UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: DIP IN AGRIC 3, DIP IN AGRIC EDUC 3

COURSE CODE: LUM 304 (Old Programme)

TITLE OF PAPER: DRAUGHT ANIMAL IMPLEMENTS

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER QUESTIONS.

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SECTION I: COMPULSORY QUESTION

QUESTION 1

(a) Define the following terms;

(i) Draught force (2 ½ Marks)
(ii) Work (2 ½ Marks)
(iii) Energy (2 ½ Marks)
(iv) Power (2 ½ Marks)

(b) During a practical session, students were asked to take readings of draught pull in the chain when ploughing with two oxen. A simple dynamometer was used and readings were recorded at regular intervals. It was observed that on average, a pull force of 1.21 kN was maintained when the oxen were walking steadily at an average speed of 0.9m/s. Given that the angle of pull was 16°, and the plough width of cut was 200mm, calculate:

(i) The draught force (2 Marks)
(ii) The time required in actual ploughing to finish one hectare (2 Marks)
(iii) The distance travelled to complete one hectare (2 Marks)
(iv) The work done by the oxen in ploughing one hectare (2 Marks)
(v) The power generated by the oxen (2 Marks)

(b) In most Southern African countries, the peak demand period for ploughing amongst smallholder farmers who rely on draft animals coincides with the dry period when the animals are in their worst body condition. Discuss this statement and make three recommendations to overcome the problem. (10 Marks)

(c) Draw a sketch of a double neck yoke indicating all the dimensions. What length of yoke would you recommend for cultivating maize crop in Swaziland? (10 Marks)

SECTION II: ANSWER TWO QUESTIONS FROM THIS SECTION

QUESTION 2

(a) The success or failure of animal draught power can be attributed to the management of draught animals. Discuss this statement. (20 Marks)

(b) A farmer in the Low Veld Region of Swaziland approaches you for advice on how to select animals for draft work. What factors would you advise him to consider? (10 marks)

QUESTION 3

(a) What are the objectives of training animals for draught work? (10 Marks)

(b) The mass of an animal is best measured on a cattle scale. However, in rural areas the mass can be quickly estimated using an ordinary measuring tape. You have been asked to take measurements on a bullock and you find length of 133 cm and girth of 146 cm. What is the estimated mass of the bullock? (10 Marks)

(c) With the aid of a sketch diagram, give a description of how you would plough an irregular piece of land using casting ploughing pattern. (10 Marks)

QUESTION 4

(a) Why is it important to always ensure that the depth and width of ploughing are set correctly on an animal drawn plough? (10 Marks)

(b) Briefly discuss why draught animal power is considered as appropriate technology for Southern Africa. (10 Marks)

(c) In Botswana, teaming of working animals is a common practice. However, research has found out that a loss of 7.5% in efficiency is experienced for each additional pair of animals after the first pair. Given that each ox on a farm has an average mass of 450 kg and pulls 10% of its weight and the average walking speed when ploughing is 2 m/s. How much power will be realised if the farmer harnesses a team of eight (8) oxen at a time? (10marks)