

JUN 2023

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE AND ENGINEERING

AEH 309

Department of Engineering and Physics

Bachelor of Science Honours Degree in Agricultural Engineering

Repair and Maintenance of Agricultural Machinery

3 hours (100 Marks)

**Instructions:**

1. This paper contains 6 questions
2. Answer any **FOUR** questions, each of which carries 25 marks

**Question 1**

- a) Outline the guidelines that can be used to initiate an operation and maintenance program in industry. [10 marks]
- b) State and explain 10 metric factors that can be used to evaluate an operation and maintenance program. [10 marks]
- c) Explain how oil analysis can be used as a predictive maintenance management strategy. [5 marks]

**Question 2**

Discuss the roles of each of the following functions in operation and maintenance of an agro-industry of your choice.

- a) Administration, [5 marks]
- b) Engineering, [5 marks]
- c) Operations, [5 marks]
- d) Maintenance, and [5 marks]
- e) Training. [5 marks]

### Question 3

- a) Give an outline of how one can service the fuel system of a tractor. [15 marks]
- b) Explain the need for loosening the drain pipe and the vent pipe. [4 marks]
- c) Explain the challenges associated with insufficient clutch free movement. [6 marks]

### Question 4

- a) Outline the causes of hydraulic system damage. [5 marks]
- b) Give suggestions that may help to reduced hydraulic system damage. [4 marks]
- c) Explain briefly the function of a turbo. [6 marks]
- d) Discuss five major symptoms that may signal that your turbo has a fault. [10 marks]

### Question 5

Explain the causes of the following types of smoke in diesel engines:

- a) White smoke. [8 marks]
- b) Black smoke. [9 marks]
- c) Blue smoke. [8 marks]

### Question 6

- a) Explain the following protective alarms usually found on larger diesel engine.
  - i. Over-speed device [4 marks]
  - ii. Low lube oil. [4 marks]
  - iii. Water jacket [3 marks]
- b) Explain the maintenance procedure for a disc plough. [14 marks]