



**UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER**

PROGRAMME: BSC AGRIC II (ABE)

COURSE CODE: ABE 209

TITLE OF PAPER: FARM BUILDINGS AND STRUCTURES

TIME ALLOWED: TWO (2) HOURS

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO
OTHER QUESTIONS.**

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GRANTED BY THE CHIEF INVIGILATOR**

SECTION I: COMPULSARY

QUESTION ONE

- A) Name the five categories of agricultural structures giving at least one example of each. **(10 marks)**
- B) Name and briefly describe the functions of any three (3) crop storage structures that are commonly found in Swaziland. **(10 marks)**
- C) The University Farm Director intends to construct a concrete silage silo with a design life of 20 years. The depreciation cost is expected to be 5 % per year and the initial costs were estimated to be E5000.00. The bank loan is currently at 17 % interest and an insurance of 1.0 % after construction.
- i. Calculate the annual cost of the structure. **(10 marks)**
 - ii. What would be the value of the structure after the second year of operation? **(5 marks)**
 - iii. If the returns obtained from silage sales are E900.00 annually, what advice would you give to the farm director and why? **(5 marks)**
- [40 marks]**

SECTION B: ANSWER ANY TWO QUESTIONS**QUESTION TWO**

- A) Define giving at least one example of the three main types of loads that can be exerted on farm buildings and structures. **(6 marks)**
- B) A concrete ring beam 150 x 150 mm in cross section x 6.0 m in length was designed to secure a maize storage sliding door in a poultry farm. Calculate the dead load of the beam, assuming gravity to be 9.81 m/s^2 and the density of concrete as 5.0 kN/m^3 . **(4 marks)**
- C) In not more that ten lines, state with the aid of a diagram the main weakness of concrete as a building material. **(5 marks)**
- D) Discuss in detail the six main factors that affect the choice of building materials. **(15 marks)**
- [30 marks]**

QUESTION THREE

- A) A small holder farmer intends venturing into broilers raised on deep litter. He was advised to start small with 1000 birds.
- i. Translate this information into design specifications. **(10 marks)**
- ii. Specify the dimensions i.e. **length** and **width** of the **ground plan** for this proposed farming enterprise given that the space requirement for broilers on deep litter is **6 birds/m²**. **(5 marks)**
- B) Briefly describe with **reasons** the **type and size** of **blocks** that you could advise the farmer to build his poultry house. **(5 marks)**
- C) Draw the **ground plan** for the proposed poultry house, showing the dimensions and the **title block** with all the information that it should have. **(10 marks)**
- [30 marks]**

QUESTION FOUR

- A) i. What are the structural elements that make up agricultural buildings? **(6 marks)**
- ii. What are the **nine (9)** types of common roof designs that could be used in the design and construction of agricultural buildings? **(9 marks)**
- B) Timber is one of the most common building materials used in a number of agricultural structures in Swaziland, but it has one major problem.
- i. State the structural weakness that timber has as a building material. **(2 marks)**
- ii. How could such a problem be corrected in order to meet the design specifications of timber structural sections? **(3 marks)**
- C) i. What are the **two (2)** main types of stress that are experienced by structural members in farm buildings and structures? **(4 marks)**
- ii. A brick pier of 700 mm x 700 mm and 3.0 m high weighs 19 kN/m³. It is supporting an axial load from a column of 490 kN. The load is spread uniformly over the top of the pier. Calculate the stress in the brickwork immediately under the column. **Show all your work.** **(6 marks)**

[30 marks]