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***B.Tech. Degree II Semester Special Supplementary Examination in
Polymer Science and Engineering April 2020***

PE 1206 PHYSICAL AND INORGANIC CHEMISTRY

Time: 3 Hours

Maximum Marks: 50

PART A
(Answer *ALL* questions)

(10 × 2 = 20)

- I. (a) What is activation energy?
(b) Define order and molecularity of a reaction.
(c) Give two methods employed for the extraction of metals.
(d) State and explain Raoult's Law.
(e) What is zone refining?
(f) Give the structure of Ferrocene.
(g) Draw the d orbital splitting diagram for a tetrahedral complex.
(h) Define solubility of a gas in a liquid.
(i) What is an azeotrope?
(j) The vapour pressure of an aqueous solution of sugar is lower than that of pure water. Why?

PART B

(4 × 7½ = 30)

- II. (a) Write a brief note on the following:
(i) Cupellation (ii) Zone refining (iii) Liquefaction
(b) Note on Ellingham diagram.
- OR**
- III. (a) Write a brief note on various metallurgical operations.
(b) How are the following purified:
(i) Zirconium (ii) Nickel (iii) Silicon (iv) Uranium
- IV. (a) Explain synergic effect in metal-alkene complexes with the help of a diagram.
(b) Explain Jahn Teller distortion and conditions for the distortions. Which of the following complexes are expected to show Jahn Teller distortion?
(i) $[CuCl_6]^{4-}$ (ii) $[Cr(acac)_3]$
- OR**
- V. (a) Explain the factors influencing the stability of complexes.
(b) Note on crystal field theory.

(P.T.O.)

- VI. (a) Give the preparation and electrophilic substitution of Ferrocene.
(b) Explain the stability of the following complexes on the basis of 18 electron rule.
(i) $V(CO)_6$, (ii) $Fe(CO)_5$, (iii) $Fe_2(CO)_9$

OR

- VII. (a) Define ideal solution and deduce expression for ΔG_{mix} , ΔS_{mix} , ΔH_{mix} for the solutions of liquid with almost similar nature.
(b) Define ebullioscopic constant of a solvent. Derive an expression to show that molal elevation constant is a colligative property.
- VIII. (a) Explain Lindemanns theory of unimolecular reactions.
(b) The rate constant for a first order reaction is $1.54 \times 10^{-3} \text{ sec}^{-1}$. Calculate its half life period.

OR

- IX. (a) Explain transition state theory.
(b) What is pseudo order reaction? Integrate the rate expression for a first order reaction.
