



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)

University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING

DIPLOMA IN BUILDING TECHNOLOGY

BCECD & BCEBT 205: ENGINEERING SURVEYING II

Date: 25/4/2016

Time: 8:30 – 10:30 AM

INSTRUCTIONS:

- This paper comprises of **five** questions
- Question **one** is **compulsory** and carry 30 marks
- Answer **question one** and any **other two** questions

1. a) List three axes on which the theodolite is constructed (3 marks)
- b) Distinguish between the following terms as referred to in theodolite measurements
 - i. Face-left and face-right observation
 - ii. Transiting and swinging the telescope
 - iii. Balancing in and lining in (6 marks)
- c) Briefly describe three methods of measuring horizontal angles in theodolite surveying (9 marks)
- d) With an aid of a neat labeled sketch describe six parts of the theodolite (12 marks)

2. a) Distinguish between the following co-ordinate systems
- Polar and Rectangular co-ordinates
 - Reduced and Whole Circle bearings (4 marks)
- b) State six considerations in the selection of compass traverse stations (6 marks)
- c) Explain the Vertical Circle Index Adjustment under the following sub-headings;
- Aim
 - Test
 - Adjustment (10 marks)
3. a) Convert the following quadrantal bearings to whole circle bearings
- N65° 20'E
 - S84° 25'E
 - N39° 10'W
 - S48° 55'W (4 marks)
- b) State three sources of errors in horizontal distances determined tacheometrically giving relevant examples in each case (6 marks)
- c) With the aid of a sketch derive the tacheometric formulae for determining horizontal distance and the difference in height between two points when the staff is held vertical and the line of sight inclined upwards. (10 marks)
4. a) State five geometrical relationships of a correctly adjusted theodolite (5 marks)
- b) The table below shows data obtained during a compass traverse exercise.
- | Line | Forward bearing | Back bearing |
|------|-----------------|--------------|
| AB | 89°40' 00" | 271°25' 00" |
| BC | 122°40' 00" | 301° 40' 00" |
| CD | 240°10' 00" | 60°10' 00" |
| DA | 323°10' 00 " | 142°25' 00" |
- Identify the stations that are free from local attraction
 - Determine the correct bearings for the traverse lines
 - If the magnetic declination on site was found to be 3° 45' west, determine the true bearings of the traverse lines (15 marks)

5. a) The table below shows data obtained on a road survey exercise. Determine the correct vertical angles to points M, N and P

Point	Height of target	Vertical angle	
		Face Right	Face Left
M	1.250 m	88°12' 20"	271°45' 27"
N	1.250 m	89°28' 30"	270°29' 30"
P	1.250 m	90°38' 10"	269°19' 42"

(5 marks)

- b) The table below shows tachometric observations on an inclined staff at stations P and T. The co-ordinates of the instrument station are; (+ 1540.00 mN, - 1075.00 mE). If the tachometric constants are 100 and 0, determine;

- (i) The co-ordinates of P and T
(ii) Difference in height between P and T

Staff station	Bearing	Vertical angle	Stadia readings (m)		
P	300°30' 40"	+ 14°10' 00"	1.28	1.83	2.50
T	180°40' 20"	- 8° 40' 00"	2.20	2.60	3.46

(15 marks)