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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QUESTION THREE

A) What is the relationship between concrete strength and workability? **[2 marks]**

B) Describe the test that could be conducted to determine the compressive strength of concrete. **[8 marks]**

C) What are the other two building materials that are commonly used in farm buildings in Swaziland besides concrete? **[2 marks]**

D i. Discuss briefly the major benefit of preparing bills of materials or quantities during the design and eventual construction of structures. **[3 marks]**

ii An on-site concrete slab measuring 10.0 m x 15.0 m x 75 mm thick was constructed and cured under ideal conditions with the following costs incurred.

- Cement = E 1500.00/m^3
- Sand = E 800.00/m^3
- Gravel = E 500.00/m^3.

Calculate the material and total cost of the concrete slab, if the concrete mix used was 1:2:4. **[15 marks]**

QUESTION FOUR

A) i. What are the two (2) types of walls used in the construction of buildings? **[2 marks]**

ii. What are the design wall sizes that are made by the following standard block sizes? Express your answer in millimetres. **[6 marks]**

- 9 - inch blocks
- 6 - inch blocks
- 4.5 - inch blocks

iii. Why are 4.5- inch blocks not used for the construction of external walls? **[2 marks]**

B) Write short note on each of the following.

i. Properties of structural sections. **[5 marks]**

ii. Timber **[5 marks]**

iii. Stress **[5 marks]**

iv. Agricultural fences **[5 marks]**

SECTION I: COMPULSARY

QUESTION ONE

A) i. What are the other two (2) structural elements that make up agricultural buildings other than the roof? **[2 marks]**

ii. Name the nine types of roof designs in Figure 1 that could be used in the design and construction of agricultural structures. **[9 marks]**

B) Briefly discuss any five (5) of the eight factors that affect the choice of building materials. **[10 marks]**

C) Concrete is a very common building material that is used in a number of agricultural structures in Swaziland, but it has one major problem when used as a beam.

i. State the structural weakness that concrete has as a building material.

[2 marks]

ii. How could such a problem be corrected in order to meet the design specifications of concrete beams? **[3 marks]**

D) A 3000 x 2000 concrete hydrant protection was designed by an irrigation engineer to secure vandalism of her main water supply line. The hydrant protection was to be built using 6-inch concrete blocks that were 300 mm long, 150 mm wide and 150 mm high. If the foundation was 200 mm deep, with a standard mortar thickness of 15 mm between blocks, calculate the number of blocks that would be required for the valve protection. **[14 marks]**

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION TWO

A) Name the five (5) categories of agricultural structures giving at least one example of each. **[10 marks]**

B) Briefly discuss the role of agricultural structures in agricultural production.

[10 marks]

C) i. Name the other two types of loads other than dead loads that may be exerted on farm structures. **[3 marks]**

ii. A concrete ring beam 230 x 230 mm in cross section x 8.0 m in length was designed to secure a garage door in a tractor workshop farm. Calculate the dead load of the beam, assuming gravity as 10 m/s^2 and the density of concrete as 5.0 kN/m^3. **[7 marks]**