Unit I

Syllabus : Introduction to electromagnetic waves and electromagnetic spectrum, Interference in thin film of uniform thickness (with derivation), Interference in thin film wedge shape (qualitative) Applications of Interference : testing optical flatness, anti-reflection coating.

Syllabus : Diffraction of light; Diffraction at a single slit, conditions for principal maxima and minima; diffraction pattern; diffraction grating; conditions for principal maxima and minima starting from resultant amplitude equation; Rayleigh's criterion for resolution; resolving power of telescope and grating.

Syllabus : Polarization of light, Malus' Law Double refraction, Huygens' theory of double refraction Application of Polarization : LCD

Unit II

Syllabus : Basic of laser and its mechanism, characteristics of laser Semiconductor laser : Single Heterojunction laser Gas Laser : CO2 Laser Applications of lasers : Holography, IT, Industrial, medical

Syllabus : Introduction, parameters : Acceptance Angle, Acceptance Cone, Numerical Aperture Types of optical fibre- step index and graded index Attenuation and reasons for losses in optic fibres (qualitative) Communication system: basic building blocks Advantages of optical fibre communication over conventional methods.

Unit III

Syllabus : De-Broglie hypothesis Concept of phase velocity and group velocity (qualitative) Heisenberg Uncertainty Principle Wave-function and its physical significance Schrodinger's equations : time independent and time dependent Application of Schrodinger's time independent wave equation - Particle enclosed in infinitely deep potential well (Particle in Rigid box) Particle in Finite potential well (Particle in Non Rigid box) (qualitative) Tunneling effect, Tunneling effect examples (principle only): Alpha Decay, Scanning Tunneling Microscope, Tunnel diode Introduction to quantum computing

Unit IV

Syllabus : Free electron theory (Qualitative) Opening of band gap due to internal electron diffraction due to lattice Band theory of solids Effective mass of electron Density of states - Fermi Dirac distribution function Conductivity of conductors and semiconductors Position of Fermi level in intrinsic and extrinsic semiconductors (with derivations based on carrier concentration) Working of PN junction on the basis of band diagram Expression for barrier potential (derivation) Ideal diode equation Applications of PN junction diode : Solar cell (basic principle with band diagram) IV Characteristics and Parameters, ways of improving efficiency of solar cell Hall effect : Derivation for Hall voltage, Hall coefficient, applications of Hall effect

Syllabus :

Magnetism : Origin of Magnetism, Classification of magnetism on the basis of permeability (qualitative) Applications of magnetic devices : Transformer cores, magnetic storage, magneto-optical recording.

Superconductivity : Introduction to superconductivity, Properties of superconductors, zero electrical resistance, critical magnetic field, persistent current, Meissner effect, Type I and Type II superconductors. Low and high temperature superconductors (introduction and qualitatative), AC/DC Josephson effect, SQUID : Basis construction and principle of working, Applications of SQUID Applications of superconductors.

Syllabus :

Non Destructive Testing : Classification of Non-destructive testing methods Principles of physics in Non-destructive Testing Advantages of Non-destructive testing methods Acoustic Emission Testing Ultrasonic (thickness measurement, flaw detection) Radiography testing.

Nanotechnology : Introduction to nanotechnology Quantum confinement and surface to volume ratio Properties of nanoparticles: optical, electrical, mechanical Applications of nanoparticles: Medical (targeted drug delivery), electronics, space and defense, automobile.

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Marking Scheme for University Theory Examination

Unit No	Unit Name	In Semester Exam (30 Marks) Duration 1 Hr	End Semester Exam (70 Marks) Duration. 2 Hr. 30min.
1	Wave Optics	15	-
2	Laser and Optic Fiber	15	-
3	Quantum Mechanics	-	18
4	Semiconductor Physics	-	17
5	Magnetism and Superconductivity	-	18
6	Non-Destructive Testing and Nanotechnology	-	17
	Total Marks	**30**	**70**

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