Reg.No :

D. K. M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1

SEMESTER EXAMINATIONS

JUNE - 2022

21CPCH2C

QUANTUM CHEMISTRY AND ANALYTICAL TECHNIQUES

Time: 3 Hours

SECTION $- A (5 \times 6 = 30)$

Max. Marks: 75

Answer ALL the questions.

- 1. (a) State and explain Planck's quantum theory and wave particle duality. (Or)
 - (b) Derive the Schrodinger wave equation for a particle in a one dimensional box.
- 2. (a) Explain in detail about antisymmetry and Pauli's exclusion principle.

(Or)

- (b) Discuss the eigen function and eigen value for butadiene by using HMO theory.
- 3. (a) Give an account of rotational spectra of diatomic molecule.

(Or)

- (b) Derive an expression for the vibrational frequency of a diatomic molecule as simple harmonic oscillator.
- 4. (a) Briefly explain the principle, instrumentation and applications of XPS.

(Or)

- (b) Explain the theory and application of inorganic systems by using cyclic voltammetry.
- 5. (a) Discuss the theory, instrumentation and applications of TEM.
 - (Or)
 - (b) Explain in detail about TGA.

SECTION – **B** (3 x 15 = 45)

Answer any THREE of the following questions

6.	. (a) Explain the postulates of quantum mechanics.	(6)
	(b) Determine the energy and wavefunction of rigid rotor.	(9)
7.	. (a) Discuss the LCAO-MO and VB theory of hydrogen molecule.	(7)
	(b) Explain the determination of bond angles of sp, sp ² , sp ³ hybridizations.	(8)
8.	. (a) Explain the effect of isotopic substitution with example.	(7)
	(b) Discuss the overtones, combination hot bands and fermi resonance.	(8)
9.	. (a) Explain the instrumentation and applications of AAS.	(8)
	(b) Define amperometry and explain the types of titration curves.	(7)
10	0. (a) Discuss the theory and instrumentation of EDAX.	(8)
	(b) Draw and explain the curves of DSC and DTG.	(7)

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