

EMBU UNIVERSITY COLLEGE
(A CONSTITUENT COLLEGE OF THE UNIVERSITY OF NAIROBI)

SECOND SEMESTER EXAMINATION 2013/2014

SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF
SCIENCE IN AGRICULTURE AND BACHELOR OF SCIENCE IN
HORTICULTURE.

AEB 202: STRUCTURES AND MATERIALS

DATE: APRIL 9, 2014

TIME: 11.00AM – 1.00PM

INSTRUCTIONS:

Answer Question ONE and ANY other Two

QUESTION ONE

- a.) i.) Explain why farm buildings and structures are important parts of integrated rural Development. (5 marks)
- ii.) Describe briefly five (5) factors affecting the choice of materials for a construction job. (5 marks)

- b.) Explain the meaning the following characteristics of wood as a building material:
 - i.) Strength (2 marks)
 - ii.) Hardness (2 marks)
 - iii.) Stiffness (2 marks)
 - iv.) Toughness (2 marks)
 - v.) Warping (2 marks)

c.) A normal mix of 1:3:5 cement-sand-stone concrete by volume using naturally moist aggregates is used in a construction job. 62 litres of water is added. 2 bags of cement are used.

Assumptions:

Moisture content of sand	4%
Moisture content of stones	1.5%
Bulk density of the sand	1400kg/m ³
Bulk density of the stones	1600kg/m ³
Solid density of aggregate materials	2650kg/m ³
Solid density of cement	3100kg/m ³
Density of water	1000kg/m ³
One bag of 50kg cement	37 litres

- i.) Calculate the volume of the aggregates in the mix. (4 marks)
- ii.) Calculate the weight of the aggregates. (3 marks)
- iii.) Calculate the amount of water contained in the aggregates. (3 marks)

QUESTION TWO

a.) Explain the following defects in wood when used as a construction material:

- i.) Brittle heart (1 mark)
- ii.) Wide growth rings (1 mark)
- iii.) Knots (1 mark)
- iv.) Decay (1 mark)
- v.) Fissures (1 mark)

b.) i.) Describe the desirable properties associated with concrete as a building material

(4 marks)

ii.) Explain the recommended hand mixing method of concrete normally adopted on small jobs.

(4 marks)

c) Draw and label the basic parts of a zero grazing unit to accommodate five dairy cows.

(7 marks)

QUESTION THREE

a.) A nominal mix of 1:3:6 (cement-sand-stone) is used to construct rectangular concrete floor 7.5 metres by 4.0 metres and 7 centimetres thick. 50 kilograms of cement is equal to 37 litres. Calculate the amount of materials needed to construct this floor.

(10 marks)

b.) i.) Explain **FIVE** advantages of earth (soil) as a building material. (5marks)

ii.) Explain **THREE** ways in which soil stabilization increases the soils resistance to destructive weather condition.

(1½ marks)

iii.) Describe the functions of paints and indicate the major ingredients found in various paints.

(3½ marks)

QUESTION FOUR

a.) State **FOUR** reasons why drawings are important in farm structures. (4 marks)

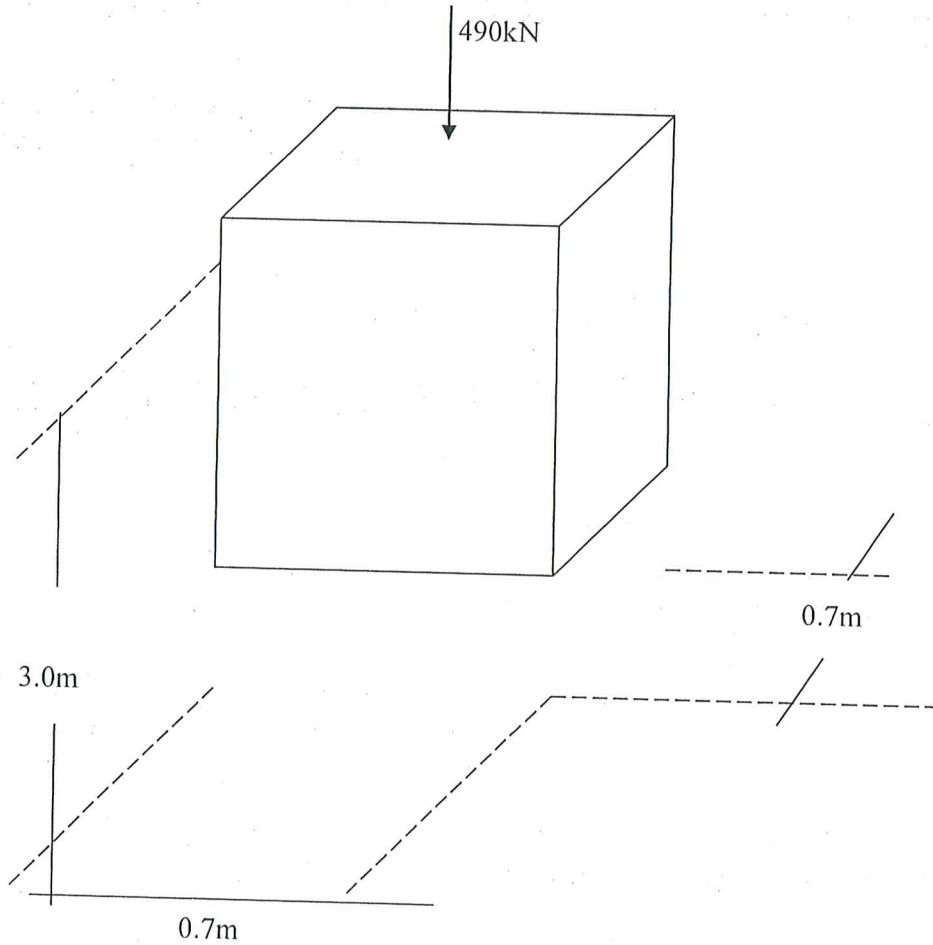
b.) A brick pier is 0.7metres square and 3 metres high and weighs 19kN/M^3 . It is supporting an axial load from a column of 490 kN. The load is spread uniformly over the top of the pier, so that the arrow shown in the diagram below merely represents the resultant of the load. Calculate:

i.) The stress in the brick work immediately under the column.

(2 marks)

ii.) The stress at the bottom of the pie.

(5 marks)



- c.) i.) Describe **FIVE** types of natural fibres used in building construction. (5 marks)
- ii.) Explain **FOUR** function of ventilation in a building. (4 marks)

QUESTION FIVE

- a.) Describe the following structures found on a dairy farm:
- i) Cattle race (2½ marks)
- ii.) Cattle rush (2½ marks)
- b.) i.) List **SIX** factors of environmental quality concern to both man and livestock. (3marks)
- ii.) With the aid of a diagram, name four zones in farmstead planning and indicate the

activities in each zone.

(2 marks)

c.) Describe the following housing systems for layers:

i.) Deep litre system

(2 ½ marks)

ii.) Semi-intensive system

(2 ½ marks)

d.) i.) State **FIVE** objectives of fencing on a farm.

(2½ marks)

i.) List **FIVE** types of wire fences commonly used on farms.

(2½ marks)

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