AV–1668

B.Sc. (Part—I) Semester—I Examination

INDUSTRIAL CHEMISTRY (R/V)

Time : Three Hours]　　　　　　　　　　　　　　　　[Maximum Marks : 80

N.B. :— (1) Question no. **1** is compulsory.

(2) Attempt **one** question from each Unit.

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

(4) Use of basic (non scientific) calculator is allowed.

1. (A) Fill in the blanks :

(i) Coal is regarded as ——————— fuel.

(ii) Manometer is used for measurement of ——————— .

(iii) Normal composition of water gas is ——————— .

(iv) Physical quantities such as length, mass, time etc. are regarded as ———————
quantities.　　　　　　　　　　　　　　　　　　　　　　　　　　　　　2

(B) Choose correct alternative :

(i) Separation of two or more miscible liquid components from each other by providing
thermal energy is carried out by ——————— operation.

　　(a) Extraction　　　　　　　　(b) Crystallization

　　(c) Distillation　　　　　　　　(d) Filtration

(ii) ——————— is a source of nonconventional energy.

　　(a) Coal　　　　　　　　　　(b) Wood

　　(c) Oil　　　　　　　　　　　(d) Wind

(iii) Which of the following is not the type of heat exchanger ? .

　　(a) Parallel flow　　　　　　　(b) Counter flow

　　(c) Cross flow　　　　　　　　(d) Turbulent flow

(iv) Raffinate phase is separated during ——————— operation.

　　(a) Distillation　　　　　　　　(b) Extraction

　　(c) Crystallization　　　　　　　(d) Evaporation　　　　　　　　2

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

    (i)   What is heat capacity ?

    (ii) State Wien's displacement law.

    (iii) Define latent heat of Vapourization.

    (iv) Define Calorific value.   4

UNIT—I

2. (A) Give the SI units of :

      (i)   Pressure   (ii) Work

      (iii) Enthalpy   (iv) Density   4

    (B) Define :

      (i)   Base units   (ii) Multiple units

      (iii) Molecular weight   (iv) Molality   4

    (C) 98 gms of H_2SO_4 is dissolved in water to prepare 1 lit. of solution. Find normality and molarity of the solution.   4

OR

3. (P) Calculate the molecular weight of :

      (i) H_2SO_4

      (ii) NH_3

      (iii) NaOH

      (iv) HCl.   4

    (Q) Prove that sum of all the mole fractions in the solution is unity.   4

    (R) Give an account of :

      (i)   Mole percent and

      (ii) Weight percent.   4

UNIT—II

4. (A) Discuss distillation operation and give the material balance equation with block diagram.   4

(B) Give an account on :

    (i) Limiting reactant

    (ii) Excess reactant.   4

(C) An evaporator operating at atmospheric pressure is fed with weak feed at a rate of 10,000 kg/hr. Weak feed that contains 15 % NaOH by weight is to be concentrated to 40 % NaOH by weight. Calculate thick product obtained and water evaporated per hour.   4

OR

5. (P) Discuss evaporation operation and give the material balance equation with block diagram.   4

  (Q) Discuss :

    (i) Stoichiometric equation

    (ii) Stoichiometric coefficient.   4

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

UNIT—III

6. (A) Explain how electricity is produced by using solar energy.   4

  (B) Show the relationship between C_p and C_v.   4

  (C) Give an account on the uses of Solar energy.   4

OR

7. (P) Explain Hess's law of constant heat summation.   4

  (Q) Discuss :

    (i) Wind energy

    (ii) Biomass energy.   4

  (R) Explain heat of reaction with an example.   4

UNIT—IV

8. (A) Explain proximate analysis of Coal.   4

  (B) Discuss destructive distillation of Coal tar.   4

  (C) Explain the process of petroleum cracking.   4

OR

9. (P) Discuss the classification of Coal.   4

    (Q) What is Coal gas ? Describe the manufacturing process of Coal gas.   4

    (R) Describe fractional distillation of Crude Oil.   4

UNIT—V

10. (A) Explain the phenomenon of Pool boiling.   4

    (B) Discuss the phenomenon of Filmwise and Dropwise condensation.   4

    (C) Explain U-tube heat exchanger.   4

OR

11. (P) Explain general heat conduction equation.   4

    (Q) Discuss counter flow heat exchanger.   4

    (R) Explain forced and free convection.   4

UNIT—VI

12. (A) Explain construction and working of venturimeter.   4

    (B) Derive Bernoulli's equation.   4

    (C) Give an account on various valves.   4

OR

13. (P) Explain the construction and working of centrifugal pump.   4

    (Q) What is Reynold's number ? Give details about Reynold's experiment.   4

    (R) What is fluid ? Give its classification.   4