

10286 STRUCTURES 2

10331 CONSTRUCTION DESIGN 4

BUILDING STRUCTURES 6

SUPERSTRUCTURE COMPONENT

EXAMINATION : Semester 2, 2000

TIME : 2 HOURS

INSTRUCTIONS:-

1. **You must answer all three questions** [60 marks total]
2. State any assumptions made
3. Any references are permitted
4. Answers to all questions shall include diagrams, references to appropriate codes and acknowledgment of information sources as necessary

Question 1

- 1[a] Which regions of a simply supported reinforced concrete beam subject to transverse loading are most likely to require shear reinforcement and why? Illustrate your answers with appropriate diagrams, and references to the Concrete Structures Code AS 3600.

[8 marks]

- 1[b] Determine the required spacing of the shear reinforcement in a rectangular reinforced concrete beam for a design shear force, V^* of 300 kN, using 10 mm wire [W10] as vertical ligatures and assuming tensile reinforcement, A_{st} of 2400 square millimetres.

Assume:

- $f_c = 40$ Mpa
- $D = 600$ mm
- $d = 525$ mm
- $B = 450$ mm

[12 marks]

Question 2

A singly reinforced concrete beam is simply supported over a span of 7.2m. It has tensile reinforcement [A_{st}] of 5Y32 bars.

The beam is also required to carry a superimposed dead load of 30 kN/m.

Assume: $f_c = 40$ MPa $D = 720$ mm $d = 645$ mm $b = 550$ mm
 $f_{sy} = 400$ MPa Concrete density = 24 kN/m³

- 2[a] Determine the maximum uniformly distributed live load which can be carried by the beam described above ? Consider bending only. [12 marks]
- 2[b] Determine the design load F_d for the beam for the strength limit state and draw the bending moment diagram. [4 marks]
- 2[c] What is the deflection limit for this beam? [4 marks]

Question 3

“Wind loads probably cause more structural failures than any other type of load.”

Describe and discuss the meaning of this statement, and its implications for the design and detailing of steel framed structures. In your discussion include appropriate sketch diagrams.

[20 marks]

END OF QUESTIONS