# UNIVERSITY OF RUHUNA

### Faculty of Engineering

End-Semester 1 Examination in Engineering: August 2018

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.**

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## SECTION – A

Q1.  a)  Explain the differences between 'Plane Surveying' and 'Geodetic Surveying'.

[2.0 Marks]

b)  Define the following terms with respect to leveling.
  i)    Datum.
  ii)   Level line.
  iii)  Horizontal line.

[3.0 Marks]

c)  List main factors affecting accuracy in leveling.

[3.0 Marks]

d)  Table Q1 shows data extracted from a Surveying Field Book during a leveling exercise carried out on continuously sloping ground. Elevation at chainage 150 m has been established as 150.00 m from Mean Sea Level (MSL).
  i)    Find the reduced levels of all the stations by rise and fall method.

[5.0 Marks]

  ii)   Calculate the gradient of the line joining the first and last stations.

[2.0 Marks]

Table Q1

| Station | Chainage (m) | Backsight (m) | Intermediate sight (m) | Foresight (m) | Remarks |
|---------|--------------|---------------|------------------------|---------------|---------|
| 1 | 0 | 0.580 | | | |
| 2 | 15 | | 1.110 | | |
| 3 | 30 | | 2.365 | | |
| 4 | 45 | | 2.870 | | |
| 5 | 60 | 0.635 | | 3.435 | Change point (CP) 1 |
| 6 | 75 | | 1.370 | | |
| 7 | 90 | | 2.415 | | |
| 8 | 105 | | 3.205 | | |
| 9 | 120 | 0.710 | | 4.110 | CP 2 |
| 10 | 135 | | 1.825 | | |
| 11 | 150 | | | 2.665 | Elevation = 150.00 m |

Q2.  a)  i)  List at least ten activity spaces for a two story house plan proposed for a lawyer.

[2.0 Marks]

     ii)  Draw the activity relationship diagram (bubble diagram) for the activity spaces listed above.

[2.0 Marks]

    b)  i)  Explain the difference between a 'Shallow Foundation' and a 'Deep Foundation'.

[2.0 Marks]

     ii)  Explain the reasons for choosing 'Pile Foundation' in some constructions.

[2.0 Marks]

    c)  i)  State the factors which need to be considered in choosing materials for different types of structures.

[1.0 Mark]

     ii)  Briefly explain the advantages of the use of steel as a structural material.

[2.0 Marks]

    d)  Describe how the following factors affect workability of concrete.
        i)  Water/Cement ratio.

[2.0 Marks]

        ii)  Aggregate/ Cement ratio.

[2.0 Marks]


Q3.  a)  i)  Describe the basic principle of electronic distance measurement.

[2.0 Marks]

     ii)  List main uses of total station in surveying.

[2.0 Marks]

    b)  i)  Explain main purposes for carrying out a reconnaissance survey before a 'Tape and Offset Survey'.

[2.0 Marks]

     ii)  List essential details of a prospection diagram drawn for a 'Tape and Offset Survey'.

[2.0 Marks]

    c)  Explain with sketches, how to carry out the following operations in 'Tape and Offset Survey'.
        i)  Measure a line that crosses a river of about 50 m wide.

[2.0 Marks]

        ii)  Set out a right angle from a survey line.

[2.0 Marks]

    d)  Distance between two stations A and B, measured using a 30 m steel tape was recorded as 350 m. Later it was found that the tape was 0.05 m short for every 30 m it measures. Determine the correct distance between A and B.

[3.0 Marks]

Q4.   A dam construction is proposed as a multipurpose development project in drought-stricken rural area of dry zone in Sri Lanka.

a)   Define the terms 'Civil Engineering' and 'Military Engineering', the two major divisions of engineering considered at the beginning of the evolution of Engineering profession.

[2.0 Marks]

b)   List five sub-disciplines of civil engineering which are required for the design and construction of the dam.

[2.5 Marks]

c)   List five possible purposes of a construction of a reservoir.

[2.5 Marks]

d)   List five possible stake holders identified from the purposes list in Q4. (c).

[2.5 Marks]

e)   It is needed to model this dam project as civil engineering system. Answer the following questions in order to full fill this need.

   i) Identify two feedback cycles in the system.
   ii) Identify five main (inside) elements in the system.
   iii) Identify two main environmental related (outside) elements to this system.
   iv) Draw the system diagram indicating the connections between the different elements identified in Q4. (e) (ii) and (iii).

[5.5 Marks]