



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2412: HIGHWAY ENGINEERING II

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Drawing Instruments*

This paper consists of **FIVE** questions

Answer question **ONE (COMPULSORY)** from **SECTION A** and any other **TWO** questions from **SECTION B**

Maximum marks for each part of a question are clearly shown

This paper consists of **TWO** printed pages

SECTION A (COMPULSORY)

Question 1 (30 marks)

- a) Briefly describe the following types of pavements
- (i) Flexible
 - (ii) Rigid (4 marks)
- b) (i) Define bituminous concrete
- (ii) Outline the Principal properties of bituminous concrete (8 marks)
- c) Define the following terms used in road desing
- (i) Growth rate
 - (ii) Design life (4 marks)
- d) (i) Briefly describe **FOUR** types of road maintenance
- (ii) A new road is to be designed with the following factors: Growth rate = 3%; Number of standard Axles = 2000; the design life is 15 years
- Calculate the culmulative number of standard axles (14 marks)

SECTION B (Attempt any TWO questions)

Question 2 (20 marks)

- a) (i) Explain **FOUR** types of joints used in rigid pavements
- (ii) Briefly describe **THREE** ways in which water can trespass into sub-grade soil (14 marks)
- b) Briefly explain **THREE** factors which may affect CBR test results (6 marks)

Question 3 (20 marks)

- a) Briefly explain the functions of each layer of flexible pavement (10 marks)
- b) (i) State the objectives of soil stabilization
- (ii) Outline the methods used in soil stabilization (10 marks)

Question 4 (20 marks)

- a) Briefly describe each of the following basic earthwork operations
- (i) Clearing and grubbing
- (ii) Excavations
- (iii) Compaction
- (iv) Finishing (10 marks)
- b) (i) State **THREE** categories of construction plants giving an example in each category (6 marks)
- (ii) State **FOUR** assumptions made in calculating stress, strain and deflections in pavements (4 marks)

Question 5 (20 marks)

- a) Outline the purpose of pavement design and the principal factors which influence the production of satisfactory pavement (10 marks)
- b) Briefly explain the benefits that accrue from the use of labour based construction techniques compared to equipment based techniques (10 marks)