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UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME: BSC AGRIC ECON. AGBMGT. II
BSC AGRIC EDUC. II
BSC AGRON. II
BSC ANI. SC. II
BSC ANI. SC. (DAIRY) II
BSC HORT. II

COURSE CODE: ABE 210

TITLE OF PAPER: PRINCIPLES OF FARM MECHANISATION

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 1

a) List five examples of renewable and non-renewable sources of energy that can be used for agricultural production. Give one example of the energy use in each case. [15 marks]

b) (i) What is tillage? [2 marks]
(ii) List the common tillage processes for plant growth. [8 marks]

c) The best operating speed is 8 kph when using a chisel plough in hard dry soils. The chisel plough requires a draught of 2.36 kN/m when operating at a depth of 200 mm. Determine drawbar power when the total cutting width of the chisel plow is 4.5 m. [10 marks]

What engine power rating should be used if 2/3 of engine power is made available at the draw-bar. [5 marks]

SECTION II ANSWER ANY TWO QUESTIONS

QUESTION 2

a) Explain the purpose of leaving headland in a ploughing operation using a tractor? [7 marks]

b) Describe the following methods of ploughing:
(i) Round and round ploughing;
(ii) One way ploughing [10 marks]

c) There are 15 discs on a disc harrow spaced at 25 cm. Measurements of the operations showed that the total time lost in the field for turning and adjustments is 30% of the time the harrow is in the field. Determine the field capacity assuming there is no overlap between passes and the operating speed is 7 kph. . [13 marks]

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QUESTION 3

a) Discuss the measures that can be taken to reduce spray drift when using conventional boom sprayers. [10 marks]

b) Determine the nozzle flow rate of a sprayer that will travel at 8 kph and has a nozzle spacing of 50 cm on a 18 m boom given that the desired application rate is 280l/ha.

[12 marks]

c) Compare and contrast the use of ULV (Ultra Low Volume) sprayers to conventional knapsack sprayers in small scale agriculture

[8 marks]

QUESTION 4

a) Explain the concept of minimum tillage as compared to zero tillage in semi-arid regions.

[8 marks]

b) It is important to routinely calibrate farm equipment. What are the benefits of calibrating farm equipment.

[7 marks]

c) 15 l of water was collected during a calibration exercise in which a distance of 150 m had been covered while moving at 4.8 kph and carrying a 9 m boom sprayer whose nozzles are spaced at 0.5 m apart.

Calculate

(i) the nozzle discharge rate;

[8 marks]

(ii) the application rate.

[7 marks]