



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECV 204: THEORY OF STRUCTURES I

DATE: 23/3/2021

TIME: 2.00-4.00 PM

INSTRUCTIONS

Answer question one and any other two questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Briefly state the role of a **Civil Engineer** within the Built Environment setting design of structures such as roads, bridges, water dams e.tc. (2 marks)
- b) What you understand by the term **Structural Engineering** explaining the role a Structural Engineer plays in design/supervision of structures. (3 marks)
- c) Briefly explain how basic loads to be carried on a structure are determined. (10 marks)
- d) In the case of Architectural structures, describe **two principal** and most important types of loads to be considered in the analysis of an Architectural structure. (15 marks)

QUESTION TWO (20 MARKS)

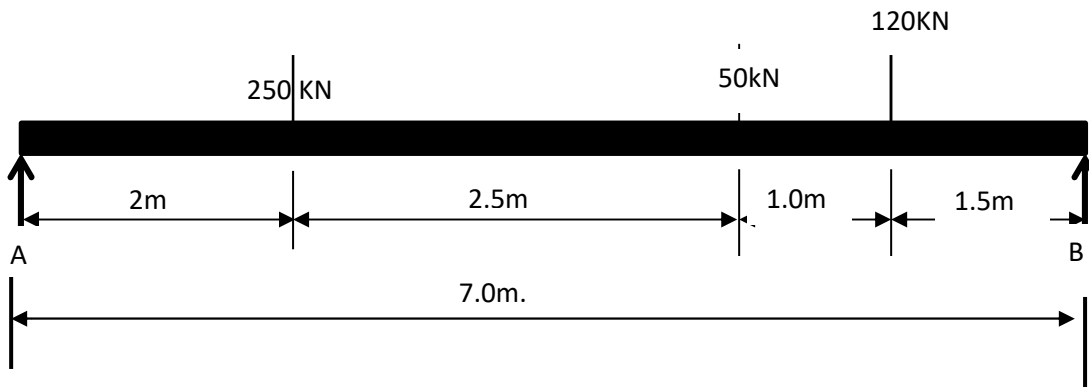
- a) Define the terms Theory of Structures and Strength of materials. (4 marks)
- b) Name three conditions and equations of equilibrium of any system of forces. (6 marks)
- c) Explain with the aid of a clearly annotated sketch of a cantilever beam what is meant by a moment of force? (10 marks)

QUESTION THREE (20 MARKS)

- a) Explain why it is necessary to classify buildings into different types of classes during the design stage and give at least **two** types of classes. (6 marks)
- b) Briefly describe what you understand by the terms listed below. (14 marks)
- Structural elements.
 - Foundations.

QUESTION FOUR (20 MARKS)

- a) Explain what a force is and state the effect it has when applied to a stationary body. Briefly show how the force will be worked out making use of applied force formula.. (7 marks)
- b) Calculate the magnitude and direction of the reaction in the loaded beam shown in the figure below. (13 marks)



QUESTION FIVE (20 MARKS)

- a) Define the following terms :
- Statically determinate framework.
 - Statically Indeterminate Framework (6 marks)
- b) Determine the magnitude and type of force acting in each of the members of the framework sketch below using method of joint resolution of forces. (14 marks)

