



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

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

HIGHER DIPLOMA IN CIVIL ENGINEERING

EBC 3203: REINFORCED CONCRETE & MANSONRY DESIGN

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY 2013

TIME: 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

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

Question One (20 marks)

- a) Outline the process of structured design. **(5 marks)**
- b) The floor of a classroom block 6.5m x 15.0m consists of FIVE reinforced concrete beams equally spaced at 3.0m centres and monolithically casted together with the slab. The beams one in turn supported on reinforced concrete columns.

Design typical T-beam

Data:

Imposed load on floor = 2.5KN/m²
Finishes on floor = 0.7KN/m²

(20 marks)

Question Two (20 marks)

- a) Define design loads
- b) Design L-Beam in question 1(b) **(20 marks)**

Question Three (20 marks)

- a) Define design loads **(5 marks)**
- b) Figure 1 shows a plan of an office block.

Design Panel 'X' of the slab

Sketch a section through the shorter span to show the arrangement of reinforcement. **(15 marks)**

A

Data

- Imposed load on floor = 3.0KN/m²
- 15mm thick screed on upper side of slab
- 20mm thick screed on lower side of slab
- PVC floor tiles of weight = 0.2KN/m²
- Density of concrete = 24KN/m³
- Density of screed = 18KN/m³
- Permissible local bond stress = 1.25N/mm²
- Pst = 210N/mm²

Question Four (20 marks)

- a) State factors governing structural design. **(5 marks)**
- b) The floor of a hall of clear spars 3.0m by 7.5m is supported on 200mm thick block walls on all its four sides.
Design the slab and sketch a section through the shorter span to show the arrangement of reinforcement. **(15 marks)**

Data:

- Pst = 210N/mm²
- Finishes on slab = 0.7N/mm²
- Imposed Load on floor = 3.0KN/m²

Question Five (20 marks)

- a) State factors governing structural design. **(5 marks)**

- b) A reinforced concrete column of actual length of 4.0m is required to carry an axial load of 400KN. The column is fully fixed at both ends.
- i) Design the column
 - ii) Design the column base for bending.
- (15 marks)**

Data:

- | | | |
|----------------------------|---|----------------------|
| - Pcc | = | 5.3N/mm ² |
| - Psc | = | 175N/mm ² |
| - Pst | = | 210N/mm ² |
| - Pcb | = | 7N/mm ² |
| - Bearing capacity of soil | = | 200KN/m ² |