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Question Paper Code : 51367

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Second Semester

Civil Engineering

CY 2161/CY 24/080010002 – ENGINEERING CHEMISTRY – II

(Common to all branches)

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is reversible cell? Give a suitable example.
2. Write the reduction reaction of a calomel electrode.
3. Why is the rate of corrosion of impure zinc is very much higher than that of pure zinc?
4. What is the mechanism of stress corrosion? Give a suitable example.
5. Define cetane number.
6. State the composition of producer gas.
7. What is the number of degrees of freedom of a closed system in which $\text{CaCO}_3(\text{s})$ is in equilibrium with $\text{CaO}(\text{s})$ and $\text{CO}_2(\text{g})$?
8. State condensed phase rule and give justification for using it.
9. State any two metal ions which can be estimated using Flame photometer.
10. Define absorbance.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive Nernst' Equation. (8)
(ii) Explain using graphs the conductometric titrations of
(1) a strong base with a strong acid and (4)
(2) a weak base with a strong acid. (4)
Or
(b) (i) How is the emf of a cell determined? Explain in detail any one application of emf measurement. (8)
(ii) Construct the following cells and give expression for the potential in terms of Nernst' Equation.
(1) a concentration cell (4)
(2) a cell consisting of an ion selective electrode and Zn electrode in contact with Zn^{2+} ions. (4)

12. (a) (i) Discuss the factors associated with the metal which affects the rate of corrosion. (8)
- (ii) How is corrosion protection of underground iron pipelines and railway lines carried out? (8)

Or

- (b) (i) State the constituents of an oil paint with examples and explain their functions. (8)
- (ii) Explain metallic coating of nickel by
- (1) electroplating and (4)
- (2) electroless plating. (4)
13. (a) (i) Describe the physico chemical principles involved in the production of water gas. (8)
- (ii) Explain the fixed bed catalytic craking of petroleum oil. (8)

Or

- (b) (i) What is meant by proximate analysis? Explain how it is carried out. (8)
- (ii) Describe the Bergius process for synthesis of petrol. How is the octane number rating of petrol increased? (8)
14. (a) (i) State phase rule and define each term in it with suitable examples. (8)
- (ii) Explain in detail the cooling curves in lead-silver eutectic system at different compositions. How is desilverisation of argentiferous lead carried out? (8)

Or

- (b) (i) Interpret the phase diagram of a simple eutectic system. (8)
- (ii) Explain the effect of variation of pressure on all the stable and metastable equilibria in an ice-water-water vapour system. (8)
15. (a) (i) Draw the block diagram of a flame photometer and explain the principle of its operation. (8)
- (ii) Derive Beer Lambert's Law. What are its limitations? (5)
- (iii) A solution of thickness 2 cms transmits 40% incident light. Calculate the concentration of the solution. Given that $\epsilon = 5000 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$. (3)

Or

- (b) (i) Explain the principle, construction and working of UV Visible spectrometer with a neat diagram. (10)
- (ii) Explain how Fe^{2+} can be estimated using calorimetric technique. (6)