



**UNIVERSITY OF SWAZILAND  
SUPPLEMENTARY EXAMINATION PAPER**

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

**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) A water trough measures 2.0m x 2.0m x 1.0m internal dimensions, the 1.0m being the height. The top water level is 0.9m. The base is made of concrete 0.15m thick and the brick walls are 230.0mm thick. The densities of water, concrete and brick wall may be taken as 10.0kN/m<sup>3</sup>, 23.6 kN/m<sup>3</sup>, 15.0 kN/m<sup>3</sup> respectively.
- i. Draw a plan view of the water trough. **[9 marks]**
  - ii. Draw a section of the water trough. **[9 marks]**
  - iii. Other than a plan and a section, what are the other core drawings that constitute a set of design drawings as required by the Swaziland Building and Housing Act of 1968? **[2 marks]**
- B) i. Briefly describe the three (3) types of loads experienced by agricultural structures. **[10 marks]**
- ii. Calculate the resultant load due to the water, concrete base and brick walls acting at the centre of the base. **[10 marks]**

**SECTION 2: ANSWER ANY TWO QUESTIONS****QUESTION TWO**

- A) Sketch a framework for a building and on it, indicate the following structural members.
- i. Ring beam. **[5 marks]**
  - ii. Strip footing. **[5 marks]**
  - iii. Roof tie beam. **[5 marks]**
  - iv. Concrete wall. **[5 marks]**
- B) Calculate the compression stress in a column given that it is square in cross section made of the nominal size 150 mm x 150 mm x 6mm. Assume axial loading of 1000 N/mm<sup>2</sup>. **[10 marks]**

**QUESTION THREE**

- A) State at least two (2) reasons why the knowledge of structural materials is important in the design and construction of agricultural structures? **[4 marks]**
- B) Describe in detail the elements that can help in the selection of appropriate building materials during the design and construction stages. *Grading will consider well planned and coherent discussions.* **[26 marks]**

**QUESTION FOUR**

- A) Briefly describe the three (3) types of loads that may be exerted in agricultural buildings and structures. **[9 marks]**
- B) Describe briefly the following stresses as experienced in agricultural buildings and structures.
- i. Compressive stress. **[5 marks]**
  - ii. Tensile stress. **[5 marks]**
- C) A rivet of 10 mm diameter is connecting two pieces of flat steel in a roof tie. Calculate the tensile stress of the rivet when the steel bars are subjected to an axial pull of 6.0 kN. **[5 marks]**
- D) In not more than half a page, discuss the role of agricultural buildings and structures in your future career in land and water management. **[6 marks]**