



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 210: CIVIL ENGINEERING MATERIALS II

DATE: 11/12/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer question **ONE** and any other **TWO** questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) List **five** Physical properties of aggregates which have an effect on concrete. (5 marks)
- b) Describe the effect each of the five Physical properties of aggregates as listed in (a) above can have on concrete. (12 marks)
- c) Define the terms Permeability and Absorption when used in reference to concrete. Describe how the effect of Permeability and Absorption can be reduced in concrete. (13 marks)

QUESTION SECOND (20 MARKS)

- a) Name three important characteristics which Engineers specifying Timber for Structural Engineering use are concerned with. (5 marks)
- b) Name at least three timber properties which must be known in order to design timber structure properly. (5 marks)
- c) It is a requirement that timbers for Structural engineering use has to be graded before use. Name and describe two grading methods employed in carrying out the grading. (10 marks)

QUESTION THREE (20 MARKS)

- a) Explain what you understand by the term Moisture Content (M.C.) of timber and describe the effect moisture has on the timber. (4 marks)
- b) Defects in timber can occur at various stages during growing and conversion as well as seasoning. Name and describe two types each of natural and conversion defects which can occur. (8 marks)
- c) Occasionally timber requires treatment with a preservative to assist them resist infestations. Name and describe two types of preservatives treatment normally carried out. (8 marks)

QUESTION FOUR (20 MARKS)

- a) Define the terms Segregation and bleeding which are sometimes used to describe some types of concrete. Explain how segregation and bleeding can take place and how each can be minimized. (10 marks)
- b) List at least three types of admixtures which are sometimes introduced in concrete to improve or alter its properties. Describe how each of these admixtures affects the resulting concrete. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Briefly define the following terms as used in reference to steels:
 - i. Stress
 - ii. Elastic limit
 - iii. Design stress. (4 marks)
- b) Describe how carbon can influence in making of steel particularly with respect to tensile strength, ductility, elongation and weldability. (8 marks)
- c) Define with the aid of typical stress-strain curves for mild and ultra- high strength steel the distinctive features in respect to the two curves. (Annotate the critical points of the curves with respect to each material. (8 marks)