

UNIVERSITY OF SOUTH AUSTRALIA  
SCHOOL OF GEOINFORMATICS, PLANNING AND BUILDING

PROGRAM **Graduate Certificate in Building and Planning**

COURSES **BUIL 4004 02602 Building Structures 6 *Superstructure Component***

EXAMINATION: **Semester 1, 2002**

**DURATION:** 2.0 hours

INSTRUCTIONS TO CANDIDATES:

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

**Question 1** [20marks]

[5 marks each part]

- [a] Describe at least three types of slab which might be used in a reinforced concrete slab floor system.  
[b] What are the factors which might influence the selection of an appropriate slab system for a suspended reinforced concrete floor?
- [c] Describe and discuss at least two important aspects of slab behaviour and design.
- [d] What is the purpose of transverse reinforcement and where is it located in a slab?

**Question 2** [20marks]

[a] Describe the types of reinforcement required in a reinforced concrete beam subjected to transverse loading, and explain why they are required. [ 5 marks]

[b] Determine the required tensile reinforcement, using Y28 bars, to resist bending in a rectangular reinforced concrete beam which is required to span 7.2 m, and carry a live load  $Q$  of 30 kN/m and a superimposed dead load  $G$  of 25 kN/m. The beam is simply supported at each end and has the following properties:

$$\begin{array}{lll} f_{sy} = 400 \text{ Mpa} & D = 600 \text{ mm} & b = 450 \text{ mm} \\ f_c = 32 \text{ Mpa} & d = 525 \text{ mm} & \\ \text{Concrete density} = 24 \text{ kN/m}^3 & & \end{array} \quad [15 \text{ marks}]$$

**Question 3** [20marks]

[a] Describe briefly the main ways in which concrete can deteriorate. [5 marks]

[b] Determine the required spacing of the shear reinforcement in a rectangular reinforced concrete beam for a design shear force,  $V^*$  of 140 kN, using R10 bars (ie not wire) as vertical stirrups and assuming tensile reinforcement,  $A_{st}$ , of 3Y24 bars.

$$\begin{array}{llll} \text{Assume:} & f_c = 25 \text{ MPa} & D = 500 \text{ mm} & d = 425 \text{ mm} \\ f_{sy} = 250 \text{ MPa} & & b_v = 425 \text{ mm} & \end{array} \quad [15 \text{ marks}]$$