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**UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER**

PROGRAMME: BSc AGRICULTURAL AND BIOSYSTEMS ENGINEERING 2

COURSE CODE: ABE205

TITLE OF PAPER: FARM POWER

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

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SECTION 1: COMPULSORY QUESTION

QUESTION 1

- a. Figure 1 shows the combustion process in a two-stroke engine. Compare this process with a four-stroke engine [15 marks]

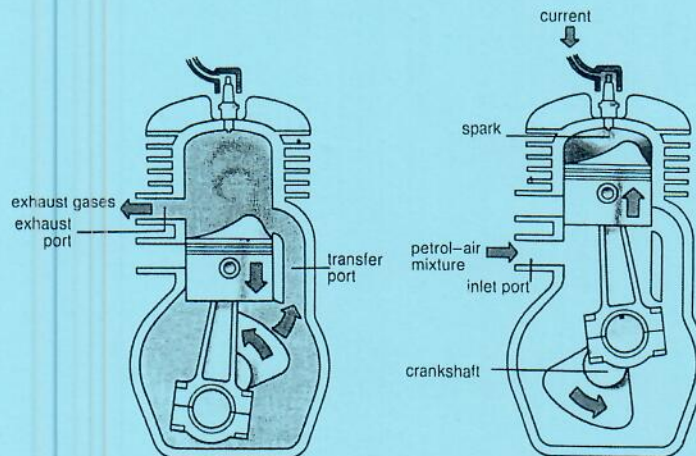


Figure 1: The two stages of a two-stroke engine

- b. What do you understand by external combustion engine? [5 marks]
- c. Discuss two (2) key parameters that determine the quality of diesel and petrol fuel. [10 marks]
- d. Describe the step-by-step procedure you would use to jump-start a tractor with a dead battery. [10 marks]

SECTION II: ANSWER ANY TWO (2) QUESTIONS

QUESTION 2

- a. What are the possible causes of engine overheating? Discuss five (5) strategies that one can use to eliminate these causes. [15 marks]
- b. Figure 2 shows a gear train composed of three gears. Gear A revolves at 60 rev/min in a clockwise direction.

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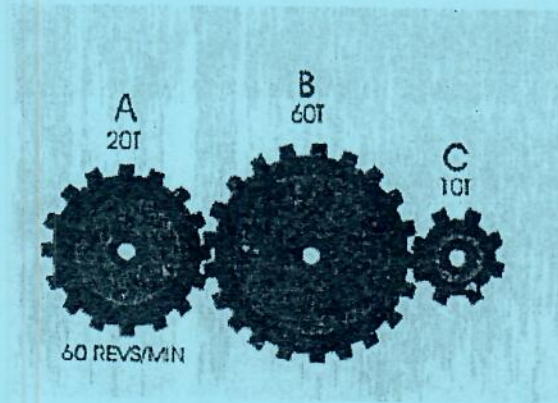


Figure 2: Gear train in transmission of power machines

- i. What is the output in rev/min at gear C? [7 marks]
- ii. In what direction does Gear C rotate? [2 marks]
- iii. What is the function of gear B in the transmission? [6 marks]

QUESTION 3

- a. A four-cylinder, four-stroke internal combustion engine has a bore size of 250 mm and a stroke of 500 mm. The engine runs at 300 revolutions per minute (rpm) giving a compression ratio of 18:1. Determine the following:
 - i. Piston displacement [3 marks]
 - ii. Clearance volume [5 marks]
 - iii. Piston surface area [2 marks]
 - iv. Displacement volume [5 marks]
 - v. Piston speed [5 marks]
- b. Discuss five advantages of diesel engines over petrol engines. [10 marks]

QUESTION 4

- a. Discuss three (3) major uses of a clutch in a tractor. [15 marks]
- b. State five (5) causes of excessive fuel consumption in engines. [5 marks]
- c. You have been assigned to assist a farmer who has failed to start his tractor. Your trouble shooting exercise indicates that there are air locks in the diesel fuel line. Precisely describe how you would bleed the air locks. [10 marks]