

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DIPLOMA IN AGRICULTURAL
EDUCATION AND EXTENSION**

AGEN 0232: INTRODUCTION TO AGRICULTURAL FIELD MACHINES

STREAMS: DIP. AGEX

TIME: 2 HOURS

DAY/DATE: MONDAY 14/04/2025

11.30 A.M. – 1.30 P.M.

INSTRUCTIONS

- Answer ALL questions in Section A and any other TWO in Section B.
- This paper contains SEVEN questions.

SECTION A (30 MARKS)

QUESTION ONE

- a) Define the term "soil tillage" as applied in agriculture. [2 Marks]
- b) Discuss four major tillage objectives. [8 Marks]

QUESTION TWO

- (a) Define the following forces encountered in soil tillage.
- i. Drought [2 Marks]
- ii. Scouring [2 Marks]
- (b) Discuss four properties that affect the reactions of soils to applied force in mechanics of soil tillage. [2 Marks]

QUESTION THREE

- (a) Describe the function of the following disc angles in a disc plough. (Illustrate each of the angles).

- i. Tilt angle [2 Marks]
 - ii. Disc angle [2 Marks]
- (b) Discuss four functions of a seed planter. [4 Marks]

QUESTION FOUR

In a full width calibration test of an 18 by 200mm grain drill, 30 turns of the drive wheel yielded 3.0kg of wheat seed. If the rolling circumference of the drive wheel is 3.7 meters, determine the seeding rate in kilograms per hectare for this grain drill planter. [6 Marks]

SECTION B

QUESTION FIVE

- a) With the aid of a diagram, name the basic parts of a row crop planter. [5 Marks]
- b) The fertility of a particular field is such that the maize yield is at a maximum at 37500 plants, per hectare. The average survival is 85%. Row spacing is 76 centimetres. Determine the following for this row crop planter.
 - (i) Seed spacing. [4 Marks]
 - (ii) If the planter used has a 16 cell seed plate, and the drive wheel has a diameter of 80 centimeters, how many revolutions must the seed plate make per revolution of the drive wheel. (Assume zero slip). [6 Marks]
- c) Differentiate between primary tillage and secondary tillage. [5 Marks]

QUESTION SIX

- a) With the aid of a diagram, name the basic parts of a field chemical sprayer. [6 Marks]
- b) List five classifications of chemical sprays and indicate the volume medium diameter for the droplets. [5 Marks]
- c) Discuss four major types of seed losses in a combine harvester. [4 Marks]
- d) With the aid of a diagram, name the basic parts of the feed mechanism in a forage harvester (chopper). [5 Marks]

QUESTION SEVEN

- a) With the aid of a diagram, name the basic parts of the cleaning unit of the combine harvester (indicate the direction of flow of the different materials through the combine harvester). [6 Marks]
- b) A farmer in Narok County uses a combine harvester that has a 5 metre width to harvest wheat. The combine harvester moves at a speed of 1.5 meters per second and in one minute, 400kg of materials enter the header. Of this amount 180kg enters the grain tank and the remaining 220kg of material is discharged through the combine on to the field. Determine the following for this combine harvester.
- i. Field capacity in hectares per hour. [2 Marks]
 - ii. Material capacity in tonnes per hour or kilograms per hour. [2 Marks]
 - iii. Throughput capacity in tonnes per hour or kilogram per hour. [2 Marks]
- c) Discuss the operation of the following parts of a haybaler:
- (i) Feed auger [2 Marks]
 - (ii) Packer fingers [2 Marks]
- d) Discuss two types of hay conditioners. [4 Marks]
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