

Vidyalankar

F.E. : Sem. II
Applied Physics II

Syllabus

Time : 2 Hrs.

Theory : 75 Marks

Term work : 25 Marks

1. Optics :

- Interference in thin films, wedge shaped films and Newton's rings, applications of interference.
- Fraunhofer diffraction through double slit and diffraction grating, grating spectra, resolving power of grating.
- Total internal reflection, materials and types of optical fibres, numerical aperture, modes of propagation, V-number, attenuation, dispersion and other losses in fibres, applications.

2. LASERs :

- Absorption, spontaneous and stimulated emission, population inversion, metastable state, pumping schemes, active medium, resonant cavity, derivation for Einstein's coefficients.
- He-Ne laser, Nd : YAG laser, semiconductor diode laser, introduction to molecular and tuneable lasers.
- Application of lasers to holography, Memory reading and writing and other applications.

3. Foundations of Quantum Mechanics :

- de'Broglie's hypothesis, group and phase velocity, wave packet, uncertainty principle and its applications.
- Wave function and probabilistic interpretation, one-dimensional time dependent. Schrodinger equation, reduction to time independent form, application to free particle and particle in a box.
- Introduction to quantum computing.

4. Magnetic Materials and Circuits :

- Atomic origin of magnetization, magnetic moment of atom, diamagnetism, Langevin's theory of paramagnetism and Curie's law, Weiss' theory of ferromagnetism.
- Magnetic circuits, magnetomotive force, reluctance, permeance, Ohm's law for magnetic circuit, relation between mmf and "H", magnetic circuit due to solenoid, Hysteresis.
- Ferrites, soft and hard magnetic materials and their applications.

5. Bio-Physics :

- Introduction and scope-molecular modeling, energy transfer and energy cycles, biomechanics, neurobiophysics.
- Tools-spectroscopy-UV/visible, IR, use of NMR, microscopy – SEM, STM and AFM.

6. Vacuum Technology :

- Basic definitions, units, low, high and ultrahigh vacuum, methods of production.
- Vacuum pumps – rotary, diffusion, vacuum gauges – pirani, penning, thermocouple.
- Application to thin films, microelectronics, nanotechnology, plasma physics.

Recommended Books :

- Fundamentals of Physics (*Holliday/Resnick*) Wiley India, 6th edition.
- Fundamentals of optics (*Jenkins & White*) McGraw-Hill Int.
- Understanding Physics (*Cummins*) Wiley India.
- Modern Engineering Physics (*A. S. Vasudeva*) S Chand Publications
- A textbook of Engineering Physics (*Kshirsagar & Avadhanulu*) S. Chand Publications
- Quantum mechanics (*Bransden & Jochain*) Wiley Eastern
- Vacuum technology (*A Roth*)
- Bio-Physics (*Vasantha Pattabhi & N Gautham*) Narosa Publications.

