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**University Examinations 2015/2016**

**SECOND YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL ENGINEERING**

**ECV 2250: THEORY OF STRUCTURES III**

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**DATE: NOVEMBER, 2015 TIME:** $1½$ **HOURS**

**INSTRUCTIONS:** *Answer question* ***one COMPULSORY*** *and any other* ***two*** *questions.*

**QUESTION ONE – (30 MARKS)**

1. Explain five elements of a complete building structure. (10 Marks)
2. State five factors that influence the durability of concrete. (5 Marks)
3. State five advantages and disadvantages of a reinforced concrete. (10 Marks)
4. Distinguish between a short column and a slender column. (5 Marks)

**QUESTION TWO (15 MARKS**)

Design a beam section shown in the figure below with a characteristic material strength of fcu = 45N/$mm^{2}$ for the concrete and $f\_{y}$= 460N/$mm^{2}$ for the steel with RIZ stirrups and 30mm concrete cover. The design moment at the ultimate limit state is 250KNm which causes sagging of the beam.

 

**QUESTION THREE (15 MARKS)**

A short braced column has to carry an ultimate axial load of 1366 KN. The column size is 250 mm x 250 mm. Find the steel area required for the longitudinal reinforcement and select suitable bars. The materials are grade 30 concrete and grade 460 reinforcement. (15 Marks)

**QUESTION FOUR (15 MARKS)**

Design the reinforcement for a simply supported slab 220mm thick and spanning in two directions. The effective span in each direction is 4.5m and 6.3m and the slab supports a live load of 10KN/$m^{2}$. The characteristic material strengths are fcu = 30N/$mm^{2}$ and fy = 460N/$mm^{2}$.

(15 Marks)