Reg. No. : | | | | | | | | | | |

Question Paper Code: 41105

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2015.

First Semester

Computer Science and Engineering

14UCY105 – APPLIED CHEMISTRY

(Common to EEE, ECE, EIE, ICE and IT)

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

1. The salt bridge in the electrochemical cell serves to

   (a) Increase the rate at which equilibrium is obtained.

   (b) Increase the voltage of the cell

   (c) Maintain electrical neutrality

   (d) Increase the oxidation/reduction rate.

2. Which of the following can we use to measure pH?

   (a) A glass electrode (b) a concentration cell

   (c) a hydrogen electrode (d) all of the above

3. In some photochemical reactions low quantum yield is obtained. It is due to

   (a) Deactivation of reacting molecules

   (b) occurrence of reverse primary reaction

   (c) recombination of dissociation fragments

   (d) all of the above

4. The substance which initiate a photochemical reaction but itself does not undergo any chemical change is called

(a) Catalyst (b) fluorescent (c) sensitizer (d) none of the above

5. Which of the following metals could provide cathodic protection to iron: Al, Zn, Cu, Ni?

(a) Al and Zn (b) Cu and Ni

(c) Cu (d) All of the above

6. What is the effect of pH on corrosion?

(a) Lower the pH, greater is the corrosion

(b) Higher the pH, greater is the corrosion

(c) Neutral the pH, lower is the corrosion

(d) pH has no effect on corrosion

7. When one of the products of a reaction acts as a catalyst for that reaction, the phenomenon is

(a) catalysis (b) autocatalysis (c) promoters (d) enzyme catalysis

8. What is the effect of adsorption with respect to surface area

(a) Greater the surface area, greater is the adsorption

(b) Lesser the surface area, greater is the adsorption

(c) Greater the surface area, lesser is the adsorption

(d) none of these

9. Which among the following groups are chromophores

(a) –N=N- (b) –N=O (c) –C=O (d) All of the above

10. Which among the following is used to find the atomic structure of a crystal?

(a) XRD (b) UV-Visible

(c) AAS (d) Flame photometry

PART - B (5 x 2 = 10 Marks)

11. Electrode potential of zinc is assigned a negative value (0.76v) whereas that of copper a positive value (+0.34v) give reason.

12. A Certain system absorbs 3 x 10^{18} quanta of light per second. On irradiation for 20 minutes 0.003 mole of the reactant was found to have reacted. Calculate the quantum yield for the process (Avagadro's number = 6.02 x 10^{23}).

13. Give the importance of Pilling Bedworth rule.

14. What are promoters and autocatalysis?

15. Explain the principle of X-ray diffraction?

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Derive the Nernst equation for a single electrode potential. (8)

(ii) Describe the construction of a saturated calomel electrode. Write its electrode reaction. (8)

Or

(b) (i) Describe the standard hydrogen electrode and its use in the determination of single electrode potential. (8)

(ii) Explain the potentiometric redox titration of $FeSO_4$ vs $K_2Cr_2O_7$ with neat diagram. (8)

17. (a) (i) Discuss in detail Fluorescence and photo sensitization. (8)

(ii) Explain the determination of quantum yield. (8)

Or

(b) (i) State and explain the laws of photochemistry in detail. (8)

(ii) Explain the mechanism of fluorescence and phosphorescence with the help of Jablonski diagram. (8)

18. (a) (i) Explain differential aeration corrosion with suitable example. (8)

(ii) What is cathodic protection? Explain the sacrificial anodic and impressed current cathodic protection methods. (8)

Or

(b) (i) State and explain the various factors that influence the rate of corrosion. (8)

(ii) State the constituents of oil paints with examples and their functions. (8)

19. (a) (i) Discuss Freundlich's adsorption isotherm of a gas on a solid. How are the constants of this isotherms obtained? (8)

(ii) What are the differences between physisorption and chemisorption. (8)

Or

(b) (i) Give the main points of Langmuir theory of adsorption and deduce Langmuir adsorption isotherm equation. (8)

(ii) Write briefly about the role of ion exchangers in pollution control. (8)

20. (a) (i) Discuss the various types of electronic transitions in detail. (8)

(ii) How is nickel estimated by AAS? Explain the principle and instrumentation. (8)

Or

(b) (i) State Beer's Law. Write the applications of UV Visible spectroscopy. (8)

(ii) How is sodium estimated by flame photometry? Explain the principle and instrumentation. (8)

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