CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN ANIMAL SCIENCE, BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND BACHELOR OF SCIENCE IN HORTICULTURE.

AGEN 331: INTRODUCTION TO AGRICULTURAL FIELD MACHINES

STREAMS: B.Sc. (ANSC) Y3S1, B.Sc. (AGED) Y3S1, & B.Sc. (HORT) Y3S1,

TIME: 2 HOURS

DAY/DATE: FRIDAY 8/12/2017 **11.30 A.M - 1.30 P.M.**

INSTRUCTIONS:

- **This paper contains SEVEN Questions**
- **Answer ALL Questions in Section A and any TWO in Section B.**

SECTION A:

QUESTION ONE

Describe FIVE objectives for mechanizing Agriculture. [10 Marks]

QUESTION TWO

(a) Describe primary soil tillage and name three implements used to accomplish it. [5 Marks]
(b) Explain three types of implement linkages on the farm. [3 Marks]

QUESTION THREE

Describe the following forces encountered in soil tillage:

(i) Draught [2 Marks]
(ii) Drawbar pull [2 Marks]
(iii) Side draught [2 Marks]
(iv) Scouring [2 Marks]

QUESTION FOUR

With the aid of a diagram, name the basic parts of a chemical field sprayer. [4 Marks]

SECTION B

QUESTION FIVE

(a) Explain the term calibrations as applied to machines that dispense materials on the farm. [2 Marks]

(b) In a full calibration test of an 18 by 20cm grain drill, 50 turns of the drive wheel yielded 3.0 kilogrames of wheat seed. Drive wheel diameter was 60cm. Determine the seed application rate per hectare for this grain drill planter. [8 Marks]

(c) (i) With the aid of diagrams, describe the function of three types of disc harrows used in secondary tillage operations. [9 Marks]

(ii) What is the main purpose of a subsoiler tool on the farm. [1 Mark]

QUESTION SIX

(a) Describe FOUR patterns or methods of distributing seeds when using seed planting machines. [8 Marks]

(b) (i) With the aid of a diagram, name the basic parts of a row crop planter drive mechanism. [4 Marks]

(ii) Explain two possible causes for excessive amount of unthreshed seed in a combine harvester. [2 Marks]

(c) A farmer in Narok County uses a combine harvester that has a 5 metre width of cut, to harvest wheat. The combine harvester moves at a speed of 2 metres per second and in one minute 500 kg of materials enter the header. Of this amount 200kg enters the grain tank and the remaining 300 kg of material is discharged through the combine to the field. Determine the following for this combine harvester;

(i) Field capacity (in hactares per hour) [2 Marks]
(ii) Materials capacity (in kg per hour) [2 Marks]
(iii)Throughput capacity (in kg per hour) [2 Marks]

QUESTION SEVEN

(a) During a practical class exercise with a field chemical sprayer, one uniform application rate test delivered 0.8 litres per minute from each nozzle. There were 20 nozzles spaced at 0.8 metres apart on the boom. The spray concentrate contained 50 gm per litre of a certain herbicide and the required application rate was 1kg of the herbicide per hectre. The tractor forward speed was 5km per hour. Determine the spray concentrate-water mixing ratio. [10 Marks]

(b) Describe four types of seed losses on a combine harvest. [4 Marks]

(c) With the aid of a diagram, name the basic functional components of the forage chopper (forage harvester.) [6 Marks]

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