Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2021

Subject Code:3170515 Date:27/12/2021

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 code and standard. List out technical organizations for codes and standards.	**03**
	(b)	Discuss the various locations for pressure taps in orifice meter. Also state advantages and disadvantages of orifice meter.	**04**
	(c)	List out and explain various types of valvesin piping system.	**07**
Q.2	**(a)**	What is operating pressure and operating temperature?	**03**
	(b)	Discuss steam separators and Explain types of separators.	**04**
	(c)	Benzene at 37.80C is pumped through the system at a rate of 9.09 nr/h with the help of a centrifugal pump. The reservoir is at atmospheric pressure. Pressure at the end of discharge line is 345 kPa g. The discharge head is 3.05 m and the pump suction head is 1.22 m above the level of liquid in reservoir. 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 (77) is 0.6. The density of benzene is 865 kg/m3 and its vapour pressure at 37.80C is 26.2 kPa. Calculate (a) $(NPSH)_A$ and (b) power required by centrifugal pump.	**07**
		OR	
	(c)	What is steam trap? Explain float-thermostatic steam trap with advantages and disadvantages.	**07**
Q.3	**(a)**	What is water hammer in process plant?	**03**
	(b)	What is pipe support? Explain the functions of supports and selection criteria.	**04**
	(c)	Discuss piping materials and their selection criteria briefly	**07**
		OR	
Q.3	**(a)**	Calculate allowable internal pressure P for Schedule 40 mild steel pipe having ultimate tensile strength (S value) of 65,300 psi.	**03**
	(b)	A thin cylindrical shell with wall thickness 12 mm and internal diameter 125 mm is subjected to a steam pressure 10 N/mm^2. Find allowable stress and longitudinal stress in the shell material.	**04**
	(c)	With a neat sketch explain typical P&I diagrams for pumps and Shell and tube heat exchanger.	**07**
Q.4	**(a)**	What is pressure drop in fittings and valves? Explain equivalent length of pipe line for fittings and valves.	**03**
	(b)	What are the assumptions and equations to determinations of thickness required by steel pipe for withstanding internal pressure ?	**04**
	(c)	Discuss different types of metal type expansion joints.	**07**
		OR	
Q.4	**(a)**	Discuss the types of loads.	**03**

	(b)	Write a short note on different types of pumps and their selection criteria.	**04**
	(c)	Explain: PFD and P&ID.	**07**
Q.5	**(a)**	What is Fitting in piping system? Explain any three types of fittings.	**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.5	**(a)**	What is thermal pipe expansion? Enlist the causes of thermal expansion.	**03**
	(b)	With a neat sketch explain typical P&I diagrams for distillation column and Reactors.	**04**
	(c)	List out and explain various types of flange.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3170515 Date:06/06/2022

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)**	What are the general consideration while selecting piping materials?	**03**
	(b)	Explain pipe fittings.	**04**
	(c)	Explain various methods of pipe fabrication with necessary diagrams.	**07**
Q.2	**(a)**	What is water hammer?	**03**
	(b)	List various types of pumps with their applications.	**04**
	(c)	List the types of valves with their applications.	**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 is 345 kPa g. The discharge is 3.05 m above the pump centre line and 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 the Hexane is 659 kg/m^3 and vapour pressure of the same at 37.8°C is 33.71 kPa. Calculate NPSHA and power required by centrifugal pump.	**07**
Q.3	**(a)**	Explain various types of Flanges and its applications.	**03**
	(b)	Discuss the points to be taken care during designing the pipe supports.	**04**
	(c)	Explain the factors influence the choice of pump.	**07**
		OR	
Q.3	**(a)**	Explain the function of steam separator and steam traps.	**03**
	(b)	List the special features of P and I diagram.	**04**
	(c)	Explain Lockhart and Martinelli method for calculation of pressure drop.	**07**
Q.4	**(a)**	What is (1) Schdule number (2) Cavitation (3) Pump priming?	**03**
	(b)	Discuss various supports for pipes as per ASME B 31.3.	**04**
	(c)	Draw P and I diagram for distillation column and CSTR with explanation.	**07**
		OR	
Q.4	**(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 difference between PFD and P and I diagram.	**07**

Q.5	**(a)**	Explain codes and standards.	**03**
	(b)	Explain the method for deciding the wall thickness of the pipe.	**04**
	(c)	What is longitudinal and hoop stress. Derive relation between hoop stress & longitudinal stress.	**07**

OR

Q.5	**(a)**	Which steps are to be followed while selecting the pipe size?	**03**
	(b)	What is the function of gasket? Explain the selection criteria for it.	**04**
	(c)	Explain various expansion joints with their application.	**07**

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