



UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME: BSc ABE 2

COURSE CODE: ABE202

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 1: COMPULSORY

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QUESTION 1

- a. A three-bottom 40 cm mouldboard plough has a working width of 15 cm and a draft of 12 kN. Given that the working speed is 4 km/hr and that field efficiency of the plough is 80.5 %, calculate:
- i. power requirement [10 marks]
 - ii. actual field efficiency [5 marks]
- b. Distinguish between conventional and conservation tillage [5 marks]
- c. Explain the reasons for the widespread use of mouldboard ploughs in Swaziland [10 marks]
- d. What important functions are performed by planters during planting? [10 marks]

SECTION 2: ANSWER ANY TWO (2) QUESTIONS**QUESTION 2**

- a. A maize field of 90 hectares is sprayed twice before harvesting is conducted. Spraying is applied while moving at 8 km/hr. Each nozzle discharges 0.5 l/min and the nozzles are spaced at 50 cm apart on an 18 m boom. Determine,
- i. The application rate in l/ha [10 marks]
 - ii. The annual cost of spraying if the concentrate is sold at E85/l and a dilution of 1:50 is recommended [10 marks]
- b. Explain why disc ploughs are preferred to moldboard ploughs in tropical countries [10 marks]

QUESTION 3

- a. Determine the power required to pull a three-bottom 30 cm mouldboard plough working to a depth of 15 cm. The tractor is operated at a speed of 5 km/hr and the soil resistance is 80 kPa. [15 marks]
- b. Machine performance is critical in the management of farm machinery. Field efficiency is one of the major factors used to determine machine performance. Discuss any three (3) ways of improving field efficiency of farm machines. [15 marks]

QUESTION 4

a. The reaction of soil to forces applied by tillage tools depend on the following properties: shear strength of the soil, adhesive properties of the soil and frictional characteristics. What are the effects of these factors on tillage? **[10 marks]**

b. During the static calibration of a four-row planter, the following results were obtained after collecting data from the seed hoppers.

Measurement	Value
Diameter of wheel (mm)	400
Row width (mm)	900
# of wheel turns	50
Amount of seed collected (kg)	50

Determine the amount of seed that the farmer must buy to plant five (5) hectares of land.

[20 marks]