B.Sc. (Part–I) Semester–I Examination

1S : 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. 2

(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 2

(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. 4

UNIT–I

2. (a) Explain the terms :

(a) Normality (b) Molarity

(c) Derived unit (d) Specific heat 4

(b) Calculate the molecular weight of :

(a) $KMnO_4$ (b) $K_2Cr_2O_7$

(c) KCl (d) 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 = 40F, H_2O = 18) 4

(r) Convert the following :

(a) Length = 3ft into meter (b) Mass 1 kg in lb

(c) Volume = $3m^3$ 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 H_2 & CO

(ii) Kmoles of CH_3OH 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

(p) Define :

(1) Latent heat of vaporization.

(2) Latent heat of sublimation.

(3) Latent heat of fusion.

(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 force 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