

**B.Sc. (Part-I) Semester-I Examination****IS : INDUSTRIAL CHEMISTRY (R/V)**

Time : Three Hours]

[Maximum Marks : 80

**Note :—** (1) Question No. 1 is compulsory and carries 8 marks.

(2) Remaining six questions carry 12 marks each.

(3) Give chemical equations and draw diagrams wherever necessary.

(4) Use of calculator is allowed.

1. (A) Fill in the blanks :

(i) Unit of calorific value in MKS system \_\_\_\_\_.

(ii) The sum of atomic weights of atoms present in molecule is called \_\_\_\_\_.

(iii) \_\_\_\_\_ is capacity of body to do work.

(iv) Physical quantities such as length, mass time etc. are regarded as \_\_\_\_\_ units.

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(B) Choose correct alternatives :

(i) Fluid static deals with study of fluid at :

(a) Rest

(b) Motion

(c) Dynamic

(d) None of these

(ii) Which of the following is a derived unit ?

(a) m;

(b) kg;

(c) m/s

(d) lb

(iii) The enthalpy change (i.e. heat evolved or absorbed) in a particular reaction is same whether the reaction takes place in one step or several steps is \_\_\_\_\_.

(a) Newton's law

(b) Hess's law

(c) Bayle's law

(d) Avogadro's law

(iv) Molecular weight of  $H_3PO_4$  is 98. Its equivalent weight is :

(a) 49

(b) 32.66

(c) 33

(d) 49.5

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(C) Answer in **one** sentence :

(i) What is crystallization ?

(ii) Define Latent heat of phase change.

(iii) What is Mole Fraction ?

(iv) State Dalton's law of pressure.

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**UNIT-I**

2. (a) Explain the terms :

(a) Normality

(b) Molarity

(c) Derived unit

(d) Specific heat

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- (a)  $\text{KMnO}_4$  (b)  $\text{K}_2\text{Cr}_2\text{O}_7$   
 (c)  $\text{KCl}$  (d)  $\text{KOH}$

(atomic wt of K = 39 Mn = 55, O-16, Cr = 52, H = 1, Cl = 35.5) 4

- (c) 29.25 gm of Sodium Chloride is dissolved in 1000 ml of water. Find Normality and Molarity of solution. 4

OR

3. (p) Write the SI units of :

- (a) Length (b) Mass  
 (c) Time (d) Temperature 4

- (q) An aqueous Solution of sodium hydroxide is prepared by dissolving 20 kg of NaOH in 100 kg of water. Find wt % and mole % composition of Solution.

(Mol. wt. of NaOH = 40,  $\text{H}_2\text{O}$  = 18) 4

- (r) Convert the following :

- (a) Length = 3ft into meter (b) Mass 1 kg in lb  
 (c) Volume =  $3\text{m}^3$  into l (d) Pressure = 2 atm into mm of Hg 4

### UNIT-II

4. (a) What is evaporation ? Give its overall and individual material balance. 4

- (b) Explain :

- (i) Stoichiometric coefficient  
 (ii) Stoichiometric equation 4

- (c) The carbon monoxide is reacted with hydrogen to produce methanol.

Calculate from the reaction :

- (i) Stoichiometric ratio of  $\text{H}_2$  & CO  
 (ii) Kmoles of  $\text{CH}_3\text{OH}$  produced per Kmole of CO reacted. 4

OR

5. (p) What is crystallization ? Give its overall and individual material balance. 4

- (q) Explain in brief : Yield and Selectivity. 4

- (r) A single effect evaporator is fed with 10000 kg/h of weak liquor containing 15% caustic soda by weight and is concentrated to get thick liquor containing 40% by weight caustic (NaOH). Calculate :

- (i) kg/h of water evaporated  
 (ii) kg/h of thick liquor obtained. 4

### UNIT-III

6. (a) Explain with example :

- (1) Heat of formation  
 (2) Heat of combustion. 4

- (b) Discuss the role of Solar energy in production of electricity. 4

- (c) Explain in detail Biomass energy. 4

OR

- (1) Latent heat of vaporization. 4  
 (2) Latent heat of sublimation. 4  
 (3) Latent heat of fusion. 4  
 (4) Heat of Reaction. 4  
 (q) What are the uses of Solar energy ? How is it used in heating water ? 4  
 (r) Explain tidal power. 4

#### UNIT-IV

8. (a) Describe Ultimate Analysis of Coal. 4  
 (b) Give an account of origin of Petroleum. 4  
 (c) Describe distillation of coal tar. 4

#### OR

9. (p) Discuss mining of Petroleum. 4  
 (q) Explain manufacturing of water gas with diagram. 4  
 (r) Write in brief on different types of coal. 4

#### UNIT-V

10. (a) Write in brief filmwise and dropwise condensation. 4  
 (b) State and explain Fourier's law. 4  
 (c) Explain conduction modes of heat transfer. 4

#### OR

11. (p) Explain the phenomenon of pool boiling. 4  
 (q) Write a brief account on forced and free convections. 4  
 (r) What are heat exchangers ? Explain parallel heat exchanger. 4

#### UNIT-VI

12. (a) Explain U-tube manometer and Pitot tube. 6  
 (b) Describe construction and working of reciprocating pump. 6

#### OR

13. (p) Describe orifice meter on the basis of construction and working. 6  
 (q) Explain Reynold's number with Reynold's Experiment. 6

