

D.K.M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1**SEMESTER EXAMINATIONS****NOVEMBER – 2018****15CPCH3B****ELECTROCHEMISTRY AND QUANTUM CHEMISTRY****Time : 3 Hours****Max. Marks: 75****SECTION – A (5 x 6 = 30)****Answer ALL the questions.**

1. (a) Explain the Debye - Huckel theory of strong electrolytes.
(Or)
(b) Discuss the qualitative and quantitative verification of the Debye Huckel limiting law.
2. (a) What are electrocapillary curves? How these curves are useful in the detection of adsorption of ions at electrode and electrolyte interfaces?
(Or)
(b) Write a note on Ficks law of diffusion.
3. (a) Explain Evans diagram and Pourbaix diagram.
(Or)
(b) Explain the mechanism of Hydrogen and Oxygen evolution reactions.
4. (a) State the main postulates of quantum mechanics.
(Or)
(b) i) Explain ψ and ψ^2 . State the conditions to be satisfied by a well behaved wave function. (3)
ii) What is meant by wave particle duality? (3)
5. (a) Write a note on Born - Oppenheimer approximation.
(Or)
(b) State and prove variation theorem.

SECTION – B (3 x 15 = 45)**Answer any THREE of the following questions.**

6. a) Define Ionic strength. (3)
b) Explain the EMF method of determination of mean activity coefficient. (6)
c) Discuss Huckel equation and Debye Huckel - Bronsted equation. (6)
7. a) Compare Helmholtz - Perrin, Guoy - Chapmann and Stern model of electrical double layers. (12)
b) Explain Lippmann equation. (3)
8. Derive Butler - Volmer equation for one electron and multi electron transfer reaction. Explain its significance and applications. (15)
9. Derive the energy and wave function of an electron in one dimensional and three dimensional box. (15)
10. a) Apply the perturbation method to hydrogen atom placed in a uniform electric field along the Z - axis. (8)
b) Apply the HMO method to butadiene. (7)
