STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.

(For candidates admitted during the academic year 2004-05 & thereafter)

SUBJECT CODE : **PH/MO/SP64**

B.Sc. DEGREE EXAMINATION APRIL 2010
BRANCH III - PHYSICS
SIXTH SEMESTER

COURSE : **MAJOR – OPTIONAL**
PAPER : **SPECTROSCOPY**
TIME : **3 HOURS**   MAX. MARKS : 100

SECTION – A

ANSWER ALL QUESTIONS: **(10 x 3 = 30)**

1. What will be the velocity of infrared radiation?
2. What is one quantum of energy?
3. Define Stark effect.
4. What is an asymmetric top molecule?
5. For a rotating molecule, what will be the effect of isotopic substitution?
6. Explain what is meant by anharmonic oscillator.
7. Define zero point energy.
8. How many fundamental vibrations are possible for a linear molecule?
9. What is a spherical top molecule?
10. State the rule of mutual exclusion.

SECTION – B

ANSWER ANY SIX QUESTIONS: **(6 x 5 = 30)**

11. Explain the relation between slit width and resolving power.
12. Write a note on intensity of spectral lines.
13. For a rigid diatomic molecule, obtain an expression for rotational energy.
14. The first line in pure rotation spectra of CO appears at 384.235 m^{-1}. Calculate the moment of inertia of the molecule.
15. Considering a vibrating diatomic molecule as an harmonic oscillator, derive an expression for the vibrational energy.
16. Discuss the fundamental vibrations of polyatomic molecules.
17. Explain the pure Raman Spectra of linear molecules.
18. Write a note on Vibrational Raman Spectra.

SECTION – C

ANSWER ANY TWO QUESTIONS: **(2 x 20 = 40)**

19. Discuss the rotational energy levels of symmetric top and asymmetric top molecules.
20. With a block diagram, explain the features of a microwave spectrometer.
21. Explain the techniques and instrumentation to study Infrared Spectra.
22. a) Give the classical theory of Raman Effect.
    b) Outline the quantum theory of Raman Effect.

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