# FACULTY OF ENGINEERING & INFORMATICS

## B.E. (I-Year) (Common to all Branches) (Supplementary) Examination, January 2011

## ENGINEERING CHEMISTRY

Time : Three Hours]     [Maximum Marks : 75

*Answer **ALL** questions of Part A, at one place in the Answer Book.*
*Answer **FIVE** questions from Part B.*

### PART—A (Marks : 25)

1. Differentiate between Reversible and Irreversible processes.     2

2. Explain Gibbs Free energy function and its importance.     2

3. What are co-polymers ? Give two examples.     2

4. Why the calomel is used as reference electrode in place of the standard hydrogen electrode ?     2

5. A sample of water contains 21·9 mg of magnesium bicarbonate, 19·0 mg of magnesium chloride, 33 mg of calcium chloride and 18 mg of magnesium sulphate per litre. Calculate the temporary and permanent hardness of this sample. (Atomic weights of Mg = 24, Ca = 40, S = 32, Cl = 35·5)     3

6. Give the equation for the preparation of :
   (i) Styrene-butadiene rubber
   (ii) Neoprene rubber.     3

7. State and explain Kohlrausch's law of independent migration of ions.     3

8. How is the corrosion of a metal prevented by sacrificial anodic method ?     2

9. What is meant by calorific value of a fuel ? Give the units of calorific value of the gaseous fuel.     3

10. Write charging and discharging reactions of the lead-acid battery.     3

### PART—B (Marks : 50)

11. (a) Obtain an expression relating T and V in an adiabatic reversible expansion of a gas obeying the equation of state PV = nRT.

    (b) One mole of an ideal gas at 300 K is compressed isothermally under external pressure of 200 atm. Calculate the quantities q, w, $\Delta H$ and $\Delta E$, if the initial and final pressure of the gas is 2·0 atm and 100 atm respectively.

12. (a) Explain the effect of dilution on specific and equivalent conductance.

   (b) Conductivity of 0·02 N KCl at 298 K is $2·768 \times 10^{-3}$ s. $cm^{-1}$. It offers a resistance of 82·4 ohm in a given cell. Using the same cell 0·005 N offers a resistance of 32·4 ohm. Find the following (i) Cell constant, (ii) Equivalent and (iii) Specific conductance.

13. (a) Explain the principle involved in the potentiometric acid-base titrations (strong acid *vs* strong base) using calomel and quinhydrone electrodes.

   (b) Derive Gibbs-Helmholtz equation and discuss its applications.

14. (a) Explain addition, condensation and co-polymerisation processes with examples.

   (b) Differentiate between thermoplastics and thermosetting resins with examples.

15. (a) What are boiler troubles and explain preventive measures.

   (b) Explain the octane and cetane numbers of a fuel. Discuss their significance.

16. (a) Write notes on :
       (i) Galvanization
       (ii) Galvanic corrosion.

   (b) Give the preparation, properties and uses of :
       (i) Nylon 66
       (ii) PVC.

17. (a) How calorific value of fuel is determined by Bomb Calorimeter ?

   (b) What are conducting polymers ? Mention any four applications of conducting polymer.