



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL
ENGINEERING

BCECD 304: REINFORCED CONCRETE AND MASONRY DESIGN

Date: 31/5/2017

Time: 2:00 – 4:00 PM

Instructions:

- This paper comprises of **five** questions
 - Question **one** is **compulsory** and carry 30 marks
 - Answer **question one** and any **other two** questions
 - No mobile phones are allowed in the room
 - You should also have BS 8110
1. A simply supported reinforced concrete beam, with an effective span of 4.5m, 400mm deep and 250mm wide carries a uniformly distributed characteristic dead load of 45KN/m and a uniformly distributed characteristic imposed load of 15KN/m (excluding own self weight). Concrete grade C35 is used under moderate exposure conditions and fire resistance of 1.5hr. High yield reinforcement steel is to be used. Design the beam.
(30 marks)
 2. Design the longitudinal steel and links for a 400mm square column short braced which is to carry an ultimate load of 1600KN with the following material property;
 $f_{cu}=30\text{N/mm}^2$, $f_y=460\text{N/mm}^2$.
(20 marks)

3. A 200mm thick simply supported reinforced concrete slab spans 4.5m. Design a suitable slab using grade 35 concrete and high yield reinforcement to support the following characteristic loads:

Imposed loads = 10 kN/m^2

Finishes = 1.25 kN/m^2

Concrete density = 24 kN/m^3

The slab will be exposed to mild situation. (20 marks)

4. A solid footing has to transfer a dead load of 1800kN and an imposed load of 450kN from a column of size 400×350mm. Assuming $f_y = 415 \text{ N/mm}^2$ and $f_{cu} = 20 \text{ N/mm}^2$ and the safe bearing of soil to be 200 kN/m^2 design the footing. (20 marks)
5. A reinforced concrete beam which is 300×450mm deep is required to span 4.5m. The beam carries a dead load and live load of 20kN/M and 10kN/M respectively. Assume $f_{cu} = 30 \text{ N/mm}^2$, $f_y = 460 \text{ N/mm}^2$, $f_{yv} = 250 \text{ N/mm}^2$, and exposure condition = Mild, design the beam. (20 marks)