

M.Sc. S.Y. (Physics) (CBCS Pattern) Semester-IV
PSCPHYT15.3 - Core Elective Paper-XV - Atomic and Molecular Physics-II

P. Pages : 1

Time : Three Hours



GUG/W/24/11417

Max. Marks : 80

Either:

1. a) Discuss time dependence in quantum mechanics perturbation theory. 8
b) What is Polarizability? Deduce an expression for calculation of polarizability. 8

OR

- e) Explain fluctuation-dissipation theorem in rotational correlation function. 8
f) Explain Re-orientational spectroscopy of liquids. 8

Either:

2. a) Describe the Burning and detection of holes in Doppler broadened two level system. 8
b) Explain two-photon absorption spectroscopy and write its selection rule. 8

OR

- e) Explain Ramsey fringes in saturation spectroscopy. 8
f) Explain briefly photo acoustic spectroscopy. 8

Either:

3. a) What is stimulated Raman scattering? Explain electromagnetic theory of stimulated Raman scattering. 8
b) Explain Quantum mechanical treatment in stimulated Raman scattering. 8

OR

- e) Explain fluorescence spectroscopy using Jablonski diagram. 8
f) What is time resolved fluorescence excited state life time? Explain it and also discuss its advantages. 8

Either:

4. a) What is matrix isolation? What are the limitations of matrix representation? 8
b) Explain Fourier transform spectroscopy and explain its experimental setup. 8

OR

- e) Write a note on Reducible and irreducible representation. 8
f) Explain molecular symmetry with types. 8

5. Attempt **all** the following questions.
a) Derive quantum mechanical expression for emission rate. 4
b) Write notes on Laser optogalvanic spectroscopy. 4
c) State and explain Kasha's rule. 4
d) Explain Laser cooling. Give its applications? 4
