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**T 3506**

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

First Semester

(Regulation 2004)

Civil Engineering

CY 1101 — CHEMISTRY — I

(Common to all branches Except Marine Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define single electrode potential.
2. Calculate the e.m.f of the concentration cell consisting of zinc electrodes, one immersed in a solution of a 0.02 M and the other immersed in 0.001 M solution of its ions at 25°C.
3. Distinguish between reversible and irreversible process.
4. Define first law of thermodynamics and mention its limitations.
5. What are called consecutive reactions? Give two examples.
6. Define the phenomenon of chemisorption with suitable example.
7. Name chemical reaction in which an acid is used as catalyst.
8. Determine the absorbance of a solution, if the transmittance of a solution is 25%.
9. Give the frequency region of UV-visible spectrum.
10. Define rate law and rate constant.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the determination of pH of a solution using glass electrode. (16)  
Mention its advantages.

Or

- (b) How is conductometric titration of a strong acid against strong base carried out? Explain with diagram. Mention the advantages of conductometric titrations. (16)
12. (a) (i) Discuss the entropy change in reversible process. (10)  
(ii) 2 moles of an ideal gas at 25°C is isothermally and reversibly expanded until the volume is increased 10 times. Calculate the resulting change in entropy. (6)

Or

- (b) (i) Derive an expression for Vant Hoff isotherm. (10)  
(ii) The value of equilibrium constant for a reaction is found to be  $2 \times 10^4$  at 30°C. Calculate  $\Delta G^\circ$  for the reaction. (6)
13. (a) (i) Define second order reaction. List the characteristics of second order reaction. (10)  
(ii) A second order reaction where  $a = b$ , is 30% completed in 600 seconds. How long will it take for the reaction to go to 75% completion? (6)

Or

- (b) What are called parallel reactions? Give example. Derive the expression for the kinetics of parallel reaction. (16)
14. (a) (i) Define adsorption. Explain how gases are adsorbed over metal surfaces. (8)  
(ii) Derive Freundlich adsorption isotherm. (8)

Or

- (b) (i) Define homogeneous and heterogeneous catalysis. Give example for each. (8)  
(ii) List the characteristics of catalysts. (8)

15. (a) Define emission spectrum. Explain absorption of radiation and mention the factors affecting absorbance. (16)

Or

- (b) (i) Define visible and ultraviolet spectroscopy. (4)
- (ii) Explain the working principle of visible and ultraviolet spectrophotometers and mention the applications of UV spectroscopy. (12)
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