Engineering Physics

Course Code	19BS1104	Year	I	Semester	I
Course Category	Basic Sciences	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Apply the fundamental laws of electricity and magnetism to currents and propagation of EM waves.
CO2	Identify the propagation of light and demonstrate the loss mechanisms in optical fibers.
CO3	Explain the principles of physics in dielectrics, magnetic materials and identify the mechanisms of polarization for useful engineering applications.
CO4	Classify solids and calculate carrier concentration and conductivity in semiconductors.
CO5	Demonstrate the functioning of solar cell, photodiode, and semiconductors devices for engineering applications.

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (H:High, M: Medium, L:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H											M	
CO2	H	H											H	
CO3	H	H											M	
CO4	H	H											M	
CO5	H	H											H	

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Basics of Electromagnetics** Electrostatic field: Coulombs law and Gauss law, derivation of Coulombs law from Gauss law, applications of Gauss law (line charge, thin sheet of charge and solid charged sphere), Gauss law of electrostatics in dielectric medium, divergence and curl of electric fields, electric potential, relation between potential and force, Poisson's and Laplace equations. Magneto static field: Biot–Savart law, divergence and curl of magnetic fields, Faraday's and Ampere's laws in integral and differential form, displacement current, continuity equation, Maxwell's equations	CO1
II	**Fiber Optics** Introduction, advantages of optical fibers, principle and structure, acceptance angle, numerical aperture, modes of propagation, classification of fibers, fiber optic communication, importance of V- number, fiber optic	CO2

	sensors (Temperature, displacement and force), applications.	
III	**Dielectric and Magnetic materials** Dielectric materials: Introduction, electric polarization, dielectric polarizability, susceptibility and dielectric constant, types of polarizations (qualitative treatment only), frequency dependence of polarization, Lorentz (internal) field (quantitative), Clausius-Mossotti equation. Magnetic materials: Introduction, magnetic dipole moment, magnetization, magnetic susceptibility and permeability, origin of permanent magnetic moment, classification of magnetic materials, Weiss theory of ferromagnetism (qualitative), domain theory, hysteresis, soft and hard magnetic materials.	CO3
IV	**Semiconductor physics** Introduction, origin of energy band, intrinsic and extrinsic semiconductors, mechanism of conduction in intrinsic semiconductors, generation and recombination, carrier concentration in intrinsic semiconductors, variation of intrinsic carrier concentration with temperature, n-type and p-type semiconductors, carrier concentration in n type and p type semiconductors.	CO4
V	**Semiconductor devices** Drift and diffusion currents in semiconductors, Hall effect and its applications, magnetoresistance, p-n junction layer formation and V-I characteristics, direct and indirect band gap semiconductors, construction and working of photodiode, LED, solar cell	CO5

Learning Resources
Text Books
1. Engineering Physics, R.K.Gaur&S.L.Gupta, Dhanpatrai Publications. 2. Solid State Physics ,S.O.Pillai, New Age International.
Reference Books
1.A Text Book Of Engineering Physics,M.N.Avadhanulu&P.G.Kshrisagar,S.Chand Publications 2.Semiconductor Devices & Physics,S.M.Sze,Wiley,2008. 3.Applied Physics, P.K. PalanaiSwamy, Scitech Publications. 4.Engineering Physics,Dr.M.Arumugam,Anuradha Publications. 5. Introduction To Electrodynamics,David.J.Griffths,Pearson Education.
e- Resources & other digital material
http://physicsforidiots.com/physics/electromagnetism/ https://www.arcelect.com/fibercable.htm http://freevideolectures.com/Course/3048/Physics-of-Materials/36 https://www.iitk.ac.in/mse/electronic-materials-and-devices https://link.springer.com/chapter/10.1007/978-3-319-48933-9_35