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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR / MAY 2014

COMMON TO ALL BRANCHES OF ENGINEERING AND TECHNOLOGY

First Semester

CY 9111 – ENGINEERING CHEMISTRY

(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define Clausius statement.
2. What is chemical potential?
3. Define the term 'phase' and 'component'.
4. What is condensed phase rule?
5. List any four factors that govern the adsorption of gases on solids.
6. What is autocatalysis? Give an example.
7. Define Beer-Lambert's law.
8. Give any two applications of IR spectroscopy.
9. Define the term 'nanorod' and 'nanowire'.
10. Write a brief note on nanocatalysis.

Part – B (5 x 16 = 80 marks)

11. (i) Write short notes on carbon nanotubes and their applications. (8)
(ii) Explain the various applications of nanochemistry in biology and medicine. (8)
 12. a) (i) Prove the Maxwell Relations: $\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$ and $\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$ (8)
(ii) Derive Gibbs Helmholtz equation relating free energy and enthalpy. (8)
Discuss any two of its application.
- (OR)**
- b) (i) What is Van't Hoff isotherm? Derive an expression for the Van't Hoff reaction isotherm. (8)
(ii) Write short notes on entropy change for reversible and irreversible processes. (8)

13. a) (i) Draw a neat labeled phase diagram of water system and interpret the areas, curves and triple points in it. (8)
(ii) Write short notes on thermal analysis when a pure substance and a mixture of solids in a fused state are allowed to cool slowly. (8)

(OR)

- b) (i) Draw a neat labeled phase diagram of sulphur system and explain areas, curves and triple point in it (8)
(ii) What is an eutectic system? Describe 'Lead-Silver' simple eutectic system with a neat phase diagram. (8)

14. a) (i) What is adsorption? Write short notes on the various applications of adsorption. (8)
(ii) Discuss the role of adsorption in catalytic reactions taking a specific example. (8)

(OR)

- b) (i) Write short notes on basic principles of adsorption chromatography. (8)
(ii) Discuss the kinetics of enzyme catalyzed reaction by deriving Michaelis-Menton equation. (8)

15. a) (i) Describe briefly about the mechanism of substitution nucleophilic unimolecular (S_N1) reaction. (8)
(ii) Explain the basic components in IR spectrophotometer with a neat block diagram. (8)

(OR)

- b) (i) What are elimination reactions? Discuss briefly on the E1 mechanism. (8)
(ii) Discuss the principles involved in the instrumentation and working of a UV-Visible spectrophotometer. (8)
