

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
FACULTY OF THE BUILT ENVIRONMENT  
**DEPARTMENT OF ARCHITECTURE**  
BACHELOR OF ARCHITECTURAL STUDIES (HONOURS) DEGREE  
2013-14 ACADEMIC YEAR  
PART II - SECOND SEMESTER EXAMINATIONS – MAY 2014  
**AAR 2205 – STRUCTURAL DESIGN II**

**Instructions**

**Duration: 3 Hours**

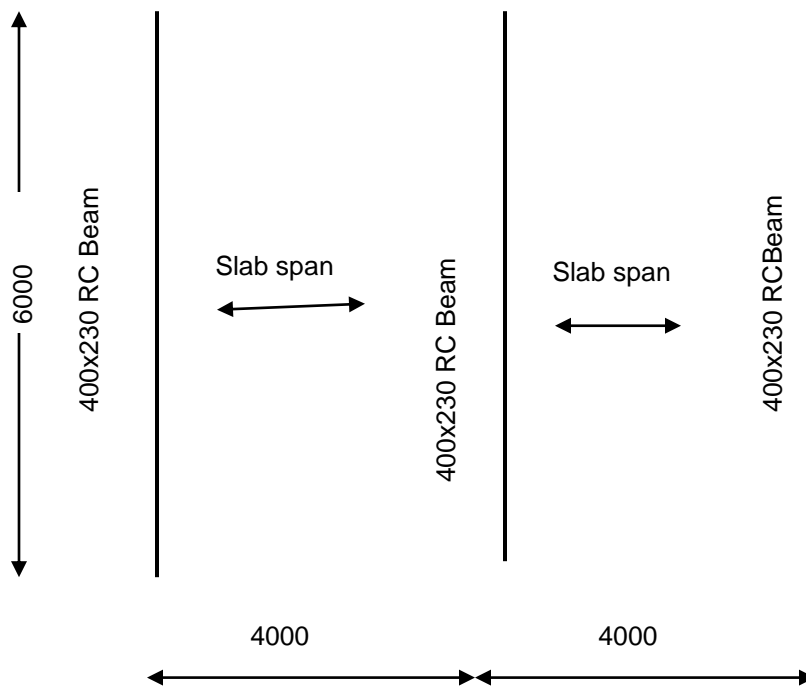
***Answer all questions.***

**QUESTION 1**

- 1.0 Why are partial factors used in design. [5]
- 2.0 What are the partial safety factors for dead and live loads. [5]
- 3.0 Explain the difference between characteristic loads and design loads. [5]
- 4.0 Explain the difference between Ultimate Moment of Resistance and Design Moment. [5]
- [20]**

**QUESTION 2**

A series of 400 x 230 RC Beams spaced at 4.0 m and spanning 6.0m support a 150mm RC Slab as shown in the figure. If the floor has to carry an imposed load of  $5.0\text{kN/m}^2$  calculate the design load that each floor beam supports.



**[20]**

### **QUESTION 3**

Design a short square column to carry the following loads

Characteristic Dead load      750kN

Characteristic Live load      600kN

Sketch the reinforcement details if the column height between floors is 3.2 meters.

Use grade 30 concrete and grade 460 and 250 reinforcement for the main reinforcement and ties respectively

**[30]**

### **QUESTION 4**

For the column in Question Two design a square base. Assume the soil bearing pressure to be 200kN/m<sup>2</sup>.

Use grade 25 concrete and grade 460 reinforcement.

**[30]**