

**UNIVERSITY OF SWAZILAND**  
**FACULTY OF SCIENCE**  
**FINAL EXAMINATION 2009**

**B.A II, B.Ed. II, BSc. and B.A.S.S II.**

**TITLE OF PAPER** : ELEMENTARY SURVEYING AND CARTOGRAPHY

**COURSE NUMBER** : GEP 213

**TIME ALLOWED** : THREE (3) HOURS

**INSTRUCTIONS** : ANSWER ANY THREE (3) QUESTIONS INCLUDING  
QUESTION ONE (1) WHICH IS COMPULSARY.  
MARKS WILL CONSIDER CLEARLY ARTICULATED  
AND LOGICAL WORK FOR ALL CALCULATIONS.

**ALLOCATION OF MARKS** : QUESTION ONE CARRIES FOURTY (40) MARKS  
AND THE OTHER QUESTIONS CARRY THIRTY  
(30) MARKS EACH.

**DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE  
INVIGILATOR**

**SECTION I : COMPULSARY**

**QUESTION ONE**

- a) Draw a contour map using the contour grid shown on Figure 1 in the following page using a contour interval of 10 m. The grid was drawn using a 1: 5000 scale and a grid north. The reduced levels on the grid were produced using the rise and fall method and the units are meters (m). The development site in question was a section of a development site in Bulawayo, Zimbabwe. The map should indicate the title box, boarder line and all the identification information that has to be included on such maps.

**(25 marks)**

- b) What are the other methods of contouring besides the Grid? **(2 marks)**
- c) Calculate the slope between VW. **(5 marks)**
- d) If the spacing between grid points was 5.0 m, calculate the area of the development site. **(5 marks)**
- e) Indicate the area that you can propose for use as a botanical garden on the contour map and state your reasons for doing so. **(3 marks)**  
**(40 marks)**

Examination NO:.....

54 ●	54 ●	64 ●	73 ●	89 ●
53 ●	52 ●	69 ●	75 ●	95 ●
47 ●	51 ●	61 ●	93 ●	82 ●
49 ●	57 ●	65 ●	69 ●	75 ●
V 47 ●	59 ●	56 ●	63 ●	62 ●

W

V

**SECTION B : ANSWER ANY TWO QUESTIONS**

**QUESTION TWO**

- a) During the setting-out of a botanical garden, the site in question had to be leveled. To do this a topographic survey grid of 30 m x 30 m was conducted in an attempt to provide the required contour map from which a formation depth of 1.5 m was determined. The sum of N (the number of times the reduced level has been used) were computed as 40.0, while the total height of the reduced level multiplied by N was 4840.0 m. Compute the following:
- i. Mean height. (5 marks)
  - ii. Depth of excavation. (5 marks)
  - iii. Volume of excavation. (5 marks)
  - iv. If the company doing the work had one 200 m<sup>3</sup> capacity truck, how many times was the truck going to transport the earth removed from the site? (5 marks)
- b) i. Name the method of contouring that was employed to collect the data referred to in (a) above. (2 mark)
- ii. State briefly the uses of contour maps. (8 marks)
- (30 marks)

**QUESTION THREE**

- a) What are the three (3) categories of map projection? (3 marks)
- b) Briefly describe the major cartographic break through that was achieved through map projection. (7 marks)
- (c) Globes are said to portray the ideal nature of the earth. Discuss the inherent problems of globes which justify the wide use of map projections to produce the conventional maps. (20 marks)
- (30 marks)
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**QUESTION FOUR**

- a) i. What is your pace factor? State your answer in meters/pace corrected to two decimal places. (2 mark)
- ii. Name any two (2) methods of linear measurements used in surveying other than pacing. (4 marks)
- b) During damage inspection the length of a dam flood spillway was identified as in dire need of repairs, however the length had to be determined in the field where there was no instrument at hand other than pacing. Calculate the length of the spillway using your pace factor, assuming the spillway was found to be 150 paces when measured. (4 marks)
- c) i. What are the four statements of scale that may be used to express a map scale? (4 marks)
- ii. A cartographer had a portion of a farm plan which had a scale of 1: 5000 and a principal scale of 1: 2000, calculate the scale factor of the plan. (5 marks)
- d) i. Define the term "offset" as used in chain surveying. (1 mark)
- ii. What are the three methods used to establish offsets in chain surveying? (3 marks)
- iii. State how errors due to damaged chains are corrected in chain surveying? (1 mark)
- e) A development site of  $3000 \text{ cm}^2$  was calculated from a map with a scale of 1:1000. However, the lengths of the site were measured using a chain that was 0.4% too short.
- i. Calculate the true area of the development site. (3 marks)
- ii. Calculate the percentage error of the calculated area. (3 marks)
- (30 marks)
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**QUESTION FIVE**

- a) Discuss in detail the role of lettering in modern cartography. **(8 marks)**
- b) Swaziland has four agro-ecological zones; the Highveld, Middleveld, Lowveld and Lubombo Plateau. Use the appropriate lettering and shading or hatching to complete the ecological zones of Swaziland shown on Figure 2. **(20 marks)**
- c) What statement of scale was used on this map? **(2 marks)**
- (30 marks)**
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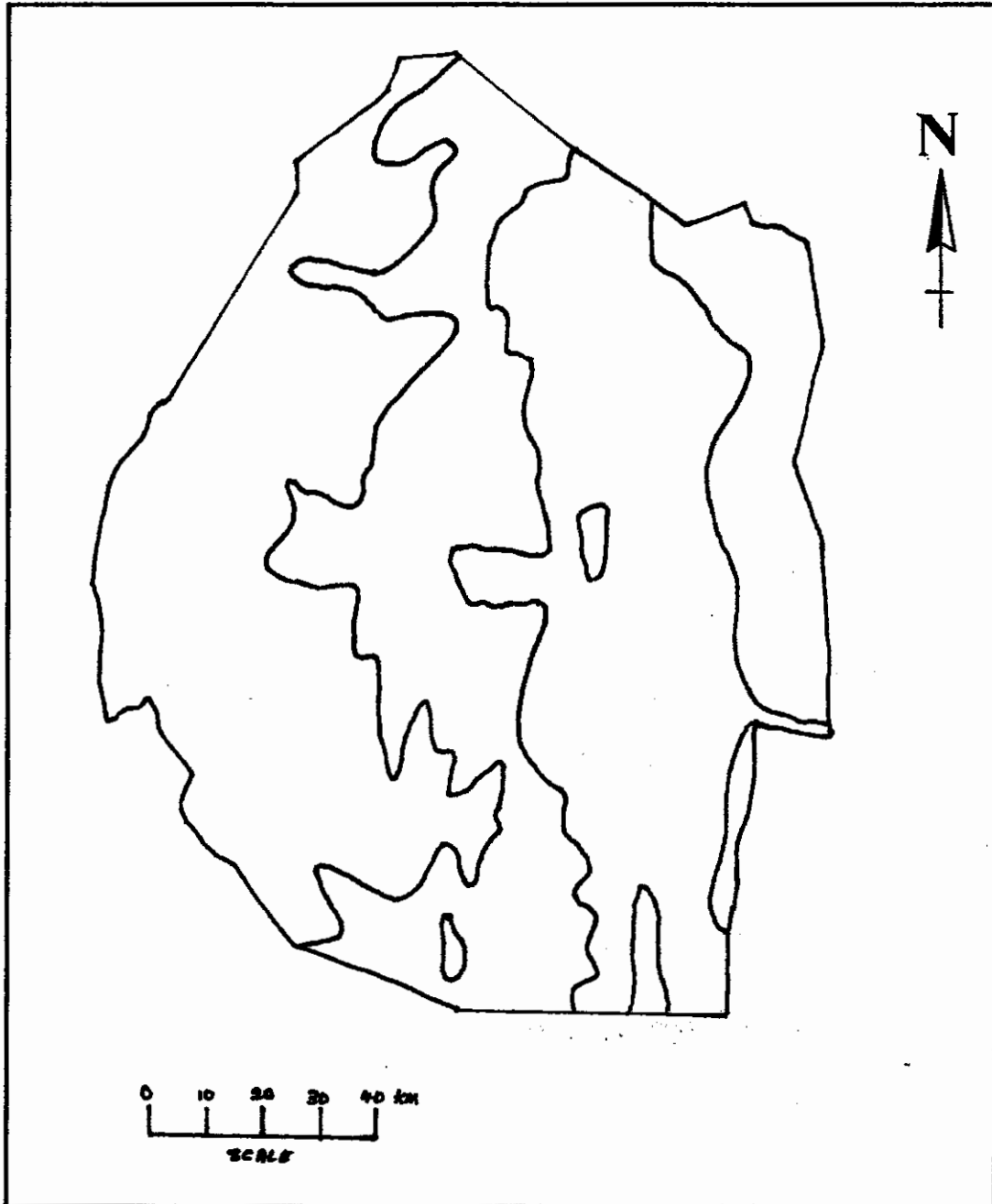


Figure 2. Ecological zones of Swaziland