



*"Investing in Africa's Future"*

## **COLLEGE OF HEALTH, AGRICULTURE & NATURAL SCIENCES**

**NAAE 201: FARM POWER AND MACHINERY**

**END OF SECOND SEMESTER EXAMINATIONS**

**November/December 2023**

**LECTURER: MR. W. ZENDERA**

**DURATION: (3HRS)**

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### ***INSTRUCTIONS***

- 1. Answer ALL question in Section A                      20 Marks**

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- 2. Answer four questions in Section B                      80 Marks**

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**Use the answer booklet provided**

**Begin the Answer for each question on a new page**

## SECTION A

### Question 1A

- a) Explain airlock in diesel injection systems. [5 marks]
- b) Describe the process of bleeding and what it accomplishes. [5 marks]
- c) Explain the conditions under which the following is likely to occur:
  - i. Black smoke, and [5 marks]
  - ii. White smoke. [5 marks]

## Section B (Answer Four Questions, 80 Marks)

### Question 1B

Explain the possible causes of the following:

- a) Overheating in tractor engines. [5 marks]
- b) Tractor is difficult to start or could not start. [5 marks]
- c) Lack of engine power. [5 marks]
- d) Battery is failing to charge. [5 marks]

### Question 2B

- a) List 5 types of secondary tillage equipment. [5 marks]
- b) Briefly describe the following gang assemblies on disc harrows:
  - i. Single acting, [5 marks]
  - ii. Double acting, and [5 marks]
  - iii. Offset. [5 marks]

### Question 3B

- a) List the functions performed by a combine harvester. [5 marks]
- b) Describe the adjustments made on a combine harvester. [5 marks]
- c) Discuss the challenges faced by small scale farmers in using harvesting machines like the combine harvester. [10 marks]

#### Question 4B

- a) Sketch and clearly label the theoretical pressure volume diagram for a diesel (compression ignition) engine. [5 marks]
- b) Explain what is happening at each stage of the circle in (a) above. [5 marks]
- c) A six cylinder engine has a bore of 70 mm and a stroke of 80 mm, if the clearance volume of one cylinder is 42 000 mm<sup>3</sup>, calculate:
  - i. The compression ratio. [5 marks]
  - ii. The engine capacity in litres. (1 litre = 10<sup>6</sup> mm<sup>3</sup>). [5 marks]

#### Question 5B

- a) Explain the need for the use of dual wheels on a tractor. [5 marks]
- b) Give reasons for ballasting tractors. [3 marks]
- c) Explain the consequences of incorrect tyre pressure. [2 marks]
- d) Explain five mechanical problems which may result in premature wearing of tractor tyres. [10 marks]

#### Question 6B

- a) State six functions of the lubrication system. [6 marks]
- b) Describe the procedure for changing the engine oil and oil filter. [10 marks]
- c) Explain the maintenance frequency of the lubrication system. [4 marks]