00159

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	**: CVX6546 Construction Engineering and Management**
Academic Year	: 2021/2022
Date	: 14th February 2023
Time	: 0930-1230hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Six (6)** questions in **Three (3)** pages.
3. Answer any **Four (4)** questions only. All questions carry equal marks.
4. Answer for each question should commence on a new page.
5. This is a Closed Book Test (**CBT**).
6. Answers should be in clear handwriting.
7. Do not use red colour pens.

Q1.

(a) Describe the importance of providing 'site preparation and services' effectively in a new highway construction project with reference to the following two services;

- plant maintenance workshop and standing area
- water supply

(Marks 07)

(b) Explain the external factors (additional factors) to be considered during the planning stage for site mobilisation.

(Marks 06)

(c) Name four possible types of material that could be encountered during an excavation for a building requiring a deep foundation. Also name equipment/tools which could be used in the excavation of these materials.

(Marks 07)

(d) Write a descriptive note on 'tamping rollers'.

(Marks 05)

Q2.

(a) Subgrade, sub-base, base and surfacing are the four main elements of a road pavement. Briefly describe the types and respective specifications used in Sri Lanka separately when preparing two of these elements namely base and surfacing.

(Marks 07)

(b) Explain the roller compacted concrete (RCC) and state four advantages of using RCC in dam construction.

(Marks 06)

(c) There are three different actions through which compaction effort (energy) can be applied to a soil layer to attain compaction. Explain these actions while emphasising on the equipment which offer these actions and the type of soil for which these actions are suitable.

(Marks 06)

(d) Entrapped air in fresh concrete can cause numerous harmful effects to concrete. Briefly explain four such harmful effects.

(Marks 06)

Q3.

(a) There are several factors affecting the workability of concrete other than the water content. Identify five such factors and briefly explain how they affect the workability.

(Marks 07)

(b) Describe the role of the site engineer of a multi storied building in planning a concreting operation carried out using ready mixed concrete and concrete pumps (pump cars).

(Marks 07)

(c) The primary purpose of vibration is to compact the concrete in order to achieve the maximum possible density of concrete. Briefly explain what is understood by 'Over vibration' and 'Revibration' while emphasizing on situations where these acts can be harmful and their consequences on quality of concrete.

(Marks 06)

(d) Write an explanatory note on external (clamp on) vibrators emphasising on their installation and operation.

(Marks 05)

Q4.

(a) Briefly describe the construction process of 'Driven cast-in-place piles'.

(Marks 06)

(b) List any eight different properties required of high performance concrete (HPC). Briefly explain the use of supplementary cementitious materials in producing HPC.

(Marks 07)

(c) List six different properties of HPC that enables it to show resistance in severe environment (high durability in severe environment). Explain any two such properties.

(Marks 05)

(d) The green buildings facilitate a country to achieve a range of global expectations such as addressing climate change and accelerating economic growth. Explain environmental, social, and economic benefits of green buildings.

(Marks 07)

Q5.

(a) Explain the role of a project manager in construction safety in relation to the three main requirements.

(Marks 06)

(b) Explain what is meant by 'housekeeping' in a construction site, and also how to implement this in a construction project.

(Marks 06)

(c) The concept of quality that we know of has evolved through four stages. Identify these stages and indicate their main features.

(Marks 06)

(d) Explain the benefits of adopting a formal quality standard using an example of a formal quality standard.

(Marks 07)

Q6. A Construction Company is awarded a contract to construct an office building. The activity list along with descriptions, respective preceding activities and durations are given in the table below.

Activity	Activity Description	Preceding Activities	Duration (weeks)
A	Organise		3
B	Site layout		3
C	Excavation	A, B	6
D	Foundation	C	12
E	Floor slab	D	3
F	Structures	E	18
G	Roof construction	F	6
H	Brickwork	F	12
I	Masonry	F	3
J	Plumbing and electrical work	H	6
K	Plastering	H, I	12
L	Doors and windows	K	3
M	Roof covering	G	3
N	Painting	G, J, L	6
O	Glazing	L	3
P	Clearing	M, N, O	3

(a) Draw the activity on arrow diagram for this project.

(Marks 08)

(b) Carry out the forward pass and backward pass calculations on this network and indicate the critical path.

(Marks 05)

(c) Name three types of floats used in Critical Path Method and compute these for activities G and J.

(Marks 04)

(d) Under resource planning, there are two approaches to assessing resources required for a project. Briefly explain these two approaches.

(Marks 08)