UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019

COURSE NAME	:	ADVANCED STRUCTURE DESIGN
COURSE CODE	:	BFS40903
PROGRAMME CODE	:	BFF
EXAMINATION DATE	:	DECEMBER 2018/ JANUARY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER ALL QUESTIONS OPEN BOOK EXAMINATION

TERBUKA

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 (a) List the reasons for using a drop panel in flat slab and its effects on moment distribution.

(2 marks)

(b) **Figure Q1** shows a part of concrete flat slab for building. The spacing between column is 7 m for both directions. The diameter of the column is 600 mm. The slab will support 1 kN/m² of finishes and a live load of 3 kN/m². The characteristic material strengths of concrete (f_{ck}) and steel (f_{yk}) are 30 N/mm² and 500 N/mm² respectively. Unit weight of the concrete is 25 kN/m³.

(i) Sketch (with dimension) the column strip and middle strip of the slab; and determine the bending moment coefficient for panel 2-3/ B-C.

(4 marks)

(ii) Calculate the design load on the slab and the effective span of the slab.

(4 marks)

(iii) Calculate the moment of the column and middle strip. Given negative moment distributions for column strip is 60%, middle strip 40%, and positive moment distributions for column strip is 50%, middle strip 50%.

(3 marks)

(iv) Design the main reinforcements for middle and column strips. Use bar diameter = 12 mm, concrete cover = 25 mm.

(8 marks)

(v) Check the deflection at mid-span of the slab.

(4 marks)

Q2 (a) Sketch and discuss the behavior of plate structural element due to shear stress.

(4 marks)

(b) List the functions of transverse and load bearing stiffener in plate girder.

(2 marks)

(c)   **Figure Q2** shows the proposed section of plate girder for a building. The welding size is 12 mm, grade of the steel for flange and web is 255 N/mm^2.

(i)   Classify the web and the flange of the proposed girder.

(4 marks)

(ii)   Calculate the moment capacity of the proposed section.

(2 marks)

(iii) Check the shear buckling resistance of the end panel for the conditions; $a < h_w$ and $a > h_w$. Given $V_{Ed} = 3000$ kN.

(10 marks)

Q3   **Figure Q3** shows the section of a rectangular water tank.

(a)   Sketch a free body diagram of the water tank floor, and calculate the bending moment at mid-span of the slab.

(6 marks)

(b)   Design the main and secondary reinforcements of the slab.

(8 marks)

(c)   Sketch the main and secondary reinforcements of the slab.

(2 marks)

(d)   Check the crack width based on the flexural tension in matured concrete. Consider minimum reinforcement to control thermal and shrinkage cracking as $0.00346A_{ct}$ and water tightness Class 1. Given that $E_s = 200$ kN/mm^2, $E_c = 33$ kN/mm^2, $f_{ck} = 30$ N/mm^2, $f_{yk} = 500$ N/mm^2, $f_{ctm} = 2.9$ N/mm^2 and $k_t = 0.4$, cover = 40 mm, $\emptyset_{bar} = 10$ mm.

(12 marks)

END OF QUESTIONS

CONFIDENTIAL

FINAL EXAMINATION

SEMESTER/SESSION: SEM I -2018/2019   PROGRAMME CODE   : BFF
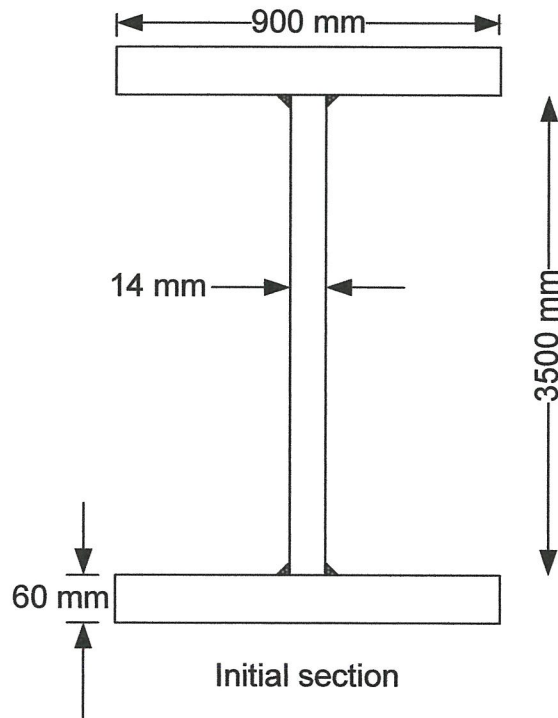COURSE   : ADVANCED STRUCTURE DESIGN   COURSE CODE   : BFS40903

Ø = 600 mm

FIGURE Q1

FINAL EXAMINATION

SEMESTER/SESSION : SEM I -2018/2019   PROGRAMME CODE :BFF
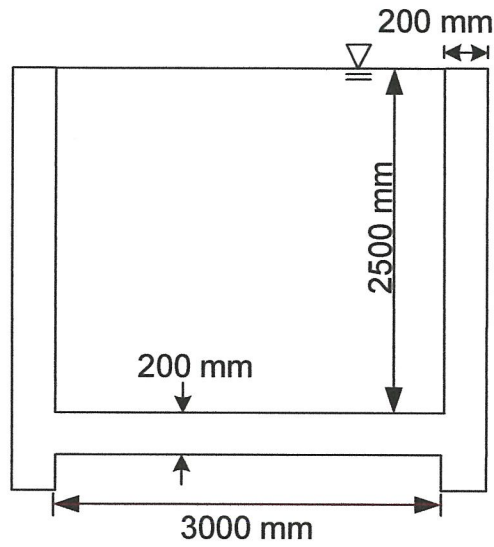COURSE   : ADVANCED STRUCTURE DESIGN   COURSE CODE : BFS40903

Initial section

FIGURE Q2

FIGURE Q3