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ICH 403

I Semester M.Sc. Degree Examination, November/December 2019

INDUSTRIAL CHEMISTRY

Physical Chemistry

Time : 3 Hours]

[Max. Marks : 70

- 1) *Answer any five questions from Part A and any five questions from Part B.*
- 2) *Figures to the right indicate marks.*

PART – A

Answer **any five** questions :

(5 × 2 = 10)

1. (a) Give the expression for the variable R in hydrogen atom and explain the terms involved in it.
- (b) Find i, m and n values of 3d⁵ electronic system.
- (c) Give an account of Born-Haber cycle showing the flow diagram with terms involved.
- (d) Why the conventional techniques are not suitable to study fast reactions?
- (e) Give the principle of electrophoretic painting.
- (f) What is cathodic protection? How is it achieved?
- (g) What is material yield and how is it related in terms of selectivity?
- (h) Mention the properties of a membrane used in a chlor-alkali cell.

PART – B

Answer **any five** full questions :

(5 × 12 = 60)

2. (a) Derive time independent Schrodinger wave equation.
- (b) Discuss the postulates of quantum mechanics.
- (c) How linear operator differ from Laplacian operator? **(5 + 4 + 3)**

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3. (a) What is tunneling in quantum mechanics? Explain.
(b) How Schrodinger wave equation is applied to a particle in ID box? Discuss.
(c) The wave function is single valued. Justify. **(4 + 5 + 3)**
4. (a) Give an account on excess thermodynamic function.
(b) Define the term chemical potential. Describe the method of determination of chemical potential taking an example.
(c) Discuss the kinetics and mechanism of pyrolysis of acetaldehyde. **(4 + 4 + 4)**
5. (a) What is steady state approximation? Apply it to obtain the rate expression for decomposition ozone.
(b) Derive Kirchoff's equation and explain its significance in thermodynamics. **(6 + 6)**
6. (a) Explain how deaeration causes the corrosion of metals.
(b) Explain any four differences between electroplating and electroless plating.
(c) Describe the electrochemical etching process for the manufacture of printed circuit boards. **(4 + 4 + 4)**
7. (a) Discuss Tafel extrapolation method of determination of corrosion rate.
(b) Discuss the effect of any six plating variables on the nature of electro-deposit. **(6 + 6)**
8. (a) Explain the industrial production of potassium hydroxide.
(b) Explain the electroinorganic and synthesis of fluorine.
(c) Explain the principles of cell design for electrolysis. **(4 + 4 + 4)**
9. (a) Describe any one method of sewage treatment with diagram.
(b) Discuss the process of electroreduction and oxidation of hydrocarbons. **(6 + 6)**