



MACHAKOS UNIVERSITY
University Examinations for 2021/2022 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: 23/8/2022

TIME: 11.00-1.00 PM

INSTRUCTIONS:

- 1) *This examination contains a total of FIVE questions. QUESTION ONE IS Compulsory.*
- 2) *Answer QUESTION ONE and ANY OTHER TWO QUESTIONS.*

QUESTION ONE (30 MARKS)

- a) Describe in details the process used in the manufacture of Bitumen (12 marks)
- b) Giving formulae define the following terms
 - i. Density
 - ii. Bulk density
 - iii. Specific Gravity/Relative Density (9 marks)
- c) State the THREE important characteristics of Asphalt (3 marks)
- d) Define Soil Compaction (3 marks)
- e) Elucidate Liquidity Limit in soil (3 marks)

QUESTION TWO (20 MARKS)

Describe the THREE common methods used in manufacture and proportioning of aggregates

QUESTION THREE (20 MARKS)

- a) Discuss 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) Outline the FOUR control factors that affect the extent of compaction. (4 marks)
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QUESTION FOUR (20 MARKS)

- a) Define the term Asphalt Recycling (4 marks)
- b) Describe in details the THREE basic methods applied in Bitumen recycling (16 marks)

QUESTION FIVE (20 MARKS)

- a) State the Four control factors affecting the extent of compaction. (5 marks)
- b) Outline the Five soil fractions recognized in AASHTO. (5 marks)
- c) Describe the steps involved in the Proctor procedure. (10 marks)