

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY  
DEPARTMENT OF CIVIL AND WATER ENGINEERING  
FACULTY OF INDUSTRIAL TECHNOLOGY  
BACHELOR OF ENGINEERING (HONOURS) DEGREE  
PART III FIRST SEMESTER EXAMINATION- JANUARY 2008  
DESIGN OF STRUCTURES I- TCW 3103

INSTRUCTIONS

Answer **QUESTION ONE AND ANY TWO FROM THE REST**  
Open Book Examination

Time: 4hours  
TotalMarks: 100

QUESTION ONE

- ( A ) Explain the difference between conceptual design and detailed design. 6 Marks
- ( B ) Describe characteristic strength and design strength and the relation between two. 8 Marks
- ( C ) What is a Code of Practice and what is its purpose in structural design. 6 Marks

QUESTION TWO

- ( A ) Discuss how shear failure can arise in reinforced concrete members and how such failures can be avoided. 5 Marks
- ( B ) A 520 x 300 rectangular beam has a span of 8.0m. It carries the following loads
- |  |           |
|--|-----------|
| characteristic dead load excluding self weight | 16.0 kN/m |
| characteristic imposed load                    | 10.0 kN/m |

The material to be used is grade 30 concrete and grade 460 reinforcement

Design the beam 35 Marks

### QUESTION THREE

A simply supported beam spanning 6m and fully restrained laterally carries the following loads

Characteristic dead load 16kN/m including self weight

Characteristic imposed load 25kN/m

Select a suitable Grade 43 UB

Check the shear capacity and deflection of the selected section.

40 Marks

### QUESTION FOUR

A ground floor wall in a three-storey building supports the following loads. Choose suitable bricks and mortar for the wall.

characteristic dead load 35kN/m excluding self weight

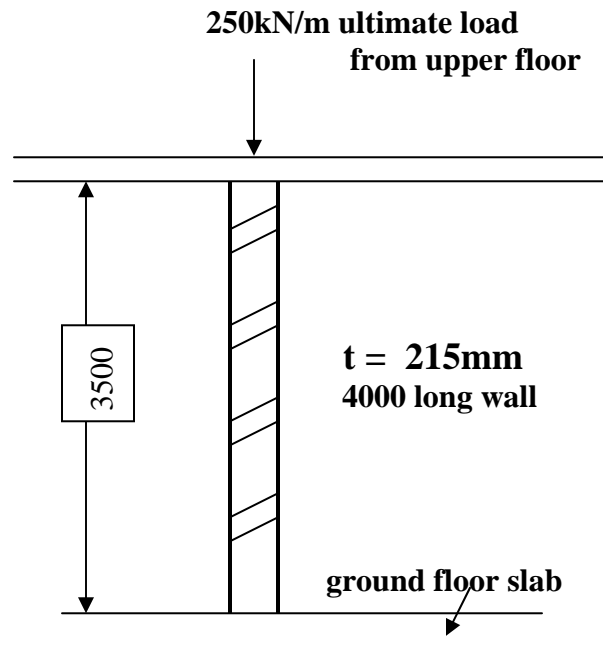
characteristic imposed load 40kN/m

Total ultimate load from upper floors 250kN/m

Assume

Partial safety factor for material  $\gamma_m = 2.8$

Density of Bricks 22kN/m<sup>3</sup> (2200kg/m<sup>3</sup>)



Section through wall

40 Marks



