UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: December 2015

Module Number: CE8328 **Module Name: Construction Management**

[Three Hours]

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

Q1.

a) "Project monitoring is very difficult to achieve even for a well-planned project". Do you agree with this statement? Explain with reasons.

[2.0 Marks]

b) Explain the importance of having project meetings as a project monitoring and controlling tool.

[2.0 Marks]

c) Faculty of Engineering has started renovation works for academic quarters.Figure Q1 represents the progress bar chart for thatproject including planned and actual cost information. The project is planned to complete within 8 months. Now the project is in its end of month 5. You may assume that corresponding cost for each activity is spent equally in each month.

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

ii Calculate the additional cost and the additional time needed to complete the project based on the available data at the end of month 5.

[6.0 Marks]

d) Table Q1 represents critical ratios for few activities of a project. Explain the nature of progress of those activities considering given critical ratio values and the definition of the critical ratio.

[2.0 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 29 weeks.

[3.0 Marks]

Q3.

a) Explain the need for cash flow forecast for the contractor and the client.

[2.0 Marks]

b) What are the information that can be taken from a cash flow statement for the decision making process of a construction company?

[3.0 Marks]

c) Table Q3 represents the cash flow statement for a project which is planned to start in January, 2016. It is prepared considering following assumptions.

   a. Contractor is responsible for paying wages weekly.
   b. Material suppliers will be paid at the end of each month.
   c. Client will pay to the contractor in the same month keeping 10% retention.
   d. Sub-contractors will be paid with one month delay keeping 10% retention.
   e. Half retention will be released to both contractor and sub-contractors after two months and second half of the retention will be released at the end of the year.

Based on the information available in Table Q3, answer for followings.

i Contractor is planning to start the project by taking a bank loan. What is the minimum amount he has to get as a loan considering the whole construction period?

ii What is the best time he can invest for any other business?

iii Assume that at the beginning contractor is having Rs. 100,000.00 in his hand. Calculate the cumulative cash flow based on that. Use the last column of the Table Q3 for answering and attached with the answer booklet.

[4.0 Marks]

d) Draw the monthly cash flow diagram for the information given in Table Q3.

[3.0 Marks]

Q4.

a) "Feasibility study is a management-oriented activity". Explain this statement.

[2.0 Marks]

b) Explain the use of 'Payback Period' for the decision making during the feasibility stage.

[2.0 Marks]

c) Why is it important to check the technical feasibility of a project?

[2.0 Marks]

d) A contractor is awarded to undertake construction projects by two clients at the same time. At the moment he can concentrate only on one project. For the two projects, cost-benefit information are shown in Table Q4. What is the best option to accept by the contractor considering the economic feasibility only? Consider 12% discount rate.

[6.0 Marks]

Q5.

a) Discuss the three fundamental elements to be satisfied to make a legal contract.

[3.0 Marks]

b) Explain the situations where an offer may come to an end.

[3.0 Marks]

c) Explain the followings in relation with ICTAD standard bidding document (SBD01).

i Occasions where a bid-security may be forfeited.

ii Procedure adopted for late bids.

ii Procedure of bid opening.

[6.0 Marks]

ID	Task	Planned cost (Rs.000.00)	Actual cost at the end of month 5 (Rs.000.00)	Time (months)							
				1	2	3	4	5	6	7	8
1	Demolition	580	500								
2	Doors and Windows	4,500	3,800								
3	Roof work	5,445	5,565								
4	Plumbing	150	25								
5	Wall & Plaster repairing work	400	175								
6	Floor Finishes	130	35								
7	Painting	600	190								
8	Access Road	225	145								
9	Interior items	2,600	-								
10	Site Management	750	468								

Completed work Remaining work

Figure Q1: Progress Bar Chart

Table Q1: Critical Ratio of Activities

Activity	Critical Ratio
A	0.933
B	1.003
C	1.024
D	1.0
E	0.926

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

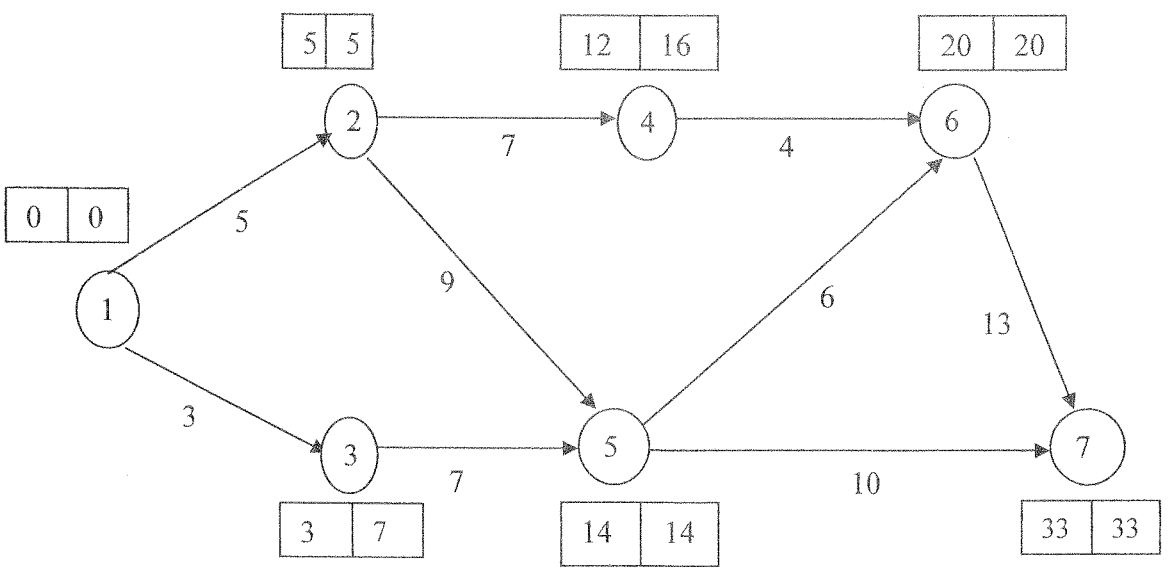

Figure Q2: Activity relationships

Table Q3: Cash Flow Statement

Month	Week No	Wages, plant hire and Overheads	Materials	Sub-Contractors	Total	Accounts received by the client	Cumul-ative cash flow	
January	1	20,000			20,000		-20,000	
	2	20,000			20,000		-40,000	
	3	20,000			20,000		-60,000	
	4	20,000			20,000		-80,000	
	5	20,000	125,000		145,000	252,000	27000	
February	6	20,000			20,000		7000	
	7	25,000			25,000		-18000	
	8	25,000			25,000		-43000	
	9	20,000	115,000	45,000	180,000	252,000	29000	
March	10	25,000			25,000		4,000	
	11	25,000			25,000		-21000	
	12	25,000			25,000		-46000	
	13	25,000	150,000	49,950	224,950	216,000	-54950	
April	14	25,000			25,000		-79950	
	15	23,500			23,500		-103450	
	16	15,000			15,000		-118450	
	17	15,000	80,000	54,000	149,000	225,000	-42450	
May	18	20,000			20,000		-62,450	
	19	20,000			20,000		-82,450	
	20	15,000			15,000		-97,450	
	21	15,000	50,000	31,500	96,500	225,000	31,050	
June								
				22,500	22,500		8550	
July		half retention		11,275	11,275	65,000	62275	
December		half retention		11,275	11,275	65,000	116000	

Table Q4: Cash Flow Information

Investment cash flow	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Proposed project	Project 1					
Cash inflows (Rs. 000.00)	145	180	225	175	115	55
Cash outflows (Rs. 000.00)	250	190	200	150	90	30
Proposed project	Project 2					
Cash inflows (Rs. 000.00)	175	185	200	200	115	75
Cash outflows (Rs. 000.00)	200	200	175	140	120	70