ATOMIC AND MOLECULAR PHYSICS

PROF. AMAL KUMAR DAS

Department of Physics
IIT Kharagpur

COURSE OUTLINE :

Atom and molecule are the fundamental unit for all matters in universe. Matter, whatever the states, is made of atoms. The properties of all matters are governed by the electronic structure of atom and molecule. They have individual properties like electronic, magnetic and optical properties, which are quite different from the collective properties of matter made of atoms and molecules. This course will enlighten the knowledge of atoms and molecules and build up the pre-requisite knowledge for all science and engineering field.

ABOUT INSTRUCTOR :

After completion of B. Sc (Hons) in Physics and M. Sc in Physics in 1994, Prof. Amal Kumar Das did Ph. D on experimental physics and material science from Institute of Physics, Bhubaneswar. After completing post-doctoral research on experimental physics from Paul Drude Institute, Berlin, Germany, Prof. Das joined as a Faculty in Department of Physics, Indian Institute of Technology Kharagpur in 2004 and teaching different subject to UG and PG students including experiments in teaching laboratory of all levels starting from 1st year of B. tech/ B Sc/integrated M. Sc to Ph. D. Prior to join here, Prof. Das took experimental physics laboratory for four years to B. Sc students in an undergraduate college named Malda College under North Bengal University, West Bengal.

COURSE PLAN :

Week 1: Experimental observations and theoretical development in discovery of constituents of an atom al

Week 2: Structure of an atom with Thomson model, Rutherford model and Bohr model
Week 3: Atomic structure of an atom
Week 4: Structure of an atom with Magnetic quantum number, Bohr magnetic moment, LS coupling, total angular momentum and g-factor
Week 5: Atomic spectra and Multielectron atoms
Week 6: Quantum mechanical treatment
Week 7: Quantum mechanical treatment of hydrogen like atom
Week 8: Hydrogen like atom in magnetic field
Week 9: Physics and Rotation of molecules
Week 10: Vibration of a molecule
Week 11: Electronic spectra of a molecule
Week 12: Atomic and Molecular Spectroscopy, Raman Spectroscopy and Resonance spectroscopy