UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME: BSC AGRIC ECON. AGBMGT. II
                    BSC AGRIC EDUC. II
                    BSC AGRIC 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.

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN
GRANTED BY THE CHIEF INVIGILATOR

SECTION I   COMPULSORY

QUESTION 1

a)   Distinguish between the terms 'implement' and 'machine' as definitions for tools of agriculture.

[6 marks]

b)   Name any three examples of renewable energy sources that are used for agricultural production in Swaziland. Give one example of the energy use in each case.

[9 marks]

c)   (i)   What is tillage?

[2 marks]

(ii)   Distinguish between tillage processes and tillage practices.

[6 marks]

(iii) List the four common tillage processes for plant growth.

[8 marks]

d)   What are the main objectives of using conservation tillage in agriculture.

[9 marks]

SECTION II – ANSWER ANY TWO QUESTIONS

QUESTION 2

a)
   i.   Name the three common methods of planting.

[6 marks]

   ii. Give one example of the local seeds necessary for each type of planting in i) above.

[3 marks]

b) Figure 1 shows an animal drawn mouldboard plough.
    i.   Label parts 1 and 2.

                                            [4 marks]

    ii.   State the functions of parts 1 and 2.

                                              [3 marks]
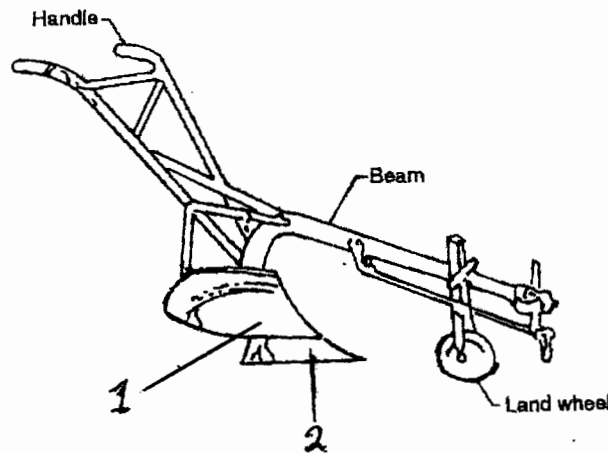
    iii.   How would you set the depth of ploughing on the plough in Figure 1?

                                              [3 marks]

Figure 1   Animal drawn mouldboard plough

c) During a calibration exercise the following data were collected:

Parameter/Item	value
No of rows	2
Distance moved	80 m
Spacing between wheels	75 cm
Diameter of drive wheels	0.5 m
Number of seeds dropped	640

    i.   Calculate the spacing between the plants within a row.

                                              [6 marks]

    ii.   The plant population in plants per hectare.

                                              [5 marks]

QUESTION 3

a) Distinguish between dusting and spraying as actions of plant protection.

[6 marks]

b) Discuss the safety features to be observed when handling spraying operations

[8 marks]

c) In a calibration exercise, 0.6L of water was collected from a nozzle of a knapsack sprayer while spraying over a distance of 100 m. If the operator was walking at a rate of 1.2 km/h and the spray covers an equivalent single row spacing of 90 cm, determine

(i) the nozzle discharge in L/min?

[5 marks]

(ii) the application rate of the spraying chemical?

[5 marks]

a) What category would you classify the knapsack sprayer used in c) above.
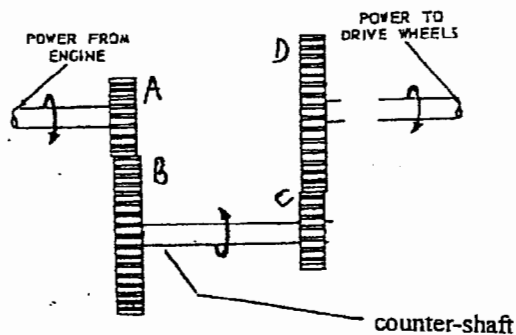
[3 marks]

justify your answer.

[3 marks]

QUESTION 4

a) Discuss the advantages and disadvantages of using wind as an energy source for agricultural production in Swaziland.

[10 Marks]

b)   List three biomass energy sources that are commonly used in rural communities of Swaziland.

[3 marks]

c) Name any five pre-start checks you would conduct on a tractor before starting to operate a wheeled tractor.

[5 marks]

d) A gear arrangement in a tractor gearbox is shown in Figure 2. The number of teeth for the respective gears are shown next to Figure 2.

Gear	Number of Teeth
A	15
B	30
C	10
D	30

Figure 2.   Active gears in a tractor gearbox for a particular gear selection.

Calculate

   i) the gear ratio that is obtained between the input shaft A and the output shaft D.

[7 marks]

   ii) number of rotations per minute at D when the shaft from the engine rotates at 3000 rpm.

[5 Marks]