

**FACULTY OF ENGINEERING AND INFORMATICS**  
**B.E. I Year (Common to all Branches) (Supplementary)**  
**Examination, Dec. 2009/Jan. 2010**  
**ENGINEERING CHEMISTRY**

Time: 3 Hours]

[Max. Marks: 75

**Note :** Answer all questions of Part A.

Answer five questions of Part B.

**PART – A****(25 Marks)**

1. What happens to the internal energy of a system, if work is done i) by the system, ii) on the system ? 2
2. Calculate the change in entropy accompanying the isothermal expansion of 5 moles of an ideal gas to 6 times to its initial volume at 330 K. 3
3. Why does the equivalent conductance increases with dilution ? 2
4. Describe the construction of standard hydrogen electrode. 3
5. Why does corrosion of water filled steel tanks occur below the waterline ? 3
6. What are the salts responsible for the temporary and permanent hardness of water ? 2
7. Differentiate between homopolymer and copolymer. 2
8. Why does raw rubber need vulcanization ? 3
9. What is octane number ? What is its significance ? 2
10. Calculate the minimum weight of air required for complete combustion of 1 kg of fuel containing : C = 90%, H = 3.5 % ; O = 3% and rest is ash. 3

## PART – B

(50 Marks)

11. a) Derive a Clausius-Clapeyron, equation. What are its applications ? 7  
 b) An ideal gas expands reversibly and isothermally from a volume of 10 lit. to 20 lit. at 27°C. Calculate the  $\Delta E$ ,  $q$  and  $w$ . 3
12. a) Describe the construction of calomel electrode. 4  
 b) What is the effect of dilution on specific conductance and equivalent conductance ? 2  
 c) A zinc rod is placed in 0.01 m  $\text{ZnSO}_4$  solution at 298 K. Write the electrode reaction and calculate the potential of the electrode  $E_{\text{Zn}^{2+}/\text{Zn}}^0 = -0.76\text{V}$ . 4
13. a) What is corrosion ? Describe the mechanism of electrochemical corrosion. 6  
 b) Describe the softening of water by ion-exchange method. 4
14. a) Write preparation, properties and uses of (a) PVC (b) Buna-N. 6  
 b) Differentiate between thermoplastics and thermosetting resins. 4
15. a) Describe the analysis of coal by proximate analysis. 6  
 b) Describe the determination of calorific value by Bomb calorimeter. 4
16. a) Differentiate between isothermal process and adiabatic process. 2  
 b) Discuss the entropy change in reversible and irreversible processes. 4  
 c) Write a note on break point chlorination. 4
17. a) Describe the construction of lead-acid battery with the reactions occurring during charging and discharging. 6  
 b) Describe the principle of strong acid-strong base conductometric titration. 4