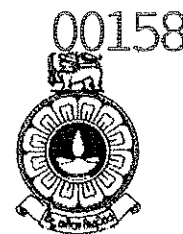


(13)

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Civil Engineering



Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: CVX4532/CEX4232 Construction Engineering and Planning
Academic Year	: 2017/18
Date	: 25 th January 2019
Time	: 0930-1230hrs

General Instructions

1. Read all instructions carefully before answering the questions.
 2. This question paper consists of Eight (8) questions in Four (4) pages.
 3. Answer a total of Five (5) questions selecting at least two (2) questions from each section. All questions carry equal marks.
 4. Answer for each question should commence from a new page.
 5. This is a Closed Book Test (CBT).
 6. 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
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(01)

The quality of workmanship is very important to ensure the strength and durability of concrete. Answer the following in relation to this.

- (a) "Entrapped air" in concrete and "entrained air" in a concrete mix. (05 marks)
- (b). Briefly discuss the three (3) main factors that affect the workability of concrete and their implication on ready-mix concrete. (05 marks)
- (c). The method of using a poker vibrator for the compaction of concrete and suitable precautions to be taken. (05 marks)
- (d). Explain what is meant by 'curing' of the concrete cast at site, and the reasons why curing should be done. (05 marks)

(02)

- (a). Explain what is meant by 'compaction of soil'. (04 marks)
- (b). What are the factors which influence the degree of soil compaction? (04 marks)
- (c). Briefly describe the procedure for compacting earthworks. (04 marks)
- (d). A layer of topsoil is to be moved over a haul distance of 30 meters with the help of a bulldozer under the following operating conditions:

The bulldozer travels at 3 km/h when it is pushing the topsoil and returns at double the pushing speed. The time taken for loading, shifting gears etc. is 0.35 minutes for each cycle. The operating factor is 50 minutes per hour. The soil has a swell of 25% and the rated capacity of the machine is 4 cubic meters of loose volume.

Determine the output of the bulldozer per hour. Indicate each step of your calculations. (08 marks)

(03)

- (a) Draw a diagram showing a typical wiring and switching system with two switches & bulbs. Indicate live and neutral wires clearly in the diagram. (04 marks)
- (b) Briefly explain the three (3) types of electrical wiring installation used in domestic buildings. (04 marks)
- (c) Briefly explain the following terms used in electrical installation systems;
(ii) Earth (ii) Single-phase supply (iii) Three-phase supply (iv) Kilowatt (v) Rating (04 marks)
- (d) Lamps used for lighting of domestic buildings can be either (i) CFL bulbs, or (ii) LED bulbs. Briefly explain the two types. (04 marks)
- (e) List the five (5) types of lamps commonly available. Briefly describe each of them. (04 marks)

(04)

- (a) As a responsible engineer the safety of people and property should be ensured when building in densely built-up areas.
 - i. State six (6) important points to be considered in determining the type, and degree of support which should be provided to the sides of an excavation. (06 marks)
 - ii. Discuss two (2) important factors to be considered before commencing excavations adjacent to existing buildings. (05 marks)
- (b) Explain using clear and neat sketches, the use of a profile board to set out excavations for foundations of a new building. (04 marks)
- (c) Write short descriptive notes on “displacement piles” and methods of installing them. (05 marks)

SECTION B

(05)

- (a) There are different levels of construction planning. Explain the Macro planning process and the Micro planning process of building construction projects. (05 marks)
- (b) Outline five (5) activities each for macro and micro planning, with respect to construction of an examination hall for the Open University of Sri Lanka. You may make suitable assumptions. (04 marks)
- (c) Explain why construction site layout planning is an important activity giving four major considerations for planning site facilities. Describe four important site facilities commonly provided at construction sites. (07 marks)
- (d) Explain the resources used in civil engineering construction and describe the procedure for scheduling of resources in brief. (04 marks)

(06)

- (a) Explain the function of a Bar Chart and the function of a Network Diagram. (04 marks)
- (b) Table 1 in next page gives the activities and their interactions, together with their durations in days, for a project to install a pump used for pumping water.
 - (i) Draw a complete activity-on-arrow network diagram for the given project. Carryout the forward pass and backward pass, and determine the early event time (EET) and the late event time (LET) for each activity. (06 marks)
 - (ii) Determine the project completion time and identify the critical path (02 marks)
 - (iii) Draw Bar Charts for the activities based on early start times and late start times on the same axis. (04 marks)
 - (iv) Calculate the float times for activities. (04 marks)

Table 1

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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

(07)

- (a) Explain 'Unit Rate Estimating' and 'Operational Estimating' highlighting the differences. Use a direct cost rate and an operational cost rate for simple BOQ items as examples to illustrate your answer for each case. Actual costs are not required.

(10 marks)

- (b) Explain the items that need to be recorded when performing Progress Control on a construction site.

(05 marks)

- (c) Give an example of an accident that may occur on a construction site and explain five causes for indirect costs.

(05 marks)

(08)

- (a) Selection of earthmoving plant will depend on the construction methods to be used for specific work. Explain five factors to be considered when selecting construction methods for basements, deep pits, trenches etc.

(05 marks)

- (b) Cranes & Hoists are used for lifting materials. Explain five types of crane indicating their use.

(05 marks)

- (c) Explain the terms 'operating efficiency' and 'operating factor' for a given equipment.

(05 marks)

- (d) Explain the terms 'Fixed time' and 'Variable time' in relation to the Cycle time for a scraper.

(05 marks)