THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF CIVIL ENGINEERING
Bachelor of Technology (Engineering)

040

Final Examination - 2008/09

CEX 6239 Construction Management

Time Allowed : Three Hours

Date: 20th March 2009 Time : 0930-1230 hrs.

Answer any four (4) questions.

Q1.

(a) Explain the importance of Project Management in achieving the main objectives of a construction project.

(09 marks)

(b) Draw a typical Organization Structure for the staff of a construction site & explain the importance of maintaining hierarchical discipline.

(10 marks)

(c) Draw a graph indicating the typical Project Life Cycle for a construction project and indicate the corresponding 'level of effort' in meeting time targets.

(06 marks)

Q2.

(a) Discuss why Plant Management is an important factor to be considered at the stage when tenders are submitted for a construction project.

(06 marks)

(b) Discuss the most important aspects of a Process Chart in selecting suitable earthmoving plant for a road construction project.

(12 marks)

(c) From the point of view of handling materials and construction pre-cast units, what are the most important details to be considered, in organizing the site layout?

(07 marks)

Q3.

(a) The main activities involved in a construction project, together with their durations, predecessors and resources are shown below.

Table1.

Name	Activity	Duration (weeks)	Predecessors	Resources (men)
A	Drill well	4		4
B	Deliver material	2		4
C	Excavate	5		5
D	Construct power line	3		6
E	Pump house	3	A	2
F	Assemble tank	4	B	3
G	Foundation	4	C	7
H	Install pipe	6	C	4
I	Install pump	2	E, D, C	5
J	Erect tower & tank	6	F, G	8

The completion of activities I, H and J will end the project.

(a) Draw an activity-on-arrow network and an activity-on-node network for the above project indicating durations, event numbers and event times; Early start, Early finish, Late start, Late finish. Comment on the two types of network diagrams.

(06 marks)

(b) Calculate the Total Float for each activity and tabulate it against the activity name.

(05 marks)

(c) Explain the importance of a Bar Chart. Represent the above activities in early-start order, on a bar chart.

(06 marks)

(c) Draw the resource assignment for Early start schedule of the above project. Also draw an improved level of resource assignment by considering the floats of activities. Explain the effect of resource aggregation on the activity schedule.

(08 marks)

Q4.

(a) Explain the function of a Design Brief and identify the major requirements to be included in a Design Brief with respect to the construction of a lecture room for students of OUSL.

(08 marks)

(b) What are the multiple activities to be considered in computing the cycle time for a job of 'excavating earth and dumping' for filling a road trace? Illustrate a set of possible activities on a chart.

(06 marks)

(c) Outline the possible financial methods of encouraging motivation of engineers to work on civil engineering construction sites.

(05 marks)

(d) Express a 75-100 piecework system graphically and explain its application with respect to construction workers.

(06 marks)

Q5.

A Water Supply Scheme costing Rs. 49 Million is to be constructed by a civil engineering contractor, who has submitted a programme as shown in Table 2.
The value of work contained in each activity has been calculated from the rates contained in the bill of quantities and listed in the Table.

Table 2.

Activity	Duration (months)	Value (Rs. M)	Starting Time (months)
1. Intake well	3	6	1
2. Intake pump house	3	3	2
3. Pumping main	2	4	1
4. Aerator	2	2	2
5. Treatment plant	7	7	2
6. Elevated water tank	4	8	4
7. Clear water pump house	3	3	6
8. Clear water pumping main	2	16	6

The following data are available:

(i) Interim bill payments are made monthly with a delay of one month.

(ii) The gross profit margin is 10% of the contract value.

(iii) Retention is 10% of the bill value up to a maximum limit of 5% of the contract sum.

(iv) Half the retention is paid on practical completion and the remaining half 6 months later

(v) Rate of work throughout any activity is uniform

(vi) All costs are met at the instant they are incurred.

You are required to

(a) Draw a bar chart indicating cumulative values for the activities

(04 marks)

(b) Prepare cumulative Cash-Out Vs Time and cumulative Cash-In vs Time graphs on the same sheet.

(10 marks)

(c) Calculate the maximum amount of cash the contractor needs to execute this contract and the time of requirement. Comment on the cash flow and suggest ways of improving it.

(06 marks)

(d) What is Capital lock-up and why is it important to calculate the interest payable on the Capital Lock-up?

(05 marks)

Q6.

(a) Indicate the parties involved in Cost Control at the Construction Stage of a project and their functions.

(07 marks)

(b) When calculating variances at the end of six months on a construction site of a road construction project, it is found that there is an adverse variance for the item 'construction materials'. List & explain possible reasons.

(07 marks)

(c) Explain the difference between 'Cost Cutting' and 'Cost Control'

(04 marks)

(d) Explain Cost Control by Overall Profit or Loss and indicate how useful this method is for construction projects.

(07 marks)