1. Subject code: **EP- 305** Course title: **Atomic and Molecular Physics**
2. Contact Hours: L: 3 T: 1 P: 0
3. Examination Duration (Hrs): Theory: 3 Practical: 0
4. Relative Weight: CWS: 25, PRS:--, MTE: 25, ETE: 50, PRE: --
5. Credits: 4
6. Semester: ODD
7. Subject area: DEC-1
8. Pre-requisite: Basic knowledge of Atoms and Molecules
9. Objective: The course provides basic understanding of the Nature, essential principles, fundamental techniques and their prospective applications

10. Detail of Course:

S. No.	Contents	Contact Hours
1.	Bohr-Sommerfeld theory of Hydrogen Atom, Quantum mechanics of Hydrogen atom: Angular momentum & Parity, Magnetic dipole moments, Electron spin and Vector atom model, Spin orbit Interaction: Hydrogen fine structure, Identical particles & Pauli's principle	**08**
2.	Helium Atom & its spectrum, Multielectron atoms: Hartree's field: Atomic ground states & periodic table, Spectroscopic terms: L-S & j-j couplings, Spectra of alkali elements, Spectra of alkaline earth elements	**07**
3.	The Zeeman effect, Paschen-Back effect, The stark effect, Hyperfine structure of spectral lines, The Breadth of Spectral lines, X-ray spectra, Fine structure in X-ray Emission Spectra, X-ray Spectra and Optical spectra	**06**
4.	Rotational spectroscopy: Rigid rotor, Rotational spectra of diatomic molecules, Intensities of spectral lines, Isotope effects, Non-Rigid Rotator, Rotation levels of polyatomic molecules: spherical, symmetric, and Asymmetric top molecules	**07**
5.	Vibrational spectroscopy: Vibration of diatomic molecules, Harmonic oscillator and Anharmonic oscillator, Vibrational-rotational couplings, Vibration of polyatomic molecules	**06**
6.	Electronic spectroscopy: Electronic spectra of diatomic molecules, vibrational coarse structure, Franck-Condon Principle, Dissociation energy and dissociation products, Rotational fine structure of Electronic-Vibration transition, Production of excited state, Radiative processes, Kasha's Rule, Jablonbski diagram, Luminescence, Photoluminescence, kinetics, Quantum yield and Lifetime	**08**
	Total	**42**

11.Suggested Books:

S. No.	Name of Books/ Authors	Year of publication/ Reprint
1.	Introduction to Atomic Spectra, by Harvey Elliott White /McGraw Hill	1934
2.	Principles of Modern Physics, by Robert B. Leighton McGraw Hill	1959/
3.	Molecular spectra and molecular structure I, II and III. Spectra of diatomic molecules by G. Herzberg/Prentice-Hall	1939
4.	Fundamentals of molecular spectroscopy by C. N. Banwell and E.M. McCash4/McGraw Hill	1994
5.	Principles of fluorescence spectroscopy by J.R. Lakowicz. Springer	1983