Code No. 9005

FACULTY OF ENGINEERING & INFORMATICS

B.E. I - Year (Suppl.) Examination, January 2015

Subject : Engineering Chemistry

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Par t - B.

PART – A (25 Marks)

1 Differentiate reversible process from irreversible process and give conditions. (3)
2 Derive expression for variation of free energy with temperature and pressure. (3)
3 Describe the construction and working of Calomel electrode. (3)
4 Define emf and give the general expression for emf of a galvanic cell and explain the link between emf and cell reaction. (3)
5 Write a note on Ni-Cd battery. (3)
6 Explain reverse osmosis with diagram. (2)
7 Write the chemical equations for preparation of polyurethane. (2)
8 What is biodegradable polymer? Discuss the significance with an example? (2)
9 Differentiate primary battery from secondary battery. (2)
10 Explain centane rating. (2)

PART – B (50 Marks)

11 (a) Give combined expression of I law and II law of thermodynamics and derive the conditions of equilibrium and spontaneity from it in terms ΔS, ΔA and ΔG. (7)
(b) Two moles of an ideal gas are compressed isothermally at $100^{o}C$ and reversibly from a pressure of 10 to 25 atm. Find the value of ΔG. (3)

12 (a) Explain the principle, method and applications of conductometric titrations. (7)
(b) Consider the cell Ag/AgBr(s)/Br- (M = 0.32) || Cu^{2+}(M = 0.42)|Cu(s) the emf of the cell at $25^{o}C$ in 0.565 volts. Write the cell reaction and calculate standard emf of the cell. (3)

13 (a) Discuss the Dry corrosion and wet corrosion with their reactions with reference to iron. (6)
(b) Discuss the boiler scales with causes and effects. (4)

14 (a) What are conducting polymers? Discuss the mechanism of conduction in intrinsic and extrinsic conducting polymers with one example for each type. (6)
(b) Discuss the applications of nano materials with reference to carbon nanotubes. (4)

15 (a) Explain fractional distillation of petroleum and discuss the composition and significance of fractions obtained from the above fractionation. (6)
(b) Discuss the significance of cracking and give flow diagram for catalytic cracking. (4)

16 (a) Derive Gibbs Helmholtz equation and discuss its applications. (5)
(b) What is alkalinity of water? Give its determination and discuss the expressions for various alkalinities of water in terms of phenolphthalein alkalinity and total alkalinity? (5)

17 (a) What is electrochemical series? Discuss its applications. (4)
(b) Discuss ultimate analysis of coal and its significance. (6)

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