NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF THE BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE
BACHELOR OF ARCHITECTURAL STUDIES (HONOURS) DEGREE
2010-2011ACADEMIC YEAR
PART II - SECOND SEMESTER EXAMINATIONS – MAY 2011
AAR 2205 – STRUCTURAL DESIGN II

Instructions ***Duration: 3 Hours***

Answer all questions.

QUESTION 1

Steel floor beams arranged as shown in Figure 1.0 support a 150mm thick reinforced concrete slab which fully restraines the beams laterally. The floor supports a characteristic imposed load of 5.0 $kN/m^{2.}$ Calculate the ultimate design load carried by one beam.

[15]

QUESTION 2

In QUESTION 1 determine a suitable section of Grade 43 steel.

[25]

QUESTION 3

A short braced reinforced concrete column supports a characteristic dead load of 750kN and a characteristic live load of 400kN. Assuming the percentage steel content to be one percent (1.0%) choose

1.0 a suitable dimension for the column

2.0 the area of longitudinal reinforcement

3.0 the size and spacing of the links

Show a sketch of the column and reinforcement.

Use grade 30 concrete and grade 460 and 250 reinforcement for the main reinforcement and links respectively [30]

QUESTION 4

For the column in QUESTION 3 design a base. Assume the soil bearing pressure to be $150kN/m^2$.

Use grade 25 concrete and grade 460 reinforcement. [30]

QUESTION 1- Figure 1.0