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

Final Examination - 2011

CEX 6239 Construction Management

Time Allowed : Three Hours

Date: 03rd March 2012 Time : 0930-1230 hrs.

Answer any four (4) questions.

All questions carry equal marks

Q1.

(a) Local construction Contractors have to face many problems, one critical issue being the cash-flow problem. Identify factors causing cash-flow problems and discuss ways in which the government can take steps to help the Contractors.

(10 marks)

(b) List the different types of earth transporting plant available in Sri Lanka. Identify and discuss the factors to be considered in selecting equipment for various types of earthwork operations.

(10 marks)

(c) If a company is to replace machinery, discuss the alternative finance options available. (05 marks)

Q2.

(a) A project has been awarded for the construction of a road of length 25 km. Major activities of the project are identified below.

Preliminaries, Clearing of road trace, Common excavation in earthwork, Sub-base, Base course, Bitumen surfacing, Shoulder material placing, and Culverts

(i) Making reasonable assumptions regarding the items of work and the order in which they are to be carried out, identify realistic durations for the above activities such that the road can be completed in one year assuming a five day working week. State any other assumptions made.

(05 marks)

(ii) Draw a suitable activity-on-node network for the construction of this project indicating activity times, sequence of activities and the critical path.

(10 marks)

(iii) Prepare a bar chart based on 'Earliest Event Times' and indicate the Latest Event Times and the floats of activities on the same chart. (05 marks)

(b) Compare the use of network diagrams and bar charts giving their advantages and disadvantages for different projects.

(05 marks)

Q3.

A Water Supply Scheme costing Rs. 73.5 Million is to be constructed by a civil engineering contractor, who has submitted a programme as shown in Table 3.1
The value of work contained in each activity has been calculated from the rates contained in the bill of quantities and listed in the same Table.

Table 3.1

Activity	Duration (months)	Value (Rs. M)	Starting Time (months)
1. Intake well	3	9	1
2. Intake pump house	3	4.5	3
3. Pumping main	2	6	1
4. Aerator	2	3	3
5. Treatment plant	7	10.5	3
6. Elevated water tank	4	12	6
7. Clear water pump house	3	4.5	8
8. Clear water pumping main	2	24	8

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

(03 marks)

(b) Calculate the cash flow and draw the Cumulative Cash-Out Vs Time and Cumulative Cash-In vs Time graphs on the same sheet.

(16 marks)

(c) Comment on the cash flow and suggest ways of improving it.

(06 marks)

Q4.

(a) Describe a suitable Cost Control method for implementing on a construction site, explaining to what extent it is advisable to spend money on Cost Control. (10 marks)

(b) Briefly describe the following four different approaches to understanding human behaviour

(i) Self-actualising man
(ii) Complex man
(iii) Social man
(iv) Economic man

(08 marks)

(c) Describe the procedure for 'method design' using an example from construction. (07 marks)

Q5.

(a) Explain how the main objectives of a construction project can be achieved through Project Management. (07 marks)

(b) List the operations involved in the production and placing of concrete, describing the different types of equipment used in each stage. (07 marks)

(c) Value Management concept at the construction stage offers minimum incentives to contractors for making a change of proposals, even with offer of financial incentives. Explain. (05 marks)

(d)
List the 'Cost' elements of the operating costs of equipment.

Determine the 'Direct Cost per hour' of owning and operating a 1/4 cu.m capacity hydraulic backhoe excavator from the following data.

Initial cost	Rs. 2,500,000
Resale value	Negligible
Useful life	10 years
Interest on capital	15% per annum
Fuel consumption	10 litres per hour
Cost of fuel	100 Rs per litre
Oil & grease	10% of fuel cost
Repairs to machine	10 % of initial price per annum
Operator	'all in' cost of Rs 100 per hour
Insurance & tax	1.5 % of initial price per annum
Average working hours per year	2000

(06 marks)

Q6.

(a) The law requires the fulfillment of four basic elements for a 'Contract'. Explain briefly. (04 marks)

(b) As per the ICTAD definition, explain the items included in a 'Contract' for the contract agreement to be complete.

(09 marks)

(c) What are the advantages of using a Design & Build contract for a building project?

(06 marks)

(d) When calculating variances at the end of six months on a road construction project, it is found that there is an adverse variance for the item 'construction plant'. List & explain possible reasons giving advice on how to manage future projects.

(06 marks)