Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3170514 Date:16-12-2023

Subject Name: Mechanical Design of Process equipments

Time: 10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Describe in brief about design pressure & design temperature	**03**
	(b)	State different types of gasket used in chemical industries	**04**
	(c)	Explain the function of the following parts for the shell and tube heat exchanger. (i) Baffles (ii) Tie rods (iii) Spacers (iv) Expansion joint (v) Tube side pass partition (vi) Tube sheet (vii) Support	**07**
Q.2	**(a)**	Define weld joint efficiency factor. Explain radiography test.	**03**
	(b)	Discuss about advantage, disadvantage of flanged joint over welding joint	**04**
	(c)	Discuss different types of gaskets and their selection criteria	**07**
		OR	
	(c)	A nozzle having ID 400 mm is fabricated from S.S 316 plate. It is attached by welding to a vessel having ID 1500 mm. Internal design pressure = 10 Kgf/cm^2 , design temperature = 300 C. Maximum allowable stress at design temperature = 612.4Kg/cm^2 . Joint efficiency = 0.85 for both shell and nozzle, Corrosion allowance = 1.5 mm, Density of material = 7830 Kg/m^3 ,thickness of plate for shell fabrication is 18mm, use 18 mm 6.35 mm thick plate for nozzle fabrication, use 18 mm thick plate for reinforcement plate . Calculate weight of reinforcement pad.	**07**
Q.3	**(a)**	Enlist different types of flange facings	**03**
	(b)	Discuss in brief about Flat Heads	**04**
	(c)	Discuss different types of nozzles and their selection criteria	**07**
		OR	
Q.3	**(a)**	Enlist different types of Heads	**03**
	(b)	Discuss in brief about Conical Heads	**04**
	(c)	Discuss about different methods for shell subjected to external pressure	**07**
Q.4	**(a)**	Discuss analytical method for thickness calculation of shell subject to external pressure.	**03**
	(b)	Write a short note on safety valves	**04**
	(c)	Derive the equation for longitudinal and circumferential stresses generated due to operating pressure in cylindrical vessel.	**07**
		OR	
Q.4	**(a)**	Discuss the term: Poisson’s Ratio and Moment of Inertia	**03**
	(b)	Discuss about Fixed roof storage tanks	**04**
	(c)	Different types of jackets & their selection criteria	**07**
Q.5	**(a)**	Give full form of TEMA, ASME and HTRI	**03**
	(b)	Write a short note on Tray supports used for distillation column	**04**
	(c)	Write in details about the types of packing’s used in a packed column.	**07**

OR

Q.5	**(a)**	Explain the function of the following parts for the shell and tube heat exchanger. (i) Baffles (ii) Tie rods (iii) Spacers	**03**
	(b)	State various types of distillation column and explain its parts.	**04**
	(c)	Explain design procedure for saddle support.	**07**

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