



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIFTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 503: HIGHWAY MATERIALS

DATE: 12/8/2021

TIME: 2.00-4.00 PM

INSTRUCTIONS

1. This paper comprises of five questions. Answer **three** questions
2. Question one is **compulsory** and carry 30 marks
3. Answer any other **two** questions

QUESTION ONE (30 MARKS)

- a) Describe in details the process used in the manufacture of Bitumen (15 marks)
- b) Giving formulae define the following terms
 - i. Density
 - ii. Bulk density
 - iii. Specific Gravity/Relative Density (12 marks)
- c) State the THREE important characteristics of Asphalt (3 marks)

QUESTION TWO (20 MARKS)

Describe in details the Bitumen Manufacturing Process

QUESTION THREE (20 MARKS)

- a) Describe the methods used for evaluating the strength and supporting power of a Subgrade. (4 marks)
- b) Describe in details the TWO methods used in Soil classification (12 marks)
- c) State the FOUR control factors that affect the extent of compaction (4 marks)

QUESTION FOUR (20 MARKS)

- a) Define the THREE common methods used in proportioning of aggregates (6 marks)
- b) Define the term Asphalt Recycling (2 marks)
- c) Describe in details the THREE basic methods applied in Bitumen recycling (12 marks)

QUESTION FIVE (20 MARKS)

- a) What is Soil Compaction (2 marks)
- b) Define Liquidity Limit in soil (1 mark)
- c) State the Four control factors affecting the extent of compaction (2 marks)
- d) Define the Five soil fractions recognized in AASHTO (5 marks)
- e) Describe the steps involved in the Proctor procedure (10 marks)