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

Final Examination - 2009

CEX 6239 Construction Management

Time Allowed : Three Hours

Date: 13th March 2010 Time : 0930-1230 hrs.

Answer any four (4) questions.

Q1.

(a) Draw a typical organization structure for a construction organisation undertaking medium scale building construction projects and discuss the basis on which structuring is performed.
(08 marks)

(b) Discuss the steps to be followed in a Recruitment & Selection System for recruiting a Site Supervisor.
(07 marks)

(c) Justify the importance of Project Management in relation to a road construction project?
(10 marks)

Q2.

It is required to select plant needed for construction of earth bunds in a flood protection scheme;

(a) Identify the major earthwork and construction tasks involved, in such a project. (05 marks)
(b) Explain the steps involved in the logical approach for selection of plant for the above tasks, giving a process chart. List the plant required for each task listed in (a) above. (10 marks)
(c) Discuss cost effective alternative methods of obtaining the required plant.
(10 marks)

Q3.

(a) Explain the function of a network diagram and list the major advantages over a Bar Chart.
(05 marks)

(b) The Table 1 below gives the activities and their interactions, together with their durations in days, in a project to install a pump set for pumping water.

Table 1.

Event No.	Description	Activity	Duration in Days	Preceded by	Followed by
1.	Selection of the pump set	A	3	-	B
2.	Obtaining quotations	B	7	A	C
3.	Purchasing the pump set	C	2	B	F
4.	Laying the mat for pump foundation	D	4	A	E
5.	Construction of the foundation block	E	7	D	F

6.	Fixing the pump set on foundation	F	2	E,C	G
7.	Installation of pipelines	G	4	F	I
8.	Completing electric lines	H	2	C	I
9.	Providing electric connections & commissioning the pump	I	1	H,G	None

(a) Draw an activity-on-arrow diagram and show the critical path. Draw a table with Early start time, Late start time and Start floats for all activities (05 marks)

(b) Draw a bar chart for the project based on early start times. Indicate late start time of activities on the same chart. (05 marks)

(c) Draw an activity-on-node diagram for the same project and discuss the advantages of this diagram over the activity-on-arrow. (10 marks)

Q4.

(a) 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 back hoe excavator from the following data: (10 marks)

Initial cost	Rs. 4,500,000
Resale value	Negligible
Useful life	10 years
Interest on capital	15% per annum
Fuel consumption	10 litres per hour
Cost of fuel	70 Rs per litre
Oil & grease	10% of fuel cost
Repairs to machine	10 % of initial price per annum
Operator	'all in' cost of Rs 150 per hour
Insurance & tax	1 1/2 % of initial price per annum
Average working hours per year	2000

(b) List the steps involved in planning a preventive maintenance programme for equipment at a construction site. (07 marks)

(c) Why is it important for an organisation to carry out an inventory of spare parts? Give a broad classification of the spare parts generally needed. (08 marks)

Q5.

(a) Explain the major differences in cash flow forecasting at Project level and Company level, for a construction project.

(05 marks)

(b) A contractor's project budget showing project value month by month is given in the table below:

Item/Month	1	2	3	4	5	6
Project value Rs. '000	220	440	770	660	550	330

The Profit Margin is uniform and is 10% of the Cost.

The Conditions of Contract allow interim measurements to be made monthly. Payment of the amount certified less 10% retention is to be paid to the contractor one month later. Half the retention is included in the final certificate on practical completion and the other half is released six months after practical completion.

Outgoing cash flows are met one month after the costs have been incurred.

No Advance payment is given to the contractor.

Calculate the contractor's cash flow. (15 marks)

(c) Any control system involves certain overheads. How can you find the optimal point, which gives the most economical expenditure on ' Cost Control'? (05 marks)

Q6.

(a) As per the ICTAD definition what are the items included in a 'Contract' for the contract agreement to be complete?

(09 marks)

(b) What is the best type of contract suitable for emergency works? What is the biggest drawback in this system?

(06 marks)

(c)

When calculating variances at the end of six months on a construction site of a water treatment plant, it is found that there is an adverse variance for the item 'construction plant'. List & explain possible reasons.

(05 marks)

(d) Briefly explain two accident preventive measures that can be taken at the planning stage of a construction project.

(05 marks)