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Question Paper Code : 11296

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Second Semester

Civil Engineering

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

(Common to all branches (except Marine Engg.))

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a Galvanic cell?
2. Draw a representative plot of conductometric titration of a strong acid versus strong base.
3. List out the differences (any four) between chemical corrosion and electrochemical corrosion.
4. What are vapour phase inhibitors?
5. What is the difference between caking coal and coking coal?
6. What is the composition of producer gas? What is its calorific value?
7. How many phases and components are present in the following system?
$$\text{CaCO}_{3(s)} \rightleftharpoons \text{CaO}_{(s)} + \text{CO}_{2(g)}$$
8. What do you understand by heat treatment of stainless steel?
9. What is finger print region in IR spectroscopy? Mention its important use.
10. What is the principle of estimation of iron by colorimetry?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive Nernst equation for the calculation of cell emf. Give its applications. (8)
(ii) Explain the measurement of pH of a solution Using glass electrode. Mention the advantage of this electrode. (8)

Or

- (b) (i) What is electrochemical (or) EMF series? Give its applications with suitable examples. (8)
- (ii) Explain the principle involved in potentiometric titrations. Write an experimental procedure for carrying out the titration of a precipitation reaction. (8)
12. (a) (i) When does the electrochemical corrosion occur? Describe the mechanism of electrochemical corrosion. (8)
- (ii) Write a brief note on cathodic protection methods. (8)
- Or
- (b) (i) With reference to control of corrosion rate, explain (1) anodic inhibitors and (2) cathodic inhibitors. (6)
- (ii) How will you distinguish between electroplating and electroless Plating? Write a detailed account on the activation of surface, overall reaction, electroless Plating and favourable conditions of Nickel. (10)
13. (a) (i) Explain the ultimate analysis of coal. (6)
- (ii) Describe the Otto-Hoffmann method of coke manufacture and the recovery of various by-products. (10)
- Or
- (b) (i) A coal sample was found to contain the following :
C = 81%, H = 4%, O = 2%, N = 1% and the remaining being ash.
Estimate the quantity of minimum air required for the complete combustion of 1 kg of coal sample, if 40% of excess air is required. (6)
- (ii) How is flue gas analysis carried out by Orsat's apparatus? Mention also the significance of such analysis. (10)
14. (a) (i) What is the difference between critical point and triple Point? 100 kg of a sample of argentiferous lead containing 0.5% Ag is melted and then allowed to cool. If eutectic contains 2.6% Ag, (1) what mass of eutectic will be formed and (2) what mass of lead will separate out? (6)
- (ii) Discuss the Pb-Ag system with a complete phase diagram. (10)
- Or
- (b) (i) Mention two non-ferrous alloys. Give their composition and uses. (6)
- (ii) Name five different alloy steels and briefly explain their applications. (10)
15. (a) (i) Describe the various components of colorimeter and its working in detail. (8)
- (ii) Explain any four applications of IR spectroscopy with suitable examples. (8)
- Or
- (b) (i) With a neat diagram explain the principle, instrumentation and working of atomic absorption spectroscope. How will you estimate the amount of nickel using atomic absorption spectroscopy? (10)
- (ii) Describe the steps involved in the determination of sodium ion concentration in a given sample solution using flame photometer. (6)