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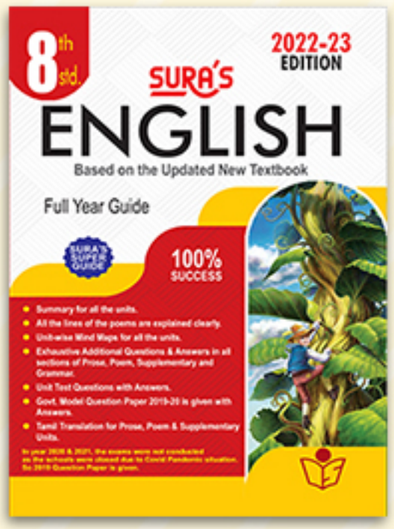

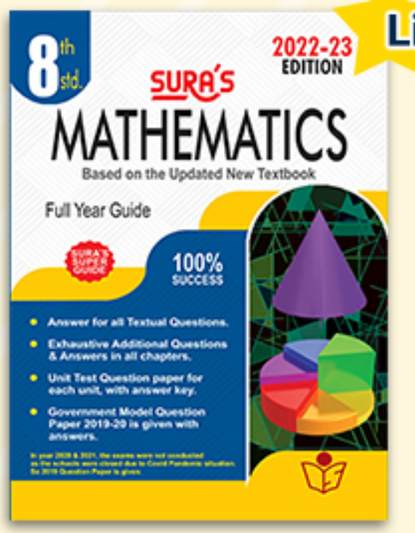

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NOTE FROM PUBLISHER

It gives me great pride and pleasure in bringing to you **Sura's Science Full Year Guide for 8th Standard.** It is prepared as per the Latest New Textbook.

This guide encompasses all the requirements of the students to comprehend the text and the evaluation of the textbook.

Additional questions have been provided exhaustively for clear understanding of the units under study.

In order to learn effectively, I advise students to learn the subject section-wise and practice the exercises given. It will be a teaching companion to teachers and a learning companion to students.

Though these salient features are available in this Guide, I cannot negate the indispensable role of the teachers in assisting the student to understand the subject thoroughly.

I sincerely believe this guide satisfies the needs of the students and bolsters the teaching methodologies of the teachers.

I pray the almighty to bless the students for consummate success in their examinations.

Subash Raj, B.E., M.S.
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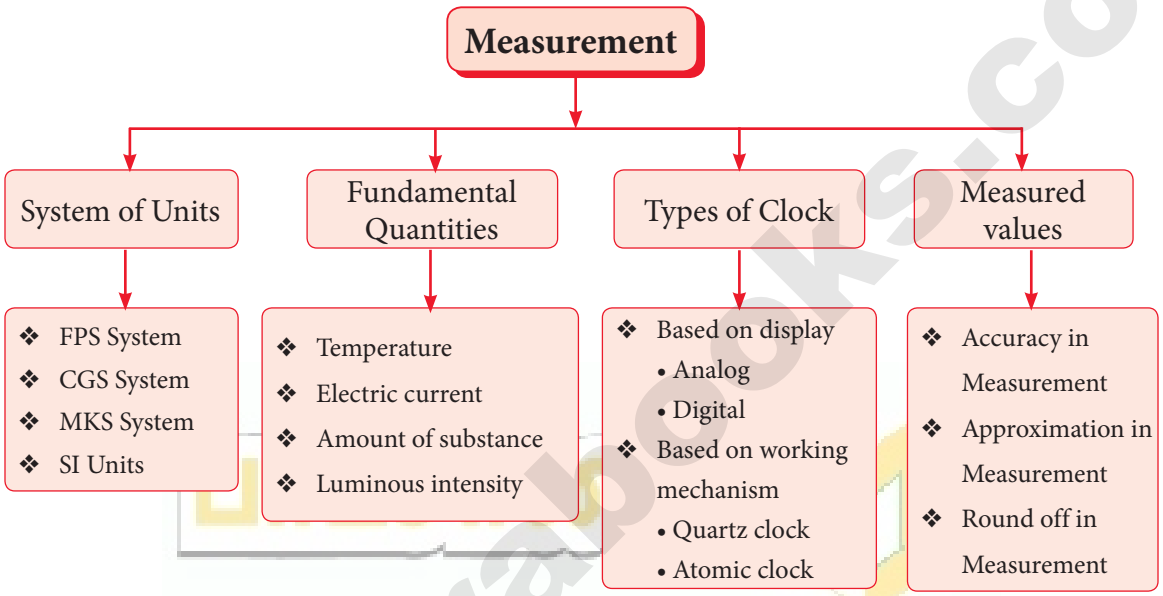
Unit 1

MEASUREMENT

Concept Map



Definitions

Measurement	:	**Measurement** is the process of finding an unknown physical quantity by using a standard quantity.
Temperature	:	**Temperature** is a measure of the average kinetic energy of the particles in a system.
Electric Current	:	The magnitude of an **electric current** is the amount of electric charges flowing through a conductor in one second.
One ampere	:	**One ampere** is defined as one 'coulomb' of charge moving in a conductor in one second.
Amount of substance	:	**Amount of substance** is a measure of the number of entities (particles) present in a substance.
Mole	:	The SI unit of amount of substance is **mole** and it is denoted as **'mol'**.

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**.
One candela	:	The light emitted from a common wax candle is approximately equal to **one candela**.
Luminous flux or luminous power	:	**Luminous flux** or **luminous power** is the measure of the perceived power of light. Its SI unit is '**lumen**'.
One lumen	:	**One lumen** is defined as the luminous flux of the light produced by the light source that emits one candela of luminous intensity over a solid angle of one steradian.
Plane angle	:	It is the angle between the intersection of two straight lines or intersection of two planes.
Radian	:	**Radian** is the angle subtended at the centre of a circle by an arc whose length is equal to the radius of the circle.
Solid angle	:	It is the angle formed by three or more planes intersecting at a common point.
Steradian	:	**Steradian** is the solid angle at the centre of a sphere subtended by a portion whose surface area is equal to the square of its radius of the sphere.
Digital clock	:	A **digital clock** displays the time directly. It shows the time in numerals or other symbols. It may have 12 hours or 24 hours display.
Analog clock	:	Clock which shows time with 3 moving motion and the clock face is marked from 1 to 12.
Quartz clock	:	These clocks are activated by 'electronic oscillations', which are controlled by a 'quartz crystal'.
Atomic clock	:	These clocks are making use of periodic vibrations occurring within the atom.
Accuracy	:	**Accuracy** is the closeness of a measured value to the actual value or true value.
Precision	:	**Precision** is the closeness of two or more measurements to each other.
Approximation	:	**Approximation** is the process of finding a number, which is acceptably close to the exact value of the measurement of a physical quantity.

Formulae to Remember

1.	Electric Current	=	$I = \frac{Q}{t}$ Electric Currnet $I = \frac{\text{Amount of electric charge (Q)}}{\text{time (t)}}$
2.	π radian	=	180° 1 radian $= \frac{180^\circ}{\pi}$ (or) $1^\circ = \frac{\pi}{180^\circ}$

TEXT BOOK EXERCISES

I. Choose the best answer :

1. Which one the following systems of units is the British System of unit?
(a) CGS (b) MKS (c) FPS (d) SI **[Ans. (c) FPS]**

2. Electric current is a _____ quantity.
(a) base (b) supplementary (c) derived (d) professional **[Ans. (a) base]**

3. SI unit of temperature is _____ .
(a) celsius (b) fahrenheit (c) kelvin (d) ampere **[Ans. (c) kelvin]**

4. Luminous intensity is the intensity of _____ .
(a) laser light (b) UV light
(c) visible light (d) IR light **[Ans. (c) visible light]**

5. Closeness of two or more measured values is called as _____ .
(a) accuracy (b) precision
(c) error (d) approximation **[Ans. (b) precision]**

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.
[Ans. (a) Approximation gives accurate value.]

II. Fill in the blanks :

1. The solid angle is measured in _____. **[Ans. steradian]**
2. The coldness or hotness of a substance is expressed by ____. **[Ans. temperature]**
3. _____ is used to measure electric current. **[Ans. Ammeter]**
4. One mole of a substance contains _____ atoms or molecules. **[Ans. 6.023×10^{23}]**
5. The uncertainty in measurement is called as _____. **[Ans. error]**
6. The closeness of the measured value to the original value is _____. **[Ans. Accuracy]**
7. The intersection of two straight lines gives us_____. **[Ans. 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. **[Ans. False]**

   Correct statement : Temperature is a measure of **average** kinetic energy of the particles in a system.

2. If one coulomb of charge is flowing in one minute, it is called 'ampere'. **[Ans. False]**

   Correct statement : If one coulomb of charge is flowing in one **second**, it is called 'ampere'.

3. Amount of substance gives the number of particles present in a substance. **[Ans. True]**
4. Intensity of light coming from a candle is approximately equal to one 'candela'. **[Ans. True]**
5. Quartz clocks are used in GPS devices. **[Ans. False]**

   Correct statement : **Atomic** clocks are used in GPS devices.

6. Angle formed at the top of a cone is an example for 'plane angle'. **[Ans. False]**

   Correct statement : Angle formed at the top of a cone is an example for 'solid angle'

7. The number 4.582 can be rounded off as 4.58. **[Ans. True]**

IV. Match the following :

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

Ans.

Temperature	Measure of hotness or coldness
Plane angle	Angle formed by the intersection of two planes
Solid angle	Angle formed by the intersection of three or more planes
Accuracy	Closeness to the actual value
Precision	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 the assertion and the 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]

Additional Questions

I. Choose the correct answer :

1. **The SI unit of length is the _____.**
   (a) millimetre (b) centimetre (c) metre (d) kilometre **[Ans. (c) metre]**
2. **The magnitude of a physical quantity consists of _____.**
   (a) a unit (b) a number and a unit
   (c) a number (d) a unit and its symbol
   [Ans. (b) a number and a unit]
3. **The SI unit of mass is _____.**
   (a) milligram (b) gram (c) quintal (d) kilogram **[Ans. (d) kilogram]**
4. **Among the following, which is not a metric system?**
   (a) CGS (b) MKS (c) FPS (d) SI **[Ans. (c) FPS]**
5. **_____ is a physical quantity that expresses the degree of hotness or coldness of a substance.**
   (a) Electric current (b) Luminous intensity
   (c) Temperature (d) none of the above **[Ans. (c) Temperature]**
6. **Luminous intensity is measured by a _____ which gives the luminous intensity in terms of candela.**
   (a) ammeter (b) photometer
   (c) voltmeter (d) analog clock **[Ans. (b) photometer]**
7. **Scientists modified the clock's mechanism to obtain _____.**
   (a) estimation (b) approximation
   (c) accuracy (d) none of the above **[Ans. (c) accuracy]**
8. **Atomic clocks have an accuracy of one second in every _____ seconds.**
   (a) 10^9 (b) 10^3 (c) 10^{10} (d) 10^{13} **[Ans. (d) 10^{13}]**
9. **Time difference between two adjacent time zones is _____.**
   (a) 2 hours (b) 5:30 hours (c) 1 hour (d) 24 hours **[Ans. (c) 1 hour]**
10. **GMT is measured at the longitude of _____ degree.**
    (a) 20 (b) 0 (c) 10 (d) 5 **[Ans. (b) 0]**

II. Fill in the Blanks :

1. _____ is the process of finding an unknown physical quantity by using a standard quantity. **[Ans. Measurement]**
2. The CGS, MKS and SI units are _____ system of units. **[Ans. metric]**
3. FPS is a _____ system of units. **[Ans. British]**
4. Temperature is a measure of the average _____ of the particles in a system. **[Ans. kinetic energy]**
5. Flow of electric charges (eleectrons) in a unit time is _____. **[Ans. Electric current]**

III. True or False - if false give the correct statement :

1. The unit of length in FPS system is foot. **[Ans. True]**
2. The unit of mass in CGS system is kilogram. **[Ans. False]**
   Correct statement: The unit of mass in CGS system is **gram**.

3. Heat is a physical quantity that expresses the degree of hotness or coldness of a substance. **[Ans. False]**

Correct statement: **Temperature** is a physical quantity that expresses the degree of hotness or coldness of a substance.

4. Heat energy removed from a substance will lower its temperature. **[Ans. True]**

5. Voltmeter is a device used to measure electric current. **[Ans. False]**

Correct statement: **Ammeter** is a device used to measure electric current.

IV. Match the following.

1.

1.	π radian	(a)	Mars climate orbiter
2.	Base quantities	(b)	mol
3.	Amount of substance	(c)	7
4.	Martian climate	(e)	180º

[Ans. (1 - d. 2 - c, 3 - b, 4 - a)]

2.

1.	$\frac{Q}{t}$	(a)	Plane angle
2.	GMT	(b)	Royal observatory
3.	Two dimensional	(c)	Solid angle
4.	Three dimensional	(d)	I

[Ans. (1 - d. 2 - c, 3 - a, 4 - c)]

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) Assertion is false, but reason is true.

1. **Assertion : The SI unit of temperature is kelvin.**
Reason : Thermometers are calibrated with some standard scales like celsius, fahrenheit and kelvin.
[Ans. (b) Both assertion and reason are true, but the reason is not the correct explanation of the assertion]

2. **Assertion : Temperature is a physical quantity.**
Reason : Temperature is expresses degree of hotness or coldness of a body.
[Ans. (a) Both assertion and reason are true and reason is the correct explanation of the assertion]

3. **Assertion : Radian is the angle subtended at the centre of a circle by an arc whose length is equal to the radius of the circle.**
Reason : 1 radian = $\frac{180^o}{\pi}$
[Ans. (a) Both assertion and reason are true and the reason is the correct explanation of the assertion]

VI. Answer very briefly :

1. What is Physics?

Ans. Physics is the study of nature and natural phenomena.

2. Name the British system of units.

Ans. FPS system.

3. Which city's location is taken as the 'reference longitude' of the 1st?

Ans. The location of Mirzapur in U.P.

4. What is the symbol for unit of electric current?

Ans. A (ampere).

5. Mention the SI unit of luminous flux.

Ans. Lumen.

VII. Answer briefly :

1. Mention the SI unit & symbol of temperature.

Ans. (i) The SI unit of Temperature is kelvin.

(ii) Its symbol is 'K'.

2. Define electric current. Write its formula and unit.

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

$$\text{Electric current} = \frac{\text{Amount of electric charge (Q)}}{\text{time (t)}}$$

$$I = \frac{Q}{t}$$

(ii) SI unit of electric current is 'ampere' and it is denoted as A.

3. Define amount of substance. Mention its SI unit and symbol.

Ans. (i) Amount of substance is a measure of the number of entities (particles) present in a substance.

(ii) The SI unit of amount of substance is mole and it is denoted as 'mol'.

4. What is luminous intensity? Mention its SI unit and symbol.

Ans. (i) 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.

(ii) The SI unit of luminous intensity is candela and is denoted as 'cd'.

5. What are the rules for rounding off a number?

Ans. Rules for rounding off :

(i) Decide which is the last digit to keep.

(ii) Leave it the same, if the next digit is less than 5.

(iii) Increase it by one, if the next digit is 5 or greater than 5.

VIII. Answer in detail :

1. Write a note on accuracy and precision.

Ans. Accuracy in Measurements :

(i) Measurement is the base of all experiments in science and technology. The value of every measurement contains some uncertainty. These uncertainties are called as 'Errors'.

(ii) The difference between the real value and the observed value is called an error.

Accuracy : Accuracy is the closeness of a measured value to the actual value or true value.

Precision : Precision is the closeness of two or more measurements to each other.

Accuracy and Precision

2. Explain the Greenwich Mean Time.

Ans. (i) Greenwich Mean Time (GMT) is the mean solar time at the Royal Observatory, located at Greenwich in London.

(ii) It is measured at the longitude of zero degree.

(iii) The Earth is divided into 24 zones, each of a width of 15 degree longitude.

(iv) These regions are called as 'Time Zones'. Time difference between two adjacent time zones is 1 hour.

3. Write a note on approximation.

Ans. (i) Approximation is the process of finding a number, which is acceptably close to the exact value of the measurement of a physical quantity.

(ii) It is an estimation of a number obtained by rounding off a number to its nearest place value.

(iii) When the data are inadequate, physicists are in need of an approximation to find the solution for problems.

(iv) Approximations are usually based on certain assumptions having a scientific background and they can be modified whenever accuracy is needed.

IX. Problems for practice:

1. When 5 coulomb of charge, flows through a circuit for 20 seconds. calculate the current.

Ans. **Given:** Charge, Q = 5 C

Time, t = 20 s

Solution: Cureent $I = \frac{Q}{t} = \frac{5}{20} = 0.25$ A

I = **0.25 A**

2. Convert 90º into radian.

Ans. **Given:** $1^\circ = \frac{\pi}{180^\circ}$

$90^\circ = \frac{\pi}{\cancel{180}_{2}} \times \cancel{90} = \frac{\pi}{2}$ **radian.**

3. Round off the number 5.323 to two decimal places.

Ans. **Step : 1** Identify the last digit to be kept. 2 is the last digit to be kept.

Step : 2 The following digit, (i.e.) 3 is less than 5. So retain 2 as 2.

∴ The answer is 5.32.

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UNIT TEST

Time : 60 min. Marks : 25

I. Choose the correct answer : (3×1 = 3)

1. **SI unit of temperature is**
   (a) celsius (b) fahrenheit (c) kelvin (d) ampere
2. **Closeness of two or more measured values is called as_____.**
   (a) accuracy (b) precision (c) error (d) approximation
3. **Heat energy given to a substance will _____ its temperature.**
   (a) increase (b) decrease (c) remains same (d) none

II. Fill in the blanks. (3 × 1 = 3)

4. _____ is used to measure electric current.
5. The SI unit of plane angle is _____.
6. _____ clocks are used in Global Positioning System.

III. Match the following : (4 × 1 = 4)

7.	Quartz clock	(a)	periodic vibrations
8.	Atomic clock	(b)	ampere
9.	Electric current	(c)	coulomb
10.	Charge	(d)	10^9 seconds

IV. Very briefly : (4 × 1 = 4)

11. What is the SI unit of luminous intensity?
12. What type of oscillations are used in atomic clocks?
13. How many base quantities are there?
14. Round off the number 1.862 to two decimal places.

V. Answer briefly : (any 3) (3 × 2=6)

15. What is measurement?
16. What are the differences between plane angle and solid angle?
17. What are the rules for rounding off a number?
18. Mention the SI unit & symbol of temperature.
19. Define amount of substance. Mention its SI unit and symbol.

VI. Answer the following in detail : (1 × 5 = 5)

20. (a) Write a short note on different types of clocks.
    (or)
    (b) Write a note on accuracy and precision.

★★★★★

Answer Key

I. 1. (c) kelvin 2. (b) precision 3. (a) increase

II. 4. Ammeter 5. radian 6. Atomic

III. 7 - d, 8 - a, 9 - b, 10 - c.

IV. 11. Candela (cd) 12. Periodic vibrations 13. Seven 14. 1.86

V. 15. Refer Sura's Guide, Textual Q. No. VII - 1.

16. Refer Sura's Guide, Textual Q. No. VII - 7.

17. Refer Sura's Guide, Additional Q. No. VII - 5.

18. Refer Sura's Guide, Additional Q. No. VII - 1.

19. Refer Sura's Guide, Additional Q. No. VII - 3.

VI. 20. a) Refer Sura's Guide, Textual Q. No. VIII - 2. (or)

b) Refer Sura's Guide, Additional Q. No. VIII - 1.

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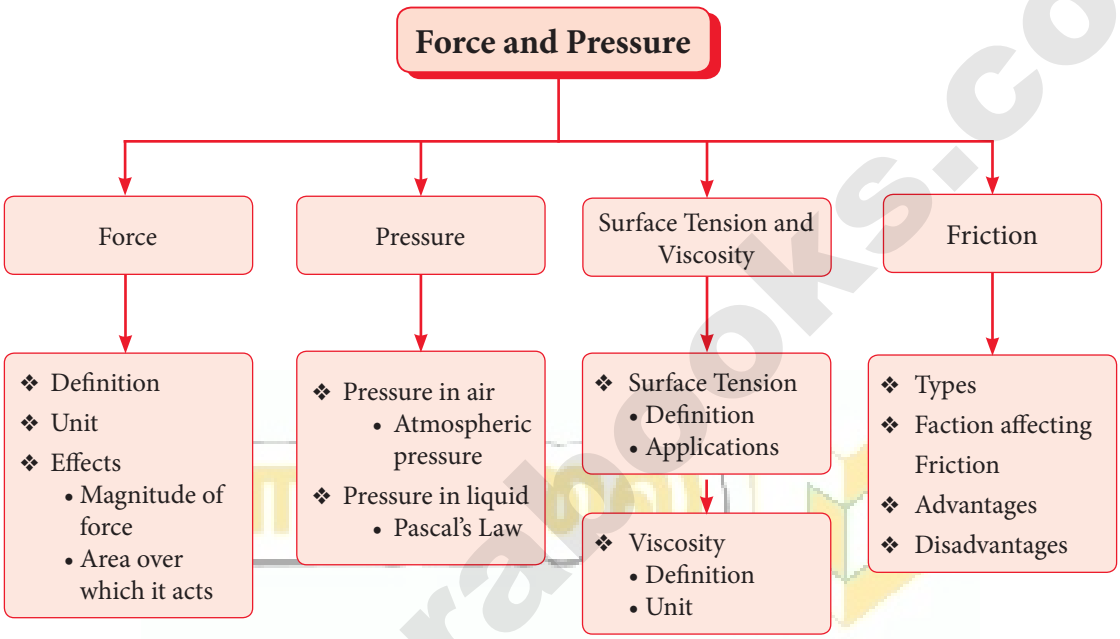
Unit 2

FORCE AND PRESSURE

Concept Map



Definitions

Force	:	**Force** is an external agency which changes or tends to change the state of rest or the state of uniform motion of a body or the direction of a moving body or the shape of the body.
Thrust	:	The force acting perpendicularly on any given surface area of a body. It is measured by the unit newton.
Pressure	:	The amount of force or thrust acting perpendicularly on a surface of area of one square meter of a body.
Atmospheric pressure	:	The amount of force or weight of the atmospheric air that acts downward on unit surface area of the surface of the Earth.
Buoyant force	:	**Buoyant force** is the upward force exerted by water on a floating or a partly submerged body. The phenomenon is known as buoyancy.

Pascal's law	:	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.
Surface tension	:	**Surface tension** is the property of a liquid. The molecules of a liquid experience a force, which contracts the extent of their surface area as much as possible, so as to have the minimum value. Thus, the amount of force acting per unit length, on the surface of a liquid is defined as surface tension.
Viscosity	:	The frictional force acting between the successive layers of the liquid which acts in order to oppose the relative motion of the layer is known as viscous force. Such a property of a liquid is called **viscosity**.
Friction	:	It is the force which opposes the relative motion between two surfaces in contact.
Static friction	:	The friction experienced by the bodies, which are at rest is called **static friction**.
Kinetic friction	:	Friction existing during the motion of bodies is called **kinetic friction**.
Sliding friction	:	When a body slides over the surface of another body, the friction acting between the surfaces in contact is called **sliding friction.**
Rolling friction	:	When a body rolls over another surface, the friction acting between the surfaces in contact is called **rolling friction**.

Formulae to Remember

1.	Pressure P	=	$\frac{\text{Thrust (or) Force (F)}}{\text{Area (A)}}$ $P = \frac{F}{A}$
2.	Force F	=	Pressure × Area
3.	Area A	=	$\frac{\text{Force}}{\text{Pressure}}$

TEXT BOOK EXERCISES

I. Choose the correct answer for each of the following :

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

[Ans. (a) stop moving]

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 **[Ans. (c) Both a and b]**

3. Unit of pressure is

(a) Pascal (b) $N\ m^{-2}$
(c) Poise (d) Both a and b **[Ans. (d) Both a and b]**

4. The value of the atmospheric pressure at sea level is **[Govt. MQP-2019]**

(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 **[Ans. (a) 76 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 **[Ans. (d) All the above]**

6. Which of the following liquids has more viscosity?

(a) Grease (b) Water
(c) Coconut oil (d) Ghee **[Ans. (a) Grease]**

7. The unit of viscosity is

(a) $N\ m^2$ (b) poise (c) $kg\ m\ s^{-1}$ (d) No unit **[Ans. (b) poise]**

II. Fill in the blanks :

1. The pressure of a liquid column _____ with the depth of the column. **[Ans. increases]**

2. Hydraulic lift works under the principle of _____. **[Ans. Pascal's Law]**

3. The property of _____ of a liquid surface enables the water droplets to move upward in plants. **[Ans. surface tension]**

4. A simple barometer was first constructed by _____. **[Ans. Torricelli]**

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

1. Force acting on a given area is called pressure. **[Ans. True]**

2. A moving body comes to rest due to friction alone. **[Ans. True]**

3. A body will sink if the weight of the body is greater than the buoyant force. **[Ans. True]**

4. One atmosphere is equivalent to 1,00,000 newton force acting on one square metre. **[Ans. True]**

5. Rolling friction is slightly greater than the sliding friction. **[Ans. False]**
Correct statement: Rolling friction is **slightly lesser** than the sliding friction.

6. Friction is the only reason for the loss of energy. **[Ans. True]**

7. Liquid pressure decreases with the decrease of depth. **[Ans. True]**

8. Viscosity depends on the pressure of a liquid. **[Ans. True]**

IV. Match the following :

a.

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

Ans.

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

b.

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

Ans.

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

V. Complete the analogy :

1. Knot in a thread : _____ friction ::Ball bearing : _____ friction ※
Ans. Static, rolling.

2. Downward force : Weight :: Upward force offered by liquid : _____ ※
Ans. 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.

Ans. Given : Weight of a stone F = 500 N

Area A = 25 cm^2 = 25×10^{-4} m^2

To find : Pressure P = ?

Formula : Pressure $P = \frac{F}{A}$

$$= \frac{\overset{20}{\cancel{500}}}{\underset{1}{\cancel{25} \times 10^{-4}}}$$

Solution : Pressure P = 20×10^4 Nm^{-2} (or) 20×10^4 Pa

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 reason is the correct explanation of assertion]

2. Assertion : Broad straps are used in bags.
Reason : Broad straps last for long.
[Ans. (b) Both assertion and reason are true, but reason is not the correct explanation of 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) 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.

Ans. Force can change the static condition of a body.
(i) If you squeeze a sponge, its shape changes.
(ii) If you pull a rubber band, it becomes longer.

Intext Activities

➞ ACTIVITY - 1

Fix a matrix of sharp pins on a wooden board in rows and columns. Take a big blown up balloon. Place it gently over the pins and place a small book on the top of the balloon. Will the balloon burst? Will the pins prick the balloon?

Ans. **Aim :** To understand the effect of a force depends on the magnitude of the force and the area over which it acts.

Materials required : Sharp pins, wooden board, balloon.

Procedure :

(i) Fix a matrix of sharp pins on a wooden board in rows and columns.
(ii) Take a big blown up balloon.
(iii) Place it gently over the pins.
(iv) Place a small book on the top of the balloon.
(v) Observe what happens.
(vi) Will the balloon burst? Will the pins prick the balloon?

Inference :

(i) The balloon will not burst. If you prick the balloon with a single pin it will burst. But this did not happen even though many more pins were pricking the balloon.
(ii) A single pin produces a large pressure over a small area. But, when a large number of pins prick a body, each pin exerts very little pressure on the balloon, as the applied force gets distributed over a large surface of the body. So, the balloon will not burst.

Conclusion : We conclude that the effect of a force depends on the magnitude of the force and the area over which it acts.

➞ ACTIVITY - 2

Take a conical flask and a well boiled egg, after removing its shell. Place the egg on the mouth of the flask. It will not enter the flask. Now take a piece of paper. Burn it and drop it inside the flask. Wait for a few seconds to burn fully. Now, keep the egg on the mouth of the flask. Wait for a few minutes. What do you observe?

Ans. **Aim :** To realise the atmospheric pressure.

Materials required : Conical flask, boiled egg, piece of paper.

Procedure :

(i) Take a conical flask.
(ii) Take a well boiled egg, after removing its shell.
(iii) Place the egg on the mouth of the flask.
(iv) It will not enter the flask.
(v) Take a piece of paper.
(vi) Burn it and drop it inside the flask.
(vii) Wait for a few seconds, let it burnt fully.
(viii) Now keep the egg on the mouth of the flask.
(ix) Wait for a few minutes.

Observation : The egg placed at the mouth of the flask gets compressed and it falls into the flask, due to the atmospheric pressure.

Inference :

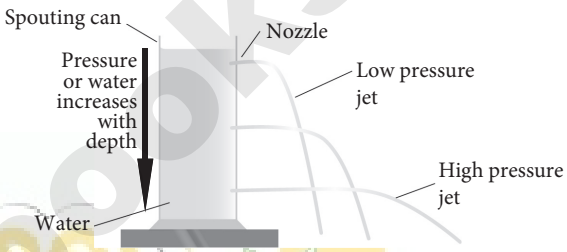
(i) When the paper is burning in the flask, the oxygen present in the air inside the conical flask is used up for its combustion. This reduces the pressure of the air in the flask. The air in the atmosphere tends to occupy the low pressure region in the flask.

(ii) So, it rushes through the mouth of the flask, thus pushing the egg into the flask.

➞ ACTIVITY - 3

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.

Ans. **Aim :** To understand that the pressure in a liquid varies with the depth of the point of observation in it.



Materials required :

(i) Plastic bottle

(ii) Water

Procedure :

(i) Take a plastic bottle.

(ii) Punch three holes on its sides in the same direction but at different heights.

(iii) Now pour some water into it and let it flow through the holes.

(iv) Observe the flow of water.

Observation :

(i) The water comes out from all the holes with different forces and falls on the table at points that are at variable distances from the bottle.

(ii) Water from the lowest hole comes out with the greatest force and falls at a point that is at the maximum distance from the bottle.

(iii) Water from the top most hole comes out with the least force and falls at the point that is at the minimum distance from the bottle.

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

➞ ACTIVITY - 4

Take a glass tube that is open at both ends. Fix a rubber balloon at the lower end of the tube. Pour some water into the tube and observe the balloon. Now, pour some more water into the balloon and again observe the balloon.

Ans. **Aim :** To demonstrate that liquid exerts pressure at the bottom of its container depends on the height of the liquid column in it.

Materials required : Transparent glass tube, balloon, water.

Additional Questions

I. Choose the correct answer :

1. The SI unit of pressure is _____.

(a) $\frac{kg}{m^3}$ (b) $\frac{kg}{m^2}$ (c) Pascal (d) Newton **[Ans. (c) Pascal]**

2. The wear and tear in the machine part is due to _____.

(a) electrostatic force (b) frictional force
(c) muscular force (d) gravitational force **[Ans. (b) frictional force]**

3. Which of the following increases friction?

(a) Lubricant (b) Treads on a tyre
(c) Streamlining (d) Polishing **[Ans. (b) Treads on a tyre]**

4. The total force exerted by a body normal to the surface is called _____.

(a) pressure (b) thrust
(c) force of gravity (d) none of these **[Ans. (b) thrust]**

5. The atmospheric pressure on the surface of the earth is about _____.

(a) 10^{-5} Nm^{-2} (b) 10^{4} Nm^{-2} (c) 10^{5} Nm^{-2} (d) 10^{3} Nm^{-2} **[Ans. (c) 10^5 Nm^{-2}]**

6. The SI unit of force is _____.

(a) dyne (b) newton (c) pascal (d) newton second
[Ans. (b) newton]

7. The SI unit of surface tension is _____.

(a) Nm^{-2} (b) Nm^{-1} (c) pascal (d) dyne **[Ans. (b) Nm^{-1}]**

8. The amount of force acting per unit length on the surface of a liquid is called ____.

(a) friction (b) buoyant force
(c) surface tension (d) atmospheric pressure
[Ans. (c) surface tension]

9. At sea level, the height of the mercury column is around _____ mm.

(a) 760 (b) 76 (c) 67 (d) 670 **[Ans. (a) 760]**

10. Friction existing during the motion of bodies is called _____ friction.

(a) sliding (b) static (c) rolling (d) kinetic **[Ans. (d) kinetic]**

II. Fill in the Blanks :

1. If the same force is made to act on a larger area, the pressure _____.
[Ans. decreases]
2. At the given depth, a liquid exerts _____ pressure in all directions. **[Ans. equal]**
3. The pressure exerted by the air around us is called _____ pressure.
[Ans. atmospheric]
4. At higher altitudes, atmospheric pressure is _____. **[Ans. less]**
5. Friction depends on the _____ of two surfaces in contact. **[Ans. nature]**
6. Water strider insect slides on the water surface easily due to the _____ of water.
[Ans. surface tension]
7. The force which acts in order to oppose the relative motion of the layer is known as _____ force. **[Ans. viscous]**

8. The automobile brake system works according to _____. [Ans. Pascal's law]
9. The _____ is used to compress the bundles of cotton or cloth so as to occupy less space. [Ans. hydraulic press]
10. In the SI system 1 atm = _____ pascal. [Ans. 1,00,000]

III. True or False - if false give the correct statement :

1. A push or pull on an object is called force.
Ans. True.
2. Pressure can be increased by decreasing the thrust.
Ans. False. **Correct statement:** Pressure can be increased by **increasing** the thrust.
3. Cooking is difficult at higher altitude.
Ans. True.
4. The pressure exerted by air is called atmospheric pressure.
Ans. True.
5. Pressure is directly proportional to the area of contact.
Ans. False. **Correct statement:** Pressure is **inversely** proportional to the area of contact.
6. The pressure in a liquid is the same at all depths.
Ans. False. **Correct statement:** The pressure in a liquid **increases** with depth.

IV. Match the following :

1.

i	Friction produces	(a)	Ceiling fan
ii	Lubricants	(b)	Heat
iii	Soapy floor	(c)	Oil and grease
iv	Ball bearing	(d)	Rolling friction
v	Wheels	(e)	Less the friction

[Ans. (i - b, ii - c, iii - e, iv - a, v - d)]

2.

i	Force	(a)	one atmosphere
ii	1 atm	(b)	Reduce friction
iii	viscosity	(c)	vector quantiy
iv	Lubricants	(d)	barometer
v	Torricelli	(e)	poise

[Ans. (i - c, ii - a, iii - e, iv- b, v - d)]

V. Analogy :

1. Liquid pressure : _____:: Atmospheric Pressure : _____.
Ans. Manometer, Barometer.
2. Broader straps : _____ :: Thin needles : _____.
Ans. Less pressure, High pressure.
3. Pascal's law : _____ :: Surface tension : _____.
Ans. Hydraulic brake, Capillary action.
4. Viscous force : _____ :: Buoyant force : _____.
Ans. Viscosity, Buoyancy.

5. Objects placed at rest on earth : _____ :: Bodies slide over the surface on other body : _____.

Ans. Static friction, Sliding friction.

VI. Assertion and Reason.

Mark the correct choice as :

(a) Both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) Both assertion and reason are true, but the reason is not the correct explanation of the assertion.
(c) The assertion is true, but the reason is false.
(d) The assertion is false, but the reason is true.

1. **Assertion : Force is defined as a push or pull acting on a body.**
   Reason : CGS unit of force is newton.
   [Ans. (c) The assertion is true, but the reason is false]

2. **Assertion : Friction always opposes the motion.**
   Reason : Whenever one surface moves or tries to move over another surface, the force of friction starts acting on the surfaces.
   [Ans. (d) The assertion is false, but the reason is true]

3. **Assertion : The pressure at the bottom of the sea is lesser than that near the surface.**
   Reason : The pressure exerted by a liquid depends upon the depth of the liquid and density of the liquid.
   [Ans. (d) The assertion is false, but the reason is true]

4. **Assertion : We can live very happily if friction is not present in nature.**
   Reason : Aeroplane shape is streamlined to reduce the effort of frictional force. **[Ans. (d) The assertion is false, but the reason is true]**

5. **Assertion : There is danger of a vehicle skidding on a wet road.**
   Reason : The tyres of the vehicle lose their grip on the road due to increase in friction due to presence of water on the road.
   [Ans. (c) The assertion is true, but the reason is false]

VII. Answer very briefly.

1. **Write the SI unit of force.**

Ans. newton (N).

2. **Write the SI unit of pressure.**

Ans. pascal (Pa).

3. **Mention the factors that the effect of a force depend.**

Ans. **(i)** Magnitude of the force
(ii) The area over which it acts.

4. **Name the material which is used to reduce friction.**

Ans. Lubricant.

UNIT TEST

Time : 60 min. **Marks : 25**

I. Choose the correct answer: (3×1 = 3)

1. Unit of pressure is
(a) pascal (b) N m^{-2} (c) poise (d) Both (a) & (b)

2. Which of the following liquids has more viscosity?
(a) Grease (b) Water (c) Coconut oil (d) Ghee

3. At sea level, the height of the mercury column is around _____ mm.
(a) 760 (b) 76 (c) 67 (d) 670

II. Fill in the blanks: (3 × 1 = 3)

4. The barometer was invented by _____.
5. Friction is called a _____ evil.
6. A drinking straw works on the existence of _____ pressure.

III. Match the following: (4 × 1 = 4)

7.	Barometer	(a)	Upward force
8.	Buoyant force	(b)	Atmospheric pressure
9.	Force	(c)	A substance that can flow
10.	Fluid	(d)	Action of push and pull

IV. Answer in one word: (4 × 1 = 4)

11. Name the two basic types of friction.
12. Write the SI unit of force.
13. Name the material which is used to reduce friction.
14. Which is working due to liquid pressure.

V. Answer the following in one or two sentences: (any 3) (3 × 2=6)

15. Define friction. Give two examples of the utility of friction in day to day life.
16. Cooking in a place located at a higher attitude is difficult. Why?
17. Define force. Mention its SI unit.
18. Give two examples to reduce friction.
19. Explain why the cutting instruments are sharpened.

VI. Answer the following in detail: (1 × 5 = 5)

20. (a) What is surface tension? Explain the applications of surface tension.

(or)

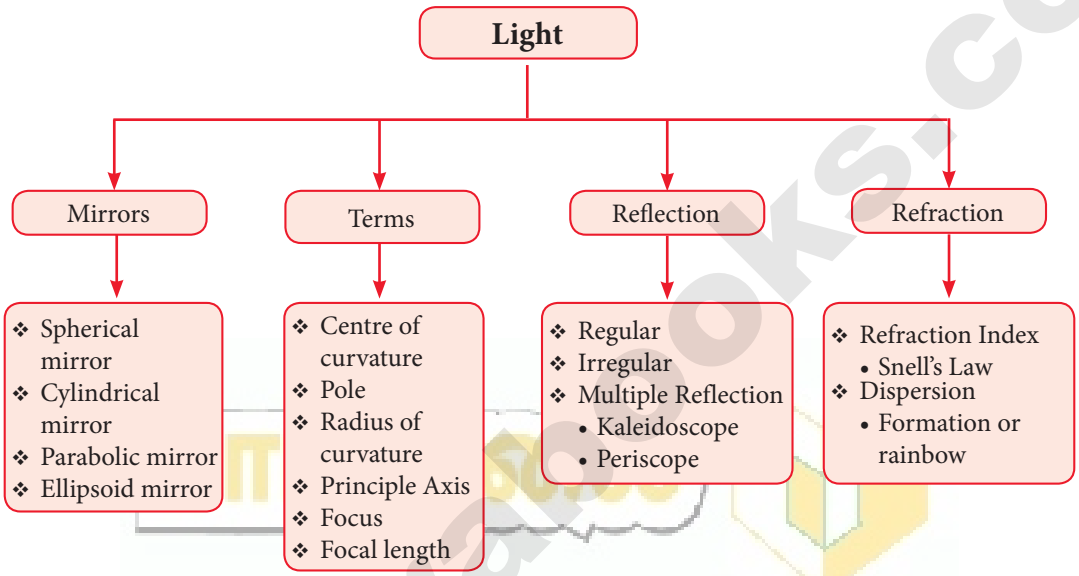
(b) Explain how friction can be minimised.

★★★★★

Unit 3

LIGHT

Concept Map



Definitions

Mirrors	:	A shiny surface which reflect almost the light falling on it.
Spherical mirrors	:	Spherical mirrors are one form of curved mirrors. If the curved mirror is a part of a sphere, then it is called a **spherical mirror**.
Concave mirrors	:	A spherical mirror, in which the reflection of light occurs at its concave surface, is called a **concave mirror**.
Convex mirrors	:	A spherical mirror, in which the reflection of light occurs at its convex surface, is called a **convex mirror**.
Parabolic mirrors	:	A **parabolic mirror** is one type of curved mirror, which is in the shape of a parabola. It has a concave reflecting surface and this surface directs the entire incident beam of light to converge at its focal point.
Center of Curvature	:	It is the center of the sphere from which the mirror is made. It is denoted by the letter C in the ray diagrams.
Pole	:	It is the geometric centre of the spherical mirror. It is denoted by the letter P.
Radius of Curvature	:	It is the distance between the center of the sphere and the vertex. It is shown by the letter R in ray diagrams.

Principal Axis	:	The line joining the pole of the mirror and its center of curvature is called **principal axis**.
Focus	:	When a beam of light is incident on a spherical mirror, the reflected rays converge (concave mirror) at or appear to diverge from (convex mirror) a point on the principal axis. This point is called the **'focus'** or **'principal focus'**.
Focal length	:	The distance between the pole and the principal focus is called **focal length** (f) of a spherical mirror.
Reflection	:	The bouncing back of the light rays as they fall on the smooth, shiny and polished surface is called reflection.
Laws of reflection	:	(i) The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane. (ii) The angle of incidence (i) and the angle of reflection(r) are always equal.
Regular reflection	:	When a beam of light falls on a smooth surface, it gets reflected. After reflection, the reflected rays will be parallel to each other. This is called **regular reflection**.
Irregular reflection	:	When a beam of light falls on a rough surface, the light rays are reflected at different angles. This kind of reflection is called **irregular reflection**.
Multiple reflection	:	It is the reflection of light back and forth several times between reflecting surfaces. If a reflected light ray is reflected again on being incident on another surface, it is termed **multiple reflections**.
Kaleidoscope	:	It is a device, which functions on the principle of multiple reflection of light, to produce numerous patterns of images.
Periscope	:	It is an instrument which functions on the principle of multiple reflection of light, for viewing bodies or ships, which are over and around another body or a submarine.
Refraction	:	The phenomenon of bending of light on passing from one medium to another is called **refraction** of light.
Refractive index of a medium	:	The refractive index of a medium is the ratio of the speed of light in vacuum to the speed of light in that medium.
Snell's law of refraction	:	Refraction of light rays, as they travel from one medium to another medium, obeys two laws, which are known as Snell's law of refraction. Thye are : (i) The incident ray, the refracted ray and the normal at the point of intersection, all lie in the same plane. (ii) 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.

Formulae to Remember

1.	Focal length (f)	=	$\frac{\text{Radius of curvature (R)}}{2}$
2.	Refractive index (μ)	=	$\frac{\text{Speed of light in air (c)}}{\text{Speed of light in the medium (v)}}$
3.	Refractive index (μ)	=	$\frac{\sin i}{\sin r}$
4.	Number of images formed N	=	$\frac{360^{\circ}}{\theta} - 1$
5.	Speed of light in medium (v)	=	$\frac{c}{\mu}$
6.	Speed of light in air (c)	=	$\mu \times v$

TEXT BOOK EXERCISES

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 **[Ans. (b) spherical mirrors]**

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 **[Ans. (b) concave mirror]**

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 **[Ans. (b) convex mirror]**

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 **[Ans. (c) principal axis]**

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 **[Ans. (b) focal length]**

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 **[Ans. (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 **[Ans. (c) 20 cm]**

II. Fill in the blanks :

1. The spherical mirror used in a beauty parlour as make-up mirror is _____. **[Ans. concave mirror]**

2. Geometric centre of the spherical mirror is _____. **[Ans. pole]**

3. Nature of the images formed by a convex mirror is _____. **[Ans. smaller, virtual and erect]**

4. The mirror used by the ophthalmologist to examine the eye is _____. **[Ans. concave mirror]**

5. If the angle of incidence is 45°, then the angle of reflection is _____. **[Ans. 45°]**

6. If an object is placed between two mirrors which are parallel to each other, the number of images formed is _____. **[Ans. infinite]**

III. Match the following :

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

★ Multiple reflection of light

Ans.

Convex mirror	Rear – view mirror
Parobolic mirror	Radio telescopes
Snell's law	sin i/sin r =μ
Dispersion of light	Rainbow
Refractive index	$\mu = \frac{c}{v}$

IV. Answer briefly :

1. **Define focal length.**

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

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

Ans. **Concave mirrors :**

(i) Concave mirrors are used while applying make-up or shaving, as they provide a magnified image.

(ii) They are used in torches, search lights and head lights as they direct the light to a long distance.

Convex mirrors :

(i) 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.

(ii) 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.

Ans. (i) The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.

(ii) The angle of incidence and the angle of reflection are always equal.

4. Define the refractive index of a medium.

Ans. 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.

5. State the Snell's law of refraction.

Ans. Refraction of light rays, as they travel from one medium to another medium, obeys two laws, which are known as Snell's laws of refraction. They are:

(i) The incident ray, the refracted ray and the normal at the point of intersection, all lie in the same plane.

(ii) 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.

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

V. Answer in detail :

1. Explain the images formed by a concave mirror?

Ans.

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 short notes on regular and irregular reflection. ※

Ans. 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**.

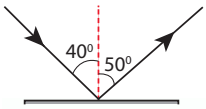
Additional Questions

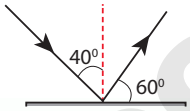
I. Choose the correct answer :

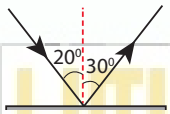
1. **The splitting of white light into its seven constituents colours is called**
(a) reflection (b) refraction
(c) deviation (d) dispersion **[Ans. (d) dispersion]**

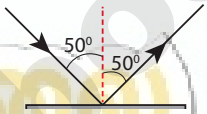
2. **Which surface will not reflect most of the light falling on them?**
(a) Rough surface (b) Smooth surface
(c) Shining surface (d) Opaque surface **[Ans. (a) Rough surface]**

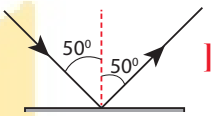
3. **The ENT doctor uses a _____.**
(a) plane mirror (b) concave mirror
(c) convex mirror (d) convex lens **[Ans. (b) concave mirror]**

4. **Which of the following demonstrates the law of reflection?**
(a) 

(b) 

(c) 

(d) 

[Ans. (d) 

]

5. **In dispersion, the colour of light that will bend more is _____.**
(a) red (b) yellow (c) green (d) violet **[Ans. (d) violet]**

6. **Which of the phenomenon of light bouncing back into the same medium called?**
(a) Dispersion (b) Splitting
(c) Reflection (d) Refraction **[Ans. (c) Reflection]**

7. **The velocity of light in vacuum is 3×10^8 ms^{-1} and in glass is 2×10^8 ms^{-1}. The refractive index of glass is _____.**
(a) 2 (b) 1.5 (c) 1.8 (d) 1.33 **[Ans. (b) 1.5]**

8. **Incident angle of a ray of light is 30°. The angle between the incidend ray and the reflected ray is _____.**
(a) 50° (b) 90° (c) 60° (d) 15° **[Ans. (c) 60°]**

9. **Convex mirror produces image which is _____**
(a) virtual (b) diminished
(c) erect (d) all of them **[Ans. (d) all of them]**

10. **The phenomenon of light passing through the object is called _____.**
(a) reflection (b) refraction
(c) dispersion (d) total internal reflection **[Ans. (b) refraction]**

II. Fill in the Blanks :

1. The bouncing back of light from a surface is called _____. [Ans. reflection]
2. _____ mirrors make things look larger when objects are placed close to it [Ans. Concave]
3. Convex mirror always forms _____ and _____ image. [Ans. virtual and erect]
4. The incident ray, _____ ray and the _____ at the point of incidence, all lie on the same plane. [Ans. reflected, normal]
5. A ray of light incident along normal to the mirror _____ its path. [Ans. retraces]
6. When light passes from one medium to another the ray gets bent. This property of light is called _____. [Ans. refraction]
7. Spherical mirrors are one form of _____ mirrors. [Ans. curved]
8. _____ mirrors magnify the object placed close to them. [Ans. Concave]
9. The image formed by convex mirrors is _____ than the object. [Ans. smaller]
10. _____ mirrors form the perfect image of an object. [Ans. Plane]
11. The _____ of a mirror determines the type of image it forms. [Ans. shape]
12. The _____ is an optical device with a polished surface that reflects the light falling on it. [Ans. mirror]

III. True or False - if false give the correct statement :

1. We can see things around us only when the light reflected by them reaches our eyes.
Ans. True.
2. Light is a form of energy and it travels in a straight line.
Ans. True.
3. The periscope is an optical device with a polished surface that reflects the light falling on it.
Ans. False. **Correct statement:** The mirror is an optical device with a polished surface that reflects the light falling on it.
4. Curved mirrors have surfaces that are spherical, cylindrical, parabolic and ellipsoid.
Ans. True.
5. Curved mirrors form the perfect image of an object.
Ans. False. **Correct statement:** Plane mirrors form the perfect image of an object.
6. Curved mirrors produce images that are either enlarged or diminished.
Ans. True.
7. A thin layer of molten aluminium or silver is used for coating glass plates that will then become mirrors.
Ans. True.
8. The most common example of a convex mirror is the make-up mirror.
Ans. False. **Correct statement:** The most common example of a concave mirror is the make-up mirror.

XI. Numerical Problems :

1. If two mirrors are placed at an inclination of 30º then how many images can be seen?

Ans. Formula : Number of images $N = \frac{360^\circ}{\theta} - 1$

Given : $\theta = 30^\circ$

Solution : $N = \frac{360^\circ}{30^\circ} - 1$

$= 12 - 1 = \mathbf{11\ images}$.

2. What is the speed of light in diamond if its refractive index is 2.41?

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

Given : $\mu = 2.41$

Solution : $c = 3 \times 10^8\ ms^{-1}$

$\mu = \frac{c}{v}$

$v = \frac{3 \times 10^8}{2.41}$

Speed of light in diamond $v = \mathbf{1.24 \times 10^8\ ms^{-1}}$

3. A light ray moves from glass ($V_{glass} = 2.0 \times 10^8\ ms^{-1}$) to diamond ($V_{diamond} = 1.25 \times 10^8\ ms^{-1}$). What is the refractive index of diamond with respect to glass?

Ans. Refractive index of diamond with respect to glass

$$\mu_{dg} = \frac{\text{Velocity of light in glass } (V_g)}{\text{Velocity of light in diamond } (V_d)}$$

Solution : $= \frac{2.0 \times 10^8}{1.25 \times 10^8} = \frac{200}{125} = \mathbf{1.60\ (No\ unit)}$.

4. Find the refractive index of water with respect to glass if the refractive index of water is $\frac{4}{3}$ and the refractive index of glass is $\frac{3}{2}$.

Ans. Refractive index of water with respect to glass $\mu_{wg} = \frac{\text{Refractive index of water } (\mu_w)}{\text{Refractive index of glass } (\mu_g)}$

$\mu_{wg} = \frac{\mu_{water}}{\mu_{glass}}$

Solution : $= \frac{4}{3} \times \frac{2}{3} = \frac{8}{9}$

Thus, refractive index of water with respect to glass = **0.88 (No unit)**.

5. **The speed of light in air is 3×10^8 ms^{-1} and that in water is 2.25×10^8 ms^{-1}. Find the absolute refractive index of water.**

Ans. Refractive index μ = $\frac{\text{Speed of light in air (c)}}{\text{Speed of light in the medium (v)}}$

Solution : $\mu = \frac{3 \times 10^8}{2.25 \times 10^8}$ μ = **1.333 (No unit)**.

XI. Cross word puzzle :

Across :

3. The geometrical centre of a spherical mirror.
6. Centre of the sphere from which the mirror is made.
7. An optical device with a polished surface that reflects the light falling on it.
8. Image which can be formed on a screen.
9. Image which cannot be formed on a screen.
10. The bending of a light ray when it passes from one medium to another medium of different density.

Down :

1. Mirror which converges a parallel beam of light passing through it.
2. Imaginary line passing through the centre of curvature of the mirror.
4. Mirror which diverges a parallel beam of light passing through it.
5. The formation of rainbow is an example of _____.

					(1) C											
				(3) P	O	L	E									
					N											
(10) R	E	F	R	A	C	T	I	O	N							
		(4) C			A											
		O			V					(2) P						
(6) C	E	N	T	R	E	O	F	C	U	R	V	A	T	U	R	E
		V								I						
		E		(5) D						N						
		(7) X	M	I	R	R	O	R		C						
				S						I						
				P						P						
			(8) R	E	A	L				A						
				R						L						
				S						A						
			(9) V	I	R	T	U	A	L	X						
				O						I						
				N						S						

UNIT TEST

Time : 60 min. **Marks : 25**

I. Choose the correct answer: (3×1 = 3)

1. **The refractive index of water is**
   (a) 1.0 (b) 1.33 (c) 1.44 (d) 1.52
2. **In the head lights of motor vehicles, _____ are used as reflectors.**
   (a) plane mirrors (b) concave lenses
   (c) convex mirrors (d) concave mirrors
3. **If we mix lights of the colours of the rainbow, we will get _____.**
   (a) pink light (b) brown light
   (c) colourless light (d) black light

II. Fill in the blanks: (3 × 1 = 3)

4. Geometric centre of the spherical mirror is _____.
5. _____ mirrors magnify the object placed close to them.
6. _____ is a form of energy and it travels in straight line.

III. Match the following: (4 × 1 = 4)

7.	Convex mirror	(a)	Radio telescopes
8.	Parobolic mirror	(b)	wall
9.	Regular reflection	(c)	rear – view mirror
10.	Irregular reflection	(d)	Plane mirror

IV. True or False - if false give the correct statement: (4 × 1 = 4)

11. Light is a form of energy and it travels in a straight line.
12. Focus is the geometric centre of the spherical mirror.
13. Refractive index is a ratio of two similar quantities and so, it has no unit.
14. Reflection from a rough surface is called diffused reflection.

V. Answer the following in one or two sentences: (3 × 2=6)

15. Define focal length.
16. Stake the laws of reflection.
17. Define the refractive index of a medium .
18. State the Snell's law of refraction.
19. Why do we need a shiny surface for reflection?

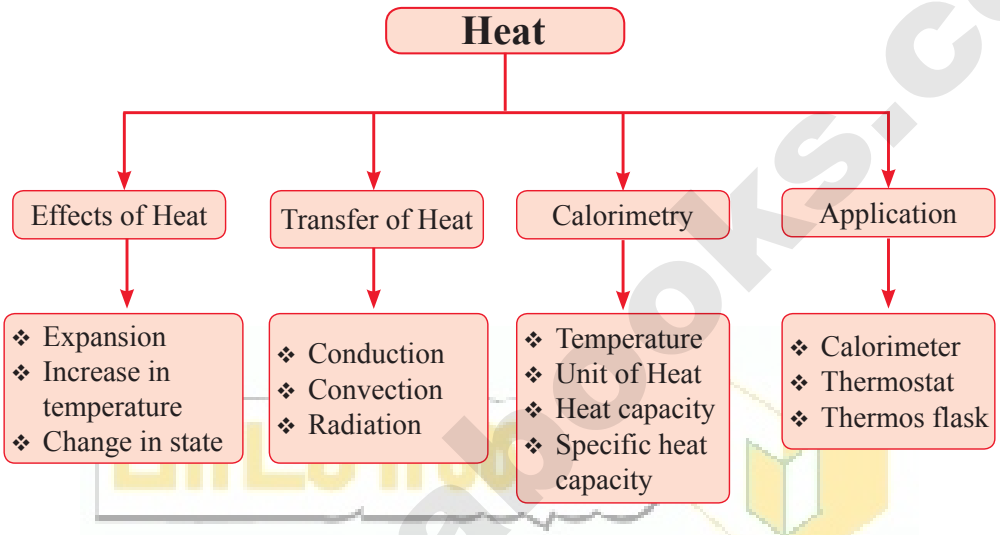
VI. Answer the following in detail: (1 × 5 = 5)

20. (a) What is dispersion? Explain in detail. (or)
    (b) List out the uses of periscope.

Unit 4

HEAT

Concept Map



Must Know Definitions

Heat	:	**Heat** is defined as an energy which flows from hot substances to cold substances, or, from hot region to cold region of a substance.
Thermal energy	:	The energy that is generated and measured by heat.
Units of heat	:	Since heat is a form of energy, its unit is the same as the unit of energy. (i.e.) joule. The SI unit of heat is joule (J). The most commonly used unit of heat is calorie. 1 calorie = 4.186J
One Calorie	:	**One calorie** is the amount of heat energy required to raise the temperature of 1 gram of water through 1°C.
One kilo Calorie	:	The amount of energy in food items is measured by the unit kilo calorie. 1 kilo calorie = 4200 J (Approximately).
Heat capacity	:	The amount of heat energy required by a substance to raise its temperature by 1°C or 1 K. It is denoted by the symbol C'.
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.
Calorimetry	:	The technique used to measure The amount of heat involved in a physical or a chemical process.
Calorimeter	:	A device used to measure the amount of heat gained or lost by a substance.

Thermostat	:	A device which maintains the temperature of a place or an object constant.
Thermos Flask	:	The **thermos flask** (Vacuum flask) is an insulating storage vessel that keeps its content hotter or cooler than the surroundings for a longer time.

Formulae to remember

Heat capacity	:	$C' = \frac{Q}{\Delta T}$ Jk^{-1}
Amount of heat energy	:	$Q = C' \times \Delta T$ J
Specific of heat capacity	:	$C = \frac{Q}{m \times \Delta T}$ Jkg^{-1} K^{-1}

TEXT BOOK EXERCISES

I. Choose the best answer :

1. Heat is a form of _____.

(a) electrical energy (b) gravitational energy
(c) thermal energy (d) None of these **[Ans. (c) thermal energy]**

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 **[Ans. (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
[Ans. (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
[Ans. (c) Gas]

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

(a) sublimation (b) condensation
(c) freezing (d) deposition **[Ans. (c) freezing]**

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

(a) solid (b) liquid (c) gas (d) All of them
[Ans. (a) solid]

II. Fill in the blanks :

1. A calorimeter is a device used to measure the_____. [Ans. amount of heat gained or lost by a substance]
2. _____ is defined as the amount of heat required to raise the temperature of 1kg of a substance by 1°C. [Ans. Specific heat capacity]
3. A thermostat is a device which maintains _____. [Ans. temperature of an object constant]
4. The process of converting a substance from gaseous state to solid state is called_____. [Ans. deposition]
5. If you apply heat energy, the temperature of a system will _____. [Ans. increase]
6. If the temperature of a liquid in a container is decreased, then the interatomic distance will _____. [Ans. 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. [Ans. True]
2. The dimensions of a substance are increased if the temperature of the substance is decreased. [Ans. False]

   Correct statement : The dimensions of a substance are increased if the temperature of the substance is **increased**.
3. The process of converting a substance from solid state to gaseous state is called condensation. [Ans. False]

   Correct statement : The process of converting a substance from solid state to gaseous state is called **sublimation**.
4. Convection is the process by which the thermal energy flows in solids. [Ans. False]

   Correct statement : Conduction is the process by which the thermal energy flows in Solids (or) convection is the process by which the thermal energy flows in liquids and gases.
5. The amount of heat gained by a substance is equal to the product of its mass and latent heat. [Ans. True]
6. In a thermos flask, the silvered walls reflect and radiate the heat outside. [Ans. False]

   Correct statement : In a thermos flask, the silvered walls reflect **radiated heat back to the liquid in the bottle.**

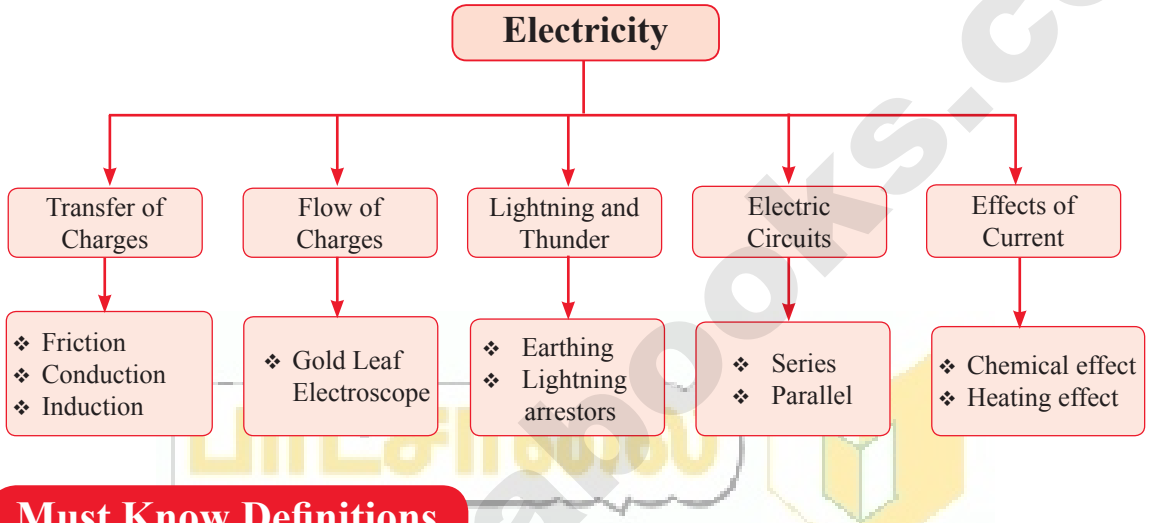
IV. Match the following :

Conduction	Liquid
Convection	Gas to liquid
Radiation	Solid to gas
Sublimation	Vaccum
Condensation	Solid

Unit 5

ELECTRICITY

Concept Map



Must Know Definitions

Electric charge	:	Charge or **electric charge** is the basic property of matter that causes objects to attract or repel each other.
Transfer of charges by friction	:	The process of charging an uncharged body by rubbing a charged body over the other.
Transfer of charges by conduction	:	Charges can be transferred to an 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**.
Transfer of charges by induction	:	The process of charging an uncharged body by bringing a charged body near to it but without touching is called **induction**.
Electric current	:	The flow of electric charges through a material.
Conductors	:	The materials which allow electric charges to pass through them easily are called **conductors** of electricity.
Insulators	:	Materials which do not allow electric charges to pass through them easily are called **insulators**. Rubber, wood and plastic are insulators.
Ions	:	Electrically charged atoms or group of atoms.
Anode	:	The positive terminal of the battery is called **Anode**.
Cathode	:	The negative terminal of the battery is called **Cathode**.

Electrolyte	:	A liquid that conducts electricity and breaks up chemically during the process is called **electrolyte**.
Electrolysis	:	The decomposition of molecules of a solution into positive and negative ions on passing an electric current through it, is called **electrolysis**.
Chemical effect of electric current	:	When electric current is passed through a conducting solution, some chemical reactions take place in the solution. This chemical reactions produce electrons which conduct electricity. This is called **chemical effect of electric current**.
Heating effect of electric current	:	When electric current passes through a conductor, there is a considerable 'friction' between the moving electrons and the molecules of the conductor. During this process, electrical energy is transformed to heat energy. This is known as **heating effect of electric current**.
Electric fuse	:	A strip of wire that melts and breaks an electric circuit if the current exceeds a safe level.
Electric circuit	:	The path through which electrons flow from one terminal to another terminal of the source, is called **electric 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.
Parallel circuit	:	It is a closed circuit in which the current divides into two or more paths before recombining to complete the circuit.
Voltage	:	The difference between the potentials (higher potential and lower potential) is known as potential difference, commonly known as **voltage**.

TEXT BOOK EXERCISES

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 **[Ans. (b) positive]**

2. The electrification of two different bodies on rubbing is because of the transfer of [Govt. MQP-2019]

(a) neutrons (b) protons
(c) electrons (d) protons and neutrons **[Ans. (c) electrons]**

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
[Ans. (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 **[Ans. (b) positive]**

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

[Ans. (d) a protective device for breaking an electric circuit]

II. Fill in the blanks :

1. _____ takes place by rubbing objects together. **[Ans. Transfer of electron]**

2. The body which has lost electrons becomes _____. **[Ans. positive]**

3. ____ is a device that protects building from lightning strike. **[Ans. Lightning arrester]**

4. _____ has a thin metallic filament that melts and breaks the connection when the circuit is overheated. **[Ans. Electric fuse]**

5. Three bulbs are connected end to end from the battery. This connection is called _____. **[Ans. 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. **[Ans. True]**

2. A charged body induces an opposite charge on an uncharged body when they are brought near. **[Ans. True]**

3. Electroscope is a device used to charge a body by induction. **[Ans. True]**

4. Water can conduct electricity. **[Ans. True]**

5. In parallel circuit, current remains the same in all components. **[Ans. False]**

Correct statement : In parallel circuit, **voltage** remains the same in all components.

IV. Match the following :

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

Ans.

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

Intext Activities

➝ ACTIVITY - 1

Take a comb and place it near some pieces of paper. Are they attracted by the comb? No. Now comb your dry hair and place it near them. What do you see? You can see that the paper pieces are attracted by the comb now. How is it possible?

Ans. 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.

➝ ACTIVITY - 2

Take a sheet of paper. Turn it into a hollow cylinder. Tie one end of the cylinder with a silk thread and hang it from a stand. Now take an ebonite rod and charge it by rubbing it with a woollen cloth. Bring this charged ebonite rod near the paper cylinder. The cylinder will be attracted by the rod. If you touch the paper cylinder by the charged rod, you will see the paper cylinder repelling the rod. Can you say the reason?

Ans. When the paper cylinder is touched by the rod, some negative charges are transferred to the paper. Hence, the negative charges in the rod are repelled by the negative charges in the paper cylinder.

➝ ACTIVITY - 4

Rub your foot on a carpet floor and touch a door knob. What do you feel? Do you feel the shock in your hand? Why does this happen?

Ans. Getting a shock from a doorknob after rubbing your foot on a carpet floor, results from discharge. Discharge occurs when electrons on the hand are quickly pulled to the positively charged doorknob. This movement of electrons, which is felt as a shock, causes the body to lose negative charge.

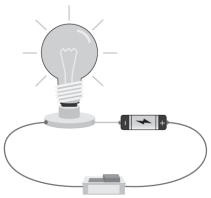
➝ ACTIVITY - 5

Take two pieces of wire, an LED light and a battery, and make a simple electric circuit. Take some water in a glass and put the wires in the water as shown in the figure. Does the LED bulb glow? What do you understand from this?

Ans. Yes, the LED bulb glows. From this activity we understood that liquids also conduct electricity.

➝ ACTIVITY - 7

Take a battery, a bulb, a switch and few connecting wires. Make an electric circuit as shown in the figure. Keep the switch in the 'OFF' position. Does the bulb glow?



Ans. No, the bulb does not glow.

Now move the electric switch to the 'ON' position and let the bulb glow for a minute or so. Touch the bulb now. Do you feel the heat?

Ans. Yes, the bulb is hot because electrical energy is transformed to heat energy. This is known as **heating effect of electric current**.

★★★★★

Additional Questions

I. Choose the correct answer :

1. Electroplating is based on _____effect of electricity.
(a) magnetic (b) chemical (c) heating (d) physical
[Ans. (b) chemical]

2. A positively charged object will attract _____charged object.
(a) positively (b) negatively
(c) both a and b (d) none [Ans. (b) negatively]

3. The method of charging an object by touching is called _____.
(a) induction (b) diffusion (c) current (d) conduction
[Ans. (d) conduction]

4. Lightning occurs due to _____.
(a) rain (b) humidity (c) wind (d) electric discharge
[Ans. (d) electric discharge]

5. Electric charge can be transferred from a charged object to another through _____.
(a) vacuum (b) conductor
(c) air (d) insulator [Ans. (b) conductor]

6. Electric charge is measured in _____.
(a) volt (b) coulomb (c) ampere (d) watt
[Ans. (b) coulomb]

7. The value of charge of an electron is equal to _____.
(a) 6.04×10^{-19} C (b) 1.602×10^{-18} C
(c) 1.602×10^{-19} C (d) 6.10×10^{-18} C [Ans. (c) 1.602×10^{-19} C]

8. Before using electroscope, it should be _____.
(a) charged (b) closed (c) discharged (d) cleaned
[Ans. (c) discharged]

9. Lightning rods are made of _____.
(a) copper (b) plastic (c) sand paper (d) wood
[Ans. (a) copper]

10. Electricity produced on rubbing is _____.
(a) static electricity (b) current electricity
(c) electromagnet (d) none [Ans. (a) static electricity]

11. The materials which allows electric current to pass through it, is called _____.
(a) conductor (b) insulator (c) both a and b (d) none of these
[Ans. (a) conductor]

12. The material which does not allow electric current is called _____.
(a) solution (b) metal (c) insulator (d) electrolyte
[Ans. (c) insulator]

13. All metals are _____.
(a) conductors (b) insulators (c) electrolytes (d) none
[Ans. (a) conductors]

14. **An electrolyte _____.**
(a) has positive charge (b) has negative charge
(c) should be able to conduct charge without dissociating.
(d) should be able to form positive and negative ions.
[Ans. (d) should be able to form positive and negative ions]

15. **Most common industrial application of chemical effects of electric current is _____.**
(a) anodising (b) electroplating (c) electrolysis (d) none
[Ans. (b) electroplating]

16. **The terminal which is connected to a positive terminal of a battery is called _____.**
(a) anode (b) cathode (c) neutral (d) none
[Ans. (a) anode]

17. **Flow of _____ per unit time is called current.**
(a) charge (b) proton (c) neutron (d) all of these
[Ans. (a) charge]

18. **Liquids that conduct electricity are the solutions of _____.**
(a) acids (b) bases (c) salts (d) all of these
[Ans. (d) all of these]

19. **A tiny particle which rotates around the nucleus of an atom is _____.**
(a) proton (b) electron (c) neutron (d) both a and b
[Ans. (b) electron]

20. **_____ wire is used in the filament of the bulbs.**
(a) Nichrome (b) Copper (c) Tungsten (d) None
[Ans. (c) Tungsten]

II. Fill in the Blanks :

1. Comb rubbed with hair_____electrons from the hair and becomes negatively charged.
[Ans. gains]

2. Electric charge is measured in _____ . **[Ans. coulomb]**

3. Since, protons and electrons are equal in number, an atom is electrically _____ .
[Ans. neutral]

4. When an ebonite rod is rubbed with fur, the fur transfers _____ to the ebonite rod.
[Ans. electrons]

5. Before the discovery of electrons, it was considered that electric current is due to the flow of _____ charges. **[Ans. positive]**

6. The gold - leaf electroscope was developed by _____ . **[Ans. Abraham Bennet]**

7. _____ is an example of discharge that takes place in clouds. **[Ans. Lightning]**

8. During thunderstorm air is moving _____ rapidly . **[Ans. upward]**

9. Huge quantities of electricity are discharged in light flashes and temperatures of over _____ ºC or more can be reached . **[Ans. 30,000]**

10. _____ extreme heat will vapourize the water inside a tree, creating steam that may burn out the tree. **[Ans. Lightning's]**

11. ____ is a device that protects building from lightning strike. **[Ans. Lightning arrester]**

12. _____ is a species of fish which can give electric shocks . **[Ans. Electric eel]**

UNIT TEST

Time : 60 min. **Marks : 25**

I. Choose the correct answer: (3 × 1 = 3)

1. 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

2. Electric charge is measured in _____

(a) Volt (b) Coulomb (c) ampere (d) watt

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

II. Fill in the blanks: (4 × 1 = 4)

4. The body which has lost electrons becomes _____.

5. Unit of electrical force or electric pressure _____.

6. _____takes place by rubbing objects together.

7. Three bulbs are connected end to end from the battery. This connection is called _____.

III. Write True or False: (3 × 1 = 3)

8. The charge acquired by an ebonite rod rubbed with a piece of flannel is negative.

9. Water can conduct electricity.

10. Electroscope is a device used to charge a body by induction.

IV. Answer the following in one or two sentences: (5 × 2 = 10)

11. What is earthing?

12. Give some uses of electroplating.

13. What are anodes and cathodes?

14. How thunder takes place?

15. Write the differences between conductors and insulators.

V. Answer the following in detail: (1 × 5 = 5)

16. Distinguish between series and parallel circuit.

(or)

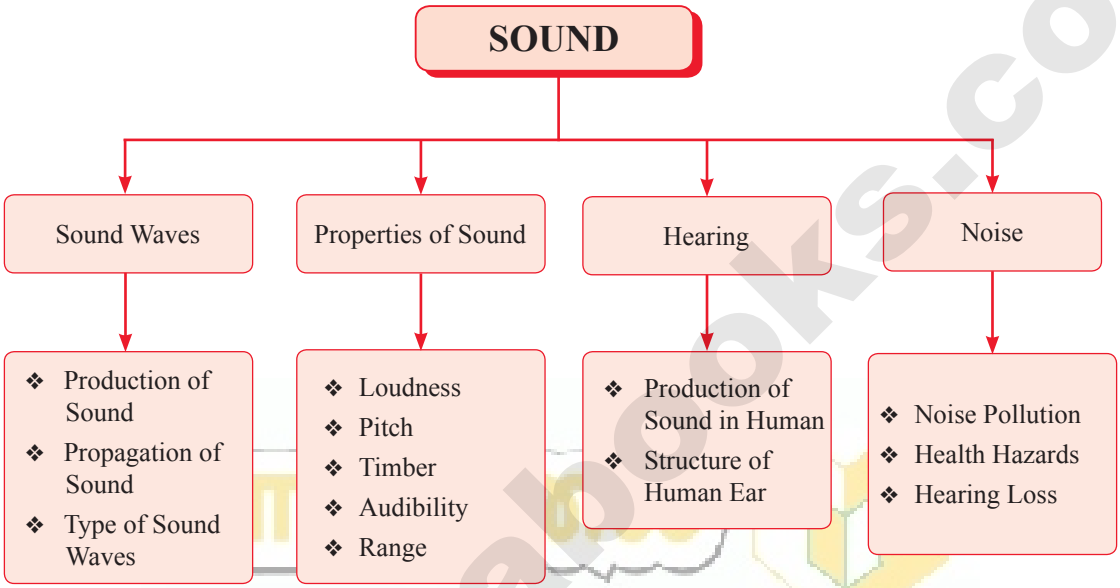
What is electroscope? Explain how it works?

★★★★★

Unit 6

SOUND

Concept Map



Must Know Definitions

Sound	:	**Sound** is a form of energy that is transferred as vibrations through the air or any other medium in the form of waves.
Time period	:	The time taken by a vibrating particle to complete one vibration is known as **time period** of the vibration.
Audible sound	:	Sound with the frequency ranging from 20 Hz to 20,000 Hz is called sonic sound or **audible sound**.
Infrasonic sound	:	A sound with a frequency below 20 Hz is called as subsonic or **infrasonic sound**.
Ultrasonic sound	:	A sound with a frequency greater than 20,000 Hz is called as **ultrasonic sound**.
Vibration	:	**Vibration** means a kind of rapid to and fro motion of a particle.
Compression	:	The region of high pressure in a longitudinal wave is called a **compression**.
Rarefaction	:	The region of low pressure in a longitudinal wave is called a **rarefaction**.
Wavelength	:	The distance between two consecutive particles which are in same phase of vibration is called **wavelength**.

Amplitude	:	The maximum displacement of a vibrating particle from its mean position is called **amplitude**.
Frequency	:	The number of vibrations of a particle in the medium in one second is known as **frequency**.
Sonic Boom	:	A shock wave that consists of compressed sound waves created when something moves faster than the speed of sound.
Loudness	:	**Loudness** is defined as the characteristic of a sound that enables us to distinguish a weak or feeble sound from a loud sound.
Pitch	:	The **pitch** is the characteristic of sound that enables us to distinguish between a flat sound and a shrill sound.
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
Noise	:	Any sound that is unpleasant to the ear is called **noise**.

Formulae to remember

Speed of sound	=	Frequency × Wave length
v	=	$n \times \lambda$
Wavelength	=	$\frac{\text{Speed of sound}}{\text{Frequency}}$
λ	=	$\frac{v}{n}$
Frequency	=	$\frac{\text{Speed of sound}}{\text{Wavelength}}$
n	=	$\frac{v}{\lambda}$
Frequency	=	$\frac{1}{\text{Time period}}$
n	=	$\frac{1}{T}$

TEXT BOOK EXERCISES

I. Choose the best answer :

1. Sound waves travel very fast in

(a) air (b) metals (c) vacuum (d) liquids

[Ans. (b) metals]

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) **[Ans. (c) (iii) and (iv)]**

3. The amplitude of the sound wave decides its **[Govt. MQP-2019]**

(a) speed (b) pitch (c) loudness (d) frequency

[Ans. (c) loudness]

4. What kind of musical instrument is a sitar?

(a) String instrument (b) Percussion instrument

(c) Wind instrument (d) None of these **[Ans. (a) String instrument]**

5. Find the odd one out.

(a) Harmonium (b) Flute

(c) Nadaswaram (d) Violin **[Ans. (d) Violin]**

[Hint : Violin is a stringed instrument. Others are wind or reed instruments.**]**

6. Noise is produced by

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

(c) regular and periodic vibrations. (d) irregular and non-periodic vibrations.

[Ans. (d) irregular 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

[Ans. (c) 20 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

[Ans. (a) Loudness increases and pitch is higher]

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

(a) Irratition (b) Stress (c) Nervousness (d) All the above

[Ans. (d) All the above]

II. Fill in the blanks :

1. Sound is produced by _____. **[Ans. vibrating particles]**
2. The vibrations of a simple pendulum are also known as_____. **[Ans. oscillation]**
3. Sound travels in the form of _____. **[Ans. mechanical waves]**

4. High frequency sounds that cannot be heard by you are called _____.
[Ans. Ultrasonic]

5. Pitch of a sound depends on the _____ vibration. [Ans. frequency of the]

6. If the thickness of a vibrating string is increased, its pitch _____. [Ans. decreases]

III. Match the following :

Ultrasonics	Frequency below 20Hz
Speed of sound in air	Needs material medium
Infrasonics	330 ms^{-1}
Sound propagation	Frequency more than 20,000 Hz

Ans.

Ultrasonics	Frequency more than 20000 Hz
Speed of sound in air	330 ms^{-1}
Infrasonics	Frequency below 20Hz
Sound propagation	Needs material medium

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

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

V. Answer briefly:

1. **What is vibration?**

Ans. Vibration means a kind of rapid to and fro motion of a particle.

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

Ans. **Lightning**. The most common example of 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?**

Ans. 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.

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 330ms^{-1}).

Ans. Solution:

Given data : time, t = 2 s

Speed of sound v = 330 ms^{-1}

To find : Distance, d = ?

Formula : 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?

Ans. Solution:

Given data :

Distance travelled by a sound wave, d = 2000 m

time taken, t = 8 s

To find : Velocity of sound, v = ?

Formula : $\text{Velocity, v} = \frac{\text{distance (d)}}{\text{time (t)}}$

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

3. A wave with a frequency of 500 Hz is travelling at a speed of 200 m^{-1}. What is the wavelength?

Ans. Solution:

Given data : Frequency, n = 500 Hz

Speed v = 200 ms^{-1}

To find : Wavelength, λ = ?

Formula : $\text{Wavelength, } \lambda = \frac{\text{Speed (v)}}{\text{Frequency (n)}}$

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

Intext Activities

→ ACTIVITY - 1

Take the tray of an empty match box and stretch a rubber band around it, along its length. Then, pluck the stretched rubber band with your index finger. What do you observe? Do you hear any sound?

Ans. Observation :

(i) On plucking the rubber band, it starts vibrating.

(ii) We can hear a feeble humming sound as long as the rubber band is vibrating.

(iii) The humming sound stops as soon as the rubber band stops vibrating.

Conclusion : This confirms that sound is produced by vibrating particles.

Additional Questions

I. Choose the correct answer :

1. **Sound cannot travel through _____.**
(a) solid (b) liquid (c) vacuum (d) air **[Ans. (c) vacuum]**

2. **Vibrations in an object produce _____.**
(a) pressure (b) sound (c) density (d) current
[Ans. (b) sound]

3. **Frequency is expressed in _____.**
(a) hertz (b) metre (c) kilogram (d) second
[Ans. (a) hertz]

4. **Unwanted sounds are called _____.**
(a) noise (b) music (c) both a and b (d) none **[Ans. (a) noise]**

5. **Pitch of sound is determined by its _____.**
(a) speed (b) loudness (c) amplitude (d) frequency
[Ans. (d) frequency]

6. **The hearing range of human ear is _____.**
(a) 20 Hz to 20 k Hz (b) less than 20 Hz
(c) more than 20 k Hz (d) none **[Ans. (a) 20 Hz to 20 kHz]**

7. **The voices of men, women and children differ because of difference in their _____.**
(a) lungs (b) vocal cords (c) ear drum (d) wind pipe
[Ans. (b) vocal cords]

8. **The time taken for one complete vibration is called its _____.**
(a) loudness (b) pitch (c) time period (d) frequency
[Ans. (c) time period]

9. **_____instruments produce a specific sound when they are struck, scrapped or clashed together.**
(a) Reed (b) Stringed (c) Percussion (d) Wind
[Ans. (c) Percussion]

10. **Bats produce _____sound during screaming.**
(a) infrasonic (b) ultrasonic (c) noise (d) blast
[Ans. (b) ultrasonic]

11. **The outer and visible part of the human ear is called _____.**
(a) ear drum (b) cochlea (c) pinna (d) canal **[Ans. (c) pinna]**

12. **_____is produced by the regular patterns of vibration.**
(a) Music (b) Ultrasonic (c) Ear drum (d) none **[Ans. (a) Music]**

13. **Transverse waves are produced only in_____ and liquids.**
(a) solids (b) gases (c) both a and b (d) none
[Ans. (a) solids]

14. **The speed of sound _____with increase in humidity.**
(a) decreases (b) increases (c) remains same (d) none
[Ans. (b) increases]

15. **A device used in laboratory to produce pure sound of some particular frequency is called _____.**
(a) tuning fork (b) sonar (c) sonometer (d) none
[Ans. (a) tuning fork]

II. Fill in the blanks :

1. _____ is produced when an object is set to vibrate. [Ans. Sound]
2. The substance through which sound is transmitted is called_____. [Ans. medium]
3. Sound cannot travel in _____. [Ans. vacuum]
4. The speed of sound is _____ in solids than in liquids. [Ans. more]
5. _____ is the distance between two consecutive particles, which are in the same phase of vibration. [Ans. Wavelength]
6. _____ is the number of vibrations of a particle in the medium in one second. [Ans. Frequency]
7. In any medium, as the _____ increases, the speed of sound also increases. [Ans. temperature]
8. The speed of sound in air is 331 ms^{-1} at _____ and _____ at 22ºC. [Ans. 0ºC, 344 ms^{-1}]
9. The unit of frequency is _____. [Ans. hertz]
10. The amount of water vapour in the air is known as _____. [Ans. humidity]
11. The _____ of air decreases with increase in humidity. [Ans. density]
12. The region of high pressure is called as _____ and the region of low pressure is called as _____. [Ans. compression, rarefaction]
13. _____waves are produced only in solids and liquids. [Ans. Transverse]
14. The unit of amplitude is _____. [Ans. metre]
15. The unit of loudness is _____. [Ans. decibel]
16. The natural frequencies are known as the _____of the guitar string. [Ans. harmonics]
17. The Larynx has two ligaments called _____stretched across it. [Ans. vocal cords]
18. The outer and visible part of the human ear is called _____. [Ans. pinna]
19. _____is produced by the irregular and non-periodic vibrations. [Ans. Noise]
20. Males generally have _____ and _____vocal cords that produce a deeper, low pitch sound in comparison with females. [Ans. thicker, longer]

III. True or False - if false, give the correct statement :

1. The seismic wave formed during earthquake is an example for a transverse wave.

Ans. False. **Correct statement:** The seismic wave formed during earthquake is an example for a **longitudinal** wave.

2. The loudness of a sound depends on its pitch.

Ans. False. **Correct statement:** The loudness of a sound depends on its **amplitude.**

3. The pitch is the characteristic of sound that enables us to distinguish between a flat sound and a shrill sound.

Ans. True.

4. The voice of a female has a lower pitch than a male.

Ans. False. **Correct statement:** The voice of a female has a **higher** pitch than a male.

5. Longitudinal waves are produced in solids liquids and also in gases.

Ans. True.

6. Sound with the frequency ranging from 20 Hz to 20,000 Hz is called sonic sound.

Ans. True.

8th STD

COMMON ANNUAL EXAMINATION - 2022

SCIENCE (with answers)

Reg. No.

TIME ALLOWED : 2.30 Hours] [MAX. MARKS : 100

I. Choose the correct answer. (10 × 1 = 10)

1. SI unit of temperature is _____.
   (a) Celsius (b) Fahrenheit
   (c) Kelvin (d) Ampere
2. Sound waves travel very fast in
   (a) air (b) metals
   (c) Vaccum (d) liquids
3. Cryogenic fuels are stored at _____.
   (a) room temperature
   (b) low temperature
   (c) very low temperature
   (d) very high temperature
4. The liquid metals used in thermometers is _____.
   (a) Copper (b) mercury
   (c) silver (d) gold
5. Which of the following is known as azote?
   (a) Oxygen
   (b) Nitrogen
   (c) sulphur
   (d) Carbon dioxide
6. We brush our teeth with tooth paste because it is _____ in nature.
   (a) basic (b) acidic
   (c) Both a and b (d) None of these
7. Plants that prevent soil erosion are _____.
   (a) algae (b) fungi
   (c) bryophytes (d) pteridophytes
8. Which one of the following organisms lack muscles and skeleton for movement?
   (a) Dog (b) Snail
   (c) Earthworm (d) Human being
9. _____intake needs to be increased to prevent osteoporosis in later life.
   (a) Pottassium (b) Phosphorous
   (c) Iron (d) Calcium
10. The process of placing seeds in the soil is called as _____.
    (a) ploughing (b) sowing
    (c) Crop production (d) Crop rotation

II. Fill in the blanks. (5 × 1 = 5)

11. Hydraulic lift works under the principle of _____.
12. Three bulbs are connected end to end from the battery. This connection is called _____.
13. _____is the enzyme responsible for browning of vegetables and fruits.
14. Dry ice is used as a _____.
15. The size of the cells are measured in units of _____.

III. State true of false. If false, correct the statement. (5 × 1 = 5)

16. Quartz clocks are used in GPS devices.
17. Water can conduct electricity?
18. Pirus is a closed seeded plant.
19. Anthractite is the highest grade coal.
20. Using clean toilets for defecation is good practice.

IV. Match the following. (5 × 1 = 5)

21. Convection	-	Sexual maturity
22. Radiation	-	Change in voice
23. Puberty	-	Testosterone
24. Adam's apple	-	liquid
25. Androgen	-	Vaccum

V. Give reasons for the following.(2 ×2 ½ = 5)

26. Ice floats on water.
27. Sea water is unfit for drinking.

VI. Problems. (2 ×2 ½ = 5)

28. A sound wave travels 2000 m in 8 s. What is the velocity of the second?
29. A sound has a frequency of 5 Hz and a speed of 25 ms^{-1}. What is the wavelength of the sound?

VII. Draw and label the parts. (1 × 5 = 5)

30. Draw the structure of the yeast and label the parts.

(OR)

Name and Draw the different shapes and sizes of some cells.

VIII. Answer briefly. (Any 15 Questions) **(15 × 2 = 30)**

31. Define - Ampere

32. Cooking in a place located at a higher altitude is difficult. Why?

33. Distinguish between natural and artificial magnets?

34. Name three types of heat transfer?

35. What are Cryogenic Fuels?

36. Complete the analogy :
Downward force : Weight
Upward force offered by liquid :_____

37. List out the uses of nitrogen.

38. Soda bottle bursts sometimes when it is opened during summer. Why?

39. What are the methods of removing handness of water?

40. Define - Acid.

41. What do you mean by catenation?

42. What is a chemical equation?

43. Write the four types of bacteria, based on their shape.

44. Mention the function of **'Alveoli'**.

45. Differentiate : Movement and Locomotion.

46. List out the changes which occur during puberty.

47. What is green manure?

48. What is global warning?

IX. Answer in Detail. **(6 × 5 = 30)**

49. State Pascal's law and mention its applications.
(OR)
With the help of a neat diagram, explain the working of a calorimeter.

50. List out the use of magnets.
(OR)
What are the achievements of Chandrayan - 1?

51. Balance the following chemical equation.
a. $Na + O_2 + Na_2O$
b. $Ca + N_2 + Ca_2N_2$
c. $N_2 + H_2 + NH_3$
d. $Caco_3 + Hcl \rightarrow Cacl_2 + CO_2 + H_2O$
e. $Pb\ (No_3)_2 \rightarrow PbO + No_2 + O_2$
(OR)
Tabulate the any 5 differences between metal and non - metals.

52. What are the uses of acids?
(OR)
How is water purified at a water purification plant?

53. Write a short note on bacteria and its structure.
(OR)
Write the difference between Bryophytes and Pteridophytes.

54. Discuss the various types of movements seen in living Organisms.
(OR)
What is deforestation? Explain the causes and effects of deforestation.

★ ★ ★

Answers

I.

1. (c) Kelvin
2. (b) metals
3. (b) low temperature
4. (b) mercury
5. (b) Nitrogen
6. (a) basic
7. (c) bryophytes
8. (b) Snail
9. (d) Calcium
10. (b) sowing

II.

11. Pascal' Law
12. series circuit
13. Poly phenol oxidase or tyrosinase
14. refrigerant
15. Micron

III.

16. False
17. True
18. False
19. True
20. True