

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 cm^2 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) Bim-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