



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

SCHOOL OF ENGINEERING AND TECHNOLOGY

**UNIVERSITY EXAMINATIONS FOR THE DIPLOMA IN BUILDING
AND CIVIL ENGINEERING**

2ND YEAR 2ND SEMESTER 2017/2018 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TBC 2222

COURSE TITLE: ENGINEERING SURVEYING II

EXAM VENUE: LR 15

STREAM: DIP IN BLD & CIV ENG

DATE: 20/12/2017

EXAM SESSION: 2.00 – 3.30PM

DURATION: 1 ½ HOURS

Instructions

- 1. Answer question 1 (Compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

QUESTION ONE (MARKS 30)

- i. Define the following (MARKS 9)
 - a) Levelling survey
 - b) Traverse survey
 - c) Setting out survey

- ii. What do you understand by the following as used in engineering surveying (MARKS 12)
 - a) Datum
 - b) Bench Mark
 - c) Survey Station
 - d) Survey line

- iii. List any three areas where you can apply levelling survey in your profession (MARKS 3)
- iv. The table below shows field measurements of four angles of a traverse. Using the table, calculate the values of the angles (MARKS 6)

Observation station	Target station	Face left reading	Face right reading	Accepted mean angle
B	A	89° 16' 20''	269° 16' 20''	
	C	185° 18' 40''	365° 19' 00''	
C	B	185° 39' 40''	05° 39' 20''	
	D	271° 38' 20'	91° 38' 40''	
D	C	275° 18' 00''	95° 18' 20''	
	A	01° 02' 20''	181° 02' 40''	
A	D	00° 00' 00''	180° 00' 00''	
	B	92° 15' 30''	272° 15' 30''	

QUESTION TWO (MARKS 20)

- i. Briefly discuss ways of classifying traverse survey (**10 marks**)
- ii. Outline the basic steps involved in traverse surveying (**2.5 marks**)
- iii. Explain what is meant by Face Left and Face Right in angular measurements using theodolite instrument and its importance in the exercise (**3 marks**)

- iv. The table below shows a set of slope linear distances and slope angles. The angles are taken with the telescope in the zenith position. Compute the horizontal distances **(4.5 marks)**

Line	Slope length (m)	Zenith angle θ ($^{\circ}$)	Horizontal distance, H (m)
AB	25.735	87 $^{\circ}$ 20' 30"	
BB'	11.101	105 $^{\circ}$ 25' 30"	
B'C	12.202	85 $^{\circ}$ 15' 10"	
CD	53.317	93 $^{\circ}$ 26' 50"	

QUESTION THREE (MARKS 20)

- i. Discuss in brief the various types of bearings which you know **(6 marks)**
 ii. ABCD is an open traverse and the survey data is as given here below

Line	AB	BC	CD	DE
Forward Bearing	30 $^{\circ}$ 00' 00"	110 $^{\circ}$ 00' 00"	225 $^{\circ}$ 00' 00"	295 $^{\circ}$ 00' 00"
Length of line	50.0	70.0	82.0	31.2

Complete the table below and show all your computations step by step **(14 marks)**

Line	Partial Coordinate		Total Coordinates		Station
	ΔX	ΔY	Easting	Northing	
			0.00	0.00	A
AB					B
BC					C
CD					D
DE					E

QUESTION FOUR (MARKS 20)

- i. Where would you apply the knowledge of horizontal curves learnt in this course? **(1.5marks)**
 ii. By the use of a sketch, explain the following terminologies as used on a horizontal curve
- Vertex (V)
 - Deflection angle (Δ)
 - Sub tangent distance (T)
 - Point of curvature (PC)
 - Point of tangency (PT)
 - Long cord (LC)
 - Middle ordinate (MO)
 - External (E)

(8 marks)

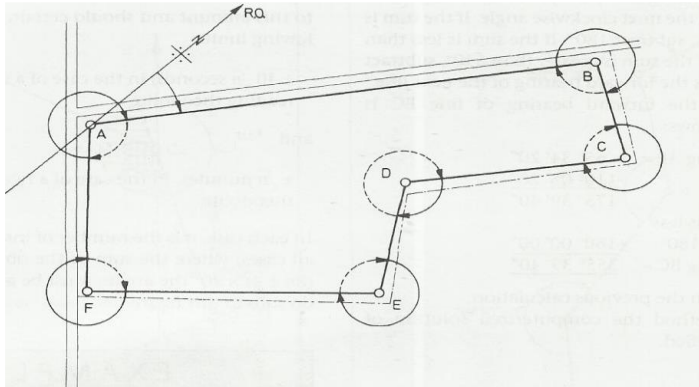
- iii. Complete the horizontal curve data given in the table below (10.5 marks)

	Symbol	Terminology	Equation
1	LC	Long Cord	

2	R	Radius	
3	L	Length of curve	
4	T	Tangent Distance	
5	D	Degree of curve	
6	E	External distance	
7	MO	Middle Ordinance	

QUESTION 5 (20Marks)

The figure below shows a route of a traverse survey. The values of exterior angles measured by one second theodolite are given in the table below.



The whole circle bearing of line AB is $43^{\circ} 40' 45''$

Angle	ABC	BCD	CDE	DEF	EFA	FAB
Mean observed value	$272^{\circ} 03' 10''$	$272^{\circ} 05' 51''$	$104^{\circ} 50' 31''$	$261^{\circ} 11' 06''$	$266^{\circ} 10' 15''$	$263^{\circ} 38' 25''$

- Determine the angular error of the traverse (**4marks**)
- Adjust the angles of the traverse to eliminate the error (**4 marks**)
- Calculate the bearing of all other lines of the traverse (**12 marks**)