THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

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

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING

EBC 3224: HIGHWAY ENGINEERING I

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*
- *Calculator*
- *Drawing instruments*

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 clearly shown

This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

a) Briefly outline the following methods of traffic volume count:-

(i) Manual
(ii) Radar Detector
(iii) Magnetic detector

b) (i) Outline **FOUR** design factors for a street lighting system (8 marks)

(ii) Give **FOUR** objectives of providing roadway lighting (4 marks)

c) (i) State **FOUR** situations which prohibit the use of single lantern central lighting in dual carriageways (6 marks)

(ii) Outline **THREE** types of discernment of night-time driving conditions (6 marks)

SECTION B (Answer any TWO questions from this section)

Question 2

a) (i) State the purpose of Origin and Destination surveys as used in highway planning
(ii) Briefly describe the following Origin and Destination methods giving the advantages or each:

(i) Roadside interview
(ii) Home interview
(iii) Tag or sticker method (12 marks)

b) Define the following terms as used in speed surveys
(i) Spot speed
(ii) Journey speed
(iii) Running speed (6 marks)

c) Briefly explain the term 'road intersection' as applied in geometric design of highways (2 marks)

Question3

a) Define the following terms as applied to street lighting:

(i) Mounting height
(ii) Outreach
(iii) Arrangement (6 marks)

b) With the aid of a sketch, explain **THREE** methods of sighting lanterns on plan (9 marks)

c) State **FIVE** design principles of a good junction (5 marks)

Question 4

a) Explain the following terms as applied in transport demand studies
   (i) Trip generation
   (ii) Trip distribution
   (iii) Level of service (6 marks)

b) State any **FOUR** application of traffic assignment (4 marks)

c) Briefly describe **THREE** traffic assignment techniques (6 marks)

d) State **FOUR** factors that affect trip generation (4 marks)

Question 5

a) List any **SIX** factors which govern the design of geometric features of a highway (6 marks)

b) (i) Define the term Capacity as applied to geometric design of highways (3 marks)
   (ii) Briefly explain **THREE** factors that affect capacity (6 marks)

c) Describe the following aspects considered in geometric design of roads
   (i) Gamber
   (ii) Gradient (5 marks)