

FACULTY OF ENGINEERING & INFORMATICS**B.E. I – Year (Common to all) (Suppl.) Examination, December 2013****Subject : Engineering Chemistry****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

1. What is state function? Explain with an example. 2
2. Differentiate between Gibbs and Helmholtz free energy. 3
3. Define ionic mobility and transport number. Give the interrelationship between them. 3
4. Distinguish between primary and secondary battery. 2
5. What is corrosion of metals? What are its causes? 3
6. Explain the disadvantages of hard water. 2
7. What is copolymerization? Explain with an example. 3
8. What are the advantages of vulcanized rubber? 2
9. Write a note on LPG and CNG. 3
10. Explain the mechanism of conduction in conducting polymers. 2

PART – B (50 Marks)

- 11.a) Compare the work done in isothermal and adiabatic reversible expansion. 4
- b) One mole of an ideal mono-atomic gas expands reversibly from a volume of 10 dm^3 at 298 K to a volume of 20 dm^3 at 250 K. Calculate the change in entropy for this process ($C_v = 3/2 R$). 6
- 12.a) Define specific and equivalent conductance of an electrolyte. Explain the method of their measurement. 5
- b) A conductance cell has two platinum electrodes of 1.50 square cm area placed at 10.50 cm apart, placed in an electrolytic solution. The resistance of the solution was found to be 200 ohms . Calculate the cell constant, and specific conductance of the electrolytic solution. 5
- 13.a) Explain the different types of electrochemical corrosion. 5
- b) What are the different corrosion control methods? Explain any two of them. 5
- 14.a) Explain the differences between thermoplastics and thermosetting polymers. 4
- b) Give the preparation, properties and uses of the following : 6
 - i) Bakelite
 - ii) Nylon – 6, 6
 - iii) Buna-S rubber
- 15.a) Define calorific value of a fuel. Distinguish between Higher and Lower calorific value of a fuel. 3
- b) What is cracking of petroleum? Give its significance. 3
- c) Calculate the weight of air required for the combustion of 3 kg of coal containing $80\% \text{ C}$, $8\% \text{ H}$, $3\% \text{ O}$, $4\% \text{ S}$ and remaining ash. 4
- 16.a) What is Hardness of water? How will you determine the hardness of water by EDTA method. 6
- b) A sample of water contains the following dissolved salts :
 $\text{Ca}(\text{HCO}_3)_2 = 20 \text{ mg/L}$, $\text{Mg}(\text{HCO}_3)_2 = 17.5 \text{ mg/L}$, $\text{MgCl}_2 = 12 \text{ mg/L}$,
 $\text{CaCl}_2 = 22.2 \text{ mg/L}$ and $\text{CaSO}_4 = 28 \text{ mg/L}$. Calculate the temporary and permanent hardness of water. 4
- 17.a) Write a note on types of electrodes. 6
- b) Calculate the emf of a Daniel cell at 25°C , when the concentration of ZnSO_4 and CuSO_4 are 0.01 M and 0.1 M respectively. The standard potential of the cell is 1.10 V . 4