8th science guide EM

1.Measurement

I. Choose the best answer.

1. Which one the following systems of unit is the British System of unit?

a. CGS b. MKS **c. FPS** d. SI

2. Electric current is a ___quantity

a. base b. supplementary c. derived d. professional

3. SI unit of temperature is ___

a. Celsius b. Fahrenheit **c. kelvin** d. ampere

4. Luminous intensity is the intensity of_____

a. laser light b. UV light **c. visible light** d. IR light

5. Closeness of two or more measured values is called as ___

a. accuracy **b. precision** c. error d. approximation

6. Which one of the following statement is wrong?

a. Approximation gives accurate value.

b. Approximation simplifies the calculation.

c. Approximation is very useful when little information is available.

d. Approximation gives the nearest value only.

II. Fill in the blanks.

1. The solid angle is measured in ____(**steradian)**

2. The coldness or hotness of a substance is expressed by ____(**temperature)**.

3. ____ is used to measure electric current.(**Ammeter)**

4. One mole of a substance contains ___atoms or molecules.(**6.023×10^{23})**

5. The uncertainty in measurement is called as ____(**error)**.

6. The closeness of the measured value to the original value is ___(**Accuracy)**.

7. The intersection of two straight lines gives us ____(**plane angle**.)

III. State true or false. If false, correct the statement.

1.Temperature is a measure of total kinetic energy of the particles in a system. **False (average)**

2. If one coulomb of charge is flowing in one minute, it is called 'ampere'. **False (per second)**

3. Amount of substance gives the number of particles present in a substance. **True**

4. Intensity of light coming from a candle is approximately equal to one 'candela'. **True**

5. Quartz clocks are used in GPS devices. **False (Atomic) .**

6.Angle formed at the top of a cone is an example for 'plane angle'. **True**

7. The number 4. 582 can be rounded off as 4. 58.**True**

IV. Match the following.

Ans:

Temperature	Closeness to the actual value	**Measure of hotness or coldness**
Plane angle	Measure of hotness or coldness	**Angle formed by the intersection of two planes**
Solid angle	Closeness to two or more measurements	**Angle formed by the intersection of three or more planes**
Accuracy	Angleformedby the intersection of three ormore planes	**Closeness to the actual value**
Precision	Angle formed by the intersection of two planes	**Closeness to two or more measurements**

V. Consider the statements given below and choose the correct option.

a. Both assertion and reason are true and reason is the correct explanation of the assertion.

b. Both assertion and reason are true but reason is not the correct explanation of the assertion.

c. Assertion is true, but reason is false.d. Both assertion and reason are false.

1. Assertion: The SI system of units is the suitable system for measurements.

Reason: The SI unit of temperature is kelvin.

Ans (b) both assertion and reason are true but reason is not the correct explanation ' of the assertion

Correct explanation: In SI system the units are precisely defined and have the same value everywhere.

2. Assertion: Electric current, amount of substance, luminous intensity are the fundamental physical quantities.

Reason: They are independent of each other.

Ans (a) both assertion and reason are true and reason is the correct explanation of the assertion

3. Assertion: Radian is the unit of solid angle.

Reason: One radian is the angle subtended at the centre of a circle by an arc of length equal to its radius.

Ans Assertion is false, but reason is true

Correct explanation: Radian is the unit of plane angle.

VI. Answer very briefly.

1. How many base quantities are included in SI system? **Seven.**

2. Give the name of the instrument used for the measurement oftemperature**.** **Thermometer.**

3. What is the SI unit of luminous intensity? **Candela (cd).**

4 What type of oscillations are used in atomic clocks? **Periodic vibrations.**

5. Mention the types of clocks based on their display. **Analog clock and digital clock**.

6. How many times will the 'minute hand' rotate in one hour**?** **One time.**

7. How many hours are there in a minute? **60 minutes = 1 hr**1 minute = 1/60 = 0.0167 hours.

VII. Answer briefly.

1. What is measurement?

Measurement is the process of finding an unknown physical quantity by using a standard quantity.

2.Name the three scales of temperature. **Celsius, Fahrenheit, Kelvin**

3. Define - Ampere.

One ampere is defined as one 'coulomb' of charge moving in a conductor in one second.

4. What is electric current?

The magnitude of an electric current is the amount of electric charges flowing through a conductor in one second.

5. What do you mean by luminous intensity?

The measure of the power of the emitted light, by a light source in a particular direction, per unit solid angle is called as luminous intensity.

6. Define - Mole.

Mole is defined as the amount of substance, which contains 6.023×10^{23} entities.

7. What are the differences between plane angle and solid angle?

Plane Angle	Solid Angle
Angle between the intersection of two lines or planes	Angle between the intersection of three or more planes at a common point.
It is two dimensional	It is three dimensional.
Unit is radian	Unit is steradian

VIII Answer in detail.

1. List out the base quantities with their units.

QUANTITY	UNIT	SYMBOL
Lenth	metre	m
Mass	kilogram	kg
Time	second	s
Temperature	kelvin	K
Electric Current	ampere	A
Amount of substance	mole	mol
Luminous Intensity	candela	cd

2. Write a short note on different types of clocks.

Types of clocks based on display(i) Analog clocks(ii) Digital clocks

(i) Analog clocks **:** It looks like a classic clock. It has three hands to show the time.

- ❖ Hours Hand : It is short and thick. It shows 'hour'.
- ❖ Minutes Hand **:** It is long and thin. It shows 'minute'.
- ❖ Seconds Hand **:** It is long and very thin. It shows 'second'. It makes one rotation in one minute and 60 rotations in one hour.
- ❖ Analog clocks can be driven either mechanically or electronically.

(ii) Digital clocks :

- ✓ A digital clock displays the time directly. It show's the time in numerals or other symbols. It may have a 12 hours or 24 hours display.
- ✓ Recent clocks are showing Date, Day, Month, Year, Temperature etc.
- ✓ Digital clocks are often called as Electronic Clocks.

Different types of clocks based on working mechanism :

(i) Quartz Clock:

These clocks are activated by 'electronic oscillations', which are controlled by a 'quartz crystal' The frequency of a vibrating crystal is very precise. So, the quartz clock is more accurate than the mechanical clock.These clocks have an accuracy of one second in every 10^9 seconds.

(ii) Atomic Clock:

- ➢ These clocks are making use of periodic vibrations occurring within the atom.
- ➢ These clocks have an accuracy of one second in every 10^{13} seconds.
- ➢ Atomic clocks are used in Global Positioning System (GPS), Global Navigation Satellite System (GLONASS) and International time distribution services.

IX Higher Order Thinking Question.

1. Your friend was absent to school yesterday. You are enquiring about his absence. He told that he had fever and it was measured to be 100°C. Is it possible to have 100°C fever? If he is wrong, try to make him understand.

No. It is not possible of 100°C fever. The normal temperature of human body is between 98.4°F and 98.6°F.

Normally here **100°C** is boiling point of water**.**

So, he should say that, he was affected by a fever of 100°F and it is not 100°C.

Prepared by Subbiah Palaniyandi

2.Force and Pressure

I. Choose the best answer.

1. If we apply force against the direction of motion of the body, then the body will

a. stop moving b. move with an increased speed

c. move with a decreased speed d. move in a different direction

2. Pressure exerted by a liquid is increased by

a. the density of the liquid b the height of the liquid column

c. Both a and b d. None of the above

3. Unit of pressure is_____ a. Pascal b. Nm^{-2} c. Poise **d. Both a and b**

4. The value of the atmospheric pressure at sea level is

a. 76 cm of mercury column b. 760 cm of mercury column

c. 176 cm of mercury column d. 7.6 cm of mercury column

5. Pascal's law is used in____

a. hydraulic lift b. brake system c. pressing heavy bundles**d. All the above**

6. Which of the following liquids has more viscosity?

a. Grease b. Water c. Coconut oil d. Ghee

7. The unit of viscosity is___ a. Nm^2 **b. poise** c. $kgms^{-1}$ d. No unit

II. Fill in the blanks.

1. The pressure of a liquid column ____ with the depth of the column **(increases)**.
2. Hydraulic lift works under the principle of____ (**Pascal's Law**.)
3. The property of ____ of a liquid surface enables the water droplets to move upward in plants

(**surface tension**)

4. A simple barometer was first constructed by ____ (**Torricelli**.)

III. State true or false. If false, correct the statement.

1. Force acting on a given area is called pressure. **True**
2. A moving body comes to rest due to friction alone. **True**
3. A body will sink if the weight of the body is greater than the buoyant force. **True**
4. One atmosphere is equivalent to 1,00,000 newton force acting on one square metre. **True**
5. Rolling friction is slightly greater than the sliding friction. **False lesser**
6. Friction is the only reason for the loss of energy. **False** not only
7. Liquid pressure decreases with the decrease of depth. **True**

8. Viscosity depends on the pressure of a liquid. **False**

IV. Match the following.

		ANS
Static friction	Viscosity	**Objects are at rest**
Kinetic friction	Least friction	**Objects are in motion**
Rolling friction	Objects are in motion	**Least friction**
Friction between the liquid layers	Objects are sliding	**Viscosity**
Sliding friction	Objects are at rest	**Objects are sliding**

		ANS
Barometer	reduce friction	**Atmospheric pressure**
Increasing area of contact	Atmospheric pressure	**increases friction**
Decreasing area of contact	cause of friction	**decreases friction**
Lubricants	increases friction	**reduce friction**
Irregular surface	decreases friction	**cause of friction**

V. Complete the analogy.

1. Knot in a thread : Static friction :: Ball bearing : ___ friction **(rolling)**

2. Downward force : Weight :: Upward force offered by liquid : ___ **(Buoyant force)**

VI. Numerical Problem.

1. A stone weighs 500 N. Calculate the pressure exerted by it, if it makes contact with a surface of area 25 cm^2.

Weight of a stone F = 500 N , Area A=25 cm^2 = $25 \times 10^{-4} m^2$,

Pressure P = $\frac{F}{A}$ = $\frac{500}{25 \times 10^{-4}}$ = 20×10^4 Nm^{-2} or 20×10^4 Pa

2. In a hydraulic lift, the surface area of the input piston is 10 cm^2. The surface area of the output piston is 3000cm^2. A 100 N force applied to the input piston raises the output piston. Calculate the force required to raise the output piston.

Pressure input on piston,

P = $\frac{F}{A}$ = $\frac{100}{10 \times 10^{-4}}$ = 10^5 N

According to Pascal's law P = $\frac{F}{A}$ = $\frac{F}{3000 \times 10^{-4}}$

10^5 = $\frac{F}{3000 \times 10^{-4}}$ = $\frac{F \times 10^4}{3000}$

$10^4 \times F = 10^5 \times 3000$, $F = 3000 \times 10^1$, **$F = 3 \times 10^4$N**

VII. Consider the statements given below and choose the correct option.

a. Both assertion and reason are true and reason is the correct explanation of assertion.

b. Both assertion and reason are true, but reason is not the correct explanation of assertion.

c. Assertion is true, but reason is false.

d. Both assertion and reason are false.

1. **Assertion**: Sharp knives are used to cut the vegetables.

Reason: Sharp edges exert more pressure.

Ans : (a) Both assertion and reason are true and the reason is the correct explanation of the assertion]

2. **Assertion**: Broad straps are used in bags.

Reason: Broad straps last for long.

Ans : (b) Both assertion and reason are true, but the reason is not the correct explanation of the assertion]

Correct explanation: The weight of the bags falls on larger area of shoulder. So lesser pressure is produced.

3. **Assertion:** Water strider slides easily on the surface of water.

Reason: Water strider experiences less buoyant force.

Ans : (b) If both assertion and reason are true, but reason is not the correct explanation of assertion]

Correct explanation: It is due to the surface tension of water.

VIII. Answer very briefly.

1. Give two examples to verify that a force changes the shape of a body.
   - ✓ If you squeeze a sponge, its shape changes.
   - ✓ If you pull a rubber band, it becomes longer.
   - ✓

2. Give two examples to verify that a force tends to change the static condition of a body.
   - ➢ A rest rubber ball begins to move, when a force applied on it.
   - ➢ The force applied by player makes the football move towards the goal.
   - ➢

3. How do you feel when you touch a nail immediately after it is hammered into a wooden plank? Why?

The nail becomes hot due to friction. Friction changes kinetic energy to heat.

4. How does the friction arise between the surfaces of two bodies in relative motion?

The force of friction is arised by the interlocking of the irregularities of the two surfaces.

5. Name two instruments which help to measure the pressure of a fluid.

(a) Manometer(b) Pressure gauge.

6. Define one atmosphere.

The pressure exerted by the mercury column (1 cm)is considered as the pressure of magnitude 'one atmosphere' (1 atm).

7. Why are heavy bags provided with broad straps?

Broader straps are provided on a back-pack for giving less pressure on the shoulders by providing a larger area of contact with the shoulder.

8. How does surface tension help a plant?

Water molecules rise up due to surface tension. Water molecules are absorbed by the roots and Xylem vessels help the water to rise upward due to "capillarity action" which is caused by the surface tension of water.

9. Which has greater viscosity, oil or honey? Why?

Honey has greater viscosity , because Thicker liquids are more viscous than thinner liquids.

IX. Answer briefly.

1. Define friction. Give two examples of the utility of friction in day to day life.

Friction is a force that slows down moving objects or prevents stationary objects from moving.

utility of friction in life.

- ✓ Cars and buses are able to move safely on the road because of friction between the treaded tyres and the surface of the road.
- ✓ We are able to write on paper only with the help of friction between the pencil or pen and paper.

2. Mention any three ways of minimising friction.

- ➢ By using lubricantsare applied to surfaces to reduce the friction between the surfaces.
- ➢ We sprinkle fine powder on the carrom board and then we polish its surface to make smooth so that the striker slides easily on the surface.
- ➢ We use leadshots in bearing of a cycle hub because rolling friction is smaller than sliding friction.

3. State Pascal's law and mention its applications.

The pressure applied at any point of a liquid at rest, in a closed system, will be distributed equally through all directions of the liquid.

- ✓ In an automobile service station, the vehicles are lifted upward using the hydraulic lift, which works as per Pascal's law.
- ✓ The automobile brake system works according to Pascal's law.

4. Why is a ball bearing used in a cycle hub?

The rolling friction is smaller than sliding friction, sliding is replaced by rolling with the usage of ball bearings. So lead shots are used in the bearing of a cycle hub to reduce the friction.

X. Answer in detail.

1. Friction is a necessary evil - Explain.

- We can hold any object in our hand due to friction.
- We can walk on the road because of friction. The footwear and the ground help us to .walk without slipping.
- Writing easily with a pen on paper is due to friction.
- Automobiles can move safely due to friction between the tyres and the road. Brakes can be applied due to frictional resistance on brake shoes.
- We are able to light a matchstick, sew clothes, tie a knot or fix a nail in the wall because of friction. Though it is giving a negative effect, in most of our day to day life friction helps us to make our life easy. So, it is called as "necessary evil".

Disadvantages

- Friction wears out the surfaces rubbing with each other, like screws and gears in machines or soles of shoes.
- To overcome the friction an excess amount of effort has to be given to operate a machine. This leads to wastage of energy.

2. Give the different types of friction and explain each with an example.

Two types:(i) Static friction(ii) Kinetic friction.

(i) Static friction: The friction experienced by the bodies, which are at rest is called static friction. (E.g : All the objects rigidly placed to be at rest on the Earth, a knot in a thread.)

(ii) Kinetic friction: Friction existing during the motion of bodies is called kinetic friction.

Further, kinetic friction two types :(i) Sliding friction(ii) Rolling friction.

(i) Sliding friction: When a body slides over the surface of another body, the friction acting between the surfaces in contact is called sliding friction.

(ii) Rolling friction: When a body rolls over another surface, the friction acting between the surfaces in contact is called rolling friction.

Rolling friction is less than sliding friction. That is why wheels are provided in vehicles, trolleys, suitcases etc.

3. Describe an experiment to prove that friction depends on the nature of a surface.

To understand about the frictional force between the layers of liquid in motion.

Different kinds of liquid (coconut oil, honey, water, ghee), glass plates - 4 nos.

Procedure :

Take a small quantity of different kinds of liquid like coconut oil, honey, water and ghee etc., in a cup. Place one drop of each liquid on a separate glass plate. Next, gently raise one end of the glass plate, one by one, so as to allow the liquid to slide down the smooth surface of the plate. Observe the speed of each liquid.

Observation: Each liquid moves with a different speed. Water flows faster than other liquids. Coconut oil flows with a moderate speed. Ghee flows very slowly.

Inference: Between the layers of each liquid, in motion, there is a frictional force parallel to the layers of the liquid. This frictional force opposes the motion of the liquid layers while they are in motion.

4. Explain how friction can be minimised**.**

Using lubricants :

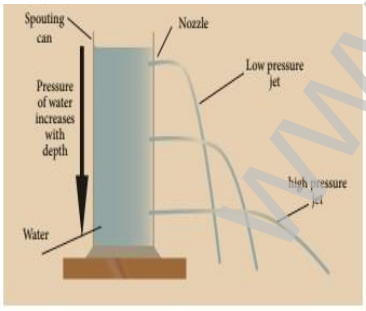
(a) A substance, which reduces the frictional force, is called a lubricant.E.g : Grease, coconut oil, graphite, castor oil, etc.

(b) The lubricants fill up the gaps in the irregular surfaces between the bodies in contact. This provides a smooth layer thus preventing a direct contact between their rough surfaces.

Using ball bearing :

Since, the rolling friction is smaller than sliding friction, sliding is replaced by rolling with the usage of ball bearings. We can see lead shots in the bearing of a cycle hub.

5. Describe an experiment to prove that the pressure in a liquid increases with depth.



Take a plastic bottle. Punch three holes on its side in the same direction, but at different heights. Now pour some water into it and let it flow through the holes. Observe the flow of water. Water from the lowest hole comes out with the greatest force and the water from the topmost hole comes out with the least force.

.This activity confirms that the pressure in a liquid varies with the depth of the point of observation in it.

XI. Higher Order Thinking Questions.

1. Why is it not advisable to use a fountain pen while travelling in an aeroplane?

Fountain pens are built in such a way that the pressure inside them balances the atmospheric pressure at sea level. Since atmospheric pressure decreases with an increase in height above sea level, the pressure inside the pen turns out to be much greater than the air pressure in an aeroplane and the pen stalls leaking.

2. Is there any possibility of making a special device to measure the magnitude of friction directly?

Yes. Tribometer is a special device to measure the magnitude of friction directly.

3. Vidhya feels that mercury is costly. So, instead of mercury she wants to use water as a barometric liquid. Explain the difficulty of constructing a water barometer.

- Mercury is commonly used in barometers because of its high density means the height of the column can be a reasonable size to measure atmospheric pressure.
- A barometer using water, for instance, would need to be 13.6 times taller than a mercury barometer to obtain the same pressure difference.
- This is because mercury is 13.6 times more dense than water.

Prepared by Subbiah Palaniyandi

3.Light

I. Choose the best answer.

1. Which of the following has curved reflecting surface?

a) plane mirrors **b) spherical mirrors** c) simple mirrors d) None of the above

2. The spherical mirror with a reflecting surface curved inward is called

a) convex mirror **b) concave mirror** c) curved mirror d) None of the above

3. The spherical mirror used as a rear view mirror in the vehicle is

a) concave mirror **b) convex mirror** c) plane mirror d) None of the above

4. The imaginary line passing through the centre of curvature and pole of a spherical mirror is called

a) centre of curvature b) pole **c) principal axis** d) radius curvature

5. The distance from the pole to the focus is called

a) pole length **b) focal length** c) principal axis d) None of the above

6. If the image and object distance is same, then the object is placed at

a) infinity b) at F c) between f and P **d) at C**

7. If the focal length of a spherical mirror is 10 cm, what is the value of its radius of curvature?

a) 10 cm b) 5 cm **c) 20 cm** d) 15 cm

II. Fill in the blanks.

1. The spherical mirror used in a beauty parlour as make-up mirror is____ (**concave mirror)**.

2. Geometric centre of the spherical mirror is___ (**pole**.)

3. Nature of the images formed by a convex mirror is ___ (**smaller, virtual and erect**.)

4. The mirror used by the ophthalmologist to examine the eye is____ (**concave mirror**.)

5. If the angle of incidence is 45°, then the angle of reflection is ___ (**45°**.)

6. If an object is placed between two mirrors which are parallel to each other, the number of images formed is____ (**infinite**.)

III. Match the following.

		Ans:
Convex mirror	Radio telescopes	**Rear – view mirror**
Parobolic mirror	Rear – view mirror	**Radio telescopes**
Snell's law	Kaleidoscope	**sin i/sin r =μ**
Dispersion of light	sin i/sin r =μ	**Rainbow**
Refractive index	Rainbow	**Kaleidoscope**

IV. Answer briefly.

1. Define focal length.

The distance between the pole and the principal focus is called focal length (f) of a spherical mirror.

2. Give any two applications of a concave and convex mirror.

Concave mirrors :

- Concave mirrors are used while applying make-up or shaving, as they provide a magnified image.
- They are used in torches, search lights and head lights as they direct the light to a long distance.

Convex mirrors :

- Convex mirrors are used in vehicles as rear view mirrors because they give an upright image and provide a wider field of view as they are curved outwards.
- They are found in the hallways of various buildings including hospitals, hotels, schools and stores. They are usually mounted on a wall or ceiling where hallways make sharp turns.

3. State the laws of reflection**.**

- ✓ The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.
- ✓ The angle of incidence and the angle of reflection are always equal.

4. Define the refractive index of a medium.

The amount of refraction of light in a medium is denoted by a term known as refractive index of the medium, which is the ratio of the speed of light in the air to the speed of light in that particular medium

$$\mu = . \frac{\text{Speed of light in air (c)}}{\text{Speed of light in the medium (v)}}$$

5. State Snell's law of refraction

- The incident ray, the refracted ray and the normal at the point of intersection, all lie in the same plane.
- The ratio of the sine of the angle of incidence (i) to the sine of the angle of refraction (r) is equal to the refractive index of the medium, which is a constant,

or

$$\mu = \frac{\sin i}{\sin r}$$

V. Answer in detail.

1. Explain the images formed by a concave mirror.

Answer:

Position of the Object	Position of the Image	Image Size	Nature of the Image
At infinity	At F	Highly diminished	Real and inverted
Beyond C	Between C and F	Diminished	Real and inverted
At C	At C	Same size as the object	Real and inverted
Between C and F	Beyond C	Magnified	Real and inverted
At F	At infinity	Highly magnified	Real and inverted
Between F and P	Behind the mirror	Magnified	Virtual and erect

2. What is reflection? Write a short note on regular and irregular reflection.

A ray of light, falling on a body having a shiny polished and smooth surface alone is bounced back. This bouncing back of the light rays as they fall on the smooth, shiny and polished surface is called reflection.

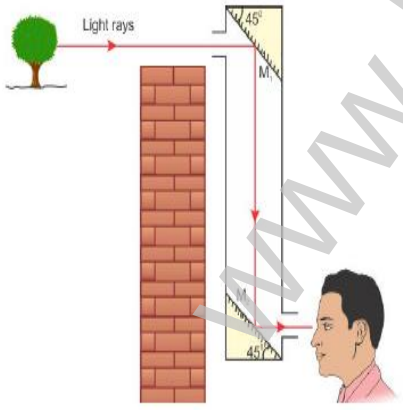
Regular reflection :

Regular reflection, the reflected rays will be parallel to each other. Here, the angle of incidence and the angle of reflection of each ray will be equal.Hence, the law of reflection is obeyed in this case and thus a clear image is formed. This reflection is called 'regular reflection' or 'specular reflection'.

Irregular reflection :

Irregular reflectionbody having a rough or irregular surface, each region of the surface is inclined at different angles.When light falls on such a surface, the light rays are reflected at different angles.the law of reflection is not obeyed in this case and thus the image is not clear. Such a reflection is called 'irregular reflection' or 'diffused reflection'.

3. Explain the working of a periscope.



It is an instrument used for viewing bodies or ships, which are over and around another body or a submarine.It is based on the principle of the law of reflection of light. It consists of a long outer case and inside this case mirrors or prisms are kept at each end, inclined at an angle of 45°. Light coming from the distant body, falls on the mirror at the top end of the periscope and gets reflected vertically downward. This light is reflected again by the second mirror kept at the bottom, so as to travel horizontally and reach the eye of the observer.

In some complex periscopes, optic fibre is used instead of mirrors for obtaining a higher resolution. The distance between the mirrors also varies depending on the purpose of using the periscope.

4. What is dispersion? Explain in detail.

Splitting of white light into its seven constituent colours (wavelength), on passing through a transparent medium is known as **dispersion of light**.

Dispersion occurs because, light of different colours present in white light have different wavelength and they travel at different speeds in a medium.Refraction of a light ray in a medium depends on its speed.As each coloured light has a different speed, the constituent coloured lights are refracted at different extents, inside the prism. Moreover, refraction of a light ray is inversely proportional to its wavelength.

VI. Numerical problems.

1. The radius of curvature of a spherical mirror is 25 cm. Find its focal length.

Radius of curvature R = 25 cm

$$F = \frac{R}{2} = \frac{25}{2} = \mathbf{12.5\ cm}$$

2. If two plane mirrors are inclined to each other at an angle of 45°, find the number of images formed.

Angle of inclination = 45^o

Number of images formed $= \frac{360^0}{\text{angle}} - 1$, $= \frac{360^0}{45^0} - 1 = 8 - 1 = 7$ images

3. Speed of light in air is 3×10^8 m s^{-1} and the refractive index of a medium is 1. 5. Find the speed of light in the medium.

Speed of light in air c = 3×10^8 ms^{-1}

Refractive index of a medium μ = 1.5

$\mu = c/v$

$1.5 = \frac{3 \times 10^8}{v}$

$V = \frac{3 \times 10^8}{1.5}$

$v = 2 \times 10^8$ ms^{-1}

Speed of light in medium v = $\mathbf{2 \times 10^8\ ms^{-1}}$

Prepared by Subbiah Palaniyandi

4.Heat

I. Choose the best answer.

1. Heat is a form of ____

a. electrical energy b. gravitational energy **c. thermal energy** d. None of these

2. If you apply some heat energy to a substance, which of the following can take place in it?

a. Expansion b. Increase in temperature c. Change of state **d. All the above.**

3. Which of the following substances will absorb more heat energy?

a. Solid b. Liquid c. Gas **d. All the above**

4. If you apply equal amount of heat to a solid, liquid and gas individually, which of the following will have more expansion? a. Solid b. Liquid **c. Gas** d. All of them

5. The process of converting a liquid into a solid is called____

a. sublimation b. condensation **c. freezing** d. deposition

6. Conduction is the way of heat transfer which takes place in a_____

a. solid b. liquid c. gas d. All of them

II. Fill in the blanks.

1. A calorimeter is a device used to measure the ____ (**heat capacity of water**.)

2. ____ is defined as the amount of heat required to raise the temperature of 1kg of a substance by 1°C.

(**Specific heat capacity**)

3. A thermostat is a device which maintains ____ (**temperature of an object constant**.)

4. The process of converting a substance from gaseous state to solid state is called __ (**deposition**)

5. If you apply heat energy, the temperature of a system will ____ (**increase**)

6. If the temperature of a liquid in a container is decreased, then the interatomic distance will __ (**decrease**)

III. State True or False. If false, correct the statement.

1. The applied heat energy can be realised as an increase in the average kinetic energy of the molecules. **True**

2. The dimensions of a substance are increased if the temperature of the substance is decreased.

False Correct : increased.

3. The process of converting a substance from solid state to gaseous state is called condensation.

False Correct : sublimation**.**

4. Convection is the process by which the thermal energy flows in solids.

False Correct: liquids and gases.

5. The amount of heat gained by a substance is equal to the product of its mass and latent heat. **True**

6. In a thermos flask, the silvered walls reflect and radiate the heat outside.

False Correct : back to the liquid in the bottle.

IV. Match the following.

		ans
Conduction	Liquid	**Solid**
Convection	Gas to liquid	**Liquid**
Radiation	Solid to gas	**Gas**
Sublimation	Gas	**Solid to gas**
Condensation	Solid	**Gas to liquid**

V. Consider the statements given below and choose the correct option.

a. Both assertion and reason are true and reason is the correct explanation of assertion.

b. Both assertion and reason are true, but reason is not the correct explanation of assertion.

c. Assertion is true, but the reason is false.

d. Assertion is false, but the reason is true.

1**. Assertion**: Radiation is a form of heat transfer which takes place only in vacuum.

Reason: The thermal energy is transferred from one part of a substance to another part without the actual movement of the atoms or molecules.

(b) Both assertion and reason are true, but reason is not the correct explanation of the assertion.

2. **Assertion**: A system can be converted from one state to another state.

Reason: It takes place when the temperature of the system is constant.

(a) Both assertion and reason are true and the reason is the correct explanation of the assertion.

VI. Answer briefly.

1. What are the applications of conduction in our daily life?

- ✓ We cook food in vessels made up of metals. When the vessel is heated, heat is transferred from the metal to the food.
- ✓ When we iron dresses heat is transferred from the iron to the cloth.

2. What are the effects of heat?

(i) Expansion (ii) Increase in temperature (iii) Change in state

3. Name three types of heat transfer.

(i) Conduction (ii) Convection (iii) . Radiation

4. What is conduction?

The process of heat transfer in solids from the region of higher temperature to the region of lower temperature without the actual movement of atoms or molecules is called as conduction**.**

5. Write a note on convection**.**

The form of heat transfer from places of high temperature to places of low temperature by the actual movement of molecules is called convection.

6. Define specific heat capacity.

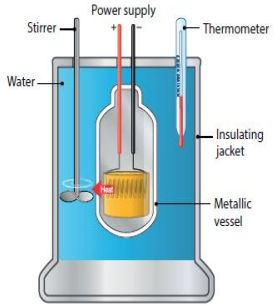
The amount of heat energy required to raise the temperature of 1 kilogram of a substance by 1°C or 1 K. It is denoted by the symbol C.

7. Define one calorie.

One calorie is the amount of heat energy required to raise the temperature of 1 gram of water through 1°C.

VII. Answer in detail.

1. With the help of a neat diagram, explain the working of a calorimeter.



A calorimeter is a device used to measure the amount of heat gained or lost by a substance. It consists of a vessel made up of metals like copper or aluminium which are good conductors of heat and electricity. The vessel is kept in an insulating jacket to prevent heat loss to the environment. There are two holes in it. Through one hole a thermometer is inserted to measure the temperature of the contents.A stirrer is inserted through another hole for stirring the content in the vessel.

The vessel is filled with liquid which is heated by passing current through the heating element.Using this device we can measure the heat capacity of the liquid in the container.

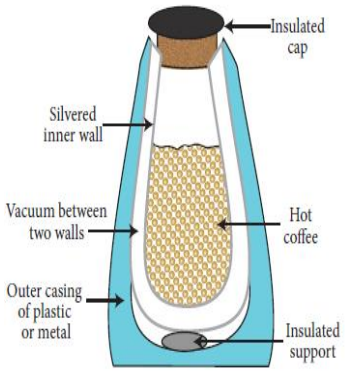
2. Write a note on thermostat.

A thermostat is a device which maintains the temperature of a place or an object constant.The word thermostat is derived from two Greek words, ‘thermo’ meaning heat and ‘static’ meaning staying the same.

Thermostats are used in any device or system that gets heated or cools down - to a pre-set temperature. It turns an appliance or a circuit on or off when a particular temperature is reached. Devices which use

thermostat include building heater, central heater in a room, air conditioner, water heater, as well as kitchen equipments including oven and refrigerators.Sometimes, a thermostat functions both as the sensor and the controller of a thermal system.

3. Explain the working of thermos flask.



A thermos flask has double walls, which are evacuated.It is silvered on the inside. The vacuum between the two walls prevents heat being transferred from the inside to the outside bv conduction and convection.With very little air between the walls, there is almost no transfer of heat from the inner wall to the outer wall or vice versa. Conduction can only occur at the points where the two walls meet, at the top of the bottle and through an insulated support at the bottom. The silvered walls reflect radiated heat back to the liquid in the bottle.

VIII. Higher Order Thinking Questions.

1. Why does the bottom of a lake not freeze in severe winter though the surface is all frozen?

Lakes don't completely freeze because the ice (and eventually snow) on the surface acts to insulate the water below. To freeze water into ice, a large quantity of heat is to be withdrawn. This heat cannot be supplied all at once, so water freezes slowly and keeps the weather.

2. Which one of the following statements about thermal conductivity is correct? Give reason.

a) Steel > Wood > Water b) Steel > Water > Wood

c) Water > Steel > Woodd) Water > Wood > Steel

Ans: b) Steel > Water > Wood

Reason :

Thermal conductivity is defined as the heat flow per unit time.

Steel has a higher thermal conductivity than water and wood.

[Thermal conductivity of steel = 50.2 w/mk

Thermal conductivity of water = 0.6 w/mk

Thermal conductivity of wood = 0.12 w/mk]

IX. Numerical Problems.

1. An iron ball requires 1000 J of heat to raise its temperature by 20°C. Calculate the heat capacity of the ball.

Heat capacity C' $= \frac{Q}{\Delta T}$

Here, A = 1000 J

T = 20°C − 0°C = 20°C = 20K

$C = \frac{1000}{20} = 50\ JK^{-1}$

2. The heat capacity of the vessel of mass 100 kg is 8000 J/°K. Find its specific heat capacity.

Specific heat capacity, $C = \frac{Q}{m \times \Delta T}$

Here, m = 100 *kg*

Heat capacity $= \frac{Q}{\Delta T}$ = 8000 J/°C = 8000 J/K

$C = \frac{Q}{m \times \Delta T} = 100 \times 8000\ J = 8{,}00{,}000\ JKg^{-1}K^{-1}$

Prepared by Subbiah Palaniyandi

5.ELECTRICITY

I. Choose the best answer.

1. When an ebonite rod is rubbed with fur, the charge acquired by the fur is

a. negative **b. positive** c. partly positive and partly negative d. None of these

2. The electrification of two different bodies on rubbing is because of the transfer of

a. neutrons b. protons **c. electrons** d. protons and neutrons

3. Which of the following a simple circuit must have?

a. Energy source, Battery, Load b. Energy source, Wire, Load

c. Energy source, Wire, Switch **d. Battery, Wire, Switch**

4. An electroscope has been charged by induction with the help of charged glassrod. The charge on the electroscope is

a. negative **b. positive** c. both positive and negative d. None of the above

5. Fuse is ____ .

a. a switch b. a wire with low resistance

c. a wire with high resistance **d. a protective device for breaking an electric circuit**

II. Fill in the blanks.

1. ____takes place by rubbing objects together. (**Transfer of electron**)
2. The body which has lost electrons becomes _____ **(positive.)**
3. ____is a device that protects building from lightning strike. (**Lightning arrestor**)
4. _____has a thin metallic filament that melts and breaks the connection when the circuit is overheated .(**Electric fuse**)
5. Three bulbs are connected end to end from the battery. This connection is called ___ **(series circuit.)**

III. State true or false. If false, correct the statement.

1. The charge acquired by an ebonite rod rubbed with a piece of flannel is negative. **True**
2. A charged body induces an opposite charge on an uncharged body when they are brought near. **True**
3. Electroscope is a device used to charge a body by induction. **True**
4. Water can conduct electricity. **True**
5. In parallel circuit, current remains the same in all components **False** Correct : voltage

IV. Match the following.

Ans:

Two similar charges	acquires a positive charge	**repel each other**
Two dissimilar charges	prevents a circuit from overheating	**attract each other**
When glass rod is rubbed with silk	repel each other	**acquires a positive charge**
When ebonite rod is rubbed with fur	attract each other	**acquires a negative charge**
Fuse	acquires a negative charge	**prevents a circuit from overheating**

V. Give reason for the following.

1. When a glass rod is rubbed with silk cloth both get charged.

Reason :

When a glass rod is rubbed with a silk cloth the free electrons in the glass rod are transferred to silk cloth. It is because the free electrons in the glass rod are less tightly bound as compared to that in silk cloth. Since the glass rod looses electrons, it has a deficiency of electrons and hence acquires positive charge. But, the silk cloth has excess of electrons. So, it becomes negatively charged.

2. When a comb is rubbed with dry hair it attracts small bits of paper.

Reason:

Comb rubbed with hair gains electrons from the hair and becomes negatively charged. These electrons are accumulated on the surface of the comb. When a piece of paper is teared into bits, positive and negative charges are present at the edges of the bits. Negative charges in the comb attract positive charges in the bits. So, the paper bits are moving towards the comb.

3. When you touch the metal disc of an electroscope with a charged glass rod the metal leaves get diverged.

Reason :

The leaves of an electroscope diverge because when a glass rod is touched on the metal disc, the charge travels through the metal rod to the leaves. Since, like charge repel, the charge travels till the leaves and then open up as both the leaves have like charges.

4. In an electroscope the connecting rod and the leaves are all metals**.**

Reason: These are made of metals so that the electrons become free to move.

5. One should not use an umbrella while crossing an open field during thunderstorm.

Reason:

Carrying an umbrella is not advisable during thunderstorm.As the rod of umbrella and its supporting wires are made up of metals.Thus during thunderstorm, the conducting object should be avoided.

VI. Consider the statements given below and choose the correct option.

a. Both assertion and reason are true and reason is the correct explanation of assertion.

b. Both assertion and reason are true and reason is not the correct explanation of assertion.

c. Assertion is true but reason is false.

d. Assertion is false but reason is true.

1. Assertion: People struck by lightning receive a severe electrical shock.

Reason: Lightning carries very high voltage.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

2. Assertion: It is safer to stand under a tall tree during lightning

Reason: It will make you the target for lightning.

d. Assertion is false but reason is true.

VII. Answer briefly.

1. How charges are produced by friction?

Rubbing certain materials with one another can cause the built-up of electrical charges on the surfaces. So charges are produced by friction.

2. What is earthing?

Earthing is the process of connecting the exposed metal parts of an electrical circuit to the ground.

3. What is electric circuit?

The path through which electrons flow from one terminal to another terminal of the source, is called electric circuit.

4. What is electroplating?

The process of depositing a layer of one metal over the surface of another metal by passing electric current in called electroplating.

5. Give some uses of electroplating.

- ❖ We use iron in bridges and automobiles to provide strength.

- ❖ A coating of zinc is deposited on iron to protect it from corrosion and formation of rust.
- ❖ Chromium has a shiny appearance. It does not corrode.
- ❖ It resists scratches.

VIII. Answer in detail.

1. Explain three ways of charge transfer**.**

a.Transfer by Friction b.Transfer by Conduction c. Transfer by Induction

(a) Transfer by Friction :

This method of charging an uncharged body by rubbing it against another body is called charging by friction. Eg.: While combing hair charges are transferred from the hair to comb due to friction.

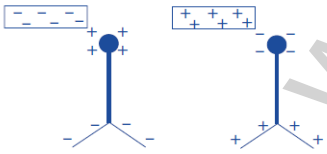
(b) Transfer by conduction :

Charges can be transferred to on object by bringing it in contact with a charged body. This method of transferring charges from one body to other body is called transfer by conduction. Eg. : When the ebonite rod is rubbed with woollen cloth, electrons from the woollen cloth are transferred to the ebonite rod. Now ebonite rod will be negatively charged.

(c) Transfer by Induction :

The process of charging an uncharged body by bringing a charged body near to it but without touching it is called induction. Eg.: we can charge an uncharged object when we touch it by a charged object. But, it is also possible to obtain charges in a body without any contact with other charges.

2. What is electroscope? Explain how it works.



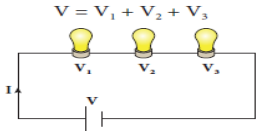
An electroscope is a scientific instrument used to detect the presence of electric charge on a body. It made out of conducting materials, generally metal.The electroscope works on the principle that like charges repel each other. In a simple electroscope two metal sheets are hung in contact with each other.

They are connected to a metal rod that extends upwards, and ends in a knob at the end.If you bring a charged object near the knob, electrons will either move out of it or into it.This will result in charges on the metal leaves inside the electroscope.

If a negatively charged object is brought near the top knob of the electroscope, it causes free electrons in the electroscope to move down into the leaves, leaving the top positive.Since both the leaves have negative charge, they repel each other and move apart. If a positive object is brought near the top knob of the electroscope, the free electrons in the electroscope start to move up towards the knob.This means that the bottom has a net positive charge. The leaves will spread apart again.

2. Explain series and parallel circuit.

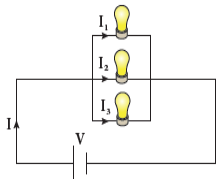
Series Circuit



A series circuit is one that has more than one resistor (bulb) but only one path through which the electrons can travel. From one end of the battery the electrons move along one path with no branches through the resistors (bulbs) to the other end of the cell.

All the components in a series circuit are connected end to end.So, current through the circuit remains same throughout the circuit.But, the voltage gets divided across the bulbs in the circuit. In the following series circuit two bulbs are used as resistors.Let I be the current through the circuit and V_1,V_2, V_3 be the voltage across each bulb.The supply voltage V is the total of the individual voltage drops across the resistances. $V= v_1 + v_2 + v_3$

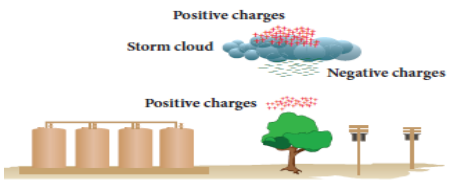
Parallel Circuit:



In a parallel circuit, there is more than one resistor (bulb) and they are arranged on many paths.This means charges (electrons) can travel from one end of the cell through many branches to the other end of the cell. Here, voltage across the resistors (bulbs) remains the same but the current flowing through the circuit gets divided across each resistor.

Let us consider three bulbs connected in series.Let V be the voltage across the bulbs and I_1,I_2,I_3 be thecurrent across each bulb. The current I from the battery is the total of the individual current flowing through the resistances. $I = I_1+I_2+I_3$

3. How lightning takes place?

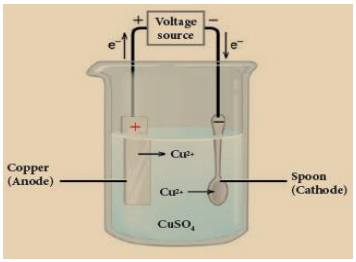


Lightning is produced by discharge,of electricity from cloud to cloud or from cloud to ground. During thunderstorm air is moving upward rapidly. This air which moves rapidly, carries small ice crystals upward.At the same time, small water drops move downward.

When they collide, ice crystals become positively charged and move upward and the water drops become negatively charged and move downward. So the upper part of the cloud is positively charged and the lower part of the cloud is negatively charged.When they come into contact, electrons in the water drops are attracted by the positive charges in the ice crystals. Thus, electricity is generated and lightning is seen. Sometimes the lower part of the cloud which is negatively charged comes into contact with the positive charges accumulated near the mountains, trees and even people on the earth. This discharge produces lot of heat and sparks that results in what we see as lightning.

5. What is electroplating? Explain how it is done.

Electroplating



Electroplating is one of the most common applications of chemical effects of electric current.The process of depositing a layer of one metal over the surface of another metal by passing electric current is called electroplating.Take a glass jar and fill it with copper sulphate solution.Take a copper metal plate and connect it to the positive terminal of battery.

Connect an iron spoon to the negative terminal of the battery. Now, dip them in the copper sulphate solution.When electric current is passed through the copper sulphate solution, you will find that a thin layer of copper metal is deposited on the iron spoon and an equivalent amount of copper is lost by the copper plate.

Prepared by Subbiah Palaniyandi

6.SOUND

I. Choose the best answer.

1. Sound waves travel very fast in a. air **b. metals** c. vacuum d. liquids

2. Which of the following are the characteristics of vibrations?

i.Frequency ii.Time period iii. Pitch iv. Loudness

a) i and ii b) ii and iii **c) iii and iv** d) i and iv

3. The amplitude of the sound wave decides its a. speed b. pitch **c. loudness** d. frequency

4. What kind of musical instrument is a sitar?

a. String instrument b. Percussion instrument c. Wind instrument d. None of these

5. Find the odd one out. a. Harmonium b. Flute c. Nadaswaram **d. Violin**

6. Noise is produced by

a. vibrations with high frequency. b. regular vibrations.

c. regular and periodic vibrations. **d. irregular and non-periodic vibrations**.

7. The range of audible frequency for the human ear is

a. 2 Hz to 2000 Hz b. 20 Hz to 2000 Hz **c. 20 Hz to 20000 Hz** d. 200 Hz to 20000 Hz

8. If the amplitude and frequency of a sound wave are increased, which of the following is true?

a. **Loudness increases and pitch is higher.** b. Loudness increases and pitch is unchanged.

c. Loudness increases and pitch is lower .d. Loudness decreases and pitch is lower.

9. Which of the following may be caused by noise?

a. Irratition b. Stress c. Nervousness **d. All the above**

II. Fill in the blanks.

1. Sound is produced by _____ (**vibrating bodies**)

2. The vibrations of a simple pendulum are also known as ___ (**oscillation**)

3. Sound travels in the form of ____ **(longitudinalwaves)**.

4. High frequency sounds that cannot be heard by you are called ____ **(Ultrasonic)**.

5. Pitch of a sound depends on the ____vibration **(frequency of the)**.

6. If the thickness of a vibrating string is increased, its pitch ____ **(decrease)**.

III. Match the following.

Ultrasonics	Frequency below 20Hz	Frequency more than20000 Hz
Speed of sound in air	Needs materialmedium	$330ms^{-1}$
Infrasonics	$330ms^{-1}$	Frequency below 20Hz
Sound propagation	Frequency more than20000 Hz	Needs materialmedium

IV. Consider the statements given below and choose the correct option.

A. Both assertion and reason are true and reason is the correct explanation of assertion.

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false.

D.Assertion is false but reason is true.

E. Both Assertion and reason are false.

1. **Assertion**: When lightning strikes, the sound is heard a little after the flash is seen.

Reason: The velocity of light is greater than that of the sound.

Ans:(a) If both assertion and reason are true and reason is the correct explanation of assertion.

2. **Assertion:** Two persons on the surface of moon cannot talk to each other.

Reason: There is no atmosphere on moon.

Ans: (a) If both assertion and reason are true and reason is the correct explanation of assertion.

V. Answer briefly.

1. What is vibration?

Vibration means a kind of rapid to and fro motion of an object.

2. Give an example to show that light travels faster than sound?

We showing that light travels faster than sound is lightning. Whenever a lightning strikes, you see the lightning first and then hear the thunder after some time.

3. To increase loudness of sound by four times, how much should the amplitude of vibration be changed?

Loudness of a sound depends on the amplitude of the vibration. So to increase loudness of sound by four times, the amplitude of the vibration also to be increased by four times.

4. What is an ultrasonic sound?

A sound with a frequency greater than 20000 Hz is called as ultrasonic sound.

5.Give two differences between music and noise.

Music	Noise
The sound that provides a pleasing sensation to the ear.	Sound that is unpleasant to the ear
. It is produced by the regular patterns of vibrations.	It is produced by the irregular and non-periodic vibrations.

6. What are the hazards of noise pollution?

- ❖ Noise may cause irritation, stress, nervousness and headache.
- ❖ Long term exposure to noise may change the sleeping pattern of a person.
- ❖ Sustained exposure to noise may affect hearing ability. Sometimes, it leads to loss of hearing.
- ❖ Sudden exposure to louder noise may cause a heart attack and unconsciousness.
- ❖ Noise of horns, loud speakers, etc., cause disturbances leading to lack of concentration.
- ❖ Noise pollution affects a person's peace of mind.

7. Mention few measures to be taken to reduce the effect of noise pollution.

- ➢ Strict guidelines should be set for the use of loudspeakers on social, religious and political occasions.
- ➢ All automobiles should have effective silencers.

8. Define the following terms. a. Amplitude b. Loudness

Amplitude :

Amplitude is the maximum displacement of a vibrating particle from its mean position. It is denoted by 'A' and its unit is 'metre' (m).

Loudness :

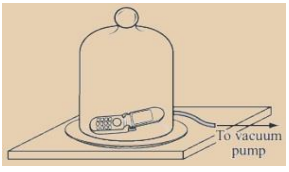
It is defined as the characteristic of a sound that enables us to distinguish a weak or feeble sound from a loud sound. The unit of loudness of sound is decibel (dB).

9. How does planting trees help in reducing noise pollution?

- ✓ Plant parts such as stems, leaves, branches wood, etc., absorb sound.
- ✓ Rough bark and thick, fleshy leaves are particularly effective at absorbing sound due to their dynamic surface area and helps in reducing noise pollution.

VI. Answer in detail.

1. Describe an experiment to show that sound cannot travel through vaccum.



Take a bell jar and a mobile phone. Switch on the music in the mobile phone and place it in the jar. Now, pump out the air from the bell jar using a vacuum pump.As more and more air is removed from the jar, the sound from the mobile phone becomes feebler and finally, very faint.

Conclusion : This experiment proves that sound cannot travel in vacuum and it needs a medium.

2. What are the properties of sound?
(a) Loudness (b) Pitch (c) Quality or Timbre

(a) Loudness:

It is defined as the characteristic of a sound that enables us to distinguish a weak or feeble sound from a loud sound.The loudness of a sound depends on its amplitude. When a drum is softly beaten, a weak sound is produced. However, when it is beaten strongly, a loud sound is produced.The unit of loudness of sound is decibel (dB).

(b) Pitch:

The pitch is the characteristic of sound that enables us to distinguish between a flat sound and a shrill sound.Higher the frequency of sound, higher will be the pitch. High pitch adds shrilliness to a sound.The sound produced by a whistle, a bell, a flute and a violin are high pitch sounds.

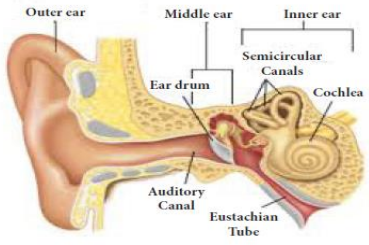
(c) Quality or Timbre :

The quality or timbre is the characteristic of sound that enables us to distinguish between two sounds that have the same pitch and amplitude.For example in an orchestra, the sounds produced by some musical instruments may have the same pitch and loudness.

3. What steps should be taken to reduce the effect of noise pollution?

- Strict guidelines should be set for the use of loudspeakers on social, religious and political occasions.
- All automobiles should have effective silencers.
- People should be encouraged to refrain from excessive honking while driving.'
- Industrial machines and home appliances should be properly maintained.
- All communication systems must be operated in low volumes.
- Residential areas should be free from heavy vehicles.
- Green corridor belt should be set up around the industries as per the regulations of the pollution control board.
- People working in noisy factories should wear ear plugs.
- People should be encouraged to plant trees and to use absorbing materials like curtains and cushions in their home.

1. Describe the structure and function of the human ear?



The outer and visible part of the human ear is called pinna (curved in shape).It is specially designed to gather sound from the environment, which then reaches the ear drum (tympanic membrane) through the ear canal. When the sound wave strikes the drum, the ossicles move inward and outward to create the vibrations.

These vibrations are then picked up by special types of cells in the inner ear. From the inner ear the vibrations are sent to the brain in the form of signals.The brain perceives these signals as sounds.

VII. Problems.

1. Ruthvik and Ruha hear a gunshot 2 second after it is fired. How far away from the gun they are standing? (Speed of sound in air is equal to $330 ms^{-1}$)

Distance = Speed × time

Distance d = 330 × 2 = **660 m**

2. A sound wave travels 2000 m in 8 s. What is the velocity of the sound?

$$\text{Volcity } V = \frac{\text{distance (d)}}{\text{time(t)}}$$

$$V = \frac{2000}{8} = \mathbf{250 ms^{-1}}$$

3. A wave with a frequency of 500 Hz is traveling at a speed of $200\ ms^{-1}$. What is the wavelength?

$$\text{Wavelength } \lambda = \frac{\text{Velocity (V)}}{\text{Frequency(n)}}$$

$$\lambda = \frac{200}{500} = \frac{2}{5} = \mathbf{0.4\ m}$$

Prepared by Subbiah Palaniyandi

7.MAGNETISM

I. Choose the best answer.

1. A magnet attracts___ a) wooden materials b) any metal c) copper **d) iron and steel**

2. One of the following is an example for a permanent magnet.

a) Electromagnet b) Mumetal c) Soft iron **d) Neodymium**

3. The south pole of a bar magnet and the north pole of a U-shaped magnet will____

a) attract each other b) repel each other c) neither attract nor repel each other d) None of the above

4. The shape of the Earth's magnetic field resembles that of an imaginary_____

a) U-shaped magnet b) straight conductor carrying current c) solenoid coil **d) bar magnet**

5. MRI stands for ____

a) Magnetic Resonance Imaging b) Magnetic Running Image

c) Magnetic Radio Imaging d) Magnetic Radar Imaging

6. A compass is used for____

a) plotting magnetic lines b) detection of magnetic field c) navigation **d) All of these**

II. Fill in the blanks.

1. The magnetic strength is ___ at the poles.(**maximum)**
2. A magnet has ____magnetic poles.(**two**)
3. Magnets are used in ____ for generating electricity. (**dynamos)**
4. _____are used to lift heavy iron pieces. (**Electromagnets**)
5. A freely suspended bar magnet is always pointing along the ____ north-south direction. (**geographic)**

III. Match the following.

ANS:

Magnetite	Magnetic lines	Natural magnet
A tiny pivoted magnet	Natural magnet	Compass box
Cobalt	Compass box	Ferromagnetic material
Closed curves	Ferromagnetic material	Magnetic lines
Bismuth	Diamagnetic material	Diamagnetic material

IV. Consider the statements given below and choose the correct option.

a. Both assertion and reason are true and reason is the correct explanation of assertion.

b. Both assertion and reason are true, but reason is not the correct explanation of assertion.

c. Assertion is true, but reason is false.

d. Assertion is false, but reason is true.

1. Assertion: Iron filings are concentrated more at the magnetic poles.

Reason: The magnets are so sharp.

Ans: (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

2. **Assertion:** The Earth's magnetic field is due to iron present in its core.

Reason: At a high temperature a magnet loses its magnetic property or magnetism.

Ans: (d) Assertion is false but the reason is true.

V. Answer briefly.

1. Define magnetic field.

The space around a magnet in which its magnetic effect or influence is observed.It is measured by the unit tesla or gauss (1 tesla =10,000 gauss).

2. What is artificial magnet? Give examples.

Magnets that are made by people in a laboratory or a factory are called artificial magnets. Eg.: Horse shoe magnet, bar magnet, U-shaped magnet, cylindrical magnets, disc magnets, ring magnets and electromagnets.

3. Distinguish between natural and artificial magnets?

Natural Magnets	**Artificial Magnets**
These are found in nature.	These are man-made magnets.
Have irregular shapes and dimensions.	They can be made in different shapes and dimensions.
The strength of a natural magnet is well determined and difficult to change.	Artificial magnets can be made with required and specific strength.
These are permanent magnets.	Their properties are time bound.
They have a less usage.	They have a vast usage in day-to-day life.

4. Earth acts as a huge bar magnet. Why? Give reasons.

A freely suspended magnetic needle at a point on the Earth comes to rest approximately along the geographical north - south direction.This shows that the Earth behaves like a huge magnetic dipole with its magnetic poles located near its geographical poles.

5. How can you identify non-magnetic materials? Give an example of a non-magnetic material.

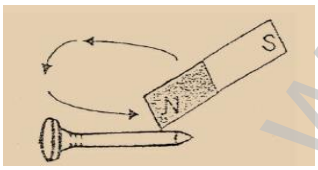
Materials which are not attracted by magnets are called non-magnetic materials.Example : Wood, Glass, Rubber, Plastic, Aluminium.

VI. Answer in detail.

1. List out the uses of magnets.

- In ancient times, the magnet in the form of'direction stone' helped seamen to find the directions during a voyage.
- Nowadays, magnets are used to generate electricity in dynamos.
- Electromagnets are used in our day-to-day life.
- They are used in electric bells and electric motors.
- They are used in loudspeakers and microphones.
- An extremely powerful electromagnet is used in the fast moving Maglev train to remain floating above the tracks.
- In industries, magnetic conveyor belts are used to sort out magnetic substances from scraps mixed with non-magnetic substances.
- Magnets are used in computer in its storing devices such as hard disks.
- In banks, the magnets enable the computers to read the MICR numbers printed on a cheque.
- The tip of the screw drivers are made slightly magnetic so that the screws remain attached to the tip.
- At hospitals, extremely strong electro magnets are used in the MRI (Magnetic Resonance Imaging) to scan the specified internal organ.

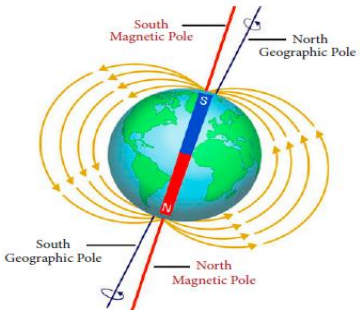
2. How will you convert a 'nail' into a temporary magnet?



Spread some steel pins on a wooden board and bring an iron nail near them.Now, make one of the magnetic poles of the bar magnet touch one end of the iron nail.Slide it along its length in one direction slowly till the other end is reached.Repeat the process, as shown in the diagram, 20 to 30 times.

The magnet has to be moved in one direction only. Avoid the swiping of the magnet back and forth.Now, bring the iron nail near the steel pins.The steel pins stick to the iron nail because nail has become a temporary magnet.

3. Write a note on Earth's magnetism.



Earth has been assumed or imagined by the scientists as a huge magnetic dipole.The south pole of the imaginary magnet inside the Earth is located near the geographic north pole and the north pole of the Earth's magnet is located near the geographic south pole.The line joining these magnetic poles is called the magnetic axis. The magnetic axis intersects the geographic north pole at a point called the north geomagnetic pole or northern magnetic pole.

It intersects the geographic south pole at a point called the south geomagnetic pole or southern magnetic pole.The magnetic axis and the geographical axis (axis of rotation) do not coincide with each other. The cause of the Earth's magnetism, are as follows.

Masses of magnetic substances in the Earth Radiations from the Sun Action of the Moon

VII. Higher Order Thinking Questions.

1. Though Earth is acting as a huge bar magnet it is not attracting other ferromagnetic materials. Why? Give reasons.

Earth is not attracting other ferromagnetic materials because the magnetic character of ferromagnetic materials is affected by the external temperature. When they are heated, they become paramagnetic at curie temperature.

2. Why it is not advisable to slide a magnet on an iron bar back and forth during magnetising it?

It is not advisable to slide a magnet on an iron bar back and forth because moving it in opposite directions will work to cancel each other out.

3. Thamizh Dharaga and Sangamithirai were playing with a bar magnet. They put the magnet down and it broke into four pieces. How many poles will be there?

Each broken piece behaves like a separate magnet. Therefore, four pieces will have eight poles.

Prepared by Subbiah Palaniyandi

8.Universe and Space Science

I. Choose the best answer.

1. Which of the following is a celestial body?

a) Sun b) Moon c) Stars **d) All the above**

2. Mangalyaan was sent to____

a) Moon **b) Mars** c) Venus d) Mercury

3. Chandrayaan - 1 was launched on

a) 22nd October 2008 b) 8th November 2008 c) 22nd July 2019 d) 22nd October 2019

4. ____is called as Red planet. a) Mercury b) Venus c) Earth **d) Mars**

5. Which of the following is the working principle of Rockets?

a) Newton's first law b) Newton's second law **c) Newton's third law** d) All the above

6. Cryogenic fuels are stored at

a) room temperature b) low temperature **c) very low temperature** d).very high temperature

7. ____ was the first manned mission of NASA to go to the moon.

a) Apollo-5 **b) Apollo-8** c) Apollo-10 d) Apollo-11

II. Fill in the blanks.

1. The study about stars and planets are known as ____ **(Astronomy)**.
2. Our sun belongs to ___ Galaxy.(**Milky way**)
3. Mars revolves around the Sun once in ___ days.(**687)**
4. ____ is India's first interplanetary mission. (**Mangalyaan** OR **Mars Orbiter Mission**)
5. ____ was the first man to walk on the surface of the Moon.(**Neil Armstrong**)

III. Say true or false. If false, correct the statement.

1. The Sun and the celestial bodies form Solar system. **True.**
2. Chandrayaan-1 was launched from Sriharikota. **True**
3. Mars is the smallest planet in the Solar system. **False** Correct: Mercury
4. PSLV and GSLV are India's popular satellites. **True.**
5. The propellant of a rocket is only in the form of solids. **False.** Correct : solids or liquids.

IV. Match the following.

Chandrayaan	Fuel	**Moon**
Mangalyaan	Moon	**Mars**
Cryogenic	First manned mission to the moon	**Fuel**
Apollo 8	First man landing mission to the moon	**First manned mission to the moon**
Apollo 11	Mars	**First man landing mission to the moon**

V. Answer briefly.

1. What are celestial objects?

The stars, the planets, the Moon and any other objects like asteroids and comets in the sky are called celestial objects.

2. Define galaxy.

A collection of billions of stars held together by mutual attraction is called galaxy.

3. What are the objectives of Chandrayaan -1?

- To find the possibility of water on the Moon.
- To find the elements of matter on the Moon.
- To search for the existence of Helium-3.
- To make a 3-dimensional atlas of the Moon.
- To study about the evolution of the solar system.

4.List out the objectives of Mangalyaan.

- ✓ To develop the technology required for interplanetary mission.
- ✓ To explore the surface of Mars.
- ✓ To study the constituents of the Martian atmosphere.
- ✓ To provide information about the future possibility of life and past existence of life on the planet.

5. What are Cryogenic Fuels?

Cryogenic fuels are the fuels used in rocket engine. They are maintained or stored at very low temperature in order to keep them in liquid state.

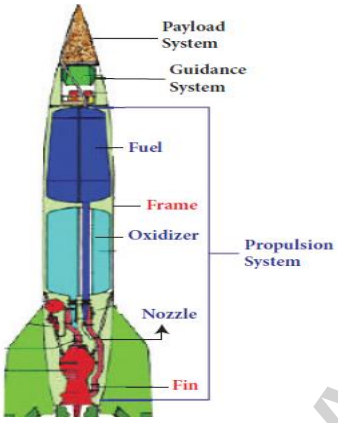
6. Name the Indians worked at NASA. **Kalpana Chawla** and **Sunitha Williams.**

VI. Answer in detail.

1. What are the achievements of Chandrayaan - 1?

- The discovery of presence of water molecules in the lunar soil.
- Chandrayaan-1 confirmed that the Moon was completely molten once.
- Chandrayaan-1 has recorded images of the landing site of the US space-craft Apollo-15 and Apollo-11.
- It has provided high-resolution spectral data on the mineralogy of the Moon.
- The existence of aluminium, magnesium and silicon were picked up by the X-ray camera.
- More than 40,000 images have been transmitted by the Chandrayaan-1 camera in 75 days.
- The acquired images of peaks and craters show that the Moon mostly consists of craters,
- Chandrayaan-1 beamed back its first images of the Earth in its entirety.
- Chandrayaan-1 has discovered large caves on the lunar surface that can act as human shelter on the Moon.

2. Explain the parts of a rocket.



(i) Structural system

(ii) Payload system.

(iii) Guidance system.

(iv) Propulsion system.

(i) Structural system (Frame): It is the frame that covers the rocket. It is made up of very strong but light weight materials like titanium or aluminum. Fins are attached to some rockets at the bottom of the frame to provide stability during the flight.

(ii) Payload system :

It is the object that the satellite is carrying into the orbit. Payload depends on the rocket's mission. The rockets are modified to launch satellites with a wide range of missions like communications, weather monitoring, spying, planetary exploration, and as observatories. Special rockets are also developed to launch people into the Earth's orbit and onto the surface of the Moon.

(iii) Guidance system :

Guidance system guides the rocket in its path. It may include sensors, on-board computers, radars, and communication equipments.

(iv) Propulsion system :

It takes up most of the space in a rocket. It consists of fuel (propellant) tanks, pumps and a combustion chamber. There are two main types of propulsion systems. They are: liquid propulsion system and solid propulsion system.

3. Write a note on Apollo missions.

Apollo Missions are the most popular missions of NASA.These missions made American Astronauts to land on the Moon It consists of totally 17 missions. Among them Apollo -8 and Apollo-11 are more remarkable. Apollo-8 was the first manned mission to go to the Moon. It orbited around the Moon and came back to the Earth. Apollo-11 was the first 'Man Landing Mission' to the moon. It landed on the Moon on 20th July 1969. Neil Armstrong was the first man to walk on the surface of the Moon.

VII. Higher Order Thinking Questions.

1. We always see one side of the Moon. Why?

Moon doesn't have its own light, but it reflects the sunlight. The time period of rotation of the Moon about its own axis is equal to the time period of revolution around the Earth. That's why we are always seeing its one side.

Prepared by Subbiah Palaniyandi