

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF
SCIENCE IN AGRICULTURE AND BACHELOR OF SCIENCE IN
AGRICULTURAL EDUCATION

AGEN 131: BASIC FARM POWER SOURCE AND UTILIZATION

STREAMS: BSC (AGRIC) Y2S1

TIME: 2 HOURS

DAY/DATE: MONDAY 02/12/2019

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS:

- This paper contains seven questions
- Answer all questions in section A and any TWO questions in section B

SECTION A (30 MARKS)

QUESTION ONE

(a) Discuss four advantages of a water cooled engine compared to an air cooled engine

[4

marks]

(b) Define the following terms as applied in internal combustion engine:

- (i) Flash point of a fuel [2 marks]
- (ii) Ignition temperature of a fuel [2 marks]
- (iii) Calorific value of a fuel [2 marks]

QUESTION TWO

A four cylinder engine has a bore of 90 mm and a stroke of 110 mm

Calculate the following for this engine:

(a) The piston displacement of one cylinder in cubic centimeters

[3 marks]

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- (b) The capacity of the engine in litres (1 litres = 1000mm³) [3 marks]

QUESTION THREE

- (a) Define the term wheel slip as applied in tractor/vehicle performance [3 marks]
(b) List three negative effects of wheel slip on tractor performance [3 marks]

QUESTION FOUR

- (a) Describe coefficient of traction for a tractor [2 marks]
(b) The coefficient of a traction in (Ct) firm clay, soil for a wheel type tractor is 56%. The load (wr) on the driving wheels is 1200 kg without wheel weight and 1450 kg with wheel weight. Determine the traction force [6 marks]

SECTION B (40 MARKS)

QUESTION FIVE (20 MARKS)

- (a) Discuss five environmental parameters in designing suitable enclosure (cabin) for the tractor operator. [10 marks]
(b) Explain the function of the following components in a vehicle
(i) Idler gear in a gear drive train [2 marks]
(ii) Suspension spring [2 marks]
(c) Discuss three important factors to consider when matching tractor and implement. [6 marks]

marks]

QUESTION SIX (20 MARKS)

- (a) Describe the construction materials in the clutch/brake lining [4 marks]
(b) A gearbox is driven in second gear where the constant – mesh gears on the clutch shaft and countershaft have 16 and 35 teeth respectively. The second gear on the main shaft has 32 teeth and meshes with the countershaft gear having 14 teeth. Determine the following for this gear box:
(i) The second gear ratio [4 marks]
(ii) The propeller shaft speed for an engine speed of 3600 rpm [4 marks]

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- (c) Discuss four benefits for performing preventive maintenance on a tractor/vehicle

[8

marks]

QUESTION SEVEN (20 MARKS)

- (a) Traction enhances tractor performance on soft soils. Discuss four methods of improving traction on the farm tractor. [8 marks]
- (b) With the aid of a diagram, name the basic components of the ignition battery. [5 marks]
- (c) Discuss four differences between gear drives and chain and sprocket drives in power transmissions. [7 marks]
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