



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (AGRICULTURAL EDUCATION AND EXTENSION)

AGN 374: FARM MACHINERY

DATE:

TIME:

INSTRUCTIONS

This paper contains **FIVE** questions

Question **ONE** is **COMPULSARY** and carries **30 Marks**

Questions **TWO – FIVE** carries 20 Marks each. **Answer question ONE and any other TWO questions**

QUESTION ONE -COMPULSARY (30 Marks)

- a) What is farm mechanization? (2 marks)
- b) Briefly discuss any five (5) advantages of agricultural mechanization. (10 marks)
- c) Explain what you understand by the following (5 marks)
 - i) Secondary tillage
 - ii) Conservation tillage
 - iii) PTO
 - iv) UAV
 - v) Gang mower
- d) A farmer has a 2 bottom, 35 cm plough operating at 25 cm depth in soil with specific resistance of 3.7 N/cm^2 and at a speed of 6 km/hr. Calculate;
 - (i) Total draft (2 marks)
 - (ii) Power required to pull the plough. (3 marks)
- e) Using a sketch, briefly explain how a cyclone separator on a hammer mill works. (8 marks)

QUESTION TWO (20 MARKS)

- a) State the basic parts of a mouldboard plough (5 marks)
- b) Briefly discuss the four classifications of a mouldboard plough. (8 marks)
- c) Maintenance of farm machinery is a very critical part of machinery management. Briefly discuss the considerations made during the maintenance of a disc plough. (7 marks)

QUESTION THREE (20 MARKS)

- a) Differentiate between a reciprocating tine harrow and rotary power harrow. (4 marks)
- b) Outline clearly the main functions of a seeder (Planter). (6 marks)
- c) Figure Q3 shows a seed planter. Name the parts 1 to 8. (4 marks)

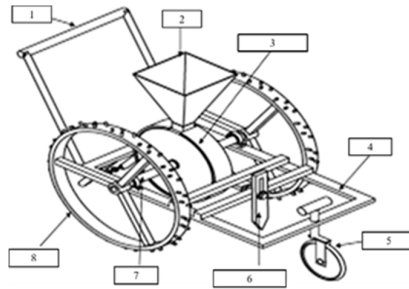


Figure Q3: Seed planter

- d) Briefly discuss the three basic metering mechanisms of a precision planter. (6 marks)

QUESTION FOUR (20 MARKS)

- a) Briefly explain what you understand by the following terms related to transplanters. (5 marks)
 - i) Cell fill
 - ii) Fluted roller
 - iii) Studded roller
 - iv) Bare root
 - v) Modules
- b) What are the advantages of module transplanting? (5 marks)
- c) Briefly explain how a fertilizer distributor is maintained. (6 marks)
- d) A farmer in Nakuru is to transplant 900,000 onion seedlings to one hectare of land with a 300 mm row width. Determine the plant spacing if the field efficiency is 85%. (4 marks)

QUESTION FIVE (20 MARKS)

- a) Figure Q5 shows a combine harvester. Name the parts 1 to 10. (5 marks)

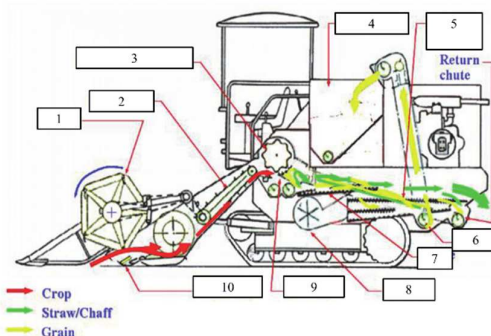


Figure Q5: Combine harvester

- b) Give the functions of the parts 1, 2, 3, 4 and 8 in **Figure Q5**. (5 marks)
- c) Briefly explain how a flail mowers work. (4 marks)
- d) What are the main advantages of using drones in precision farming? (6 marks)