

COMMONWEALTH OF AUSTRALIA

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Family Name	
Given Names	
Student Number	
Teaching Period	Semester 2, 2016

FINAL EXAMINATION	DURATION				
ENG466 – Design of Concrete Structures	<table border="1"> <tr> <td>Reading Time:</td> <td>10 minutes</td> </tr> <tr> <td>Writing Time:</td> <td>120 minutes</td> </tr> </table>	Reading Time:	10 minutes	Writing Time:	120 minutes
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INSTRUCTIONS TO CANDIDATES

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is an OPEN BOOK examination

Any non-programmable calculator is permitted

Any handwritten material is permitted

Hard copy, unannotated English translation dictionary only

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
Any printed material with the exception of CDU Library books	1 x 16 Page Book 1 x Scrap Paper

**THIS EXAMINATION IS PRINTED
DOUBLE-SIDED.**

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SECTION A

Each question worth 4 marks (Total 40 Marks)

Q.1

Given characteristic strength of concrete is 40 MPa, estimate the value of splitting tensile strength.

Q.2

A singly reinforced beam of width 250mm and effective depth 500 mm has area of steel of 1500 mm². Calculate the unit weight of the beam.

Q. 3

What is a Plastic centre? Use diagram to explain.

Q. 4

A column of 6m length pinned at both end has a cross sectional area of 10×10^4 mm² a second moment of area of 8×10^9 mm⁴. Calculate the slenderness ratio.

Q.5

Explain the difference in approach to the design of one way and two way slabs.

Q. 6

The anchorage development length is given as 800mm. The diameter of the bar is 16mm and strength of steel is 500MPa. What is the approximate apparent bond strength?

Q.7

What is the maximum capacity of a rectangular beam of dimension 300mmx450m in torsion for a characteristic strength of concrete 32MPa?

Q.8

Explain the phenomenon of longitudinal shear.

Q.9

Explain with sketch, the corner reinforcement you will provide for a corner of a slab where both end are terminating.

Q.10

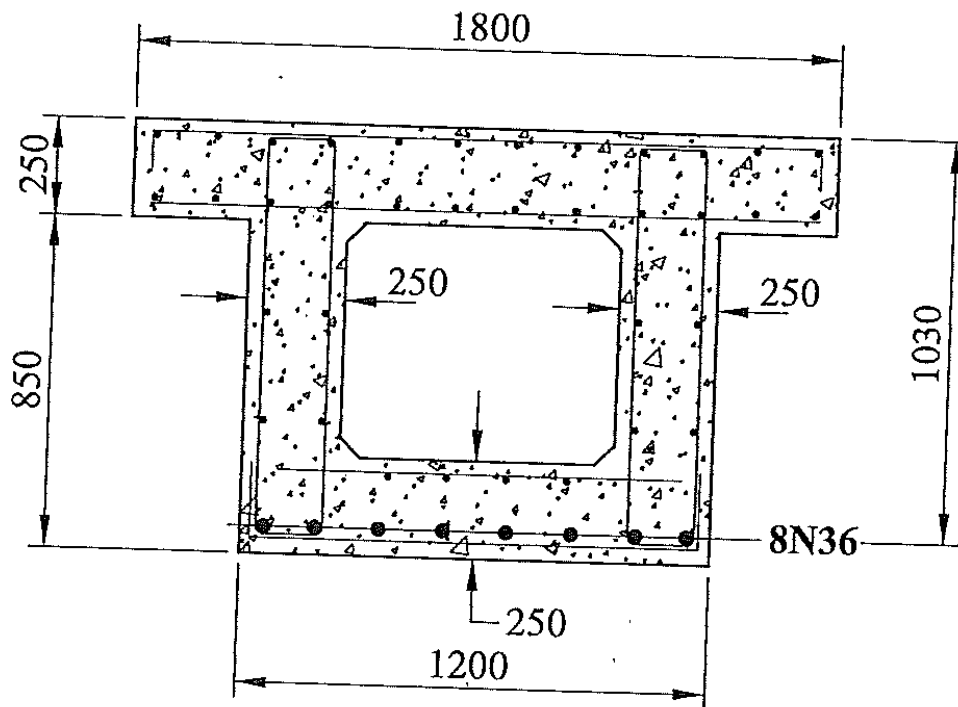
What is an interaction diagram? How will you construct one?

SECTION B

Q. 1 (15 Marks)

Design the stirrups for the section shown below. The section carries a design shear force of 1400 Kn.

$f'_c = 32 \text{ MPa}$, $f_{sy} = f_{sy.f} = 500 \text{ MPa}$, $A_{st} = 8160 \text{ mm}^2$.



Q. 2 (15 Marks)

(a) (8 Marks)

A slab 175mm thick, $d = 145 \text{ mm}$ is reinforced with 12 mm bars at 150 mm centres one way and 10 mm bars at 200mm centres in the other direction. Concrete strength = 32 MPa. Determine the maximum load can be carried on an area of 300mm X 400mm without punching failure.

(b) (7 Marks)

Explain how you will find out the positive and negative moments for the central and surrounding regions for a two way slabs supported on four sides using simplified method recommended by AS3600.

Q. 3 (15 Marks)

A column section to resist an axial design compression force of 4000KN and maximum bending moment of 230kNm in X direction and of 130 kNm in Y direction. Width of column 400mm and total depth 600mm. It has one 28mm bars in each corner. Cover to top and bottom bar is 60mm. Check whether the column satisfies the condition for biaxial bending.

Q. 4 (15 Marks)

(a) (8 Marks)

Discuss the difference in the approach for a concentric and eccentric loading wall footings.

(b) (7 Marks)

Discuss the AS3600 requirements for bond and anchorage for bars in tension and in compression.