SYLLABUS 2020-2021

CLASS: 12 **SUBJECT: PHYSICS**

UNIT	CONTENT
1. Electrostatics	1.1 Introduction 1.1.1 Historical background of electric charges 1.1.2 Basic Properties of charges 1.2 Coulomb's law 1.2.1 Super position principle 1.3.1 Electric Field 1.3.2 Electric field due to the system of point charges 1.4.1 Electric dipole 1.4.2 Electric Field due to a dipole 1.4.3 Torque experienced by an electric dipole in the uniform electric field 1.5 Electrostatic potential and potential energy 1.5.1 Electrostatic Potential energy & Electro static Potential 1.5.2 Electric Potential due to a point charge 1.5.3 Electro static Potential at a point due to an electric dipole 1.5.6 Electro static potential energy for collection of point charges 1.5.7 Electro static potential energy of a dipole in a uniform electric field 1.6.1 Electric Flux 1.6.2 Electric flux for closed surfaces 1.6.3 Gauss Law 1.6.4 Applications of Gauss Law 1.8.1 Capacitors 1.8.2 Energy stored in the capacitor 1.8.3 Application of capacitors 1.8.4 Effect of dielectrics in capacitors 1.8.5 Capacitors in series and parallel 1.9.1 Distribution of charges in a conductor 1.9.2 Action of points or corona discharge 1.9.4 Vande graff Generator

2. Current Electricity	2.1 Electric Current 2.1.1 Conventional Current 2.1.2 Drift Velocity 2.1.3 Microscopic model of current 2.2 Ohm's Law 2.2.1 Resistivity 2.2.2 Resistors in Series and Parallel 2.2.3 Colour code for carbon resistors 2.2.4 Temperature dependence of resistivity 2.3 Energy and power in electrical circuits 2.4.1 Electromotive force and internal resistance 2.4.2 Determination of internal resistance 2.4.3 Cells in series 2.4.4 Cells in Parallel 2.5.1 Kirchhoff's First rule 2.5.2 Kirchhoff's Second rule 2.5.3 Wheatstone's bridge 2.5.4 Metre bridge 2.5.7 Measurement of internal resistance of cell by Potentiometer 2.7 Thermo electric current 2.7.1 Seebeck effect 2.7.2 Peltier Effect 2.7.3 Thomson effect
3. Magnetism and magnetic effects of electric current	3.1 Introduction 3.1.2 Basic properties of magnets 3.2 Coulomb's inverse square law of magnetism 3.8 Biot - Savart law 3.8.1 Definition and explanation of Biot - Savart law 3.8.2 Magnetic field due to long straight conductor carrying current 3.8.3 Magnetic field produced along the axis of the current carrying circular coil 3.8.5 Current loop as a magnetic dipole 3.9 Ampere Circuital law 3.9.1 Ampere's circuital law 3.9.2 Magnetic field due to the current carrying wire of infinite length using Ampere's law

	3.9.3 Magnetic field due to a long current carrying solenoid 3.10 Lorentz force 3.10.1 Force on a moving charge in a magnetic field 3.10.2 Motion of a charged particle in a uniform magnetic field 3.10.3 Motion of a charged particle under crossed electric and magnetic field (velocity selector) 3.10.5 Force on a current carrying conductor placed in a magnetic field 3.10.6 Force between two long parallel current carrying conductors 3.11.2 Moving coil galvanometer
4. Electromagnetic Induction and Alternating current	4.1 Electromagnetic Induction 4.1.1 Introduction 4.1.2 Magnetic Flux (Φ_B) 4.1.5 Fleming's right hand rule 4.1.6 Motional emf from Lorentz force 4.3 Self-Induction 4.3.1 Introduction 4.3.2 Self-inductance of a long solenoid 4.3.3 Mutual Induction 4.3.4 Mutual Inductance between two long co-axial solenoids 4.4 Methods of producing induced emf 4.4.1 Introduction 4.4.2 Production of induced emf by changing the magnetic field 4.4.3 Production of induced emf by changing the area of the coil 4.4.4 Production of induced emf by changing relative orientation of the coil with the magnetic field 4.6 Transformer 4.6.1 Construction and working of transformer 4.6.2 Energy losses in Transformer 4.6.3 Advantages of AC in long distance power transmission. 4.7 Alternating Current 4.7.1 Introduction

	4.7.1 Mean or Average value of AC 4.7.2 RMS value of AC 4.7.3 AC circuit containing pure resistor 4.7.4 A Circuit containing pure inductor 4.7.5 AC circuit containing only a capacitor 4.7.6 AC circuit containing a resistor, an inductor and a capacitor in series - Series RLC circuit 4.7.7 Resonance in series RLC circuit 4.7.8 Q- factor 4.8 Power in AC circuits 4.8.1 Introduction of power in AC circuits 4.8.2 Wattless current 4.8.3 Power factor 4.8.4 Advantages and disadvantages of AC over DC 4.9 Oscillation in LC circuits 4.9.1 Energy conversion during LC oscillations 4.9.2 Conservation of energy in LC oscillations
5. Electromagnetic waves	5.1 Introduction 5.1.1 Displacement current and Maxwell's correction to Ampere's circuital law 5.1.3 Maxwell's equations in integral form 5.2 Electromagnetic waves 5.2.1 Production and properties of electromagnetic waves-Hertz experiments 5.2.3 Electromagnetic spectrum 5.3 Types of spectrum emission and absorption spectrum fraunhofer lines
6. Ray optics	6.1 Introduction 6.1.1 Ray optics 6.1.2 Reflection 6.1.3 Angle of deviation due to reflection 6.1.4 Image formed in plane mirror 6.1.5 Characteristics of the image formed by plane mirror 6.2 Spherical mirrors 6.2.1 Paraxial rays and marginal rays 6.2.2 Relation between f and r

	6.2.5 The mirror equation 6.2.6 Lateral magnification in spherical mirror 6.3 Speed of light 6.3.1 Fizeau's method to determine speed of light 6.3.3 Refractive index 6.3.4 Optical path 6.4 Refraction 6.4.1 Angle of deviation due to refraction 6.4.3 Principle of reversibility 6.4.4 Relative refractive index 6.4.5 Apparent depth 6.4.6 Critical angle and total internal reflection 6.4.8 Refraction in glass slab 6.5 Refraction at single spherical surface 6.5.1 Equation for refraction at single spherical surface 6.6 Thin lens 6.6.3 Lens makers formula and lens formula 6.6.4 Lateral magnification in thin lens 6.6.6 Focal length of lenses in contact 6.6.7 Silvered lenses 6.7 Prism 6.7.1 Angle of deviation produced by a prism 6.7.2 Angle of minimum deviation 6.7.3 Refractive index of the material of the prism 6.7.4 Dispersion of white light through a prism 6.7.5 Dispersive power 6.7.6 Scattering of sunlight
7. Wave optics	7.1 Theories on light 7.1.1 Corpuscular theory 7.1.2 Wave theory 7.1.3 Electromagnetic wave theory 7.1.4 Quantum theory 7.2 Wave nature of light 7.2.1 wave optics 7.2.2 Huygens' principle

	7.2.3	Proof for laws of reflection using Huygens principle
	7.2.4	Proof for laws of refraction using Huygens principle
	7.3	Interference
	7.3.1	Phase difference and path difference
	7.3.2	Coherant Sources
	7.3.3	Double slit as coherent source
	7.3.4	Young's double slit experiment
	7.3.5	Interference in white light (polychromatic light)
	7.3.6	Interference in thin films
	7.4	Diffraction
	7.4.2	Diffraction in single slit
	7.4.4	Fresnel's distance
	7.4.5	Difference between interference and diffraction
	7.4.9	Resloution
	7.5.3.1	Polariser and analyser
	7.5.3.2	Plane and partially polrised light
	7.5.3.3	Malus law
	7.5.3.4	Uses of polroids
	7.5.4	Polrisation by reflection
	7.5.4.1	Brewster's law
	7.5.4.2	Pile of plates
	7.6	Optical instruments
	7.6.1	Simple microscope
	7.6.1.1	Near Point focusing
	7.6.1.2	Normal focusing
	7.6.1.3	Resolving Power of Microscope
	7.6.1.4	Resolving Power of telescope
	7.6.2	Compound microscope
	7.6.3	Astronomocal telescope
	7.6.3.1	Magnification in astronomical telescope
	7.6.5	Reflecting telescope
	7.6.7.3	Astigmatism

8. Dual nature of radiation and mater	8.1 Introduction 8.1.1 Electron Emission 8.2 Photo Electric Effect 8.2.1 HERTZ, Hallwach and Lenards's Observation 8.2.2 Effect of intensity of incident Light on Photo Electric current 8.2.3 Effect of Potential Difference on Photo Electric current 8.2.4 Effect of Frequency on Incident Light on stopping potential 8.2.5 Laws of Photo Electric current 8.2.6 Concept of Quantization of Energy 8.2.7 Particle Nature of light - Einstein Explanation 8.2.8 Photo Electric cells and their Applications 8.3 Matter waves 8.3.1 Introduction wave Nature of Particles 8.3.2 De - Broglie wavelength 8.3.3 De Broglie wavelength of electron 8.3.4 Davisson - Germer Experiment 8.3.5 Electron Microscope 8.4 X - ray Spectra Continuous X Ray Spectra, Characteristic X Ray Spectra
9. Atomic and nuclear physics	9.1 Introduction 9.2 Electric Discharge Through gases Properties of Cathode Rays 9.2.1 Determination of Specific Charge (e/m) of electron - Thomsons experiment 9.2.2 Determination of charge of electron -Millikan's Oil Drop Experiment 9.3.2 Ruther ford Model 9.3.3 Bohr atom model 9.3.4 Atomic Structure 9.4.3 Atomic and Nuclear masses 9.4.4 Size and density of Nucleus 9.4.5 Mass Defects and Binding energy 9.4.6 Binding Energy 9.5 Nuclear Force 9.6.1 Alpha decay

	9.6.2 Beta Decay 9.6.3 Gamma Emission 9.6.4 Laws of Radioactivity 9.6.5 Half Life, Mean life 9.6.6 Carbon dating 9.7 Nuclear fission 9.8 Nuclear fusion
10. Electronics and communication systems	10.1 Introduction 10.1.1 Energy Band Diagram 10.1.2 Classification of materials 10.2 Types of Semi conductors 10.2.1 Intrinsic Semiconductor 10.2.2 Extrinsic Semi conductor 10.3.1 PN Junction Formation 10.3.2 PN Junction Diode 10.3.4 Rectification 10.3.5 Breakdown Mechanism 10.3.6 Zener Diode 10.4 The Bipolar Junction transistor 10.4.1 Transistor circuit Configuration 10.4.2 Transistor action in CB mode 10.4.3 Relation between α and β 10.4.4 Operating point 10.4.5 Transistor as a switch 10.5 Digital Electronics 10.5.1 Analog and digital signal 10.6 Boolean Algebra 10.7 De Morgans Theorem 10.7.1 De Morgans 1st Theorem 10.7.2 De Morgans 2nd Theorem 10.7.3 Integrated chips 10.8 Communication System 10.9 Modulation 10.9.1 Amplitude modulation 10.9.2 Frequency modulation 10.9.3 Phase modulation

11. Recent developments in physics	11.1 Introduction 11.2 Nano science and Nano technology 11.2.1 Nano Science 11.2.2 Interdisciplinary nature of nanotechnology 11.2.3 Nano in nature 11.3 Robotics 11.3.1 What is Robotics ? 11.3.2 Components of robotics 11.3.3 Types of Robotics
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PRACTICALS	
CLASS: 12	**SUBJECT: PHYSICS**
Sl.No	**Topic**
1	Determine the value of the Horizontal component of the earth magnetic field using tangent galvanometer. Take atleast four readings.
2	Compare the emf of two cells using potentiometer.
3	Adjust the grating for normal incidence using the spectrometer. Determine the wavelength of green, blue, yellow and red lines of mercury spectrum(the number of lines per metre length of the grating can be noted from the grating).
4	Voltage - current characteristics of a PN junction diode.
5	Verification of truth tables of logic gates using integrated circuits.
6	Verification of De morgan's Theorems.