

**B. Tech Degree I & II Semester (Combined) Examination  
June 2013**

**IT/CS/EC/CE/ME/SE/EB/EI/EE/FT 1103 ENGINEERING CHEMISTRY**  
(2012 Scheme)

Time : 3 Hours

Maximum Marks : 100

**PART A**  
(Answer *ALL* questions)

(8 x 5 =40)

- I. (a) Differentiate between Frenkel defect and Schottky defect.  
(b) What are the applications of vibrational (Infrared) spectroscopy?  
(c) Explain with suitable examples the Bronsted – Lowry concept of acids and bases.  
(d) Derive the integrated rate equation for a second order reaction  $2A \rightarrow$  products. Hence derive an expression for its half change time ( $t_{1/2}$ ).  
(e) Define enthalpy, H. What is its molecular interpretation?  
(f) State phase rule and explain the terms involved.  
(g) (i) Explain addition polymerization with examples.  
(ii) Describe shortly the free radical mechanism of addition.  
(h) Describe the preparation of (i) Buna –S (ii) Neoprene

**PART B**

(4 x 15 = 60)

- II. (a) What are the salient features of the band theory of solids? Explain the existence of (i) insulators (ii) semiconductors (iii) metals. (6)  
(b) Describe the Born-Haber cycle for NaCl. (5)  
(c) Explain the theory of NMR spectroscopy. (4)
- OR**
- III. (a) Write a note on Fermi level in semiconductor. (4)  
(b) What is electron spectroscopy for chemical analysis? Explain. (5)  
(c) Describe the B.E.T. isotherm. (6)
- IV. (a) Define standard single electrode potential and derive the Nernst equation for electrode potential. (6)  
(b) What are concentration cells? Derive an expression for the e.m.f. of a concentration cell. (5)  
(c) Explain the electrochemical theory of corrosion taking rusting of iron as example. (4)

**OR**

(P.T.O.)

- V. (a) What are the characteristics of fuel cells? Describe the hydrogen – oxygen fuel cell. (6)
- (b) Explain cathodic protection. (4)
- (c) Describe with a diagram how a copper bangle is electroplated with gold. (3)
- (d) Show that the time required for 99.9% conversion for a first order reaction is almost 10 times its half charge time  $t_{1/2}$ . (2)
- VI. (a) Derive the Kirchoff's equation. (5)
- (b) (i) Explain chemical potential. (2)  
(ii) Derive the Vant Hoff's reaction isotherm. (4)
- (c) Explain the lead-silver simple eutectic system with a neat phase diagram. (4)
- OR**
- VII. (a) Derive the Gibbs – Helmholtz equation. (5)
- (b) The Gibb's energy change for a reaction at 300 k is  $-86 \text{ KJ mol}^{-1}$  and at 310 k it is  $-84 \text{ KJ mol}^{-1}$ . Calculate  $\Delta H$  for the reaction at the average temperature of 305k.  $\Delta G$  at 305 k is  $-85 \text{ KJ mol}^{-1}$ . (3)
- (c) Explain one component water system using a neat phase diagram. (7)
- VIII. (a) Explain: (i) Injection moulding (ii) Extrusion moulding (4)
- (b) Describe the preparation, properties and uses of (i) Nylon, 6, 6 (ii) PET (6)
- (c) Write notes on solid lubricants. (5)
- OR**
- IX. (a) Explain classification and properties of refractories. (6)
- (b) Write notes on silicone polymers. (5)
- (c) Explain the theory of setting of cement. (4)