,000			
	9	3,000	6,000	15,000	83,000	85,000
March	10	5,000	8,000			
	11	5,000	2,500			
	12	7,500	18,000			
	13	4,000	10,000	25,000	168,000	165,000
April	14	3,500	8,000			
	15	3,500	10,000			
	16	4,000	10,000			
	17	5,000	7,000	10,000	229,000	230,000
May	18	4,000	10,000			
	19	3,500	15,000			
	20	3,500	8,000			
	21	2,500	10,000			
	22	3,000	5,000	12,500	306,000	**310,000**

Table Q5: 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	Filling 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

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Data Sheet to Prepare Contractor's Cash Flow

Month	Week No	Wages, plant hire and Overheads	Materials	Sub Contractors	Total	Accounts received	Cumulative cash flow
January	1						
	2						
	3						
	4						
	5						
February	6						
	7						
	8						
	9						
March	10						
	11						
	12						
	13						
April	14						
	15						
	16						
	17						
May	18						
	19						
	20						
	21						
	22						
June							
July							
August							
December							