

22PYB03 - SOLID STATE PHYSICS (Common to ECE, EEE & BME)				
	L	T	P	C
	3	0	0	3
PRE REQUISITE : NIL				
Course Objective:	<ul style="list-style-type: none"> To gain adequate information about the properties of matter and properties of nanostructures. To expose the concepts of Photonics and fiber optics and Advanced new engineering materials 			
Course Outcomes The student will be able to		Cognitive Level	Weightage of COs in End Semester Examination	
CO1	Apply principles of semiconductor physics to the design and optimization of semiconductor-based biomedical equipment.	Ap	20%	
CO2	Employ their knowledge of dielectric properties to optimize and enhance the performance of electronic components such as capacitors and transformer.	Ap	20%	
CO3	Examine how magnetic moments and superconductivity are utilized in the design of biomedical devices like MRI machines and magnetic sensors.	An	20%	
CO4	Analyze the impact of fabrication techniques on enhancing the performance and efficiency of microprocessors.	An	20%	
CO5	Evaluate how the properties and preparation methods of advanced materials can be utilized to develop innovative solutions in material science.	Ev	20%	

UNIT I – SEMICONDUCTING MATERIALS	(9)
Introduction to semiconducting materials – Elemental and compound semiconductors – Intrinsic semiconductor – carrier concentration derivation – variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors (qualitative) – Hall effect – determination of Hall coefficient – Applications	
UNIT II – DIELECTRIC MATERIALS	(9)
Electrical susceptibility – dielectric constant – electronic, ionic, orientation and space charge polarization – frequency and temperature dependence of polarization – internal field – Clausius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferro electricity and applications.	
UNIT III – MAGNETIC AND SUPERCONDUCTING MATERIALS	(9)
Origin of magnetic moment – Bohr Magneton – Types of magnetic materials – Domain theory – Hysteresis – soft and hard magnetic materials – Ferrites – applications – Superconductivity – properties – types of superconductors – BCS theory of superconductivity (qualitative) – High Tc superconductors – Application of superconductors – Magnetic levitation.	

UNIT IV – FABRICATION PROCESS OF INTERGATED CIRCUITS	(9)
Bulk crystal growth – Epitaxial growth – masking and etching-diffusion of impurities-selective diffusion – Formation of PN junction – resistors – capacitors – inductors – isolation methods – metal semiconductor contact – Introduction to integrated circuit – monolithic and hybrid circuits – Thin film and Thick film technology – Definition of LSI, MSI, VLSI circuits.	
UNIT V – ADVANCED MATERIALS AND NANO TECHNOLOGY	(9)
Metallic glasses: preparation, properties and applications – Shape Memory Alloys (SMA): Characteristics, properties of NiTi alloy, application – Nano materials: Properties, Preparation – Pulsed laser deposition – chemical vapour deposition of nano particles and applications – Carbon nano tubes: fabrication – arc method – structure – properties and application.	
TOTAL (L: 45) = 45 PERIODS	
TEXT BOOKS:	
<ol style="list-style-type: none"> 1. M.N.Avadhanulu and P.G.Kshirsagar, “A text book of Engineering Physics”, S. Chand and Company, New Delhi, 2019. 2. A.Marikani, “Materials Science”, PHI Learning Private Limited, Eastern Economy Edition, 2017. 3. M.A.Wahab, “Solid State Physics”, 3rd edition ,Narosa Publishing House Pvt.Ltd., 2016. 	
REFERENCES:	
<ol style="list-style-type: none"> 1. B.Rogers , J. Adams and S.Pennathur, “Nanotechnology : Understanding Small System” CRC Press, 2017. 2. Jacob Millman, Charistos C Halkilas, Satyabratajit “Electronic Devices & Circuits”, Tata McGraw Hill, Education Private Limited, 2016, Third Edition. 3. Subrahmanyam N, Brijlal, “A Text Book Of Optics” S.Chand & Co. Ltd, New Delhi, 2019. 	
WEB LINKS:	
<ol style="list-style-type: none"> 1. https://bayanbox.ir/view/7764531208313247331/Kleppner-D.-Kolenkow-R.J.-Introduction-to-Mechanics-2014.pdf. 2. https://physicaeducator.files.wordpress.com/2017/11/electricity_and_magnetism-by-purcell-3ed-ed.pdf. 3. https://rajeshvcet.home.blog/regulation-2021/ph3151-engineering-physics-study-materials/ 4. https://zenodo.org/record/243407#.ZEgPZXZBzIU https://farside.ph.utexas.edu/teaching/qmech/qmech.pdf. 6. https://web.pdx.edu/~pmoeck/phy381/workbook%20nanoscience.pdf. 	

Mapping of COs with POs / PSOs														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2												
2	3													
3	3													
4	3		3				2						3	
5	3					2	2					2		
CO (W.A)	3	2	3			2	2					2	3	

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