Course Number and Name

BPH201 - ENGINEERING PHYSICS -II

Credits and Contact Hours

3 & 45

Course Coordinator's Name

Dr. Velavan

Text Books and References

TEXT BOOKS:

1. Jayaraman D Engineering Physics II. Global Publishing House, 2014.
2. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011.
3. Senthilkumar G. Engineering Physics II. VRB Publishers, 2011.

REFERENCES:

1.Arumugam M., Materials Science. Anuradha publishers, 2010

2. Pillai S.O., Solid State Physics. New Age International(P) Ltd., publishers, 2009

3. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009

Course Description

- To expose the students to multiple areas of science of engineering materials which have direct relevance to different Engineering applications
- To understand the concepts and applications of conducting, Semiconducting, magnetic & dielectric materials as well as their optical properties.

Prerequisites	Co-requisites
ENGINEERING PHYSICS -I	NIL

required, elective, or selected elective (as per Table 5-1)

Course Outcomes (COs)

CO1	Understand about properties and advancements of conducting materials.
CO2	Understand the principle and properties semiconducting materials.
CO3	Acquire Knowledge on Magnetic and dielectric Materials.
CO4	To Know about the creation of new materials with novel properties
CO5	To Understand the impact of modern materials in technical uses.
CO6	Learn new engineering materials and its characteristics

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	H										
CO2		L	H		M						
CO3		M		H							
CO4	H		M	L							
CO5		L	L								

	CO6	H											

List of Topics Covered

UNIT I CONDUCTING MATERIALS 9

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic semiconductor – carrier concentration derivation Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors -direct and indirect band gap- derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications Superconductivity : properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V ADVANCED ENGINEERING MATERIALS 9

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, Nanomaterials– Preparation -pulsed laser deposition – chemical vapour deposition – Applications – NLO materials –Birefringence- optical Kerr effect – Classification of Biomaterials and its applications.