

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF  
BACHELOR OF SCIENCE IN AGRICULTURE AND BACHELOR OF SCIENCE  
IN HORTICULTURE

AGEN 341: FARM STRUCTURES

STREAMS: BSC (AGRIC & HORT)Y4S1

TIME: 2 HOURS

DAY/DATE: TUESDAY 05/12/2017

8.30 A.M. – 10.30 A.M.

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INSTRUCTIONS:

- THIS PAPER CONTAINS SEVEN QUESTIONS
- ANSWER ALL QUESTIONS IN SECTION A AND ANY OTHER TWO IN SECTION B

SECTION A

QUESTION ONE

Briefly discuss the importance of farm structures and buildings as part of integrated rural development.

[6 marks]

QUESTION TWO

- (a) Explain four functions of ventilation in a building. [4 marks]
- (b) With the aid of a diagram, name four zones in farmstead planning and indicate the activities in each zone. [4 marks]

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### QUESTION THREE

A stone pier to support an axial load from a water tank of 600kN is 1.0 meter square and 4 meters high and weighs 20kN/M<sup>3</sup>. The load is spread uniformly over the top of the pier so that the arrow shown in the diagram below merely represents the resultant of the load.

Calculate:

- (i) The stress in the stone pier immediately under the water tank. [3 marks]
- (ii) The stress at the bottom of the stone pier. [5 marks]

### QUESTION FOUR

- (a) Describe the following types of walls in building construction:
  - (i) Masonry wall [2 marks]
  - (ii) Monolithic wall [2 marks]
  - (iii) Frame wall [2 marks]
- (b) Give two factors which will determine the type of wall to be used. [2 marks]

## SECTION B

### QUESTION FIVE

- (a) (i) With the aid of a diagram name the basic parts of a double horizontal stay on a fence line. [5 marks]
- (ii) Explain two main objectives of fencing on a farm [2 marks]

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- (b) Describe the following types of roofs in building constructions:
- (i) Hip roof [2 marks]
  - (ii) Monopitched roof [2 marks]
  - (iii) Double pitched (Gable) roof [2 marks]
- (c) (i) Briefly describe two main groups of crop drying systems. [4 marks]
- (ii) Determine the weight of dried wheat grain that weighed 1000 kg at a moisture content of 30%. The wet grain was dried to 13% moisture content. [3 marks]

### QUESTION SIX

- (a) Briefly describe FIVE desirable properties associated with concrete as a building construction material. [5 marks]
- (b) Calculate the amount of materials (in volume and weight) needed to construct a rectangular concrete floor slab 12 meters by 8 meters and 10 centimeters thick. Use a nominal mix of 1:3:6. 50 kg of cement is equal to 37 litres.  
30% decrease in volume when mixed and 5% waste  
Density of sand = 1.4 tons per m<sup>3</sup>  
Density of stone = 1.6 tons per m<sup>3</sup> [10 marks]

### QUESTION SIX

- (a) Briefly describe five desirable properties associated with concrete as a building construction materials. [5 marks]
- (b) Calculate the amount of materials (in volume and weight) needed to construct a rectangular concrete floor slab 12 metres by 8 metres and 10 centimeters thick. Use a nominal mix of 1:3:6  
50 kg of cement is equal to 37 litres  
**Assume:**  
30% decrease in volume when mixed and 5% waste  
Density of sand = 1.4 tons per m<sup>3</sup>  
Density of stone = 1.6 tons per m<sup>3</sup> [10 marks]
- (c) Differentiate between the following terms as used in farm structures
- (i) Column and beam [2 marks]
  - (ii) Tensile strength and compressive strength [2 marks]
- (d) Define the term modulus of elasticity. [1 mark]

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**QUESTION SEVEN**

- (a) Using a gable roof design drawing, name the basic parts of the roof. [10 marks]
  - (b) Describe three important design parameters in construction of a green house.[6 marks]
  - (c) Describe two roof covering materials for greenhouse. [4 marks]
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