SCHEME OF COURSE WORK

Course Details:

Course Title	**:PHYSICS**		
Course Code	**: 13BP1101**	**L T P C**	**4 0 0 3**
Program:	**: B.Tech.**		
Specialization:	**: ELECTRONICS AND COMMUNICATION ENGINEERING**		
Semester	**: I**		
Prerequisites	**:KNOWLEDGE OF INTERMEDIATE PHYSICS**		
Courses to which it is a prerequisite	**: For all Engineering Courses**		

Course Outcomes (COs):

1	Interpolate the knowledge of elastic and acoustic response of materials for various applications.
2	Summarize the basic theories of electrostatics and dielectrics to solve a variety of problems.
3	Convert the knowledge of basic principles of electro magnetism to design electrical and electronic devices
4	Resolve the discrepancies in classical estimates through quantum principles and classify the solids.
5	Realize the principles of optics in designing optical devices

Program Outcomes (POs):

1	Graduates will be able to apply the knowledge of mathematics, science, engineering fundamentals to solve complex electronics and communication engineering problems.
2	Graduates will attain the capability to identify, formulate and analyse problems related to electronics and communication engineering and substantiate the conclusions using the first principle of science and engineering.
3	Graduates will be in a position to design solutions for electronics and communication engineering problems and design system components and processes that meet the specified needs with appropriate consideration to public health and safety.
4	Graduates will be able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.
5	Graduates will able to select and apply appropriate techniques from the available resources and modern electronics and communication engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.
6	Graduates will be able to carry out their professional practice in electronics and communication engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.
7	Graduates will be able to understand the impact of the professional engineering solutions on environmental safety.
8	Graduate will transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
9	Graduates will be able to function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.
10	Graduates will be able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
11	Graduates will be able to demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
12	Graduates will engage themselves in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of electronics and communication engineering.

S	**Strongly Correlated**
M	**Moderately Correlated**
Blank	**No Correlation**

CO-PO Mappng:-

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	S	M	M	M		M			M	M		M
CO-2	S	M	M	S	S	M			M	M	M	M
CO-3	S	M	M	S	S				M	M	M	M
CO-4	S	M	M	S					M	M	M	M
CO-5	S	M	M	M	S				M	M	S	M

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	Teaching-Learning Strategy	Assessment Method & Schedule
1	Introduction – classification of stress, strain and Hooke's law – Elastic behavior of materials – Poisson's ratio and relationship between modulus of elasticity – Twisting couple on a solid shaft.	**CO-1**	1)define and Classify: Stress and Strain 2)State Hooke's Law 3)Write a note on Elastic behavior of materials. 4)State and explain Poisson's ratio and elaborately explain the relationship b/w moduli of rigidity.	Lecture / Discussion	Assignment I (Week 7 - 8) / Quiz-I (Week -4)/ Mid-MIDTest 1 (Week 9)
2	Bending of beams – bending moment - Y by cantilever – Uniform bending - Reverberation and reverberation time – absorption coefficient.	**CO-1**	1) Explain the term 'Bending of Beams and Bending moment'. 2) Write a note on Cantilevers and derive an expression for Y by cantilever method. 3) Explain the terms Reverberation and Reverberation time and absorption coefficient.	Lecture / Discussion & Problem solving/ PPT	Assignment I (Week 7 - 8)/ Quiz -I (Week -4)/ Mid-MID Test 1 (Week 9)
3	Sabine's law (quantitative treatment) – Factors affecting the acoustics of buildings and their remedies – Acoustical design of a hall. Vectors - unit vectors - Gradient of a scalar field –	**CO-1** **CO-2**	1) Discuss quantitatively the Sabine's formula for reverberation time 2) Discuss in detail the factors affecting acoustics of buildings and remedies. 3) Write a note on Acoustic design of a hall. 4)Define gradient of a scalar field and write some of its applications.	Lecture / Discussion	Mid-Test 1 (Week 9)/ Assignment I (Week - 7-8)/ Quiz -I (Week -4)
4	Divergence & curl of a vector field Coulombs law - Electric flux - Gauss law in electrostatics – differential form of Gauss law – derivation of Coulombs law from Gauss Law – Applications of Gauss Law (Electric Field due to a solid charged sphere and thin sheet of charge).	**CO-2**	1)What is divergence and curl of a vector field? Write their mathematical expressions. 2)State and prove Gauss's theorem. Using Gauss theorem find electric field due to a solid charged sphere. 3)Using gauss theorem derive an expression for electric field due to a thin sheet of charge	Lecture / Problem solving	Mid-Test 1 (Week 9)/ Quiz -I (Week -4) Assignment I (Week7)
5	Gauss law in dielectric medium, Dipole - Electric displacement vector - Dielectric permittivity and susceptibility- Dielectric constant and dielectric polarization in materials.	**CO-2**	1) Apply Gauss's theorem to a dielectric medium and obtain the relationship between E, D and P vectors. 2)Define electric displacement vector. Discuss its properties. 3)What do you mean by dielectric constant? Define electric susceptibility. Derive a relation between dielectric constant and dielectric susceptibility.	Lecture / Discussion	Mid-Test 1 (Week 9) / Quiz -II (Week -8) Assignment I (Week7)

			4)What do you mean by dielectric polarization?		
6	Types of polarizabilities, Electronic polarizability derivation, Internal fields in solids and Claussius - Mosotti equation - frequency dependence of dielectric constant - Dielectric loss -	**CO-2**	1)Explain the electronic polarizability in atoms and obtain an expression for electronic polarizability interms of the radius of the atom. 2)Explain the concept of internal field in solids and hence obtain an expression for it. 3)Explain Clausius-Mosotti relation in dielectrics subject to a static field. 4)Discuss the frequency dependance of various polarization process in dielectric materials.	Lecture / Problem solving	Mid-Test 1 (Week 9)/ Quiz -II (Week 8) Assignment I (Week7)
7	Dielectric Strength and dielectric breakdown - important dielectric materials in electrical engineering. Biot-Savart Law - Magnetic flux – Magnetic scalar potential - Magnetic Vector Potential - Ampere's law.	**CO-2** **CO-3**	1)What is dielectric breakdown? Explain briefly the various factors contributing to breakdown in dielectrics. **2)**State and explain Biot Savarts Law **3)**Explain magnetic Scalar potential and derive the expression for the same. **4)** Express magnetic field in terms of vector potential.	Lecture / Problem solving	Mid-Test 1 (Week 9) / Quiz -II (Week -8) Assignment I (Week-7-8)
8	Force and torque on a magnetic dipole due to external magnetic field, Magnetization - Bound volume and surface current densities - auxiliary field **H (**Ampere's law in magnetized materials) - Magnetic susceptibility and permeability	**CO-3**	**1.** Write the integral form of Ampere's circuital law. **2.** A long copper rod of radius R carries a uniformly distributed current I .Find H inside and outside the rod.	Lecture / Problem solving	Mid-Test 1 (Week 9) / Quiz -II (Week -8)
9	**Mid-Test 1**	-----	----------	-------	----------
10	Force on charged particle under electric and magnetic fields - Faraday's law of electromagnetic induction - Self and mutual Inductances - Displacement current density - Maxwell's equations – Physical Significance of Maxwell's equations	**CO-3**	**1.** Define Faradays Laws of electromagnetic induction. **2.** Give Physical significance of Maxwell's equations.	Lecture / Problem solving	Mid-Test II (Week 18) / Quiz -III (Week -13) Assignment II (Week-16-17)
11	Introduction to wave mechanics – wave particle duality – de-Broglie matter waves – Wave function characteristics and significance – Schrodinger's time independent wave equation – particle in one dimensional rigid box	CO-4	1)Explain the concept of wave particle duality and obtain an expression for wavelength of matter waves. 2) Derive time independent Schrodinger's wave equation for a free particle. 3)Show that the energies of a particle in a potential box are	Lecture / Problem solving	Mid-Test II (Week 18) / Quiz -III (Week -13) Assignment II (Week-16-17)

			quantized.		
12	Fermi-Dirac distribution function – Fermi level - Effect of temperature on Fermi function - Bloch theorem (Qualitative), Kronig - Penny model (Qualitative treatment) – Concept of effective mass	CO-4	1)Explain the Fermi- Dirac distribution function of electrons. Explain the effect of temperature on the distribution. 2)Discuss the Kronig Penny model for the motion of an electron in a periodic potential. 3)Explain the concept of effective mass.	Lecture / Discussion and Problem solving	Mid-Test II (Week 18) / Quiz -III (Week -13) Assignment II (Week-16-17)
13	Origin of energy band formation in solids – Classification of materials in to conductors, semi-conductors and insulators based on number of effective electrons. Introduction to optics, Interference phenomenon, Interference through thin films in reflected light.	CO-4 CO-5	1)Discuss the origin of energy band structure in solids. 2)What is interference? 3)What is stokes principle?	Lecture / Discussion	Mid-Test II (Week 18) / Quiz -III (Week -13) Assignment II (Week-16-17)
14	Newton's rings –determination of wave length of a source Diffraction due to single slit Diffraction grating Resolving Power of grating (qualitative).	CO-5	1)Why is the central fringe in Newton's Ring dark? 2)What is diffraction? 3)What is the difference between interference and diffraction 4)What is the difference between resolving power and dispersive power	Lecture / Problem solving	Mid-Test II (Week 18) / Quiz -IV (Week -17) Assignment II (Week-16-17)
15	Polarization,Law of Malus, Brewster's law, double refraction, Nicol prism, Problems, Basic principle of a LASER, Induced absorption, spontaneous and stimulated emissions	CO-5	1)Discuss different types of polarization? 2)Give the construction and working of Nicol Prism. 3)What is difference between spontaneous emission and stimulated emissions?	Lecture / Problem solving	Mid-Test II (Week 18) / Quiz -IV (Week -17) Assignment II (Week-16-17)
16	Einstein's coefficients Population inversion, Ruby laser,CO_2 laser, Semiconductor laser, Laser Applications.	CO-5	1)Describe construction and working of Ruby Laser. 2)Explain construction and working of CO_2 Laser. 3)What is difference between gas laser and solid lasers? 4)What are the Applications of lasers?	Lecture / Discussion /PPT	Mid-Test II (Week 18) / Quiz -IV (Week -17) Assignment II (Week-16-17)
17	Introduction to optical fibers, Classification of fibers on the basis of refractive index profile, Acceptance angle and numerical aperture definitions and expression for Numerical aperture. Applications relating to communication and sensors (force and temperature).	CO-5	1)What are the advantages of optical fibers? 2)What is the relation between acceptance angle and numerical aperture? 3)What are the applications of fibers? How do we use it in fiber optic communication?	Lecture / Problem solving/ PPT	Mid-Test II (Week 18) / Quiz -IV (Week -17)
18	**Mid-Test 2**				
19/20	**END EXAM**				