



**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2021/2022**

COURSE NAME : OFFSHORE STRUCTURE DESIGN  
COURSE CODE : BFS 41303  
PROGRAMME CODE : BFF  
EXAMINATION DATE : JULY 2022  
DURATION : 3 HOURS  
INSTRUCTION :  
1. ANSWER **ALL** QUESTIONS  
2. THE FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **CLOSED BOOK**.  
3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

CONFIDENTIAL

TERBUKA

- Q1** (a) Describe and sketch **TWO (2)** fixed platform and 2 floater and movable platform. (10 marks)
- (b) Discuss **FIVE (5)** requirements to enter the confined space such as storage tank. (10 marks)
- (c) What is the definition of hazard and discuss **TWO (2)** of hazards in oil and gas industry. (5 marks)
- Q2** (a) Discuss the **FIVE (5)** advantages of welding over other joining method in the construction of offshore structure. (5 marks)
- (b) The steel column of the offshore platform is connected using a steel plate as shown in **Figure Q2**. The column is subjected to axial compression load of 600 kN ( $N_{Ed,G}=275$  kN and  $N_{Ed,Q}=325$  kN) and bending moment of 100 kNm.
- (i) Check the presence of tension due to axial load and moment and calculate the net tension. (5 marks)
- (ii) Check the design resistance of the bolt group connecting flange cover plate to column flange. (15 marks)
- Q3** (a) Offshore structural platform can divide into two type which are fixed and floating offshore platforms. List **THREE (3)** main loads that should be considered in the design of fixed offshore platform and briefly explain each of them. (9 marks)
- (b) The 250 mm thick of reinforced concrete wall to be constructed on the offshore platforms. The wall subjected to a horizontal direct tension force of 360 kN/m and bending moment of 30 kNm under operation conditions. The reinforcement provided is 20 mm ribbed high-yield bar at 125 mm centres at each faces of the wall with characteristic strength of 500 N/mm<sup>2</sup> and class 35/45 concrete is to be used.
- (i) Determine the nominal concrete cover of the wall considering the exposure class of XS1, design working life of 25 years and resisting 2 hours fire resistance. (4 marks)

- (ii) Calculate the crack width of the wall under the short-term loading condition.

(12 marks)

- Q4** A simply supported beam with 4.5 m span is to be constructed as a part of fixed offshore platform. The beam is design to carry a permanent load including selfweight of 25 kN/m and a variable load of 16 kN/m. The materials are grade C40/50 concrete and grade 500 steel reinforcement. By using given the following additional design data, estimate long-term deflection at mid span of the beam due to loading and considering the beam is made of normal aggregate and props removed at 28 days.

Beam width, $b$	=	300 mm
Beam depth, $h$	=	600 mm
Nominal concrete cover, $C_{nom}$	=	40 mm
Compression reinforcement, $A_{s'prov}$	=	3H16
Tension reinforcement, $A_{sprov}$	=	5H25
Shear reinforcement	=	R10 - 150
Modulus of elasticity of concrete, $E_c$	=	31 kN/mm
Modulus of elasticity of steel, $E_s$	=	200 kN/mm
Relative humidity of outdoor exposure	=	80%
Cement type	=	R
Constant value, $K$	=	0.104

(25 marks)

- END OF QUESTIONS -

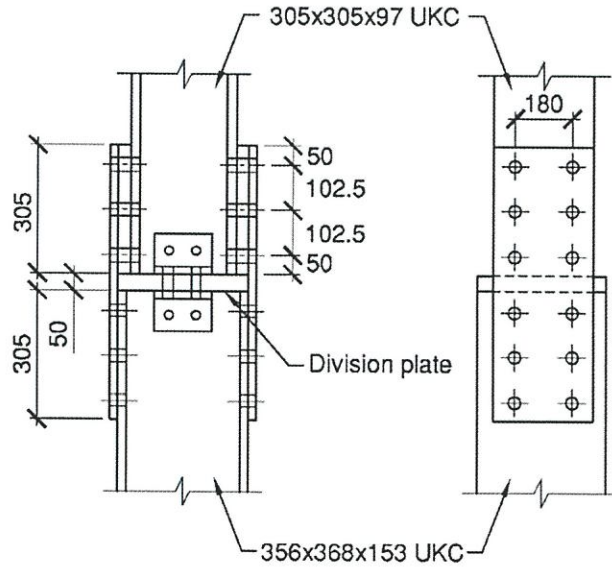
FINAL EXAMINATION

SEMESTER/SESSION : SEM II / 2021/2022

PROGRAMME : 4 BFF

COURSE : OFFSHORE STRUCTURE DESIGN

COURSE CODE : BFS41303



Flange cover plates:-  
2 No. 305x10x640mm

Packs  
2 No. 305x27x305mm

Bolts  
M24, Grade 8.8

FIGURE Q2

