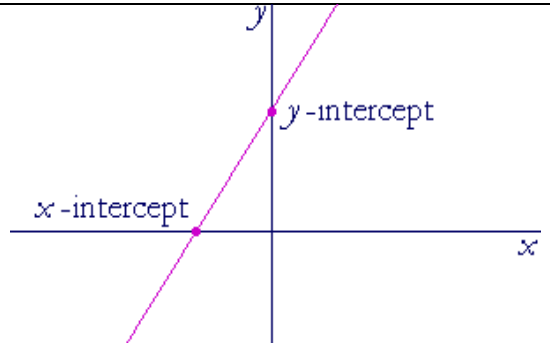
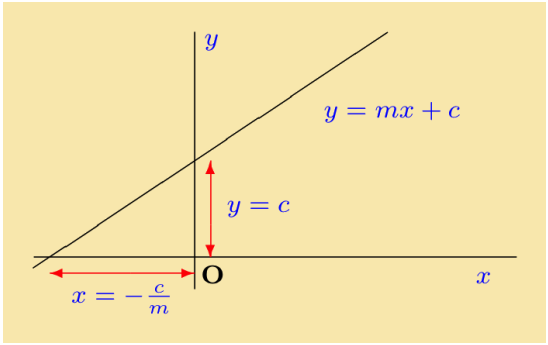
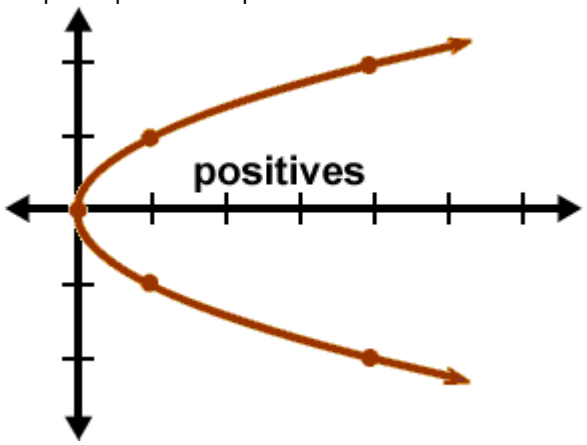
KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

CONTENT/GIST/CONCEPT/POINTS OF SYLLABUS	LEARNING OBJECTIVE	LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS	LEARNING OUTCOME
DAY- 1 Basic/ Previous knowledge of Mathematical Tools Algebraic Formula Trigonometrical Formulae Logrithm Limits	To apprise students about basic mathematics applicable while deriving/deducting the Formula of Physics.	**Algebra : Basic Formulae:** $(a+b)^2=a^2+b^2+2ab$ $(a-b)^2=a^2+b^2-2ab$ $(a+b)^3=a^3+b^3+3ab(a+b)$ $(a-b)^3=a^3-b^3-3ab(a-b)$ **Binomial Expansion :** $(1+x)^n= 1+nx+n(n-1)x^2/2+\ldots\ldots$ Special Case :- For x<<1, higher power terms can be neglected Hence, $(1+x)^n= 1+nx$ **Trigonometry:** • $Sin^2\theta + Cos^2\theta = 1$ • $\sin 2\theta = 2\ \sin\theta\cos\theta$ • $\cos 2\theta = 2\,Cos^2\theta - 1$ $= 1 - 2\ Sin^2\theta$ $= Cos^2\theta - Sin^2\theta$ • $\tan 2\theta = \frac{2\tan\theta}{1-tan^2\ \theta}$ • $\sin(A+B) = \sin A\cos B + \cos A\ Sin\ B$ • $\sin(A-B) = \sin A\cos B - \cos A\ Sin\ B$ • $\cos(A+B) = \cos A\cos B - \sin A\ sin\ B$ • $\cos(A-B) = \cos A\cos B + \sin A\ sin\ B$ • $\sin A + \sin B = 2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$ • $\sin A - \sin B = 2\cos\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$ • $\cos A + \cos B = 2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$ • $\cos A - \cos B = 2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$ • $\sin(-\theta) = -\sin\theta$ • $\cos(-\theta) = \cos\theta$ • $\tan(-\theta) = -\tan\theta$ • $\sin(90-\theta) = \cos\theta$ • $\sin(90+\theta) = \cos\theta$ • $\cos(90-\theta) = \sin\theta$	The students will be able to understand and apply the formulae in mathematical derivations and deductions. It also enriches the numerical ability of students. Expected learning outcomes may be verified through various tools like recall test, recognition tests/Application Exercises.

		• $\cos(90+\theta) = -\sin\theta$ • $\sin(180-\theta) = \sin\theta$ • $\sin(180+\theta) = -\sin\theta$ • $\cos(180-\theta) = -\cos\theta$ • $\cos(180+\theta) = -\cos\theta$ **Logrithm:** • $\log(mxn) = \log m + \log n$ • $\log\frac{m}{n} = \log m - \log n$ • $a^x = N$, Then $\log_a N = x$ **Limits:** • Consider the function $f(x)=x^2$ observe that as x takes values very close to 0 the value of f(x) also moves towards 0. We say $\lim_{x\to 0} f(x) = 0$ [To be read as limit of f(x) as x tends to 0 equals 0] The limit of f(x) as x tends to 0 is to be thought of as the value of f(X) should assume at x=0. In general as $x \to a, f(x) \to l$ then l is called limit of function f(x) which is symbolically written as $\lim_{x\to 0} f(x) = l$ **For Practice:** (i) Find value of $\cos 210^0$. (ii) Find value of $\sin 240^0$.	

CONTENT/GIST/ CONCEPT/POINTS OF SYLLABUS	LEARNING OBJECTIVE	LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS	LEARNING OUTCOME
DAY 2 **Basic concepts of graphs**	To make the students aware about the different types of graph and identification of graphs on the basis of algebraic expressions.	**Graphs :** A diagrammatic representation of variation of one quantity with respect to another is called a Graph. **Main Points** • From shape of graph we can have clear idea about the relationship between two quantities represented by it. • If graph is a straight line and passes through the origin, it is of the form y=mx. A straight line graph having positive or negative intercepts on y axis is represented by $y = mx \pm c$ • The slope of the graph and its intercepts on x or y axis gives us the values of physical quantity.	

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

Differentiation **Integration**		 • With the help of graph we can determine mean value from a large no. of observations. • Graph for straight line equation.  • Graph for parabolic equation  $y^2 = 4ax$ The general equation of parabola is $y = ax + bx^2$ • The equation for circle is $x^2 + y^2 = a^2$ • The equation for ellipse is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	The students will be able to derive the different formulae of physics with help of Calculus and also be able to apply the same while solving the numerical.

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

Basic Calculus : Differentiation

Rate of change of a physical quantity with respect to some variable is differentiation.

$y = f(X) \Rightarrow \frac{dy}{dx} = Rate\ of\ Change\ of\ y\ w.r.t\ x = differential\ coefficient\ of\ y\ w.r.t\ x$

Ex: Velocity = Rate of change of displacement

Or $v = \frac{dx}{dt}$

Acceleration = Rate of change of velocity

Or $a = \frac{dv}{dt}$

Formulae :

- $\frac{d}{dx}(x^n) = nx^{n-1}$
- $\frac{d}{dx}(\sin x) = \cos x$
- $\frac{d}{dx}(\cos x) = -\sin x$
- $\frac{d}{dx}(\log x) = \frac{1}{x}$
- $\frac{d}{dx}(e^x) = e^x$
- $\frac{d}{dx}(u \times v) = u \times \frac{dv}{dx} + v \times \frac{du}{dx}$
- $\frac{d}{dx}(u / v) = (v \times \frac{du}{dx} - u \times \frac{dv}{dx})/v^2$

Integration: Integration means summation

Formulae :

- $\int x^n\ dx = x^{n+1}$
- $\int \sin x\ dx = -\cos x$
- $\int \cos x\ dx = \sin x$
- $\int (u + v)\ dx = \int u\ dx + \int v\ dx$

Definite Integration:

If $\frac{d}{dx}\ f(x) = f'(x)\ then\ \int_b^a f'(x)dx = f(a) - f(b)$

Exercise for Students:

- Evaluate

$$\int_0^{\pi/4} Sin\ 2x\ dx$$

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>CONTENT/GIST/CONCEPT/POINTS OF SYLLABUS</td><td>LEARNING OBJECTIVE</td><td>LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS</td><td>LEARNING OUTCOME</td></tr>
<tr>
<td>DAY 3

Derived S.I. Units, Greek Alphabets, fundamental constants, Decimal multiples and sub-multiples and conversion of units from one system to another system.</td>
<td>1. To make the students learn and understand the significance of Units.
2. Students will be able write the values of Physical quantity correctly.</td>
<td>
Commonly used <u>Derived S.I. Units with special names :</u>
<table>
<tr><th>Physical Quantity</th><th>Name of S.I. Unit</th><th>Symbol</th></tr>
<tr><td>Frequency</td><td>Hertz</td><td>Hz</td></tr>
<tr><td>Energy</td><td>Joule</td><td>J</td></tr>
<tr><td>Force</td><td>Newton</td><td>N</td></tr>
<tr><td>Power</td><td>Watt</td><td>W</td></tr>
<tr><td>Pressure</td><td>Pascal</td><td>Pa</td></tr>
<tr><td>Electric Charge</td><td>Coulomb</td><td>C</td></tr>
<tr><td>Electric Potential Difference</td><td>Volt</td><td>V</td></tr>
<tr><td>Electric Resistance</td><td>Ohm</td><td>Ω</td></tr>
</table>
<u>Commonly used Greek alphabets to represent physical quantities</u>
<table>
<tr><th>Letters</th><th>Name</th><th>Letters</th><th>Name</th></tr>
<tr><td>α</td><td>Alpha</td><td>Θ</td><td>Theta</td></tr>
<tr><td>β</td><td>Beta</td><td>λ</td><td>Lamda</td></tr>
<tr><td>γ</td><td>Gamma</td><td>μ</td><td>mu</td></tr>
<tr><td>δ</td><td>delta</td><td>ν</td><td>nu</td></tr>
<tr><td>ε</td><td>epsilon</td><td>ϖ</td><td>omega</td></tr>
<tr><td>η</td><td>eta</td><td>ρ</td><td>rho</td></tr>
<tr><td>ϕ</td><td>phi</td><td>ζ</td><td>tau</td></tr>
</table>
<u>Fundamental Constants</u>
<table>
<tr><th>Constant</th><th>Symbol</th><th>Value in S.I. Unit</th></tr>
<tr><td>Acceleration due to</td><td>g</td><td>9.8 m/s^2</td></tr>
</table>
</td>
<td>Students will be able to convert units from one system into another system and will also get to know about Greek alphabets and decimal multiples, sub-multiples.</td>
</tr>
</table>

Gravity		
Avogadro Constant	N_A	6.023×10^{23} mol^{-1}
Electronic Charge	e	1.6×10^{-19} C
Electronic rest mass	m_e	9.1×10^{-31} Kg
Rest mass of Proton	m_p	1.672×10^{-27} Kg
Rest mass of Neutron	m_n	1.674×10^{-27} Kg
Speed of Light	c	3.0×10^{8} m/s

Decimal Multiples and Sub-multiples to be used in S.I. Units

Sub-multiples/Multiples	Prefix	Symbol
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10	deca	da
10^{2}	hecto	h
10^{3}	kilo	K
10^{6}	mega	M
10^{9}	Giga	G
10^{12}	Tera	T

Fill in the blanks by suitable conversion of units

G= 6.67×10^{-11} Nm^2 / Kg^2 = _ _ _ _ _ _ _ cm^3 s^{-2} g^{-1}

= $6.67 \times 10^{-11}(kg\text{-}ms^{-2})m^2Kg^{-2}$

= $6.67 \times 10^{-11}Kg^{-1}m^3s^{-2}$

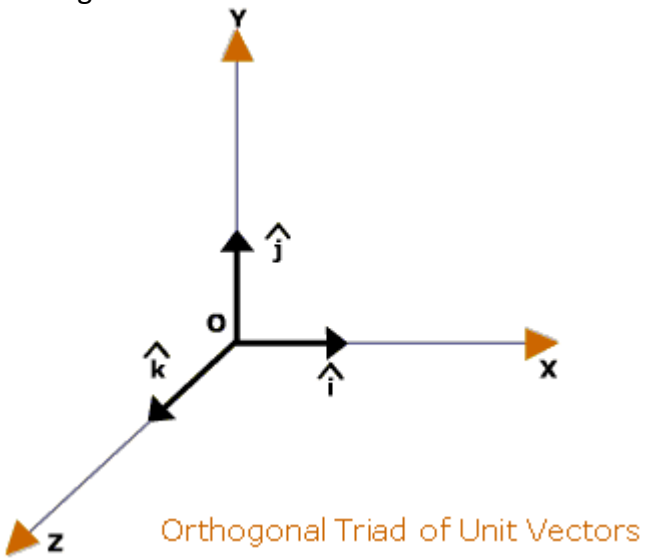
= $6.67 \times 10^{-11} \times (1/1000)\ g^{-1}(10^6cm^3)s^{-2}$

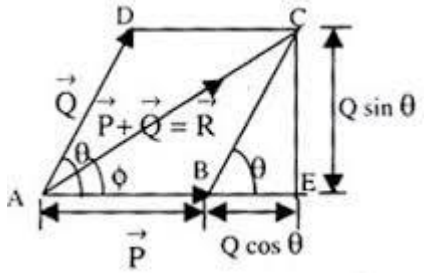
= $6.67 \times 10^{-8}g^{-1}cm^3\ s^{-2}$ Ans.

For Practice:

1. 1 Kgm^2s^{-2}= _ _ _ _ _ _ _ _gcm^2s^{-2}
2. 3 ms^{-2}= _ _ _ _ _ _ _ _ _Km h^{-2}

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

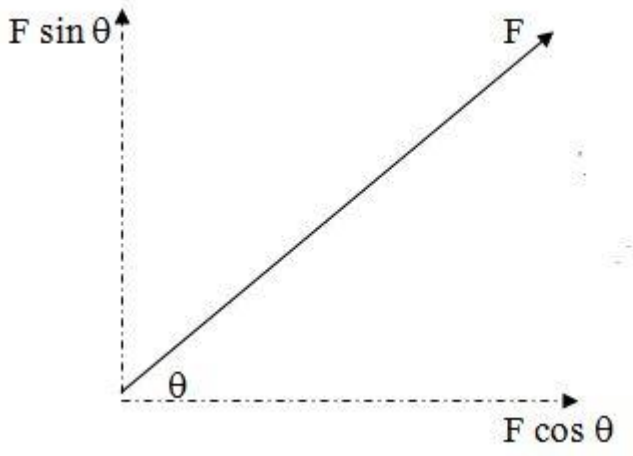
CONTENT/GIST/CONCEPT/POINTS OF SYLLABUS	LEARNING OBJECTIVE	LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS	LEARNING OUTCOME
DAY 4 Basic Concepts of Vector	1.To recapitulate Vector Concepts 2.To understand the application of vectors to find the direction of different vector quantities like Force, Field Intensities etc.	**Key Points to Remember** 1. All the measurable physical quantities can be divided into two classes: • Scalars • Vectors 2. Scalars – The physical quantities having magnitude but no direction. Ex- Speed, length, mass etc. 3. Vectors - The physical quantities having both magnitude and direction. Ex- Velocity, Acceleration, Momentum etc. 4. Vectors can be added, subtracted and multiplied but cannot be divided by another vector. 5. Orthogonal unit vectors :  Orthogonal Triad of Unit Vectors 6. Unit Vectors – Has magnitude one $\hat{a} = \frac{\vec{a}}{\lvert\vec{a}\rvert}$ 7. Resultant of two vectors**P&Q**inclined at an angle θ	Vector concepts will lead students to understand basic concepts of electric and magnetic fields.



$$R = \sqrt{P^2 + Q^2 + 2PQ\cos\theta}$$

$$\phi = \tan^{-1}\left[\frac{Q\sin\theta}{P + Q\cos\theta}\right]$$

8. A vector inclined at an angle with the horizontal can be resolved into two rectangular components has



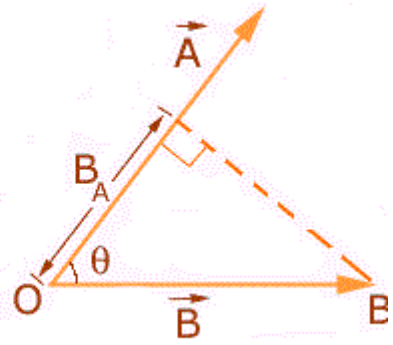
9. A vector can be expressed as

$$\vec{A} = A_x\hat{\imath} + A_y\hat{\jmath} + A_z\hat{k}$$

$$\vec{B} = B_x\hat{\imath} + B_y\hat{\jmath} + B_z\hat{k}$$

10. Dot Product or Scalar Product

$$\vec{A} \cdot \vec{B} = AB\cos\theta$$



$$\mathbf{i}\cdot\mathbf{i} = \mathbf{j}\cdot\mathbf{j} = \mathbf{k}\cdot\mathbf{k} = \cos 0 = 1$$

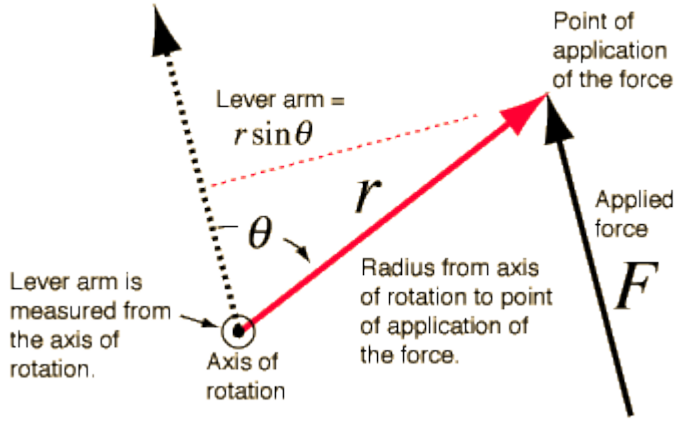
$$\mathbf{i}\cdot\mathbf{j} = \mathbf{j}\cdot\mathbf{k} = \mathbf{k}\cdot\mathbf{i} = \cos\left(\pi/2\right) = 0$$

11. Cross Product or Vector Product

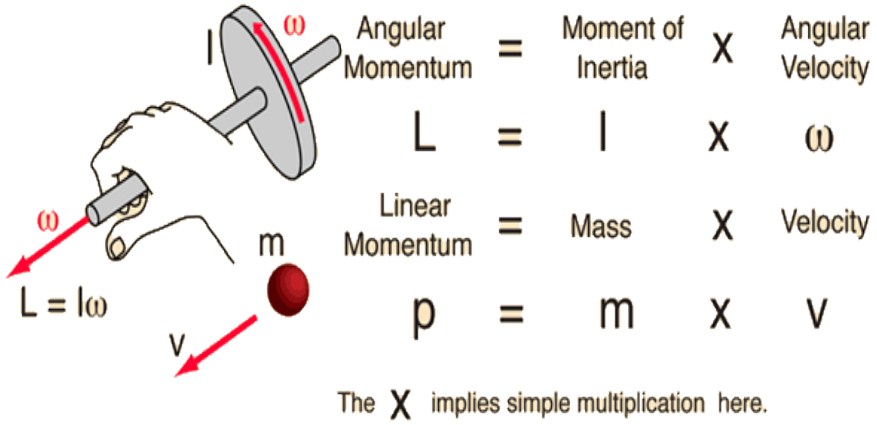
$$a \times b = |a||b|\sin\theta$$

		$\hat{i} \times \hat{j} = -\hat{j} \times \hat{i} = \hat{k}$ $\hat{j} \times \hat{k} = -\hat{k} \times \hat{j} = \hat{i}$ $\hat{k} \times \hat{i} = -\hat{i} \times \hat{k} = \hat{j}$ $\hat{i} \times \hat{i} = \hat{j} \times \hat{j} = \hat{k} \times \hat{k} = 0$ **For Practice:** Two problems one related to dot product and another related to cross product will be solved with the help of students.	
CONTENT/GIST/CONCEPT/POINTS OF SYLLABUS	**LEARNING OBJECTIVE**	**LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS**	**LEARNING OUTCOME**

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

DAY 5 Basic concepts in Mechanics.	To make the students a quick revision of the concepts and formulae of Mechanics. To make the students able to apply the formulae in the derivations of different formulae of electrostatics and magnetism.	• **MOTION –** An object is said to be in motion if it changes its position w.r.t. time. • **INERTIA –** Resistance to change. A body cannot change its state of motion on its own. External force is required to change the state of motion. • Discussion of Laws of Motion and Equations of Motion. • Calculation of acceleration from Newton's second law. • **COUPLE OF FORCE-** A pair of equal and opposite forces having different lines of action. It produces rotation without transition. • **TORQUE –** Turning effect(Analogue of force in rotational motion) of force. $\text{torque} = \tau = rF\sin\theta$  • **Work in rotational motion** – W = $\int \tau . d\theta$ • **Moment of Inertia –** I= $\sum mr^2$,[Analogue of mass in rotational motion] • **Angular Momentum -** $\vec{L} = \vec{r} \times \vec{p}$ [Moment of momentum]	This activity/ exercise will give clarity to students to understand some "difficult to understand" concepts of mechanics. The students enable themselves to understand the cause and effect different types of fields.

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION



Turning movement of a particle about axis of rotation.

- **Gravitational Field**-It is space around a mass or an assembly of masses over which it can exert gravitational forces on other masses.
- **Gravitational Field Strength-**Gravitational Field strength at a point in the gravitational field is the force experienced by a unit mass placed at that point.It is directed towards the particle producing the field.
- **Gravitational Potential-**Gravitational Potential at a point in the gravitational field is the amount of work done in bringing a unit mass from infinity to that point.

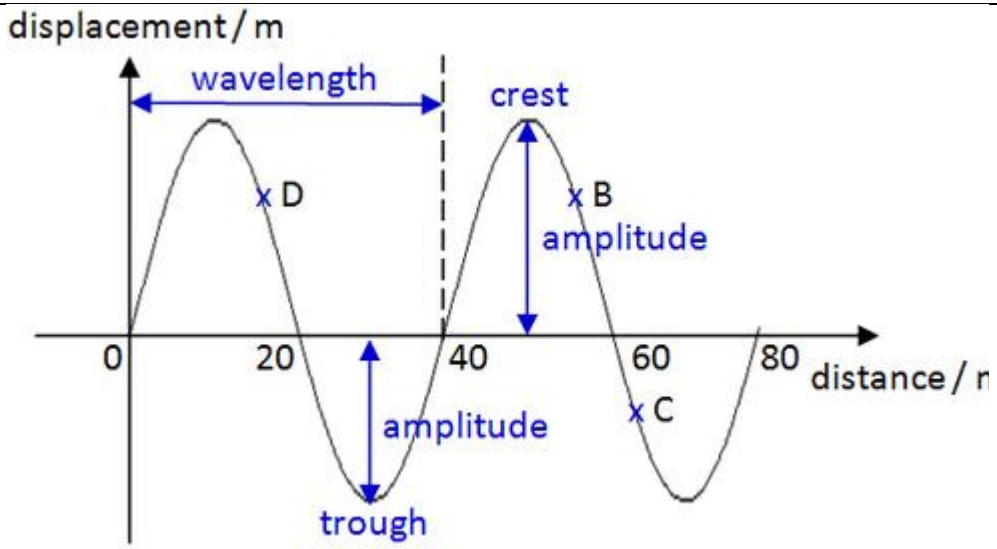
For Practice:

- Write down the formula for work done in rotatory motion.
- In the equation $= \frac{dJ}{dt}$; if τ is torque, then what is the unit of J?

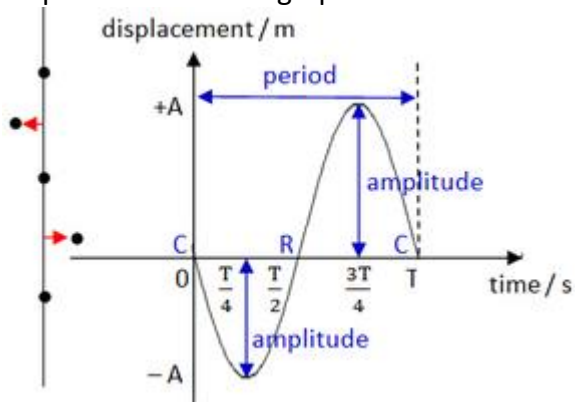
CONTENT/GIST/CONCEPT/POINTS OF SYLLABUS	LEARNING OBJECTIVE	LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS	LEARNING OUTCOME

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

DAY 6 Basic concepts of waves and oscillations.	To let students to learn basic concepts of waves and oscillatory motions.	• **OSCILLATORY MOTION :**Periodic to and fro motion about mean position. (Discussion on terms – Amplitude, Time Period, Frequency , Angular Frequency , Wavelength) • **Phase :** The quantity that expresses the state of motion i.e. position and direction of motion of a particle at an instant with reference to a given point. • **Relation between Phase difference and Path difference** Phase difference =$\frac{2\pi}{\lambda}$ X Path difference (Derivation required) • **Free Oscillations:**The oscillations without outside interference are free oscillations. • **Forced Oscillations:**The oscillations which are compelled to take place with a frequency other than the natural frequency. • **Resonance :**Phenomenon of reducing an oscillation in a system by the influence of an external periodic force having the same frequency as that of natural frequency of the system. Amplitude of oscillation becomes maximum at resonance. • **Waves :**A kind of disturbance. **1.** A kind of disturbance which travels through a medium without any net transport of medium is called a mechanical wave. **2.** Electromagnetic Waves – These waves need no medium to travel. • Mechanical Waves are of two types – 1. Longitudinal 2. Transverse (Discussion on longitudinal and transverse waves) • **Graphs :**Displacement – distance graph in a wave.	Students will be able to apply the previous knowledge of wave & oscillations in understanding the electromagnetic waves, Alternating Currents and wave optics.



Displacement – time graph in a wave.

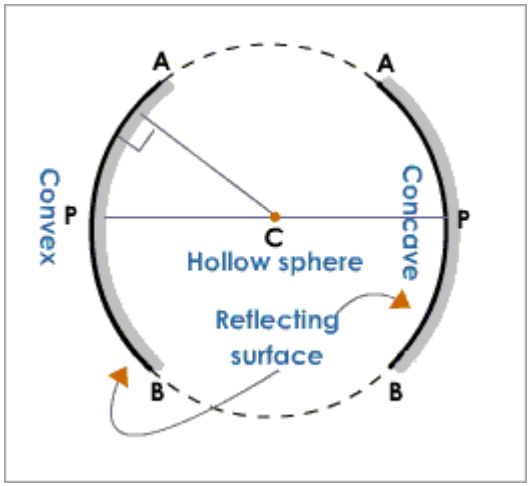
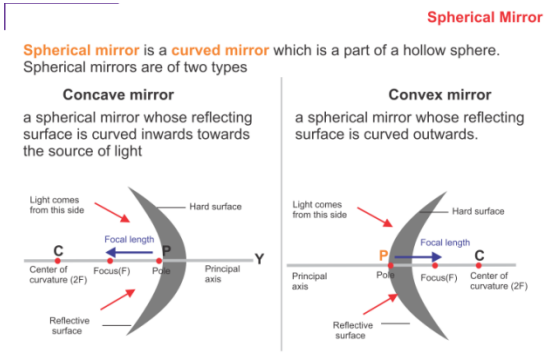


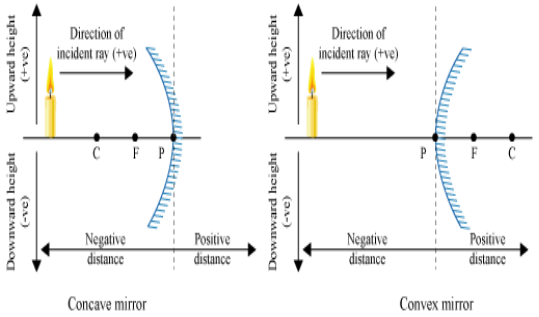
For Practice :-

- The amplitude of a body performing simple harmonic motion is 1.5 m. Write down the distance covered and displacement of body after 1 complete oscillation.
- Natural frequency of musical instrument is 256 Hertz. When in oscillation a periodic force of 300 Hertz frequency is applied on it, what will be effect on amplitude of oscillations?

ONTENT/GIST/CONCEPT/POINTS OF SYLLABUS	LEARNING OBJECTIVE	LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS	LEARNING OUTCOME

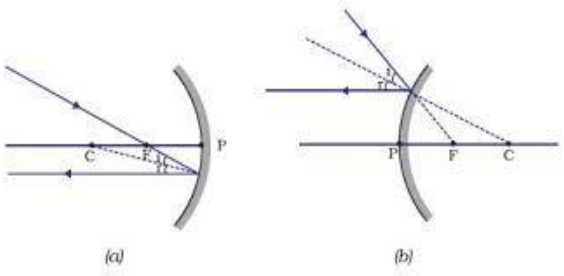
KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

DAY 7 Reflection from Spherical Mirrors & Image formation. Basic concepts of Optics Ray diagrams and Image formations.	To enable the students to understand the concepts of image formations by spherical mirrors and lenses. To develop a "connect" between previous knowledge of optics and the 'ray optics' of Class XII.	•  •  •	Students will draw the error free ray diagram. Students are able to elaborate the terminology of optics.

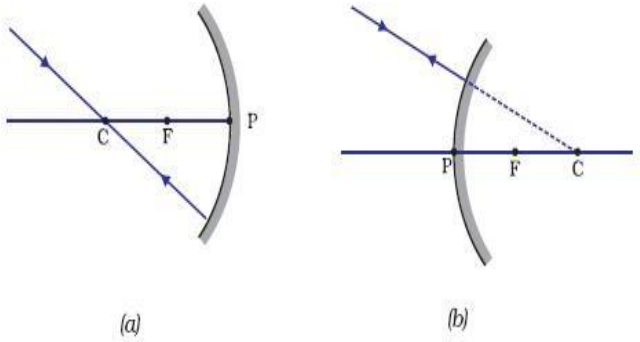


- Rules for drawing images formed by Spherical Mirrors

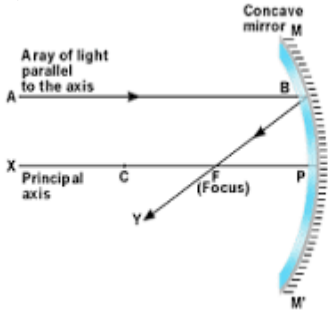
(1)



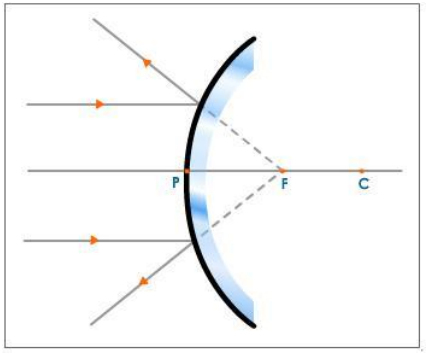
(2)



(3)

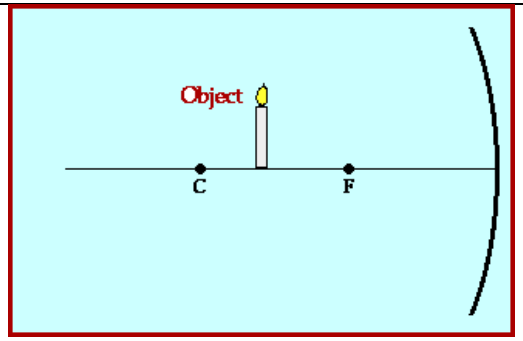


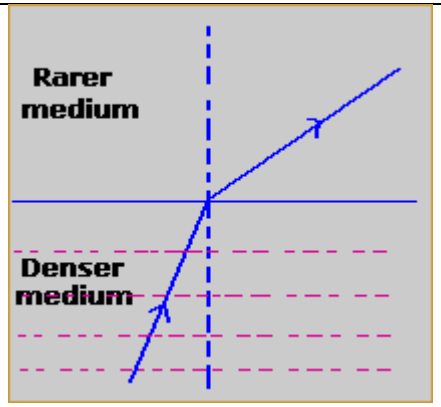
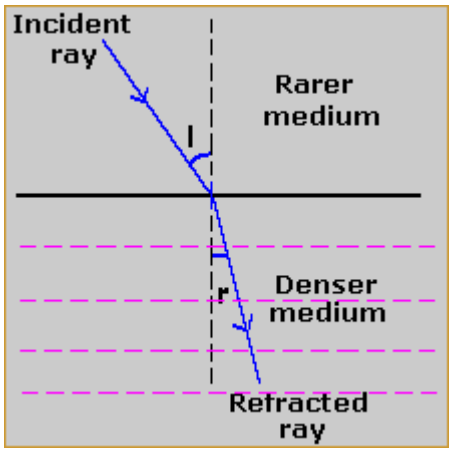
(4)



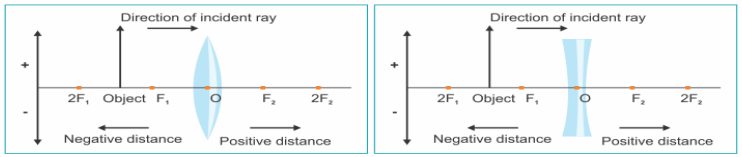
For Practice

An object is kept in front of concave mirror as shown.Complete the ray diagram showing the image formation of object.

			
CONTENT/GIST/CONCEPT/POINTS OF SYLLABUS	**LEARNING OBJECTIVE**	**LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS**	**LEARNING OUTCOME**
Day 8 Basic concept/ Ray diagrams of refraction.	To make the students understand the meaning and significance of refractive index. To enable the students to learn the Effect of refractive index on refraction.	• Refraction: Bending of light due to change in density. • Snell's Law: Refractive index (R.I) n=sin i/sin r =c/v $_1n_2=n_2/n_1=v_1/v_2$ • **<u>Factors on which R.I. depends:</u>** (1) Nature of medium (2) Wavelength of Light (3) Temperature (4) Nature of surrounding medium • (1)	The students shall be able to draw the correct diagram and image formation by spherical lens.

		 Rarer medium Denser medium (2)  Incident ray Rarer medium i r Denser medium Refracted ray •	

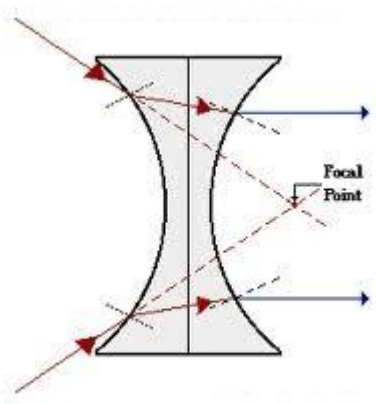
Sign Convention for Lenses



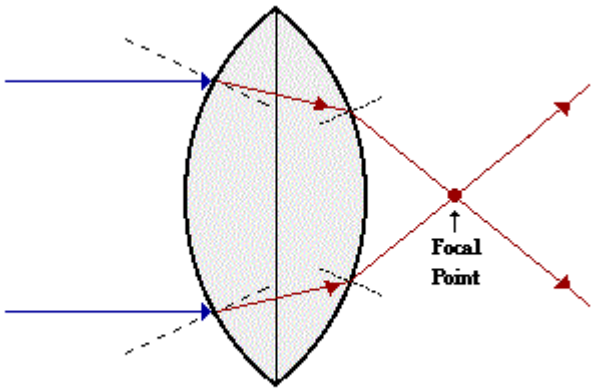
Type of lens	u	v		f		Height of the image (h_i)		Height of the object (h_o)
		Real	Virtual	Real	Virtual	Real	Virtual	
Convex	negative	positive	negative	positive	No virtual focus	negative	positive	positive
Concave	negative	No real image is formed	negative	No real focus	negative	No real image is formed	positive	positive

Rules for drawing images formed by spherical lenses

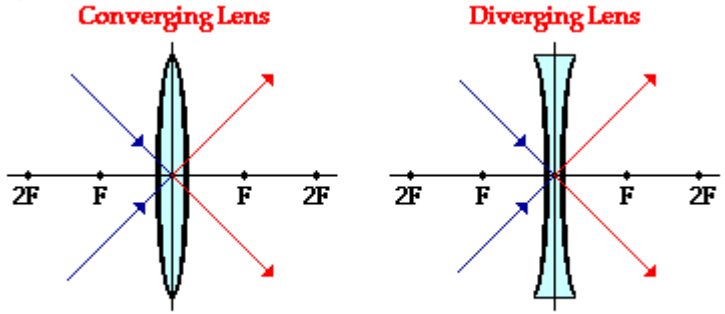
(1)



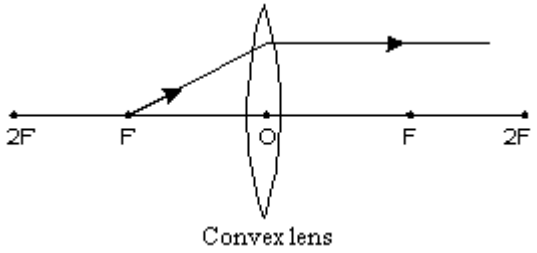
(2)


Focal
Point

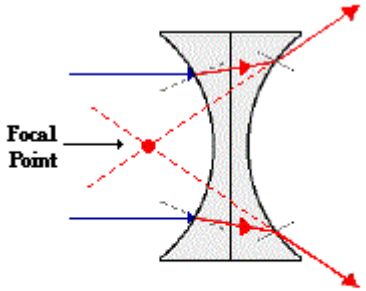
(3)


Converging Lens
Diverging Lens
2F
F
F
2F
2F
F
F
2F

(4)


2F
F
O
F
2F
Convex lens

(5)



For Practice:

(1) For the same angle of incidence, the angles of refraction in media P, Q, R are 35^0, 25^0, 15^0. In which medium will the velocity of light be minimum ?

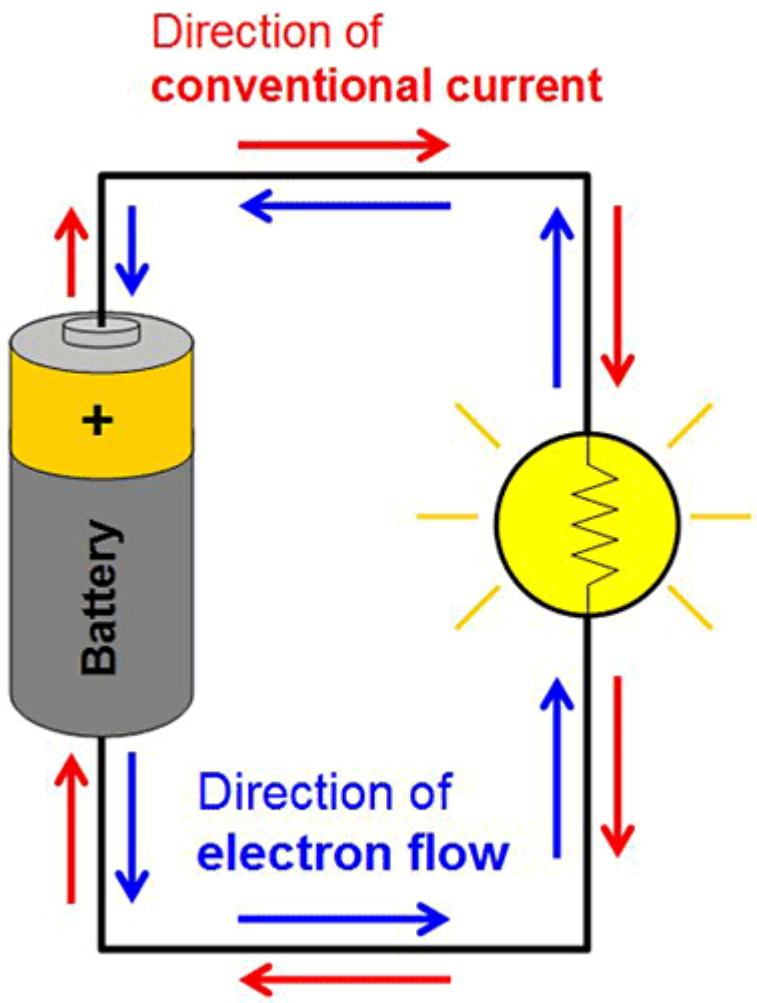
(2) A convex lens is held in water. What would be the change in focal length?

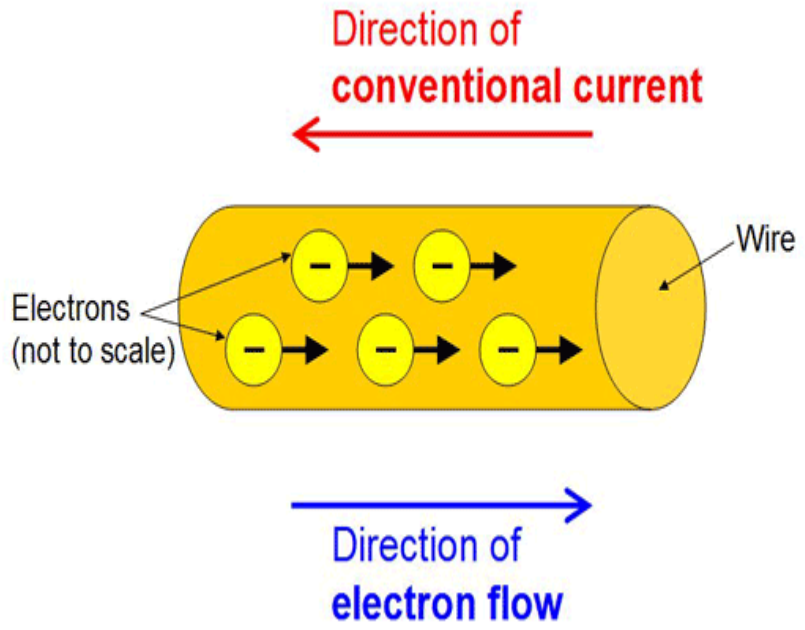
CONTENT/GIST/CONCEPT/POINTS OF SYLLABUS	LEARNING OBJECTIVE	LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS	LEARNING OUTCOME
DAY 9 Electrostatics	To develop understanding for electric charge and electric current. The students will also be able to understand properties of electric charge	1. **ELECTRIC CHARGE–** It is an intrinsic property of elementary particles like electrons and protons which gives rise to electric force between various objects. **Types:** 1. Positive Charge 2. Negative Charge 3. Like charges repel and unlike charges attract each other 4. Two kinds of charges developed on rubbing	The students will be able to respond the about the basic properties of electric charge, electrification and the types of electric charges. Students will also be able to differentiate the Charge and Mass and analogy between them.

Positive Charge	Negative Charge
1. Glass Road	1. Silk Cloth
2. Flannel or cat skin	2. Ebonite Rod
3. Woolen Cloths	3. Amber Rod
4. Woolen Coat	4. Plastic Seat
5. Woolen Carpet	5. Rubber Shoes

	and effect of electric charge in rest/Motion.	1. Conductors – The substances through which electric charges can flow easily. Ex- Metals 2. Insulators - The substances through which electric charges cannot flow. Ex- Paper, Mica, Wood 3. Quantization of Charge – The charge on a body exist in discrete amounts. $q = \pm ne$ i.e. the charge on a body is an integral multiple of electronic charge. 4. Electroscope – Device to detect the presence of charge on a body. 5. Additivity of Charge –Total charge on a system is the algebraic sum of all individual charges located inside the system. 6. Conservation of charge – 1. Total charge of an isolated system remains constant 2. Electric charges can neither be created nor destroyed. They can only be transferred from one body to another. 1. Discussion on 'a body can be charged by conduction and induction'. **For Practice:** 1. Which is bigger a Coulomb or Charge on an Electron? How many electronic charges form one Coulomb of Charge? 2. When a glass rod is rubbed with silk cloth, the glass rod acquires a charge of 1.6 X 10^{-13} C. What is charge on silk cloth?	More questions may be asked
CONTENT/GIST/CONCEPT/POINTS OF SYLLABUS	**LEARNING OBJECTIVE**	**LEARNING ACTIVITY/EXERCISE BY TEACHERS/ STUDENTS**	**LEARNING OUTCOME**

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

DAY-10 Basic terminology/ laws of current electricity.	To develop ability among the students to understand and correlate with the previous knowledge of current electricity with the high cognitive deductions and the concepts.	• Electric Current – Rate of flow of electric charge w.r.t time  	The students will be able to understand the basic mechanism of flow of current and its relation with electric potential. Students will also be able to differentiate the role of Elecric Potential Potential/Potential Difference and E.M.F.



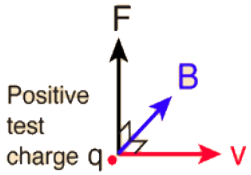
- Ohm's Law – The current flowing through a conductor is directly proportional to the potential difference applied across its ends provided physical conditions remains unchanged.
- Resistance – Opposition to the flow of current

$$R = \frac{V}{I}$$

- Terminal Potential Difference – The potential difference between the terminals of a cell in closed circuit (i.e. when current flows through it)
- EMF of a cell - The potential difference between the terminals when no current flows through the cell (i.e. in an Open Circuit)
- Electric Energy – The total work done (or energy supplied) by the source in maintaining current in circuit for a given time is electric energy consumed in circuit.
  Electric Energy = Work(W)= V X Q = V X (I X T)= V X I X T
- Electric Power – The rate at which work is done by source in maintaining current in circuit is called electric power.
  Electric Power = W/T = V X I

- Concept of Magnetic Field – The space around a current carrying conductor in which its magnetic effects can be experienced is called Magnetic Field.
- Lorentz Magnetic Force – A current carrying conductor placed in a magnetic field experiences a force leads to a conclusion that charges moving in a magnetic field experiences forces.
  Force experienced by a charge is

$$\vec{F} = q\vec{v} \; x \; \vec{B}$$



For Practice :-

1. Calculate the no. of electrons crossing a given cross section in 1 sec to constitute a current of 1A.
2. Battery of EMF 10 V and internal resistance 3 Ω if connected to a resistor. If the current in circuit is 0.5A,find
   (a)The resistance of resistor.
   (b)Terminal voltage of battery.