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UNIVERSITY OF SWAZILAND

DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

FINAL EXAMINATION
MAY 2005

TITLE OF PAPER: ELEMENTARY SURVEYING AND CARTOGRAPHY

COURSE CODE: GEP 213

INSTRUCTIONS: ANSWER THREE (3) QUESTIONS INCLUDING QUESTION 1, WHICH IS COMPULSORY AND ONE (1) QUESTION FROM EACH SECTION

MARKS ALLOCATION: QUESTION 1 CARRIES 40 MARKS. OTHER QUESTIONS CARRY 30 MARKS EACH.

THIS QUESTION PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR

SECTION A
(COMPULSORY QUESTION)

QUESTION 1

(a)   Write short notes on the following methods of making linear measurements:

   (i)   Pacing;   (5 Marks)

   (ii)   Using a surveyor's chain;   (5 Marks)

(b)   A steel tape will normally be provided with standardisation data for correction of
        measured lengths to account for differences that arise from conditions other than
        those at standardisation.

        In order to determine the horizontal distance between two points A and B set on
        the floor of a tunnel, measuring heads were set up over those points. A new 30m
        steel tape, standardised on the flat under a pull of 49N at 20°C, is suspended in
        catenary between the measuring heads, and a pull of 147N is applied. The mean
        tape readings at the measuring heads are observed to be 0.422m and 29.782m, and
        the difference in level between the heads is found to be 0.075m. Determine the
        corrected horizontal distance between the points A and B given the following:

        Mean tape temperature during observation $= 26°C$
        Cross-sectional area of tape $= 0.406cm^2$
        Mass of tape $= 0.27g/cm$
        Coefficient of linear expansion of steel $= 1.15 \times 10^{-5}/°C$
        Modulus of elasticity of steel $= 207,000N/mm^2$

        NOTE: The formulae in the appendix would assist you to arrive at the solution.
                                                                          (20 Marks)

(c)   Write short notes on map scale, giving examples where necessary.

                                                                          (10 Marks)

SECTION B

ANSWER ANY ONE QUESTION FROM THIS SECTION

QUESTION 2

(a)   Write short notes on two methods of making right angles, other than using the eye, when conducting a tape and offset survey.

(10 Marks)

(b)   Explain how one would use an Abney level to determine the height of an object on a slope (the object is positioned downslope of the observer).

(10 Marks)

(c)   Outline the procedure for determining land slope using a line-level.

(10 Marks)

QUESTION 3

(a)   Define the following:

  (i)   Open traverse;
  (ii)   Whole-circle bearing;
  (iii)   Local attraction.   (15 Marks)

(b)   Write short notes on the following applications of levelling:

  (i)   Contouring;
  (ii)   Planning of roads;
  (iii)   Planning of underground services e.g. drains.   (15 Marks)

SECTION C

ANSWER ANY ONE QUESTION FROM THIS SECTION

QUESTION 4

(a)   With examples, explain the following objectives of maps:

     (i)   Analytical purposes involving measuring and computing;
     (ii) Mobility and navigation;
     (iii) Summarise voluminous statistical data.   (15 Marks)

(b)   With examples, explain **THREE (3)** methods of classifying maps.   (15 Marks)

QUESTION 5

(a)   It is accepted that a host of controls or external forces influence the cartographic design process. Briefly explain, with examples, how the following influence map design:

     (i)   Purpose;
     (ii)   Reality;
     (iii) Available data;   (15 Marks)

(b)   Briefly explain the following design principles in cartography:

     (i)   Legibility;
     (ii)   Visual contrast;
     (iii) Hierarchical organisation.   (15 Marks)

APPENDIX

Correction for pull $= (P - P_s)\dfrac{L}{(AE)}$

where P, P_s = field and standard tensions respectively;
 A = cross-sectional area of band;
 E = Young's modulus of elasticity for the band;
 L = Length measured.

Correction for temperature = $\alpha L(t - t_s)$

Where α = coefficient of linear expansion.
 t = field temperature
 t_s = standardisation temperature

Correction for slope = $-\dfrac{h^2}{2L}$

Where h = difference in level between points

Correction for sag = $-\dfrac{w^2 L^3}{24P^2}$

Where w = weight per unit length of the tape