

17423

21314

3 Hours / 100 Marks

Seat No.

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- 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.

Marks

1. a) **Attempt any SIX of the following :** **12**
- i) Define Reversible and Irreversible process.
 - ii) State types of adsorption with one example.
 - iii) Describe effects of temperature on corrosion with suitable example.
 - iv) Define phase rule. State the meaning of terms involved in it.
 - v) State first law of thermodynamics with expression.
 - vi) Enlist uses of following materials. (Atleast four)
 - 1) PVC
 - 2) Polyethylene
 - vii) Describe the meaning of the term electrode potentials.

P.T.O.

b) Attempt any **TWO** of the following : 8

- i) Explain importance of lining. What are different types.
- ii) Enlist specific types of corrosion. Explain any one in details.
- iii) Explain Freundlich adsorption isotherm.

2. Attempt any **FOUR** of the following : 16

- a) Find expression for w , q and ΔE in an isothermal reversible expansion of a gas.
- b) Describe following corrosion preventive methods.
 - i) Use of high purity metal
 - ii) Use of alloy additions.
- c) Derive the phase rule $F + P = C + 2$
- d) Distinguish between Lyophilic and Lyophobic colloids.
- e) Give examples of commonly used material of construction. State uses of SS304, SS316.
- f) Explain the mechanism of dry corrosion.

3. Attempt any FOUR of the following :**16**

- a) Describe the meaning of following thermodynamic process.
 - i) Isothermal process
 - ii) Adiabatic process
 - iii) Isobaric process
 - iv) Isochoric process
- b) Define adsorption. State mechanism of adsorption.
- c) State criterion for selection of material of construction in chemical industries.
- d) One mole of an ideal gas is expanded isothermally and reversibly at 27°C from a volume of 2.28 m³ to 4.56 m³. Calculate q, w, ΔE.
 $R = 8.314 \text{ J/K.mol.}$
- e) Draw and explain phase diagram of water system.
- f) Write note on plastic lining.

4. Attempt any FOUR of the following :**16**

- a) Describe uses and limitations of phase rule.
- b) What is galvanic series. Draw table for galvanic series.
- c) Define enthalpy. Derive expression for it.
- d) Compare physical and chemical adsorption.
- e) Discuss the importance of design and material selection in controlling corrosion.
- f) Explain in brief glass lining and its applications.

5. Attempt any FOUR of the following : 16

- a) Enlist methods for preparation of colloidal solution. Explain one in details.
- b) Draw neat sketch of galvanic or electric cell.
- c) Define following with one example.
 - i) Second law of thermodynamics.
 - ii) Zeroth law of thermodynamics
- d) State application of following materials.
 - i) Carbon steel
 - ii) Teflon
 - iii) Alloys of aluminium
 - iv) Polypropylene
- e) Calculate the minimum work which must be done to compress 16 gm of oxygen at 300 k from a pressure of $1.01325 \times 10^3 \text{ N/m}^2$ to a pressure of $1.01325 \times 10^5 \text{ N/m}^2$.
- f) Explain characteristics of Lyophilic and Lyophobic colloids.

6. Attempt any FOUR of the following : 16

- a) Describe pitting corrosion and selective corrosion.
 - b) Explain langmuir adsorption isotherm.
 - c) Explain -
 - i) cyclic process
 - ii) Internal energy.
 - d) Explain with examples -
 - i) Intensive property
 - ii) Extensive property
 - e) Describe in detail classification of Engineering materials.
 - f) Explain impressed current method of cathodic protection.
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