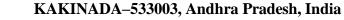
JAWAHARLAL NEHRUTECHNOLOGICALUNIVERSITY: KAKINADA



R-16 Syllabus for EEE JNTUK

| I Year-II Semester | | | 1 | 1 | <u> </u> |
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| | APPLIED PHYSICS (R161207) | | | | |
| | 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 | 3 |
| | and Polarization involving required to design instruments with higher resolution. | |
| 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.





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KAKINADA-533003, Andhra Pradesh, India

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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)