

Selvam College of Technology (Autonomous),

“A” Grade by NAAC, UGC recognized 2(f) Status, Approved by AICTE – New Delhi, Affiliated to Anna University

Namakkal – 03. www.selvamtech.edu.in

U24PY101	ENGINEERING PHYSICS	L	T	P	C
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COURSE OBJECTIVES:					
To gain knowledge on the basics of crystallography and properties.					
To get familiar with magnetic material properties and its applications.					
To introduce the fundamentals of quantum mechanics.					
To understand the basics of optics and lasers the basics of optics and lasers.					
To instil knowledge on physics of semiconductors and semiconductor devices.					
UNIT I	CRYSTALLOGRAPHY AND ENGINEERING MATERIALS				9
Lattice parameters-Crystal systems - Packing factors of cubic and HCP crystal systems-Miller indices-Linear and planar density of atoms-Debye-Scherer method of crystal structure determination- Crystal imperfections - point, line and surface defects and their role in electrical- mechanical and optical properties of materials- Growth of crystal of biological molecules- Factors affecting crystallization of organic molecules- XRD of molecules and proteins.					
UNIT II	MAGNETIC MATERIALS				9
Basic definitions - Magnetic moment - Magnetic field Magnetic field intensity - Magnetic permeability Magnetization Intensity of magnetization - Magnetic susceptibility - Types of magnetic materials -Dia, Para and Ferromagnetic materials Domain theory of ferromagnetism Origin of domains Antiferromagnetic materials- Ferrites - Structure, properties and applications - Hysteresis - Hard and soft magnetic materials.					
UNIT III	QUANTUM MECHANICS				9
Black body radiation (Qualitative) - Planck’s hypothesis - Einstein’s theory of Radiation - Matter waves-de Broglie hypothesis - Electron microscope - Uncertainty Principle - The Schrodinger Wave equation (time-independent and time-dependent) - Meaning and Physical significance of wave function - Normalization - Particle in an infinite potential well-particle in a three-dimensional box -Degenerate energy states - Barrier penetration and quantum tunneling - Tunneling microscope.					
UNIT IV	OPTICS AND LASERS				9
Interference - Thin film interference - Air wedge- Applications –Interferometers-Michelson Interferometer - Diffraction CD as diffraction grating - Diffraction by crystals -Polarization -polarizer’s - Laser - characteristics Spontaneous and Stimulated emission- population - inversion- Metastable states - optical					

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feedback -Nd-YAG laser, CO₂ laser, Semiconductor laser - Industrial and medical applications -Optical Fibers - Total internal reflection - Numerical aperture and acceptance angle -Fiber optic communication Fiber sensors -Fiber lasers.

UNIT V	SEMICONDUCTING MATERIALS AND DEVICES	9
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Elemental and compound semiconductors. Intrinsic and extrinsic semiconductors- P-N junction - VI Characteristics of PN junction diode and Zener diode- Hall Effect - Rectifiers- Half wave and Full wave- Bipolar junction transistors-Field Effect Transistors - FET amplifier- UJT- RC coupled amplifier - Concept of Positive and Negative feedback -Wien Bridge Oscillator.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1	Describe the structure and behaviour of crystals.
CO2	Comprehend the properties of magnetic materials.
CO3	Interpret the behaviour of microscopic objects using fundamentals of quantum mechanics.
CO4	Summarize the concepts of optics and lasers in engineering applications.
CO5	Explain the characteristics of Semiconducting materials and Devices.

TEXT BOOKS:

1	N. Garcia, A. Damask and S. Schwarz, Physics for Computer Science Students, Springer-Verlag,2012.
2	D. Halliday, R. Resnick and J. Walker, Principles of Physics. John Wiley & Sons, 10th Edition,2015
3	B D. K. Bhattacharya, PoonamTandon "Engineering Physics", Oxford University Press, 2017.
4	Gaur R K, Gupta S L, “Engineering Physics”, DhanpatRai Publications, 2017

REFERENCES:

1	Arthur Beiser, ShobhitMahajan, S. RaiChoudhury, "Concepts of Modern Physics", McGraw-Hill (Indian Edition), 2017.
2	K.Thyagarajan and A.Ghatak Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
3	R. Wolfson, Essential University Physics. Volume 1 & 2. Pearson, 2016.
4	D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.