



COLLEGE OF AGRICULTURE, FISHERIES & FORESTRY
SCHOOL OF AGRICULTURAL SCIENCES & FORESTRY
DEPARTMENT OF SOIL SCIENCE & AGRICULTURAL ENGINEERING
FINAL EXAMINATION
SEMESTER 1, 2019
TRADE DIPLOMA IN AGRICULTURE
AEG 521Sme: 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 = 04.
9. Total Marks = 100.

SECTION	DESCRIPTION	Marks
SECTION A	Multiple Choice Questions (MCQ) All question in this section are Compulsory.	30
SECTION B	Short answer questions All question in this section are Compulsory.	30
SECTION C	Calculations. All question in this section are Compulsory.	40
	TOTAL	100

SECTION A – Multiple Choice Questions (MCQ)

All questions are compulsory (30 Marks)

Part 1

- Field efficiency of tractor was not depend on its
(A) Engine capacity (B) Implement attached
(C) Solar intensity (D) All above
- An average man can develop maximum power of about
(A) 74.6 watts (B) 0.1 Hp
(C) Both A & B (D) None of the above
- Energy requirement for 4 min operating of 1.2kw motor
(A) 28.8×10^4 j (B) 4.8j
(C) 7.5j (D) 75×10^6 j
- 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
- The thermal efficiency (%) of diesel engine varies from
(A) 28-32 (B) 32-38
(C) 38-42 (D) 42-52
- 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) Stroke (B) Piston
(C) Camshaft (D) Cylinder
- Which of the following is not a renewable source of energy?
(A) Solar Energy (B) Wind energy
(C) Fossil fuels (D) All above
- What is the pressure range of knapsack sprayer during operation?
(A) $7 - 8 \text{ kg/cm}^2$ (B) $3 - 5 \text{ kg/cm}^2$
(C) $200 - 300 \text{ kPa}$ (D) none of the above answers
- During the Second stroke of a two stroke 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

- 10 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
- 11 Control droplet application
 (A) Fertilizer application method (B) Seed drilling method
 (C) Pesticide application method (D) Seed sowing method
- 12 What is the main functional part of the seed drilling machine?
 (A) Seed box (B) Seed metering mechanism
 (C) Seed tube (D) All of the above
- 13 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) Diesel engine
 (C) Four stroke engine (D) Petrol engine
- 14 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
- 15 The rate of doing work at the rate of 5400 N-m per minute
 (A) 54Hp (B) 54Kw
 (C) 90w (D) 9000kwh

SECTION B - Short Answers

All questions are compulsory (30 Marks)

1. Define the term "Farm Mechanization". (1 marks)
2. Explain the importance of hand tools for land preparation. (2 marks)
3. Define the terms Energy and power. (2 marks)
4. Define tillage and list three objectives of tillage operation on a farm. (3marks)
5. Briefly explain the term renewable energy and two renewable energy sources. (2 marks)
6. List three (3) factors you would consider 'when selecting a tractor for your farm. (2marks)
7. List two types of primary tillage equipment and explain their functions. (3mark)
8. Briefly explain seed metering mechanisms and function of a seed drill. (2 marks)
9. Explain the difference between Primary and secondary tillage operation and write briefly explain 02 secondary tillage implements. (3marks)

10. Briefly explain the function of 4 stroke engine. (3 marks)
11. Compare differences between two stroke and four stroke engine. (2 marks)
12. Explain preventive maintenance of tractor. (2 marks)
13. Briefly explain three source of power use in the farm. (3 marks)

SECTION C – Calculations

All questions are compulsory (40 Marks)

1. 4-wheel tractor is used for plowing paddy field, force required for plowing was measured 8 kN and plowing speed was 5km/h calculate the power output of the tractor by horse power (HP) (1HP = 746W) **(4 marks)**
2. Determine the horse power required to pull a four bottom 22cm plough, working to depth of 14 cm. The tractor is operating at a speed of 5.5 km/h. The soil resistance is 0.9kg/cm² 1hp = 746w **(6 marks)**
3. If farm house has operated for 01month, 3 motors each 400w 6 hours per day and for 20 days and 3 bulbs each 20w 12 hours per day for 30 days, calculate electric energy requirement for one month. Calculate electric bill if 1 unit cost \$0.6/= (consider 1 electric unit = 1kwh (kilo watt hour) **(7 marks)**
4. A rotary cultivator having 12 blades spaced at 18cm apart is mounted on a tractor with a forward speed of 6.5 km/h covers an area of 5 hectares in 6 hours. Calculate the field efficiency of the rotary cultivator. **(5 marks)**
5. A mechanical seed drill has 14 furrow openers spaced at 30cm apart. During testing, 2.8 kg of seed has been collected after 12 revolutions of the drive wheel. If the diameter of the drive wheel is 140cm. Calculate the seed requirement per hectare Assume there is 11% slippage of the drive wheel during drilling. **(8marks)**
6. A four-hectare farm is to be sprayed with a 15-liter knapsack sprayer which has a swath width of 700mm and a discharge of 550ml/min. The cost of the pesticide is \$14/l and its application is 7ml/liter. Calculate the volume of spray in liters required per hectare if the walking speed or the spray man is 16m/min. **(5marks)**
 - How many tank loads of spray is required for this farm? **(2marks)**
 - Calculate the amount of pesticide required per knapsack and what would be the total cost of spraying this farm? **(3marks)**

THE END