



# **MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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## **University Examinations 2013/2014**

THIRD YEAR, SECOND SEMESTER AND SECOND YEAR, SECOND SEMESTER  
EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN HORTICULTURE

### **ABE 2322- INTRODUCTION TO FARM POWER AND MACHINERY**

**DATE: DECEMBER 2013**

**TIME: 2 HOURS**

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**INSTRUCTIONS:** Answer question *one* and any other *two* questions

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#### **QUESTION ONE – 30 MARKS**

- (a) Briefly discuss the role of Agricultural Mechanization in the development of agriculture based economies of the third world countries. (8Marks)
- (b) Define the following engine terminologies:
- (i) Bore
  - (ii) Stroke
  - (iii) Piston displacement
  - (iv) Clearance volume
  - (v) Compression ratio (5Marks)
- (c) With the aid of labeled diagrams show the schematic arrangement of the valve system in the process of operating the valves. (6Marks)
- (d) Briefly explain three classifications of Agricultural field machines and give two examples in each case. (6Marks)
- (e) Outline five methods of planting/seeding. (5marks)

## QUESTION TWO – 20 MARKS

- (a) Explain the operation of a compression ignition type of four stroke cycle engine. (5Marks)
- (b) With the aid of a labeled diagram show the main components of a diesel engine fuel system. (6Marks)
- (c) With the aid of a labeled diagram show the features of a two stroke cycle engine. (3Marks)
- (d) The bore and stroke of a certain engine are given as 110mm and 135mm respectively. It is also given that the clearance volume is a seventh of the piston displacement. Calculate:
  - (i) The piston displacement
  - (ii) The total cylinder volume
  - (iii) The compression ratio. (6Marks)

## QUESTION THREE – 20 MARKS

- (a) Briefly discuss three types of engine lubrication systems. (9Marks)
- (b) The cross-sectional area of a furrow cut by a certain tillage implement is 60sq.cm. Given that the average soil resistance is 0.6kg/sq. cm, calculate the pull exerted by the power source if the implement pulls at an angle of  $25^{\circ}$  with the horizontal. (6Marks)
- (c) Outline two seeding/planting methods. (5Marks)

## QUESTION FOUR – 20MARKS

- (a) Briefly explain two types of crop protection machines. (7Marks)
- (b) Calculate the time required to harvest 5.0 hectares of grass by means of a 2.0 meters wide mower operating at a speed of 4.5km/hr. Take the field efficiency of the mower to be 90%. (5Marks)
- (c) Briefly discuss the following aspects of horticultural machinery/structures:
  - (i) Grading and grading machines
  - (ii) Greenhouse classification. (8Marks)