



Shree H.N.Shukla group of colleges

PHYSICS

T.Y.B.Sc. (Sem. VI) (CBCS)

Syllabus

Paper: Physics-603

(Spectroscopy and Applied Optics)

UNIT -1: (12 hour: 14 Mark)

Atomic Spectroscopy:

Production of Spectra, Type of Spectra- Emission Spectra, Absorption Spectra. Bohr's Theory of atom, Franck-Hertz Experiment, Shortcoming of Bohr Theory, Sommerfield Elliptical orbits (theoretical part only), The spinning electron, Space quantization, Quantum numbers and their physical interpretations, Magnetic moments of an Atom and Lande's g Factor.

Experimental study of Zeeman effect, Classical interpretation of Normal Zeeman effect, Vector atom model and Normal Zeeman effect, Vector atom model and Anomalous Zeeman effect, Paschen-Back effect, Stark effect, Numerical Problems.

Basic Reference Book: Elements of Spectroscopy By Gupta, Kumar, Sharma Publisher: Pragati Prakashan Twenty-eight Edition 2016.

UNIT -2: (12 hour: 14 Mark)

Molecular Spectroscopy: Introduction, Experimental study, Theoretical explanation, Theory of pure rotational Spectra, Theory of rotational Vibrational Spectra, Theory of electronic band Spectra,

Basic Reference Book: Atomic Physics By J.B.Rajam. Publisher: S.Chand &Company Ltd.

Raman Spectra: Raman effect and its Salient features, Observation of Raman Spectra, Classical theory of Raman effect, Quantum theory of Raman effect, Vibrational Raman Spectra, Pure Rotational Raman Spectra, Vibrational- Rotational Raman Spectra, Structure determination from Raman Spectroscopy, Applications and its importance, Numerical Problems.

Basic Reference Book: Elements of Spectroscopy By Gupta,
Kumar, Sharma Publisher: Pragati Prakashan Twenty-eight Edition 2016.

UNIT -3: (12 hour: 14 Mark)

Laser: Three basic radiation process- Spontaneous emission, Stimulated emission, Absorption, Laser principle, Properties of Laser beam, Einstein's Coefficients, Population Inversion, Pumping Processes, Pumping Scheme, Metastable states, The principle pumping schemes, Types of Lasers: Ruby Laser, Nd:YAG Laser, He-Ne Laser, Semiconductor Laser, Holography: Principal of Holography- Recording of hologram, Reconstruction of image, Applications of Laser : Laser in industry, Laser induced fusion, Laser tracking, LIDAR, Numerical Problems.

Basic Reference Book: Elements of Spectroscopy By Gupta,
Kumar, Sharma Publisher: Pragati Prakashan Twenty-eight Edition 2016.

UNIT -4: (12 hour: 14 Mark)

X-Rays and X-Ray Diffraction: Production of X-rays, Properties of X-rays, Continuous X-ray Spectrum, Characteristic Emission Spectrum, Explanation of Emission Spectra, Diffraction of X-ray, Bragg's Law, Laue Spots, Bragg's Spectrometer, Spectra, Reciprocal lattice, Properties of reciprocal lattice, Bragg diffraction equation in reciprocal lattice, Brillouin zones, Atomic scattering factors, Structure factor, Experimental methods for X-ray Diffraction: Laue method, Rotating crystal method, Powder diffraction method, Numerical Problems.

Basic Reference Books:

1. Elements of Spectroscopy By Gupta,
Kumar, Sharma Publisher: Pragati Prakashan Twenty-eight Edition 2016.
2. A text book of Solid State Physics, S.L.Kakani & C. Hemrajani,
Publisher: S.Chand & Company Ltd.

UNIT -5: (12 hour: 14 Mark)

Fiber optics: Optical Fibers, Necessary of cladding, Total internal reflection, Critical angle of Propagation, Modes of propagation, Acceptance angle, Fractional refractive index change, Numerical Aperture, Types of Optical Fibers, Losses in optical fiber – Attenuation, Distortion, Applications: Illumination & Image transmission, Military Applications, Medical Applications , Optical fiber Sensors, Fiber optic communication System, Merits of optical fibers, Numerical Problems.

Basic Reference book : A Text Book of Optics N.Subrahmanyam, Brij Lal & M.N.Avadhanulu, Publisher: S.Chand &Company Ltd.

Other Reference Books:

1. Fundamentals of Solid state Physics by Saxena, Gupta and Saxena, Publisher:Pragati Prakashan
2. Introduction to LASER by Tyagrajan.
3. Optics and Spectroscopy - R. Murugesan & Kiruthiga Sivaprashatha. Publisher: S.Chand & Company Ltd.
4. Optical Electronics - A.K.Ghatak and K. Thyagarajan. Publisher: Cambridge Uni. Press.
5. A Text Book of Optics N.Subrahmanyam, Brij Lal & M.N.Avadhanulu, Publisher: S.Chand &Company Ltd.
6. Atomic Physics By J.B.Rajam. Publisher: S.Chand &Company Ltd.
7. Modern Physics By S.L.Kakani and Shubhra Kakani
8. Fundamental of Molecular Spectroscopy By Colin N Banwell & Elaine M McCash Publisher: TMG Latest Edition
9. Refresher Course in Physics Volume 1,2 & 3 By C.L.Arora