



**COLLEGE OF AGRICULTURE, FISHERIES & FORESTRY**  
**SCHOOL OF AGRICULTURAL SCIENCES**  
**DEPARTMENT OF SOIL SCIENCE AND AGRICULTURAL ENGINEERING**  
**FINAL EXAMINATION**  
**TRIMESTER II, 2017**  
**TRADE DIPLOMA IN AGRICULTURE – YEAR I**  
**AEG 404 FARM MECHANIZATION AND MACHINERY**

Time Allowed : 3 hours and 10min

**Instructions**

1. You are allowed 10 minutes Extra reading time during which you are NOT to write.
2. Begin each answer on a fresh page and use both sides of the sheet.
3. Do not write your name on any answer sheet - only write your examination number.
4. Insert all written sheets, graph paper, drawing paper, etc. in their correct sequence and secure with string.
5. For all sheets of paper of which rough/draft work has been done, cross it through And you **MUST ATTACH** to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Non-programmable calculators are permitted
8. Total number of pages = 06
8. **TOTAL MARKS = 100**

SECTION	DESCRIPTION	Marks
SECTION A	Part I – Multiple Choice	10
	Part II – Fill the Blanks	5
	Part III– True or False	5
	<b>All question in this section are Compulsory</b>	
SECTION B	Short Answer	30
	<b>All question in this section are Compulsory</b>	
SECTION C	Long Answer	10
	<b>All question in this section are Compulsory</b>	
SECTION D	Diagrams	10
	<b>All question in this section are Compulsory</b>	
SECTION E	Calculation	30
	<b>All question in this section are Compulsory</b>	
<b>TOTAL</b>		<b>100</b>

**SECTION A****MULTIPLECHOICE****(10 marks)****PART I**

1. The linear distance travelled by the piston between the Top Dead Center (TDC) and the Bottom Dead Center (BDC) when the crankshaft rotates by 180°
  - A. Piston
  - B. Stroke
  - C. Camshaft
  - D. Cylinder
2. During the Second stroke of a two strike engine cycle the processes that take place simultaneously are
  - A. induction and compression
  - B. Power and induction
  - C. induction and exhaust
  - D. Power and Exhaust
3. Which of the following is a secondary tillage implement?
  - A. Mould board plough
  - B. Disc plough
  - C. Disc harrow
  - D. Chisel plough
4. Which of the following is not a renewable source of energy?
  - A. Solar power
  - B. Hydro power
  - C. Fossil fuels
  - D. Biomass fuels
5. The chamber for compressing and burning of the fuel in the internal combustion engine
  - A. Exhaust valve
  - B. Cylinder
  - C. Crankshaft
  - D. Inlet valve
6. A workshop tool used to provide a mechanical advantage in applying torque to turn bolts, nuts or other hard to turn items.
  - A. Spanner
  - B. Screw driver
  - C. Hammer
  - D. Box wrench
7. Essential part of the internal combustion engine that allows fresh charge of Fuel/air into the combustion chamber.
  - A. Spark plug
  - B. Exhaust valve
  - C. piston
  - D. inlet valve

8. A machine that "combines" the tasks of harvesting, threshing, and cleaning Grains of the harvested crops
  - A. Combine harvester
  - B. Harvester
  - C. Reaper
  - D. None of the above answers
9. What is the major component of the farm tractor where the power from the engine is transmitted to the big driving wheels of the tractor?
  - A. Hydraulic system
  - B. Power takes off
  - C. Transmission system.
  - D. Differential system
10. It is a circular solid metal part attached to one end of the crankshaft. It gains momentum during the power stroke and provides rotation to non-power strokes
  - A. Crankshaft
  - B. Camshaft
  - C. Flywheel
  - D. Piston

**Part II** **Fill in the Blanks** **(05 marks)**

1. \_\_\_\_\_ is equipment that is used to harness a working horse.
2. \_\_\_\_\_ is an ancient agricultural hand tool used to shape the soil, control weeds, and harvest root crops. (Hilling), creating narrow furrows (drills) and shallow channels for planting seeds.
3. Power developed by an average pair of bullocks is about \_\_\_\_\_ (HP) for usual farm work
4. An average man can generate nearly \_\_\_\_\_ Horse Power (HP).
5. A \_\_\_\_\_ is a room or building which provides both the area and tools or machinery that may be required for the repair and maintenance of farm machinery and equipment.

**Part III** **True and False** **(05 marks)**

In the Answer booklet provided write "TRUE or FALSE" if the statement is correct and "FALSE" if the statement is incorrect

1. The Gudgeon Pin connects the small end of the piston to the connecting rod.
2. Exhaust valve opens during the compression stroke of a diesel engine.
3. Chisel plough is primary implements
4. Primary tillage involves breaking down large clods of soil into smaller pieces.
5. Diesel engines come in two and four stroke versions.

**SECTION B****SHORT ANSWERS****(30marks)**

1. List two objectives of farm Mechanization? **(2marks)**
2. Define the terms Energy **(1mark)**
3. List three factors conducive to farm mechanization? **(3marks)**
4. Define tillage and list three objectives of tillage operation on a farm? **(3marks)**
5. Briefly explain the term Renewable energy? **(1mark)**
6. List three (3) factors you would consider 'when selecting a tractor for your farm? **(3marks)**
7. Define farm tractor? **(1mark)**
8. List two types of ploughs commonly used on farms in Fiji? **(1mark)**
9. Define Engine? **(1 mark)**
10. List two methods of planting seeds in the field? **(1mark)**
11. Define the Primary and secondary tillage operation and write least two implements of used these tillage operations? **(3marks)**
12. Explain the function of a seed drill? **(1mark)**
13. What is the function of a Piston in an engine? **(1mark)**
14. Differentiate between fixed cost and Variable cost? **(2 marks)**
15. List three source of farm Power on the farm? **(3 marks)**
16. List three type of seed metering mechanism? **(3marks)**

**SECTION C****LONG ANSWERS****(10 marks)**

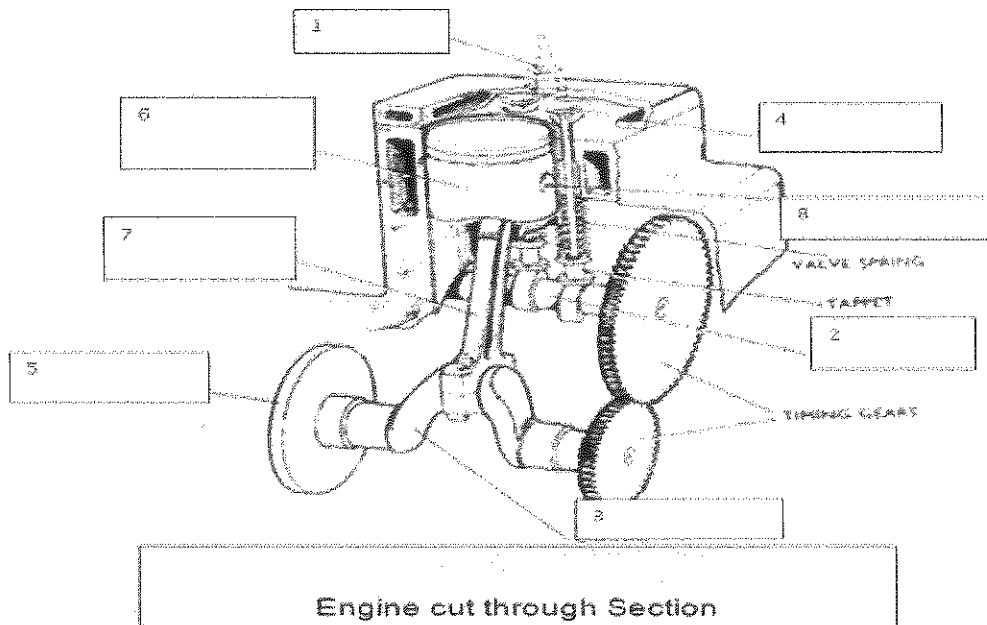
1. With the help of neat well labeled diagrams explain the operation of a four stroke cycle in Either a diesel engine or a petrol engine? **(8marks)**
2. List any two differences between a petrol engine and a diesel engine? **(2marks)**

**SECTION D**

**DIAGRAM**

**(10marks)**

Identify the parts in the cross-sectional view of the engine provided below.



**SECTION E**

**CALCULATIONS**

**(30marks)**

All Questions are Compulsory

**Question 1**

**Power and Field Efficiency**

**(10 marks)**

- A. A rotary cultivator having 10 blades spaced at 20cm apart is mounted on a tractor with a forward speed of 6 kmph covers an area of 5 hectares in 6 hours. Calculate the field efficiency of the rotary cultivator **(05 marks)**
- B. Determine the horse power required to pull a four bottom 28 cm plough, working to depth of 12 cm. The tractor is operating at a speed of 5.0kmph. The soil resistance is 0.8 kg/cm<sup>2</sup> **(05 marks)**

**Question 2****Calibration of Knapsack Sprayer****(10marks)**

A five hectare farm is to be sprayed with a 16 liter knapsack sprayer which has a swath width of 550mm and a discharge of 600ml/min. The cost of the pesticide is \$25/L and its application is 15ml/liter.

- a) Calculate the volume of spray in liters required per hectare if the walking speed or the spray man is 20m/min **(03 marks)**
- b) How many tank loads of spray is required for this farm? **(03 marks)**
- c) Calculate the amount of pesticide required per knapsack **(02 marks)**
- d) What would be the total cost of spraying this farm? **(02 marks)**

**Question 3****Calibration of Seed Drill****(10marks)**

A seed drill has 11 furrow openers spaced at 350mm apart. The seed drill was jacked up and 2500g of seed was collected after 10 revolutions of the drive wheel. Calculate the seed rate per hectare if the diameter of the drive wheel is 850mm. Assume there is 10% slippage of the drive wheel during drilling

**THE END**