

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF ARCHITECTURE AND QUANTITY SURVEYING

DEPARTMENT OF ARCHITECTURE
BACHELOR OF ARCHITECTURAL STUDIES (HONOURS) DEGREE

PART II FIRST SEMESTER EXAMINATIONS – JANUARY 2004
AAR 2105 STRUCTURAL DESIGN I

Instructions

Time : 3 Hours

Answer *Part I* and any *two* from Part II.

Part I

QUESTION 1

Find the centroid of the Section shown in fig. 1. All dimensions are in millimetres.

[10]

QUESTION 2

Calculate the I_{xx} and I_{yy} of the Section shown in fig. 2. All dimensions are in millimetres.

[15]

QUESTION 3

For the cantilever loaded as shown in fig. 3, calculate

- a) The bending moment at the 40 KN load.
- b) The bending moment at the point D
- c) The maximum bending moment and draw the bending moment and shearforce diagrams.

[25]

Part II

QUESTION 4

A timber joist 75 mm wide has to carry a uniform load of 10 KN on a span of 4 m. The bending stress is to be 6 N/mm². What depth should the joist be?

[25]

QUESTION 5

A simple lap joint with four 20 mm diameter hand-driven rivets is shown in fig. 4. Calculate the safe load w .

[25]

QUESTION 6

Calculate the safe inclusive uniformly distributed load for a 457 x 145 UB52. Simply supported at its ends if the span is 6m. The maximum permissible bending stress is 165 N/mm² and the maximum permissible deflection is 1/360 of the span. E is 205 000 N/mm², $Z=949\ 000\ \text{mm}^3$, $I = 190,4 \times 10^6\ \text{mm}^4$.

[25]

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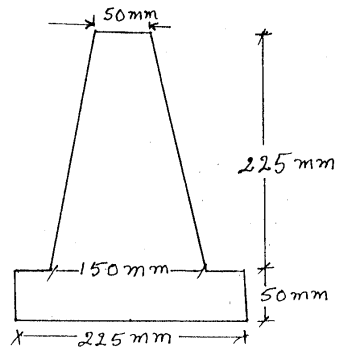


Fig. 1

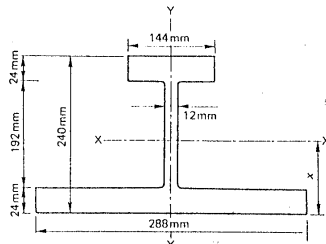


Fig. 2

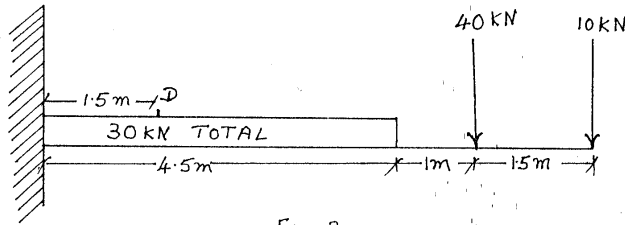


Fig 3

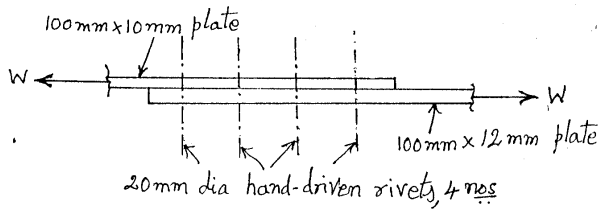


Fig 4

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