

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF THE BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE
BACHELOR OF ARCHITECTURAL STUDIES (HONOURS) DEGREE
2012-13 ACADEMIC YEAR
PART II - SECOND SEMESTER EXAMINATION – MAY 2013
AAR 2205 – STRUCTURAL DESIGN II

Instructions

Duration: 3 Hours

Answer all questions.

Total Marks 100

QUESTION 1

A simply supported reinforced concrete slab spans 5.0m. Design a suitable slab using grade 25 concrete and grade 460 reinforcement to support the following loads

Imposed 4.0 kN/m²

Finishes 0.5 kN/m²

[25]

QUESTION 2

(a) Explain the difference between a short and a slender column

[10]

(b) A short column supports a characteristic dead load of 650kN and a characteristic live load of 450kN, the size of the column being 250mm x 250mm. Using grade 30 concrete and grade 460 reinforcement calculate the size of reinforcement required. Draw a sketch of the column

[15]

QUESTION 3

For the Column in Question 2 design a base assuming the following:

Grade 30 concrete and grade 460 reinforcement

Permissible soil pressure 150 kN/m²

[25]

QUESTION 4

A timber beam with an effective span of 3.0 m supports a uniformly distributed load of 3.5 kN/m including self-weight of the beam. Determine a suitable section for the beam using timber of strength class SC3. Assume that the beam is held in position

Assume the following

Strength Class of timber SC 3

For SC 3 Grade

Bending stress parallel to grain = 5.3 N/mm²

Shear stress parallel to grain = 0.67 N/mm²

Modulus of Elasticity E = 5800 N/mm²

Long term loading

Modification Factors:

K3, duration of loading 1.0

K8 Load sharing system 1.1

K7 Depth factor

for d = 225 1.032

for d = 200 1.046

[25]