No. of Printed Pages : 02

SEAT No. [45]

SARDAR PATEL UNIVERSITY
B. Sc. Examination (Third semester)
Friday, 29th November-2019
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. The pressure developed by the pump impeller is proportional to the _____ of fluid in the impeller.
   (a) temperature (b) velocity (c) density (d) volume
2. The impeller blades of the centrifugal pump in revolving produce a reduction in _____ at the eye of the impeller.
   (a) pressure (b) temperature (c) volume (d) resistance
3. The material and _____ calculations are basic tools for process design work.
   (a) phase balance (b) mass balance (c) energy balance (d) chemical balance
4. The boiling point of the triple distilled mercury is _____.
   (a) 675 °F (b) 372 °F (C) 575 °F (d)100 °F
5. The heat transfer equipment which consists of two concentric pipes is called as _____ heat exchanger.
   (a) plate type (b) double pipe (c) finned tube (d) shell and tube
6. Tube thermocouples are made of _____ with iron in the form of a tube having 1/8 in. outside diameter.
   (a) Iron-constantan (b) copper-constantan
   (c) Chromel- alumel (d) platinum- rhodium
7. Invar contain _____ % nickel.
   (a) 28 (b)36 (c) 42 (d) 25
8. Hardness due to 162 mg/lit $Ca(HCO_3)$ is equal to _____ .
   (a) 50 ppm (b) 100 ppm (c) 150 ppm (d) 200 ppm
9. Hardness of water is expressed in terms of _____ .
   (a) $CaCO_3$ (b) $CaHCO_3$ (c) Na_2CO_3 (d) $NaHCO_3$
10. The maximum allowed Hardness of water for boiler operating at 0 – 10 kg/cm^2 pressure is _____ .
    (a) 10 ppm (b) 80 ppm (c) 2 ppm (d) 40 ppm

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

1. What is general balance equation?
2. Define the following terms: (i) Selectivity (ii) Open system
3. Explain by-passing streams.
4. Give the various losses occurring during the operation of a centrifugal pump.
5. Define the following terms: (i) Pump (ii) Casing
6. State the disadvantages of double pipe heat-exchanger.
7. Give the type of expansion thermometer.

8.	Give the advantage and disadvantage of bimetallic thermometer	
9.	Explain about capillary and armor which are used in industrial pressure spring thermometer.	
10.	Give the need of water for different purposes in manufacturing industries.	
11.	What are the common impurities present in natural water?	
12.	How priming can be minimized in boiler?	
Q-3	Flow Give the brief account on mass and volumetric Rate	**[10]**
	OR	
Q-3	Write a note on Recycle operation and its importance	**[10]**
Q-4	**Attempt the following**	
(a)	Write notes on Diaphragm pump.	**[05]**
(b)	Write in brief on finned tube heat exchanger	**[05]**
	OR	
Q-4	**Attempt the following**	
(a)	Give the comparison of centrifugal pump with reciprocating pump	**[05]**
(b)	Give the advantages and disadvantages of centrifugal pump.	**[05]**
Q-5	**Attempt the following**	
(a)	Write notes on mercury in-glass thermometer.	**[05]**
(b)	Write notes on optical pyrometers.	**[05]**
	OR	
Q-5	**Attempt the following**	
(a)	Write notes on temperature scale.	**[05]**
(b)	Give the advantage and disadvantage of industrial thermocouples.	**[05]**
Q-6	**Attempt the following**	
(a)	Describe continuous hot-lime soda process.	**[05]**
(b)	Discuss the prevention of scale formation in boilers.	**[05]**
	OR	
Q-6	**Attempt the following**	
(a)	Describe water softing by zeolite process.	**[05]**
(b)	Calculate the amount of Lime-soda needed for softing water containing the following per liter: $Ca(HCO_3)_2$ = 162 mg; $Mg(HCO_3)_2$ = 73 mg; $MgCl_2$ = 95 mg; NaCl = 585 mg; $CaSO_4$ = 136 mg. What is the temporary and total hardness of the sample?	**[05]**