THE OPEN UNIVERSITY OF SRI LANKA
DIPLOMA IN TECHNOLOGY (CIVIL) - LEVEL 4
FINAL EXAMINATION - 2008/09

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CEX 4232 - CONSTRUCTION ENGINEERING AND PLANNING

Time allowed : Three hours

Date : Tuesday, 17th March 2009 **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)

Being the engineer in-charge of a high rise building construction project in a hilly area, you are required to have an adequate knowledge of the types of earth moving equipment that will be required depending on the condition at the site.

(a). List all types of earth moving equipment that will be required. (04 marks)

(b). Name two types of Bulldozers and explain their functions. (04 marks)

(c). Write the conditions that the Bulldozers are used for earth moving work. (06 marks)

(d). Identify activities in your building construction work where hoisting equipment are frequently used. List the different types of hoisting machines you will need and describe how this hoisting equipment can be effectively used for different purposes in the construction site. (06 marks)

(02)

Sound knowledge of earth compaction procedures adopted in construction sites is of prime importance for a person working in civil engineering projects.

(a). Explain what is meant by 'soil compaction'. (06 marks)

(b). What are the factors influence the degree of soil compaction? (04 marks)

(c). What are the methods available in order to specify soil compaction to the contractor? Describe them. (05 marks)

(d). What are the 'pros' and 'cons' of the above stated specification methods in soil compaction? (05 marks)

(03)

(a). What does the 'wearing surface' of a road mean? Give the reasons for surfacing a road? (06 marks)

(b). Draw a neat sketch of a cross section of a road in a cut section indicating all the important features of it. (04 marks)

(c). Describe the difference between "rigid" and "flexible" pavements. (05 marks)

(d). 'Tar' and 'Bitumen' are terms often used when making reference to wearing surfaces. Distinguish between them. (05 marks)

(04)

(a). Explain what is meant by "curing" of concrete cast at site, while giving reasons as to why it should be done. (05 marks)

(b). Describe the procedure adopted to repair a honeycombed area on the side of a concrete beam. (05 marks)

(c). Describe the causes for "shrinkage" of concrete. (04 marks)

(d). Explain what is meant by "durability" of concrete, and write the precautions that should be taken at the site to ensure the durability of a concrete structure. (06 marks)

SECTION B

(05)

(a). Explain why planning is important for construction projects and discuss the main stages in the planning process of public related projects. (08 marks)

(b). A new Regional Centre is proposed for the Open University of Sri Lanka, and is to be located in one of the provinces. Identify and explain the macro planning activities for this project. (08 marks)

(c). If you are appointed as the Technical Officer for the above project, broadly out line and explain the micro planning activities for the construction of the above project. Explain the detailed micro planning process for the construction of civil engineering laboratories. (04 marks)

(06)

The activities, durations and labour requirements for a small project are given below.

Activity	Name	Duration (weeks)	Labour
1-2	A	2	10
2-3	B	2	2
2-4	C	3	5
3-5	D	4	6
4-5	E	8	3
4-6	F	4	4
5-6	G	1	2
5-7	H	8	8
6-7	I	4	4

(a). Draw an activity-on-arrow network for the project and indicate the critical path and determine the project duration. (04 marks)

(b). Draw a bar chart showing activities at their earliest start times and indicate the resource requirement. (04 marks)

(c). If the maximum number of labour available is 10, arrive at a suitable sequence of activities for completing this project. (06 marks)

(d). State the advantages of preparing work programs at the pre-tender stage of a construction project. (06 marks)

(07)

(a). Draw a typical operation 'cycle' for a truck, which is loaded by a shovel in an earthwork operation. What is 'fixed time' and 'variable time' with regard to cycle time?
Explain how the cycle time could be reduced to increase production. (10 marks)

(b). Discuss the use of combinations of machines on earthwork operations using illustrations. (10 marks)

(08)

(a). Indicate in a figure, all the costs involved in the making up of a Tender Price for a construction project. (03 marks)

(b). Name one BOQ item for which you can use Operational Estimating and derive a rate explaining the process. You may make relevant assumptions.

Compare the rate obtained from above in the BOQ item, with the rate obtained by the method of Unit Rate Estimating. (09 marks)

(c). What do you understand by Progress Control of a construction project? What are the parties involved? What are the things to be controlled? (08 marks)