Content Product
Detailed syllabus
ENGINEERING PHYSICS - I

UNIT I - CRYSTAL PHYSICS

Crystallography – Introduction, Crystal structure, Unit cell, Bravais lattice, Lattice planes. **Miller indices** – introduction to Miller indices, d spacing in cubic lattice, Problem 1, Problem 2. **Crystal structure** - Fundamental quantities related to crystal structure, d spacing lattice of simple cubic structure. **Space lattice** – introduction, Simple cubic structure, Body-centered cubic(BCC) structure, Face-centered cubic(FCC) structure, Hexagonal close packed structure, Problem 1, Problem 2. **Other cubic structure** - Diamond cubic structure, Graphite cubic structure. **Crystal growth techniques** – Introduction to Crystal growth techniques, Bridgmann techniques (Crystal growth from solution), Czochralski techniques(Crystal growth from melt). **Vapour growth techniques** – introduction to Vapour growth techniques, Chemical vapour deposition method.

UNIT II - PROPERTIES OF MATTER AND THERMAL PHYSICS

Elasticity – Introduction, Elasticity, Plasticity, Stress, Strain, Hooke's law, stress strain-diagram. **Modulus of elasticity** – Introduction, Young's modulus, Rigitidy modulus, Bulk modulus, Compressibilty, Relation between three moduli of elasticity. **Poisson's ratio** – Introduction to Poisson's ratio. **Factors affecting elasticity** - Factors affecting elasticity. **Bending moment** – introduction to Bending moment, Expression for Bending moment, Depression of a cantilever. **Young's modulus by uniform bending** - Uniform bending and Non-uniform bending, Problem 1, Problem 2. **I-shaped girders** – Introduction to I-shaped girders. **Modes of heat transfer** – Introduction to Modes of heat transfer, Convection, Radiation. **Thermal conductivity** – Introduction to Thermal conductivity, Wiedemann-Franz law, Thermal diffusivity. **Newton's Law of cooling** – Introduction to Newton's Law of cooling. **Linear heat flow** – Introduction to Linear heat flow, Thermal conductivity of bad conductors by linear heat flow-Lee's Disc method. **Radial heat flow** - Thermal conductivity of rubber by radial heat flow. **Conduction through compound media** - Thermal conduction through series compound media, Thermal conduction through parallel compound media

UNIT III - QUANTUM PHYSICS

Black body radiation spectrum – Introduction to Black body radiation, Laws for explaining the energy distribution, Planck's black body radiation law, Planck's radiation law, Compton effect. **Properties of matter waves** – Introduction to Properties of matter waves, G.P Thomson experiment, Problem 1. **Schrodinger's wave equation** - Time dependent wave equation, Time independent wave equation. **Physical significance of wave function** – Introduction to Physical significance of wave function, Basic postulates of wave mechanics, Particle in a one dimensional box. **Electron microscope** - Introduction to electron microscope, Scanning electron microscope, Transmission electron microscope.

UNIT IV - ACOUSTICS AND ULTRASONICS

Acoustics - Introduction to sound, Intensity level and decibel, Problem 1, Problem 2, Problem 3.

Sabine's formula - Growth of sound intensity in a room, Decay of sound intensity inside the room (Continue). **Absorption coefficient** – Introduction to Absorption coefficient, Measurement of Absorption coefficient. **Factors affecting acoustics of buildings** – Introduction, Reverberation, Loudness, Focusing due to walls and ceilings, Echoes, Echelon effect, Resonance effect, Noises from the exterior. **Ultrasonics** - Introduction to ultrasonics, Magnetostriction method, Magnetostrictive ultrasonic generator, Piezoelectric effect, Piezoelectric ultrasonic generator. **Acoustic grating** – Introduction, Problem 1. **Non destructive testing** - Introduction to Non destructive testing, Magnetic particles testing, Radiography, Gamma-ray Radiography, Ultrasonic testing. **Pulse echo system** - Introduction to pulse echo system. **Ultrasonic scanning system** - Introduction to Ultrasonic scanning system, A-Scan or amplitude mode, B-Scan or brightness mode, C-Scan, TM - scan(Time motion scan), Nondestructively testing a specimen using ultrasonic. **Applications of ultrasonics in medical** – Introduction to Applications of ultrasonics in medical. **Sonogram (Ultrasonic imaging system)** – Introduction to Sonogram (Ultrasonic imaging system).

UNIT V - PHOTONICS AND FIBRE OPTICS

Laser - Introduction to laser, Spontaneous and Stimulated Emission. **Population inversion** - Introduction to Population Inversion, Basic requirement of a Laser, Problem 1. **Einstein's A and B coefficients** – Introduction, Upward transition, Downward transition. **Nd:YAG laser** - Introduction of Nd:YAG laser, Construction and working of Nd:YAG laser, Applications-Nd:YAG laser. **CO2 laser** - Introduction of CO2 laser, Vibrational Modes of CO2 molecule, Construction and working of CO2 laser, Laser action in CO2 Laser, Special features and Applications of CO2 Laser. **Semiconductor laser** - Introduction to Semiconductor laser, Homojunction Laser, Heterojunction laser, Applications, Problem 1, Problem 2, Problem 3. **Applications of laser** - Laser cutting and Welding, Lasers in heat treatment, Lasers in Medical Treatment, Holography, Compact Disc Audio, Other Applications. **Fibre optics** – Introduction, Principle of fibre optics, Propagation mechanism, Problem 1, Problem 2, Problem 3. **Propagation of light in optical fibre** - Ray propagation, Mode propagation, Angle of acceptance, Numerical aperture. **Types of optical fibres** – Introduction, Types of optical fibre based on index, Types of optical fibre based on material, Glass fibre, Plastic optical fibre, Fibre fabrication, Fabrication. **Losses in optical fibre** – Attenuation, Material absorption loss, Scattering Losses in Fibre, Bending loss, Dispersion, Coupling loss. **Fibre optic communication system** - Introduction to fibre optic communication, Optical cables, Uses of optical cables, Construction of fibre optic cable, Properties of plastic fibres, Fibre optic communication system, Applications. **Fibre optic sensors** – Introduction, Intrinsic sensor or active sensor, Extrinsic sensor or passive sensor. **Endoscope** – Introduction to Endoscope, Application of endoscopes.