Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022

Subject Code:3170515 Date:07-01-2023

Subject Name:Piping Design

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)**	Explain codes, standards and schedule number for pipes.	**03**
	(b)	Discuss types of flanges and Gaskets.	**04**
	(c)	Explain the selection criteria of material for pipe system	**07**
Q.2	**(a)**	Discuss the steps for determination of optimum pipe size.	**03**
	(b)	Explain equivalent length of pipes and pipefittings.	**04**
	(c)	Explain various pipefittings.	**07**
		OR	
	(c)	Hexane at 37.8 °C is pumped through the system at a rate of 9.09 m^3/h. The tank is at atmospheric pressure. Pressure at the end of discharge line 345 kPa g. The discharge is 3.05 m above the pump centerline and the suction lift is 1.22 m above the level of liquid in the tank. The friction loss in suction line is 3.45 kPa and that in the discharge line is 37.9 kPa. The mechanical efficiency of the pump is 0.6. The density of Hexane is 659 kg/m^3 and its vapour pressure at 37.8 °C is 33.71 kPa. Calculate (1) $(NPSH)_A$ (2) Power requirement by centrifugal pump.	**07**
Q.3	**(a)**	Explain methods of pipe fabrication and its application.	**03**
	(b)	List various flowmeters and explain any one in detail.	**04**
	(c)	Explain pumps with broad classification and selection criteria	**07**
		OR	
Q.3	**(a)**	What is the use of Steam separators and steam traps?	**03**
	(b)	Estimate the optimum pipe diameter for a flow of dry chlorine gas of 10000 Kg/h at 6.5 atm and 18°C through carbon steel pipe.	**04**
	(c)	Discuss types of valves and its applications in the industry.	**07**
Q.4	**(a)**	What is ‘water hammer’ in process plant?	**03**
	(b)	Explain the importance of design pressure and temperature for piping system.	**04**
	(c)	Discuss the Lockhart and Martinelli correlations and its applications.	**07**
		OR	
Q.4	**(a)**	What are the reasons of energy losses in pipelines?	**03**
	(b)	Explain various pipe supports and selection criteria.	**04**
	(c)	Discuss the assumptions and steps calculating thickness of the pipe for the condition of internal and external pressure.	**07**
Q.5	**(a)**	What is the importance of PFD and P & ID in manufacturing units?	**03**
	(b)	Explain importance and application of ‘Expansion joints’ in pipe system.	**04**
	(c)	Explain P & ID of reactor and heat exchanger.	**07**

OR

Q.5	**(a)**	Calculate allowable internal pressure P for Schedule 40 mild steel pipe having ultimate tensile strength (S value) of 65,300 psi.	**03**
	(b)	What is (1) NPSH (2) ASME (3) Fanning Friction Factor (4) Cavitation	**04**
	(c)	Draw and explain P & ID of distillation column and pumps.	**07**

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