



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

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**UNIVERSITY EXAMINATION FOR THE DEGREE IN SCIENCE IN  
CONSTRUCTION MANAGEMENT**

**2<sup>ND</sup> YEAR 2<sup>ND</sup> SEMESTER 2022/2023 ACADEMIC YEAR**

**CENTRE: MAIN CAMPUS**

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**COURSE CODE: TCB 1212**

**COURSE TITLE: ENGINEERING SURVEYING II**

**EXAM VENUE:**

**STREAM: BSc. CONSTRUCTION MGT**

**DURATION: 2 HOURS**

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**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.**

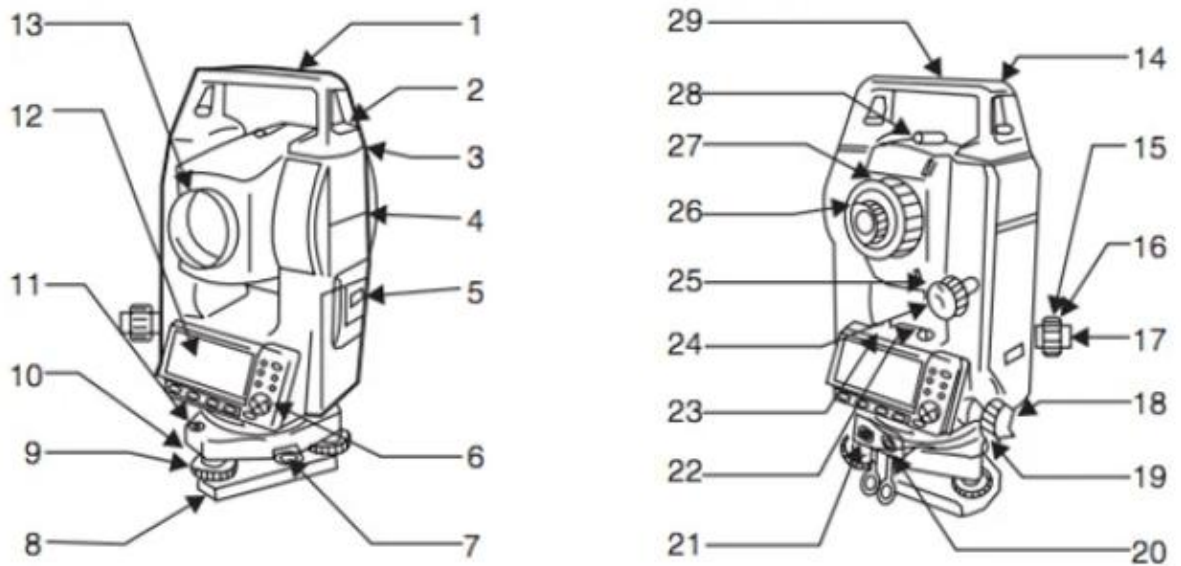


### SECTION A: 30 Marks

#### QUESTION ONE (10 marks)

- a) Answer the following questions by stating TRUE or FALSE.
  - i. In angle measurements with a theodolite, Zenith angle is a reading with the telescope turned to point to the North.....
  - ii. The terms *accuracy* means nearness of a measurement to another. ....
  - iii. The sum of the internal angles for an eight-sided figure is 1080 degrees .....
  - iv. The departure in a traverse course is the change in direction eastwards. ....
  - v. *Reduced bearing* is a clockwise angle measured from grid north to the desired line. ....

b) The diagram below shows parts of a survey instrument which can be used in traversing survey. Name the parts listed below



item	Part No	Name of Part
i	1	
ii	8	
iii	9	
iv	24	
v	27	



Registration No.....

**QUESTION TWO 20 marks**

- a) The table below gives vertical angles taken in the field with a *modern digital theodolite* in the process of taking linear measurements along traverse legs. Complete the table

**4 marks**

Line	Slope Length S (m)	$\theta$ ( $^{\circ}$ )	Horizontal Length
AB	25.735	87° 20' 30''	
BC	11.101	105° 25' 30''	
CD	12.202	85° 15' 10''	
DE	53.317	93° 26' 50''	

- b) Some common features encountered in triangulation survey are given here below. Explain very briefly what they are and how they are used in the process of triangulation. **6 marks**

- i. Figure A



Fig A

- ii. Figure B

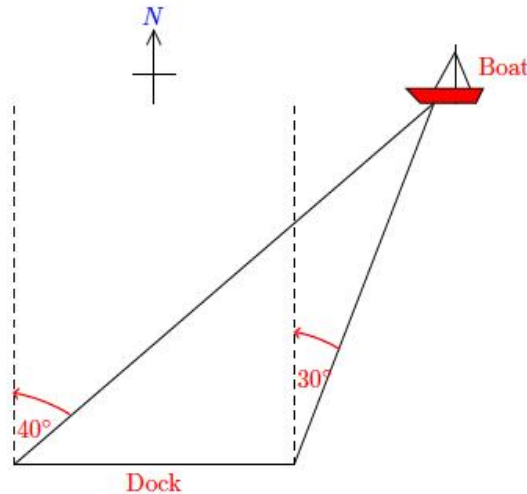




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Figure B

- c) The fig Qf.1 below shows a ship out of dock somewhere in the sea. Given that the survey station west of the dock is **A**, the station east of the dock is **B** and that where the ship occupies is **C**. Angles  $CAB$  and  $CBA$  have been determined graphically as  $50^\circ$  and  $120^\circ$  respectively. The distance  $AB$  is 200m. Determine how far the ship is from stations **A** and **B**. Also determine the bearing of line  $BA$ . **5 marks**



- d) The following readings were taken with a level and 4 m staff:  
0.578 B.M.( $BM_L = 58.250$  m), 0.933, 1.768, 2.450, (2.005 and 0.567) C.P., 1.888,  
1.181, (3.679 and 0.612) C.P., 0.705, 1.810.  
Draw up a level book page and reduce the levels by the height of instrument method.

**5 marks**

### SECTION B: 40 Marks

Answer any two (2) questions from this section. Each question carries 20 marks

#### QUESTION THREE (20 marks)

Below you are given three survey stations P, Q and R. These stations lie on a part of an open traverse route. The traverse survey moves from the direction of P to R. The Horizontal angle at P has been measured and you are required to measure the horizontal angle at Q. Assume you have a digital theodolite.





**QUESTION FOUR (20 marks)**

The table below shows data obtained from a traverse survey for a closed loop traverse ABCDEA.

Station	Length (m)	Angle
A		238.6667
	24.93	
B		65.5
	37.56	
C		82.5
	48.42	
D		91.75
	35.26	
E		61.16667
	25.77	
A		

Determine:

- i. The accuracy of the measured angles and adjust if necessary **5 marks**
- ii. The azimuths of the traverse legs if the azimuth of line AB is  $210^{\circ}40'00''$  **5 marks**
- iii. Departures and latitudes of the traverse legs **7 marks**
- iv. Error in Eastings, Error in Northings and linear error **3 marks**  
*(You may organize all your answers in a single table and show sample calculations for each question)*

**QUESTION FIVE (20 marks)**

The figure below illustrates a trigonometric levelling exercise. It is required to determine the elevation of point F

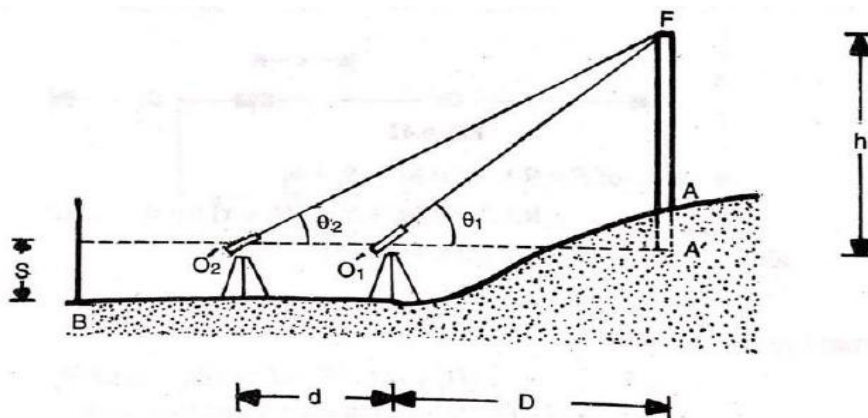


Fig Q5



Registration No.....

- a) For the case of the given figure (object foot inaccessible, same instrument height), outline the procedure for carrying out the exercise      **7 marks**
- b) Derive appropriate mathematical formula to determine the height  $h$       **8 marks**
- c) Given the following data, determine the elevation of point  $F$       **5 marks**
  - $d = 8\text{m}$
  - $\theta_1 = 41.367^\circ$
  - $\theta_2 = 30.8668^\circ$
  - $S = 1.546\text{m}$
  - $\text{BM}_L = 1156.455\text{m}$