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

ICH 403

I Semester M.Sc. Degree Examination, April 2021
INDUSTRIAL CHEMISTRY
Physical Chemistry

Time : 3 Hours Max. Marks : 70

Instructions : 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) In the hydrogen spectrum, what is the wavelength of light associated with the n = 2 to n = 1 electron transition ?

b) Explain the significance of eigen function and eigen value.

c) How does entropy change in a reaction ? Write the expression for entropy changes for finite variations at constant T.

d) What are the factors affecting the rate law ?

e) What do you mean by linear polarization resistance ? Write the Stern-Geary equation and explain the terms involved.

f) State any two applications of electroless plating.

g) Write the principles of cell design.

h) What is Kolbe's electrolytic method ?

PART – B

Answer **any five full** questions : **(5×12=60)**

2. a) Obtain first order correction terms for energy and wave function using perturbation theory.

b) Derive Einstein's photoelectric equation.

c) What are the important assumptions of molecular orbital theory and valence bond theory ? **(5+3+4)**

P.T.O.

3. a) How the Born-Oppenheimer approximation simplifies molecular Hamiltonian operators? Deduce expression for it.
   b) Derive the linear momentum operator of a particle moving in x direction.
   c) Verify the Heisenberg's uncertainty principle for the ground state of a one dimensional simple harmonic oscillator. **(4+3+5)**

4. a) Explain the physical significance of entropy.
   b) Derive Kirchhoff's equation. How is it useful in thermodynamics ?
   c) What is steady state approximation ? Explain its significance. **(3+6+3)**

5. a) Illustrate kinetics of consecutive reactions with a suitable example.
   b) Outline the principle and applications of electrophoretic painting. **(6+6)**

6. a) Explain the types of corrosions with appropriate examples.
   b) Describe how the corrosion could be prevented by cathodic and anodic prevention method. **(6+6)**

7. a) Discuss the importance of metal finishing and processing.
   b) How the electrophoretic painting differs from electroforming ?
   c) Explain the fundamentals of electroplating of copper with neat labeled diagram. **(4+4+4)**

8. a) Describe the mechanism of industrial production of potassium hydroxide.
   b) Discuss the electro-synthesis of adipo nitrile.
   c) Explain the electro-inorganic synthesis of ozone. **(4+4+4)**

9. a) Discuss the computation of costing of an electrolytic process.
   b) What are the qualitative aspects of general considerations of electrochemical engineering ?
   c) Explain the electro reduction of nitrocompounds with suitable example. **(5+4+3)**