



# **KIBABII UNIVERSITY**

**UNIVERSITY EXAMINATIONS  
2017/2018 ACADEMIC YEAR**

**FIRST YEAR SECOND SEMESTER  
MAIN EXAMINATIONS**

**FOR THE DEGREE OF B.SC (BAB, BEE, AND BAE)**

**COURSE CODE: SAB 140**

**COURSE TITLE: FARM POWER AND MACHINERY**

**DATE: 31<sup>ST</sup> JULY 2018**

**TIME: 2 PM – 4 PM**

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**INSTRUCTIONS TO CANDIDATES**

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 3 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

### QUESTION ONE (COMPULSORY) – (30 MARKS)

- a) Briefly discuss the concept of farm mechanization in agricultural production (3 Marks)
- b) Under the context of farm power and machinery, explain the following:
- (i) Heat engine (1 Mark)
  - ii) External combustion engine (1 Mark)
  - iii) Fuel based classification of heat engines (1 Mark)
- c) Explain four sequence of events (working cycle) of an internal combustion engine (3 Marks)
- d) Differentiate the following:
- i) FHP and PTO HP (2 Marks)
  - ii) Two stroke and four stroke engines (3 Marks)
- e) With an aid of a sketch, describe the fuel supply system in a spark ignition engine (3 Marks)
- f) Describe the functions of following components of a tractor:
- (i) Differential unit (2 Marks)
  - (ii) Hydraulic control system (2 Mark)
- g) A 3 x 30 cm plough is moving at a speed of 4 km/h. calculate how much time it takes to plough 500 x 500 m field when the field efficiency is 70 % (3 Marks)
- h) Describe broadcasting as a method of sowing (3 Marks)
- i) Discuss any three components of a nozzle of a sprayer (3 Marks)

### QUESTION TWO (20 MARKS)

- a) Give a brief comparison between petrol and diesel engines (4 Marks)
- b) With an aid of a sketch describe the working principle of a four stroke engine (8 Marks)
- c) A governor is an important component of an engine of farm machinery, answer the following based on its function:
- i) Briefly state two roles of a governor as a mechanical device (3 Marks)
  - ii) Give two reasons for governor hunting (3 Marks)
  - iii) Calculate the percentage regulation of the governor given the speed at no load was 500rpm and the speed at full load is 400rpm (2 Marks)

### QUESTION THREE (20 MARKS)

- a) Given that a four stroke 6 cylinder engine can exert pressure of  $50\text{kg/cm}^2$  when producing power, piston diameter is 0.005m, from top dead centre to bottom dead centre is 1500mm, it makes 10 revolutions per second and it loses 10% its power due to friction. Compute the following;
- i) IHP (5 Marks)
  - ii) FHP (2 Marks)
  - iii) BHP (3 Marks)
- b) Explain two differences between a Sprayer and a Duster (1 Mark)
- c) State four reasons for calibrating a Boom Sprayer (4 Marks)
- d) Draw a clearly labeled diagram to show a Sprayer Circuit (5 Marks)

### QUESTION FOUR (20 MARKS)

- a) An indigenous plough has a 20 cm wide furrow at the top and 10 cm depth. Calculate the volume of soil handled per day 8 hours if the speed of working is 2.5 km/h (3 Marks)
- b) With an aid of a sketch, discuss the components of a disc plough (8 Marks)
- c) Briefly explain the objectives of tillage (5 marks)
- d) Briefly explain four types of furrow openers (4 Marks)

### QUESTION FIVE (20 MARKS)

- a) Describe the procedure used to calibrate a seed drill (8 Marks)
- b) The following results were obtained while calibrating a seed drill. Calculate the seed rate per hectare. (i) No. of furrows = 10 (ii) Spacing between furrows = 20 cm (iii) Diameter of drive wheel = 1.5 meter (iv) Revolutions of ground wheel rotated for seed delivery = 500 (v) seed collected = 20 kg. (6 Marks)
- c) Calculate the time required for sowing 1.6 hectares of land by a five furrow seed drill working at 12.5 cm deep. The speed of seed drill is 3.2 km/hr and pressure exerted by the soil on the seed drill is  $0.42\text{ kg/cm}^2$ . The space between furrow openers is 10 cm and time loss in turning is 10%. (6 Marks)