NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF ARCHITECTURE AND QUANTITY SURVEYING
BACHELOR OF ARCHITECTURE (HONOURS) DEGREE
PART II SUPPLEMENTARY EXAMINATIONS – JUNE 2005
STRUCTURAL DESIGN II – AAR 2205

Instructions:
Answer all questions.

Total marks: 100
Time: 3 Hours

QUESTION 1

A reinforced concrete staircase shown in Fig.Q1 is to carry the following loads:
Imposed: 3 kN/m^2
Finishes and partitions = 2.1kN/m^2
Take f_{cu} = 40 N/mm^2, f_y = 460 N/mm^2 and conditions of exposure are mild
Design and detail the staircase (30 marks)

QUESTION 2

A simply supported reinforced concrete slab 4 m long carries the following loads:
imposed = 2.50 kN/m^2
finishes and partition = 1.75kN/m^2
The characteristic material strength are: f_{cu} = 35 kN/mm^2 and f_y = 460 kN/mm^2
Design the slab (25 marks)

QUESTION 3

a) Determine the ultimate moment of resistance of a T-section of the following dimensions:
bf = 450 mm, bw = 300 mm, hf = 150 mm and d = 440 mm. The area of tension reinforcement = 2410 mm^2
The characteristic material strengths are f_{cu} = 30 kN/mm^2 and f_y = 460 kN/mm^2
(20 marks)

QUESTION 4

A reinforced concrete column has cross-sectional dimensions of 600 mm x 450 mm and is part of a braced frame. The effective height of the column in relation to both axes is 7.250 m. Design the column for the following conditions
i) axial load = 3500 kN, My (bottom) = 110 kNm, My (top) = 175 kNm
ii) conditions of exposure are mild
iii) f_{cu} = 40 kN/mm^2 and f_y = 460 kN/mm^2 (25 marks)

Fig. Q1