OCTOBER 2011 **P/ID 40008/PPHH**

Time : Three hours Maximum : 100 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write about Asymmetric top molecules with examples.

2. What are the two useful information got from the knowledge of centrifugal distortion constant, D?

3. What are group frequencies?

4. Give the selection rule for parallel vibrations.

5. Define polarizability of a molecule.

6. What are stoke's and anti-stoke's radiations?

7. Define electron spin angular momentum.

8. Give the principle of photoelectron spectroscopy.

9. State Franck-Condon principle.

10. Define Predissociation of a molecule.

PART B — (5 × 6 = 30 marks)

Answer ALL questions.

11. (a) Discuss about the instrumentation required for microwave spectroscopy.

Or

(b) Write about chemical analysis by microwave spectroscopy.

12. (a) Discuss about the simple harmonic oscillator.

Or

(b) Write about skeletal group vibrations in Infrared spectroscopy.

13. (a) Give the classical theory of Raman effect.

Or

(b) Discuss about the Rotational Raman spectrum of a symmetric top molecule.

14. (a) Write about the building up rules which determine how electrons in large atoms occupy orbitals.

Or

(b) Explain the electronic spectrum of Lithium.

15. (a) Discuss about Born-Oppenheimer approximation.

Or

(b) Write about the techniques and instrumentation of electronic spectroscopy.

PART C — ($5 \times 10 = 50$ marks)

Answer ALL questions.

16. (a) Obtain the expression for energy of a rigid diatomic molecule.

Or

(b) Explain the quadrupole hyperfine interaction in microwave spectra and outline the importance of these studies.

17. (a) Explain the effect of an hormonicity on the vibrational spectra of diatomic molecule.

Or

(b) Describe the experimental techniques and applications of IR spectroscopy.

18. (a) Describe the Raman effect in relation to inorganic, organic and physical chemistry.

Or

(b) Explain the application of Raman Spectroscopy in the molecular structural confirmation of water and carbon-di-oxide molecules.

19. (a) Discuss the electronic spectra of Helium atom.

Or

(b) Discuss about the orbital and spin contributions of outer shell electrons to the Total angular momentum.

20. (a) Give the Molecular orbital theory and write about the shapes of molecular orbitals.

Or

(b) Discuss about Electronic angular momentum in diatomic molecules with classification of states.

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