



FNU FIJINATIONAL UNIVERSITY

COLLEGE OF AGRICULTURE, FISHERIES & FORESTRY
SCHOOL OF AGRICULTURAL SCIENCES & FORESTRY
DEPARTMENT OF SOIL SCIENCE & AGRICULTURAL ENGINEERING

FINAL EXAMINATION
TRIMESTER 1, 2018

BACHELOR OF SCIENCE (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
SECTION B Descriptive type questions.	All question in this section are Compulsory. Short Answer, Essay and Calculations.	60
	All question in this section are Compulsory.	
	TOTAL	100

SECTION – A

Part I

- 1 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
- 2 A draft animal can exert about, for doing farm work .
(A) 1/10 of its body weight (B) 1/20 of its body weight
(C) 1/30 of its body weight (D) 1/40 of its body weight
- 3 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
4. The thermal efficiency (%) of diesel engine varies from .
(A) 28-32 (B) 32-38
(C) 38-42 (D) 42-52
- 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) stroke (B) piston
(C) camshaft (D) cylinder
4. Which of the following is not a renewable source of energy?
(A) solar Energy (B) wind energy
(C) fossil fuels (D) all above
- 5 What is the pressure range of knapsack sprayer during operation?
(A) 7 – 8 kg/cm² (B) 3 – 5kg/cm²
(C) 200 – 300 kPa (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) seed drilling method
 (C) pesticide application method (D) seed sawing method
- 9 Energy requirement for 4 min operating of 1.2kw motor .
 (A) $28.8 \times 10^4\text{j}$ (B) 4.8j
 (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 rate of doing work .
 (A) energy (j) (B) power (w)
 (C) heat (j) (D) capacity (m³)
- 12 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
- 13 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
- 14 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
- 15 The rate of doing work at the rate of 5400 N-m per minute .
 (A) 54Hp (B) 54Kw
 (C) 90w (D) 9000kwh
- 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 seed drilling machine?
 (A) seed box (B) seed metering mechanism
 (C) seed tube (D) all of the above
- 18 The thermal efficiency (%) of petrol engine varies from .
 (A) 15-25 (B) 25-32
 (C) 32-38 (D) 38-40 19

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

20 The energy requirement for lift 200kg weight up to 6cm height

- (A) 1200j
- (B) 120j
- (C) 33.33j
- (D) 333.33j

Part 2

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

1. Solid pesticide is more effective than liquid pesticide.
2. Intake and exhaust valve remaining close during power-stroke.
3. Camshaft is the main shaft of the engine which rotates during power stroke.
4. Exhaust valve opens during the compression stroke of a diesel engine.
5. Petrol engine uses injector pump to pressurize the 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. Spark plug is important part of the diesel engine.
9. Share is not important part of mouldboard plough.
10. Seed metering mechanism is not important in seed drilling.

Part 3

1. _____ consists of dropping the seeds in furrow lines in a continuous stream and covering them with soil.
2. _____ of sprayer ensures that pesticide/herbicide active ingredient is applied correctly at the product labelled rate.
3. How much of energy consumed by 320w electric motor worked for 5 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. The big end of the connecting rod is attached to the _____.
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 fertilizer and 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 two stroke and four stroke engine. (2marks)
3. With the help of a neatly labeled diagram, explain the operation of a four stroke cycle in petrol engine. (4marks)
4. Name three (3) secondary 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 7KN and plowing speed was 6km/h, calculate the power output of the tractor by hose power (HP) (1HP = 746W) (4 marks)
6. Total draft of four bottom, 20 cm mouldboard plough when ploughing 12 cm deep at 6 km/h speed is 1500 kg. (a) Calculate the unit draft in kg/cm² (b) What is actual power requirement? If tractor efficiency 40% (c) If the field efficiency is 75% what is the effective rate of doing work in ha/hr? (5 marks)

Question 2.

1. Explain the fixed and variable costs of farm machinery. (2 marks)
2. Explain three (3) factors that you would consider when selecting a tractor for your farm. (2 marks)
3. Explain importance of disk plough comparison to mouldboard plough. (3 marks)
4. Briefly explain component of mechanical seed drill. (3 marks)
5. Simple gear mechanism is used to transmit engine power to rubber wheel. Smaller gear wheel having 10 tooth has been coupled to the engine and smaller wheel connected to the larger wheel having 40 tooth. The larger gear wheel was attached to rubber wheel (diameter 70cm). Calculate the number of revolutions required to be rotated of smaller gear wheel for traveling 4.4km of rubber wheel. (5 marks)
6. A mechanical seed drill has 11 furrow openers spaced at 30cm apart. During testing, 2.5 kg of seed has been collected after 10 revolutions of the drive wheel. If the diameter of the drive wheel is 160cm. Calculate the seed requirement per hectare. Assume, there is 12% slippage of the drive wheel during drilling. (5marks)

Question 3

1. Explain the importance of hand tools for land preparation. **(2marks)**
2. Explain preventive maintenance of tractor. **(2marks)**
3. Explain the importance of hydraulic lifting system in the tractor. **(3marks)**
4. It required to lift 800kg weight, so hydraulic system is used. The smaller area of liquid where providing force by pump (F_1) is 8cm^2 and the area where touch with 800kg weight is 100cm^2 . Calculate smaller force (F_2) that can be applied to lift 800kg weight. **(4marks)**
5. A five hectare farm is to be sprayed with a 14 liter knapsack sprayer which has a swath width of 600mm and a discharge of 550ml/min. The cost of the pesticide is \$15/l and its application is 9ml/liter. Calculate the volume of spray in liters required per hectare if the walking speed or the spray man is 18m/min. **(4marks)**
6. How many tank loads of spray is required for this farm? **(2marks)**
7. Calculate the amount of pesticide required per knapsack and what would be the total cost of spraying this farm? **(3marks)**

THE END