

LECTURE PLAN DEPARTMENT OF PHYSICS

NAME: PROF.G.P.Gupta

DESIGNATION: ASST. PROF.

COURSE: B.Sc SEMISTER II

SESSION: 2018-2021

PAPER NAME: PHY-CC-3.T: ELECTRICITY AND MAGNETISM

SL. No	Topic/Sub Topic	Expected No. of Lecture
01	Electric Field and Electric Potential: Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations & its solution in Cartesian coordinates, The Uniqueness Theorem. Gauss' law in integral and differential form. Multipole expansion (monopole, dipole & quadrupole), energy density in an electric field. (10 Lectures)	10
02	Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics, Solutions of electrostatic and Magnetostatic problems including boundry value problems.(10 Lectures)	10
03	Transients: Growth and Decay of currents in LR, CR , LC and LCR circuits .(10 Lectures)	10
04	Magnetic Properties of Matter: Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability.Relation between B, H, M. (6 Lectures)	06
05	Electrical Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit. Anderson's bridge, De Sauty's Bridge and Owen's bridge & their vector diagram representation. Three phase electrical power supply, delta and star connections. (10 Lectures)	10
06	Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Maximum Power Transfer theorem and Superposition Theorem.(8 Lectures)	08
07	Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. (6 Lectures)	06
	Total Lecture=	60

Reference Books:

1. Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, TMH
2. Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education
3. Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.

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PAPER NAME: PHY-CC-4.T: WAVES AND OPTICS

SL. No	Topic/Sub Topic	Expected No. of Lecture
01.	Wave Motion: Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave.(6 Lectures)	06
02.	Free Vibration,Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (6 Lectures)	06
03.	Superposition of Two Harmonic Waves: Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities, changes with respect to position and time, energy of vibrating string, transfer of energy. (7 Lectures)	07
04	Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings, Velocity of Longitudinal waves in a fluid in pipe, Newton's Formula for Velocity of Sound, Laplace's Correction.(6 Lectures)	06
05	Acoustics of building, reverberation of time, growth and decay of sound, Sabine's formula (4 Lecture)	04
06	Interference: Division of amplitude and wavefront. Interference in Thin Films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (7 Lectures)	07
07	Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.(8 Lectures)	08
08	Fraunhofer diffraction: Single slit. Circular aperture and airy pattern, Resolving Power of a telescope. Double slit. Plane transmission grating. Resolving power of grating. (7 Lectures)	07
09	Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave, Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. (6 Lectures)	06
	Total Lecture=	57

Reference Books:

1. Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
2. Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill
3. Principles of Optics, Max Born and Emil Wolf, 7th Edn., 1999, Pergamon Press.
4. Optics, Ajoy Ghatak, 2008, Tata McGraw Hill

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PAPER NAME: PHY-CC-3&4P (PRACTICAL)

SL. No	Topic/Sub Topic	Expected No. of Lecture
01	Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.	
02	To determine an unknown Low Resistance using Potentiometer.	
03	To determine an unknown Low Resistance using Carey Foster's Bridge.	
04	To compare capacitances using De'Sauty's bridge.	
05	To verify the Thevenin, Norton, Superposition and Maximum power transfer theorems.	
06	To determine self inductance of a coil by Anderson's bridge.	
07	To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.	
08	To study the response curve of a parallel LCR circuit and determine its (a) Anti- resonant frequency and (b) Quality factor Q.	
09	To determine refractive index of the Material of a prism using sodium source.	

Reference Books :

1. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

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