



TECHNICAL UNIVERSITY OF MOMBASA  
**Faculty of Engineering &  
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING  
**DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE)**

EBC 2209: REINFORCED CONCRETE & MASONRY DESIGN

**END OF SEMESTER EXAMINATION**

SERIES: APRIL 2014

**TIME ALLOWED: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions. Answer any **THREE** questions of the **FIVE** questions

All questions carry equal marks

Maximum marks for each part of a question are as shown  
This paper consists of **THREE** printed pages

### Question One

- a) List FOUR factors governing structural design: **(4 marks)**
- b) Compare the properties of constituent materials of reinforced concrete in terms of strength, durability and fire resistance. **(10 marks)**
- c) List the THREE load combinations considered in ultimate limit state design. **(6 marks)**

### Question Two

A reinforced concrete beam 400mm deep and 250mm wide is required to span a clear distance (span) of 3150mm between 150mm thick supporting walls. The beam carries dead (excluding self weight) and imposed loads of 12kN/m and 8kN/m respectively. Given the following information design the beam and show the reinforcement arrangement:

$$f_{cu} = 30\text{N/mm}^2$$

$$f_y = 460\text{N/mm}^2$$

$$f_{yy} = 250\text{N/mm}^2$$

$$\text{Cover to reinforcement} = 200\text{mm} \quad \textbf{(20 marks)}$$

### Question Three

A simply supported reinforced concrete floor slab subjected to an imposed load of 3.0kN/m<sup>2</sup> has a clear span 4.0m and is supported on 150mm thick wall. Design the floor using the following materials strength:

$$f_{cu} = 30\text{N/mm}^2$$

$$f_y = 460\text{N/mm}^2 \quad \textbf{(20 marks)}$$

### Question Four

Design the stair slab shown below given the following information:

- Effective span = 3.0m
- Stair = 1.5m
- Tread width = 260mm
- Risers = 150mm
- Live load = 3.0kN/m<sup>2</sup>
- $f_{cu}$  = 30N/mm<sup>2</sup>
- $f_y$  = 460N/mm<sup>2</sup>

Span

**Question Five**

- a) Design a square pad resisting axial characteristic load of 1000KN dead and 350KN imposed from a 400mm square column. The safe bearing pressure on the soil is 200KN/m<sup>2</sup>

$$f_{cu} = 35\text{N/mm}^2$$

$$f_y = 460\text{N/mm}^2$$

**(16 marks)**

- b) Show the pad details in cross section including the reinforcement arrangement

**(4 marks)**