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 = $2.5KN/m^2$

Finishes on floor = $0.7KN/m^2$

(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)**

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Data

- Imposed load on floor = 3.0KN/m^2
- 15mm thick screed on upper side of slab
- 20mm thick screed on lower side of slab
- PVC floor tiles of weight = 0.2KN/m^2
- Density of concrete = 24KN/m^3
- Density of screed = 18KN/m^3
- Permissible local bond stress = 1.25N/mm^2
- Pst = 210N/mm^2

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/mm^2
- Finishes on slab = 0.7N/mm^2
- Imposed Load on floor = 3.0KN/m^2

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 = $200KN/m^2$