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| Question Paper Code : 70400 |
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B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

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. What is Degree of polymerisation?
2. What are homo and hetero chain polymers? Give an example for each?
3. Calculate the change in entropy accompanying the isothermal expansion of 4 moles of an ideal gas at 300K until its volume has increased three times.
4. What are the conditions for a process to be spontaneous based on the relation?
$$\Delta G = \Delta H - T\Delta S$$
5. Define Grotthuss-Draper law.
6. What is finger print region in IR Spectroscopy? Mention its uses.
7. What do you understand by reduced phase rule?
8. What is hardening of steel? Mention its purpose.
9. What are carbon nanotubes?
10. What is laser ablation?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Distinguish between thermoplastics and thermosetting plastics. (8)
(ii) Write the synthesis of nylon-6, 6 and Epoxy resins. (8)

Or

- (b) (i) Compare addition polymerisation and condensation polymerization. (8)
(ii) Write is notes on bulk, emulsion, solution and suspension polymerization techniques. (8)
12. (a) (i) Derive Gibbs-Helmholtz equation and Explain. (8)
(ii) Compute free energy change when 5 moles of an ideal gas expands reversibly and Isothermally at 300 K from an initial volume of 50 L to 1000 L. (8)

Or

- (b) (i) What is meant by Vant Hoff's reaction isotherm? Derive the expression for a reaction isotherm of the general reaction : (8)
$$aA + bB \rightarrow cC + dD$$

(ii) Discuss the criteria for chemical reaction to be spontaneous. (8)
13. (a) (i) What is chemiluminescence? Bring out the mechanism of chemiluminescence. (8)
(ii) Explain the mechanism of fluorescence and phosphorescence. (8)

Or

- (b) (i) Explain the principle and instrumentation of UV-Visible Spectroscopy with a neat block diagram. (8)
(ii) Write a note on the types of transitions involved in organic molecule. (8)
14. (a) Explain the phase rule for water system.

Or

- (b) Define the term with respect to alloys.
(i) Annealing (6)
(ii) Hardening (5)
(iii) Normalizing. (5)

15. (a) (i) What are the properties that change from its bulk form to nano size form? Explain each with example. (8)
- (ii) Explain chemical vapour deposition technique of synthesis of nano particles. (8)

Or

- (b) (i) Discuss the solvothermal and laser ablation methods of synthesis of nano materials. (8)
- (ii) Compare the properties of molecules, nanoparticles and bulk materials. (8)
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