Course Number and Name

BPH201 - ENGINEERING PHYSICS -II

Credits and Contact Hours

3 and 45

Course Coordinator's Name

Dr Sree Latha

Text Books and References

TEXT BOOKS

- 1. "Science of engineering materials", by Dr. A.Mukunthan and S.Usha SciTech publications (india) Pvt Ltd; chennai, (2007).
- 2. Charless Kittel 'introduction to solid state physics', john wiley & sons, 7th edition, singpore.

REFERENCES:

- 1. Material science by r.suresh, v. jayakumar lakshmi publications; arapakkam (2006).
- 2. Material science by Dr. P. K. Palanisamy Scietech publications (india) Pvt Ltd, chennai (2006).
- 3. Rajendran V and Marikani a, 'material science' tata mcgraw hill publications Ltd, 3rd edition , new delhi (2004).
- 4. M.Arumugam, 'material science', anuradha publications, kumbakonam (2006).

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)													
	Required													
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 light in technical uses														
CO6 :Learn new engineering materials and its characteristics														
Student Outcomes (SOs) from Criterion 3 covered by this Course														
	COs/SOs	а	b	С	d	е	f	g	h	i	j	k		
	CO1	Н												
	CO2		L	Н		Μ								
	CO3		М		Н									
	CO4	Н		М	L								7	
	CO5		L	L										
	CO6	Н												

List of Topics Covered

UNIT I CONDUCTING MATERIALS

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

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

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

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 VADVANCED ENGINEERING MATERIALS

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.

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