



# 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)