MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AGN 373: FARM STRUCTURES

DATE: 28/11/2019 **TIME: 2.00-4.00 PM**

INSTRUCTIONS;

Answer ALL questions in section A and any other TWO questions from section B:

SECTION A: COMPULSORY (30 MARKS)

QUESTION ONE (30 MARKS)

a) Define the following terms as used in concrete technology

i. Grading (1 mark)

ii. Hardness (1 mark)

iii. Tensile strength (1 mark)

iv. Workability (1 mark)

v. Void (1 mark)

b) Describe the procedure for determining a slump test (5 marks)

c) Describe THREE (3) desirable characteristics of hardwood and soft wood as agricultural building materials (6 marks)

d) Giving TWO examples each, explain

i. Factors considered in the site selection of a farmstead (4 marks)

ii. Types of Foundations (3 marks)

iii. Zones in a standard farmstead (3 marks)

e) With the aid of a sketch briefly describe the rotary milking parlour (4 marks)

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION (40 MARKS)

QUESTION TWO (20 MARKS)

a) A farmer wishes to store some agricultural produce in a 13000mm by 5200mm by 2000mm flat roofed store made from a concrete roof slab, a concrete floor and a concrete foundation strip all whose thickness is 250mm.The walls are masonry and are 300mm. The foundation strip is 400mm wide and the foundation wall is 900mm high. Calculate stress at the bottom of the strip given that the density of concrete, stone and produce are 2400, 2000 and 780kg/m^2 respectively. The acceleration due to gravity to be 9.81m/s^2

(10 marks)

b) An office measuring 4m×3m×1.8m has two windows each 1.5 by 0.7m and a door 1.65×0.75m. The U-values in W/ (m^2.K) of the door, window, walls and ceiling are 3.2, 2.5,2.4 and 3.3 respectively. Determine the;

i) Heat gain or loss of the building when the ambient and room temperature are 25^0C and 20^0C respectively and 40 air changes per day. (5 marks)

ii) Thickness of the stone wall that will maintain the above conditions if the thermal-conductivity of stone is 2,4 W/m^2. K and the convective heat transfer coefficients for the inside and outside air films are 25 and 12.5 W/ (m^2.K) respectively (6 marks)

QUESTION THREE (20 MARKS)

a) Discuss EIGHT (8) main parameters that are considered in design of a greenhouse for rearing fish (8 marks)

b) With the aid of a sketch briefly describe the layout of a rotary milking parlour (4 marks)

c) 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. If the maximum slope of access ramp, depth and total length of the pit are 15%, 0.5 m and 6.5 m respectively, determine its width and provide a sketch of the slurry pit. (8 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) (12 marks)

b) Calculate the amount of materials needed to construct a rectangular concrete floor measuring 7.5 m by 4.0 m and 7 cm thick. Use a nominal mix of 1:3:6. Fifty kilograms of

cement have a capacity of 37 litres.

(8 marks)

QUESTION FIVE (20 MARKS)

a) Explain the three types of tendering that are used in building construction. (6 marks)

b) Prepare a bill of quantities for the sub-structure measuring 4×3m, with a footing width of 600mm, foundation wall of 3 running stones, hard core depth of 20cm, blinding of 10cm and slab (mix ratio 1:3:5) depth 15cm assuming the cost of 1 bag of cement (50kg), 1 litre of water, 1 tonne of sand (1400kg/m^3), ballast (1600 kg/m^3), hard-core 1250 kg/m^3), 1mR of cuts tone, 1 tonne of blinding (900kg/m^3), 1 man-day of skilled labour, 1 man-day of unskilled labour as KES 800.00, 0.50, 500, 1000, 300, 27, 300, 450 and 250 respectively (including transport where applicable). The works will take 10 days using two masons and 4 casuals. Take spillage, mortar for walling and shrinkage to be 30% of all the required concrete. State all other necessary assumptions

(14 marks)