

**C. ABDUL HAKEEM COLLEGE (AUTONOMOUS),
MELVISHARAM - 632 509.
SEMESTER EXAMINATIONS, NOVEMBER - 2018**

**B.Sc., PHYSICS
SEMESTER V
U15MPH502 - ATOMIC PHYSICS AND SPECTROSCOPY**

Time: Three Hours

Maximum: 75 Marks

SECTION - A (10 X 2 = 20 Marks)

Answer **ALL** Questions.

1. What is correspondence principle?
2. What are the limitations of Rutherford model?
3. State Larmor's theorem.
4. What is Zeeman effect?
5. Distinguish between symmetric top and spherical top molecules.
6. Distinguish between microwave and infrared spectroscopy.
7. What are Stokes and anti-Stokes lines?
8. State mutual exclusion principle.
9. What is Population inversion?
10. What is threshold pump power?

SECTION - B (5 X 5 = 25 Marks)

Answer **ALL** Questions.

11. a) Describe an experiment for determining critical potential.
(Or)
b) State and explain Pauli's exclusion principle.
12. a) State and explain Paschen back effect.

(Or)

- b) Calculate the wavelength separation between the unmodified line of wavelength 600 \AA and the modified lines when a magnet induction of 1 wb m^{-2} is applied in normal Zeeman effect.

13. a) Explain interaction of radiation with rotating molecule.
(Or)

- b) Explain vibrating diatomic molecule as a harmonic oscillator.

14. a) List out the differences between IR and Raman spectra.
(Or)

- b) Explain the quantum theory of Raman effect.

15. a) Explain dissociation energy and dissociation products.

(Or)

- b) What do you mean by pumping process? Explain the types of pumping process.

SECTION - C (3 X 10 = 30 Marks)

Answer **ANY THREE** Questions.

16. Explain the phenomenon of large angle scattering of alpha particles and derive the Rutherford's formula for it. Describe how the size of the nucleus and nuclear model has been obtained from the scattering.
17. Describe the experiment arrangement for studying the Zeeman effect. Use classical ideas to explain normal Zeeman effect.
18. Give the theory of rotational spectra of rigid diatomic molecules.
19. Explain the vibrational Raman spectra in detail.
20. Explain quality factor and threshold condition in laser.
