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**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 ( $10 \times 2 = 20$  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 ( $5 \times 16 = 80$  Marks)**

11. (a)
  - (i) Bring out the differences between thermoplastic and thermosetting resins. **(8)**
  - (ii) Describe the mechanism of free radical polymerization. **(8)**

**OR**

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- (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  $-\Delta G = \text{Total useful work}$ . (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  $400^\circ\text{C}$  and  $800^\circ\text{C}$  are  $1 \times 10^{-12}$  and  $1 \times 10^{-7}$  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 : (6)
- (i) Carbon nanotubes (5)
  - (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)