

**ANNUAL CURRICULUM PLAN -2020-21**  
**PHYSICS—Class12**

**Education Vision: Equipping students for higher education and develop among students, sensitivity to contribute to the betterment of society through knowledge in Physics.**

**April to September**

CHAPTER NAME	TRANSCATION STRATEGIES AND INNOVATIVE PEDAGOGY	LEARNING OUTCOMES	Core Skills/Art Integration/ Interdisciplinary Linkages.
<p><b><u>Ch 1</u></b></p> <p><b><u>Electric charges</u></b></p> <p>1)electric charges; conservation of charge, coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. dielectric constant. linear ,surface and volume charge densities.</p> <p>2)Electric field, electric field due to a point charge, electric field lines, electric dipole, electric dipole moment electric field due to a dipole, torque on a dipole in a uniform electric field</p> <p>3)Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite</p>	<ul style="list-style-type: none"> <li>• Discussion and Questioning</li> <li>• Summarization</li> <li>• Prediction</li> <li>• Visualization</li> <li>• Activation and use of prior knowledge</li> <li>• Thinking</li> <li>• Understanding when comprehension breaks down</li> <li>• Personal responses to texts</li> <li>• Connection creation and explanation.</li> </ul> <ul style="list-style-type: none"> <li>➤ Ppt</li> <li>➤ You tube</li> </ul>	<p>Students acquires the basic knowledge of Electric charges, concept of electrostatic force in vector form different distribution of charges, Electric field produced by different distribution of charges and its</p>	<ul style="list-style-type: none"> <li>• <b>Core Skills</b> Self awareness, Decision making, observation skills, Analytical skills, Problem solving, Critical thinking, logical thinking, Application, Team building.</li> <li>• <b>Art Integration</b> <ul style="list-style-type: none"> <li>➤ Read science corner in newspaper and make clippings of news related to latest developments in science and technology</li> <li>➤ Read science journals</li> <li>➤ See science programmes on TV</li> <li>➤ Participate in discussions, debates, talk shows, science quiz</li> <li>➤ Drawing, music</li> <li>➤ Make projects,</li> </ul> </li> </ul>

<p>plane sheet and uniformly charged thin spherical shell (field inside and outside).</p>			<p>small demonstrations , activities to explain scientific concept in the chapter.</p> <ul style="list-style-type: none"><li>➤ Visit to science centre's</li><li>➤ Participate in field trips.,</li><li>➤ Participate in science workshops and exhibitions.</li><li>➤ Develop hands on activities related to the topic.</li></ul> <ul style="list-style-type: none"><li>• <b>Interdisciplinary Linkage</b> Mathematics, Chemistry, Biology, Geology, Medicine.</li></ul>
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- Worksheets
- CBSE Sample Paper
- Hands on learning
- Instructional conversations
- Thinking maps
- Context based learning
- Computational thinking
- Documented problem solving
  
- Ppt
- You tube

mathematical analysis.

Student will be able to relate the phenomena of charging of a body with daily life.

**Ch2 Electrostatic Potential and Capacitance**

1)Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field.

2)Conductors and insulators, free charges and bound charges inside a conductor.

3)Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor. Grouping of capacitors series and parallel. Action at sharp points.

Student will be able to relate the Electrical potential with electric field.

Student will be able to understand the working of charge storing device i.e, capacitor. Also the students will learn about the capacitance, dielectrics and its polarization.

Electrostatic shielding concept can used to inculcate the values like helping during thunder and lighting.

<p><b>Unit 2</b> <b>Current Electricity</b></p> <p>Current , drift velocity, ohms law, macroscopic form of ohms law, power, resistance, resistivity, carbon resistors, ohmic and non ohmic conductors, series and parallel combination, meter bridge and its application, potentiometer and its application, grouping of cells in series and parallel.</p>	<ul style="list-style-type: none"> <li>• Discussion and Questioning</li> <li>• Summarization</li> <li>• Prediction</li> <li>• Visualization</li> <li>• Activation and use of prior knowledge</li> <li>• Thinking</li> <li>• Understanding when comprehension breaks down</li> <li>• Personal responses to texts</li> <li>• Connection creation and explanation.</li> <li>• Worksheets</li> <li>• CBSE sample papers</li> </ul> <ul style="list-style-type: none"> <li>➤ Hands on learning</li> <li>➤ Instructional conversations</li> <li>➤ Thinking maps</li> <li>➤ Context based learning</li> <li>➤ Computational thinking</li> <li>➤ Documented problem solving</li> <li>➤ PPT</li> <li>➤ Youtube</li> </ul> <p><b>EXPERIMENTS</b></p> <ol style="list-style-type: none"> <li>1. To determine resistance per cm of a given wire by plotting a graph for potential difference versus current.</li> <li>2. To find resistance of a given wire using metre bridge and hence determine the resistivity (specific resistance) of its material.</li> <li>3. To verify the laws of combination (series) of resistances using a metre bridge.</li> </ol>	<p>Students will learn about the various parameters of electricity and should be able to link it with daily life</p>	<ul style="list-style-type: none"> <li>• <b>Core Skills</b> Self awareness, Decision making, observation skills, Analytical skills, Problem solving, Critical thinking, logical thinking, Application, Team building.</li> <li>• <b>Art Integration</b> <ul style="list-style-type: none"> <li>➤ Read science corner in newspaper and make clippings of news related to latest developments in science and technology</li> <li>➤ Read science journals</li> <li>➤ See science programmes on TV</li> <li>➤ Participate in discussions, debates, talk shows, science quiz</li> <li>➤ Drawing, music</li> <li>➤ Make projects, small demonstrations , activities to explain scientific concept in the chapter.</li> <li>➤ Visit to science centre's</li> <li>➤ Participate in field trips.,</li> <li>➤ Participate in science workshops and exhibitions.</li> <li>➤ Develop hands on activities related to the topic.</li> </ul> </li> <li>• <b>Interdisciplinary Linkage</b></li> </ul>
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4. To verify the laws of combination (parallel) of resistances using a metre bridge.  
5. To compare the EMF of two given primary cells using potentiometer.  
6. To determine the internal resistance of given primary cell using potentiometer.

Mathematics, Chemistry, Biology, Geology, Medicine.

Students are able to understand the concept of Potential difference and current and also the process of finding the unknown current in a loop using KVL and KCL.

Also they learned to find the least count of given measuring instrument. Values like need of saving electrical energy and importance of safety measures needed in domestic circuits stressed upon.

<p><b><u>Unit 3</u></b> <b><u>Magnetic effects of current and Magnetism</u></b></p> <p><b><u>Ch 4</u></b> <b><u>Moving charges and Magnetism</u></b> <u>Biot savarts law and its application</u> Amperes circuital law and its application <u>Torque</u>, moving coil galvanometer and its conversion into ammeter and voltmeter. Orbital magnetic moment.</p>	<ul style="list-style-type: none"> <li>• Discussion and Questioning</li> <li>• Summarization</li> <li>• Prediction</li> <li>• Visualization</li> <li>• Activation and use of prior knowledge</li> <li>• Thinking</li> <li>• Understanding when comprehension breaks down</li> <li>• Personal responses to texts</li> <li>• Connection creation and explanation.</li> <li>• Worksheets</li> <li>• CBSE sample papers</li> </ul> <p>➤ Experimental demonstration of Oersted's experiment.</p> <p>➤ Experimental demonstration of Plotting of Magnetic Field lines for Bar Magnet</p>	<ul style="list-style-type: none"> <li>• Student will learn about the relation between electricity and Magnetism and different methods to find the Magnetic field due to different types of conductor.</li> <li>• Student is able to apply the knowledge of motion of a charge in a uniform MF in cyclotron. Student knows about principle construction and working of a cyclotron.</li> <li>• Student will learn about the force between two parallel conductors and its mathematical analysis depending upon the directions of current and hence define 1A</li> <li>• Student can deduce the torque associated with a coil carrying current.</li> <li>• Student will learn about the conversion of galvanometer into ammeter and voltmeter of desired range.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Core Skills</b> Self awareness, Decision making, observation skills, Analytical skills, Problem solving, Critical thinking, logical thinking, Application, Team building.</li> <li>• <b>Art Integration</b> <ul style="list-style-type: none"> <li>➤ Read science corner in newspaper and make clippings of news related to latest developments in science and technology</li> <li>➤ Read science journals</li> <li>➤ See science programmes on TV</li> <li>➤ Participate in discussions, debates, talk shows, science quiz</li> <li>➤ Drawing, music</li> <li>➤ Make projects, small demonstrations , activities to explain scientific concept in the chapter.</li> <li>➤ Visit to science centre's</li> <li>➤ Participate in field trips.,</li> <li>➤ Participate in science workshops and exhibitions.</li> <li>➤ Develop hands on</li> </ul> </li> </ul>
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		<ul style="list-style-type: none"><li>• Student is able to differentiate between an ammeter and a voltmeter.</li><li>• Practical applications of magnetic field like in MRI can be helpful for society.</li></ul>	<p>activities related to the topic.</p> <ul style="list-style-type: none"><li>➤ Magnetic declination in Sikkim and its determination</li><li>• <b>Interdisciplinary Linkage</b> Mathematics, Chemistry, Biology, Geology, Medicine.</li></ul>
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### Ch-5 Magnetism and Matter

1)Current loop as a magnetic dipole and its magnetic dipole moment, magnetic dipole moment of a revolving electron, magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis, torque on a magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet as an equivalent solenoid, magnetic field lines; earth's magnetic field and magnetic elements.Time period of an oscillating compass needle.

2)Para-, dia- and ferro - magnetic substances, with examples. Curie temperature, hysteresis curve. Electromagnets and factors affecting their strengths, permanent magnets. Selection of materials for the making of permanent, electromagnets and the core of a transformer.

To determine the resistance of a galvanometer by half- deflection method and to find its figure of merit and current for full scale deflection.

➤ Demonstration that a current carrying conductor experiences force.

- Student can compare an EF with a MF and find an analogy between the two.
- She can correlate the concepts studied in electrostatics to find the torque and PE associated with bar magnet kept in a magnetic field.
- Is able to differentiate between dia, para, and ferromagnetic materials.

Based upon the above knowledge can select materials for electromagnets , permanent , magnets and core of transformer

## Unit 4

### EMI and AC

#### Ch 6 EMI

Faradays laws in electromagnetic induction, lenzs law, eddy current and application.

Self and mutual induction and deduce L and M. Magnetic potential energy.

- Discussion and Questioning
- Summarization
- Prediction
- Visualization
- Activation and use of prior knowledge
- Thinking
- Understanding when comprehension breaks down
- Personal responses to texts
- Connection creation and explanation.
- Worksheets
- CBSE sample papers
- PPT
- Youtube

Students will learn about the different method to induce an emf in a given conductor which is useful to understand the concept of Mutual and self

Induction. Using lenzs law they are able to find the direction of induced current. They will know about the application about eddy current in daily life.

Know about the difference between L and M.

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  - Read science journals
  - See science programmes on TV
  - Participate in discussions, debates, talk shows, science quiz
  - Drawing, music
  - Make projects, small demonstrations , activities to explain scientific concept in the chapter.
  - Visit to science centre's
  - Participate in field trips.,
  - Participate in science workshops and exhibitions.

### Ch 7 Alternating current

1) Alternating currents, peak and RMS value of alternating current/voltage; reactance and impedance; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattless current. Phase angle, power factor, impedance triangle

2) AC generator and transformer.

- To find the frequency of AC mains with a sonometer.
- Hands on learning
- Instructional conversations
- Thinking maps
- Context based learning
- Computational thinking
- Documented problem solving.
- Demonstration of eddy current
- Demonstration of EMI.

Students acquire the basic knowledge about the Principle construction working and real life application of Transformer and Dynamo and the major advantage of ac in power transmission.

She knows about the various current in an ac circuit, difference in behaviour of various circuit elements in ac circuit.

Acquires knowledge about resonance and Q factor.

- Develop hands on activities related to the topic.
- Electricity generation in Sikkim

- **Interdisciplinary Linkage**  
Mathematics, Chemistry, Biology, Geology, Medicine.

<p><b>Unit 5</b> <b>Ch 8:Electromagnetic waves</b></p> <p>Displacement current ,Modified form of amperes circuital law ,Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X- rays, gamma rays) including elementary facts about their uses.</p>	<ul style="list-style-type: none"> <li>• Discussion and Questioning</li> <li>• Summarization</li> <li>• Prediction</li> <li>• Visualization</li> <li>• Activation and use of prior knowledge</li> <li>• Thinking</li> <li>• Understanding when comprehension breaks down</li> <li>• Personal responses to texts</li> <li>• Connection creation and explanation.</li> <li>• Worksheets</li> <li>• CBSE sample papers</li> </ul> <p>Group Discussion to discuss the Practical Applications of EMW in field of Communication, Medical, etc.</p>	<p>Student understands the generation and real life application of electromagnetic wave depending upon the value of wavelength and frequency.</p> <p>Student acquires knowledge about the Practical application of EMW in our Daily life.</p>	<ul style="list-style-type: none"> <li>• <b>Core Skills</b> Self awareness, Decision making, observation skills, Analytical skills, Problem solving, Critical thinking, logical thinking, Application, Team building.</li> <li>• <b>Art Integration</b> <ul style="list-style-type: none"> <li>➤ Read science corner in newspaper and make clippings of news related to latest developments in science and technology</li> <li>➤ Read science journals</li> <li>➤ See science programmes on TV</li> <li>➤ Participate in discussions, debates, talk shows, science quiz</li> <li>➤ Drawing, music</li> <li>➤ Make projects, small demonstrations , activities to explain scientific concept in the chapter.</li> <li>➤ Visit to science centre's</li> </ul> </li> </ul>
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- Participate in field trips.,
- Participate in science workshops and exhibitions.
- Develop hands on activities related to the topic.

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**October to December**

<p><b>Unit 6 Optics</b> <b>Ch9 Ray optics and optical instruments</b></p> <p><b>1)Ray Optics:</b> Reflection of light, spherical mirrors, mirror formula, refraction of light, total internal reflection and its applications, optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens maker's formula, magnification, power of a lens, combination of thin lenses in contact, combination of a lens and a mirror, refraction and dispersion of light through a prism.</p> <p><b>2)Scattering of light</b> - blue colour of sky and reddish appearance of the sun at sunrise and sunset.</p> <p><b>3)Optical instruments:</b> Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers.</p> <p><b>Ch 10 Wave optics</b></p> <p><b>1)Wave optics:</b> Wave front and Huygens's principle, reflection and refraction of plane wave at a Plane surface using wave fronts.</p> <p><b>2)Proof of laws of reflection and</b></p>	<ol style="list-style-type: none"> <li>1. To find the value of <math>v</math> for different values of <math>u</math> in case of a concave mirror and to find the focal length.</li> <li>2. To find the focal length of a convex mirror, using a convex lens.</li> <li>3. To find the focal length of a convex lens by plotting graphs between <math>u</math> and <math>v</math> or between <math>1/u</math> and <math>1/v</math>.</li> <li>4. To find the focal length of a concave lens, using a convex lens.</li> <li>5. To determine angle of minimum deviation for a given prism by plotting a graph between angle of incidence and angle of deviation.</li> <li>6. To determine refractive index of a glass slab using a travelling microscope.</li> </ol>		<ul style="list-style-type: none"> <li>• <b>Core Skills</b> Self awareness, Decision making, observation skills, Analytical skills, Problem solving, Critical thinking, logical thinking, Application, Team building.</li> <li>• <b>Art Integration</b> <ul style="list-style-type: none"> <li>➤ Read science corner in newspaper and make clippings of news related to latest developments in science and technology</li> <li>➤ Read science journals</li> <li>➤ See science programmes on TV</li> <li>➤ Participate in discussions, debates, talk shows, science quiz</li> <li>➤ Drawing, music</li> <li>➤ Make projects, small demonstrations , activities to explain scientific concept in the chapter.</li> <li>➤ Visit to science centre's</li> <li>➤ Participate in field trips.,</li> <li>➤ Participate in science workshops and exhibitions.</li> </ul> </li> </ul>
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		<p>Student will learn about the different types of mirror and lenses and respective ray diagrams for image formation along the mathematical tactics and Analysis.</p> <p>Student will learn the different optical phenomena of in our daily life like Color of a sky and cloud, Advanced sunrise and delayed sunset etc.</p> <p>Student knows about the application of lens makers formula, prism and concepts related to prism Difference between microscope and telescopes</p>	<ul style="list-style-type: none"> <li>➤ Develop hands on activities related to the topic.</li> <li>• <b>Interdisciplinary Linkage</b> Mathematics, Chemistry, Biology, Geology, Medicine.</li> </ul>
<p>Refraction using Huygens's principle.</p> <p>3) Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light, diffraction due to a single slit, width of central maximum</p> <p>Resolving power of microscope and astronomical telescope,</p>		<p>Students can draw the wave fronts for different source of light Can apply the Huygens principle to deduce the laws of refraction and reflection of light. Student acquires a knowledge about YDSE, coherent sources Diffraction, polarization of light.</p>	

polarization, plane polarized light, Brewster's law; uses of plane polarized light and use Polaroid's.			
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	<p>7. To find refractive index of a liquid by using convex lens and plane mirror.</p> <p>8. To find the wavelength of a laser using diffraction of light..</p>	<p>They know about the application of Polaroid's in day to day life.</p>	
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<p><b>Unit 7</b>  <b>Dual nature of matter and radiation</b>  <b>Chapter 11</b> : Dual nature of matter and radiation  Photoelectric effect, Einstein photoelectric equation, matter waves, Davisson and Germer experiment.</p>	<ul style="list-style-type: none"> <li>• Discussion and Questioning</li> <li>• Summarization</li> <li>• Prediction</li> <li>• Visualization</li> <li>• Activation and use of prior knowledge</li> <li>• Thinking</li> <li>• Understanding when comprehension breaks down</li> <li>• Personal responses to texts</li> <li>• Connection creation and explanation.</li> <li>• Worksheets</li> <li>• CBSE sample papers</li> </ul> <ul style="list-style-type: none"> <li>➤ Hands on learning</li> <li>➤ Instructional conversations</li> <li>➤ Thinking maps</li> <li>➤ Context based learning</li> <li>➤ Computational thinking</li> <li>➤ Documented problem solving</li> <li>➤ PPT</li> <li>➤ YOUTUBE</li> </ul>	<p>Learners will be able to understand the dual nature of light (Wave and Particle) along with experimental and mathematical verification.</p> <p>Students understand the various graphs and photoelectric effect equation. Students are able to differentiate between the ray and wave nature of a light.</p> <p>Learners will be able to understand the Concept of atoms and nuclei with help of different models developed by different scientists (Rutherford's model, bohr's model etc.)</p>	<ul style="list-style-type: none"> <li>• <b>Core Skills</b>  Self awareness, Decision making, observation skills, Analytical skills, Problem solving, Critical thinking, logical thinking, Application, Team building.</li> <li>• <b>Art Integration</b> <ul style="list-style-type: none"> <li>➤ Read science corner in newspaper and make clippings of news related to latest developments in science and technology</li> <li>➤ Read science journals</li> <li>➤ See science programmes on TV</li> <li>➤ Participate in discussions, debates, talk shows, science quiz</li> <li>➤ Drawing, music</li> <li>➤ Make projects, small demonstrations , activities to explain scientific concept in the chapter.</li> <li>➤ Visit to science centre's</li> <li>➤ Participate in field trips.,</li> <li>➤ Participate in science workshops and exhibitions.</li> <li>➤ Develop hands on activities related to the topic.</li> </ul> </li> <li>• <b>Interdisciplinary Linkage</b>  Mathematics, Chemistry, Biology, Geology, Medicine.</li> </ul>
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<p>Ch 12 Atoms Alpha scattering experiment, Rutherford's and Bohr model ,hydrogen spectrum.</p>			
<p><b>Ch 13 Nuclei</b> Size of nucleus, radioactivity ,mass energy equivalence nuclear fission and fusion</p>		<p>Students understand mass energy equivalence and its application to find the BE energy of a nuclei. Student can differentiate between nuclear fission and fusion and understands the need of the hour to ban nuclear weapons and give our future generation a nuclear weapon free world.</p>	

**Unit9:Electronic Devices**  
**Ch 14 Semiconductor**  
**Electronics**

1)Energy bands in conductors, semiconductors and insulators (qualitative ideas only)

2)Semiconductor diode - I-V characteristics in forward and reverse bias, diode as a rectifier; Special purpose p-n junction diodes: LED, photodiode, solar cell and Zener diode and their characteristics, zener diode as a voltage regulator.

- To draw the I-V characteristic curve for a p-n junction in forward bias and reverse bias.
- To draw the characteristic curve of a zener diode and to determine its reverse break down voltage.
- To study the characteristic of a common - emitter *npn* or transistor and to find out the values of current and voltage gains.

Learners will be able to understand the Concept of Conductors, Insulator and semiconductor with the help of Band Energy Theory. Understands the working of pn diodes and draw forward and reverse biasing graphs.

Learners will be able to understand the Classification of semiconductors along with Practical applications in PN diode, Rectifiers, Optoelectronic devices.

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			<ul style="list-style-type: none"><li>➤ Develop hands on activities related to the topic.</li><li>• <b>Interdisciplinary Linkage</b> Mathematics, Chemistry, Biology, Geology, Medicine.</li></ul>

