

Course Title	:	Atomic and Molecular Physics			
Course Code	:	PHY-602	Course Type	:	Core 1
Contact Hours	:	L- 40 T- 0 P- 0	Credit	:	4
Program/Semester	:	BTech/BDes/MTech/Mdes/PhD(NS)/ UG(6 semester onwards), PG (anysemester)			
Pre-requisites	:	NONE			
Evaluation Scheme	:	Quiz1-15%, Mid-Sem- 30%, Quiz2-15%, End-Sem- 40%,.			

Course Details:

Module1:

Quantum mechanics of hydrogen atom, angular momentum and parity, magnetic dipole moments, electron spin and vector atom model, spin-orbit interaction, hydrogen fine structure, identical particles and Pauli's principle. **(10H)**

Module2:

Multi-electron atoms, Hartree's field, atomic ground states, spectroscopic terms, L-S and J-J coupling, spectra of alkali and alkaline atoms, Zeeman effect, Stark effect, hyperfine structure of spectral lines, X-ray spectra. **(10H)**

Module3:

Types of molecular states and spectra, pure rotational spectra, vibrational-rotational spectra, Raman spectra, electronic spectra and Frank-Condon principle, isotope effect on electron spectra. **(10H)**

Module4:

Fluorescence and phosphorescence, classification of molecular electronic states, coupling of rotational and electronic motions, stability of molecular states, continuous and diffuse molecular spectra, concepts of LASER and its applications. **(10H)**

References:

1. Fundamentals of molecular spectroscopy edited by C.N. Banwel & E.M. McCas, 4th Edition, copyright © 1994, McGraw-Hill Education, UK, ISBN-978-0-07-462025-0.
2. Modern spectroscopy, edited by J.M. Hollas, 4th Edition, Copyright © 2004 by John Wiley & Sons Ltd, UK, ISBN- 0-470-84415-9.
3. Atomic and Molecular Spectra edited by Raj Kumar, Edition-13, Copyright © 2010, Campus book international publisher, India, ISBN-8-180-30035-8.
4. Introduction to Spectroscopy, edited by D.L. Pavia, G.M. Lampman, G.S. Kriz, & J.R. VyVyan, 5th edition, copyright © Cengage learning 2015, ISBN-13-978-1-285-46012-3.