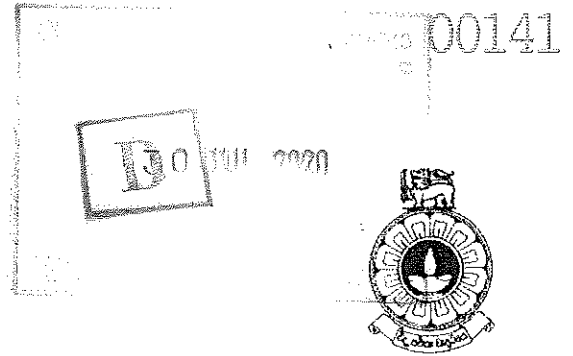


The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Civil Engineering



Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: CVX6831/CEX6331 Construction Engineering and Management
Academic Year	: 2019/20
Date	: 30 th July 2020
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 from a new page.
5. This is a Closed Book Test (**CBT**).
6. Answers should be in clear handwriting.
7. Do not use red colour pen.

Q1.

- (a) Site mobilisation is an important aspect in any large construction project, which requires sufficient attention of the project manager as well as the other personnel who are involved in planning the particular project. Briefly describe typical 'site preparation and services' that are required in a large construction site. (Marks 06)
- (b) Excavation is a construction process which is among the most hazardous of all construction operations and it is the responsibility of project engineer to carry out safer site excavations. Describe two techniques used for ensuring stability and safety of excavation. (Marks 07)
- (c) Define the term earth compaction and list five different types of earth compacting equipment. Briefly explain how compaction is accomplished by two such equipment. (Marks 06)
- (d) Briefly explain the following types of load bearing piles and their applications while illustrating your answer with sketches:
(i) End bearing pile
(ii) End bearing and friction piles (Marks 06)

Q2.

- (a) There are major two types of pavements based on their structure; flexible pavement and rigid pavement. Briefly describe above two giving examples their applications. (Marks 06)
- (b) Subgrade, sub-base, base and surfacing are four main elements of a road pavement. Briefly describe design considerations of the above elements. (Marks 06)
- (c) The formwork is a vital component of concreting work in construction. Different types of formwork are used under different circumstances and fabricated with different materials to meet specific requirements. Name two types of formwork used in Sri Lanka and explain the advantages of each under different circumstances. (Marks 06)
- (d) The preparation of course aggregate is a production process which follows a definite flow diagram. Therefore, different component of the aggregate crushing plant must be arranged in such a manner to optimise the operation. Draw an aggregate process flow diagram, and briefly state the primary function of any four components of aggregate crushing plant. (Marks 07)

Q3.

- (a) Concrete mix design is the process of finding right proportions of cement, fine aggregates, coarse aggregates and water for concrete to achieve target strength. Explain separately how size and shape of coarse aggregates affect the properties of concrete. List three most widely used methods of concrete mix design and briefly describe one of them. (Marks 06)

- (b) Due to the scarcity and negative environmental impacts of river sand mining, production of concrete has to rely on alternative fine aggregates. Describe two possible alternatives to river sand with their advantages and disadvantages. (Marks 07)
- (c) Describe the project manager's role in planning a concreting operation carried out using ready mixed concrete and concrete pumps for a construction of multi storied building. (Marks 06)
- (d) The main objective of vibration is to compact the concrete and to achieve the maximum possible density of concrete. Briefly explain what is understood by 'Over vibration' and 'Revibration' while emphasising their consequences on quality of concrete. (Marks 06)

Q4.

- (a) The precast concrete industry is evolving as a result of changes in market demand, increasing customer expectations and pressure from increasing labour costs. Explain two modern precast techniques used worldwide and their adaptability to Sri Lanka. (Marks 07)
- (b) Dredging is a form of excavation carried out under any of the following situations: fully underwater, partially underwater, shallow waters or ocean water. List three most widely used types of dredgers and explain any two of them in detail. (Marks 06)
- (c) Briefly explain the two common methods of welding, and state two advantages and two disadvantages of each. (Marks 06)
- (d) The importance of concept of green buildings is increasing as never before. The green buildings facilitate achieving a range of global expectations such as addressing climate change and accelerating economic growth. Briefly explain environmental, social, and economic benefits of green buildings. (Marks 06)

Q5.

- (a) What is understood by a raft foundation? Explain two types of raft foundations while illustrating your answer with sketches. (Marks 06)
- (b) Briefly explain what idea Maslow's Hierarchy of needs theory conveys, and list the five types of needs embedded in this theory with examples. (Marks 06)
- (c) Motivation levels within the workplace have a direct impact on employee productivity. Workers who are motivated and excited about their jobs carry out their responsibilities to the best of their ability, and productivity increases as a result. Explain techniques that can be applied to motivate construction workers to optimise the productivity in Sri Lanka. (Marks 07)
- (d) Explain briefly different semi financial incentives and financial incentive schemes used in construction industry illustrating with examples. (Marks 06)

Q6.

The Asian Development Bank (ADB) has agreed to fund a project to develop water supply facilities in a remote newly developed township. The contract has been awarded to a local contractor who has a shortage of technically competent supervisors. The project once planned has the following activities with given durations, precedence activities and supervisory requirements;

Activity	Immediate Preceding Activity	Duration Days	Supervisory Requirement (number of supervisors)
A	-	2	-
B	A	4	2
C	A	4	4
D	A	3	0
E	B	4	6
F	C	7	0
G	C	2	4
H	D	5	4
J	F	2	2
K	H	5	2
L	J	2	-
M	E, L, G	3	-
N	K, M	2	-

- (a) Draw the activity on arrow diagram for this project, carry out the forward pass and backward pass on this network, and identify the critical path. (Marks 08)
- (b) Compute the three main types of floats used in Critical Path Method (CPM) for all activities. (Marks 04)
- (c) Draw a resource aggregation chart based on 'early start order' for the resource 'supervisor'. (Marks 05)
- (d) Explain comprehensively the significance of planning and progress control, separately, in relation to a construction project. (Marks 08)