Reg. No. | | | | | | | | | | | | |

Question Paper Code : 27178

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2015

First Semester

Civil Engineering

CY 6151 : ENGINEERING CHEMISTRY – I

(Common to all branches except Marine Engineering)

(Regulations : 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. How are polymers classified ? (Any one method)
2. Write the preparation of nylon 6,6 with the relevant reaction.
3. State the second law of thermodynamics.
4. What happens to the entropy change when
   (i) ice is converted into water at room temperature ?
   (ii) I_2 vapour is sublimated to I_2 solid ?
5. State and explain Grothus-Draper Law.
6. What are the type of electronic transitions possible in ethylene ($CH_2 = CH_2$) molecule ?
7. What is meant by the term component in phase rule ?
8. What is bronze ? Why is it superior to steel ?
9. What are nanomaterials ?
10. Write any two important applications of gold nano particles in medicine.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Bring out the differences between thermoplastic and thermosetting resins. **(8)**

    (ii) Describe the mechanism of free radical polymerization. **(8)**

OR

(b) (i) What is co-polymerization ? Describe the different types of copolymerization. **(8)**

(ii) Explain the term glass transition temperature. What are the factors influencing T_g ? **(8)**

12. (a) (i) Derive the expression for the entropy change for an ideal gas. **(8)**

(ii) Prove that $-\Delta G$ = Total useful work. **(8)**

OR

(b) (i) Derive the following Maxwell's relations. **(8)**

$$\left[\frac{\partial T}{\partial V}\right]_S = \left[\frac{\partial P}{\partial S}\right]_V \text{ and } \left[\frac{\partial S}{\partial V}\right]_T = \left[\frac{\partial P}{\partial T}\right]_V$$

(ii) For the reaction $A + B \rightleftharpoons C + D$, if the rate constants at 400 °C and 800 °C are 1×10^{-12} and 1×10^{-7} respectively, calculate the standard enthalpy change for the reaction. **(8)**

13. (a) (i) Describe what is quantum efficiency/yield. **(8)**

(ii) Write short notes on the following : **(8)**

(1) Chemiluminescence

(2) Photosensitization

OR

(b) (i) Draw the block diagram of an IR spectrophotometer and describe the instrumentation. **(8)**

(ii) Write short notes on the types of vibrations in a molecule. **(8)**

14. (a) (i) Draw the phase diagram of lead-silver system and explain. Briefly write about Pattinson's process. **(8)**

(ii) Discuss the application of phase rule to water system. **(8)**

OR

(b) (i) Explain the significance of alloying. **(8)**

(ii) Write a note on heat treatment of steel. **(8)**

15. (a) Write short notes on :

(i) Carbon nanotubes **(6)**

(ii) Nanorods **(5)**

(iii) Nanowires **(5)**

OR

(b) (i) Describe the synthetic methods for the preparation of nanomaterials by

Precipitation **(4)**

Chemical vapour deposition **(4)**

(ii) Write briefly about the properties and applications of Nanoparticles. **(8)**

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