



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

FIRST/THIRD YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AEN 112/AGN373: FARM STRUCTURES

DATE: 26/3/2021

TIME: 11.00-1.00 PM

INSTRUCTIONS:

Answer *ALL* questions in *SECTION A* and any other *TWO* questions in *SECTION B*

SECTION A: COMPULSORY

SECTION A (30 MARKS)

- a) Differentiate between the following terms;
- i. Particle density and bulk density (4 marks)
 - ii. Slump test and silt test (4 marks)
 - iii. Tender and contract (4 marks)
 - iv. Farm plan and farmstead (4 marks)
- b) Using examples outline any three reasons why farm structures are important in any agricultural production process. (6 marks)
- c) Assume a 1:3:5 cement- sand- stone concrete mix by volume using naturally moist aggregates and adding 62 litres of water. Two bag of cement are used and take the following additional assumptions:
1. Moisture content of sand: 4%
 2. Moisture content of stones: 1.5%
 3. Bulk density of the sand: 1400 kg/m³
 4. Bulk density of the stones: 1600 kg/m³
 5. Solid density of aggregate materials: 2650 kg/m³
 6. Solid density of cement: 3100 kg/m³
 7. Density of water: 1000 kg/m³

Calculate the following:

- i. water- cement ratio (3 marks)
- ii. cement - aggregate ratio (3 marks)
- iii. solid volume (4 marks)

SECTION B: ANSWER ANY TWO QUESTIONS (40 MARKS)

QUESTION TWO (20 MARKS)

- a) In respect to the following structures, describe any five functional design requirements
 - i. Milking parlour (5 marks)
 - ii. Grain store (5 marks)
 - iii. Farm workshop (5 marks)
- b) A five strand barbed wire fence has been planned for a 4ha rectangular plot. Compute the number of posts required if the spacing between the posts is 10m (5 marks)

QUESTION THREE (20 MARKS)

- a) Discuss main forces that act on a farm structure and give their cardinal characteristics (6 marks)
- b) Explain five factors considered in the selection of building materials (5 marks)
- c) Explain five advantages of soil as a building material (5 marks)
- d) Describe three methods used in planning of a new farmstead (4 marks)

QUESTION FOUR (20 MARKS)

- a) Explain three methods used for carrying out the following:
 - i. Improving the soil bearing capacity (6 marks)
 - ii. Preserving and protecting the steel from rusting and corrosion (6 marks)
 - iii. Applying wood preservatives (6 marks)
- b) Define Bill of Quantities (BQ) in relation to building production (2 marks)

QUESTION FIVE (20 MARKS)

- a) Explain any three (3) desirable characteristics of hardwood and softwood as agricultural building materials (any 3 pairs) (6 marks)
- b) With the aid of a sketch describe the herringbone milking parlour (6 marks)
- c) Describe how to make concrete building blocks outlining the materials, tools, equipment and skills required. (8 marks)