



**UNIVERSITY OF SWAZILAND
RESIT AND SUPPLEMENTARY EXAMINATION PAPER**

**PROGRAMME: BSC AGRON. II
BSC ANI. SC. II
BSC ANI. SC. (DAIRY) II**

COURSE CODE: ABE208 / 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.**

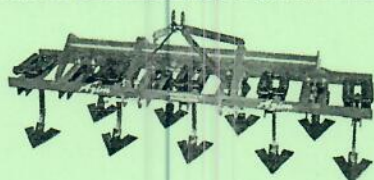

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SECTION I COMPULSORY

QUESTION 1

- a) Traditionally, farmers in the southern African region have used solar energy as a source of energy. List five processes for which solar energy has been used in agriculture in Swaziland. [10 marks]
- b) Table 1 shows two types of cultivators as distinguished by the active cultivating tools. Name active tools and state the best conditions when they are preferred. [8 marks]

Table 1. Types of cultivator cutting tools

Cultivator drawing	Active tool	Preferred operation
		
		

- c) Figure 1 shows a diagram of a mouldboard plough. Name the parts numbered in the Table 2 and their functions. [10 marks]

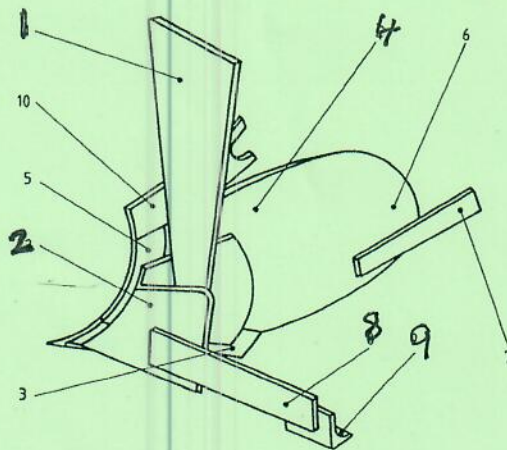


Figure 1. Parts of a mouldboard plough

Table 2. Parts and functions of a mouldboard plough.

No	Part name	Main function
1		
2		
4		
8		
9		

- d) A three bottom plough is to be attached to a tractor before setting out to the field. The width of cut per bottom is 45 cm.
 - (i) Calculate the total width of cut? [3 marks]
 - (ii) Calculate the centre of load from the ploughed furrow.[5 marks]
 - (iii) What is the importance of knowing the centre of load? [4 marks]

SECTION II – ANSWER ANY TWO QUESTIONS

QUESTION 2

- a) Briefly outline the operations involved in conventional tillage. [10 marks]

b) Name any five objectives of tillage. [10 marks]

c) Discuss the advantages of using disc ploughs in arid and semi-arid areas of tropical and subtropical regions of Africa? [10 marks]

QUESTION 3

a) What are the major objectives of plant protection. ... [6 marks]

b) Name the gears in Figure 2 [12 marks]

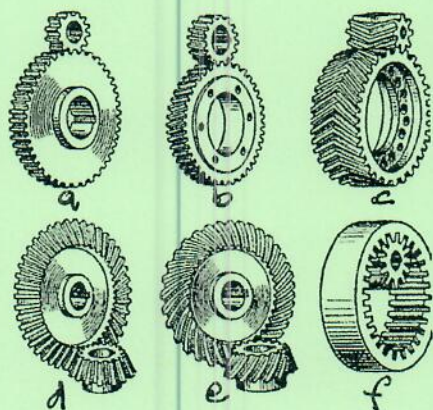


Figure 2 Types of gears

c) Figure 4 shows a connection of gears in the power transmission of a forage harvester. Given that the input shaft runs at 1200 rpm,

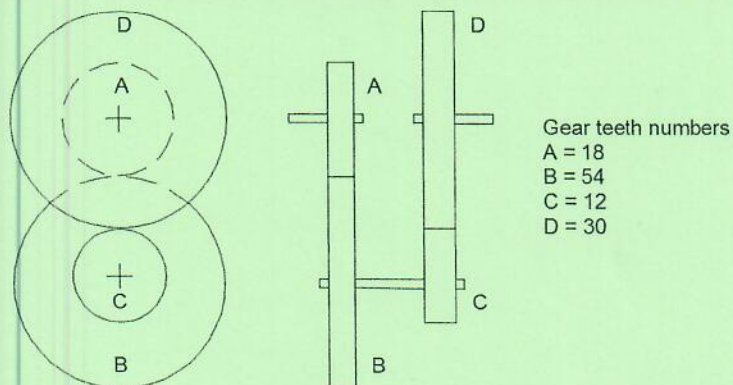


Figure 3 Arrangement of gears in a power transmission.

determine

- i. The speed of the shaft connecting gears B and C. [4 marks]
- ii. The speed of the output shaft on gear D. [4 marks]
- iii. The gear ratio of the power transmission [4 marks]

QUESTION 4

a) Name the types of sources of biomass for energy production in Swaziland. [9 marks]

b) Figure 4 shows the diagram of a donkey's dimensions that are used to estimate its mass. Given that the length, L is 150 cm and the girth, G is 220 cm, determine

i. The mass of the donkey given a conversion formula:

$$\text{Live mass (kg)} = \frac{G^{2.12} \times L^{0.688}}{3801} \quad [5 \text{ marks}]$$

ii. The pull that the donkey can apply on a cart if 45% of its body weight can be used for traction. [6 marks]

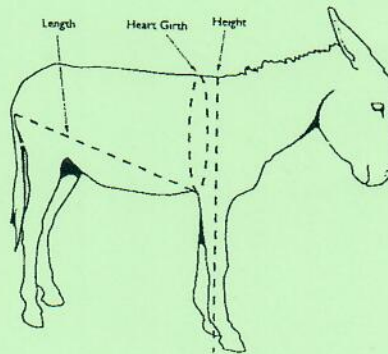


Figure 4 Dimensions of a donkey used for weight determination.

c) A planter drops seeds at 200 points in a row of 50 m. Calculate the plant population if a row spacing of 90 cm is expected. [10 marks]