THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF TECHNOLOGY (CIVIL) - LEVEL 4
FINAL EXAMINATION - 2016/17

CEX4232 - CONSTRUCTION ENGINEERING AND PLANNING

Time allowed : Three hours

Date : Friday, 17th November 2017 **Time : 09:30 - 12:30**

Selecting at least two (2) questions from each section, answer a total of five (5) questions. All questions carry equal marks.

Answers for sections A & B should be submitted on separate answer books with Section A and Section B written clearly on the cover of the respective book.

Write down your Index Number clearly on both answer books.

SECTION A

(01)

(a). When using dump trucks for construction purposes, describe the type of jobs for which the side dump trucks are preferred to rear dump trucks.

If land clearing is to be done with the help of a crawler tractor by fitting various attachments, list four (04) of such attachments that can be used.

(04 marks)

(b). Explain how the compaction of a road sub-base is carried out while describing the movement of rollers that are used.

(05 marks)

(c). Name the type of a pump that can be recommended for a site where the pump has to be kept inside the liquid to be pumped. With the help of a suitable sketch, explain how this pump is installed.

(04 marks)

(d). Although reciprocating pumps are not widely used in construction sites for special types of work, these pumps are extremely valuable.

(i). Write down three (03) applications of reciprocating pumps.
(ii). Write down four (04) disadvantages of reciprocating pumps.

(07 marks)

(02)

(a). Discuss the significance of the water-cement ratio by considering *separately*, the effect of water content and the effect of cement content on the strength and workability of concrete. (06 marks)

(b). Explain what is meant by 'segregation' of a concrete mix, its causes and how it affects the concrete cast at site. (04 marks)

(c). Explain what is meant by 'bleeding' in a concrete mix, list-down the causes for 'bleeding' and suggest precautions to prevent bleeding in a concrete mix at site. (04 marks)

(d). Describe the procedure adopted to form a construction joint in a beam and concrete it. (06 marks)

(03)

(a). Draw a neat sketch indicating all the important elements of an overhead water tank that is used in domestic buildings. (06 marks)

(b). Explain the basic operation of a flushing cistern used in a domestic household. You may draw neat sketches where necessary for your explanation. (06 marks)

(c). Draw a neat diagram of a typical septic tank indicating all important elements of it. Briefly explain the basic operations of a septic tank with reference to (i) inspection chamber, (ii) settling tank, and (iii) distribution chamber. (08 marks)

(04)

Describe the following using illustrations where relevant:

(a) The ventilation of drains giving reasons for ventilating drains, and the method of providing it. (05 marks)

(b) The function and locating of manholes. (05 marks)

(c) Selection of pipe gradient for a drainage system. (05 marks)

(d) The testing procedure of internal soil pipes. (05 marks)

SECTION B

(05)

(a) It is required to design and construct a road network for a developing area in Sri Lanka. Discuss three important reasons why planning is necessary for a project of this nature. (06 marks)

(b) Construction Planning is done at four (04) levels. Discuss the four levels in the macro planning and micro planning processes. (08 marks)

(c) You are required to design and construct a study hall for 500 students at the Open University of Sri Lanka. Outline a macro plan for the design and construction. (06 marks)

(06)

(a) A bar chart can be used for reporting and monitoring the progress of activities on a construction project by using different methods. Show on a diagram, one method of progress recording using the bar chart. (04 marks)

(b) Write down six (06) steps in a construction progress monitoring procedure. (06 marks)

(c) Machines perform earthwork operations over and over again and work in cycles.
(i) Give a general equation for 'cycle time'.
(ii) What is the cycle time for a scraper?
(iii) The cycle time can be divided into two elements. Explain. (10 marks)

(07)

(a) Explain the function of a network diagram and list two major advantages of a network diagram over a bar chart. (04 marks)

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

Event No.	Description	Activity	Duration (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

i. Draw an Activity-on-Arrow diagram and show all the Event Times and the Critical Path. (08 marks)

ii. Explain the meaning of the term 'Float' of an activity and explain how you calculate the Total Float of an activity. (04 marks)

iii. Draw a bar chart for the project based on early start times and also indicate late start time of activities on the same chart. (04 marks)

(08)

(a) Explain the four (04) major points to be borne in mind when developing a cost data bank. (04 marks)

(b) When you consider the 'Content' of a cost data bank, it is important to have only the relevant data which will be used frequently.

Answer the following:

(i) Discuss the factors to be considered when deciding the content of a cost data bank (04 marks)

(ii) Specify the categories of data which need to be stored in a cost data bank for estimating of construction works. (03 marks)

(iii) Show diagrammatically the data stored in a cost data bank and the calculations in producing direct cost rates for BOQ items in a construction estimate. (03 marks)

(c) Explain the following:

(i) Unit Rate Estimating
(ii) Operational Estimating (06 marks)