



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 1 Examination in Engineering: October 2019

Module Number: CE 1202

Module Name: Introduction to Infrastructure Planning

[Three Hours]

[Answer all questions, each question carries FIFTEEN marks]

Answers to Section-A and Section-B shall be provided on separate booklets

SECTION - A

- Q1. a) List four factors which need to be considered in selecting stations (or control points) for tape and offset surveying? [2.0 Marks]
- b) Explain the differences between 'Geological surveying' and 'Geographical Surveying'. [2.0 Marks]
- c) Explain the purpose of 'Fly Back' in leveling. [2.0 Marks]
- d) Table Q1 shows data extracted from a Surveying Field Book during a leveling exercise carried out between two Temporary Bench Marks (TBMs) 'A' and 'B'. Elevations at the two TBMs 'A' and 'B' have been established as 100.00 m and 99.295 m, respectively from the Mean Sea Level (MSL).
- i) Calculate the reduced levels of stations P, Q, and R by rise and fall method. [7.0 Marks]
- ii) Comment on the accuracy of the level line based on the readings of the two TBMs 'A' and 'B'. [2.0 Marks]
- Q2. a) i) List four features of an aesthetically pleasing building. [2.0 Marks]
- ii) State four factors that have to be considered in selecting a land for construction of a residential building. [2.0 Marks]
- iii) Consider a two storey building which is used for residential purposes. Describe how the efficient connection between activity spaces helps for effective functioning of the building. [2.0 Marks]

- b) i) Briefly explain why traps should be included with sanitary appliances. [1.0 Mark]
- ii) With the aid of sketches, describe the different types of traps with respect to their shapes. [3.0 Marks]
- c) i) In designing below-ground drainage systems, capacity of the pipes needed to convey discharges from the sanitary appliances to the below-ground drainage system are determined based on two parameters. State the two parameters. [2.0 Marks]
- ii) Drain termination is one of the main aspects to be considered in designing the below-ground drainage systems. Explain the methods that can be adopted in terminating the below-ground drains. [3.0 Marks]

Q3. a) Give an example for each of the following structural elements:

- i) Linear
- ii) Surface
- iii) Volume

[1.5 Marks]

b) i) What is meant by shrinkage of concrete?

[1.0 Mark]

ii) What is the main cause for shrinkage in concrete?

[1.5 Marks]

iii) List all the steps in concreting process in sequence and explain any step in detail.

[4.0 Marks]

c) i) With compared to the concrete, state four advantages and two limitations of steel as a construction material.

[2.0 Marks]

ii) Explain why steel and concrete are used in conjunction in reinforced concrete.

[2.0 Marks]

iii) Draw the variation of stress versus strain over a steel bar as it is stressed gradually from elastic behaviour to plastic behaviour and ultimate failure condition (fracture).

[3.0 Marks]

SECTION - B

- Q4. Palaly airport in the northern Sri Lanka is to be developed as International airport. It is expected that this project will boost the economy of the people in the vicinity of the new airport as well as those living far away. There will be many feed-back cycles activated by this project.
- a) Identify three civil engineering sub-disciplines and briefly explain the need of those sub-discipline for this project. [5.0 Marks]
- b) Explain what is meant by a negative and positive feed-back cycles. [2.0 Marks]
- c) Palaly airport development project can be modelled as a civil engineering system. Answer the following questions with respect to the modelling of this project as a system.
- i) Identify two examples for feedback cycles of the system. [1.0 Mark]
- ii) Identify five inside (main) elements of the system. [2.0 Marks]
- iii) Identify two outside (environmental) factors of this system. [1.0 Mark]
- iv) Construct a system diagram indicating the connections between the elements. [1.0 Mark]
- d) Invention of Bisokotuwa helped the ancient Sri Lankans to build reservoirs that lasted for a long time. Explain how Bisokotuwa works. [3.0 Marks]

Table Q1: Data extracted from a Surveying Field Book

Backsight (m)	Intermediate sight (m)	Foresight (m)	Remarks
3.140			TBM 'A'
2.150		2.790	Change point (CP) 1
	1.385		P
1.900		1.950	CP 2
	0.620		Q
3.780		2.050	CP 3
1.850		3.130	CP 4
	2.185		R
1.475		1.830	CP 5
		3.250	TBM 'B'

