



**UNIVERSITI KUALA LUMPUR**  
**MALAYSIA FRANCE INSTITUTE**

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**FINAL EXAMINATION**  
**JANUARY 2014 SESSION**

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**SUBJECT CODE** : FFD 22602  
**SUBJECT TITLE** : BASIC PRESSURE VESSEL DESIGN  
**LEVEL** : DIPLOMA  
**TIME/DURATION** :  
(2.0 HOURS)  
**DATE** :

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**INSTRUCTIONS TO CANDIDATES**

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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 ONE (1) section. Answer all questions.
  6. Answer all questions in English.
  7. No graph paper is appended.
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**THERE ARE 6 PRINTED PAGES OF QUESTIONS, AND NO PAGE OF GRAPH PAPER EXCLUDING THIS PAGE.**

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

1. What are the **TWO (2)** methods for measuring corrosion?
- A. Chemical process and telltale holes.
  - B. Corrosion process and telltale holes.
  - C. Telltale holes and corrosion gauges.
  - D. Holes with telltale holes and corrosions. (2 marks)

2. The initial information to design a pressure vessel are
- A. Chemical process and electrical process.
  - B. Design pressure and design process.
  - C. Design pressure and design temperature.
  - D. Maximum pressure and minimum pressure (2 marks)

3. ASME VIII consists of \_\_\_\_\_ divisions. (3 marks)

4. ASME II focuses on \_\_\_\_\_. (3 marks)

5. Write the most appropriate definition about pressure vessel.
- \_\_\_\_\_
- \_\_\_\_\_
- (4 marks)

6. Name **TWO (2)** types of lifting attachments of pressure vessel.
- I. \_\_\_\_\_
  - II. \_\_\_\_\_
- (4 marks)

7. Write the most appropriate purpose of dish heads.

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(4 marks)

8. State the main function of flanges used in fabricating pressure vessel.

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(4 marks)

9. The desired life time of a vessel is an economical question. State the design of the major vessels and the minor vessels.

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(4 marks)

10. Explain the purpose of the vortex breaker.

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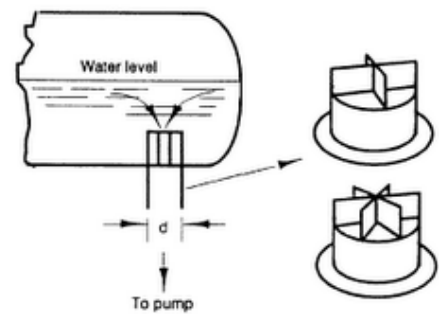


Figure 1 Schematic of vortex breaker

(4 marks)

11. Write the necessary preparation taken before painting.

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(4 marks)

12. Tall towers design considers stress conditions. List the **THREE (3)** locations where the stresses can be calculated. (5 marks)
13. Sketch and describe leeward wind and windward wind. (5 marks)
14. Find the longitudinal stress,  $\sigma_L$  the circumferential (Hoop) stress,  $\sigma_H$  of the pressure vessel are such that the internal pressure is 75 psi. The diameter is 130 inches and the thickness is 0.50 inches. (6 marks)
15. The pressure of a water tank is 95 psi. The connecting pipe above the tank is 17 feet. Find the static head pressure and the total pressure of the air tank. Use Table 1 provided.

**Table 1 Pressure of fluid static head**

PRESSURE OF FLUID STATIC HEAD										
<p>The fluid in the vessel exerts pressure on the vessel wall. The intensity of the pressure when the fluid is at rest is equal in all directions on the sides or at bottom of the vessel and is due to the height of the fluid above the point at which the pressure is considered.</p> <p>The static head when applicable shall be added to the design pressure of the vessel.</p> <p>The tables below when applicable shall be added to the design pressure of the water.</p> <p>To find the pressure for any other fluids than water, the given in the tables shall be multiplied with the specific gravity of the fluid in consideration.</p>										
Pressure in Pounds per Square Inch for Different Heads of Water										
Head Feet	0	1	2	3	4	5	6	7	8	9
0		0.43	0.87	1.30	1.73	2.16	2.60	3.03	3.46	3.90
10	4.33	4.76	5.20	5.63	6.06	6.49	6.93	7.36	7.79	8.23
20	8.66	9.09	9.53	9.96	10.39	10.82	11.26	11.69	12.12	12.56
30	12.99	13.42	13.86	14.29	14.72	15.15	15.59	16.02	16.45	16.89
40	17.32	17.75	18.19	18.62	19.05	19.48	19.92	20.35	20.78	21.22
50	21.65	22.08	22.52	22.95	23.38	23.81	24.25	24.68	25.11	25.55
60	25.98	26.41	26.85	27.28	27.71	28.14	28.58	29.01	29.44	29.88
70	30.31	30.74	31.18	31.61	32.04	32.47	32.91	33.34	33.77	34.21
80	34.64	35.07	35.51	35.94	36.37	36.80	37.24	37.67	38.10	38.54
90	38.97	39.40	39.84	40.27	40.70	41.13	41.57	42.00	42.43	42.87
<p>NOTE: One foot of water at 62° Fahrenheit equals .433 pound pressure per square inch. To find the pressure per square inch for any feet head not given in the table above, multiply the feet times .433.</p>										

(8 marks)

16. Pressure relief devices or safety valve is a must in terms of design consideration. State its main purpose of installation.
- (8 marks)
17. With the design data given, find the shell thickness,  $t$ . Design pressure of 220 psi, material SA 515 Grade 70 @ 700<sup>0</sup>F is 18100 psi. All welds will be spot-radiographed, inside radius of 50 inches, and the corrosion allowances of 0.125 inches.
- (8 marks)
18. Labelled and sketch the preferred shapes of pressure vessel openings? Determine the size of the opening if the inside diameter is 110 inches and 50 inches respectively. The code UG-36 through UG-43 are:
- a) *For maximum 60 in. inside diameter vessel (IDV) one half of the vessel diameter, but maximum 20 in.*
  - b) *For over 60 in. inside diameter vessel, one third of the vessel diameter, but maximum 40 in.*
- (10 marks)
19. The height of tall towers depends greatly on its functions. Loadings such as wind and earthquakes are also included when necessary. Explain with a diagram, why with different height stages, different plate thicknesses will be utilized.
- (12 marks)

**END OF QUESTION**