



**UNIVERSITY OF SWAZILAND  
FINAL EXAMINATION PAPER**

**PROGRAMME: BSC AGRIC II (LWM)**

**COURSE CODE: LUM 209 (NEW PROGRAMME)**

**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) i. Other than the building inspector, name at least two (2) important professionals that make up the building team. [4 marks]
- ii. Taking Swaziland as a point in-case, what instrument empowers the building inspector to demolish structural elements or members that are not standard? Please be specific. [4 marks]
- B) Discuss briefly the duties of the building inspector in a construction project. [8 marks]
- C) A concrete ring beam 230 x 230 mm, spanning 3000.0 mm was found to be sagging following a 14 day curing process. The building inspector noticed that there was a crack across the beam bottom, hence he ordered the contractor to demolish the beam and rebuild it.
- i. State the structural cause of the sagging in the beam. [7 marks]
- ii. How could such a problem be corrected in order to meet design specifications? [7 marks]
- iii. Assuming a uniformly distributed axial load of 150 N/m, calculate the reactions for this beam. [5 marks]
- iv. Sketch the beam loading diagram and show how the beam failed as a result of the load. [5 marks]

**SECTION 2: ANSWER ANY TWO QUESTIONS**

**QUESTION TWO**

- A) Briefly describe the following structures and / or structural concepts as used in farm buildings and structures.
- i. Agricultural fences; [5 marks]
- ii. Safety during construction; [5 marks]
- iii. Road types and functions. [5 marks]

- B) i. State the three (3) equations of static equilibrium. [6 marks]
- ii. Given that a concrete ring beam had a total axial point load of 10 kN occurring a meter from the left and 3.0 m from the right reaction, calculate the left and right reactions. [9 marks]

### QUESTION THREE

- A) i. Other than the roof, name the two (2) other structural elements that makes up agricultural buildings. [5marks]
- ii. What are the nine most common types of roof designs? [9 marks]
- iii. State one of these roof designs that are commonly used by small holder farmers in Southern Africa. [2 marks]
- iv. Why is the roof design stated above used the most by small holder farmers in Southern Africa? [3 marks]
- B) i. State the specific loads that any given roof is designed to withstand. [6 marks]
- ii. Given that the wind speed experienced by a roof of a 3.2 m high hay barn was 25 m/s, compute the wind load using equation 3.1 below. [5 marks]

$$q = 0.0127v^2k \quad (3.1)$$

$$\text{Where: } k = (h/6.1)^{2.7}$$

### QUESTION FOUR

- A) i. List the core setting-out equipment and materials. [5 marks]
- ii. A rectangular maize storage crib was set-out in a relatively flat site and the diagonal was found to be 20.0 m when checking the accuracy of the setting out. If the design width was 8.0 m, calculate the design length of the maize crib. [10marks]
- B) Discuss in detail how you could use the materials mentioned above to set-out a poultry house of known dimensions in the construction site. [15 marks]