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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2013

COMMON TO ALL BRANCHES OF B.E / B.Tech PROGRAMMES

First Semester

CY 8151 – ENGINEERING CHEMISTRY

(Regulation 2012)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Calculate the entropy change when 2 moles of an ideal gas expands isothermally and reversibly from a volume of 4 litres to a volume of 20 litres. ($R = 8.314 \text{ J K}^{-1} \text{ mole}^{-1}$).
2. Define Clausius inequality.
3. What are isotactic and syndiotactic polymers?
4. What is co-polymerization? Give an example.
5. How is the order of reaction determined by half life method?
6. List any four factors that affect the reaction velocity.
7. Define chemiluminescence. Give an example.
8. What is meant by 'width' in a spectral line? How does it arise in spectra?
9. Why do nanoparticles show size dependent property compared to bulk materials?
10. Define nanowire and nanorod.

Part – B (5 x 16 = 80 marks)

11. (i) Explain the different types of adsorption isotherms with suitable examples. (8)
(ii) What are enzymes? Discuss the kinetics of enzyme catalysed reaction by deriving Michaelis-Menton equation. (8)
12. a) (i) Derive Gibbs Helmholtz equation in terms of Gibbs free energy and enthalpy and discuss any two applications. (8)
(ii) What is Van't Hoff isotherm? Derive an expression for the reaction isotherm of the general reaction: $aA + bB \rightleftharpoons cC + dD$. (8)

(OR)

- b) (i) Derive the Maxwell Relation, $\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$ (4)

(ii) The equilibrium constant for the reaction, $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is 1.48×10^{-4} atm and 0.113×10^{-4} atm at 523 K and 873 K respectively. Calculate ΔH for the reaction. (4)

(iii) Derive Clausius-Clapeyron equation and discuss its applications. (8)

13. a) (i) Distinguish between thermoplastic and thermosetting polymers. Give an example for each type. (6)

(ii) Write short notes on suspension and emulsion polymerisation with suitable examples. (10)

(OR)

b) (i) Discuss the free radical mechanism of addition polymerisation. (8)

(ii) Explain number average and weight average molecular mass in polymers. (8)

14. a) (i) Discuss in detail the photo-processes which can occur in molecules upon absorption of light radiation. (8)

(ii) Explain the principle and working of UV-Visible spectrophotometer with the help of a neat schematic block diagram. (8)

(OR)

b) (i) State and explain Grothus-Draper Law. (4)

(ii) Write short notes on photosensitization. (4)

(iii) Describe with a neat diagram the principles and instrumentation involved in IR spectrometer. (8)

15. a) (i) What is chemical vapour deposition? Describe the synthesis of nanomaterials by this method. (8)

(ii) Explain any four properties of nanomaterials. (8)

(OR)

b) (i) What is Solvothermal synthesis? How are nanomaterials synthesized by this method? (8)

(ii) Explain in detail any four applications of nanomaterials. (8)
