



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (AGRICULTURAL EDUCATION AND EXTENSION)

AGN 373: FARM STRUCTURES

DATE: 19/8/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS:

Answer *ALL* questions from Section A and any other *TWO* from Section B:

SECTION A: COMPULSORY: (30 MARKS)

QUESTION ONE (30 MARKS)

- a) Describe four phases of development of rural structures. (4 marks)
- b) Explain the following as used in planning of farm structures.
 - i. Regional Planning (3 marks)
 - ii. Farmstead Planning (3 marks)
- c) Discuss two categories of loads on building components. (4 marks)
- d) Discuss three factors that must be considered when designing a greenhouse. (6 marks)
- e) Explain the difference between on-site and off-site fabrication as used in building production. (6 marks)
- f) Explain two ways in which climate affects the performance of livestock structures. (2 marks)
- g) Explain two factors to be considered in the design of rural houses. (2 marks)

SECTION B: ANSWER ANY TWO QUESTIONS (40 MARKS)

QUESTION TWO (20 MARKS)

- a) Explain five types of building foundation as used in farm structures. (10 marks)
- b) Outline the procedure for determining the size of an evaporative cooling pad and the capacity of the cooling water tank in a greenhouse. (10 marks)

QUESTION THREE (20 MARKS)

- a) Explain the following terms as used in building production:
- i. Take-off. (5 marks)
 - ii. Bill of Quantities (BOQ). (5 marks)
- b) In reference to livestock housing;
- i. Explain four general livestock housing requirements in the tropics. (4 marks)
 - ii. With aid of a sketch, show the layout for a medium- to large-scale dairy unit for a herd of 60 cows. (6 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the three types of tendering that are used in building construction. (6 marks)
- b) Explain two reasons why it is necessary to excavate the topsoil before laying the foundation. (4 marks)
- c) Discuss five types of milking parlour. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Find the size of the foundation and pier footing that will safely support the loads.
- i. Assume a building is 16 metres long and 8 metres wide.
 - ii. The roof framing plus the expected wind load totals 130 kN.
 - iii. The wall above the foundation is 0.9 kN/m.
 - iv. The floor will be used for grain storage and will support as much as 7.3 kPa.
 - v. The floor structure is an additional 0.5 kPa.
 - vi. The foundation wall and piers are each 1 metre high above the footing.
 - vii. The wall is 200 mm thick and the piers are 300 mm square.
 - viii. The soil on the site is judged to be compact clay in a well-drained area.
- Assume that the weight of the mass 1 kg equals approximately 10 N. The mass of concrete is 2 400 kg/m³. (15 marks)
- b) Discuss five farmstead planning factors as used in farm structures. (5 marks)