



# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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## University Examinations 2013/2014

SECOND YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL  
ENGINEERING

### ECV 0229: ENGINEERING SURVEY III

DATE: APRIL 2014

TIME: 1 ½ HOURS

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

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#### QUESTION ONE – (30 MARKS)

- (a) Differentiate the following concepts:
- (i) Global positioning system (GPs) and differential global positioning system (DGPS)
  - (ii) Elevation and super elevation
  - (iii) Systematic error and random errors (3 Marks)
- (b) Calculate the actual construction radius of a curve section of a road whose design speed is 120Km/hr and the carriage width is 6.7m. (3 Marks)
- (c) State and explain the three main guidelines of performing a three point resection. (3 Marks)
- (d) With an aid of a diagram, explain the following types of curves.
- (i) Transition curves (2 Marks)
  - (ii) Compound circular curves (2 Marks)
  - (iii) Reverse circular curves (2 Marks)
- (e) (i) Define the term ‘traverse’ (1 Marks)
- (ii) Explain the following types of closed traverse
- i. Loop traverse (2 Marks)
  - ii. Connecting traverse (2 Marks)
- (f) Explain the following concepts
- (i) Triangulation network (2 Marks)
  - (ii) Trilateration network (2 Marks)

(g) The following data was extracted from a survey booking;

Angle of deflection  $\theta = 24^{\circ}18'00''$

Radius 'R' = 620m

Determine

- (i) Tangent length (2 Marks)
- (ii) Long chord length (2 Marks)
- (iii) Tangential angle of the circular curve under establishment. (2 Marks)

### QUESTION TWO – (15 MARKS)

- (a) Two straight roads section *TI and Iu* meet at a deflection angle of  $4^{\circ}32'00''$  are to be connected by a  $4^{\circ}$  circular curve. The through chainage of the intersection points is 272.74 M and the bearing of *TI* is  $18^{\circ}00'$ . Calculate the bearing which must be set off from T and u to fix the first two pegs on the circular curve. Assume that the pegs are to be set at exact 20m multiples of through chainage. (8 Marks)
- (b) Explain the significance of super elevation in curve sections of roads. (2 Marks)
- (c) (i) Calculate the value of super elevation (SE) of a road section whose carriage way width is 7.3m and its design speed is 80Km/hr. (3 Marks)
- (ii) Based on stipulated DoE allowable SE values. Comment on the obtained value. (2 Marks)

### QUESTION THREE – (15 MARKS)

- (a) As an engineer assume that the university management has appointed you to design a curve that connects two straight roads at a deflection angle of  $24^{\circ}18'24''$ . The circular curve has a radius of 660m. Using tangential angle method make all necessary calculation for setting out the curve. Take a through chainage of intersection point to be 2470.85m and pegs internal of 25m. (8 Marks)
- (b) Briefly explain the three major component segments in GP. (7 Marks)

### QUESTION FOUR – (15 MARKS)

- (a) Explain any four methods of setting circular curves in road. (8 Marks)
- (b) State any five types of errors that a regular GPs receives may experience. (5 Marks)
- (c) Convert a 400m radius curve into a degree curve. (2 Marks)