



Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19
EXM/P/09/01

Year and Program: 2018-19	School of Technology	Department of FY M.Tech
Course Code: MMD 510.4	Course Title: Process Equipment Design	Semester – II
Day and Date <u>Wednesday</u>	End Semester Examination (ESE)	Time: Max Marks: 100

29/05/2019

2.30 to 5.30 pm

- Instructions:**
- 1) All questions are compulsory.
 - 2) Assume suitable data wherever necessary.
 - 3) Figures to the right indicate full marks.

		Marks	Bloom's Level	CO
Q.1	a) What are the different ways of inspection & testing which are carried out during and after the manufacturing of pressure vessels?	06	L ₂	CO1
	OR			
	a) Classify different types of pressure vessel and explain any one of them.			
	b) List the factors which must be consider while designing of pressure vessel.	04	L ₂	CO1
Q. 2	a) Describe wind girders for open top tanks.	06	L ₂	CO2
	OR			
	a) Describe the pressure vessels which are used in storage of volatile liquids.			
	b) Design Conical roof cylindrical tank with the help of following data:	06	L ₃	CO2
	Tank Diameter (Inside)	20m		
	Tank height	10m		
	Density of liquid	980kg/m ³		
	Superimposed load	1300 N/m ²		
	Conical roof slope	1 in 5		
	Material of construction (MOC)	Carbon steel		
	Permissible stress	165 N/mm ²		
	Density of MOC	7850 kg/m ³		
	Modulus of elasticity	2.5 X 10 ⁵ N/mm ²		
	Corrosion allowance	1.5 mm		
Q.3	a) Elaborate formed and dished head for designing pressure vessel.	06	L ₂	GO3
	OR			
	a) Illustrate different types of gaskets used in pressure vessel.			

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- b) Evaluate the thickness of shell using following data related to pressure vessel 06 L₃ CO3

Diameter (O.D) : 1300mm
Material of Construction : SS Grade 304
Allowable stress at 150 °C, f : 140 N/mm²
Internal Pressure : 0.4 N/mm²
Joint Efficiency : 0.90 (spot radiography of the main welds)
Assume Torque due to offset piping : 445 N-m

- Q. 4 a) Explain materials for high pressure vessels. 06 L₂ CO4

OR

- a) Design the high pressure tall vertical vessels for compressive stresses caused by dead loads.

- b) Write a note on prestressing. 04 L₂ CO4

- Q.5 a) Write down the different types of agitators and Explain any one of them. 08 L₂ CO5

OR

- a) Illustrate the power requirements for agitation.

- b) How will you design the agitator shaft considering the speed of the shaft as critical speed? 08 L₃ CO5

- c) Following data relates to the agitator vessel which is used for the purpose of mixing the liquid A and liquid B having the same density. Calculate the Power required to drive the agitator and select the appropriate motor for the same. 12 L₄ CO5
Diameter of an agitator:- 500mm
Speed :-200rpm
Sp. gravity:- 1.2
Viscosity:- 600 cP
Gland loss :- 5%
Transmission efficiency :- 95%.

- Q.6 a) Formulate the bending equation for saddle which is supported to horizontal cylindrical vessel. 08 L₂ CO6

OR

- a) Formulate the equation for designing the thickness of centered bolting chair.

- b) Describe mounting of pressure vessel. 08 L₂ CO6

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c) Following are the related to vessel

12

L4

CO6

Diameter of vessel:- 1500mm

Height of vessel:- 2000mm

Clearance from bottom foundation:- 1000mm

Weight of the vessel with contents:- 4000 Kg

Wind Pressure: 1285 N/m²

No. of brackets:- 4

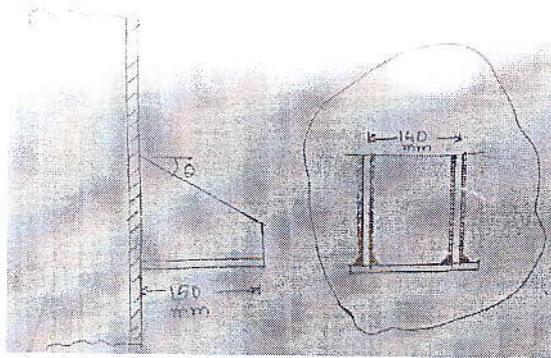
Diameter of anchor Bolt circle:- 1650 mm

Height of bracket from foundation:- 2250mm

Shape factor for cylindrical vessel:- 0.7

Permissible Bending stress for structural steel IS-800:- 157.5 N/mm²

Calculate thickness of base plate for bracket.



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