



MACHAKOS UNIVERSITY

University Examinations for 2017/2018 Academic Year

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES MANAGEMENT

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

THIRD YEAR SECOND SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE

IN AGRICULTURAL EDUCATION

AEN 373: FARM STRUCTURES

DATE:4/12/2017

TIME:8.30-10.30 AM

Instructions:

Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

- a) What are farm structures? (2 marks)
- b) What do the figures 1:3:6 mean as used in concrete technology? (4 marks)
- c) Differentiate between timber seasoning and timber preservation (4 marks)
- d) Outline three types of tendering used in building construction (3 marks)
- e) Define the following terms as used in concrete technology
 - ii. Batching (1 mark)
 - iii. Curing (1 mark)
 - iv. Workability (1 mark)
 - v. Grading (1 mark)
- f) Calculate the amount of material needed to construct a rectangular concrete floor 7.5m by 4.0m by 7.5cm thick. Use a nominal mix of 1:3:6 (Take 50kg for 37litres capacity, assuming spillage and shrinkage to be 30%, Density of Sand 1400kg/m³, Density of sand 1650kg/m³) (7 marks)

- g) Explain in each case three (3) desirable characteristics of hardwood and softwood as agricultural building materials.

QUESTION TWO (20 MARKS)

- a) Slurry manure pit is to be constructed for waste management of 10 dairy animals each with an average weight of 540 kg. The animals produce slurry at an average rate of 0.06 m^3 per day and the waste will be stored for 28 days before it is removed from the slurry pit. If the maximum slope of access ramp, depth and total length of the pit are 15%, 0.5 m and 6.5 m respectively, provide a sketch of the slurry pit and determine its width (10 marks)
- b) Prepare a bill of quantities for a slab measuring 7m by 5 by 0.4m assuming the cost of 1 bag of cement (50kg), 1 litre of water, 1 ton of sand (1400kg/m^3), ballast (1600kg/m^3), hardcore (1250 kg/m^3), 1mR of cut stone, 1 man-day of skilled and unskilled labour as KES 600, 0.5, 500, 1000, 300, 27, 450 and 250 respectively (including transport where applicable). The works will take 10 days using two masons and four casuals. Take spillage, and shrinkage to be 30% of all the required concrete. State all other necessary assumptions (10 marks)

QUESTION THREE (20 MARKS)

- a) Explain six (6) defects of wood to watch as agricultural building material (6 marks)
- b) State and explain four zones in a homestead (4 marks)
- c) Take two homes in Kenya. One is constructed with adobe block walls and a thatch roof while the other is made of hollow core concrete blocks with a sheet metal roof. Each house measures 3 by 4 metres, 2 metres high at the eaves, 3 metres at the ridge, has 1 m^2 of window and 1.5 m^2 of timber door. Find the heat lost from each house when the temperature is 0°C outside and 15°C inside. Given that; U values for a sheet metal roof is $3.85 \text{ W/ (m}^2\text{.K)}$; thatch roof, $0.26 \text{ W/ (m}^2\text{.K)}$; adobe wall, $2.5 \text{ W/ (m}^2\text{.K)}$; concrete block wall, $2.9 \text{ W/ (m}^2\text{.K)}$; wood, $2.4 \text{ W/ (m}^2\text{.K)}$ and a single glass, $6 \text{ W/ (m}^2\text{.K)}$. (10 marks)

QUESTION FOUR (20 MARKS)

- a) Describe the procedure used to transfer dimensions from a working drawing to the ground to facilitate the initiation of the construction (setting out of a building) (10 marks)
- b) State any three durable material preferred for constructing a foundation (3 marks)

- c) Briefly explain the reason for your choice in each case. (6 marks)
- d) While constructing a chick grower structure, why are corners discouraged (1 mark)

QUESTION FIVE (20 MARKS)

- a) Explain five factors considered when choosing building materials for a construction job (10 marks)
- b) Explain four Characteristics of a zero-grazing unit (4 marks)
- c) Explain three fundamental features of a farm workshop (4 marks)