

[25]

SEAT No. \_\_\_\_\_

No. of Printed Pages : 2

SARDAR PATEL UNIVERSITY

B. Sc. Examination (Third semester)

Thursday, 29<sup>th</sup> November-2018

2.00 pm to 4.00 pm

US03EICH02- Industrial Chemistry-I

Total Marks: 70

**Q-1 Choose the most appropriate option for each of the following. [10]**

1. \_\_\_\_\_ balance that indicate what is happening in a system at an instant of time.  
(a) Differential (b) Material (c) Integral (d) Energy
2. The \_\_\_\_\_ of a substance is the mass per unit volume of the substance.  
(a) temperature (b) density (c) pressure (d) quantity
3. The pressure developed by the pump impeller is proportional to the \_\_\_\_\_ of fluid in the impeller.  
(a) temperature (b) velocity (c) density (d) volume
4. Volute converts the \_\_\_\_\_ energy of the liquid imparted by the impeller to pressure energy.  
(a) mechanical (b) kinetic (c) potential (d) translational
5. A simplex pump is the one having only ..... cylinder.  
(a) four (b) two (c) three (d) one
6. Invar contain \_\_\_\_\_% nickel.  
(a) 28 (b) 36 (c) 42 (d) 25
7. Type of glass is used in optical pyrometers.  
(a) yellow-filter (b) red-filter (c) green-filter (d) brown-filter
8. Hardness of water is expressed in terms of \_\_\_\_\_.  
(a)  $\text{CaCO}_3$  (b)  $\text{CaHCO}_3$  (c)  $\text{Na}_2\text{CO}_3$  (d)  $\text{NaHCO}_3$
9. Blow down is process of \_\_\_\_\_.  
(a) Precipitation of impurities (b) Heat treatment.  
(c) Chemical purification (d) Replacing the impure water
10. Carry over of steam mainly due to \_\_\_\_\_.  
(a) Corrosion (b) Scale Formation (c) Priming & Foaming (d) turbine disipose

**Q-2 Attempt any ten question of following. [20]**

1. Give the classification of material balance problems.
2. Define the following terms: (i) Selectivity (ii) Open system.
3. Explain by-passing streams.
4. Give the factors which influence the choice of pump for particular operation.
5. Give the types of reciprocating pumps.
6. Give the classification of shell and tube heat exchanger.
7. What is constant volume gas thermometer?

(PTO)

8.	Give the application of radiation pyrometers.	
9.	Give the desirable properties of thermocouple for industrial uses.	
10.	Give the sources of water.	
11.	What are the major boiler troubles due to use of unsuitable water?	
12.	Give the methods of boiler water treatment.	
<b>Q-3</b>	List different step which will guide in solving material balance problem.	<b>[10]</b>
	<b>OR</b>	
<b>Q-3</b>	Write a note on Recycle operation and its importance.	<b>[10]</b>
<b>Q-4</b>	<b>Attempt the following</b>	
(a)	Give the brief account on Piston pump.	<b>[05]</b>
(b)	Write in brief on plate type heat exchanger.	<b>[05]</b>
	<b>OR</b>	
<b>Q-4</b>	<b>Attempt the following</b>	
(a)	Give the advantages and disadvantages of centrifugal pump.	<b>[05]</b>
(b)	Write in brief on double pipe heat exchanger.	<b>[05]</b>
<b>Q-5</b>	<b>Attempt the following</b>	
(a)	Write notes on temperature scale.	<b>[05]</b>
(b)	Write notes on optical pyrometers.	<b>[05]</b>
	<b>OR</b>	
<b>Q-5</b>	<b>Attempt the following</b>	
(a)	Write notes on mercury in-glass thermometer.	<b>[05]</b>
(b)	Give the advantage and disadvantage of industrial thermocouples.	<b>[05]</b>
<b>Q-6</b>	<b>Attempt the following</b>	
(a)	Write note on: Determination of hardness.	<b>[05]</b>
(b)	Give the brief account on common impurities in natural water.	<b>[05]</b>
	<b>OR</b>	
<b>Q-6</b>	<b>Attempt the following</b>	
(a)	Describe water softing by zeolite process.	<b>[05]</b>
(b)	Calculate the amount of Lime-soda needed for softing water containing the following per liter: $\text{Ca}(\text{HCO}_3)_2 = 162 \text{ mg}$ ; $\text{Mg}(\text{HCO}_3)_2 = 73 \text{ mg}$ ; $\text{MgCl}_2 = 95 \text{ mg}$ ; $\text{NaCl} = 585 \text{ mg}$ ; $\text{CaSO}_4 = 136 \text{ mg}$ .	<b>[05]</b>
	What is the temporary and total hardness of the sample?	