62114

Reg. No.

II Semester M.Sc. Degree Examination, November/December - 2022

PHYSICS

Atomic, Molecular Physics and Modern Optics

(CBCS Scheme 2019-20)

Paper : PHY-204

Time : 3 Hours

Maximum Marks : 70

Answer All questions. (3×15=45)

1. a) Discuss the experimental setup for Zeeman effect and obtain an expression for Zeeman shift.

   b) What is a Rydberg atom? Explain briefly. (10+5)

(OR)

2. a) Considering the diatomic molecule as a rigid rotator, discuss the rotational spectrum of it. What is a non-rigid rotator.

   b) Write few applications of microwave spectroscopy. (10+5)

3. a) Discuss the construction and working of Fourier transform spectrometer.

   b) What is anharmonicity? How it affects the vibration spectra of a diatomic molecule? (10+5)

(OR)

4. a) Discuss the classical theory of Raman effect based on polarizability.

   b) What is a vibrating rotator? Obtain an expression for its energy and represent the transitions in the energy level diagram. (7+8)

(OR)

5. a) What are the characteristics of laser light? Obtain an expression for Einstein's A and B Coefficients.

   b) Discuss the role of resonant cavity in lasing action. (10+5)

(OR)

6. a) Describe the principle, construction and working of an Helium-Neon laser using energy level diagram.

   b) Write a note on holography? Mention any two applications of it. (10+5)

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Answer any Five of the following.

(5×5=25)

7. a) Explain ortho and para states of Helium atom.

b) Write a note on Intensity of spectral lines in rotational spectrum.

c) What are linear and symmetric top molecules? Give examples for each.

d) Stokes lines are more intense than anti-Stokes lines. Justify.

e) In terms of energy level diagrams, explain the spontaneous and stimulated emissions.

f) Account for the loss of signals in optical fibres.