

Scheme G
Sample Test Paper - I

Course Name : Diploma in Chemical Engineering

Course Code : CH

Semester : Fourth

Subject Title : Physical chemistry & Material of Construction

Marks : 25

17423

Time: 1 hour

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q1. Attempt any THREE

9 Marks

- a. Define Reversible & Irreversible process. Give one example of each.
- b. State first law of Thermodynamics. Give its mathematical equation.
- c. Define phase, component & Degree of freedom
- d. Define Adsorption.

Q2. Attempt any TWO

8 Marks

- a. Differentiate between physical & chemical adsorption. (any four points)
- b. Define Isothermal & Adiabatic process with suitable example.
- c. Explain Freundlich Adsorption Isotherm

Q3. Attempt any TWO

8 Marks

- a. Explain any one method of preparation of colloids
- b. Draw neat diagram of sulphur system
- c. Calculate W & ΔU for the conversion of 1 mol of water at 100°C to steam at 1 atm pressure. Heat of vaporization of water at 100°C is 40670 J mol^{-1}

Scheme G
Sample Test Paper - II

Course Name : Diploma in Chemical Engineering

Course Code : CH

Semester : Fourth

Subject Title : Physical chemistry & Material of Construction

Marks : 25

17423

Time: 1 hour

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q1. Attempt any THREE

9 Marks

- a. Name any three application of polypropylene as material of construction.
- b. Explain why gold does not corrode.
- c. Give any three properties of cast iron
- d. Define
 - a) electrode potential
 - b) galvanic series
 - c) electrochemical series

Q2. Attempt any TWO

8 Marks

- a. Give the composition of duralumin & also give its two industrial uses
- b. List corrosion prevention methods . Explain any one of them.
- c. Define corrosion inhibitors. List any four corrosion inhibitors.

Q3. Attempt any TWO

8 Marks

- a. Explain method of glass lining on mild steel
- b. Explain electrochemical method for protection of corrosion.
- c. Give two industrial uses each of SS314 & PVC.

Scheme G
Sample Question Paper

Course Name : Diploma in Chemical Engineering

Course Code : CH

Semester : Fourth

Subject Title : Physical chemistry & Material of Construction

Marks : 100

17423

Time: 3 hour

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q.1 A. Attempt any SIX

12 Marks

- a. Define adiabatic & isothermal process
- b. Define colloidal solution.
- c. Define electrode potential of metal.
- d. Define degree of freedom.
- e. State zeroth law of thermodynamics
- f. Name the elements used for alloying aluminium
- g. What do you mean by passivity.

B. Attempt any TWO

8 Marks

- a. Explain dispersion method for preparation of colloidal solution.
- b. Explain how oxide film plays an important role in atmospheric corrosion.
- c. State properties of Teflon & give its two industrial applications.

Q2. Attempt any FOUR

16 Marks

- a. Derive equation for work done in isothermal expansion of ideal gas.
- b. Explain in brief electrochemical series of metals

- c. Determine the Degree of freedom for following systems
 - a) liquid ammonia in equilibrium with its vapours
 - b) aqueous solution of NaOH
- d. Differentiate between Lyophilic & Lyophobic solutions
- e. Explain the classification of engineering materials.
- f. Explain the mechanism of dry corrosion

Q.3 Attempt any FOUR

16 Marks

- a. Differentiate between intensive & extensive properties (any 4 points)
- b. Explain Freundlich Adsorption isotherm
- c. Explain in brief lead lining & state its purpose.
- d. Calculate Q, W, ΔU & ΔH for the isothermal expansion of 1 mol of an ideal gas at 27 °c from a volume of 10 m³ to 20 m³, against a constant external pressure of 1 atm.
- e. Draw the neat phase diagram of water system.
- f. Name any two industrial applications each of SS304 & SS314 as material of construction

Q.4 Attempt any FOUR

16 Marks

- a. Give the mathematical statement of Gibbs phase Rule & the terms involved in it.
- b. Give any four characteristics of corrosion protective coatings
- c. Define enthalpy , entropy , internal energy & PV work
- d. Differentiate between physical & chemical adsorption.
- e. Explain with sketch , working of galvanic cell.
- f. Write names of material of construction for storage of
 - a) HNO₃ acid upto its B.P.
 - b) CH₃COOH
 - c) C₂H₅OH
 - d) Caustic soda.

Q.5 Attempt any FOUR

16 Marks

- a. Explain any four applications of adsorption
- b. Explain impressed current method of cathodic protection.

- c. Differentiate between
 - a) reversible & irreversible process
 - b) open & closed system
- d. Give any four properties of mild steel.
- e. 1 mol of an ideal gas is heated from 100°K to 300°K .Calculate ΔS if
 - a) the volume is kept constant
 - b) the pressure is kept constant.Assume that $C_v = 1.5R$
- f. Derive Langmuir adsorption isotherm.

Q.6 Attempt any FOUR

16 Marks

- a. Explain electroplating with neat sketch
- b. Explain bridge arc method for preparation of lyophobic sols.
- c. Define system & surrounding . What do you mean by isolated system?
- d. State first & third law of thermodynamics. Also give their mathematical expression.
- e. Give the importance of lining. (any 4 points)
- f. Name the two situations each where galvanic & uniform corrosion occurs.