



**UNIVERSITY OF SWAZILAND  
FINAL EXAMINATION PAPER**

**PROGRAMME: BSC ABE. II**

**COURSE CODE: ABE 205**

**TITLE OF PAPER: FARM MECHANISATION**

**TIME ALLOWED: TWO (2) HOURS**

**SPECIAL MATERIAL REQUIRED: NONE**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER  
QUESTIONS.**

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GRANTED BY THE CHIEF INVIGILATOR**

## SECTION I COMPULSORY

## QUESTION 1

- a) Explain the reasons for the widespread use of mouldboard ploughs in Swaziland. [10 marks]
- b) The plough implement shown in Figure 1 shows a five (5) bottom mouldboard plough whose width of cut is 350 mm per bottom.
- Determine the total width of cut. [3 marks]
  - Calculate the horizontal distance "c", for the position of the centre of load from the furrow wall. [7 marks]
  - Explain the importance of knowing the centre of load, centre of pull and line of pull for effective field operations. [5 marks]
  - What is the field capacity of ploughing the field, when operating at a speed of 5 km/h with an overlap of 150 mm between consecutive passes of field operation, and a time utilisation efficiency of 80% is assumed. [10 marks]

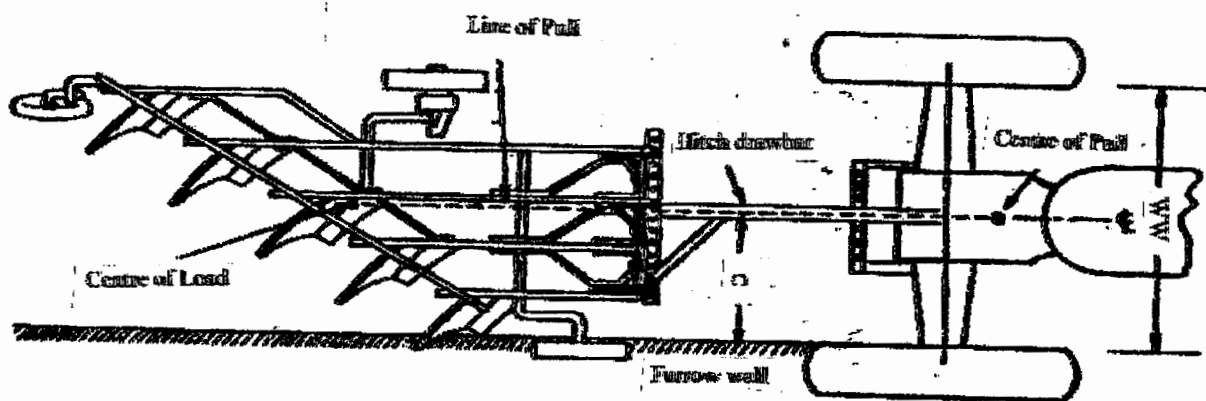


Figure 1. plough implement showing key points for draught forces.

- c) Distinguish between 'back furrow' and 'dead furrow' as result of ploughing operations [5 marks]

## SECTION II ANSWER ANY TWO QUESTIONS

## QUESTION 2

- a) What important functions are performed by planters during planting?  
[10 marks]
- b) Given the planter layout shown in Figure 1, and assuming the use of a 16 cell seed plate, calculate the following:
- the gear ratio between the drive wheel and the seed plate, when the ten (10) teeth sprocket is selected.  
[7 marks]
  - the plant spacing when the ten teeth sprocket is selected;  
[7 marks]
  - the seed rate (plant population) in seeds per hectare for the spacing calculated in ii) when the recommended row spacing is 90 cm.  
[6 marks]

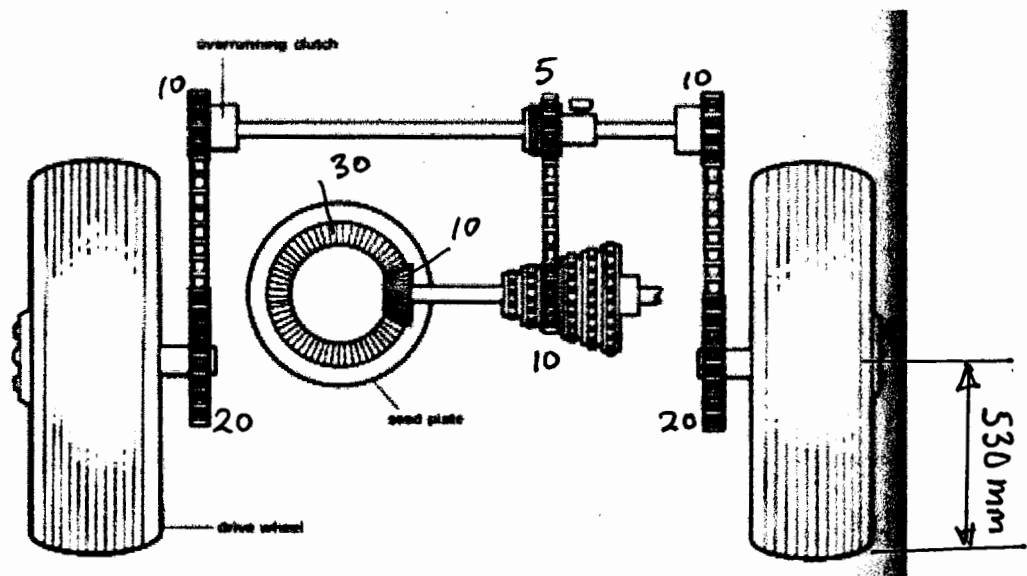


Figure 1. The metering mechanism of a planter.

## QUESTION 3

- a) Discuss safety measures that should be taken when spraying using conventional boom sprayers. [10 marks]
- b) A maize field of 90 hectares is sprayed twice before harvesting is conducted. Spraying is applied while moving at 8 kph. Each nozzle discharges 0.5 l/min and are spaced at 50 cm from each other on an 18 m boom. Determine
- (i) The application rate in l/ha [8 marks]
- (ii) The annual cost of spraying, if the concentrate is sold at E85/l and a dilution of 1:50 is recommended. [7 marks]
- c) Discuss the benefits of calibrating sprayers. [5 marks]

## QUESTION 4

- a) Name three forms of grass that may be provided to animals for feeding. [6 marks]
- b) Give an example for each form, where applicable, of a machine to harvest and process such grass for animal feed. [6 marks]
- c) As an extension worker, explain to farmers the differences between trailed, semi-mounted and mounted modes of attaching farm equipment to tractors [12 Marks]
- d) Name the commonest method of attaching equipment to tractors on small and medium sized farms in Swaziland. (Give reasons for your answer) [6 marks]