SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
M.Sc. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - III
20PCHCT3009 - Physical Chemistry - III

Total Duration : 2 Hrs 30 Mins. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. With illustrative diagram explain different types of molecular energy levels in electromagnetic spectrum.
2. Predict the wavelength of the $\pi \rightarrow \pi^*$ transitions observed in the UV spectra of the conjugated linear polyenes, ethylene and butadiene.
3. Describe in detail about rotational spectroscopy of a rigid rotar.
4. Explain the classical theory of Raman Effect highlighting molecular polarizability.
5. What do you mean by isomer shift? Explain isomer shift for iron and tin compounds in different states of oxidation.
6. Solve Schrodinger wave equation for rigid rotator by quantum mechanics.
7. Illustrate the origin and physical significance of the quantum numbers J and m.
8. Associate with perturbation method and variation method calculate energy of helium atom. Compare the results.

Section B

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Describe in detail how the Franck-Condon principle is used in explaining the intensity of spectral lines in electronic spectra.
10. Predict the importance of mutual exclusion principle in identifying symmetrical and unsymmetrical AB_2 type molecules.
11. Infer the mechanism of hyperfine interaction in the ESR spectra of organic radicals.
12. Appraise the conclusions of quantum mechanical treatment of a linear harmonic oscillator.

Contd...

Part B

Compulsory question $(1 \times 10 = 10$ Marks)

13. What is Born-Oppenheimer approximation? Apply LCAO –MO method for H_2^+ molecule.

*****

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
M.Sc. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - III
20PCHCT3009 - Physical Chemistry - III

Total Duration : 2 Hrs 30 Mins. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. With illustrative diagram explain different types of molecular energy levels in electromagnetic spectrum.
2. Predict the wavelength of the $\pi \rightarrow \pi^*$ transitions observed in the UV spectra of the conjugated linear polyenes, ethylene and butadiene.
3. Describe in detail about rotational spectroscopy of a rigid rotar.
4. Explain the classical theory of Raman Effect highlighting molecular polarizability.
5. What do you mean by isomer shift? Explain isomer shift for iron and tin compounds in different states of oxidation.
6. Solve Schrodinger wave equation for rigid rotator by quantum mechanics.
7. Illustrate the origin and physical significance of the quantum numbers J and m.
8. Associate with perturbation method and variation method calculate energy of helium atom. Compare the results.

Section B

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Describe in detail how the Franck-Condon principle is used in explaining the intensity of spectral lines in electronic spectra.
10. Predict the importance of mutual exclusion principle in identifying symmetrical and unsymmetrical AB_2 type molecules.
11. Infer the mechanism of hyperfine interaction in the ESR spectra of organic radicals.
12. Appraise the conclusions of quantum mechanical treatment of a linear harmonic oscillator.

Contd...

Part B

Compulsory question $(1 \times 10 = 10$ Marks)

13. What is Born-Oppenheimer approximation? Apply LCAO –MO method for H_2^+ molecule.

*****