

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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**University Examinations 2015/2016**

**SECOND YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING**

**ECV 2251 : ENGINEERING SURVEY III**

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**DATE: NOVEMBER, 2015 TIME:** $1½$ **HOURS**

**INSTRUCTIONS:** *Answer question* ***one COMPULSORY*** *and any other* ***two*** *questions.*

**QUESTION ONE – (30 MARKS)**

1. (i) Define a curve, as used in engineering survey. (2 Marks)

(ii) Curves in highway engineering are classified under two subheadings; Horizontal curves and vertical curves. Discuss the difference between the two. (4 Marks)

1. State and explain the four types of horizontal curves. (4 Marks)
2. By way of a clear and well labeled diagram, illustrate any five elements of a horizontal curve. (10 Marks)
3. A circular curve 12 has a length of 100m. Find its radius by:
4. Arch definition (2 Marks)
5. Chord definition (2 Marks)
6. Describe the two types of a vertical curve. (2 Marks)
7. (i) What is satellite ranging? (2 Marks)

(ii) State the original purpose of the satellite system. (2 Marks)

**QUESTION TWO (15 MARKS)**

1. Define the following surveying concepts;
2. Triangulation network (1½ Marks)
3. Trilateration network. (1½ Marks)
4. Outline any three sources of errors in GPS measurement, and describe procedures by which they can be minimized. (12 Marks)

**QUESTION THREE (15 MARKS)**

1. What is a symmetrical vertical curve? (3 Marks)
2. Using a clear and well labeled diagram, illustrate any six elements of a vertical curve.

(12 Marks)

**QUESTION FOUR (15 MARKS)**

1. State any four linear methods of setting out a simple circular curve. (2 Marks)
2. A circular curve has a 200m radius and 650 deflection angle. What is its length by:
3. arc definition (1 ½ Marks)
4. chord definition (1 ½ Marks)

 Also calculate;

1. Length of curve (2 Marks)
2. tangent length (2 Marks)
3. length of chord (2 Marks)
4. apex distance (2 Marks)
5. mid ordinate (2 Marks)