



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

DIPLOMA IN BUILDING TECHNOLOGY

DIPLOMA IN CIVIL ENGINEERING

BCECD 205; ENGINEERING SURVEYING II

DATE: 31/5/2017

TIME: 2:00 – 4:00 PM

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) State three functions of the theodolite in surveying. (3 marks)
- b) Define the following terms as used in theodolite surveying.
 - i. Face-left observation
 - ii. Face-right observation
 - iii. Transiting the telescope
 - iv. Swinging the telescope (6 marks)
- c) Briefly describe two methods of measuring horizontal angles in theodolite surveying. Use relevant sketches if necessary. (9 marks)
- d) With an aid of a neat labeled section sketch describe eight major parts of the transit theodolite. (12 marks)

2. a) Distinguish between the following types of bearings
- Whole Circle bearings (WCB)
 - Quadrantal bearings (QB) (4 marks)
- b) State six considerations to be made when selecting traverse stations (6 marks)
- c) Explain the procedure of conducting temporary adjustment of any universal survey instrument. (10 marks)
3. a) Convert the following Whole Circle bearings to reduced bearings
- $256^{\circ} 20'$
 - $84^{\circ} 25'$
 - $139^{\circ} 10'$
 - $348^{\circ} 55'$ (4 marks)
- b) Briefly explain three sources of errors in measuring horizontal distances determined by tacheometric methods. (6 marks)
- c) With the aid of a sketch derive the lens formulae for determining horizontal distance and the difference in height between two points when the staff is held vertical and the line of sight is horizontal in tacheometric surveying. (10 marks)
4. The table below shows data obtained during a compass traverse exercise.

Line	Forward bearing	Back bearing
AB	$89^{\circ}40' 00''$	$271^{\circ}25' 00''$
BC	$122^{\circ}40' 00''$	$301^{\circ} 40' 00''$
CD	$240^{\circ}10' 00''$	$60^{\circ}10' 00''$
DA	$323^{\circ}10' 00''$	$142^{\circ}25' 00''$

- 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 $3^{\circ} 45'$ west, determine the true bearings of the traverse lines (20 marks)
5. 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;
- The co-ordinates of P and T
 - Difference in height between P and T

Staff station	Bearing	Vertical angle	Stadia readings (m)		
P	$300^{\circ}30' 40''$	$+ 14^{\circ}10' 00''$	1.28	1.83	2.50
T	$180^{\circ}40' 20''$	$- 8^{\circ} 40' 00''$	2.20	2.60	3.46

