# TECHNICAL UNIVERSITY OF MOMBASA

# Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DECREE IN:

**BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE 14M)**

ECE 2202: SURVEYING I

**END OF SEMESTER EXAMINATION**
SERIES:  APRIL 2015
**TIME ALLOWED:  2 HOURS**

**Instructions to Candidates:**
You should have the following for this examination
- *Answer Booklet*
- *Pocket Calculator*

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
Use neat, large and well labeled diagrams where required
This paper consists of **THREE** printed pages

**Question One (Compulsory)**

a)  Define the following terms as sued in Engineering Surveying:
   (i)  Main Survey Line                                               **(1 mark)**
   (ii) Base-line                                                      **(1 mark)**
   (iii)    Offsets                                                    **(1 mark)**
   (iv) Chain station                                                 **(1 mark)**
   (v) Check-line                                                     **(1 mark)**

b) State and briefly explain THREE main errors encountered by surveyors when carrying out a chain survey **(6 marks)**

c) In reciprocal leveling operation across a river, the following staff readings were recorded:

       Level at A1 reading on staff C = x = 2.46m

       Level at $A_1$ reading on staff D = $x_1$ = 1.28m

       Level at $B_1$ reading on staff C = $y_1$ = 3.45M

       Level at B reading on staff D = y = 2.23m

                    X

       Determine the true difference in level between point C and D **(5 marks)**

d) State FOUR uses of contours by engineers to fulfill the requirements for any engineering works    9
**(4 marks)**

**Question Two**

a) Define the term chain survey and hence establish:
     (i) Four equipment for linear measurement
     (ii) Four equipment for mincing out
     (iii)    Four equipment used for setting out angles **(6 marks)**

b) Outline any TWO types of obstacles encountered in chain surveying and hence give remedial measures to overcome them **(8 marks)**

c) Determine between radial lines and grid methods of determining contours **(6 marks)**

**Question Three**

a) The distance measured between two points on a slopping ground is 450m. Find the correction to be applied and the horizontal distance if:
     (i) The angle of slope is $10^o$
     (ii) The slope is
     (iii)    The difference in elevation between the two points is 45m **(12 marks)**

b) Define the following terms:
     (i) Ordinance Bench Mark **(2 marks)**
     (ii) Flying levels **(2 marks)**
     (iii)    Ordinance datum **(2**
        **marks)**
     (iv)Temporary Bench mark **(2 marks)**

**Question Four**

**a)** A survey line was measured with a steel tape believed to be 30m at a temperature of 20°C and a pull of 10kg. The measured length was 1650m. The temperature during measurement was 30°C and the pull applied was 15kg. Find the true length of the line, if the cross-sectional area of the tape was 0.025cm$^2$ given:

    **(i)** Coefficient of expansion of material of tape 1°C = 3.5 x 10$^{-6}$

    **(ii)** Module of elasticity of the material of tape is 2.1 x 106kg/cm$^2$       **(10 marks)**

**b)** The following staff readings are taken from a level book. Reduce the levels by the rise and fall method and carry out routine arithmetical checks on the completed entries

| BS | IS | FS | REMARKS | |
|----|----|----|---------|--|
| 0.73 | | | On D.B.M of 67.65 | |
| 1.64 | | 4.35 | Station A | |
| | 3.08 | | | B |
| | 2.43 | | | C |
| 0.94 | | 3.11 | | D |
| | 4.07 | | | E |
| | 3.6 | | | F |
| | 3.42 | | | G |
| | 4.13 | | | H |
| | | 3.49 | I | |

**(10 marks)**

## Question Five

**a)** The following staff reading is taken from a level book. Reduce the levels by the rise and fall method and carry out the routine arithmetical checks on the computed entries:

| BS | IS | FS | REMARKS | |
|----|----|----|---------|--|
| 1.32 | | | Peg A | |
| | 2.43 | | | B |
| | 1.15 | | | C |
| | 1.72 | | | D |
| 5.06 | | | | E |
| | 4.79 | | | F |
| | 4.47 | | | G |
| | 3.25 | | | H |
| | | | Datum of R.L | |
| | | 1.84 | 30.00 | |

**b)** Using a well labeled diagram, illustrate the different tallies of a chain     **(5 marks)**