



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING

EBC 3222: HIGHWAY ENGINEERING I

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions in **TWO** sections **A & B**

Answer question **ONE (Compulsory)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY – 30 MARKS)

Question One (30 Marks)

- a) Define soil as a construction material in highways. **(2 marks)**
- b) Briefly explain main types of soil on the basis of soil constituents. **(6 marks)**
- c) A test of sub grade soil provided the following data. Liquid limit = 43%, plastic limit = 20%,
 $\mu_m = 48\%$
percentage of particles passing 75 μm . Classify the soil as per group index method and state whether it is suitable in its natural state for use as a sub base material. **(7 marks)**
- d) Define the following terms as used in soil stabilization. **(10 marks)**
- i) Soil cement
 - ii) Soil lime
 - iii) Cement modified soil
 - iv) Cement stabilized soil
 - v) Plastic soil cement
- e) List the materials required in the construction of rigid pavement. **(5 marks)**

SECTION B (Attempt any TWO questions)

Question Two (20 marks)

- a) Briefly describe the following forms of failure in pavements. **(8 marks)**
- i) Cracking
 - ii) Pot holes
 - iii) Shear failure
 - iv) Common failure
- b) (i) Define the term retaining wall **(2 marks)**
- (ii) Explain any **TWO** types of retaining walls. **(4 marks)**
- (iii) Give **SIX** factors that need to be considered in the selection of a retaining wall. **(6 marks)**

Question Three (20 marks)

- a) Define the following elements as used in pavement construction/. **(8 marks)**
- i) Median
 - ii) Cross slope
 - iii) Side slope
- b) Outline any **THREE** types of shoulders. **(3 marks)**

- c) Describe the sources of water involved in highway drainage. **(3 marks)**
- d) (i) List any **TWO** types of central reservations **(2 marks)**
(ii) Outline **FOUR** uses of kerbs on highways. **(4 marks)**

Question Four (20 marks)

- a) Explain **THREE** categories of traffic assignment. **(6 marks)**
- b) Explain **THREE** factors that influence the demand for urban travel. **(6 marks)**
- c) Define the following terms as applied in transport demand studies. **(4 marks)**
i) Level of service
ii) Trip distribution
- d) State any **FOUR** factors that affect trip generation. **(4 marks)**

Question Five (20 marks)

- a) (i) Define the term capacity as applied to geometric design of highways. **(3 marks)**
(ii) Briefly explain **THREE** factors that affect capacity. **(6 marks)**
- b) List any **SIX** factors which govern the design of geometric features of a highway. **(6 marks)**
- c) Define the following terms as used in speed surveys on highways. **(5 marks)**
i) Journey speed
ii) Spot speed
iii) Running speed