22231

11920

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Define chemical kinetic and thermodynamic

b) List out different types of chemical industries on the basis of application.

c) Identify the type of accident's in chemical process industries.

d) Draw hazards symbol for toxic and corrosive material

e) Define normality of solution.

f) State Dalton's law and Amagats law.

g) Define refractive index of solution.

Marks

2. Attempt any THREE of the following: **12**

a) Explain scale up procedure of process plant.

b) Discuss standard safety instruction to be followed while working in chemical laboratory.

c) Explain application of pH measurement in industry. Explain how pH affects the electrical conductivity

d) An aqueous solution of caustic soda (NaOH) is prepared by dissolving 20 Kg of caustic soda in 50 liter of water. Find weight %, mole % of composition of solution (Take purity of caustic soda is 100%) Density of water = 1 kg 1 lit.

3. Attempt any THREE of the following: **12**

a) Estimate the quantity of sulphuric acid required to prepared 0.5 N; 500 mililitter (ml) sulphuric acid solution.

b) Describe the procedure to measure the density of any solution using specific gravity bottle

c) Describe the principle and working of Abbe's refractometer.

d) Describe importance of size reduction in chemical industry.

4. Attempt any THREE of the following: **12**

a) Classify different types of reactor on the basis of mode of operation.

b) Explain the importance of emergency exit route and assembly point in the process plant

c) Select the personal protective equipment for the given situation with justification

(i) Plant operator is working below overhead pipe rack.

(ii) Plant operator is working near the blower giving producing noisy sound

Marks

d) A gaseous mixture of oxygen, hydrogen and nitrogen gases exert a total pressure of 380 KPa. If the partial pressure of oxygen and hydrogen are 76 KPa and 114 KPa respectively, Calculate the partial pressure of nitrogen. Also show the composition of mixture by volume %

e) Enlist different unit processes. Explain any one in detail.

5. Attempt any TWO of the following: **12**

a) Explain dependence of refractive index on concentration and temperature of solution.

b) Explain the principle of following:

(i) Distillation

(ii) Leaching

(iii) Drying

c) Explain following unit processes with suitable example.

(i) Oxidation

(ii) Sulphonation

(iii) Pyrolysis

6. Attempt any TWO of the following: **12**

a) Explain the effect of temperature and solvent on solubility of solute

b) Draw the symbol of following equipment as per IS 3232

(i) Ball mill

(ii) Evaporator

(iii) Filtration

(iv) Absorption column

(v) Jaw crusher

(vi) Crystallizer

Marks

c) Suggest the name of different process equipment may be used for following separation

(i) Solid-solid

(ii) Solid-liquid

(iii) Solid-gas

(iv) liquid-liquid

(v) liquid-gas

(vi) Gas-Gas