



**UNIVERSITY OF SWAZILAND
SUPPLEMENTARY 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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SECTION I COMPULSORY

QUESTION 1

- a) Define an 'implement' as a farming tool? [5 marks]
- b) With the aid of a diagram, show the effect of soil moisture content on soil strength [10 marks]
- c) Figure 1 shows two tillage implements (parts I and II). Use Figure 1 to answer the following questions.
 - (i) Specify which part shows primary and which shows secondary tillage implement [4 marks]
 - (ii) Give reason(s) for your choice. [2 marks]
 - (iii) Name the two implements. [4 marks]

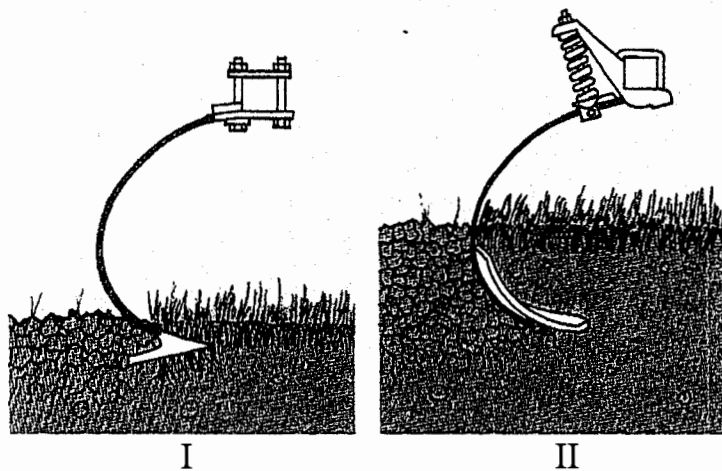


Figure 1 Two implements engaged in tillage operations

- d) A farmer has 10 days to till a field of 90 hectares in preparation for planting of jago beans. The tillage is carried out at 200 mm depth using a chisel plough that is drawn at 7 kph and a field efficiency of 80%. The labour laws permit a labour deployment of 8 hours per day. The specific soil resistance is estimated to be 12.85 kN/m after the first rains. Determine
 - i. Expected work rate of tillage operations [5 marks]
 - ii. The appropriate width of the chisel plough [4 marks]
 - iii. Implement draught force [3 marks]
 - iv. The necessary drawbar power to pull the plough [3 marks]

SECTION II – ANSWER ANY TWO QUESTIONS**QUESTION 2**

- a) Disc harrows are used in conservation tillage. What is their role during field operations in minimum tillage? [11 marks]
- b) What are the key tasks performed during planting operations? [10 marks]
- c) Explain the differences between single acting, offset and tandem disc harrows. [9 marks]

QUESTION 3

- a) Explain the terms 'back furrow' and 'dead furrow' as they arise from ploughing. [8 marks]
- b) Table 1 shows parameters that affect the application rate of the chemical on a field. Indicate the effects of the parameters in the right column (increase or decrease). [6 marks]

Table 1 Parameters affecting chemical spraying of a boom sprayer.

	PARAMETER	EFFECT
1	Ground speed	
2	Nozzle size	
3	Pump pressure	

c) The following data were noted during the calibration of a sprayer:

Length of run	30 m
Time taken per run	12 s
Spacing between nozzles	300 mm
Operating pressure	300 kPa
Quantity of sprayer liquid collected	270 ml
Effective boom width	6 m

Calculate

- (i) the application rate [8 marks]
- (ii) the nozzle discharge [8 marks]

QUESTION 4

a) Equipment for forage harvesting can be distinguished by the method of applying the cutting force to the plant. Name the methods used to cut grass. [6 marks]

- b) Briefly explain the following terms as used to describe machinery performance:
- (i) Field (Area) Capacity. [8 marks]
 - (ii) Field Efficiency. [8 marks]
 - (iii) Commodity through put. [8 marks]