



KISII UNIVERSITY
UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF THE DEGREE
OF BACHELOR OF SCIENCE IN AGRICULTURE EDUCATION & EXTENSION
FIRST SEMESTER 2022/2023
(SEPTEMBER - DECEMBER, 2022)

AGEN 131: BASIC FARM POWER SOURCE AND UTILIZATION

STREAM: Y1 S1

TIME: 2 HOURS

DAY: MONDAY 5, 9:00 A.M – 11:00 A.M

DATE: 05/12/2022

INSTRUCTIONS:

- 1. Do not write anything on this question paper.***
- 2. Answer ALL Questions in section A (Compulsory) and any TWO questions in section B.***

SECTION A

QUESTION ONE

- Explain why hybrid power systems is appropriate in a farm. [1 mark]
- Explain why majority of tractors have diesel engines.[2 marks]
- Briefly explain ways in which traction in a farm tractor can be increased.
[2marks]
- Calculate the power developed by a tractor engine which moves at 10Km/h and pulls a plough with a force of 15KN. [2marks]
- State and explain the four (4) phases of engine combustion.
[2 marks]
- State differences between a 2-stroke cycle and 4-stroke cycle. [2 marks]
- Explain why automotive engines are multiple-cylinder engines. [2 marks]
- Explain why aluminum alloy is used in the fabrication of fuel tank.
[1 mark]
- State the disadvantages of air cooling system in an engine.

[2 marks]

j. State the importance of a lubrication system in an engine.

[2 marks]

k. Outline four reasons of tractor maintenance.

[2 marks]

l. With an illustration, explain the working of a carburetor and state its functions.

[2 marks]

m. Explain why the flow of power from the pistons to the crankshaft is not smooth.

[2 marks]

n. Explain the causes of ignition troubles in a petrol engine.

[2 marks]

o. Describe functions of a gearbox in tractor transmission system.

[2 marks]

p. Outline the bad effects of high temperature in the engine.

[2 marks]

SECTION B

QUESTION TWO

(a) Given the following data

Cylinder size: 12.5 x 15 cm

Fly wheel speed: 1200 rpm

Mean effective pressure: 7 kg/cm²

Mechanical efficiency: 70%

Clearance volume: 150 cm³

Engine type: four stroke four cylinder compression ignition engine

Calculate

i. IHP [2 marks]

ii. BHP [2 marks]

iii. Compression ratio [2 marks]

iv. Swept volume [2 marks]

v. Engine capacity [2 marks]

(b) Explain two ways of improving the efficiency of the above engine.

[2 marks]

(c) Explain three properties that affect the quality of fuel.

[3 marks]

- (d) State the use of the following parts of the ignition system. [5 marks]
- i. Ignition coil
 - ii. Spark plug
 - iii. Distributor
 - iv. Governor
 - v. Condenser

QUESTION THREE

- a. With the aid of a diagram, explain how the tractor power transmission system works. [10 marks]
- b. Describe how the valves are opened in an overhead-camshaft engine using bucket tappets. [5 marks]
- c. Using well labeled diagrams, explain the working of a 2 stroke petrol engine. [5 marks]

QUESTION FOUR

- a. Explain the role of the following parts in tractor transmission
- i. Clutch; [2 marks]
 - ii. Crown wheel and pinion; [2 marks]
 - iii. Differential; [1 mark]
 - iv. Differential lock. [1 mark]
- b. Discuss any four main sources of farm power [4 marks]
- c. With the use of a circuit diagram, explain how the magneto ignition system functions. [10 marks]

QUESTION FIVE

- a. With the use of a circuit diagram, explain how the battery ignition system works. [5 marks]
- b. Explain the principle operation of the water cooling system. [5marks]
- c. Explain the procedure followed when starting and stopping the engine [5 marks]
- d. Explain the procedure followed when starting and stopping the tractor engine. [5 marks]