



**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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SECTION I COMPULSORY

QUESTION 1

- a) (i) With the aid of a diagram, explain the effect of soil moisture content on soil strength. [5 marks]
- (ii) Discuss the implications of the following parameters on tillage operations.
1. soil moisture content [3 marks]
 2. adhesive properties of soil [3 marks]
 3. frictional characteristics of the soil [3 marks]
- b) Distinguish between conventional and conservation tillage. [4 marks]
- c) Agricultural extension officers in Swaziland advise farmers to plant maize at 25 cm spacing in rows that are 90 cm apart. A farmer uses a two row planter whose drive wheel has a diameter of 500 mm and seed hoppers are fitted with 12 cell seed plates.
- (i) Determine the speed ratio that should be selected on the planter to achieve the recommended spacing within the rows. [10 marks]
 - (ii) How many cobs of maize does the farmer expect to harvest from a 5 hectare farm if 10% loss is anticipated? [8 marks]
 - (iii) What two parameters can the farmer change on the planter to increase the spacing within a row? [4 marks]

SECTION II ANSWER ANY TWO QUESTIONS

QUESTION 2

- a) Discuss the benefits of using chisel ploughs for tillage in the Lowveld region of Swaziland. [10 marks]
- b) A farmer uses 63 kW tractor to pull a chisel plough through a field at a recommended depth of 200 mm and speed of 8 kmph. Determine
- the draught force if $\frac{2}{3}$ of tractor power is used as drawbar power. [6 marks].
 - maximum width of the chisel plough that would be used if the draught force required to pull the plough at 200 mm is 11.8 kN/m [6 marks]
- c) Figure 1 shows four possible angles that furrow slices make with the furrow bottom during ploughing while using a mouldboard plough.

What parameters affect the angles of furrow slices?

[8 marks]

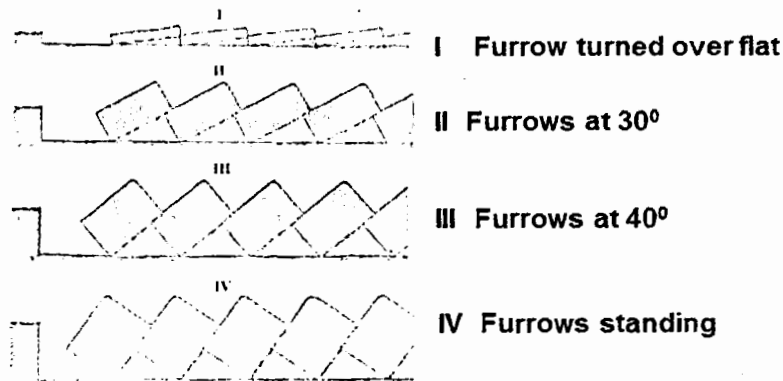


Figure 1. Angles of furrow slices after ploughing

QUESTION 3

- a) Plant protection is aimed at minimising yield loss at harvest.
- i) What are the major categories of crop growth inhibitors that plants must be protected from? [6 marks]
 - ii) What parameters influence the application rate of granular chemicals to the target areas? [5 marks]
- b) Classify planting equipment by the method of placing seeds on the surface. [5 marks]
- c) Table below shows the time obtained during spraying with boom sprayer.

Activity	Duration (min/ha)
Turning at headlands	15
Refilling spraying tank	15
Actual spraying	40
Cleaning clogged nozzles	15
Other down time	25

Calculate the field efficiency of the sprayer. [8 marks]

- d) Distinguish between trailed, semi-mounted and mounted farm equipment. [6 marks]

QUESTION 4

- a) What factors affect the size (capacity) of machinery needed on a farm? [6 marks]
- b) Discuss any three of the factors given in a) above. [9 marks]
- c) What time elements are responsible for the machine performance of farm machinery in agricultural operations? [10 marks]
- d) Which time elements in c) above are responsible for field efficiency during field operations? [5 marks]