

**FACULTY OF ENGINEERING AND INFORMATICS**  
**B.E. I Year (Common to all Branches) (Main) Examination, June 2010**  
**ENGINEERING CHEMISTRY**

Time: 3 Hours]

[Max. Marks: 75

*Note : Answer all questions of Part A.*  
*Answer five questions from Part B.*



## PART - A

(25 Marks)

1. Differentiate between reversible and irreversible processes. 3
2. A Carnot's engine works between 27°C and 127°C. Calculate the efficiency of the engine. 2
3. What is the role of the salt bridge in the electrochemical cell ? 2
4. The resistance of 0.1N solution of NaCl is 210 ohms at 18°C. Calculate the equivalent conductance of the solution. (Cell constant = 0.88 cm<sup>-1</sup>). 3
5. Bolt and nut made of the same metal is preferred. Why ? 2
6. A sample of water contains following impurities : Mg (HCO<sub>3</sub>)<sub>2</sub> = 73 mg/l, CaCl<sub>2</sub> = 222 mg/l, Mg SO<sub>4</sub> = 120 mg/l. Calculate temporary hardness and permanent hardness. 3
7. Differentiate between addition and condensation polymerisation. 3
8. Write the name and chemical structure of monomer of natural rubber. 2
9. Differentiate between high calorific value and low calorific value of fuel. 2
10. What are the requirements of a good fuel ? 3

## PART - B

(50 Marks)

1. a) State the first law of thermodynamics. What are the limitations of first law of thermodynamics ? 4
- b) Derive an equation for the work done in isothermal reversible expansion of an ideal gas. 3
- c) Calculate the maximum work obtained when 2 moles of ideal gas is expanded isothermally and reversibly from 10 l to 20 l at 25°C. 3



2. a) State and explain Kohlrausch's law. Explain two applications of this law. 6  
b) Calculate the EMF of a Daniel cell at 25°C, when the concentration of  $ZnSO_4$  and  $CuSO_4$  are 0.001 M and 0.1 M respectively. The standard potential of cell is 1.1 volts. 4
3. a) Describe the determination of hardness of water by EDTA method. 6  
b) What is cathodic protection ? Explain sacrificial anode method. 4
4. a) Write preparation, properties and uses of  
a) Teflon  
b) Buna-S. 6  
b) What are the applications of conducting polymers ? 4
5. a) What is cracking ? Describe the catalytic cracking by fixed bed method. 6  
b) Write a note on CNG. 4
6. a) Derive an equation for Vanthoff's isochore. What are its applications ? 6  
b) Write a note on pitting corrosion and crevice corrosion. 4
7. a) Describe the determination of pH by using quinhydrone electrode. 6  
b) Describe the construction of dry cell. 4