



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

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING

EBC 3204: REINFORCED CONCRETE & MASONRY DESIGN

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2013
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

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

Question One

- a) Define the following design loads giving examples:
- (i) Dead loads
 - (ii) Imposed loads
 - (iii) Thermal loads
 - (iv) Traveling loads
- (6 marks)**
- b) A short r.c. column is required to support an axial load of 450KN.
- (i) Design the column
 - (ii) Design base for the column
- (14 marks)**

Data

- Bearing capacity of soil = 250kN/m²
- Percentage requirement, Asc = 1.5% Ag
- Pcc = 5.3N/mm²
- Pst = 210N/mm²

Question Two

- a) Define the following as applied to timber design:
- (i) Green stress
 - (ii) Basic stress
 - (iii) Permissible stress
 - (iv) Grade stress and state THREE methods of grading timber
 - (v) Modification factor
- (5 marks)**
- b) State THREE main reasons necessary for masonry design
- (4 marks)**
- c) Timber joists are spaced at 2.0m centres and spans 3.5m
- (i) Select a suitable section for bending
 - (ii) Check for:
 - Shear
 - Deflection
- (11 marks)**

Question Three

- a) Outline the process of structural design
- (8 marks)**
- b) The floor of a hall of clear spans 3.0m by 7.0m is simply supported in 200mm thick block walls on all its four sides:
- (i) Design the slab
 - (ii) Sketch a section through the shorter span to show the arrangement of reinforcement
- (12 marks)**

Data

- Finishes on floor = 0.9kN/m^2
- Imposed load on floor = 2.5kN/m^2
- Density of concrete = 24kN/m^3
- Permissible local bond stress = 1.25N/mm^2

Question Four

The floor of a classroom block 7.0m by 12.0m is monolithically casted with supporting beams spaced at 3.0m centres:

- a) Design the slab **(16 marks)**
- b) Sketch a section through the shorter side of slab to show the arrangement of reinforcement **(4 marks)**

Data

- Imposed load on floor = 2.5kN/m^2
- 20mm thick screed on upper side of slab
- 15mm thick screed on lower side of slab
- PVC floor tiles of weight = 0.2kg/m^2
- Density of screed = 18kN/m^3
- Permissible local bond stress = 1.25N/mm^2

Question Five

A 300mm by 300mm r.c. column of actual length 4.5 is required to support an axial load of 400kN. The column is fully fixed at top and bottom.

- a) Design the column **(8 marks)**
- b) Design base for the column

Data

- P_{sc} = 175N/mm^2
- P_{st} = 210N/mm^2
- P_{cc} = 5.3N/mm^2
- Bearing capacity of soil = 250kN/m^2
- Permissible shear stress = 0.7N/mm^2 **(12 marks)**