M.Sc. II Semester Degree Examination, September/October - 2022
CHEMISTRY
21CHE2C7L : Electro-Quantum and Photochemistry

Time : 3 Hours   Maximum Marks : 70

Note : *Answer* **any five** *of the following questions with question no.* **1** *is* **compulsory** *and each question carries* **equal** *marks.*

1. (a) Explain Debye-Huckel theory of strong electrolytes.
(b) Discuss in detail Helmholtz-Perin electrical double layer.
(c) Explain construction, working and applications of $H_2 - O_2$ fuel cell.   **5+5+4=14**

2. (a) Explain the effect of temperature, current density and pH on overvoltage.
(b) Describe Buttler-Volmer equation
(c) Derive Tafel equation   **5+5+4=14**

3. (a) Discuss the followings :
(i) De-broglie's equation
(ii) Heisenberg uncertainty principle
(b) Elucidate Schrodinger wave equation for a particle in one dimensional box.
(c) State and derive Variation theorem.   **5+5+4=14**

4. (a) Explain Jablonski diagram of Photochemical reactions.
(b) Give laws of photochemistry.
(c) Write notes on :
(i) Photosynthesis
(ii) Quenching   **5+5+4=14**

5. (a) Explain the kinetics of photochemical decomposition of CH_3CHO.
(b) Derive Stern-Volmer equation.
(c) What is Photocatalyst ? Explain the applications of TiO_2 photocatalyst. **5+5+4=14**

6. (a) Explain :
(i) Concentration overvoltage,
(ii) Hydrogen overvoltage
(b) Give postulates of quantum mechanics.
(c) Give applications of Schrodinger wave equation to rigid rotator.   **5+5+4=14**

7. (a) Write notes on quantum yield and its determination.

    (b) Discuss the working of Uranyl oxalate actinometer.

    (c) Explain :

       (i) Photosensitisation

       (ii) Photodegradation   **5+5+4=14**

8. (a) Explain reversible and irreversible electrodes with examples.

    (b) What are operators ? Explain linear operators.

    (c) Explain :

       (i) Singlet and triplet states

       (ii) Kinetics of photochemical combination of HCl   **5+5+4=14**

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