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Question Paper Code : 51408

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Second Semester

Civil Engineering

Common to all branches (Except Marine Engineering)

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

(Regulations 2008)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Construct a cell with Fe and Mg at standard conditions and calculate the emf developed. Given : $E^\circ (\text{Fe}^{2+}/\text{Fe}) = -0.44 \text{ V}$ and $E^\circ (\text{Mg}^{2+}/\text{Mg}) = -2.37 \text{ V}$.
2. Zinc reacts with dilute H_2SO_4 to give hydrogen but Ag does not. – Explain.
3. State Pilling – Bedworth rule.
4. Name any two anodic inhibitors.
5. What is knocking ?
6. What are the desirable characteristics of metallurgical coke ?
7. Brief on degrees of freedom with example.
8. Mention about peritectic point in phase diagram of $\text{Mg}_2\text{SiO}_4 - \text{SiO}_2$.
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) What is an ion selective electrode ? Explain its principle and working. (6)
- (ii) Derive an expression for Nernst equation. The emf of a cell measured by means of a hydrogen electrode against a saturated calomel electrode at 298 K is 0.4188 V. If the pressure of the H₂ (g) was maintained at 1 atm, calculate the pH of the unknown solution, given the potential of reference calomel electrode is 0.2415 V. (10)

OR

- (b) (i) Draw the conductometric titration curve of strong acid versus strong base and explain it. (4)
- (ii) Explain with suitable examples any two applications of emf series. (4)
- (iii) Explain the potentiometric titration of FeSO₄ Vs. K₂Cr₂O₇ with a neat diagram. (8)

12. (a) (i) What is an electrochemical cell ? Explain the mechanism of electrochemical corrosion with suitable example. (8)
- (ii) Explain differential aeration corrosion with suitable examples. (8)

OR

- (b) (i) Write the difference between electroplating and electroless plating. (8)
- (ii) State the constituents of oil paints with examples and their functions. (8)

13. (a) Explain the types of petrol cracking. (16)

OR

- (b) (i) Write briefly about the techniques to prevent knocking. (8)
- (ii) Explain the methods of production of synthetic petrol. (8)

14. (a) (i) Explain the phase diagram of water in detail with a neat diagram. (10)
- (ii) Define phase, component and degrees of freedom with suitable example. (6)

OR

- (b) (i) Explain the phase diagram of lead silver system. (8)
- (ii) What is condensed phase rule ? What is its significance ? (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)