



(The University of choice)

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

**UNIVERSITY EXAMINATIONS  
2023/2024 ACADEMIC YEAR**

**YEAR THREE SEMESTER ONE EXAMINATIONS  
(Main examination)**

**BACHELOR OF SCIENCE IN AGRICULTURE EDUCATION & EXTENSION,  
AGRICULTURAL ECONOMICS & RESOURCE MANAGEMENT,  
AGRIBUSINESS MANAGEMENT & MARKETING AND BACHELOR  
OF EDUCATION, SCIENCE**

**COURSE CODE: AEN 381**

**COURSE TITLE: FARM POWER AND MACHINERY**

**DATE: 11<sup>th</sup> Dec, 2023**

**TIME: 3 – 5 PM**

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Instructions: This paper consists of 5 questions

Section A is compulsory, Answer any 3 questions from Section B

Observe the regulations governing clean drawing production

**SECTION A**  
**Question One (25 marks)**

- (a) Outline the features of the following sources of energy used in farm operations
- i. Solar energy
  - ii. Wind energy
  - iii. Biomass energy
  - iv. Chemical energy **(6 marks)**
- (b) With the aid of a diagram, describe the steps in a four stroke SI engine **(4 marks)**
- (c) With the aid of a diagram, discuss the components of a rotorvator **(4 marks)**
- (d) State and distinguish between fixed and variable costs of agricultural mechanization **(4 marks)**
- (e) Outline the advantage of a crawler tractor over a conventional tractor **(3 marks)**
- (f) State the components of a tractor transmission system and hence outline its functions **(4 marks)**

**SECTION B**  
**Question Two (15 marks)**

- (a) Outline the procedures in primary and secondary cultivation **(5 marks)**
- (b) With the aid of diagrams, discuss the following
- i. Disc mower
  - ii. Reciprocating mower **(4 marks)**
- (c) Describe the two types of diesel engine fuel injection systems **(4 marks)**
- (d) Distinguish between manual and mechanised planting systems **(3 marks)**

**Question Three (15 marks)**

- (a) Briefly describe the configuration and the mode of action of the following

implements in land preparation

- i. Chisel plough
- ii. Disc plough
- iii. Mould board plough

**(9 marks)**

- (b) State the components and functioning of a boom sprayer, hence state the basic steps in calibration **(6 marks)**

#### **Question Four (15 marks)**

- (a) Explain the importance of engine cooling and hence differentiate between two types of water cooled engines **(5 marks)**
- (b) Define slippage, and hence describe the strategies applicable in reduction of tractor slippage **(5 marks)**
- (c) Describe the calibration procedure for a fertiliser applicator **(5 marks)**

#### **Question Five (15 marks)**

- (a) Outline the challenges facing mechanisation in the tropics and as a possible policy maker give the intervention measures **(6 marks)**
- (b) Describe the functional components of the following harvester machinery
- i. Combine harvester
  - ii. Forage harvester
  - iii. Mechanised baler
- (4.5 marks)**
- (c) Outline the typical troubleshooting measures procedures for a tractor in case of the following
- i. White smoke during engine operation
  - ii. Black smoke during engine operation
  - iii. Lack of traction during operation
- (4.5 marks)**