Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code:3170515 Date:30-05-2024

Subject Name:Piping Design

Time:02:30 PM TO 05:00 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)**	Define Schedule No.; Calculate allowable internal pressure P for Schedule40 mild steel pipe having ultimate tensile strength of 65,300 psi.	**03**
	(b)	Briefly explain the role of computer soft wares in process piping engineering	**04**
	(c)	Explain the selection criteria of material for pipe system	**07**
Q.2	**(a)**	What is NSPH and why does it matter	**03**
	(b)	Briefly explain some of the issues associated with the operation of centrifugal pump	**04**
	(c)	A centrifugal pump rotating at 1000 rpm delivers 160 liter/s of water against head of 30m. The pump is installed at a place where atmospheric pressure is 10^5 Pa (absolute) and vapor pressure of wateris 3 KPa (absolute). The head loss in suction pipe is equivalent to 0.2 m of water. Calculate: 1) Minimum NPSH 2) Maximum allowable height of the pump from free surface of the sump	**07**
		OR	
	(c)	Discuss various characteristics curves for centrifugal Pumps	**07**
Q.3	**(a)**	Discuss the steps for determination of optimum pipe size	**03**
	(b)	A valve is provided at the end of a cast iron pipe of diameter 150mm and of thickness 10mm. The water is flowing through the pipe, which is suddenly stopped by closing the valve. Find the maximum velocity of water, when the rise in of pressure due to sudden closure of the valve is 196.2 N/cm^2. Modulus of elasticity of the pipe material is $11.772* 10^6$ N/cm^2 and bulk modulus of water is $19.62* 10^4$.	**04**
	(c)	List the types of valves with their applications.	**07**
		OR	
Q.3	**(a)**	What is ‘water hammer’ in process	**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**
Q.4	**(a)**	Briefly Explain the applicability of ASME B 31.3 piping code	**03**

	(b)	Explain types of gaskets and their selection criteria.	**04**
	(c)	Explain longitudinal and hoop stress. Derive relation between hoop stress & longitudinal stress	**07**

OR

Q.4	**(a)**	Explain code and standard. List out technical organizations for codes and standards	**03**
	(b)	What is pipe support? Explain the functions of supports and selection criteria.	**04**
	(c)	Explain various expansion joints with their application	**07**
Q.5	**(a)**	List the types of flow sheet. What information are to be included in PFD?	**03**
	(b)	Discuss the types of load	**04**
	(c)	Explain P & ID of reactor and heat exchanger.	**07**

OR

Q.5	**(a)**	Explain methods of pipe fabrication and its application.	**03**
	(b)	Explain difference between PFD and P and I diagram	**04**
	(c)	With a neat sketch explain typical P&I diagrams for pumps and Shell and tube heat exchanger	**07**

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