



COLLEGE OF AGRICULTURE, FISHERIES & FORESTRY
SCHOOL OF AGRICULTURAL SCIENCES
DEPARTMENT OF SOIL SCIENCE & AGRICULTURAL ENGINEERING
FINAL EXAMINATION
TRIMESTER 3, 2017
BACHELOR OF EDUCATION (AGRICULTURE)
AEG 601 FARM MECHANIZATION AND MACHINERY

Time Allowed: 3 hours plus (10 minutes reading time)

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
9. Total Marks = 100

SECTION	DESCRIPTION	Marks
SECTION A Objective type questions	Part 1 – MCQ	20
	Part 2 – True and False	10
	Part 3 – Fill in the blanks	10
All question in this section are Compulsory		
SECTION B Descriptive type questions	Short Answer, Essay and Calculations	60
All question in this section are Compulsory		
TOTAL		100

SECTION – A

Part 1

- 1 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

- 2 It is a circular heavy 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

- 3 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

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 A machine has been done the tasks of harvesting, threshing, and cleaning together during harvesting field crops
(A) Combine harvester (B) Harvester
(C) Power reaper (D) none of the above answers

6. 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

- 7 Energy efficiency of tractor can be improved by means of
(A) Reducing of sound (B) Reducing friction of implements
(C) Proper periodic maintenance (D) All above

- 8 Control droplet application
(A) Fertilizer application method (B) Pesticide application method
(C) Seed drilling method (D) Seed sawing method

- 9 Energy requirement for 5 min operating of 1.5kw motor
 (A) $45 \times 10^4 \text{ j}$ (B) 300j
 (C) 7.5j (D) $75 \times 10^6 \text{ j}$
- 10 Field efficiency of tractor was not depend on its
 (A) Engine capacity (B) Implement attached
 (C) Solar intensity (D) All above
- 11 The engine in which liquid fuel is atomized, vaporized and mixed with air in correct proportion before entering into the engine cylinder
 (A) Two stroke engine (B) Four stroke engine
 (C) Diesel engine (D) Petrol engine
- 12 When the cycle is completed in two revolution of the crankshaft
 (A) Four stroke engine (B) Two stroke engine
 (C) Petrol engine (D) Diesel engine
- 13 When the cycle is completed in one revolution of the crankshaft
 (A) Two stroke engine (B) Four stroke engine
 (C) Diesel engine (D) Petrol engine
- 14 The rate of doing work at the rate of 4800 N-m per minute
 (A) 820Hp (B) 8Kw
 (C) 800Kwh (D) 80w
- 15 The rate of doing work
 (A) Power (w) (B) Energy (j)
 (C) Heat (j) (D) Capacity (m^3)
- 16 The tractor drawn rotavator is an excellent
 (A) Rotary Secondary tillage implements (B) Rotary primary tillage implements
 (C) Rotary tillage implements (D) Mulching tillage implements
- 17 What is the main functional part of the sowing machine?
 (A) Seed box (B) Seed tube
 (C) Seed metering mechanism (D) All of the above
- 18 Rotavator work on the principle of
 (A) Rotary motion (B) Vibrating motion
 (C) Reciprocating motion (D) none of the above
- 19 Which of the following types of tynes are used in rotavator
 (A) L shaped (B) U shaped
 (C) V shaped (D) none of the above

10. The width of cut of disc plough is given by
- (A) $W = Dd/3$ (B) $W = D/3$
(C) $W = Dp$ (D) $W = Dd/2$

Part 2

In the Answer booklet provided write “TRUE if the statement is correct and “FALSE” if the statement is incorrect

1. Camshaft is the main shaft of the engine which rotates during power stroke.
2. Solid fertilizer is more effective than liquid fertilizer
3. The two revolution cycle is completed in of the crankshaft of 4-stroke engine
4. Exhaust valve opens during the compression stroke of a diesel engine.
5. Petrol engine uses fuel injector as the delivery mechanism for fuel.
6. Regular maintenance of the farm machine is not always required
7. Primary tillage involves breaking down large clods of soil into smaller pieces.
8. Screwdriver is a device specifically designed to insert and tighten, or to loosen and remove, screws
9. Diesel engines come in two and four stroke versions.
10. Exhaust fumes contain carbon – monoxide a poisonous gas. Always open the workshop doors and windows when the engine is running.

Part 3

1. The machine call _____ can perform cutting threshing and cleaning operation together.
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. How much of energy consumed by 350w electric motor worked for 10 minutes _____
4. 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.
5. Piston is connected to the connecting rod by _____
6. _____ is the tool used to provide a mechanical advantage in applying torque to turn bolts, nuts or other hard to turn items
7. _____ is a process of strengthening iron by adding carbon into it.
8. _____ are terms which describe the use of animals to pull farm equipment and other loads.
9. Penetration of disc harrow to soil can be increased by changing _____
10. _____ is a machine designed to place seeds into the soil in rows which are equally spaced and of even depth

SECTION – B

Short Answer, Essay type and Calculations

60 Marks

Question 1.

1. Define the term “Farm Mechanization”. (2marks)
2. Compare differences between a petrol and diesel engine. (2marks)
3. With the help of a neatly labeled diagram, explain the operation of a four stroke cycle in petrol engine. (5marks)
4. Name three (3) primary tillage implements and briefly explain their usage in the field. (3marks)
5. 4-wheel tractor is used for plowing paddy field, force required for plowing was measured 6KN and plowing speed was 8km/h calculate the power output of the tractor by horse power (HP) (1HP = 746W) (4 marks)
6. Calculate the horse power requirement of a tractor to pull a three disk diameter 35 cm disk plough through a depth of 12 cm. The soil resistance is 1.2 kg/cm². The speed of the tractor is 6.0 kmph, power transmission efficiency of the tractor being 70%. (4 marks)

Question 2.

1. Explain the Preventative and Protective maintenances of farm tractor (2 marks)
2. Explain three (3) factors that you would consider when selecting a tractor for your farm. (3 marks)
3. Explain seed planting techniques (2 marks)
4. Briefly explain component of mechanical seed drill (3 marks)
5. A rotary cultivator having 11 blades spaced at 15 cm apart is mounted on a tractor with a forward speed of 7 km/h covers an area of 5 hectares in 6 hours. Calculate the field efficiency of the rotary cultivator (5 marks)
6. A mechanical seed drill has 9 furrow openers spaced at 25cm apart. During testing, 2.6 kg of seed has been collected after 10 revolutions of the drive wheel. If the diameter of the drive wheel is 180cm. Calculate the seed requirement per hectare Assume there is 10% slippage of the drive wheel during drilling. (5marks)

Question 3

1. Explain the importance of mechanical fertilizer application (2marks)
2. Explain fix and variable cost for tractor operation (2marks)
3. Explain the basic parts of knapsack sprayer (3marks)

4. A five hectare farm is to be sprayed with a 15 liter knapsack sprayer which has a swath width of 650mm and a discharge of 500ml/min. The cost of the pesticide is \$20/l and its application is 12ml/liter. Calculate the volume of spray in liters required per hectare if the walking speed of the spray man is 15m/min **(6marks)**
5. How many tank loads of spray is required for this farm? **(3marks)**
6. Calculate the amount of pesticide required per knapsack and what would be the total cost of spraying this farm? **(4marks)**

THE END