



**KISII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**

**FIRST YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF  
SCIENCE IN ANIMAL SCIENCE/AGRICULTURAL EDUCATION AND  
EXTENSION/AGRICULTURE/ NATURAL RESOURCE MANAGEMENT  
SECOND SEMESTER 2023/2024  
[JAN – APRIL, 2024]**

**AGEN 131: BASIC FARM POWER SOURCE AND UTILIZATION**

**STREAM: Y1 S2**

**TIME: 2 HOURS**

**DAY: TUESDAY, 12:00 - 2:00 P.M.**

**DATE: 16/04/2024**

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**INSTRUCTIONS**

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

**SECTION A: Answer All Questions [30 marks]**

**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. [2 marks]
- Calculate the power developed by a tractor engine which moves at 12Km/h and pulls a plough with a force of 18KN. [2 marks]
- 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]

- g. Explain why automotive engines are multiple-cylinder engines.  
[2 marks]
- h. Explain why aluminum alloy is used in the fabrication of fuel tank.  
[1 mark]
- i. 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: Answer any two questions (40 Marks)**

**QUESTION TWO**

(a) Given the following data

Cylinder size: 12.5 x 15 cm

Fly wheel speed: 1200 rpm

Mean effective pressure: 7 kg/cm<sup>2</sup>

Mechanical efficiency: 70%

Clearance volume: 150 cm<sup>3</sup>

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 labelled 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. [5 marks]
- 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]