



# MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)  
University Examinations for 2015/2016

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF BUILDING AND CIVIL ENGINEERING**

**FIRST SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING**

**BCECD 304: REINFORCED CONCRETE AND MASONRY DESIGN**

**Date: 19/4/2016**

**Time: 2:00-4:00pm**

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**Instructions:**

- This paper comprises of **five** questions
- Question **one** is **compulsory** and carry 30 marks
- Answer any **other two** questions

1. A reinforced concrete beam which is 300×600mm deep is required to span 6m. The beam carries a dead load and live load of 25KN/m and 19KN/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.  
(30 marks)
2. Design the longitudinal steel and links for a 300mm square column short braced which is to carry an ultimate load of 1400KN with the following material property;  
 $f_{cu}=30\text{N/mm}^2$ ,  $f_y=460\text{N/mm}^2$ .  
(20 marks)
3. A 250mm thick simply supported reinforced concrete slab spans 5.5m. Design a suitable slab using grade 35 concrete and high yield reinforcement to support the following characteristic loads:  
Imposed loads=5KN/m<sup>2</sup>

Finishes =0.85KN/m<sup>2</sup>

Concrete density =24KN/m<sup>3</sup>

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

4. A solid footing has to transfer a dead load of 1250KN and an imposed load of 450KN from a column of size 450×450mm. Assuming  $f_y=415\text{N/mm}^2$  and  $f_{cu}=20\text{N/mm}^2$  and the safe bearing of soil to be 200KN/m<sup>2</sup> design the footing. (20 marks)
5. A simply supported reinforced concrete beam, with an effective span of 4m, 500mm deep and 250mm wide carries a ultimate uniformly distributed design load ( including own self weight ) of 50KN/m. Concrete grade C35 is used under moderate exposure conditions. High yield reinforcement steel is to be used. Design the beam. (20 marks)