Maharashtra State Board of
Secondary & Higher Secondary School, Pune

Department of Physics

Subject: Physics (54)
Standard: Twelve
Faculty: Science

Syllabus

XII Physics (Theory & Practical)

Theory Index

Sr. No.	Unit/Topic	Marks (without option)	Marks (with option)
1	Rotational Dynamics	05	07
2	Mechanical Properties of Fluids	05	07
3	Kinetic Theory of Gases and Radiation	05	07
4	Thermodynamics	05	07
5	Oscillation	04	05
6	Superposition of Waves	04	06
7	Wave Optics	05	07
8	Electrostatics	04	06
9	Current Electricity	04	06
10	Magnetic Fields due to Electric Current	04	06
11	Magnetic Materials	04	05
12	Electromagnetic Induction	05	07
13	AC Circuits	04	06
14	Dual nature of Radiation and Matter	04	05
15	Structure of Atoms and Nuclei	04	06
16	Semiconductor Devices	04	05
	Total	**70**	**98**

Syllabus

Chapter No.	Units and Subunits
1.	**1. Rotational dynamics** Introduction, Characteristic of circular motion, applications of uniform circular motion, vertical circular motion, Moment of Inertia as an Analogous Quantity for Mass, Radius of Gyration, Theorem of Parallel Axes and Theorem of Perpendicular Axes, Angular Momentum or Moment of Linear Momentum, Expression for Torque in Terms of Moment of Inertia, Conservation of Angular Momentum, Rolling Motion.
2.	**2. Mechanical Properties of Fluids** Introduction, Fluid, Pressure, Surface Tension, Fluids in Motion, Critical Velocity and Reynolds number, Stokes Law, Equation of Continuity, Bernoulli Equation.
3.	**3. Kinetic Theory of Gases and Radiation** Introduction, Behaviour of a Gas, Ideal Gas and Real Gas, Mean Free path, Pressure of Ideal Gas, Root Mean Square (rms) Speed, Interpretation of Temperature in Kinetic Theory, Law of Equipartition of Energy, Specific Heat Capacity, Absorption, Reflection and Transmission of Heat Radiation, Perfectly Blackbody, Emission of Heat Radiation, Kirchhoff's Law of Heat Radiation and it's Theoretical Proof, Spectral Distribution of Blackbody Radiation, Stefan-Boltzmann Law of Radiation, Numericals.
4.	**4. Thermodynamics** Introduction, Thermal Equilibrium, Zeroth Law of Thermodynamics, Heat, Internal Energy and Work, First Law of Thermodynamics: (Work and Heat are related), Thermodynamics state variables, Thermodynamics Process, Heat Engines, Refrigerators and Heat Pumps, Second Law of Thermodynamics, Carnot Cycle and Carnot Engine, Sterling Cycle.
5.	**5. Oscillations** Introduction, Explanation of Periodic Motion, Linear Simple Harmonic Motion, Differential Equation of S.H.M., Acceleration, Velocity and Displacement of S.H.M, Amplitude, Period, and Frequency of S.H.M., Reference Circle Method, Phase in S.H.M., Graphical Representation of S.H.M, Composition of two S.H.M.s having same period and along the same path, Energy of particle Performing S.H.M, Simple Pendulum, Angular S.H.M. and its Differential Equation, Free Oscillations, Forced Oscillations and Resonance.
6.	**6. Supervision of Waves** Introduction, Progressive waves, Reflection of waves, Supervision of Waves, Stationary, Waves, Free and forced Vibrations, Harmonics and Overtones, Sonometer, Beats, Characteristics of sound, Musical Instruments.
7.	**7. Wave Optics** Introduction, Nature of Light, Light As a Wave, Huygens Theory, Reflection of Light at a Plane Surface, Refraction of Light at a Plane Boundry Between Two Media, Polarization, Interference, Diffraction of Light, Resolving Power.
8.	**8. Electrostatics** Introduction, Application of Gauss Law, Electric Potential and Potential Energy, Electric Potential due to a Point Charge, a Dipole and a System of Charges, Equipotential Surfaces, Electrical Energy of Two Point Charges and of a Dipole in an Electrostatic Field, Conductors and Insulators, Free Charges and Bound Charges Inside a Conductor, Dielectrics and Electric Polarization, Capacitors and Capacitance, Combination of Capacitors in series and Parallel, Capacitance of a Parallel Plate Capacitors Without and With Dielectric Medium Between the Plates, Displacement Current, Energy Stored in a Capacitor, Van de Graaff Generator.

9.	**9. Current Electricity** Introduction, Kirchhoff's Laws of Electrical Network, Wheastone Bridge, Potentiometer, Galvanometer.
10.	**10. Magnetic Fields due to Electric Current** Introduction, Magnetic Force, Cyclotron Motion, Helical motion, Magnetic Force on a Wire Carrying a Current, Force on a Closed in a Magnetic Field, Torque on a current Loop, Magnetic Dipole Moment, Magnetic Potential Energy of a Dipole, Magnetic Field due to a Current (Biot-Savarts Law), Force of Attraction between two Long Parallel Wires, Magnetic Field Produced by a Circular Arc of a wire, Axial Magnetic Field Produced by Current in a Circular loop, Magnetic Lines for a current Loop, Amperes Law, Magnetic Field of a Solenoid and a Toroid.
11.	**11. Magnetic Materials** Introduction, Torque Acting on a Magnetic Dipole in a Uniform Magnetic Field, Origin of Magnetism in Materials, Magnetization and Magnetic Intensity, Magnetic Properties of Materials, Hysteresis, Permanent Magnet and Electromagnet, Magnetic Shielding.
12.	**12. Electromagnetic Induction** Introduction, Faradays Laws of Electromagnetic Induction, Lenzs Law, Flux of the Field, Motional Electromotive Force, Induced emf in a Stationary Coil in a Changing Magnetic Field, Generators, Back emf and back torque, Induction and Energy Transfer, Eddy Currents, Self-Inductance, Energy stored in a Magnetic Field, Energy Density of a Magnetic Field, Mutual Inductance, Transformer.
13.	**13. AC Circuits** Introduction, AC Generator, Average and RMS values, Phasors, Different Types of AC Circuits, Power in AC circuit, LC Oscillations, Electric Resonance, Sharpness of Resonance: Q factor, Choke coil.
14.	**14. Dual Nature of Radiation and Matter** Introduction, The Photoelectric Effect, Wave-Particle Duality of Electromagnetic Radiation, Photo cell, De Broglie Hypothesis, Davisson and Germer Experiment, wave-particle duality of Matter.
15.	**15. Structure of Atoms and Nuclei** Introduction, Thomsons Atomic Model, Geiger-Marsden Experiment, Rutherfords Atomic Model, Atomic Spectra, Bohrs Atomic Model, Atomic Nucleus, Nuclear Binding Energy, Radioactive Decays, Law of Radioactive Decays, Nuclear Energy.
16.	**16. Semiconductor Devices** Introduction, p-n Junction Diode as a Rectifier, Junction Break Down, Bipolar Junction Transistor, Logic Gates.

Practical Index

Sr. No.	Practical's Name
1	SPRING MASS OSCILLATOR
2	SURFACE TENSION
3	NEWTON'S LAW OF COOLING
4	SONOMETER I LAW OF LENGTH
5	SONOMETER II LAW OF TENSION
6	RESONANCE TUBE
7	CURRENT SENSITIVITY
8	LAWS OF RESISTANCES USING METER BRIDGE
9	RESISTANCE OF GALVANOMETER BY KELVIN'S METHOD
10	E_1/E_2 USING POTENTIONMETER
11	INTERNAL RESISTANCE OF CELL
12	μ_1 / μ_2 BY SUSPENSION METHOD
13	CHARACTERISTICS OF ZENER DIODE
14	STUDY OF LOGIC GATES
15	CHARACTERISTICS OF TRANSISTOR
	LIST OF ACTIVITIES
16	EFFECT OF DETERGENT ON SURFACE TENSION
17	SECONDS PENDULUM
18	MELDE'S EXPERIMENT
19	FACTORS AFFECTING THE RATE OF LOSS OF HEAT OF LIQUID
20	DIFFRACTION
21	HOUSEHOLD CIRCUIT
22	USE OF MULTIMETER
23	VARIATION OF POTENTIAL DROP
24	LIGHT DEPENDENT RESISTOR