THE OPEN UNIVERSITY OF SRI LANKA
DIPLOMA IN TECHNOLOGY (CIVIL) - LEVEL 4
FINAL EXAMINATION - 2015/16

CEX4232 - CONSTRUCTION ENGINEERING AND PLANNING

Time allowed : Three hours

Date : Friday, 25th November 2016 **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) The excavation of the bed of a river, lake or sea to increase the operating depth is known as dredging. There are three (03) main types of dredgers available in industry. Name these three types of dredgers and briefly describe each type.

(04 marks)

(b) Name the two (02) types of Derrick cranes available and briefly describe each type.

(04 marks)

(c) Briefly describe the four (04) methods that a contractor can be instructed to specify soil compaction.

(08 marks)

(d) Calculate (clearly indicating the steps involved) the per hour output of a bulldozer under the following conditions:

Swell of the soil handled is 25%
Rated capacity in loose volume = 3.0 m^3
Operating factor = 50 min/hr
Pushing time = 0.72 min
Returning time = 0.32 min
Loading and shifting gear time = 0.30 min

(04 marks)

(02)

(a) Draw a neat sketch of a flushing cistern, labelling all the important components of it. Briefly explain the basic operation of a flushing cistern.

(05 marks)

(b) Draw two (02) neat sketches of (i) combined and (ii) separate drain systems in a domestic house and briefly explain their functionalities.
(05 marks)

(c) In a septic tank arrangement there are two (02) stages of treatment; namely 'primary' and 'secondary'. Explain these two stages of treatment and where necessary support your answer with neat illustrations.
(06 marks)

(d) Explain the difference between 'rigid' and 'flexible' highway pavements. (04 marks)

(03)

(a) Explain what is meant by 'entrapped air in concrete' and 'entrained air in a concrete' mix. (05 marks)

(b) The principal admixtures available to improve the workability of concrete are 'water-reducing' and 'air-entraining' agents. Explain these two types of admixtures.
(06 marks)

(c) There are two (02) basic types of poker vibrators that are used in the industry. Briefly describe these two types. (04 marks)

(d) List-down the causes for bleeding, and precautions that you suggest to prevent bleeding in a concrete mix at the site.
(05 marks)

(04)

Piles have to be used for construction of foundations where soils are weak or unstable.

(a) Explain the difference between 'replacement piles' and 'displacement piles'.
(05 marks)

(b) Describe the precautions that have to be taken when driving pre-cast concrete piles.
(05 marks)

(c) Briefly describe three (03) methods of testing piles. (05 marks)

(d) Neatly sketch three (03) different types of foundations that can be used for the foundation of a column of a framed building. (05 marks)

SECTION B

(05)

(a) Briefly explain the important steps in a 'Construction Project Planning' process. Define the activities at the different Levels for a proposed road construction project. Give a brief explanation for your answer. (10 marks)

(b) It is required to construct a water supply scheme for a university having 10,000 residential students. The Project Manager has been appointed and is ready to start the contract. Explain the complete construction planning process describing the different levels of planning which are relevant to this project. (10 marks)

(06)

(a) Explain the purpose of a Cost Data Bank for estimating in construction and List five types of data that need to be stored in a Cost Data Bank. (05 marks)

(b) Progress Control is very important on construction sites. Explain five (05) items in a progress reporting procedure. (05 marks)

(c) Explain how detailed site layout planning and the preparation of resource histograms can help in minimizing the wastage of materials on construction sites. (10 marks)

(07)

An indoor stadium is to be constructed with a seating capacity of 20,000. The project begins with clearing the site, an activity that lasts eight weeks. Once the site is clear, work can start simultaneously on the structure itself and the field.
The activities will then proceed as given below.

Activity	Description	Duration (weeks)	Precedence
A	Clearing the site	8	-
Work in the field			
B	Sub surface drainage	8	A
C	Filling playing field & track	14	B
D	Installation of artificial playing turf	12	C
Work on structure			
E	Excavation	4	A
F	Concrete footings	4	E
G	Supports for seat galleries	12	F
H	Erecting pre-cast galleries	13	G
I	Seat concreting	4	H
J	Steel structure for roof	4	F
K	Erecting roof	8	J
L	Dressing rooms	4	K
M	Painting seats	3	I,L
N	Lighting	5	K
O	Score board & other facilities	4	K

(a) Draw the activity on arrow network diagram for the given project and carryout the backward pass and forward pass to determine the early start time (EST), late start time (LST), early finish time (EFT) and late finish time (LFT) for each activity.

(08 marks)

(b) Mark the critical path and explain the benefits of using Critical Path Method (CPM) as a project monitoring and controlling technique. (04 marks)

(c) Draw a bar chart for the project based on the early start times. State one advantage of using a network diagram and one advantage of using a bar chart.

(08 marks)

(08)

(a) Identify possible ways in which accidents can happen during materials handling at construction sites. Suggest possible precautions to be taken to prevent them. Give the answer in table form.

(14 marks)

(b) Prepare a suitable 'accident prevention' poster to be displayed at a multistory building construction site. (06 marks)