



SET B

UNIVERSITI KUALA LUMPUR
MALAYSIA FRANCE INSTITUTE

FINAL EXAMINATION
JANUARY 2011 SEMESTER

SUBJECT CODE : FWD 34502
SUBJECT TITLE : BASIC PRESSURE VESSEL DESIGN AND STEEL STRUCTURE
LEVEL : DIPLOMA
DURATION : 3.30pm – 5.30pm
(2 HOURS)
DATE / TIME : 04 MAY 2011

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
 2. This question paper is printed on both sides of the paper.
 3. Please write your answers on the answer booklet provided.
 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer TWO (2) question only.
 6. Answer all questions in English.
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THERE ARE 6 PRINTED PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

1. Which ASME code focuses on the rules on the construction of pressure vessels? (2 marks)
2. What does ASME II, Part A, B, C and D encompasses on? (2 marks)
3. What is the purpose of the nozzles and flanges of a pressure vessel? (2 marks)
4. Label the TWO (2) types of lifting attachments?

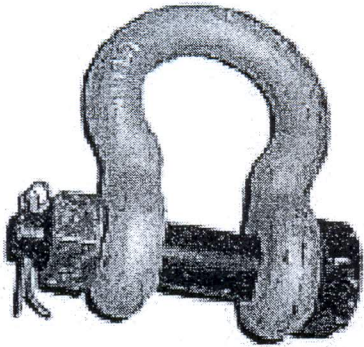


Figure 1

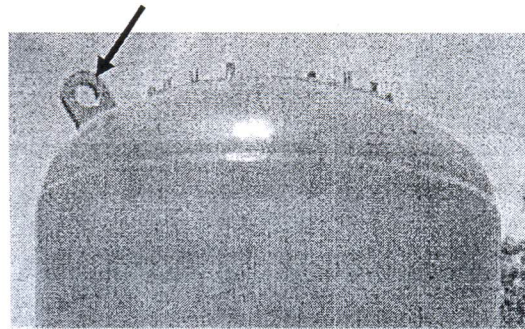


Figure 2

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5. What is the function of a relief valve?
 Give ONE (1) important reason for its installation.

(3 marks)

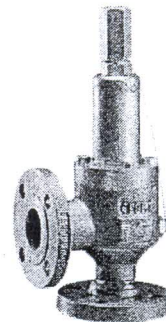
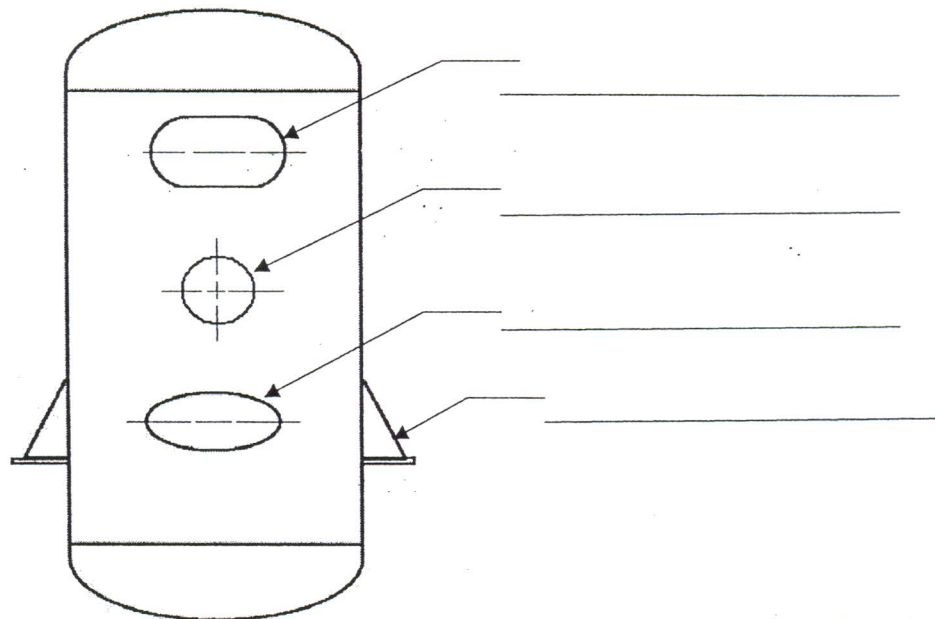


Figure 3 A pressure vessel relief valves

(3 marks)

6. A pressure vessel has to maintain to pressure. In doing this the pressure applies two types of stresses in a pressure vessel. Name the TWO (2) types of stress. (3 marks)
7. Name THREE (3) types of pressure vessel shapes. (3 marks)
8. How is the preservation of pressure vessels usually done? (3 marks)
9. What is the most common type of joint in the fabrication of pressure vessel? Draw the cross-section of the joint and show the weld with three runs and a counter weld is required. (4 marks)
10. Explain the desired life time of a major vessel and minor vessels. (4 marks)
11. How is thin-walled pressure vessel categorized? (3 marks)
12. Why the use of only two saddles is preferred? (2 marks)
13. The types of preferred opening of pressure vessel are



(2 marks)

Figure 4 A vertical pressure vessel with openings.

14. For horizontal pressure vessel as in Figure 5, answer the following questions:-
- 14.1 which is the preferred movable saddle or sliding saddle?
- 14.2 Name the important reason applying the wear plates?

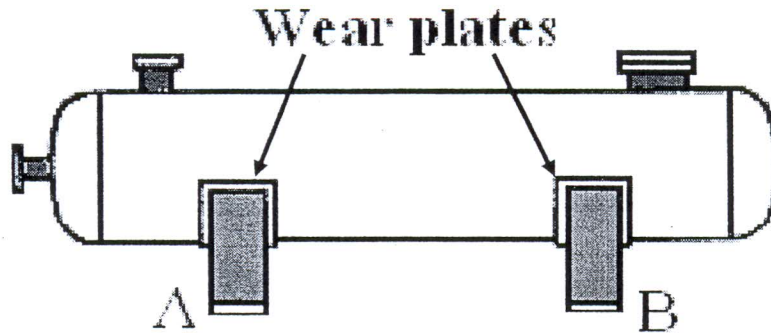


Figure 5 A horizontal pressure vessel with two saddles.

(4 marks)

15. Sketch the welds as per the welding symbols.

WELD	SYMBOL	MEANING OF SYMBOL
		<p>SYMBOL INDICATES SQUARE GROOVE WELD ON ARROW SIDE. ROOT GAP 1/8 IN.</p>
		<p>SYMBOL INDICATES V-GROOVE WELD WITH AN ANGLE OF 60 DEGREES ON ARROW SIDE</p>
		<p>SYMBOL INDICATES V-GROOVE WELD WITH AN ANGLE OF 60 DEGREES ON ARROW SIDE AND BEAD-TYPE BACK WELD ON THE OTHER SIDE</p>

Figure 6 Application of welding symbols

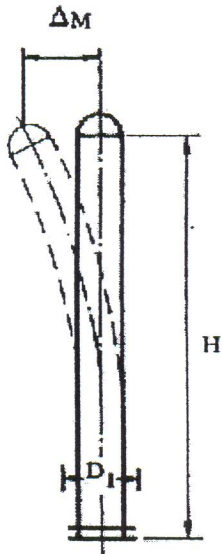
(6 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer TWO (2) questions only.

Please use the answer booklet provided.

Question 1



Formula

$$\Delta_M = \frac{P_w D_1 H (12H)^3}{8EI}$$

NOTATIONS

- Δ_M = Maximum deflection (at the top), in.
- D_1 = Width of the tower with insulation, etc. ft.
- E = Modulus of elasticity, psi
- H = Length of vessel, included skirt, ft.
- I = $R^3 \pi t$, moment of inertia for thin cylindrical shell (when $R > 10t$)
- R = Mean radius of the tower, in.
- t = Thickness of skirt, in.
- P_w = Wind pressure, psf

Given:

- D_1 = 2 ft., 6 in.
- E = 30,000,000
- H = 48 ft., 0 in.
- I = $R^3 \pi 0.3125$
- P_w = 30 psf
- R = 12 in.
- t = 0.3125 in.

- a) Determine the maximum deflection: Δ_M (15 marks)
- b) Determine the maximum allowable deflection 6"/100' of height for a 48' tower. Take 1 inch = 25.4mm and convert your answer to mm with one decimal place.

(15 marks)

Question 2

1. List down the FIVE (5) design considerations. With the following information of a vessel calculate the weight of the vessel applying the given formula.

(12 marks)

2. Before the pressure vessel is ready to be delivered, the manufacturer shall furnish the purchaser with the Manufacturers Data Report (MDR) documentations. Explain MDR and give some examples of the documents.

(8 marks)

3. Under the description of Maximum Allowable Working Pressure, the internal pressure at which it weakest element of the vessel is loaded to the ultimate permissible point. What are the assumptions to it allowances.

(15 marks)

Question 3

1. Tall towers design considers stress conditions. List the FOUR (4) locations where the stresses can be calculated.

(10 marks)

2. The height of tall towers depends greatly on its functions. Loadings such as wind and earthquakes are also included when necessary. Explain why with different height stages different plate thicknesses are utilizes.

(10 marks)

3. The expansion and contraction of horizontal vessels supported by saddles must be allowed to move. State the type of bolts needed to be used. When should the slide bearing be used?

(10 marks)

END OF QUESTION