GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-VII(OLD) • EXAMINATION - WINTER 2016

Subject Code: 170502 Date: 21/11/20					
Su	bject	Name: Process Equipment Design-II			
Time: 10:30 AM to 01:30 PMTotal Marks: 70					
Inst	truction	ns: Attempt all quastions			
	1. 2.	Attempt an questions. Make suitable assumptions wherever necessary.			
	3.	Figures to the right indicate full marks.			
Q.1 (a) A tower having 4.5 m inside line of the end closers. To constructed from SA-283 gr		A tower having 4.5 m inside diameter & 8 m length from tangent line to tange line of the end closers. Tower is operated under vacuum. Tower shell constructed from SA-283 grade-B carbon steel plate, which has yield streng	nt 07 is th		
		of 1898.4 kgf/cm ² . Determine the required thickness of shell without stiffener	S.		
		Assume 8 mm thick plate.			
	(b)	Define (i) Elasticity (ii) Toughness (iii) Fatigue (iv) Creep (v) Poisson's ratio (v Moment of inertia (vii) Welding joint efficiency factor.	<i>v</i> i) 07		
Q.2	(a)	Discuss about various types of fabrication technique used for fabrication of pressure vessel.	07		
	(b)	Explain in detail basic properties of material.	07		
		OR			
	(b)	Discuss the different types of standard flanges with a neat sketch.	07		
Q.3	(a)	Explain the stepwise procedure for the design of conical roof with structural support for storage tank.	14		
		OR			
Q.3	(a)	For a ring flange, design a flat ring type gasket and check the bolt size is appropriate or not.	14		

Internal design pressure = 12 kgf/cm^2 Design temperature = 150 oCFlange material = SA 240 Gr S type 304Max. allowable stress at design temp = 1020.7 kgf/cm2Max. allowable stress at atmospheric condition = 1275.9 kgf/cm2 Bolt material = SA 193 Gr B8 type 304 Max allowable stress at $150 \text{ oC} = 816.5 \text{ kgf/cm}^2$ Max. allowable stress at atmospheric condition = 1020.7 kgf/cm2 Bolt size $\frac{3}{4}$ inch Root area of the bolt = 0.302 in2 Edge clearance = 35 mm Bolt spacing = 61 mmGasket material = asbestos composition Gasket thickness = 1.5875 cm Gasket factor = 2.75Maximum gasket seating stress = 251.77 kgf/cm2 Shell OD = 900 mmShell thickness = 10 mm

- Write a short note on mechanical design of shell and tube heat exchanger. 07 Q.4 (a) 07
 - Discuss design of trays and supports for a tray tower. **(b)**

OR

O.4 (a) Discuss in detail the various types of jackets used for heating and Cooling. 07 A vacuum distillation column is to operate under a top pressure 50 mm hg (ab). 07 **(b)** Trays of distillation column are supported on periphery rings having 10 mm thickness and 75 mm width. The OD of column is 1m and the tray spacing is 0.5 m. Check if the support rings will act as effective stiffening rings. The material of construction is carbon steel and the maximum operating temperature 50°C. If shell thickness is 10 mm, check if this is sufficient. Modulus of elasticity of carbon steel at 50°C is 200 * 103 N/mm2 Q.5 Write a short note on Rupture disks. 07 **(a) (b)** Write a short note on TEMA Designations. 07

OR

Q.5	(a)	Write Short notes: Agitators	07
	(b)	Discuss the design of bracket or lug support.	07
