(r) State and explain Fourier's law. 4

UNIT VI

12. (a) Describe construction and working of centrifugal pump. 6

(b) Describe Bernoulli's equation. 6

OR

13. (p) Describe construction and working of Reciprocating pump. 6

(q) Describe construction and working of venturimeter. 6

AR – 480

First Semester B. Sc. (Part - I) Examination

1S : INDUSTRIAL CHEMISTRY (R/V)

P. Pages : 8

Time : Three Hours] [Max. Marks : 80

Note : (1) Question no. **1** is compulsory and carries **8** marks.
(2) Remaining all six questions carry **12** marks each.
(3) Give chemical equations and draw diagram wherever necessary.
(4) Use of calculator is allowed.

1. (a) Fill in the blanks :—

(i) Gram per cubic centimeter is a unit of _____ .

(ii) To make liquid thick or concentrated _____ operation is used.

(iii) The highest rank coal is _____ .

(iv) In centrifugal pump, mechanical energy of liquid is increased by _____ action. 2

(b) Choose the correct alternative.

(i) Proximate analysis of coal is carried out to analyse

(a) Sulphur dioxide

(b) Carbon dioxide

(c) Moisture content

(d) Nitrogen content

(ii) SI unit of heat is -

(a) Newton (b) Watts

(c) Horse power (d) Joules

(iii) The heat supplied to convert liquid at a constant pressure into vapours is called as latent heat of ———— .

(a) Vapourization (b) Sublimation

(c) Fussion (d) Neutralization

(iv) The type of heat transfer in which flow of fluid is caused by pump or fan is -

(a) Forced convection

(b) Natural convection

(c) Conduction

(d) None of above. 2

(c) Describe the process of mining of petroleum. 4

OR

9. (p) Explain ultimate analysis of coal. 4

(q) Explain destructive distillation of coal. 4

(r) Discuss fractional distillation of crude oil. 4

UNIT V

10. (a) Explain the nature of heat conduction. 4

(b) Discuss the classification of heat exchangers on the basis of direction of fluid flow. 4

(c) Describe construction and working of u-tube heat exchanger. 4

OR

11. (p) Explain filmwise and dropwise condensation. 4

(q) Give an account of nature of thermal radiation. 4

(c) Calculate the heat of reaction of the following reaction :—

$NH_3 + H_2O \longrightarrow NH_4OH$

ΔH^0_f of NH_4OH = – 361.20 KJ/mole

ΔH^0_f of H_2O = – 285.83 KJ/mole

ΔH^0f of NH_3 = – 45.94 KJ/mole 4

OR

7. (p) Prove that Cp – Cv = R 4

(q) Discuss –

(i) Tidal power

(ii) Wind Energy. 4

(r) Explain with example –

(i) Heat of formation.

(ii) Heat of combustion. 4

UNIT IV

8. (a) Explain the process of formation of coal. 4

(b) Explain coal-tar distillation. 4

(c) Answer in one sentence :-

(i) Define heat capacity.

(ii) Define Latent heat of fusion.

(iii) Define molecular weight.

(iv) State Newton's law for convection. 4

UNIT I

2. (a) Give the SI units of –

(i) Work (ii) Power

(iii) Force (iv) Density. 4

(b) Define the following terms –

(i) Molarity (ii) Normality

(iii) Mole (iv) Equivalent weight 4

(c) An aqueous solution of sodium chloride (NaCl) is prepared by dissolving 25 Kg sodium chloride in 100 kg of water. Calculate

(a) Wt % and

(b) mole % of sodium chloride and water. 4

OR

3. (p) Give the dimensions of –

(i) Density

(ii) Pressure

(iii) Specific volume

(iv) Force 4

(q) Calculate molecular wt. of

(i) H_2SO_4

(ii) NaOH

(iii) HCl

(iv) HNO_3

(Given at wt. of H = 1, S = 32, O = 16, N = 14, Na = 23, Cl = 35.5). 4

(r) 20 gm of NaOH is dissolved in water to prepare 500 ml of solution. Find the normality and molarity of solution. 4

UNIT II

4. (a) Discuss evaporation operation with block diagram and give its material balance equations. 4

(b) Explain the following terms with examples.

(i) Stoichiometric equation.

(ii) Stoichiometric coefficient. 4

(c) AN evaporator is fed with 10,000 kg/hr of weak feed containing 15% NaOH by weight and is concentrated to get thick product containg 40% by weight NaOH. Calculate kg/hr of water evaporated and kg/hr of thick product obtained. 4

OR

5. (p) Explain the following terms with example –

(i) Limiting reactant

(ii) Excess reactant 4

(q) Discuss distillation operation with block diagram and give its material balance equations. 4

(r) In the production of SO_3, 100 kmol of SO_2 and 200 Kmol of O_2 are fed to the reactor. The product stream is found to contain 80 Kmol SO_3. Find percent conversion of SO_2. 4

UNIT III

6. (a) Discuss Hess's law of constant heat summation. 4

(b) Describe water heating by solar energy. 4