< APPLIED PHYSICS >

< Common to I-I ECE, CSE & IT>

Course Category	BASIC SCIENCES	**Course Code**	**19BP1T02**
Course Type	Theory	**L-T-P-C**	3 - 0 - 0-3
Prerequisites	Intermediate Physics	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
2	Understand the physics of Semiconductors and their working mechanism for their utility in Engineering applications.
3	Impart the knowledge of Dielectric and Magnetic materials with characteristic utility in appliances.

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Analyze the optical applications using the concepts of Interference and diffraction.	Analyze (K4)
CO2	Apply the concepts of quantum mechanics for calculation of free quantum particle energies.	Applying (K3)
CO3	Apply the basics of Laser Mechanism and fiber optics for the communications systems.	Applying(K3)
CO4	Understand the electrical conductivities in semiconductors and study the types of semiconductors using Hall Effect.	Understanding(K2)
CO5	Understand the polarization phenomenon in dielectric materials and magnetic materials to study dependence on temperature and frequency response.	Understanding(K2)

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2		1	1										
CO2	2	2		1											
CO3	2	2	1												
CO4	3	2	2									1	1		
CO5	2	1													

COURSE CONTENT	
UNIT I	**WAVE OPTICS** **(10 hrs)** **INTERFERENCE** Introduction-Principle of Superposition – Coherent Sources – Interference in parallel and non - parallel thin films (reflection geometry), Newton's rings & Applications. **DIFFRACTION** Introduction- Differences between Interference and Diffraction, Differences between Fresnel and Fraunhoffer diffraction Fraunhoffer diffraction in single slit (Qualitative), Fraunhoffer diffraction Double slit(Qualitative), Grating equation (analytical Treatment)-Rayleigh criterion of resolution and Resolving power of grating,
UNIT II	**QUANTUM MECHANICS** **(8hrs)** Introduction – Matter waves – de Broglie's hypothesis – Davisson-Germer experiment – G.P.Thomson experiment – Heisenberg's Uncertainty Principle –interpretation of wave function – Schrödinger Time Independent and Time Dependent wave equations – Particle in a potential box
UNIT III	**LASERS** **(11 hrs)** Introduction-Characteristics–Spontaneous and Stimulated emission of radiation – population inversion - Pumping Mechanisms - Ruby laser – Helium Neon laser – Semiconductor laser– Applications **FIBER OPTICS:** Introduction- Structure of Optical Fiber – Total Internal Reflection-Numerical Aperture and Acceptance Angle-classification of Optical fibers- optical fiber communication system- Advantages of Optical fibers- Applications.
UNIT IV	**SEMICONDUCTOR PHYSICS** **(8 hrs)** Introduction–Intrinsic semi conductors - density of charge carriers- Electrical conductivity – Fermi level – extrinsic semiconductors - p-type &n-type - Density of charge carriers -Hall effect- Hall coefficient - Applications of Hall effect
UNIT V	**DIELECTRICS** **(11 hrs)** Introduction - Dielectic polarization– Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations- Electronic Ionic and Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation -Applications of dielectrics. **MAGNETIC PROPERTIES** Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment - Classification of Magnetic materials(Analytical)--Hysteresis-soft and hard magnetic materials & applications

TEXT BOOKS	
1.	"A Text book of Engineering Physics"by M.N.Avadhanulu, P.G.Kshirsagar -S.Chand Publications,
2.	"Engineering Physics" by M.R.Srinivasan, New Age international publishers.
3.	"Solid State Physics" by SO Pilai., - New age International Publishers
REFERENCE BOOKS	
1.	Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition
2.	Solid State Physics ,AJ Dekker, I Edition,Macmillan Publishers India Private Limited
WEB RESOURCES	
1.	https://youtu.be/NVllY3LlNqc https://youtu.be/1TRdOjVpm-0 https://youtu.be/0tHcWDNCJ-o
2.	https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.html https://www.youtube.com/watch?v=uPvWlwOhCTo
3.	https://www.youtube.com/watch?v=fdS12EaXH3A http://folk.uio.no/ravi/cutn/cmp/band1.pdf
4.	https://www.electronics-tutorials.ws/diode/diode_1.html https://youtu.be/3csUvwZdsOg https://www.youtube.com/watch?v=_40dpUzzfhA
5.	https://youtu.be/TuvLv6SBO5s https://youtu.be/u0Qf9jVh2kc

<APPLIED PHYSICS LABORATORY>

< I-I ECE, CSE & IT>/<I-II EEE

Course Category	BASIC SCIENCES	**Course Code**	**19BP1L02/ 19BP2L02**
Course Type	Lab	**L-T-P-C**	0 - 0 - 3-1.5
Prerequisites	Intermediate Physics	**Internal Assessment** **Semester End Examination** **Total Marks**	25 50 75

COURSE OBJECTIVES	
1	The student will have exposure to various experimental skills which is essential for an Engineering student.
2	To gain practical knowledge by applying the experimental methods to correlate with the Theoretical Physics.
3	Apply the Analytical techniques and graphical analysis to the experimental data

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Understand the basics of Interference, Diffraction in Physics using instruments like Spectrometer, Travelling microscope.	Understanding(K2)
CO2	Determine the Magnetic and Dielectric constants of materials.	Application(K3)
CO3	Apply the basics of Current Electricity and Semiconductors in engineering application	Application(K3)

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2														
CO2	2														
CO3	2	2	2										1		

COURSE CONTENT: (Any 10 of the following listed 12 experiments)	
1.	Determination of wavelength of laser by diffraction grating.
2.	Determination of wavelength of a source-Diffraction Grating-Normal incidence.
3.	Newton's rings – Radius of Curvature of Plano - Convex Lens.
4.	Determination of thickness of a spacer using wedge film and parallel interference fringes.
5.	Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
6.	Energy Band gap of a Semiconductor p - n junction.
7.	Characteristics of Thermistor – Temperature Coefficients
8.	Determination of dielectric constant by charging and discharging method
9.	Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10.	Dispersive power of diffraction grating.
11.	To Study the V-I Characteristics and determine the breakdown voltage of a Zener Diode
12.	Determination of Hall Voltage and Hall coefficients of a given semiconductor using Hall effect.

TEXT BOOKS	
1.	Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)
REFERENCE BOOKS	
1.	College customized manual
WEB RESOURCES	
1.	https://www.youtube.com/watch?v=h_hUBXz-G-Y
2.	https://youtu.be/dgxFFw_1gMo
3.	https://www.youtube.com/watch?v=v2B0QyW8XJ0
4.	https://www.youtube.com/watch?v=AYQLmFqFtlw
5.	https://youtu.be/toggy3WVxV4
6.	https://youtu.be/1CyFsGk-_l4

< ENGINEERING PHYSICS >

< Common to I-II CE & ME branches >

Course Category	BASIC SCIENCES	**Course Code**	**19BP2T01**
Course Type	Theory	**L-T-P-C**	3 - 0 -0-3
Prerequisites	Intermediate Physics	**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	Study the Crystal Structures, Properties and their relationship exhibited by Solid State materials for their utility.
2	Impart knowledge on magnetic materials with characteristic utility in appliances.
3	Simple harmonic motion and its adaptability for improved acoustic quality of concert halls-Impart concepts of flaw detection techniques using ultrasonic's.
4	Impart knowledge in basic concepts of LASERs along with its Engineering applications-Familiarize types of sensors for various engineering applications
5	Impart the knowledge of Nanomaterials, Properties, characterization Techniques and Applications

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Apply the basics of crystal structures and X ray diffraction technique for material studies.	Application(K3)
CO2	Analyze the materials based on their magnetic properties and use them in possible applications.	Analysis(K3)
CO3	Analyze the factors behind acoustic defects and different ultrasonic testing techniques of materials using NDT	Analysis(K3)
CO4	Understand the basics principles of laser mechanism and Sensors for applications in engineering.	Understanding(K2)
CO5	Apply the knowledge of Nanomaterials and their properties for applications in engineering	Application(K3)

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2		1											
CO2	2	2													
CO3	2	2			1	1									
CO4	2			2											
CO5	2	1													

COURSE CONTENT	
UNIT I	**CRYSTALLOGRAPHY & X-RAY DIFFRACTION** (**10 hrs)** Introduction-Basis and lattice – Unit cell - Coordination number -Packing fraction -Bravais lattice-Crystal Systems – packing fractions of SC,BCC and FCC-Crystal directions and planes-Miller indices – Separation between successive (h k l) planes – Bragg's law - Bragg's X-ray spectrometer.
UNIT II	**MAGNETIC PROPERTIES** **(8hrs)** Introduction-Magnetic-dipole-moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials(Analytical) - Wiess theory – Domain theory -Hysteresis-eddy currents- soft and hard magnetic materials - applications
UNIT III	**ACOUSTICS** (**11 hrs)** Introduction – Reverberation - Reverberation time - Sabine's formula (Jaggers' Method using Eyrings approximation)–absorption coefficient and its determination- factors affecting acoustics of buildings and their remedies. **ULTRASONICS** Introduction-Production of ultrasonic's by Magneto-striction and piezoelectric methods – Detection of ultrasonic's- Non-Destructive Testing- pulse echo system through transmission and reflection modes - Applications.
UNIT IV	**LASERS** (**11 hrs)** Introduction-Characteristics–Spontaneous and Stimulated emission of radiation – population inversion - Pumping Mechanisms - Ruby laser – Helium Neon laser –Semiconductor laser– Applications **SENSORS (Qualitative description only):** Introduction-Strain and Pressure sensors-Piezoelectric-Magnetostrictive sensors- Temperature sensor-smoke and fire detectors-Applications.
UNIT V	**PHYSICS OF NANOMATERIALS** **(8hrs)** Introduction to Basics of Nano materials, Properties - Preparation methods (Sol Gel Technique, Ball Milling) and characterization Methods Scanning tunneling Microscopy, Atomic Force Microscopy – CNTs Preparation (Arc Discharge method) and properties - Applications of NanoMaterials (CNTs).

TEXT BOOKS	
1	"A text book of Engineering Physics" by P G Kshirsagar& M N Avadhanulu, S Chand & Company Ltd
2	"Solid State Physics" by SO Pilai., - New age International Publishers
3	"Engineeing Physics by P.K.Palanisamy, Scitech publications (New Edition 2019)
REFERENCE BOOKS	
1	"Sensor and Transducers" by Ian R Sinclair, Elsevier (Newnes) 3rd Eds
2	Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition

WEB RESOURCES	
1	http://youtu.be/OTDVov_kw6A https://slideplayer.com/slide/3866455/64/video/CHAPTER+3%3A+CRYSTAL+STRUCTURES+%26amp%3B+PROPERTIES.mp4 https://youtu.be/DYTCF01gdr0
2	https://nptel.ac.in/courses/113106032/15%20-%20Magnetic%20Properties.pdf
3	https://www.svce.ac.in/departments/physics/downloads/Notes/Unit-IV/UNIT%20IV%20Acoustics.pdf
4	https://youtu.be/UheTlVwukWg http://engineering.nyu.edu/gk12/amps-cbri/pdf/Intro%20to%20Sensors.pdf
5	https://nccr.iitm.ac.in/2011.pdf https://youtu.be/lFYs3XDu4fQ

<ENGINEERING PHYSICS LABORATORY>

< Common to I-II CE & ME)>

Course Category	BASIC SCIENCES	**Course Code**	**19BP2L01**
Course Type	Lab	**L-T-P-C**	0 - 0 - 3-1.5
Prerequisites	Intermediate Physics	**Internal Assessment** **Semester End Examination** **Total Marks**	25 50 75

COURSE OBJECTIVES	
1	The student will have exposure to various experimental skills which is essential for an Engineering student.
2	To gain practical knowledge by applying the experimental methods to correlate with the Theoretical Physics.
3	Apply the Analytical techniques and graphical analysis to the experimental data

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Understand the basics of Mechanics, Elasticity, Diffraction using instruments like Fly wheel, Stewart Gee's, Grating	Understanding(K2)
CO2	Understand the basics of Waves and Oscillations in Physics using instruments like Volume Resonator,Sonometer.	Application(K3)
CO3	Determine the Magnetic and Dielectric constants of materials	Application(K3)

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2														
CO2	2														
CO3	2	2	2												

COURSE CONTENT: (Any 10 of the following listed 12 experiments)	
1.	Determination of Rigidity modulus of a material- Torsional Pendulum.
2.	Determination of Young's modulus by method of single cantilever oscillations.
3.	Determination of Acceleration due to Gravity and Radius of Gyration - Compound Pendulum.
4.	Verification of laws of vibrations in stretched strings – Sonometer.
5.	Determination of ultrasonic velocity in liquid (Acoustic grating)
6.	Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus
7.	Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
8.	Determination of dielectric constant by charging and discharging method
9.	Determination of wavelength of Laser by diffraction grating
10.	Determination of particle size using Laser.
11.	Determination of Moment of Inertia of a Fly Wheel.
12.	Determination of Velocity of sound –Volume Resonator.

TEXT BOOKS	
1.	Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)
REFERENCE BOOKS	
1.	College customized manual
WEB RESOURCES	
1.	https://youtu.be/P-eJIXZimmQ
2.	https://youtu.be/iUhfstf10rk
3.	https://www.youtube.com/watch?v=BX4QPdP7fT8
4.	https://youtu.be/toggy3WVxV4
5.	https://www.youtube.com/watch?v=AYQLmFqFtlw
6.	https://www.youtube.com/watch?v=9MBE5t1Sv_w

<NUCLEAR SCIENCE AND TECHNOLOGY >

<Common to CE, EEE, ECE>

Course Category	BASIC SCIENCES- **OPEN ELECTIVE**	**Course Code**	**19BP_T03**
Course Type	Theory	**L-T-P-C**	3 -0-0-3
Prerequisites	Intermediate Physics	**InternalAssessment** **Semester EndExamination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To introduce to the students the various basic concepts in Nuclear science and Technology
2	To impart understanding of the Nuclear Radiation hazards and Nuclear Radiation Safety Measures.

COURSE OUTCOMES		**Cognitive Level**
Upon successful completion of the course, the student will be able to:		
CO1	Understand the basics of the properties of the Nuclei.	Understanding (K2)
CO2	Understand the concepts of Radioactivity and Radioactive dating technique	Understand(K2)
CO3	Understand the basics of Nuclear Reactions	Understand(K2)
CO4	Application of the various types of Nuclear Detectors and Accelerators	Apply (K3)
CO5	Analyze the various Nuclear Radiation safety measures in Nuclear Power plants.	Analyze(K3)

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2														
CO2	2	1													
CO3	1														
CO4					2										
CO5							1		1						

COURSE CONTENT	
UNIT I	**General Properties of Nuclei (11hrs)** Nuclear constituents- Charge, Mass-shape, and Size of Nucleus, Spin - Mass Defect- Binding Energy-Packing Fraction- Semi empirical Mass formula and applications-Quantum numbers for individual nucleons - Quantum properties of nuclear states: i) Nuclear energy levels ii) Nuclear angular momentum iii) parity iv) Iso-spin – nuclear magnetic dipole moment.
UNIT II	**Radioactivity (9hrs)** Characteristic properties of Radioactive radiation -Properties of alpha ,beta and gamma rays- Natural radioactivity-Laws of radioactive disintegration-radioactive decay- half life- average life time- Units of radio activity and radiation exposure - Curie, Roentgen, Becquerel - RAD, Rep,REM, -Radioactive dating.
UNIT III	**Nuclear Fission and Fusion (10hrs)** **Fission:** Introduction – Energy released in Nuclear Fission-Nuclear chain reaction- Fissile and fertile materials- Fission reactors- heavy water reactors and breeder reactors **Fusion:** Introduction- Fusion and Thermal reactions-Fusion reaction in stars- Controlled thermonuclear reactions
UNIT IV	**Detection of Nuclear radiation and Accelerators (9hrs)** **Detection of Nuclear radiation:** Introduction-Types of detectors-Geiger Muller counter, Proportional counter, Scintillation counter Wilson cloud chamber, solid state detectors **Accelerators:** Introduction-Linear accelerators, Cyclotron, Synchrocyclotron, Betatron
UNIT V	**Nuclear Radiation Safety (9hrs)** **Nuclear Fuel Cycle:**Characteristics of Nuclear Fuels- Uranium- Production and Purification of Uranium- Reprocessing and Waste disposal. **Nuclear Radiation Safety:** Safety considerations in regulations and operations- Design Criteria, accident analysis, probabilistic risk assessment, and risk informed regulations..

TEXT BOOKS	
1.	Nuclear Physics by D.C Tayal,Himalayan Publication
2.	Nuclear Physics by Irving Kaplan
REFERENCE BOOKS	
1.	Atomic Nucleus by RD Evans
2.	P. D. Wilson, ed. The Nuclear Fuel Cycle: from Ore to Wastes, Oxford University Press (1996)
WEB RESOURCES	
1.	https://youtu.be/DVvK7_1Kldo
2.	https://youtu.be/Zc9xfUnrTxg
3.	**https://www.youtube.com/watch?v=6axVVhi62ac**
4.	https://youtu.be/avvXftiyBEs
5.	https://youtu.be/qYDjjJxc4h4 https://youtu.be/rrKFz1fxcLw https://youtu.be/uKkjrUtmg68 https://youtu.be/Cjpp66GlZiI