



UNIVERSITY OF ESWATINI
MAIN EXAMINATION PAPER

PROGRAMME: BSc AGRICULTURAL AND BIOSYSTEMS ENGINEERING 2

COURSE CODE: ABE202

TITLE OF PAPER: FARM MECHANISATION

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

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

SECTION 1: COMPULSORY QUESTION**QUESTION 1**

- a. What are the five (5) key tasks performed during planting? [15 marks]
- b. Briefly explain the following terms as used to describe machinery performance:
- Field (area) capacity [5 marks]
 - Field efficiency [5 marks]
 - Commodity throughput [5 marks]
- c. Mouldboard ploughs are very popular with farmers on Swazi Nation Land. State any five likely reasons for the preference of mouldboard ploughs by farmers. [10 marks]

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

- a. Discuss the time elements considered when computing the time efficiency of the use of a machine. [10 marks]
- b. During the static calibration of a two row planter, the following results were obtained after collecting data from both seed hoppers;

Measurement	Value
Diameter of wheel	40 cm
Row width	90 cm
Number of wheel turns	50
Amount of seed collected	3 kg

Determine the amount of seed that the farmer must buy to plant 5 hectares. [10 marks]

- c. Briefly discuss five (5) functions performed by a maize planter during planting operations. [10 marks]

QUESTION 3

- a. A farmer has two weeks (an 8 hour working day and 5 working days per week) to till a field of 160 hectares in preparation for planting. Tillage is carried out at a depth of 250 mm using a chisel plough that is drawn at 7 km/hr and a field efficiency of 95% is achieved. If the specific soil resistance is assumed to be 22 kN/m^2 after the first rains, determine,
- the expected work rate of the tillage operation [5 marks]
 - the appropriate width of the chisel plough [5 marks]
 - the implement draft force [5 marks]
 - the recommended tractor brake power if drawbar power is estimated to be $2/3$ of the engine brake power. [5 marks]
- b. Discuss the implications of the following parameters on tillage operations,
- Soil moisture content [4 marks]
 - Adhesive properties of soil [3 marks]
 - Frictional characteristics of the soil [3 marks]

QUESTION 4

- Discuss any four (4) factors that a farmer has to consider to determine and/or select a tractor for his/her farm. [20 marks]
- Discuss the different methods of planting [10 marks]