



**UNIVERSITY OF SWAZILAND
MAIN EXAMINATION PAPER**

PROGRAMME: BSc AGRICULTURAL AND BIOSYSTEMS ENGINEERING 4

COURSE CODE: ABE410

TITLE OF PAPER: FARM MACHINERY MANAGEMENT

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. Use the proper equation for each depreciation method and find the depreciation during the fifth year of life for a minor implement that was purchased new for E20000 and has an estimated life of 10 years. The salvage value is expected to be E1000.
- i. Straight line [10 marks]
 - ii. Double-declining balance [10 marks]
- b. Discuss the significance of utilisation, U , in the selection of machines. [10 marks]
- c. What do you understand by fixed costs? Discuss two (2) common machinery management fixed costs [10 marks]

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

- a. Discuss four (4) factors that should be considered when deciding on the size of machinery required [20 marks]
- b. Discuss how timeliness of operation affect machine selection [10 marks]

QUESTION 3

- a. Discuss four (4) main reasons behind machinery replacement [20 marks]
- b. Using a fixed cost percentage, find the fixed costs per hour for E250000 tractor that is used for 400 hr/yr. Assume a 12% interest rate and a 10-year life. [10 marks]

[Assume $S = 2000$]

QUESTION 4

- a. Discuss four (4) main reasons why farmers mechanise? **[20 marks]**
- b. What is the least-cost width for a spike tooth harrow used on 120 ha annually? Labour cost = E80/hr, tractor fixed costs = E60/hr, speed of operation = 8 km/hr, field efficiency = 0.70, and the price of the harrow is E1000/m. Use a 10-year life and 10% interest. **[10 marks]**

APPENDIXEquations

$$AC = \frac{(FC\%)P}{100} + \frac{cA}{Swe} [(R\&M)P + L + O + F + T]$$

$$FC = \frac{P-PS}{L} + \frac{P+PSI}{2} + 0.02P$$

$$AC = \frac{(FC\%)pw}{100} + \frac{cA}{Swe} [rmpw + L + ow + fw + T]$$

$$w = \sqrt{\frac{100cA}{(FC\%)pSe} (L + T)}$$

TABLE: VALUES FOR FIXED COST PERCENTAGE

Service life, yr	Values of FC%
1	100
2	53
3	37
4	29
5	25
6	22
7	20
8	18
9	17
10	16
11	15
12	14
15	13
20	12