

17423

21415

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.
 - (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. a) **Answer any SIX of the following:** **12**
- (i) State first law of thermodynamics and give its mathematical expression.
 - (ii) Name the types of colloidal systems.
 - (iii) Define corrosion with an example.
 - (iv) Write phase rule equation and explain the terms involved in it.
 - (v) Define homogeneous and heterogeneous systems.
 - (vi) Give the classification of plain carbon steel.
 - (vii) Which are the different types of corrosion?

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- b) **Answer any TWO of the following:** **8**
- (i) Compare hydrophilic and hydrophobic colloids.
 - (ii) What are the different methods to prevent corrosion? Explain any one in detail.
 - (iii) Write composition and uses of:
 - 1) cast iron
 - 2) mild steel.
2. **Answer any FOUR of the following:** **16**
- a) Distinguish between extensive and intensive properties (any two points).
 - b) What is electrochemical corrosion? Explain its mechanism.
 - c) Draw phase diagram for sulphur system and explain in detail.
 - d) Write the methods of preparation of colloidal solutions.
 - e) What are the importance of lining? Write different types of lining.
 - f) Distinguish between cathodic inhibitors and anodic inhibitors.
3. **Answer any FOUR of the following:** **16**
- a) Explain irreversible process with an example.
 - b) Explain adsorption isotherm.
 - c) Write in brief on plastic as a material of construction.
 - d) Differentiate between reversible and irreversible processes (any four points).
 - e) Draw phase diagram of water system.
 - f) Give any two applications of:
 - (i) Polyethylene
 - (ii) Teflon
 - (iii) Polypropylene
 - (iv) PVC

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

- a) Determine degree of freedom for the following:
- (i) ice \rightleftharpoons water \rightleftharpoons vapour
(s) (l) (g)
- (ii) water \rightleftharpoons water vapour.
- b) Explain the mechanism of dry corrosion.
- c) Prove that for an isochoric process work done is zero.
- d) What are the differences between physical and chemical adsorption?
- e) Explain electroplating to prevent corrosion of metal.
- f) Suggest suitable material of construction for storage of:
- (i) liquid ammonia
- (ii) methanol
- (iii) concentrated HNO_3
- (iv) toluene.

5. Answer any FOUR of the following:**16**

- a) Derive Langmuir adsorption isotherm.
- b) Explain oxidation corrosion in detail.
- c) Derive an expression for work done in an isothermal expansion of an ideal gas.
- d) Explain in brief lead lining and state its purpose.
- e) State:
- (i) second law of thermodynamics
- (ii) third law of thermodynamics.
- f) Give any four applications of adsorption and explain any two in detail.

6. Answer any FOUR of the following:**16**

- a) What are the factors affecting rate of corrosion?
(any eight points)
 - b) Explain Freundlich adsorption isotherm.
 - c) Derive an expression to calculate work done in a reversible isobaric process for ideal gas.
 - d) Calculate the work done in KJ by an ideal gas when 1 mol of the gas is expanded reversibly and isothermally from 4 atm to 1 atm at 300 k.
 - e) Name any two industrial applications each of SS304 and SS314 as material of construction.
 - f) Explain:
 - (i) uniform corrosion
 - (ii) pitting corrosion.
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