JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

UNIVERSITY EXAMINATIONS FOR THE DEGREE IN SCIENCE IN CONSTRUCTION MANAGEMENT

2ND YEAR 1ST SEMESTER 2017/2018 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TCM3217

COURSE TITLE: ENGINEERING SURVEYING I

EXAM VENUE: WS **STREAM: BSc CONSTRUCTION MGT**

DATE: 20/12/2017 **EXAM SESSION: 2.00 – 4.00PM**

DURATION: 2 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 1

Levelling is a method in plane surveying;

a) Define the following; Leveling, Back sight(BS), Fore sight (FS) and Intermediate sight (IS), Change Point (C.P), Height of instrument. (4 Marks)

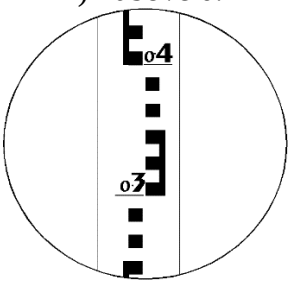
b) The following readings were taken with a level and 4 m staff. Draw up a level book page and reduce the levels by the height of instrument method - 0.578 B.M. (= 58.250 m), 0.933, 1.768, 2.450, (2.005 and 0.567) C.P., 1.888, 1.181, (3.679 and 0.612) C.P., 0.705, 1.810.

i. Identify and list the readings with respect to definitions in (a),
ii. Show each calculation before entry in table e.g. H. I_1 = h1 + B.S.1 =?
iii. Draw up a level book page, enter the calculations and the reduced the levels of the height of instrument method. (26 Marks)

Question 2

a) A staff and a tape are often used in survey exercises measuring heights and distances; given the diagram below and the underlines to mark 0.4 and 0.3. Give readings that mark edges of the rectangular blocks in the diagram for those (a);

i) below 0.3,
ii) between 0.3 and 0.4
iii) above 0.4



(8.5 Marks)

b) A tape of standard length 20 m at 85°C was used to measure a base line. The measured distance was 882.50 m. The following being the slopes for the various segments of the line:
Calculate the true length of the line if the mean temperature during measurement was 63°C and the coefficient of thermal expansion of the tape material is 6.5×10^{-6} per °C.

Segment	100	150	50	200	300	82.5
Slope	$2^0 20'$	$4^0 12'$	$1^0 06'$	$7^0 48'$	$3^0 00'$	$5^0 10'$

(11.5 Marks)

Question 3

Given that L in the diagram is the length in sight in Kilometers from the instrument. R is the mean radius of the earth (6370 km). Using a well known theorem and the diagram;

a) Drive the equation for the earths curvature (c) - (6 Marks)

b) Assuming the that C is very, very small; restate the equation in a) above. (2.5 Marks)
c) Since c is required in meters; restate the equation to read in meters. (2.5 Marks)
d) State the equation for combined curvature and refraction given that; Combined correction $= c - \frac{1}{7}$ $(0.078.5L^2$ and L is in Kilometers (4 Marks)
e) Hence, calculate the corrected staff reading for a sight of 1500 meters if the observed reading is 3.250 (5 Marks)

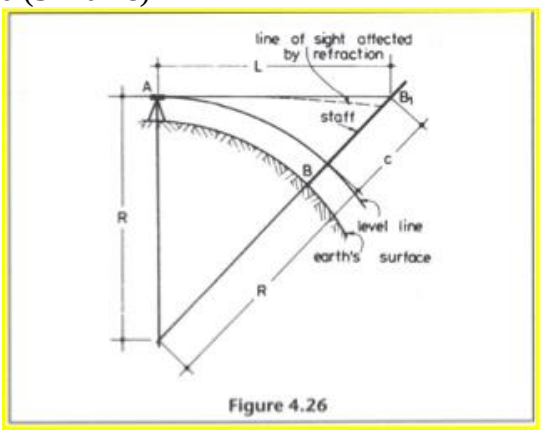


Figure 4.26

Questions 4

a) State 4 personal and 7 mistakes that are considered sources of Errors in Leveling (8 Marks)
b) State four routines that you should always observe while levelling to prevent larger errors and quickly disclose mistakes (5 Marks)
c) In respect of the above state how you would go about carrying and setting up a level (7 Marks)

Question 5

Surveying is an art or a science;

a) Define surveying while taking a general and a specific view (3 Marks)
b) Explain the three stages of a surveying process (4.5 Marks)
c) List the existing classes of surveying based on the instruments used. (4 Marks)
d) List and explain the classes of surveying based on the surface and the area surveyed (8.5 Marks)