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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

Common to All Branches

I- Semester

CY8151 – Engineering Chemistry

(Regulation 2012)

18

Time : 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Prove that $(\partial S/\partial P)_T = -(\partial V/\partial T)_P$
2. Calculate the entropy change in the thermodynamic expansion of 2 moles of an ideal gas from a volume of 5 litres to a volume of 50 litres.
3. What is meant by copolymerization?
4. Define degree of polymerization.
5. Write the statement of Grotthuss –Draper Law.
6. What are the types of electronic transitions?
7. What is pseudo molecular reaction? Give one example.
8. Why is $t_{1/2}$ of a first order reaction independent of concentration of reactants?
9. What are nanoclusters?
10. Give any two differences between bulk materials and nanoparticles.

Part – B (5 x 16 = 80 marks)

11. i) Describe the synthesis of nanomaterials by precipitation and thermolysis methods. (8)
ii) Explain about the size dependent properties of nanomaterials. (8)
 12. a) i) Derive Gibb's Helmholtz equation and discuss its applications. (8)
ii) Define chemical potential? How does chemical potential vary with temperature? (8)
- OR**
- b) i) What is meant by Van't Hoff isotherm? Derive an expression for the isotherm of a general reaction
$$aA + bB \rightleftharpoons cC + dD$$
 (8)
ii) Derive Clapeyron-Clausius equation. Discuss its applications. (8)
13. a) i) Differentiate between thermoplastics and thermosetting plastics. Give two examples each. (8)

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ii) What is meant by addition polymerization? Discuss the mechanism of free radical polymerization with suitable example. (8)

OR

b) i) Write notes on bulk, emulsion, solution and suspension polymerization techniques (8)

ii) Brief about the following properties of the polymers.
T_g, weight average molecular weight, tacticity and polydispersity index. (8)

14. a) i) Applying Michaelis-Menton equation, discuss the kinetics of enzyme catalysed reaction. Find the order of the reaction when the substrate-concentration is high. (8)

ii) In the saponification of ethyl acetate by NaOH at 283 K, y ml-of 0.043 N HCl were required to neutralize 100 ml of the reaction mixture, t minutes after the commencement of the reaction. From the data given below, prove that this is a second order reaction and calculate the rate constant.

Time (min)	0	4.89	10.37	28.18
Volume of HCl used (ml)	61.95	50.59	42.40	29.35

(8)

OR

b) i) Derive the rate equation for a second order reaction where the reactants are different. (8)

ii) Discuss the Langmuir –Hinselwood mechanism in heterogeneous catalysis. (8)

15. a) i) Explain the principle of IR spectroscopy. Give the block diagram of IR spectrometer and explain the functions of various components. (8)

ii) What are the types of photophysical processes? Explain. (8)

OR

b) i) Explain about the chemiluminescence and photo sensitization. (8)

ii) What is the statement of Beer-Lamberts law? Prove that absorbance is directly proportional to concentration. What are their limitations? (8)
