**ANNA UNIVERSITY COIMBATORE**

**B.E. / B.TECH. DEGREE EXAMINATIONS : JUNE / JULY 2009**

**REGULATIONS : 2008**

**SECOND SEMESTER**

**080010002 - ENGINEERING CHEMISTRY II**

**(COMMON TO ALL BRANCHES)**

**TIME : 3 Hours** **Max. Marks : 100**

**PART – A**

**(20 x 2 = 40 MARKS)**

**ANSWER ALL QUESTIONS**

1. Define single electrode potential? Mention the factors affecting it.
2. Calculate the single electrode potential of copper immersed in 0.01M $CuSO_4$ solution at 25° C. $E^{\circ}_{(Cu / Cu2+)} = + 0.34$ V
3. How is pH of a solution determined using glass electrode.
4. Mention the advantages of conductometre titrations.
5. State Pilling – Bedworth rule. What is its importance?
6. Zinc is more readily corroded when coupled with copper than with lead. Why?
7. Explain the function of driers in paint. Give two examples for driers.
8. Give the advantages of electroless plating over electroplating.
9. Distinguish between Proximate analysis and Ultimate analysis of coal.
10. What is meant by octane number of gasoline? How can it be improved?
11. In the catalytic cracking process, catalyst requires regeneration. Give reason.
12. Give the composition and uses of watergas.
13. What is condensed phase rule?

14. Calculate the number of phases present in the following system.

(a) $NH_4Cl_{(s)} \Leftrightarrow NH_{3(g)} + HCl_{(g)}$

(b) An emulsion of oil in water.

(c) $MgCO_{3(s)} \Leftrightarrow MgO_{(s)} + CO_{2(g)}$

(d) $\text{Ice}_{(s)} \Leftrightarrow \text{Water}_{(l)} \Leftrightarrow \text{Water vapour}_{(g)}$

15. Give the composition and uses of nichrome.

16. Mention any five purposes of making alloys.

17. A solution shows a transmittance of 20% when taken in a cell of 2.5 cm thickness. Calculate its concentration, if the molar absorption coefficient is 12000 $dm^3\ mol^{-1}\ cm^{-1}$

18. Mention the various types of electronic transitions taking place in UV spectroscopy.

19. State the limitations of flame photometry.

20. Mention few applications of IR spectroscopy.

## PART – B

**(5 x 12 = 60 MARKS)**

**ANSWER ANY FIVE QUESTIONS**

| | | | |
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| 21. | a) | Derive the Nernst's equation and explain the terms involved in it. | 6 |
| | b) | Describe the construction and working of a calomel electrode. Write the electrode reactions. | 6 |
| 22. | a) | Explain in detail the mechanism of electrochemical corrosion. | 6 |
| | b) | Explain the process of electrodeposition taking a suitable example. | 6 |

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|---|---|---|---|
| 23. | a) | Describe the Otto – Haffman's method of coke manufacture and the recovery of various by products | 8 |
| | b) | How will you obtain synthetic petrol by Fisher – Tropsch process? | 4 |
| 24. | a) | Draw a neat phase diagram of water system and explain the curves areas and point. Interpret the various features using phase rule. | 6 |
| | b) | Explain in detail the following heat treatment processes.<br>(i) Annealing (ii) Tempering (iii) Case hardening. | 6 |
| 25. | a) | Derive the expression for the Beer – Lambert's law. State its disadvantages. | 6 |
| | b) | Explain the various components and working of UV – visible spectrophotometer. | 6 |
| 26. | a) | How will you estimate the concentration of silver ions in a solution by potentiometer titration? | 6 |
| | b) | Discuss the cathodic protection methods of corrosion control. | 6 |
| 27. | a) | Write notes on electroless plating of nickel. | 6 |
| | b) | Draw the phase diagram of lead silver system and explain its salient features. | 6 |
| 28. | a) | A sample of coal was found to contain the following. C = 81%,H = 4%, O = 2%,<br>N = 10 %, S = 2% and the remaining being ash. Estimate the quantity of minimum air required for the complete combustion of 3 kg of the sample. | 6 |
| | b) | Explain the estimation of nickel by atomic absorption spectroscopy. | 6 |

*****THE END*****