JAWAHARLAL NEHRUTECHNOLOGICALUNIVERSITY: KAKINADA

KAKINADA–533003, Andhra Pradesh, India

R-16 Syllabus for EEE JNTUK

I Year-II Semester		L	T	P	C
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APPLIED PHYSICS (R161207)

Prerequisite Course: Basic Concept of Physics

Description and Objectives:

1) Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
2) Teach Concepts of coherent sources, its realization and utility optical instrumentation.
3) Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
4) Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

COs	Course Outcomes	POs
1	Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.	3
2	Teach Concepts of coherent sources, its realization and utility optical instrumentation.	2
3	Understand the utilization of optical sources in present technology.	2
4	Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.	3
5	Apply the knowledge of quantum views for understanding the formation of energy bands in solids and their classification.	2
6	Understand the physics of Semiconductors and their working mechanism for their utility in sensors.	3

UNIT-I: INTERFERENCE:

Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

UNIT-II: DIFFRACTION:

Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)- Grating equation - Resolving power of a grating, Telescope and Microscopes.

UNIT-III: POLARIZATION & LASERS:

Types of Polarization – Methods of production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).

Characteristics–Stimulated emission –Einstein's Transition Probabilities-Pumping schemes - Ruby laser – Helium Neon laser.

UNIT-IV: ELECTROMAGNETIC FIELDS:

Scalar and Vector Fields – Electric Potential-Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

UNIT-V: QUANTUM MECHANICS & FREE ELECTRON THEORY:

Introduction - Matter waves – Schrödinger Time Independent and Time Dependent wave equations – Particle in a box.

Defects of Classical free electron theory –Quantum Free electron theory - concept of Fermi Energy.

UNIT-VI: BAND THEORY OF SOLIDS & SEMICONDUCTOR PHYSICS:

Bloch's theorem (qualitative) – Kronig – Penney model – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

Conduction–Density of carriers in Intrinsic and Extrinsic semiconductors–Drift & Diffusion – relevance of Einstein's equation- Hall effect in semiconductors

TEXT BOOKS:

1. A Text book of Engineering Physics – by Dr. M.N.Avadhanulu and Dr.P.G.Kshira sagar, S.Chand & Company Ltd., (2014)
2. 'Solid State Physics' by A.J.Dekker, Mc Millan Publishers (2011)
3. Engineering Physics by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

REFERENCE BOOKS:

1. Applied Physics by P.K.Palanisamy, Scitech publications (2014)
2. Lasers and Non-Linear optics by B.B.Laud, New Age International Publishers (2008).
3. Engineering Physics by M. Arumugam, Anuradha Publication (2014)