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Chennai

2019-20 Edition

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# PERFACE

Education is not the learning of facts.  
It is rather training of the mind to think.

- Albert Einstein

**Respected Principals, Correspondents, Head Masters / Head Mistresses, Teachers,**

From the bottom of our heart, we at SURA Publications sincerely thank you for the support and patronage that you have extended to us for more than a decade.

It is in our sincerest effort we take the pride of releasing **SURA'S Science Guide for 10<sup>th</sup> Standard** – Edition 2019 - 20. This guide has been authored and edited by qualified teachers having teaching experience for over a decade in their respective subject fields. This Guide has been reviewed by a reputed Professor who is currently serving as Head of the Department in an esteemed College.

With due respect to Teachers, I would like to mention that this guide will serve as a teaching companion to qualified teachers. Also, this guide will be an excellent learning companion to students with exhaustive exercises and in-text questions in addition to precise answers for textual questions.

In complete cognizance of the dedicated role of Teachers, I completely believe that our students will learn the subject effectively with this guide and prove their excellence in Board Examinations. I once again sincerely thank the Teachers, Parents and Students for supporting and valuing our efforts. God Bless all.

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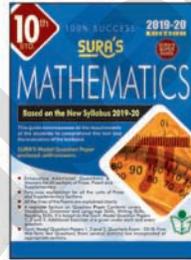
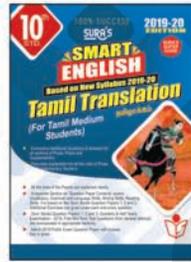
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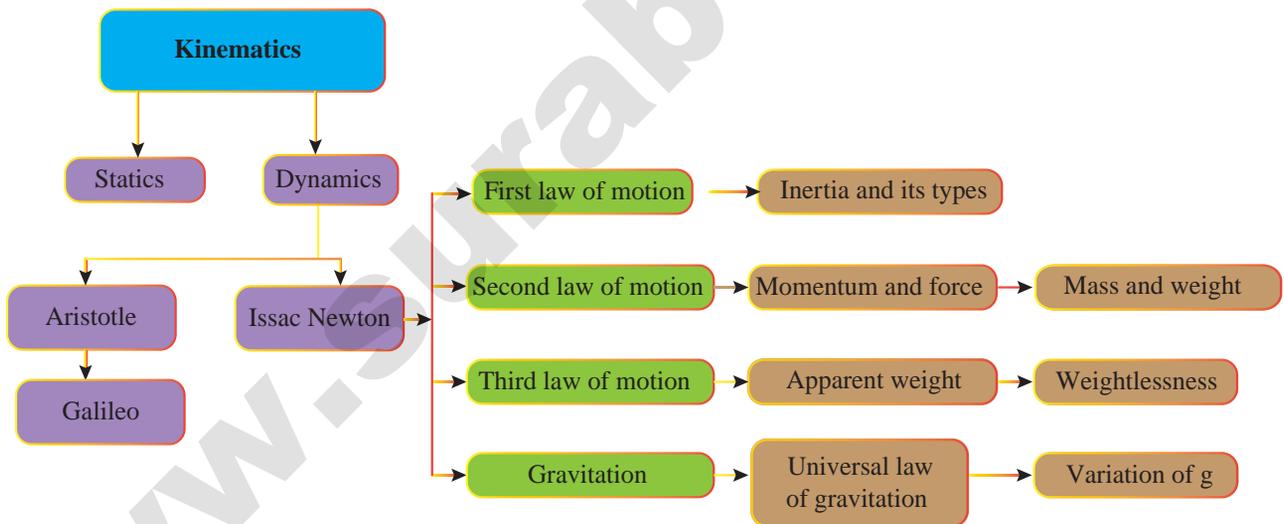
# PHYSICS

## UNIT 1



# LAWS OF MOTION

### CONCEPT MAP





### MUST KNOW DEFINITIONS

- Linear momentum** : The product of mass and velocity of a moving body gives the magnitude of its linear momentum. It acts in the direction of the velocity of the body.
- Like parallel forces** : Two or more forces of equal or unequal magnitude acting along the same direction parallel to each other.
- Unlike parallel** : If two or more forces are acting in opposite direction then they are called Unlike parallel forces.
- Resultant** : When several forces act simultaneously on the same body, then the combined effect of multiple forces can be represented by a single force, as resultant.
- Moment of the couple** : Moment of the couple is measured by the product of any one of the forces and the perpendicular distance between two forces.
- Impulse** : When a force  $F$  acts on a body for a period of time  $t$ , then the product of force and time is known as “impulse”.
- Weight** : Weight is equal to gravitational force. Also weight ( $W$ ) = mass  $\times$  acceleration due to gravity. i.e  $W = mg$
- Mass** : Mass of a body is defined as the quantity of matter contained in the object. Its SI unit is kilogram ( $kg$ ).
- Inertial mass** : If mass is defined in association with force and inertia, it is termed as “inertial mass”.
- Gravitational mass** : When the mass of a body is defined in association with the gravitational field, it is termed as “gravitational mass”.
- Apparent weight** : Apparent weight is the weight of the body acquired due to the action of gravity and other external forces on the body.
- Weightlessness** : Whenever a body or a person falls freely under the action of Earth’s gravitational force alone, it appears to have zero weight. This state is referred to as “weightlessness”.

## FORMULAE

1. Like parallel forces $F_{\text{net}}$	$= F_1 + F_2$
2. Unlike parallel forces $F_{\text{net}}$	$= F_1 - F_2$ , if $F_1 > F_2$ (or) $F_1 \sim F_2$ [ $\sim \rightarrow$ difference]
3. Torque, $\tau$	$= F \times S$ (force $\times$ perpendicular distance between the force)
4. Principle of moments	$= F_1 \times d_1 = F_2 \times d_2$
5. Force, $F$	$= \text{mass} \times \text{acceleration} = ma$
6. $1 \text{ N} = 1 \text{ kgms}^{-2}$ ; $1 \text{ kgf}$ $1 \text{ dyne} = 1 \text{ g cm s}^{-2}$ ; $1 \text{ N}$	$= 1 \text{ kg} \times 9.8 \text{ ms}^{-2} = 9.8 \text{ N}$ $= 10^5 \text{ dyne}$
7. Impulse, $J$	$= F \times t = \text{Force} \times \text{time}$
8. Law of conservation of momentum	$= m_1v_1 + m_2v_2 = m_1u_1 + m_2u_2$
9. By Newton's law of gravitation the force, $F$	$= \frac{GMm}{r^2}$ $\square G = 6.674 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$
10. Acceleration due to gravity, $g$	$= \frac{GM}{R^2}$ M - Mass of the earth R - radius of the earth
11. Weight $W$	$= mg$
12. Apparent weight	
(i) when lift is moving upwards	$R = m(g + a)$ where, $R \rightarrow$ apparent weight of the person
(ii) when lift is moving downwards	$R = m(g - a)$ $m \rightarrow$ mass of the person
(iii) when lift is at rest	$R = mg$ $a \rightarrow$ acceleration
(iv) when lift is falling down freely	$R = 0$ $g \rightarrow$ acceleration due to gravity



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Inertia of a body depends on

- (a) weight of the object
- (b) acceleration due to gravity of the planet
- (c) mass of the object
- (d) Both a & b

[Ans. (c) mass of the object]

2. Impulse is equals to

- (a) rate of change of momentum
- (b) rate of force and time
- (c) change of momentum
- (d) rate of change of mass

[Ans. (c) change of momentum]

3. Newton's III law is applicable

- (a) for a body is at rest
- (b) for a body in motion
- (c) both a & b
- (d) only for bodies with equal masses

[Ans. (c) both a & b]

4. Plotting a graph for momentum on the X-axis and time on Y-axis. slope of momentum-time graph gives

- (a) Impulsive force
- (b) Acceleration
- (c) Force
- (d) Rate of force

[Ans. (c) Force]

5. In which of the following sport the turning of effect of force used

- (a) swimming
- (b) tennis
- (c) cycling
- (d) hockey

[Ans. (c) cycling]

6. The unit of 'g' is  $\text{ms}^{-2}$ . It can be also expressed as

- (a)  $\text{cm s}^{-1}$
- (b)  $\text{N kg}^{-1}$
- (c)  $\text{N m}^2 \text{kg}^{-1}$
- (d)  $\text{cm}^2 \text{s}^{-2}$

[Ans. (b)  $\text{N kg}^{-1}$ ]

7. One kilogram force equals to

- (a) 9.8 dyne
- (b)  $9.8 \times 10^4 \text{ N}$
- (c)  $98 \times 10^4 \text{ dyne}$
- (d) 980 dyne

[Ans. (c)  $98 \times 10^4 \text{ dyne}$ ]

8. The mass of a body is measured on planet Earth as M kg. When it is taken to a planet of radius half that of the Earth then its value will be \_\_\_\_kg

- (a) 4 M
- (b) 2 M
- (c) M/4
- (d) M

[Ans. (c) M/4]

9. If the Earth shrinks to 50% of its real radius its mass remaining the same, the weight of a body on the Earth will

- (a) decrease by 50%
- (b) increase by 50%
- (c) decrease by 25%
- (d) increase by 300%

[Ans. (c) decrease by 25%]

10. To project the rockets which of the following principle(s) is/(are) required?

- (a) Newton's third law of motion
- (b) Newton's law of gravitation
- (c) law of conservation of linear momentum
- (d) both a and c

[Ans. (d) both a and c]

II. FILL IN THE BLANKS :

1. To produce a displacement \_\_\_\_\_ is required.

[Ans. force]

2. Passengers lean forward when sudden brake is applied in a moving vehicle. This can be explained by \_\_\_\_\_

[Ans. inertia of motion]

3. By convention, the clockwise moments are taken as \_\_\_\_\_ and the anticlockwise moments are taken as \_\_\_\_\_

[Ans. negative and positive]

4. \_\_\_\_\_ is used to change the speed of car.

[Ans. Gear]

5. A man of mass 100kg has a weight of \_\_\_\_\_ at the surface of the Earth.

[Ans. 980 N]

III. STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE. CORRECT THE STATEMENT IF IT IS FALSE:

1. The linear momentum of a system of particles is always conserved.

Ans. False.

**Correct Statement :** In the absence of external force, the linear momentum of a system of particle is always conserved.

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Physics that deals with the effect of force on bodies is

- (a) Kinematics (b) Dynamics  
(c) Statics (d) Mechanics

[Ans. (d) Mechanics]

2. \_\_\_\_\_ deals with the bodies which are at rest under the action of forces.

- (a) Statics (b) Kinematics  
(c) Dynamics (d) Mechanics

[Ans. (a) Statics]

3. Study of moving bodies under the action of forces \_\_\_\_\_.

- (a) Statics (b) Kinematics  
(c) Dynamics (d) Mechanics

[Ans. (c) Dynamics]

4. The resistance of a body to change its state of rest is called

- (a) inertia of rest  
(b) inertia of motion  
(c) momentum  
(d) inertia of direction

[Ans. (a) inertia of rest]

5. The resistance of a body to change its state of motion is called

- (a) force  
(b) momentum  
(c) inertia of motion  
(d) inertia of direction

[Ans. (c) inertia of motion]

6. The resistance of a body to change its direction of motion is

- (a) force  
(b) momentum  
(c) inertia of motion  
(d) inertia of direction

[Ans. (d) inertia of direction]

7. Mixing sugar in a glass of milk using a spoon is \_\_\_\_\_

- (a) force (b) momentum  
(c) inertia of motion  
(d) inertia of direction

[Ans. (c) inertia of motion]

8. The act of cleaning a carpet by heating it with a stick is an example for inertia of

- (a) motion (b) direction  
(c) rest (d) momentum

[Ans. (c) rest]

9. A luggage is usually tied with a rope on the roof of the buses due to

- (a) inertia of motion  
(b) inertia of direction  
(c) inertia of rest  
(d) momentum

[Ans. (a) inertia of motion]

10. The momentum of a heavy object at rest will be

- (a) large (b) infinity  
(c) zero (d) small

[Ans. (c) zero]

11. Inertia is a \_\_\_\_\_

- (a) property of matter (b) type of force  
(c) the speed of an object (d) none of the above

[Ans. (a) property of matter]

12. A & B are two objects with masses 100 kg & 75 kg respectively, then \_\_\_\_\_

- (a) both will have same inertia  
(b) B will have more inertia  
(c) A will have more inertia  
(d) both will have less inertia

[Ans. (c) A will have more inertia]

13. The physical quantity which is the measure of inertia is \_\_\_\_\_.

- (a) density (b) weight  
(c) force (d) mass

[Ans. (d) mass]

14. The sparks produced during sharpening a knife against a grinding wheel leaves the rim of the wheel tangentially. This is due to

- (a) inertia of rest (b) inertia of motion  
(c) inertia of direction (d) force applied

[Ans. (c) inertia of direction]



$$\begin{aligned} dp &= -mv - mv = -2mv \\ &= 2 \times 0.5 \times 20 \\ &= 20 \times 1 \\ &= 20 \text{ kg ms}^{-1} \end{aligned}$$

**11. Thief jumps from roof of a house with a box of weight W on his head. What will be the weight of the box as experienced by the thief during jump?**

**Ans.** Weight of the box during jump  $W = m(g - a)$ .  
 $= m(g - g^1) = 0$ .

**12. Action and reaction forces do not balance each other. Why?**

**Ans.** This is because forces of action & reaction act always on the different bodies.

**13. Why does a gun recoil when a bullet is fired?**

**Ans.** According to law of conservation of linear momentum.

Total linear momentum of gun & bullet before firing = Total momentum after firing.

**14. A brinjal vendor sells his brinjal using a beam balance in an elevator. Will he gain more if the elevator is accelerating up?**

**Ans.** Yes. Apparent weight =  $m(g + a)$ .

Apparent weight increases in elevator while accelerating upward.

**15. Which law is used in geotropism?**

**Ans.** Newton's law of gravitation.

**16. A boy puts a heavy box of mass M on his head and jumps down from the top of a multistoried building to the ground. How much is the force exerted by the box on his head during his force fall? Does the force of gravity increase during the fall?**

**Ans.**  $F = mg^1$ . No, the force of gravity does not increase.

**GIVE SHORT ANSWER**

**2 MARKS**

**1. An athlete runs a certain distance before taking a long jump. Why?**

**Ans. (i)** This is due to inertia of motion.

**(ii)** This is because velocity acquired by running is added to the velocity of the athlete at the time of jump.

**(iii)** Hence he can jump over a longer distance.

**2. What is Mechanics? Explain its branches.**

**Ans. (i)** It is divided into two branches, namely, statics and dynamics.

**(ii) Statics :** It deals with the objects which are at rest under the action of forces.

**(iii) Dynamics:** It is the study of moving objects under the action of forces. Dynamics is further divided as follows:

**Kinematics :** It deals with the motion of bodies without considering the cause of motion.

**Kinetics :** It deals with the motion of bodies considering the cause of motion.

**3. What is meant by natural motion?**

**Ans. (i)** According to Aristotle, A moving object naturally comes to rest without any external influence or force. Such motions are termed as "**natural motion**".

**(ii)** Natural motion is an unforced motion. According to Newtonian mechanics, the natural motion is a uniform rectilinear motion, following its first law of motion. In general relatively, a natural motion may be linear or curved.

**4. When is a body said to be in rest and motion?**

**Ans. (i)** When an object does not change its state during period of time, then it is said to be in the state of "rest".

**(ii)** When an object changes its state during a period of time, then it is said to be in the state of "motion".

**5. Define Linear Momentum.**

**Ans. (i)** The product of mass and velocity of a moving body gives the magnitude of linear momentum.

**(ii)** It acts in the direction of the velocity of the object.

**(iii)** Linear momentum = mass  $\times$  velocity

$$p = mv$$

**6. What is resultant force?**

**Ans. (i)** When several forces act simultaneously on the same object, then the combined effect of multiple forces can be represented by a single force, which is termed as resultant.

**27. What is Dynamics? Write its branches based on the study of moving objects under the action of forces?**

**Ans. Dynamics:** It is the study of moving bodies under the action of forces. Dynamics is further divided as follows.

- (i) Kinematics deals with the motion of bodies without considering the cause of motion.
- (ii) Kinetics deals with the motion of bodies considering the cause of motion.

**28. What is Linear momentum?**

**Ans. (i)** It is the quantity that helps to measure the impact of the force on the object.

**(ii)** The product of mass and velocity of a moving body gives the magnitude of linear momentum.

**(iii)** It acts in the direction of the velocity of the object.

**29. Classify the following things into like parallel and unlike parallel forces (Dragging water from well, force applied to crow bar, weight balance, turning pen cap)**

**Ans.** Dragging water from well - Like parallel forces  
 Force applied to crow bar - Unlike parallel forces

Weight balance - Like parallel forces

Turning pen cap - Unlike parallel forces

**30. If 25 N of force is used to compress a spring, then how much reactive force exerted by spring?**

**Ans.** Reactive force by spring = -25 N.

When a 25 N of forces is used to compress a spring, then same amount of force will be exerted by the spring in the opposite direction. This is according to Newton's III law of motion. i.e., To every action there is an equal and opposite reaction.

**31. Is it possible to open a cap of pen with one hand? If not give reason.**

**Ans. (i)** Yes, it is possible. Two equal & opposite forces are required to produce required amount of torque. Two fingers can be used.

**(ii)** Rotational motion produced by a single finger is less than two fingers producing equal & opposite forces.

**32. What happens to the weight of a person while he goes from polar region to equator?**

**Ans. (i)** The value of  $g$  is maximum in polar region and minimum at the equator region.

**(ii)** Since weight  $W = mg$ , as  $g$  varies, the weight of the person is more at poles than at the equator region.

**33. Weight of a person inside the lift while at rest is 50 N. What is the weight he feels when lift moves up with an acceleration of  $9.8 \text{ ms}^{-2}$ .**

**Ans.**  $R = m(g + a)$  ( $R \rightarrow$  Apparent weight)

$$mg = 50 \text{ N}$$

$$ma = 50 \text{ N}$$

$$R = mg + ma = 50 + 50$$

$$R = 100 \text{ N}$$

Here Apparent weight ( $R$ ) is greater than the actual weight  $mg (=W)$

### NUMERICAL PROBLEMS

**1. A passenger of mass 72 kg is riding in a lift what is the apparent weight of a person in (i) descending with constant velocity (ii) ascending with constant acceleration  $3 \text{ m/s}^2$ ?**

#### Given

$$\text{Mass, } m = 72 \text{ kg}$$

$$\text{Acceleration due to gravity, } g = 10 \text{ ms}^{-2}$$

$$\text{Constant acceleration, } a = 3 \text{ ms}^{-2}$$

**To find :** Apparent weight,  $R = ?$

**(i)** While descending with constant velocity.

**(ii)** While ascending with constant acceleration.

#### Solution

**(i)** While descending with constant velocity,  
 $a = 0$ ,  $R = mg$

$$R = 72 \times 10 = 720 \text{ N}$$

**Solution**

$$\begin{aligned} R &= m(g - a) \\ 400 &= 50(10 - a) \\ 400 &= 500 - 50a \\ 500 &= 500 - 400 \\ 50a &= 100 \\ a &= \frac{100}{50} \end{aligned}$$

Downward acceleration,  $a = 20 \text{ ms}^{-1}$

- 22. Calculate the force of gravitation between two bodies of weight 50 kg and 10 kg respectively place at 10 m apart. If their distance increased to 100 % then find the change in percentage of force. (New force is 75% less than the original force)**

**Given**

Mass of body 1,  $m_1 = 50 \text{ kg}$   
 Mass of body 2,  $m_2 = 10 \text{ kg}$   
 Distance,  $R = 10 \text{ m}$

Universal gravitation

$$\text{constant, } G = 6.67 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$$

**To find :** Force of gravitation,  $F = \frac{Gm_1m_2}{R^2}$

**Solution**

$$F = \frac{6.67 \times 10^{-11} \times 50 \times 10}{10^2}$$

Force,  $F = 33.35 \times 10^{-11} \text{ N}$

**GIVE LONG ANSWERS 5 MARKS**

- 1. What are the concepts prepared by Galileo?**

- Ans. (i)** The natural state of all earthly objects is either the state of rest or the state of uniform motion.
- (ii)** An object in motion will continue to be in the same state of motion as long as no external force is applied.
- (iii)** When force is applied on objects, they resist any change in their state. This property of objects is called "inertia".
- (iv)** When dropped from a height in vacuum, objects of different size, shape and mass fall at the same rate and reach the ground at the same time.

- 2. Give the application of torque.**

- Ans. (i) Gears :** A gear is a circular wheel with teeth around its rim. It helps to change the speed of rotation of a wheel by changing the torque and helps to transmit power.
- (ii) Seasaw :** When the heavier person comes closer to the pivot point (fulcrum) the distance of the line of action of the force decreases. It causes less amount of torque to act on it. This enables the lighter person to lift the heavier person.
- (iii) Steering Wheel :** A small steering wheel enables you to manoeuvre a car easily by transferring a torque to the wheels with less effort.

- 3. Give examples for Newton's third law.**

- Ans. (i)** When birds fly they push the air downwards by their wings (Action).
- (ii)** The air pushes the bird upwards (Reaction).
- (iii)** When a person swims he pushes the water using hands backwards (Action), the water pushes the swimmer in forward direction (Reaction).
- (iv)** Rockets expel gas at high velocity (Action). The downward moving gas pushes the rocket in upward direction (Reaction).
- (v)** When we fire a bullet, the gun recoils back, Bullet is moving forward (action). The gun equalise this forward action by moving backward (reaction).

- 4. Derive the Relation between g and G?**

- Ans. (i)** Let  $M$  be the mass of the Earth and  $m$  be the mass of the object.
- (ii)** The entire mass of the earth is assumed to be concentrated at its centre. The radius of the earth is  $R$  ( $= 6378 \text{ km} = 6400 \text{ km}$  approximately).
- (iii)** By Newton's law of gravitation, the force acting on the object is given by
- $$F = G M m / R^2 \text{ -----(A)}$$
- (iv)** According to Newton second law, the force acting on the object is given by the product of its mass and acceleration. Here acceleration of the is under action of gravity hence  $a = g$ .

$$F = ma = mg$$



$$F = \text{weight} = mg$$

------(B)

Comparing equations (A) and (B), we get

$$g = GM / R^2$$

Acceleration due to gravity

$$g = \frac{GM}{R^2}$$

**5. Discuss the apparent weight of a man in lift?**

**Ans.**

Case 1 : Lift is moving <b>upward</b> with an acceleration $a$	Case 2 : Lift is moving <b>downward</b> with an acceleration $a$	Case 3 : Lift is at <b>rest</b> .	Case 4 : Lift is <b>falling down freely</b>
$R - W = F_{\text{net}} = ma$ $R = W + ma$ $R = mg + ma$ $R = m(g+a)$ $R > W$	$W - R = F_{\text{net}} = ma$ $R = W - ma$ $R = mg - ma$ $R = m(g-a)$ $R < W$	Here acceleration is zero $(a = 0)$ $R = W$ $R = mg$ $R = W$	$R = m(g-a)$ Here acceleration is equals to $g$ ( $a = g$ ) $R = m(g-g)$ $R = 0$ $R = 0$
Apparent weight is greater than the actual weight	Apparent weight is lesser than the actual weight	Apparent weight is equals to actual weight.	Apparent weight is equals to zero

**HIGHER ORDER THINKING (HOTS) QUESTIONS**

**1. Why does the recoil of a heavy gun on firing not so strong as of a light gun using the same cartridges?**

**Ans.** Recoil velocity of a gun  $\propto \frac{1}{m}$ . So light rifle recoils with large velocity than the heavy rifle.

**2. If a body moves with uniform velocity, what is the net force acting on a body?**

**Ans.** If a body moves with uniform velocity, the acceleration of body is zero.

$\therefore$  net force acting on the body is zero.

$$F = ma \text{ [ } a = 0 \text{]}$$

**3. Meteorites are shooting stars. They completely burn out while they hit earth's atmosphere. Apply impulse concept to explain their burning action.**

**Ans.** A shooting star is a small piece of rock that hits earth's atmosphere. It heats up due to air temperature. They enter with very high speeds. When it strikes with high speed in short duration (i.e. impulse =  $p = \lambda t$ ) causes burning. But when hit the ground, it becomes cool.

**4. A rocket with a lift-off mass 20,000 kg is blasted upwards with an initial acceleration of  $5.0 \text{ ms}^{-2}$ . Calculate the initial thrust (Force) of the blast?**

**Given**

Initial mass of the rocket,  $m = 20,000 \text{ kg}$

Initial acceleration,  $a = 50 \text{ ms}^{-2}$

(Upward direction)

Let initial thrust of the blast be  $T$

**To find :**  $T = mg + ma$

**Solution**

$$T = m(g + a) = 20,000 (9.8 + 50)$$

$$T = 2 \times 10^4 \times 14.8$$

Initial thrust,

$$T = 29.6 \times 10^4 \text{ N}$$



UNIT TEST

Time : 60 min

Marks : 25

I. CHOOSE THE CORRECT ANSWER :

(3 × 1 = 3)

- Newton's III law is applicable
  - for a body is at rest
  - for body with equal masses
  - for body in motion
  - a & c
- Plotting a graph for momentum on the X - axis & time on Y - axis , slope of momentum - time graph gives
  - Impulse
  - Force
  - Acceleration
  - Rate of distance
- In which of the following sport the turning of effect of force used
  - swimming
  - tennis
  - cycling
  - hockey

II. FILL IN THE BLANKS :

(2 × 1 = 2)

- \_\_\_\_\_ is used to change the speed of rotation.
- To produce a displacement \_\_\_\_\_ is required.

III. STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE. CORRECT THE STATEMENT IF IT IS FALSE :

(3 × 1 = 3)

- Weight of a body is greater at the equator & less at polar.
- Newton's first law defines force & inertia.
- Newton's law of gravitation helps in discovering new stars and planets.

IV. MATCH THE FOLLOWING :

(4 × ½ = 2)

1.	Newton's I law	(a)	Propulsion of a rocket
2.	Newton's II law	(b)	Stable equilibrium of a body
3.	Newton's III law	(c)	Law of force
4.	Law of conservation of momentum	(d)	Swimming of a person

V. ASSERTION AND REASON :

(2 × 1 = 2)

- Assertion :** A rocket moves forward by pushing the air backward.

**Reason :** It drives the necessary thrust to move forward.

- Assertion :** 'g' decreases as height & depth increases.

**Reason :** 'g' depends on the mass of the object & earth's gravity.

VI. ANSWER IN ONE WORD :

(4 × 1 = 4)

- Unit of force : N ; Unit of weight : \_\_\_\_\_
- Opening a pen cap : \_\_\_\_\_ :: Opening the door : moment of force
- A lift is accelerated upward. What is apparent weight of a person inside the lift?
- Bodies of larger mass need greater effort to put them in motion. Why?



**VII. ANSWER IN A WORD OR SENTENCE :**

(2 × 2 = 4)

**15.** State Newton's II law.

**16.** Weight of a person inside the lift while at rest is 50 N. What is the weight he feels when lift moves up with an acceleration of  $9.8 \text{ ms}^{-2}$ .

**VIII. GIVE LONG ANSWER :**

(5 × 1 = 5)

**17.** State & prove Law of conservation of momentum. (or)

What are the concepts prepared by Galileo?



**Answer Key**

**I. 1.** (d) a & c **2.** (b) Force **3.** (c) cycling

**II. 4.** Gears **5.** force

**III. 6.** False. Weight of the body is less at equator, more at polar region.

**7.** True. **8.** True.

**IV. 1** - (b), **2** - (c), **3** - (b), **4** - (a)

**V. 9.** (d) Assertion is false but reason is true

**10.** (c) Assertion is true, but the reason is false

**VI. 11.** newton

**12.** Moment of couple

**13.** The opposite weight will increase.

**14.** According to Newton's II law,  $F = ma$ . For given acceleration  $a$ , if  $m$  is large,  $F$  should be more i.e., greater force.

**VII. 15.** Refer Sura's Guide Page No.6, VI 7.

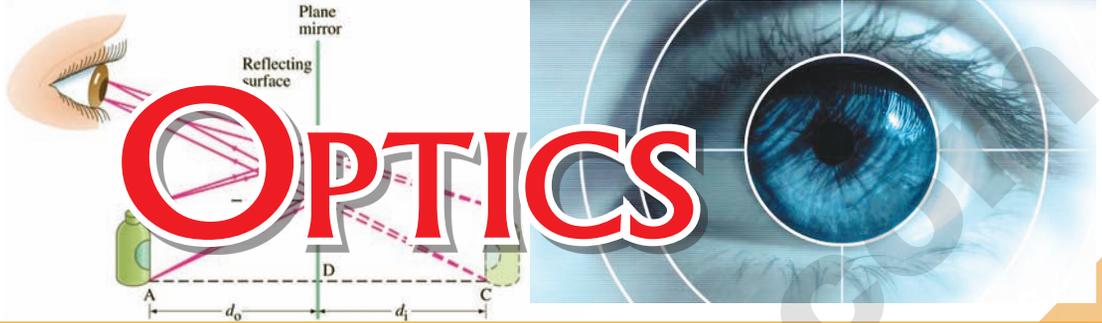
**16.** Refer Sura's Guide Page No.25, SA 33.

**VIII. 17.** Refer Sura's Guide Page No.8, VIII 4. (or)

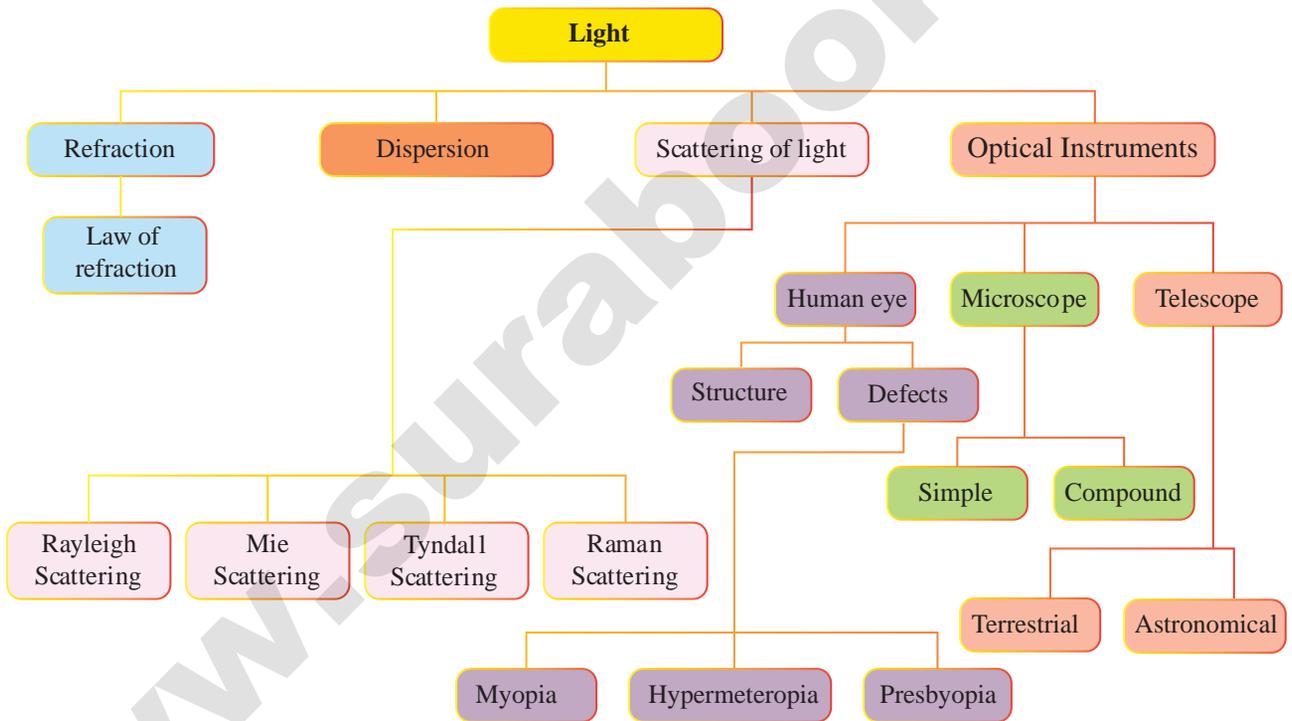
Refer Sura's Guide Page No.8, LA 1.



# UNIT 2



## CONCEPT MAP





TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. The refractive index of four substances A, B, C and D are 1.31, 1.43, 1.33, 2.4 respectively. The speed of light is maximum in

- (a) A (b) B (c) C (d) D

[Ans. (a) A]

2. Where should an object be placed so that a real and inverted image of same size is obtained by a convex lens

- (a)  $f$  (b)  $2f$   
(c) infinity (d) between  $f$  and  $2f$

[Ans. (b)  $2f$ ]

3. A small bulb is placed at the principal focus of a convex lens. When the bulb is switched on, the lens will produce

- (a) a convergent beam of light  
(b) a divergent beam of light  
(c) a parallel beam of light  
(d) a coloured beam of light

[Ans. (c) a parallel beam of light]

4. Magnification of a convex lens is

- (a) Positive  
(b) negative  
(c) either positive or negative  
(d) zero

[Ans. (c) either positive or negative]

5. A convex lens forms a real, diminished point sized image at focus. Then the position of the object is at

- (a) focus  
(b) infinity  
(c) at  $2f$   
(d) between  $f$  and  $2f$

[Ans. (b) infinity]

6. Power of a lens is  $-4D$ , then its focal length is

- (a) 4m (b)  $-40m$   
(c)  $-0.25m$  (d)  $-2.5m$

[Ans. (c)  $-0.25m$ ]

7. In a myopic eye, the image of the object is formed

- (a) behind the retina (b) on the retina  
(c) in front of the retina (d) on the blind spot

[Ans. (c) in front of the retina]

8. The eye defect 'presbyopia' can be corrected by

- (a) convex lens (b) concave lens  
(c) convex mirror (d) Bi focal lenses

[Ans. (d) Bi focal lenses]

9. Which of the following lens would you prefer to use while reading small letters found in a dictionary?

- (a) A convex lens of focal length 5 cm  
(b) A concave lens of focal length 5 cm  
(c) A convex lens of focal length 10 cm  
(d) A concave lens of focal length 10 cm

[Ans. (a) A convex lens of focal length 5 cm]

10. If  $V_B$ ,  $V_G$ ,  $V_R$  be the velocity of blue, green and red light respectively in a glass prism, then which of the following statement gives the correct relation?

- (a)  $V_B = V_G = V_R$  (b)  $V_B > V_G > V_R$   
(c)  $V_B < V_G < V_R$  (d)  $V_B < V_G > V_R$

[Ans. (b)  $V_B > V_G > V_R$ ]

II. FILL IN THE BLANKS :

1. The path of the light is called as \_\_\_\_\_.

[Ans. ray]

2. The refractive index of a transparent medium is always greater than \_\_\_\_\_. [Ans. one]

3. If the energy of incident beam and the scattered beam are same, then the scattering of light is called as \_\_\_\_\_ scattering. [Ans. elastic]

4. According to Rayleigh's scattering law, the amount of scattering of light is inversely proportional to the fourth power of its \_\_\_\_\_. [Ans. wavelength]

5. Amount of light entering into the eye is controlled by \_\_\_\_\_. [Ans. Iris]

### III. TRUE OR FALSE. IF FALSE CORRECT IT:

1. Velocity of light is greater in denser medium than in rarer medium

Ans. False.

**Correct Statement :** Velocity of light is **lesser** in denser medium than in rarer medium.

2. The power of lens depends on the focal length of the lens

Ans. True.

3. Increase in the converging power of eye lens cause 'hypermetropia'

Ans. True.

4. The convex lens always gives small virtual image.

Ans. False.

**Correct Statement :** **Concave lens** always gives small virtual image.

### IV. MATCH THE FOLLOWING :

Column - I		Column - II	
(1)	Retina	a	Path way of light
(2)	Pupil	b	Far point comes closer
(3)	Ciliary muscles	c	near point moves away
(4)	Myopia	d	Screen of the eye
(5)	Hypermetropia	e	Power of accommodation

Ans.

Column - I		Column - II	
(1)	Retina	a	Screen of the eye
(2)	Pupil	b	Path way of light
(3)	Ciliary muscles	c	Power of accommodation
(4)	Myopia	d	Far point comes closer
(5)	Hypermetropia	e	near point moves away

### V. ASSERTION AND REASON :

Mark the correct choice as

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

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

(c) Assertion is true but reason is false.

(d) Assertion is false but reason is true.

1. **Assertion** : If the refractive index of the medium is high (denser medium) the velocity of the light in that medium will be small

**Reason** : Refractive index of the medium is inversely proportional to the velocity of the light

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

2. **Assertion** : Myopia is due to the increase in the converging power of eye lens.

**Reason** : Myopia can be corrected with the help of concave lens.

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

### VI. ANSWER BRIEFLY :

1. What is refractive index?

Ans. The ratio of speed of light in vacuum to the speed of light in a medium is defined as refractive index ' $\mu$ ' of that medium.

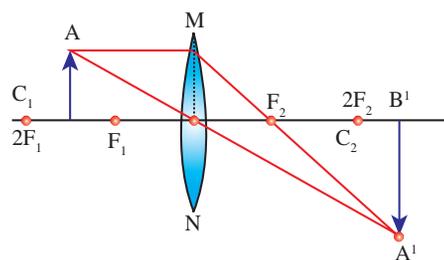
2. State Snell's law.

Ans. The ratio of the sine of the angle of incidence and sine of the angle of refraction is equal to the ratio of refractive indices of the two media.

$$\frac{\sin i}{\sin r} = \frac{\mu_2}{\mu_1}$$

3. Draw a ray diagram to show the image formed by a convex lens when the object is placed between F and 2F.

Ans.



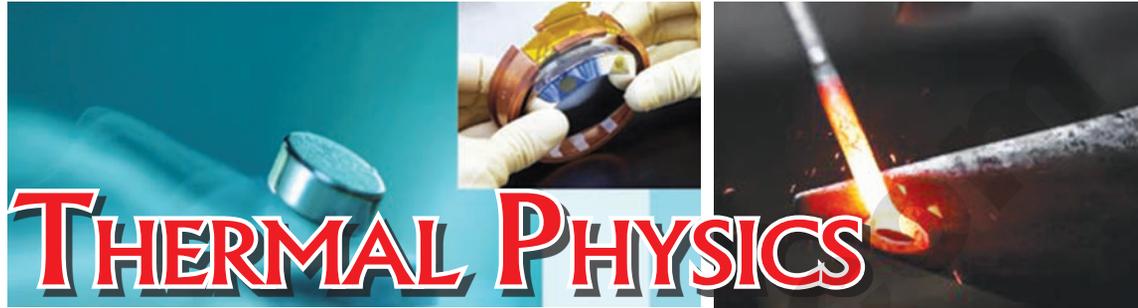
Object placed between F and C

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

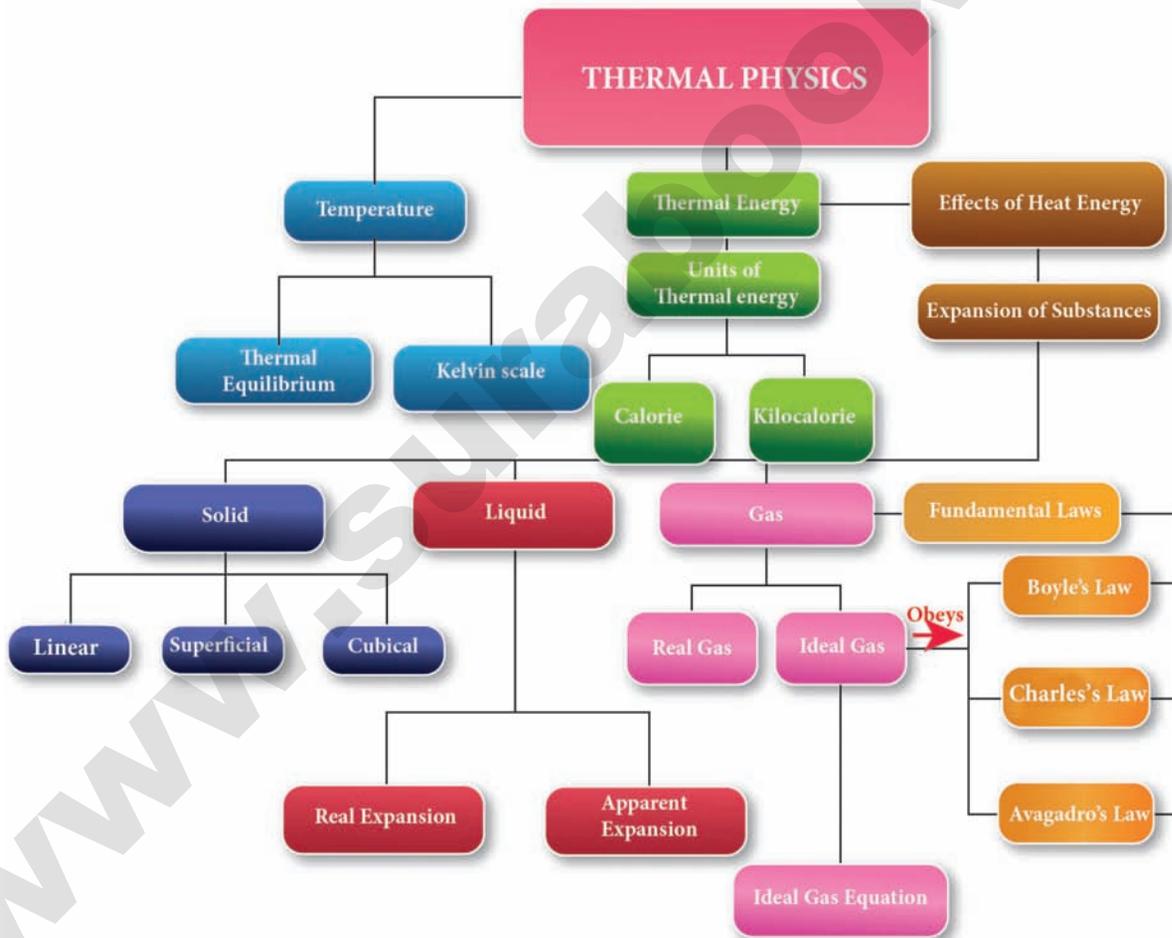
1. The path of light is \_\_\_\_\_  
(a) rays (b) point  
(c) lines (d) beam  
[Ans. (a) rays]
2. The group of rays is \_\_\_\_\_  
(a) lines (b) dots  
(c) beam (d) none of these  
[Ans. (c) beam]
3. The velocity of light is \_\_\_\_\_  
(a)  $3 \times 10^{-8} \text{ ms}^{-1}$  (b)  $3 \times 10^8 \text{ ms}^{-1}$   
(c)  $3 \times 10^8 \text{ km s}^{-1}$  (d)  $3 \times 10^{-8} \text{ km s}^{-1}$   
[Ans. (b)  $3 \times 10^8 \text{ km s}^{-1}$ ]
4. Velocity and wavelength of light are related by a relation  
(a)  $g = c \lambda$  (b)  $\gamma = \frac{c}{\lambda}$   
(c)  $c = \gamma \lambda$  (d) both b & c  
[Ans. (d) both b and c]
5. Violet and red light \_\_\_\_\_ wavelengths.  
(a) lowest, highest (b) highest, lowest  
(c) same (d) standard  
[Ans. (a) lowest, highest]
6. We can see objects because of \_\_\_\_\_  
(a) reflection (b) refraction  
(c) transmission (d) diffraction  
[Ans. (a) reflection]
7. \_\_\_\_\_ determines speed of light in a medium  
(a) thickness (b) wavelength  
(c) refractive index (d) both b and c  
[Ans. (d) both b and c]
8. When light travels from rarer to denser medium, the refracted ray is \_\_\_\_\_ the normal.  
(a) bent away  
(b) along  
(c) bent towards  
(d) just grazes the surface of separation  
[Ans. (c) bent towards]
9. For air, the refractive index is  
(a) 1 (b) infinity  
(c) 0 (d) 1 [Ans. (a) 1]
10. When a ray of light travels from one medium to another, it bends. This phenomenon is called.  
(a) reflection (b) dispersion  
(c) refraction (d) interference  
[Ans. (c) refraction]
11. The splitting up of white light into colours is called  
(a) reflection (b) refraction  
(c) scattering (d) dispersion  
[Ans. (d) dispersion]
12. On a rainy day, small oily films on water show brilliant colours. This is due to  
(a) scattering (b) dispersion  
(c) reflection (d) refraction  
[Ans. (d) dispersion]
13. Rainbow formation is due to \_\_\_\_\_ water droplets  
(a) Ionisation  
(b) absorption of sunlight  
(c) reflection and refraction of sunlight  
(d) reflection of sunlight  
[Ans. (c) reflection and refraction]
14. Red light is used in traffic signals because  
(a) It has highest wavelength  
(b) disperses least  
(c) red is symbol of danger  
(d) both a & b [Ans. (d) both a and b]
15. A star appears twinkling in the sky because of \_\_\_\_\_ by the atmosphere.  
(a) scattering of light (b) reflection of light  
(c) refraction of light (d) both a and b  
[Ans. (c) refraction of light]
16. When a beam of light is passed through a colloidal solution, the light will be  
(a) scattered (b) reflected  
(c) absorbed (d) unchanged  
[Ans. (a) scattered]

# UNIT 3



# THERMAL PHYSICS

## CONCEPT MAP





TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. The value of universal gas constant

- (a)  $3.81 \text{ mol}^{-1} \text{ K}^{-1}$  (b)  $8.03 \text{ mol}^{-1} \text{ K}^{-1}$   
(c)  $1.38 \text{ mol}^{-1} \text{ K}^{-1}$  (d)  $8.31 \text{ mol}^{-1} \text{ K}^{-1}$

[Ans. (d)  $8.31 \text{ mol}^{-1} \text{ K}^{-1}$ ]

2. If a substance is heated or cooled, the change in mass of that substance is

- (a) positive (b) negative  
(c) zero (d) none of the above

[Ans. (c) zero]

3. If a substance is heated or cooled, the linear expansion occurs along the axis of

- (a) X or -X  
(b) Y or -Y  
(c) both (a) and (b)  
(d) (a) or (b)

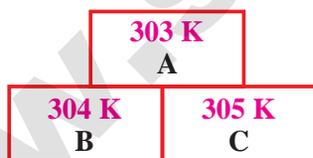
[Ans. (c) both (a) and (b)]

4. Temperature is the average \_\_\_\_\_ of the molecules of a substance

- (a) difference in K.E and P.E  
(b) sum of P.E and K.E  
(c) difference in T.E and P.E  
(d) difference in K.E and T.E

[Ans. (c) difference in T.E and P.E]

5. In the Given diagram, the possible direction of heat energy transformation is



- (a)  $A \leftarrow B, A \leftarrow C, B \leftarrow C$   
(b)  $A \rightarrow B, A \rightarrow C, B \rightarrow C$   
(c)  $A \rightarrow B, A \leftarrow C, B \rightarrow C$   
(d)  $A \leftarrow B, A \rightarrow C, B \leftarrow C$

[Ans. (a)  $A \leftarrow B, A \leftarrow C, B \leftarrow C$ ]

II. FILL IN THE BLANKS :

1. The value of Avogadro number \_\_\_\_\_

[Ans.  $6.023 \times 10^{23} / \text{mol (or) mol}^{-1}$ ]

2. The temperature and heat are \_\_\_\_\_ quantities [Ans. Scalar]

3. One calorie is the amount of heat energy required to raise the temperature of \_\_\_\_\_ of water through \_\_\_\_\_. [Ans. 1 gm; 1° C]

4. According to Boyle's law, the shape of the graph between pressure and reciprocal of volume is \_\_\_\_\_. [Ans. straight line]

III. STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE : IF FALSE EXPLAIN WHY?

1. For a given heat in liquid, the apparent expansion is more than that of real expansion.

Ans. False.

Correct Statement : The real expansion is more (or) less than that of apparent expansion.

2. Thermal energy always flows from a system at higher temperature to a system at lower temperature.

Ans. True.

3. According to Charles's law, at constant pressure the temperature is inversely proportional to volume.

Ans. False.

Correct Statement : Volume is directly proportional to temperature at constant pressure.

IV. MATCH THE FOLLOWING :

Column-I		Column-II	
1.	Linear expansion	(a)	change in volume
2.	Superficial expansion	(b)	hot body to cold body
3.	Cubical expansion	(c)	$1.381 \times 10^{-23} \text{ JK}^{-1}$
4.	Heat transformation	(d)	change in length
5.	Boltzmann constant	(e)	change in area



ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Which of the following has the fastest process of heat transfer?

- (a) Conduction (b) convection  
(c) Radiation (d) all the above

[Ans. (c) Radiation]

2. At what temperature are Celsius and Fahrenheit equal?

- (a) 40° (b) -40°  
(c) 0° (d) 100°

[Ans. (b) -40°]

3. In which process heat is transferred directly from one molecule to other?

- (a) conduction (b) convection  
(c) Radiation (d) all the above

[Ans. (d) all the above]

4. Temperature is a property which determines

- (a) amount of heat a body contains  
(b) total absolute energy a body has  
(c) direction of flow of heat  
(d) thermal energy

[Ans. (c) direction of flow of heat]

5. SI unit of temperature is

- (a) celsius (b) fahrenheit  
(c) kelvin (d) none

[Ans. (c) kelvin]

6. SI unit of heat is

- (a) calorie (b) joule  
(c) kilo calorie (d) kelvin

[Ans. (b) joule]

7. All the substances will undergo the following changes like \_\_\_\_\_ when heated.

- (a) increase in temperature  
(b) expansion of substance  
(c) change of state  
(d) all the above

[Ans. (d) all the above]

8. Thermal expansion at particular temperature is less in

- (a) solid (b) liquid  
(c) gas (d) all above

[Ans. (a) solid]

9. Increase in area due to heating is called

- (a) Linear expansion  
(b) Superficial expansion  
(c) Cubical expansion  
(d) real expansion

[Ans. (b) Superficial expansion]

10. Change in volume of a solid during heating is

- (a) Linear expansion  
(b) Superficial expansion  
(c) Cubical expansion  
(d) apparent expansion

[Ans. (c) Cubical expansion]

11. Linear expansion is the change in \_\_\_\_\_ when object is heated or cooled.

- (a) length (b) area  
(c) volume (d) density

[Ans. (a) length]

12. Fundamental laws of gases are

- (a) Boyle's law  
(b) Charles's law  
(c) Avogadro  
(d) all the above

[Ans. (d) all the above]

13. At constant temperature volume is inversely proportional to pressure of a gas is known as

- (a) Boyle's law  
(b) Charles  
(c) Avogadro  
(d) None

[Ans. (a) Boyle's law]

14. According to Charles's law

- (a)  $P \propto \frac{1}{V}$  (b)  $V \propto T$   
(c)  $V \propto n$  (d) all the above

[Ans. (b)  $V \propto T$ ]

15. Gas laws state the relationship between \_\_\_\_\_ properties of gas.

- (a) pressure (b) volume  
(c) Temperature & mass (d) all the above

[Ans. (d) all the above]

16. SI unit of temperature is \_\_\_\_\_.

- (a) K (b) °C (c) /°C (d) °F

[Ans. (a) K]



2. Write the co-efficient of cubical expansions of the materials given below in ascending order.

Mercury, Glass, Brass, Aluminium

Ans. Glass, Brass, Aluminium, Mercury

**Note**

Glass  $\rightarrow 2.5 \times 10^{-5} (K^{-1})$

Brass  $\rightarrow 6 \times 10^{-5} (K^{-1})$

Aluminium  $\rightarrow 7 \times 10^{-5} (K^{-1})$

Mercury  $\rightarrow 18.2 \times 10^{-5} (K^{-1})$

3. Four states of matter, arrange in sequence.

Plasma, Gas, Solid, Liquid

Ans. Solid, Liquid, Gas, Plasma.

**ANSWER IN ONE OR TWO SENTENCES**

1. What is thermal equilibrium?

Ans. (i) Two physical systems or objects are said to be in thermal equilibrium if there is no net flow of thermal energy between the systems.

(ii) If two bodies are said to be in thermal equilibrium, then, they will be at same temperature.

2. What is superficial expansion?

Ans. When there is an increase in the area of a solid object due to heating, then the expansion is called superficial or Areal expansion.

3. State - Avogadro's law.

Ans. Avogadro's law states that at constant pressure and temperature, the volume of gas is directly proportional to number of atoms or molecules in the gas.

(ie)  $V \propto n$

(or)  $\frac{V}{n} = \text{constant}$

4. What is Kelvin scale?

Ans. Kelvin scale is an absolute thermodynamic temperature scale using as its null point absolute zero.

(or)

Kelvin is a scale of temperature with absolute zero as zero and the triple point of water as exactly 273.16 degrees.

**GIVE SHORT ANSWER**

**2 MARKS**

1. Define temperature.

Ans. Temperature is defined as the degree of hotness or coldness of an object.

2. What is absolute temperature?

Ans. The temperature measured in relation to absolute zero using the Kelvin scale is known as absolute temperature.

3. Define Kelvin.

Ans. It is defined as the fraction,  $1/273.16$  of the thermodynamic temperature of triple point of water.

4. What is thermal energy?

Ans. Thermal energy is a form of energy which is transferred between any two objects due to the difference in their temperatures.

5. What is meant by heating?

Ans. The process in which heat energy flows from an object at higher temperature to another object at lower temperature is known as "heating".

6. Name the process of heat transmission.

Ans. This process of transmission may be done in any of the ways like conduction, convection or radiation.

7. Write characteristic features of heat energy transfer.

Ans. (i) Heat always flows from a system at higher temperature to a system at lower temperature.

(ii) The mass of a system is not altered when it is heated or cooled.

(iii) For any exchange of heat, the heat gained by the cold system is equal to heat lost by the hotter system.

8. Define one joule.

Ans. One joule is defined as the work done when a force of 1N is applied on an object to produce a displacement of one metre.

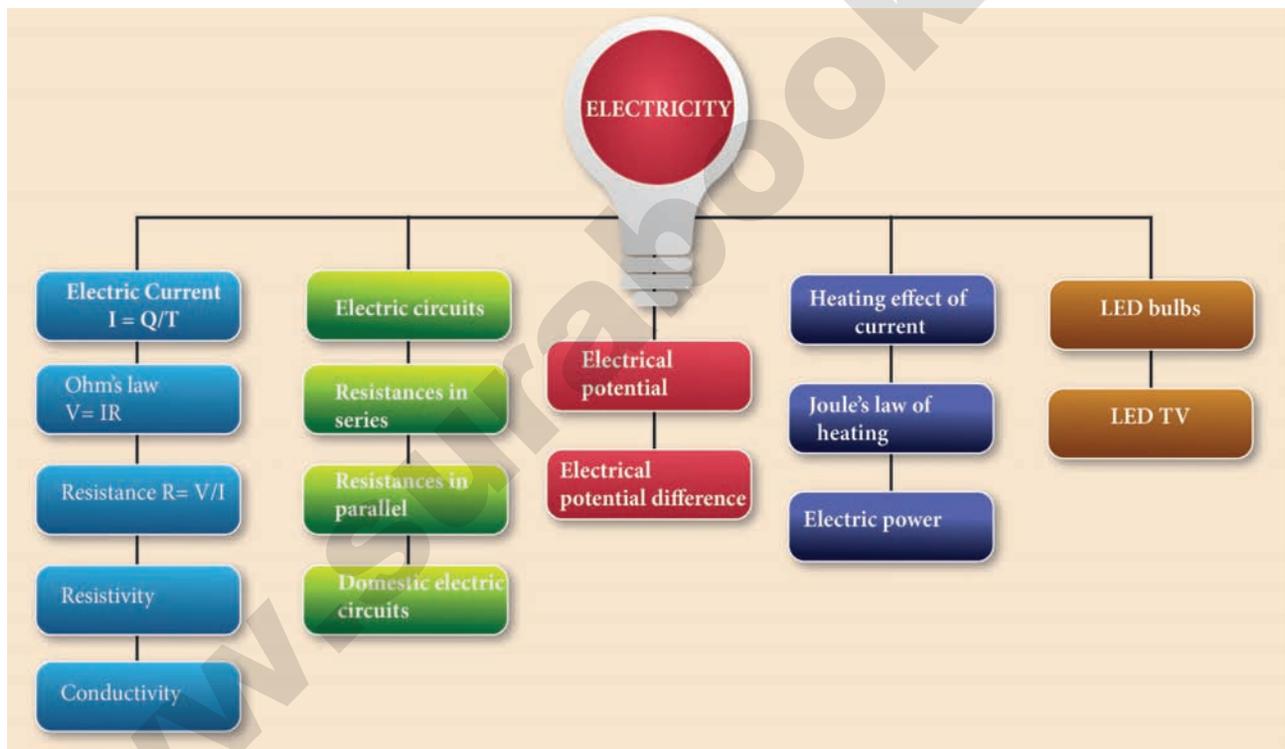
9. Define one kilocalorie.

Ans. One kilocalorie is the amount of heat required to rise the temperature of 1 kilogram of water through  $1^{\circ}C$ .

# UNIT 4



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Which of the following is correct?

- (a) Rate of change of charge is electrical power
- (b) Rate of change of charge is current
- (c) Rate of change of energy is current
- (d) Rate of change of current is charge.

[Ans. (b) Rate of change of charge is current]

2. SI unit of resistance is

- (a) mho
- (b) joule
- (c) ohm
- (d) ohm meter

[Ans. (c) ohm]

3. In a simple circuit, why does the bulb glow when you close the switch?

- (a) The switch produces electricity
- (b) Closing the switch completes the circuit
- (c) Closing the switch breaks the circuit
- (d) The bulb is getting charged

[Ans. (b) Closing the switch completes the circuit]

4. kilowatt hour is the unit of

- (a) resistivity
- (b) conductivity
- (c) electrical energy
- (d) electrical power

[Ans. (c) electrical energy]

II. FILL IN THE BLANKS :

1. When a circuit is open, \_\_\_\_\_ cannot pass through it. [Ans. current]

2. The ratio of the potential difference to the current is known as \_\_\_\_\_. [Ans. resistance]

3. The wiring in a house consists of \_\_\_\_\_ circuits. [Ans. parallel]

4. The power of an electric device is a product of \_\_\_\_\_ and \_\_\_\_\_. [Ans. voltage, current]

5. LED stands for \_\_\_\_\_. [Ans. Light Emitting Diode]

III. STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE: IF FALSE CORRECT THE STATEMENT

1. Ohm's law states the relationship between power and voltage.

Ans. False.  
 Correct Statement : Ohm's law states the relationship between **current and voltage**.

2. MCB is used to protect house hold electrical appliances.

Ans. True.

3. The SI unit for electric current is the coulomb.

Ans. False.  
 Correct Statement : The SI unit for electric current is the **ampere**

4. One unit of electrical energy consumed is equal to 1000 kilowatt hour.

Ans. False.  
 Correct Statement : One unit of electrical energy consumed is equal to **1 kilowatt hour**

5. The effective resistance of three resistors connected in series is lesser than the lowest of the individual resistances.

Ans. False.  
 Correct Statement : The effective resistance of three resistors connected in series is **higher than** the lowest of individual resistances.

IV. MATCH THE ITEMS IN COLUMN- I TO THE ITEMS IN COLUMN-II :

(i)	electric current	-	(a)	volt
(ii)	potential difference	-	(b)	ohm meter
(iii)	specific resistance	-	(c)	watt
(iv)	electrical power	-	(d)	joule
(v)	electrical energy	-	(e)	ampere

Ans.

(i)	electric current	-	(a)	ampere
(ii)	potential difference	-	(b)	volt
(iii)	specific resistance	-	(c)	ohm meter
(iv)	electrical power	-	(d)	watt
(v)	electrical energy	-	(e)	joule

### V. ASSERTION AND REASON :

Mark the correct choice as

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

1. **Assertion** : Electric appliances with a metallic body have three wire connections

**Reason** : Three pin connections reduce heating of the connecting wires

[Ans. (c) The assertion is true, but the reason is false]

2. **Assertion** : In a simple battery circuit the point of highest potential is positive terminal of the battery

**Reason** : The current flows towards the point of the highest potential.

[Ans. (c) The assertion is true, but the reason is false]

3. **Assertion** : LED bulbs are far better than incandescent bulbs.

**Reason** : LED bulbs consume less power than incandescent bulbs.

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

### VI. VERY SHORT ANSWER QUESTIONS :

1. Define the unit of current.

Ans. The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross section of a conductor, in one second. Hence,

$$1 \text{ ampere} = \frac{1 \text{ coulomb}}{1 \text{ second}}$$

2. What happens to the resistance, as the conductor is made thicker?

Ans. (i) **Decreases** : The resistance decreases as the conductor is made thicker.

(ii) **Reason** : Resistance is inversely proportional to area of cross section A.

$$\text{i.e., } R \propto \frac{1}{A} \text{ - here, } A = \pi r^2$$

Where,  $r$  is the radius which determines the thickness.

3. Why is tungsten metal used in bulbs, but not in fuse wires?

Ans. Tungsten has high melting point, it can bear high heat for glowing. But in fuse wire, the wire used in it should melt. So a metal (wire) which has low melting point should be used in a fuse wire, but not tungsten wire.

4. Name any two devices, which are working on the heating effect of the electric current.

Ans. Electric iron, and electric toaster, or electric oven, and electric heater.

### VII. SHORT ANSWER QUESTIONS :

1. Define electric potential and potential difference.

Ans. **Electric potential** : The electric potential at a point is defined as the amount of work done in moving a unit positive charge from infinity to that point against the electric force.

**Potential difference** : The electric potential difference between two points is defined as the amount of work done in moving a unit positive charge from one point to another point against the electric force.

2. What is the role of the earth wire in domestic circuits?

Ans. The earth wire provides a low resistance path to the electric current. The earth wire sends the current from the body of the appliance to the Earth, whenever a live wire accidentally touches the body of metallic electric appliance. Thus, the earth wire serves as a protective conductor, which saves us from electric shocks.

3. A piece of wire of resistance 10 ohm is drawn out so that its length is increased to three times its original length. Calculate the new resistance.

**Given**

Resistance of wire,  $R = 10 \Omega$   
Length is increased to thrice =  $3L$

**To find :** New resistance = ?

**Solution**

$$\text{Resistance (R)} = \frac{\text{resistivity } (\rho) \times \text{length (L)}}{\text{area (A)}}$$

$$R = \frac{\rho L}{A} \Rightarrow 10 = \frac{\rho L}{A}$$

When length is increased by three times ( $3L$ ) the area of cross section is reduced by three times ( $\frac{A}{3}$ ).

$$\text{New length} = 3L$$

$$\text{New Area} = \frac{A}{3}$$

$$\therefore \text{New resistance } R = \frac{\rho \cdot 3L}{\frac{A}{3}} = 9 \left( \frac{\rho L}{A} \right)$$

$$R = 9 \cdot R \Rightarrow 9 \times 10 = 90 \Omega$$

$$R = 90 \Omega$$

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. A series circuit consists of three resistors with values of 140, 250 and 220. The total resistance is.

- (a) 330 (b) 610  
(c) 720  
(d) None of the above

[Ans. (b) 610]

2. When will be the current flow in a circuit?

- (a) A switch is closed  
(b) A switch is opened  
(c) Switch is either open or closed  
(d) None of the above

[Ans. (A) A switch is closed]

3. When one of three series resistors is removed from a circuit and the circuit is reconnected the current

- (a) increase by half (b) increases  
(c) decreases by half (d) none of the above

[Ans. (b) increases]

4. The SI unit of power is

- (a) joule (b) ampere  
(c) watt (d) ohm

[Ans. (c) watt]

5. A parallel circuit consist of three resistors with values of 430, 210 and 100. The total resistance is

- (a) 0.017 ohm  
(b) 58.82 ohm  
(c) 58.82 kilo ohm  
(d) None of the above

[Ans. (b) 58.82 ohm]

6. According to Ohm's law if voltage increase and resistance stays the same

- (a) Resistance decreases  
(b) Current increases  
(c) Current remains the same  
(d) Current decreases

[Ans. (B) Current increases]

7. The amount of work done in joules when one unit electric charges moves from one point to another point in an electric circuit is called.

- (a) Resistance  
(b) Potential difference  
(c) Current  
(d) charge

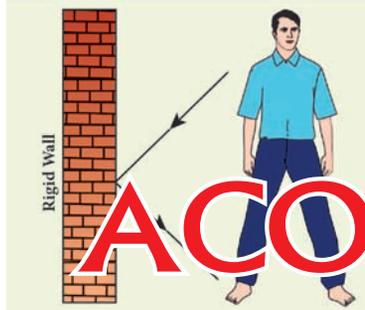
[Ans. (b) Potential difference]

8. The resistance of material depends on.

- (a) Temperature  
(b) Length of conductor  
(c) Area of cross-section  
(d) All the above

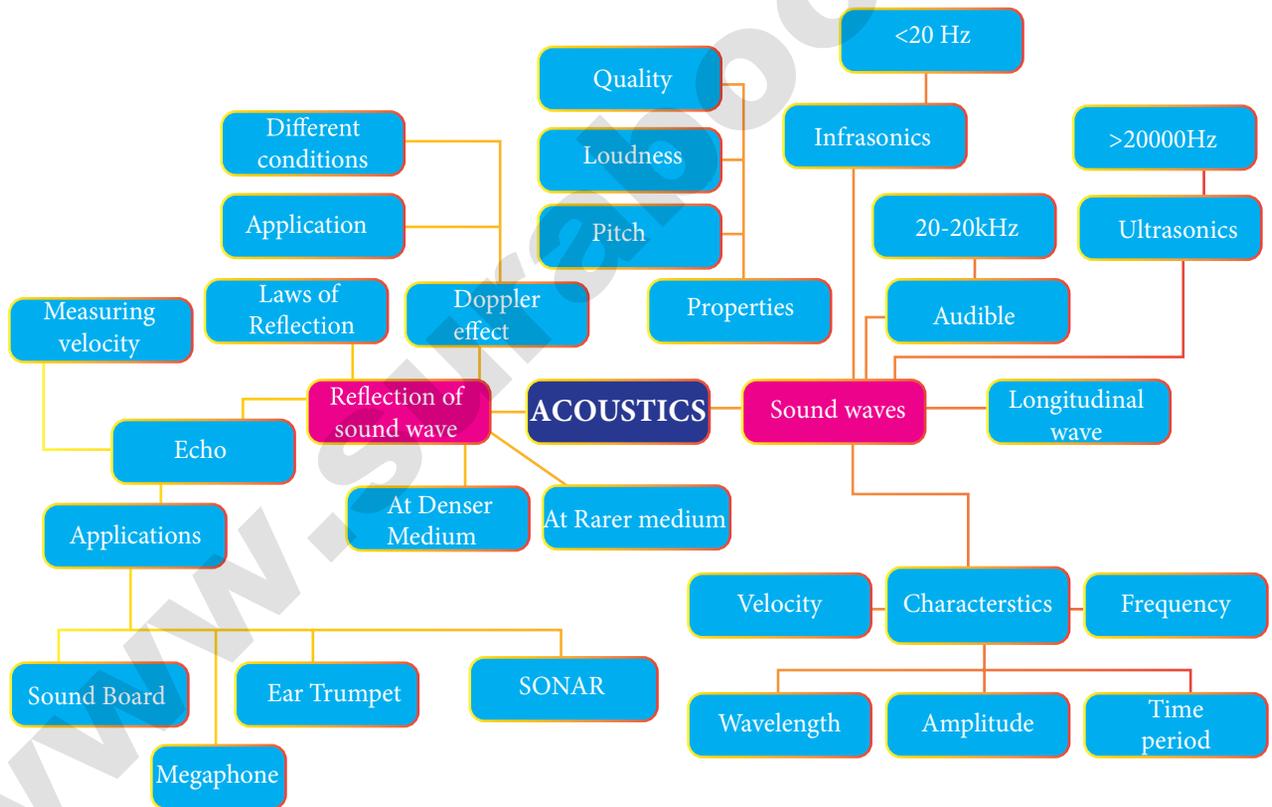
[Ans. (d) All the above]

# UNIT 5



# ACOUSTICS

## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. When a sound wave travels through air, the air particles

- (a) vibrate along the direction of the wave motion
- (b) vibrate but not in any fixed direction
- (c) vibrate perpendicular to the direction of the wave motion
- (d) do not vibrate

[Ans. (a) vibrate along the direction of the wave motion]

2. Velocity of sound in a gaseous medium is  $330 \text{ ms}^{-1}$ . If the pressure is increased by 4 times without causing a change in the temperature, the velocity of sound in the gas is

- (a)  $330 \text{ ms}^{-1}$
- (b)  $660 \text{ ms}^{-1}$
- (c)  $165 \text{ ms}^{-1}$
- (d)  $990 \text{ ms}^{-1}$

[Ans. (c)  $165 \text{ ms}^{-1}$ ]

3. The frequency, which is audible to the human ear is

- (a) 50 kHz
- (b) 20 kHz
- (c) 15000 kHz
- (d) 10000 kHz

[Ans. (b) 20 kHz]

4. The velocity of sound in air at a particular temperature is  $330 \text{ ms}^{-1}$ . What will be its value when temperature is doubled and the pressure is halved?

- (a)  $330 \text{ ms}^{-1}$
- (b)  $165 \text{ ms}^{-1}$
- (c)  $330 \times \sqrt{2} \text{ ms}^{-1}$
- (d)  $320 \times \sqrt{2} \text{ ms}^{-1}$

[Ans. (c)  $330 \times \sqrt{2} \text{ ms}^{-1}$ ]

5. If a sound wave travels with a frequency of  $1.25 \times 10^4 \text{ Hz}$  at  $344 \text{ m s}^{-1}$ , the wave length will be

- (a) 27.52 m
- (b) 275.2 m
- (c) 0.02752 m
- (d) 2.752 m

[Ans. (c) 0.02752 m]

6. The sound waves are reflected from an obstacle into the same medium from which they were incident. Which of the following changes?

- (a) speed
- (b) frequency
- (c) wavelength
- (d) none of these

[Ans. (d) none of these]

7. Velocity of sound in the atmosphere of a planet is  $500 \text{ ms}^{-1}$ . The minimum distance between the sources of sound and the obstacle to hear the echo, should be

- (a) 17 m
- (b) 20 m
- (c) 25 m
- (d) 50 m

[Ans. (c) 25 m]

II. FILL IN THE BLANKS :

1. Rapid back and forth motion of a particle about its mean position is called \_\_\_\_\_

[Ans. Longitudinal]

2. If the energy in a longitudinal wave travels from south to north, the particles of the medium would be vibrating in \_\_\_\_\_

[Ans. Amplitude]

3. A whistle giving out a sound of frequency  $450 \text{ Hz}$ , approaches a stationary observer at a speed of  $33 \text{ ms}^{-1}$ . The frequency heard by the observer is (speed of sound =  $330 \text{ m s}^{-1}$ ) \_\_\_\_\_.

[Ans. 500 Hz]

4. A source of sound is travelling with a velocity  $40 \text{ km/h}$  towards an observer and emits a sound of frequency  $2000 \text{ Hz}$ . If the velocity of sound is  $1220 \text{ km/h}$ , then the apparent frequency heard by the observer is \_\_\_\_\_.

[Ans. 2068 Hz]

III. TRUE OR FALSE :- (IF FALSE GIVE THE REASON)

1. Sound can travel through solids, gases, liquids and even vacuum.

Ans. False.

Correct Statement : Sound waves cannot travel through vacuum

**2. Why does an empty vessel produce more sound than a filled one?**

**Ans.** In an empty vessel, only air is present inside it. Whenever sound is produced in an empty vessel, the vibration of air molecule will be more due to multiple reflections. But a filled vessel has very less number of air molecules than the contents in it, so it does not produce more sound.

**3. Air temperature in the Rajasthan desert can reach 46°C. What is the velocity of sound in air at that temperature?**

$$(V_0 = 331 \text{ m s}^{-1})$$

**Ans.** Velocity of sound in gas at 0°C

$$v_0 = 331 \text{ ms}^{-1}$$

Air temperature in Rajasthan,

$$T = 46^\circ \text{C}$$

$$v_t = (v_0 + 0.61T)$$

$$= 331 + 28.06$$

$$v_t = \mathbf{359.06 \text{ m / s}}$$

**4. Explain why, the ceilings of concert halls are curved.**

**Ans.** They are made curved so that the sound after reflecting from the ceiling reaches every corner of the concert hall and the audience listen the sound clearly.

**5. Mention two cases in which there is no Doppler effect in sound?**

**Ans. (i)** When source(S) and listener (L) both are at rest.

**(ii)** When S and L move in such a way that distance between them remains constant.

**(iii)** When source S and L are moving in mutually perpendicular directions.

### VIII. PROBLEM CORNER :

**1. A sound wave has a frequency of 200 Hz and a speed of 400 ms<sup>-1</sup> in a medium. Find the wavelength of the sound wave.**

**Given**

$$\text{Frequency of a wave, } n = 200 \text{ Hz}$$

$$\text{Speed of sound, } c = 400 \text{ ms}^{-1}$$

**To find :** Wavelength,  $\lambda = ?$

**Solution**

$$\begin{aligned} \text{Velocity of light, } c &= n\lambda \Rightarrow \lambda \\ &= \frac{c}{n} = \frac{400}{200} \\ &= 2 \text{ m} \end{aligned}$$

**2. The thunder of cloud is heard 9.8 seconds later than the flash of lightning. If the speed of sound in air is 330 ms<sup>-1</sup>, what will be the height of the cloud?**

**Given**

$$\text{Time, } t = 9.8 \text{ s}$$

$$\text{Speed of sound, } c = 330 \text{ ms}^{-1}$$

**To find :** Height of the cloud,  $d = ?$

**Solution**

$$c = \frac{d}{t} \Rightarrow d \text{ height of the cloud, } = c \times t$$

$$= 330 \times 9.8$$

$$\text{Height of the cloud } d = \mathbf{3234 \text{ m}}$$

**3. A person who is sitting at a distance of 400 m from a source of sound is listening to a sound of 600 Hz. Find the time period between successive compressions from the source?**

**Given**

$$\text{Frequency of sound, } n = 600 \text{ Hz}$$

**To find :** Time period between successive compressions,  $T = ?$

**Solution**

$$T = \frac{1}{n} = \frac{1}{600} = 1.7 \times 10^{-3} \text{ s}$$

$$\text{Time period, } T = \mathbf{0.0002 \text{ s}}$$

**4. An ultrasonic wave is sent from a ship towards the bottom of the sea. It is found that the time interval between the transmission and reception of the wave is 1.6 seconds. What is the depth of the sea, if the velocity of sound in the seawater is 1400 m s<sup>-1</sup>?**

**Given**

Time interval between sending and receiving of the wave,  $t = 1.6 \text{ s}$

Velocity of sound in sea wave,  $c = 1400 \text{ ms}^{-1}$



**Conditions necessary for hearing an echo:**

- (i) Thus, the minimum time gap between the original sound and echo must be 0.1s.
- (ii) The minimum distance required to hear an echo is 17.2 m.

**b) The medical applications of echo:**

The principle of echo is used in obstetric ultrasonography, which is used to create real-time visual images of the developing embryo or fetus in the mother's uterus.

**c) Calculate the speed of sound using echo:**

- (i) The sound pulse emitted by the source travels a total distance of  $2d$  while traveling from the source to the wall and then back to the receiver.
- (ii) The time taken for this has been observed to be " $t$ ". Hence, the speed of sound wave is given by

$$\text{Speed of sound} = \frac{\text{Distance travelled}}{\text{Time taken}} = \frac{2d}{t}$$

**X. HOT QUESTIONS :**

1. Suppose that a sound wave and a light wave have the same frequency, then which one has a longer wavelength?

- (a) Sound
- (b) Light
- (c) both (a) and (b)
- (d) data not sufficient

[Ans. (b) Light]

2. When sound is reflected from a distant object, an echo is produced. Let the distance between the reflecting surface and the source of sound remain the same. Do you hear an echo sound on a hotter day? Justify your answer.

Ans. (i) An echo can only be heard if it reaches the ear after 0.1s. Time taken = Total distance / Velocity.

- (ii) If the temperature rises (i.e. on a hotter day), the velocity of sound will increase. This in turn will increase the required for hearing an echo. As The distance does not increase between the source and reflecting body, no echo is heard.

**ADDITIONAL QUESTIONS AND ANSWERS**

**CHOOSE THE CORRECT ANSWER 1 MARK**

1. Which statement is true?

- (a) Sound waves can propagate as longitudinal or transverse depending on the transmitting medium.
- (b) Sound waves are transverse and they propagate perpendicular to the transmitting medium.
- (c) Sound waves are longitudinal waves and they propagate parallel to the transmitting medium.
- (d) Sound waves can propagate as longitudinal or transverse depending on the temperature.

[Ans. (c) Sound waves are longitudinal waves and they propagate parallel to the transmitting medium.]

2. The velocity of sound is affected by

- (a) temperature
- (b) density
- (c) pressure
- (d) all the above

[Ans. (d) all the above]

3. A sound wave passes through gold rod and comes into the surrounding air. What is the relation between original wavelength  $\lambda$  and new wavelength  $\lambda'$  ?

- (a)  $\lambda = \lambda'$
- (b)  $\lambda > \lambda'$
- (c)  $\lambda < \lambda'$

(b) None of the above [Ans. (b)  $\lambda > \lambda'$ .]

4. At what velocity should a source of sound move towards a listener so that apparent frequency is twice the actual frequency?

- (a) 165 m/s
- (b) 330 m/s
- (c) 660 m/s
- (d) 110 m/s

[Ans. (a) 165 m/s]

5. The region of a sound wave having low pressure is

- (a) interference
- (b) refraction
- (c) rarefaction
- (d) compression

[Ans. (c) rarefaction]



GIVE SHORT ANSWER

2 MARKS

1. What is the work of architectural acoustician?

Ans. Architectural acoustician is a person who designs concert halls.

2. Write the properties of sound wave?

Ans. Properties of Sound Wave

- (i) Wavelength ( $\lambda$ )
- (ii) Amplitude (A)
- (iii) Time period (T)
- (iv) Frequency (n)
- (v) Velocity (v)

3. Define wavelength.

Ans. Wave length ( $\lambda$ ) is the distance between two consecutive compressions or two consecutive rarefactions.

4. Define amplitude.

Ans. The maximum displacement of a vibrating particle on either side of the mean position in a medium is called amplitude.

5. What is time period of sound wave?

Ans. Time required to produce one complete vibration of particles of the medium or time in which a wave moves a distance equal to its wavelength is called time period of the sound wave. The SI unit of time period is second (s).

6. Define frequency of a sound wave.

Ans. The number of vibrations (waves) produced per second is called the frequency of sound waves. The SI unit of frequency is hertz.

7. What is particle velocity?

Ans. The velocity with which the particles of the medium vibrate to transfer energy in the form of wave is called particle velocity.

8. Define wave velocity. Find the relation between frequency wavelength and velocity.

Ans. The velocity with which the wave travels through the medium is called wave velocity. In other words, the distance travelled by sound wave in unit time is called the velocity of sound wave.

$$v = \frac{\lambda}{T} = \lambda \times \frac{1}{T} = \lambda n \quad [ \because n = \frac{1}{T} ]$$

9. Why does sound wave travel faster in solids?

Ans. The elasticity of a solid is higher than a liquid or a gas and so sound travels faster in solids than in liquids.

10. What is pitch?

Ans. It is the characteristic of a sound wave which distinguishes a sharp sound from a dull sound. It depends upon the frequency of the wave. Higher the frequency higher will be the pitch and vice-versa.

11. What is loudness? Write its unit.

Ans. The sensation produced in the ear which enables us to distinguish between a loud and a soft sound is called loudness. The unit of the intensity is decibel (dB).

12. What is meant by quality?

Ans. It is the sensation received by the ear by which we are able to differentiate two sounds (even if they are of same pitch and loudness).

13. How does the elastic modulus of the medium affect the velocity of sound?

- Ans. (i) The speed of sound is directly proportional to the square root of the elastic modulus and inversely proportional to the square root of the density.
- (ii) Thus, velocity of sound in solids decreases as the density increases whereas the velocity of sound increases when the elasticity of the material increases.

14. Write the laws of reflection.

- Ans. (i) The incident wave, the normal to the reflecting surface and the reflected wave at the point of incidence lie in the same plane.
- (ii) The angle of incidence  $\angle i$  is equal to the angle of reflection  $\angle r$ .

15. What is the principle used in whispering gallery?

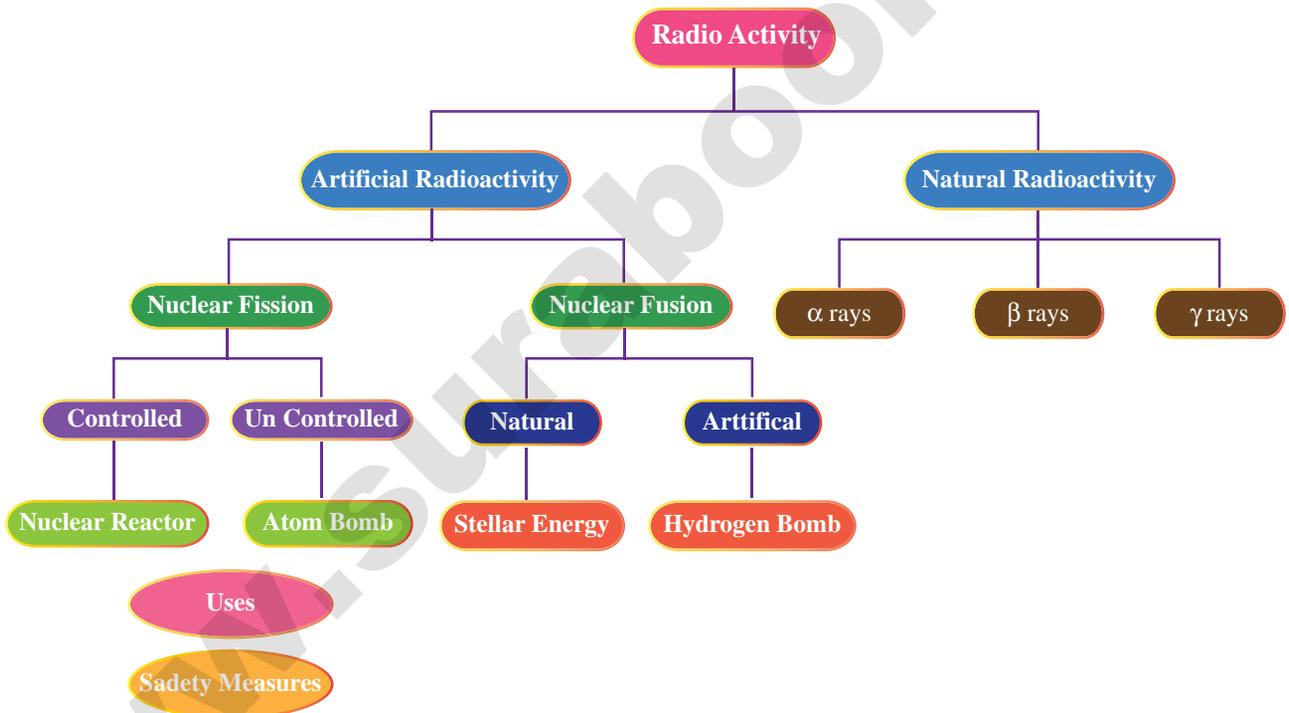
Ans. It is built with elliptically shaped walls. When a person is talking at one focus, his voice can be heard distinctly at the other focus. It is due to the multiple reflections of sound waves from the curved walls.

# UNIT 6



# NUCLEAR PHYSICS

## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Man-made radioactivity is also known as \_\_\_\_\_

- (a) Induced radioactivity
- (b) Spontaneous radioactivity
- (c) Artificial radioactivity
- (d) a & c

[Ans. (d) a & c]

2. Unit of radioactivity is \_\_\_\_\_

- (a) roentgen
- (b) curie
- (c) becquerel
- (d) all the above

[Ans. (d) all the above]

3. Artificial radioactivity was discovered by \_\_\_\_\_

- (a) Becquerel
- (b) Irene Curie
- (c) Roentgen
- (d) Neils Bohr

[Ans. (b) Irene Curie]

4. In which of the following, no change in mass number of the daughter nuclei takes place

- (i)  $\alpha$  decay
- (ii)  $\beta$  decay
- (iii)  $\gamma$  decay
- (iv) neutron decay

- (a) (i) is correct
- (b) (ii) and (iii) are correct
- (c) (i) & (iv) are correct
- (d) (ii) & (iv) are correct

[Ans. (b) (ii) and (iii) are correct]

5. \_\_\_\_\_ isotope is used for the treatment of cancer.

- (a) Radio Iodine
- (b) Radio Cobalt
- (c) Radio Carbon
- (d) Radio Nickel

[Ans. (b) Radio Cobalt]

6. Gamma radiations are dangerous because

- (a) it affects eyes & bones
- (b) it affects tissues
- (c) it produces genetic disorder
- (d) it produces enormous amount of heat

[Ans. (c) it produces genetic disorder]

7. \_\_\_\_\_ aprons are used to protect us from gamma radiations

- (a) Lead oxide
- (b) Iron
- (c) Lead
- (d) Aluminium

[Ans. (c) Lead]

8. Which of the following statements is/are correct?

- (i)  $\alpha$  particles are photons
  - (ii) Penetrating power of  $\gamma$  radiation is very low
  - (iii) Ionization power is maximum for  $\alpha$  rays
  - (iv) Penetrating power of  $\gamma$  radiation is very high
- (a) (i) & (ii) are correct
  - (b) (ii) & (iii) are correct
  - (c) (iv) only correct
  - (d) (iii) & (iv) are correct

[Ans. (d) (iii) & (iv) are correct]

9. Proton - Proton chain reaction is an example of \_\_\_\_\_

- (a) Nuclear fission
- (b)  $\alpha$  - decay
- (c) Nuclear fusion
- (d)  $\beta$  - decay

[Ans. (c) Nuclear fusion]

10. In the nuclear reaction  ${}_6X^{12} \xrightarrow{\alpha \text{ decay}} {}_Z Y^A$ , the value of A & Z

- (a) 8, 6
- (b) 8, 4
- (c) 4, 8
- (d) cannot be determined with the given data

[Ans. (c) 4, 8]

11. Kamini reactor is located at \_\_\_\_\_

- (a) Kalpakkam
- (b) Koodankulam
- (c) Mumbai
- (d) Rajasthan

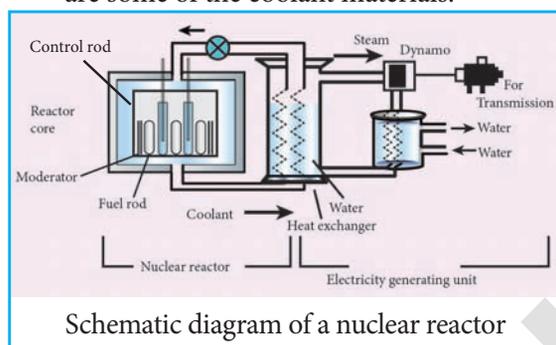
[Ans. (a) Kalpakkam]

12. Which of the following is/are correct?

- (i) Chain reaction takes place in a nuclear reactor and an atomic bomb.
  - (ii) The chain reaction in a nuclear reactor is controlled
  - (iii) The chain reaction in a nuclear reactor is not controlled
  - (iv) No chain reaction takes place in an atom bomb
- (a) (i) only correct
  - (b) (i) & (ii) are correct
  - (c) (iv) only correct
  - (d) (iii) & (iv) are correct

[Ans. (b) (i) & (ii) are correct]

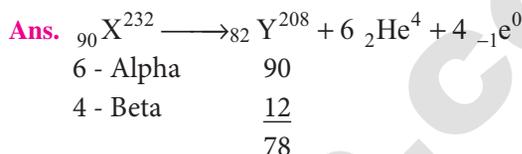
- (ii) **Moderator** : A moderator is used to slow down the high energy neutrons to get slow neutrons. Graphite and heavy water are the commonly used moderators.
- (iii) **Control rod** : Control rods are used to control the number of neutrons in order to have sustained chain reaction. Mostly boron or cadmium rods are used as control rods.
- (iv) **Coolant** : A coolant is used to remove the heat produced in the reactor core to produce steam. This steam is used to run a turbine to produce electricity. Water, air and helium are some of the coolant materials.



- (v) **Protection wall** : A thick concrete lead wall is built around the nuclear reactor in order to prevent the harmful radiations from escaping into the environment.

### XII.HOT QUESTIONS :

1. Mass number of a radioactive element is 232 and its atomic number is 90. When this element undergoes certain nuclear reactions, it transforms into an isotope of lead with a mass number 208 and an atomic number 82. Determine the number of alpha and beta decay that can occur.



2. 'X - rays should not be taken often'. Give the reason.

Ans. X- rays are radiations that can penetrate deep into your body. Over exposure of X-ray may lead to the damage of some sensitive organs present inside our body. It is better to wear lead aprons while taking X-ray films.

3. Cell phone towers should be placed far away from the residential area - why?

Ans. Cellphone towers emit high frequency radio waves or microwaves which are dangerous to humans. These electro magnetic radiations can cause health problems like Cancer, Birth defects, low sperm count, memory loss etc. So it is better to place cell phone towers far away from residential areas.

### ADDITIONAL QUESTIONS AND ANSWERS

#### CHOOSE THE CORRECT ANSWER 1 MARK

1. Which of the following material is normally fissionable?

- (a)  $\text{U}^{238}$  (b)  $\text{Th}^{232}$   
(c)  $\text{Pu}^{240}$  (d)  $\text{U}^{235}$

[Ans. (d)  $\text{U}^{235}$ ]

2. The control rod in a nuclear reactor is made of

- (a) uranium (b) cadmium  
(c) graphite (d) plutonium

[Ans. (b) cadmium]

3. The explosion of the atomic bomb takes place due to

- (a) Nuclear fission (b) Nuclear fusion  
(c) Scattering (d) Heating

[Ans. (a) Nuclear fission]

4. Energy generation in stars is due to

- (a) chemical reaction  
(b) fission  
(c) fusion of light nuclei  
(d) Fusion of heavy nuclei

[Ans. (c) fusion of light nuclei]

USE THE ANALOGY TO FILL IN THE BLANK

1. Heavier elements into higher elements : \_\_\_\_\_ :: Lighter elements into heavier elements : Nuclear fusion

Ans. Nuclear fission.

2.  $\alpha$  - rays : Helium particles ::  $\beta$  - rays : \_\_\_\_\_

Ans. electrons.

3. \_\_\_\_\_ : negative charged particles ::  $\gamma$  - rays : neutral

Ans.  $\beta$  - rays.

4.  $P^{32}$  : cure skin diseases ::  $Fe^{59}$  : \_\_\_\_\_

Ans. diagnose anaemia.

ARRANGE THE FOLLOWING IN CORRECT SEQUENCE

1. Write in descending order, the ionising property of the given rays.

$\beta$  - rays,  $\gamma$  - rays,  $\alpha$  - rays, I - R rays

Ans.  $\alpha$  - rays,  $\beta$  - rays,  $\gamma$  - rays, I - R rays

**Note** I - R rays are non - ionising rays

2. Write in ascending order, the radioactive elements according to the atomic number.

$N_p$ ,  $Pu$ ,  $U$ ,  $Pa$

Ans.  $Pa$ ,  $U$ ,  $N_p$ ,  $Pu$

**Note**

$Pa$  → Protactinium (91)

$U$  → Uranium (92)

$N_p$  → Neptunium

$Pu$  → Plutonium

ANSWER IN ONE WORD

1. The atomic number?

Ans. Gamma decay.

2. What is it called when two atomic nuclei fuse?

Ans. Nuclear fusion

3. What form of radioactive decay reduces the atomic number or number of protons by 2?

Ans. Alpha decay.

4. Write the name of the radioactive radiations which are emitted by the unstable nuclei.

Ans.  $\alpha$ ,  $\beta$  and  $\gamma$  rays

5. How does radioactive material generate electricity?

Ans. The heat generated during fission creates steam which in turn generates electricity.

6. How many power plants in India? Name the nuclear reactor in India.

Ans. 7. One in Maharashtra, Rajasthan, Gujarat, U.P and two in Tamil Nadu, Kalpakkam and Kudankulam.

7. How do workers at nuclear power plants know when they've received the maximum amount of radiation deemed safe?

Ans. Dosimeters is used to track the amount of radiation absorbed.

8. Give the value of kinetic energy of alpha ray.

Ans. 5MeV

SHORT ANSWER

2 MARKS

1. Define radioactivity. What are radioactive elements?

Ans. The phenomenon of nuclear decay of certain elements with the emission of radiations like alpha, beta and gamma rays is called as "radioactivity" and the elements which undergo this phenomenon are called as "radioactive elements".

2. What is meant by Natural Radioactivity?

Ans. The phenomenon of spontaneous emission of radiation from certain elements on its own is called "natural radio activity".

3. Name the elements which undergoes spontaneous radioactivity.

Ans. The elements whose atomic number is more than 83 undergo spontaneous radioactivity.

Ex : Uranium, Radium, etc.

Technetium (Tc) with atomic number 43 and Promethium (Pm) with atomic number 61 are the only tow radio active substances.



**GIVE LONG ANSWER**

**5 MARKS**

**1. Explain the principle & structure of atom bomb.**

- Ans.** (i) Atom bomb is based on the principle of uncontrolled chain reaction.
- (ii) In an uncontrolled chain reaction, the number of neutrons and the number of fission reactions multiply almost in a geometrical progression.
- (iii) This releases a huge amount of energy in a very small time interval and leads to explosion.

**Structure :**

- (i) An atom bomb consists of a piece of fissile material whose mass is sub critical.
- (ii) This piece has a cylindrical void. It has a cylindrical fissile material which can fit into this void and its mass is also sub critical.
- (iii) When the bomb has to be exploded, this cylinder is injected into the void using a conventional explosive.
- (iv) Now, the two pieces of fissile material add up to form super critical mass which leads to an explosion.
- (v) During this explosion tremendous amount of energy in the form of heat, light and radiation is released.
- (vi) A very high temperature and pressure are experienced in fraction of second along with hazardous radiation like  $\gamma$  rays which adversely affect the living creatures.

**2. Explain the uses of radio isotopes in medicine field?**

**Ans.** Medical applications of radio isotopes can be divided into two parts i) Diagnosis ii) Therapy Radio. I

Isotopes are used as tracers to diagnose the nature of blood circulatory disorders, defects of bone metabolism, to locate tumors, etc. Some of the radio isotopes which are used as tracers are: hydrogen, carbon, nitrogen, sulphur, etc.

- (i) Radio sodium ( $\text{Na}^{24}$ ) is used for the effective functioning of heart.
- (ii) Radio - Iodine ( $\text{I}^{131}$ ) is used to cure the goiter.

- (iii) Radio iron is ( $\text{Fe}^{59}$ ) is used to diagnose anemia and also provide treatment for the same.
- (iv) Radio phosphorous ( $\text{P}^{32}$ ) is used in the treatment of skin diseases.
- (v) Radio cobalt ( $\text{Co}^{60}$ ) and radio gold ( $\text{Au}^{198}$ ) are used in the treatment of skin cancer.
- (vi) Radiations are used to sterilize the surgical devices as they can kill the germs and microbes.

**3. Distinguish between Nuclear fission and nuclear fusion.**

**Ans.**

S.No	Nuclear fission	Nuclear fusion
1	The process of breaking (splitting) up of a heavy nucleus into two smaller nuclei is called "nuclear fission".	Nuclear fusion is the combination of two lighter nuclei to form a heavier nucleus.
2	Can be performed at room temperature	Extreme high temperature and pressure is needed
3	Alpha, beta and gamma radiations are emitted	Alpha ray, Positron, and neutrinos are emitted
4	Fission leads to emission of gamma radiation. This triggers mutation in human gene and causes genetic transform diseases.	Only light and heat energy is emitted. No harmful radiation is emitted and will not cause any genetic transform diseases.
5	Deflected by both the fields; but the direction of deflection is opposite to alpha rays. (in accordance with Fleming's left hand rule)	They are not deflected by both the fields.

**4. What are the precautions to be taken by people working in radiation labs?**

**Ans.** (i) Radioactive materials should be kept in thick walled lead container.



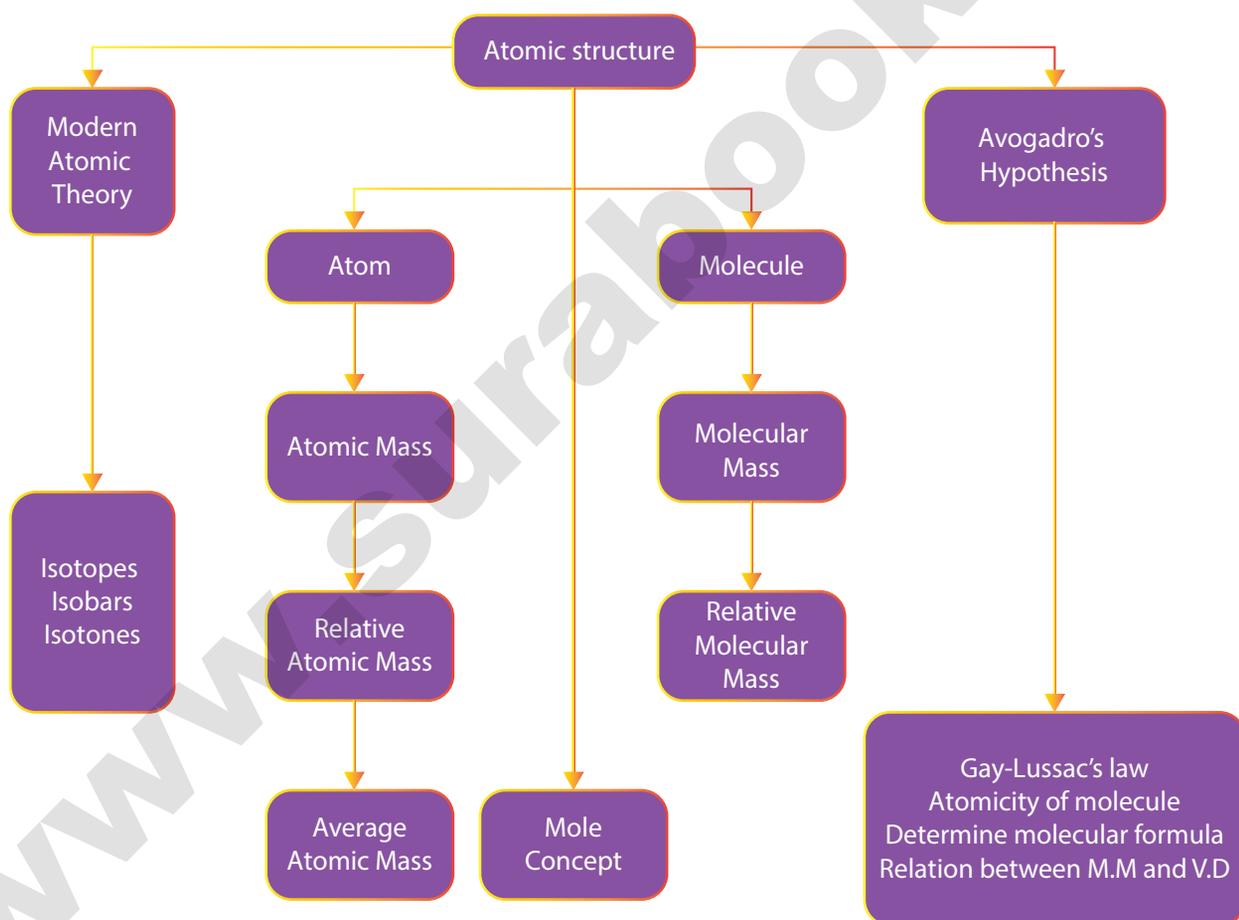
# CHEMISTRY



## UNIT 7



### CONCEPT MAP





## TEXTBOOK EVALUATION

### I. CHOOSE THE CORRECT ANSWER :

1. Which of the following has the smallest mass?

- (a)  $6.023 \times 10^{23}$  atoms of He  
(b) 1 atom of He  
(c) 2g of He  
(d) 1 mole atoms of He [Ans. (b) 1 atom of He]

2. Which of the following is a triatomic molecule?

- (a) Glucose (b) Helium  
(c) Carbon dioxide (d) Hydrogen  
[Ans. (c) Carbon dioxide]

3. The volume occupied by 4.4 g of  $\text{CO}_2$  at S.T.P

- (a) 22.4 litre (b) 2.24 litre  
(c) 0.24 litre (d) 0.1 litre  
[Ans. (b) 2.24 litre]

4. Mass of 1 mole of Nitrogen atom is

- (a) 28 amu (b) 14 amu  
(c) 28 g (d) 14 g  
[Ans. (c) 28g]

5. Which of the following represents 1amu?

- (a) Mass of a C - 12 atom  
(b) Mass of a hydrogen atom  
(c)  $\frac{1}{12^{\text{th}}}$  of the mass of a C - 12 atom  
(d) Mass of O - 16 atom  
[Ans. (c)  $\frac{1}{12^{\text{th}}}$  of the mass of a C - 12 atom]

6. Which of the following statement is incorrect?

- (a) One gram of C - 12 contains Avogadro's number of atoms.  
(b) One mole of oxygen gas contains Avogadro's number of molecules.  
(c) One mole of hydrogen gas contains Avogadro's number of atoms.  
(d) One mole of electrons stands for  $6.023 \times 10^{23}$  electrons.  
[Ans. (c) One mole of hydrogen gas contains Avogadro's number of atoms]

7. The volume occupied by 1 mole of a diatomic gas at S.T.P is

- (a) 11.2 litre (b) 5.6 litre  
(c) 22.4 litre (d) 44.8 litre  
[Ans. (c) 22.4 litre]

8. In the nucleus of  ${}_{20}\text{Ca}^{40}$ , there are

- (a) 20 protons and 40 neutrons  
(b) 20 protons and 20 neutrons  
(c) 20 protons and 40 electrons  
(d) 40 protons and 20 electrons  
[Ans. (b) 20 protons and 20 neutrons]

9. The gram molecular mass of oxygen molecule is

- (a) 16g (b) 18g (c) 32g (d) 17g  
[Ans. (c) 32g]

10. 1 mole of any substance contains \_\_\_\_\_ molecules.

- (a)  $6.023 \times 10^{23}$  (b)  $6.023 \times 10^{-23}$   
(c)  $3.0115 \times 10^{23}$  (d)  $12.046 \times 10^{23}$   
[Ans. (a)  $6.023 \times 10^{23}$ ]

### II. FILL IN THE BLANKS :

1. Atoms of different elements having \_\_\_\_\_ mass number, but \_\_\_\_\_ atomic numbers are called isobars. [Ans. same, different]

2. Atoms of different elements having same number of \_\_\_\_\_ are called isotones. [Ans. neutrons]

3. Atoms of one element can be transmuted into atoms of other element by \_\_\_\_\_. [Ans. artificial transmutation]

4. The sum of the numbers of protons and neutrons of an atom is called its \_\_\_\_\_. [Ans. mass number]

5. Relative atomic mass is otherwise known as \_\_\_\_\_. [Ans. standard atomic weight]

6. The average atomic mass of hydrogen is \_\_\_\_\_ amu. [Ans. 1.0079]

7. If a molecule is made of similar kind of atoms, then it is called \_\_\_\_\_ atomic molecule. [Ans. Homo]



**5. What is Molar volume of a gas?**

**Ans. (i)** The volume occupied by one mole of any gas at S.T.P is called molar volume.

**(ii)** One mole of any gas occupies = 22.4 litre or 22400 ml at S.T.P.

**6. Find the percentage of nitrogen in ammonia.**

**Ans.** % of nitrogen in NH<sub>3</sub>

$$= \frac{\text{Mass of nitrogen}}{\text{Molar mass of NH}_3} \times 100$$

$$= \frac{14}{17} \times 100 = 82\%$$

**VII. LONG ANSWER QUESTIONS :**

**1. Calculate the number of water molecule present in one drop of water which weighs 0.18 g.**

**Ans.** Mass of water = 0.18 g

$$\begin{aligned} \text{No of moles} &= \frac{\text{Mass}}{\text{Molecular Mass}} \\ &= \frac{0.18}{18} \end{aligned}$$

$$= 0.01 \text{ mole}$$

$$\begin{aligned} \text{Number of molecules} &= \text{No of moles} \times \\ &\quad \text{Avogadro number} \end{aligned}$$

$$= 0.01 \times 6.023 \times 10^{23}$$

$$= 0.06023 \times 10^{23}$$

$$= 6.023 \times 10^{21} \text{ molecules}$$

**2. N<sub>2</sub> + 3H<sub>2</sub> → 2NH<sub>3</sub>  
(The atomic mass of nitrogen is 14, and that of hydrogen is 1)**

**1 mole of nitrogen ( \_\_\_\_\_ g) +**

**3 moles of hydrogen ( \_\_\_\_\_ g) →**

**2 moles of ammonia ( \_\_\_\_\_ g)**

**Ans.** 28, 6, 34.

**3. Calculate the number of moles in**

**(i) 27g of Al**

**(ii) 1.51 × 10<sup>23</sup> molecules of NH<sub>4</sub>Cl**

**Ans. (i) 27 g of Al**

$$\text{No of moles} = \frac{\text{Mass}}{\text{Atomic Mass}}$$

$$= \frac{27}{27} = 1 \text{ mole}$$

**(ii) 1.51 × 10<sup>23</sup> molecules of NH<sub>4</sub>Cl**

$$\text{No of moles} = \frac{\text{Number of molecules}}{\text{Avogadro number}}$$

$$= \frac{1.51 \times 10^{23}}{6.023 \times 10^{23}} = 0.25 \text{ mole}$$

**4. Give the salient features of “Modern atomic theory”.**

**Ans.** ‘The main postulates of modern atomic theory’ are as follows:

**(i)** An atom is no longer indivisible

**(ii)** Atoms of the same element may have different atomic mass. Example - isotopes <sup>17</sup>Cl<sup>35</sup>, <sup>17</sup>Cl<sup>37</sup>.

**(iii)** Atoms of different elements may have same atomic masses. Example - Isobars <sup>18</sup>Ar<sup>40</sup>, <sup>20</sup>Ca<sup>40</sup>.

**(iv)** Atoms of one element can be transmuted into atoms of other elements.

**(v)** Atoms may not always combine in a simple whole number ratio. Eg : Glucose C<sup>6</sup>H<sup>12</sup>O<sup>6</sup>.

**(vi)** Atom is the smallest particle that take part in a chemical reaction.

**(vii)** Mass of an atom can be converted into energy. E = mc<sup>2</sup>.

**5. Derive the relationship between Relative molecular mass and Vapour density.**

**Ans. Relative molecular mass :**

**(i) (Hydrogen scale) :** The Relative Molecular Mass of a gas or vapour is the ratio between the mass of one molecule of the gas or vapour to mass of one atom of Hydrogen.

**(ii) Vapour Density :** Vapour density is the ratio of the mass of a certain volume of a gas or vapour, to the mass of an equal volume of hydrogen, measured under the same conditions of temperature and pressure.

Vapour Density

$$(\text{V.D}) = \frac{\text{Mass of given volume of gas or vapour at S.T.P}}{\text{Mass of same volume of hydrogen}}$$

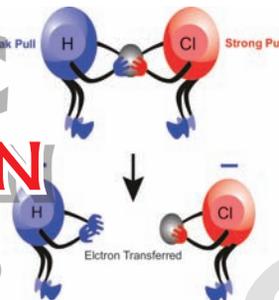
According to Avogadro's law, equal volumes of all gases contain equal number of molecules.

Thus, let the number of molecules in one volume = n, then

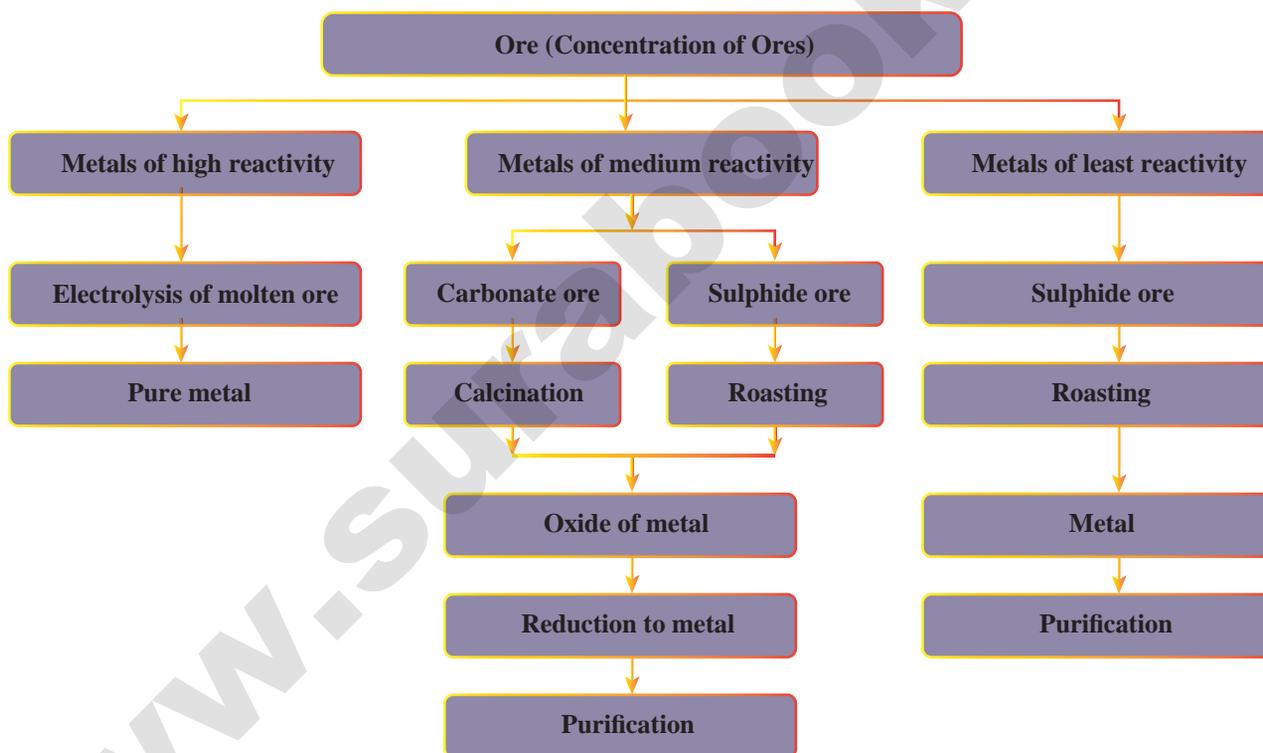


# UNIT 8

# PERIODIC CLASSIFICATION OF ELEMENTS



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. The number of periods and groups in the periodic table are \_\_\_\_\_

- (a) 6,16 (b) 7,17 (c) 8,18 (d) 7,18

[Ans. (d) 7, 18]

2. The basis of modern periodic law is \_\_\_\_\_

- (a) atomic number  
(b) atomic mass  
(c) isotopic mass  
(d) number of neutrons

[Ans. (a) atomic number]

3. \_\_\_\_\_ group contains the members of halogen family.

- (a) 17<sup>th</sup> (b) 15<sup>th</sup> (c) 18<sup>th</sup> (d) 16<sup>th</sup>

[Ans. (a) 17<sup>th</sup>]

4. \_\_\_\_\_ is a relative periodic property

- (a) Atomic radii (b) Ionic radii  
(c) Electron affinity (d) Electronegativity

[Ans. (d) electronegativity]

5. Chemical formula of rust is \_\_\_\_\_

- (a)  $\text{FeO} \cdot x\text{H}_2\text{O}$  (b)  $\text{FeO}_4 \cdot x\text{H}_2\text{O}$   
(c)  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$  (d)  $\text{FeO}$

[Ans. (c)  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ ]

6. In the aluminothermic process, the role of Al is \_\_\_\_\_

- (a) oxidizing agent  
(b) reducing agent  
(c) hydrogenating agent  
(d) sulphurising agent

[Ans. (b) reducing agent]

7. The process of coating the surface of metal with a thin layer of zinc is called \_\_\_\_\_

- (a) painting (b) thinning  
(c) galvanization (d) electroplating

[Ans. (c) galvanization]

8. Which of the following have inert gases 2 electrons in the outermost shell?

- (a) He (b) Ne (c) Ar (d) Kr

[Ans. (a) He]

9. Neon shows zero electron affinity due to \_\_\_\_\_

- (a) stable arrangement of neutrons  
(b) stable configuration of electrons  
(c) reduced size  
(d) increased density

[Ans. (b) stable configuration of electrons]

10. \_\_\_\_\_ is an important metal to form amalgam

- (a) Ag (b) Hg (c) Mg (d) Al

[Ans. (b) Hg]

II. FILL IN THE BLANKS :

1. If the electronegativity difference between two bonded atoms in a molecule is greater than 1.7, the nature of bonding is \_\_\_\_\_.

[Ans. ionic]

2. \_\_\_\_\_ is the longest period in the periodical table.

[Ans. 6<sup>th</sup>]

3. \_\_\_\_\_ forms the basis of modern periodic table.

[Ans. Atomic number]

4. If the distance between two Cl atoms in  $\text{Cl}_2$  molecule is  $1.98\text{\AA}$ , then the radius of Cl atom is \_\_\_\_\_.

[Ans.  $0.99\text{\AA}$ ]

5. Among the given species  $\text{A}^-$ ,  $\text{A}^+$ , and  $\text{A}$ , the smallest one in size is \_\_\_\_\_.

[Ans.  $\text{A}^+$ ]

6. The scientist who propounded the modern periodic law is \_\_\_\_\_.

[Ans. Henry Moseley]

7. Across the period, ionic radii \_\_\_\_\_ (increases, decreases)

[Ans. decreases]

8. \_\_\_\_\_ and \_\_\_\_\_ are called inner transition elements

[Ans. Lanthanides, Actinides]

9. The chief ore of Aluminium is \_\_\_\_\_.

[Ans. Bauxite]

10. The chemical name of rust is \_\_\_\_\_.

[Ans. hydrated ferric oxide]



**III. MATCH THE FOLLOWING :**

1.	Galvanisation	Noble gas elements
2.	Calcination	Coating with Zn
3.	Redox reaction	silver-tin amalgam
4.	Dental filling	Alumino thermic process
5.	Group 18 elements	Heating in the absence of air

Ans.

1.	Galvanisation	coating with Zn
2.	Calcination	Heating in the absence of air
3.	Redox reaction	Alumino thermic process
4.	Dental filling	silver-tin amalgam
5.	Group 18 elements	Noble gas elements

**IV. TRUE OR FALSE : (IF FALSE GIVE THE CORRECT STATEMENT)**

1. Moseley's periodic table is based on atomic mass.

Ans. False.

**Correct Statement :** Moseley's periodic table is based on atomic **number**.

2. Ionic radius increases across the period from left to right.

Ans. False.

**Correct Statement :** Ionic radius **decreases** across the period from left to right.

3. All ores are minerals; but all minerals cannot be called as ores;

Ans. True.

4. Al wires are used as electric cables due to their silvery white colour.

Ans. False.

**Correct Statement :** Al wires are used in electric cables as they are **good conductors**.

5. An alloy is a heterogeneous mixture of metals.

Ans. False.

**Correct Statement :** An alloy is a **homogeneous** mixture of metals.

**V. ASSERTION AND REASON :**

Answer the following questions using the data given below:

(i) A and R are correct, R explains the A.

(ii) A is correct, R is wrong.

(iii) A is wrong, R is correct.

(iv) A and R are correct, R doesn't explain A.

1. **Assertion :** The nature of bond in HF molecule is ionic.

**Reason :** The electronegativity difference between H and F is 1.9.

[Ans. (i) A and R are correct, R explains the A]

2. **Assertion :** Magnesium is used to protect steel from rusting.

**Reason :** Magnesium is more reactive than iron.

[Ans. (iii) A is wrong, R is correct]

3. **Assertion :** An uncleaned copper vessel is covered with greenish layer.

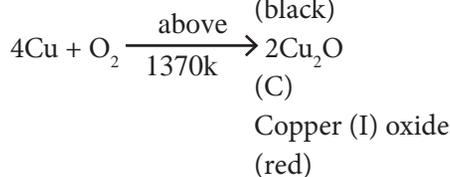
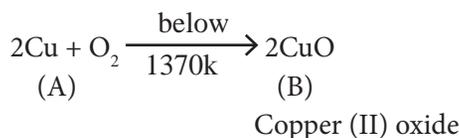
**Reason :** Copper is not attacked by alkali.

[Ans. (i) A and R are correct, R explains the A]

**VI. SHORT ANSWER QUESTIONS :**

1. A is a reddish brown metal, which combines with O<sub>2</sub> at < 1370 K gives B, a black coloured compound. At a temperature > 1370 K, A gives C which is red in colour. Find A, B and C with reaction.

Ans. Reddish brown metal A is copper.



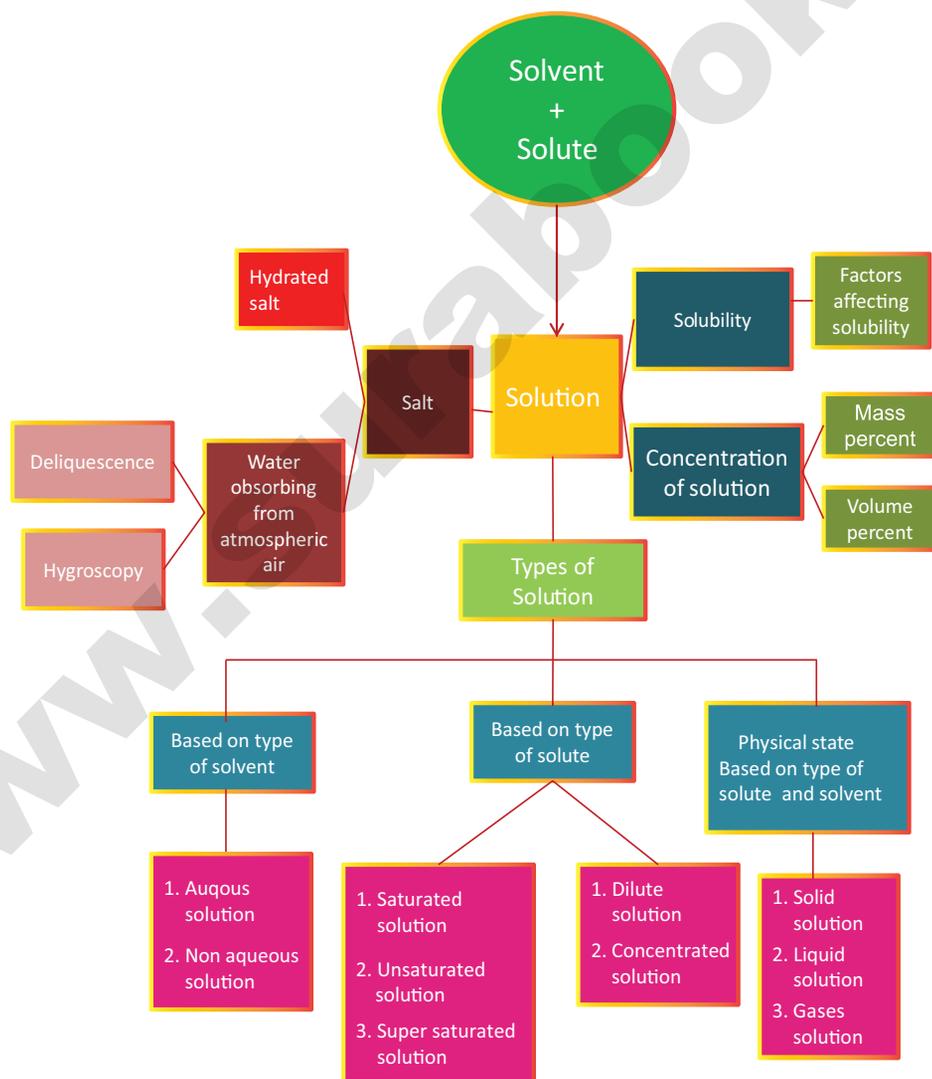
A	-	Cu	-	Copper
B	-	CuO	-	Copper (II) oxide
C	-	Cu <sub>2</sub> O	-	Copper I oxide



# UNIT 9



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

- A solution is a \_\_\_\_\_ mixture.  
(a) homogeneous  
(b) heterogeneous  
(c) homogeneous and heterogeneous  
(d) non homogeneous [Ans. (a) homogeneous]
- The number of components in a binary solution is \_\_\_\_\_.  
(a) 2 (b) 3 (c) 4 (d) 5  
[Ans. (a) 2]
- Which of the following is the universal solvent?  
(a) Acetone (b) Benzene  
(c) Water (d) Alcohol  
[Ans. (c) Water]
- A solution in which no more solute can be dissolved in a definite amount of solvent at a given temperature is called \_\_\_\_\_.  
(a) Saturated solution  
(b) Un saturated solution  
(c) Super saturated solution  
(d) Dilute solution  
[Ans. (a) Saturated solution]
- Identify the non aqueous solution.  
(a) sodium chloride in water  
(b) glucose in water  
(c) copper sulphate in water  
(d) sulphur in carbon-di-sulphide  
[Ans. (d) sulphur in carbon -di-sulphide]
- When pressure is increased at constant temperature the solubility of gases in liquid \_\_\_\_\_.  
(a) No change (b) increases  
(c) decreases (d) no reaction  
[Ans. (b) increases]
- Solubility of NaCl in 100 ml water is 36 g. If 25 g of salt is dissolved in 100 ml of water how much more salt is required for saturation?  
\_\_\_\_\_.  
(a) 12g (b) 11g (c) 16g (d) 20g  
[Ans. (b) 11g]

- A 25% alcohol solution means  
(a) 25 ml alcohol in 100 ml of water  
(b) 25 ml alcohol in 25 ml of water  
(c) 25 ml alcohol in 75 ml of water  
(d) 75 ml alcohol in 25 ml of water  
[Ans. (c) 25 ml alcohol in 75 ml of water]
- Deliquescence is due to \_\_\_\_\_.  
(a) Strong affinity to water  
(b) Less affinity to water  
(c) Strong hatred to water  
(d) Inertness to water  
[Ans. (a) Strong affinity to water]
- Which of the following is hygroscopic in nature?  
(a) ferric chloride  
(b) copper sulphate pentahydrate  
(c) silica gel  
(d) none of the above [Ans. (c) silica gel]

II. FILL IN THE BLANKS :

- The component present in lesser amount, in a solution is called \_\_\_\_\_. [Ans. Solute]
- Example for liquid in solid type solution is \_\_\_\_\_.  
[Ans. Mercury with sodium (amalgam)]
- Solubility is the amount of solute dissolved in \_\_\_\_\_ g of solvent. [Ans. 100]
- Polar compounds are soluble in \_\_\_\_\_ solvents [Ans. polar]
- Volume percentage decreases with increases in temperature because \_\_\_\_\_.  
[Ans. of expansion of liquids]

III. MATCH THE FOLLOWING :

1.	Blue vitriol	-	CaSO <sub>4</sub> .2H <sub>2</sub> O
2.	Gypsum	-	CaO
3.	Deliquescence	-	CuSO <sub>4</sub> .5H <sub>2</sub> O
4.	Hygroscopic	-	NaOH



Ans.

1.	Blue vitriol	-	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
2.	Gypsum	-	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
3.	Deliquescence	-	NaOH
4.	Hygroscopic	-	CaO

**IV. TRUE OR FALSE: (IF FALSE GIVE THE CORRECT STATEMENT)**

1. Solutions which contain three components are called binary solution.

Ans. False.

Correct statement : Solutions which contain three components are called **Trinary** solution.

2. In a solution the component which is present in lesser amount is called solvent.

Ans. True.

3. Sodium chloride dissolved in water forms a non-aqueous solution.

Ans. False.

Correct statement :  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  dissolved in water forms a aqueous solution.

4. The molecular formula of black vitriol is  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ .

Ans. False.

Correct statement : The molecular formula of green vitriol is  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ .

5. When Silica gel is kept open, it absorbs moisture from the air, because it is hygroscopic in nature

Ans. True.

**V. SHORT ANSWER QUESTIONS:**

1. Define the term: Solution.

Ans. Solution is a homogeneous mixture of one or more substances.

2. What is meant by binary solution?

Ans. Solutions which are made of one solute and one solvent (two components) are called binary solutions.

3. Give an example each

- i) gas in liquid
- ii) solid in liquid
- iii) solid in solid
- iv) gas in gas

Ans. (i) Gas - Liquid - carbon-di-oxide dissolved in water (Soda water)

(ii) Solid - Liquid - Sodium chloride dissolved in water

(iii) Solid - Solid - Copper dissolved in gold (Alloys)

(iv) Gas - Gas - Mixture of Helium-Oxygen gases,

4. What is aqueous and non-aqueous solution? Give an example.

Ans. (i) **Aqueous solution:** The solution in which water acts as a solvent is called aqueous solution.

E.g. Common salt in water, Sugar in water, Copper sulphate in water etc.

(ii) **Non - Aqueous solution:** The solution in which any liquid other than water acts as a solvent is called non - aqueous solution.

E.g: Sulphur dissolved in carbon disulphide.

5. Define Volume percentage.

Ans. Volume percentage is defined as the percentage by volume of solute (in ml) present in the given volume of the solution.

$$\text{Volume Percentage} = \frac{\text{Volume of the sloute}}{\text{Volume of the solution}} \times 100$$

6. The aquatic animals live more in cold region Why?

Ans. Aquatic animals live more in cold regions because, more amount of dissolved oxygen is present in the water of cold regions. This shows that the solubility of oxygen is more in water at low temperature.

7. Define Hydrated salt.

Ans. When ionic substances are dissolved in water to make their saturated aqueous solution, their ions attract water molecules which then attached chemically in certain ratio. This process is called hydration.

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Sugar and copper sulphate crystals are dissolved in water. The solution is called as \_\_\_\_\_.
- (a) binary (b) trinary  
(c) ternary (d) quaternary  
[Ans. (b) trinary]
2. 40 g of sodium chloride in 100 g of water at 25° C forms \_\_\_\_\_ solution.
- (a) Super saturated  
(b) Unsaturated  
(c) Saturated  
(d) Both (a) and (b)  
[Ans. (a) Super saturated]
3. 8% of NaCl solution is
- (a) 8 g of NaCl in 100 g of water  
(b) 8 g of NaCl in 92 g of water  
(c) 92 g of NaCl in 8 g of water  
(d) 92 g of NaCl in 100 g of water  
[Ans. (b) 8 g of NaCl in 92 g of water]
4. White vitriol is \_\_\_\_\_.
- (a)  $\text{CaSO}_4 \cdot 7\text{H}_2\text{O}$   
(b)  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$   
(c)  $\text{K}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$   
(d)  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$   
[Ans. (d)  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ ]
5. Anhydrous copper sulphate is \_\_\_\_\_ in colour.
- (a) blue (b) bluish green  
(c) colourless (d) black  
[Ans. (c) colourless]
6. Hygroscopic substances are used as \_\_\_\_\_ agents.
- (a) oxidizing (b) reducing  
(c) decarboxyleting (d) drying  
[Ans. (d) drying]
7. Solubility of a solute is governed by
- (a) nature of solute and solvent  
(b) temperature  
(c) pressure  
(d) all the above  
[Ans. (d) all the above]
8. Under which of the following cases, dissolution of sugar will be rapid?
- (a) Sugar crystal in hot water  
(b) Sugar crystal in cold water  
(c) Powdered sugar in hot water  
(d) Powdered sugar in cold water  
[Ans. (c) Powdered sugar in hot water]
9. A beaker contains a solution of copper sulphate. precipitation of copper sulphate takes place when small amount of it added to \_\_\_\_\_ solution.
- (a) Saturated  
(b) Super saturated  
(c) Unsaturated  
(d) Concentrated  
[Ans. (a) Saturated]
10. Quick lime is dissolved in water is a \_\_\_\_\_ process.
- (a) exothermic (b) endothermic  
(c) reversible (d) both (a) and (b)  
[Ans. (a) exothermic]
11. Example for solid in solid \_\_\_\_\_.
- (a) Soda water  
(b) Camphor in air  
(c) Charcoal  
(d) alloy  
[Ans. (d) alloy]
12. In exothermic process as the temperature increases, solubility of the salt is \_\_\_\_\_
- (a) decreases  
(b) increases  
(c) no change  
(d) increase and then remains constant  
[Ans. (a) decrease]
13. The solubility of gases in liquid increases with \_\_\_\_\_
- (a) increased volume  
(b) increased pressure  
(c) decreased pressure  
(d) none of these  
[Ans. (b) increased pressure]

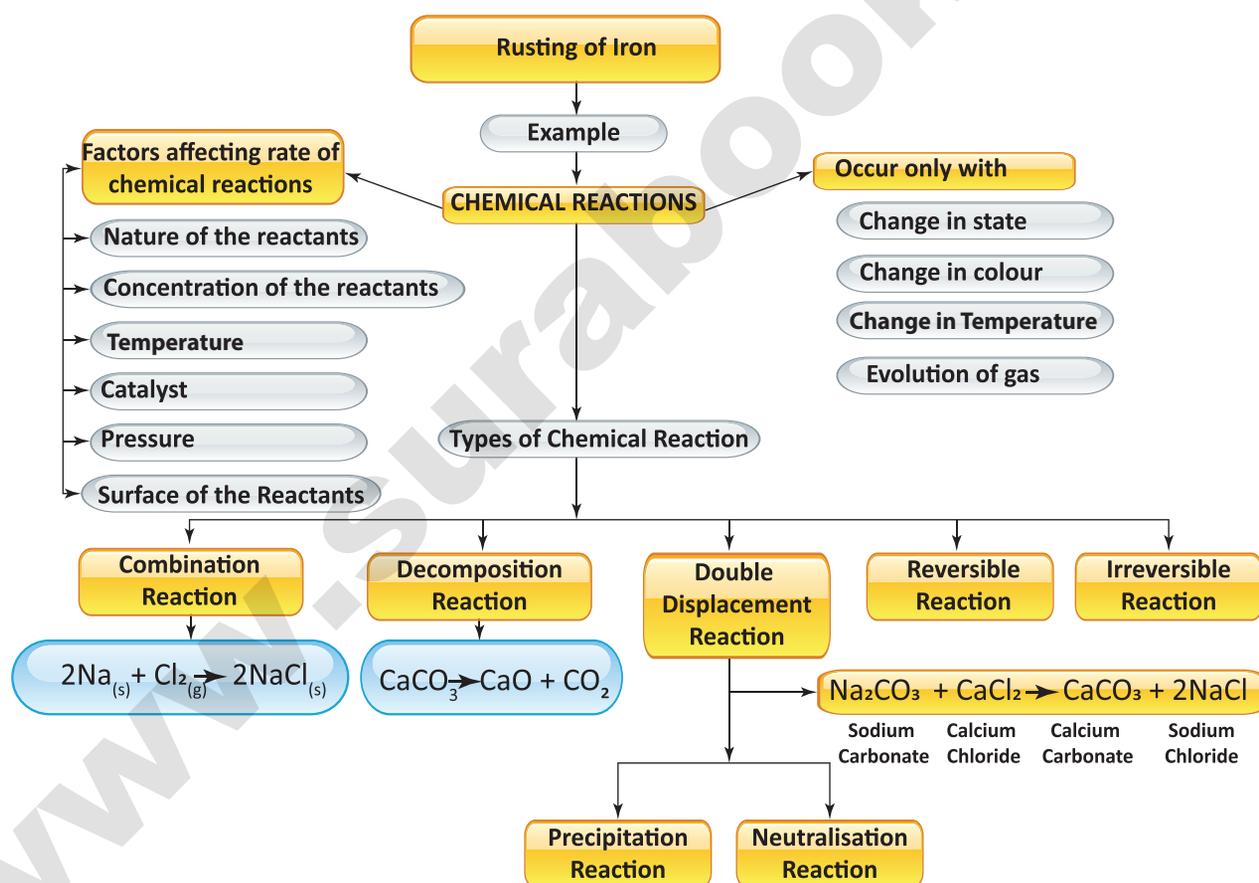


# UNIT 10



## TYPES OF CHEMICAL REACTIONS

### CONCEPT MAP



VIII. SOLVE THE FOLLOWING PROBLEMS:

1. Lemon juice has a pH 2, what is the concentration of  $H^+$  ions?

**Solution**

$$\begin{aligned} \text{pH of lemon juice} &= 2 \\ [H^+] &= ? \\ \text{pH} &= -\log_{10} [H^+] \\ \log_{10} [H^+] &= -2 \\ [H^+] &= 10^{-2} \\ &= \mathbf{0.01 \text{ mole litre}^{-1}} \end{aligned}$$

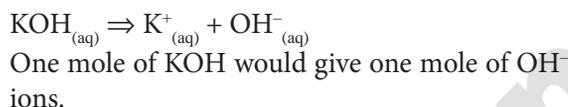
2. Calculate the pH of  $1.0 \times 10^{-4}$  molar solution of  $HNO_3$ .

**Solution**

$$\begin{aligned} [H^+] &= 1.0 \times 10^{-4} \\ \text{pH} &= -\log_{10} [H^+] \\ &= -\log_{10} [1 \times 10^{-4}] \\ \text{pH} &= -(\log_{10} 1 - 4 \log_{10} 10) \\ &= 0 + 4 \times \log_{10} 10 \\ &= 0 + 4 \times 1 = 4 \\ \text{pH} &= \mathbf{4} \end{aligned}$$

3. What is the pH of  $1.0 \times 10^{-5}$  molar solution of KOH?

**Solution**



$$\begin{aligned} [OH^-] &= 1 \times 10^{-5} \text{ mol litre}^{-1} \\ \text{pOH} &= -\log_{10} [OH^-] = -\log_{10} [10^{-5}] \\ &= -(-5 \times \log_{10} 10) = -(-5) = 5 \\ \text{pH} + \text{pOH} &= 14 \\ \text{pH} &= 14 - \text{pOH} = \mathbf{14 - 5 = 9} \end{aligned}$$

4. The hydroxide ion concentration of a solution is  $1 \times 10^{-11} M$ . What is the pH of the solution?

**Solution**

$$\begin{aligned} [OH^-] &= 1 \times 10^{-11} M \\ \text{pOH} &= -\log_{10} [OH^-] = -\log_{10} [10^{-11}] \\ &= -(-11 \times \log_{10} 10) = -(-11) = 11 \\ \text{pH} + \text{pOH} &= 14 \\ \text{pH} &= 14 - \text{pOH} = \mathbf{14 - 11 = 3} \end{aligned}$$

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Which of the following information is not conveyed by a balanced chemical equation?

- Physical states of reactants and products
- Symbols and chemicals formula of reactants and products
- Number of atoms / molecules of the reactants and products formed
- Feasibility of a chemical reaction

[Ans. (d) Feasibility of a chemical reaction]

2. The product formed when calcium oxide reacts with water is

- Slaked lime
- Carbon dioxide
- Calcium oxide
- Oxygen gas

[Ans. (a) Slaked lime]

3. The reaction between hydrogen and oxygen gas to form water is \_\_\_\_\_ reaction.

- combination
- redox
- exothermic
- all of these

[Ans. (a) combination]

4. An element 'A' on exposure to moist air turns to form compound 'B' which is reddish brown. Identify 'A' and 'B'.

- 'A' is Ag, 'B' is  $Ag_2S$
- 'A' is Cu, 'B' is CuO
- 'A' is Mg, 'B' is MgO
- 'A' is Fe, 'B' is  $Fe_2O_3$

[Ans. (d) 'A' is Fe, 'B' is  $Fe_2O_3$ ]

5.  $CaCO_{3(s)} \xrightarrow{\text{heat}} Ca_{(s)} + CO_{2(g)}$   
The above thermal decomposition reaction is an \_\_\_\_\_ reaction.

- endothermic
  - exothermic
  - both (a) and (b)
  - neither (a) nor (b)
- [Ans. (a) endothermic]



16. The pH of baking soda is 9; It is acid in natural.

Ans. False.

**Correct Statement :** The pH of baking soda is 9; It is **basic** in natural.

17. If pH of rain water is approximately 7, then it is called acid rain.

Ans. False.

**Correct Statement :** If pH of rain water is approximately 7, then it is called **rain**.

### ASSERTION AND REASON

**Direction :** In each of the following questions a statement of Assertion (A) is given and a corresponding statement of Reason (R) is given just below it. Mark the correct statement as.

- (a) Both Assertion and Reason are true and Reason is correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is correct but Reason is false.
- (e) Both Assertion and Reason are false.

1. **Assertion :** Combustion reactions are also called as an exothermic oxidation reaction.

**Reason :** In these reactions, oxygen is added and heat energy is released.

[Ans. (a) Both Assertion and Reason are true and Reason is correct explanation of Assertion]

2. **Assertion :** Aluminum hydroxide is not an alkali

**Reason :** An alkali is a base which dissolves in water.

[Ans. (a) Both Assertion and Reason are true and Reason is correct explanation of Assertion]

**Reason :** (Aluminium hydroxide does not dissolves in water)

3. **Assertion :** Colour of copper sulphate change when an iron nail kept in it

**Reason :** Copper is displaced by iron and iron sulphate is formed.

[Ans. (a) Both Assertion and Reason are true and Reason is correct explanation of Assertion]

### ANSWER IN A WORD OR SENTENCE

1. What are the ions in aqueous solutions?

Ans. Hydrogen and Hydroxyl.

2. What are the major classes of double displacement reactions?

- Ans. (i) Precipitation Reactions
- (ii) Neutralization Reactions

3. Can we get back the wood immediately from carbon dioxide and water? why?

Ans. No, because it is a permanent change.

4. How our mobile phone get energy?

Ans. Our mobile phone gets energy from its lithium ion battery by chemical reaction.

### SHORT ANSWER QUESTIONS 2 MARKS

1. Define rate of reaction.

Ans. "Rate of a reaction is the change in the amount or concentration of any one of the reactants or products per unit time".

Consider the following reaction



The rate of this reaction is given by

$$\text{Rate} = \frac{d[A]}{dt} = + \frac{d[B]}{dt}$$

Where,

[A] – Concentration of A

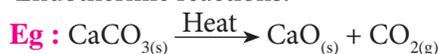
[B] – Concentration of B

2. Identify whether the following reaction is reversible or irreversible

- Ans. (i) Combustion of coal  $\rightarrow$  Irreversible reaction
- (ii) Decomposition of  $\text{PCl}_5 \rightarrow$  Reversible reaction

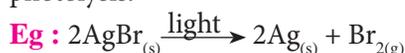
3. Define endothermic reaction. Give an example.

Ans. Reactions in which heat is absorbed are called 'Endothermic reactions'.



4. What is photolysis?

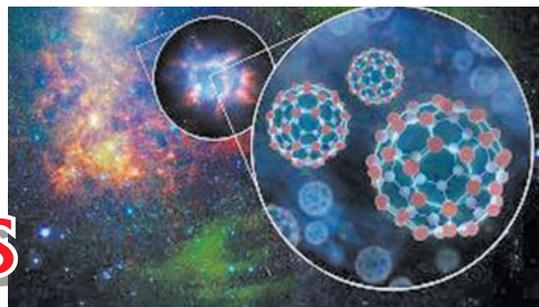
Ans. Decomposition caused by light is called photolysis.



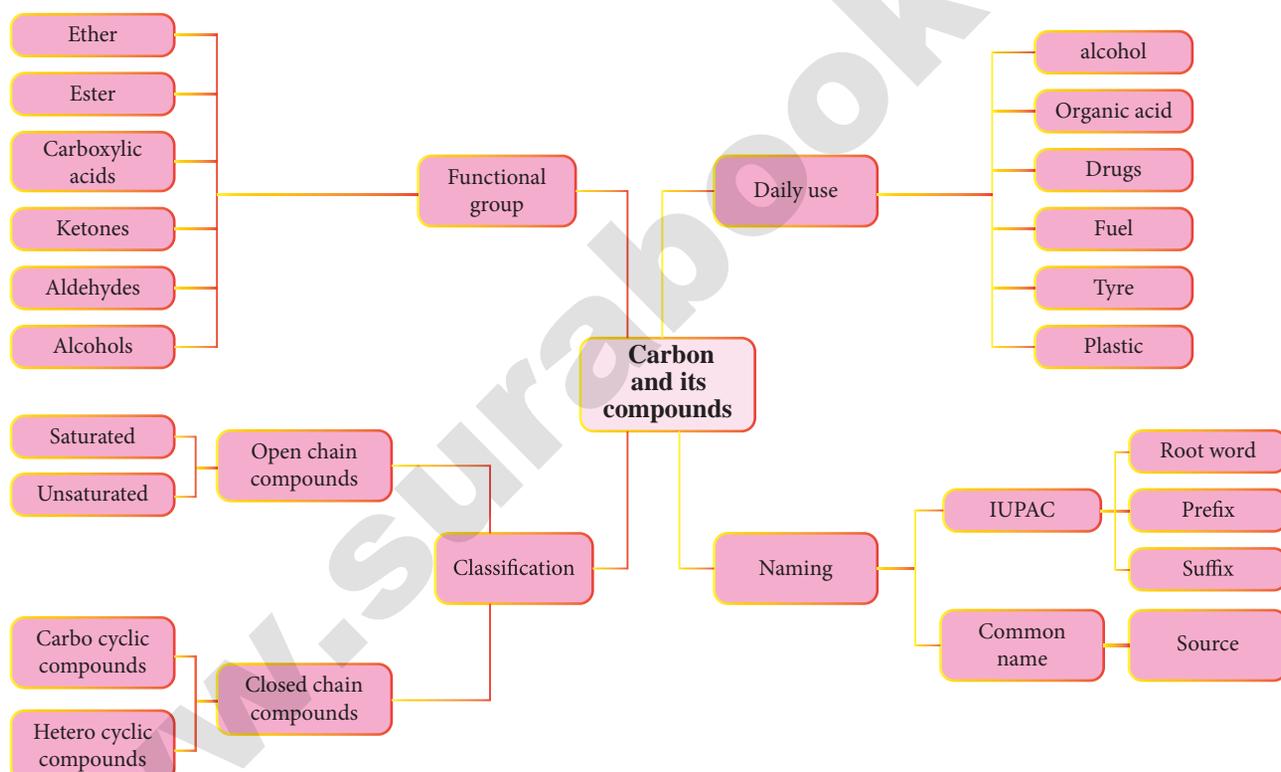


# UNIT 11

# CARBON AND ITS COMPOUNDS



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. The molecular formula of an open chain organic compound is  $C_3H_6$ . The class of the compound is

- (a) alkane (b) alkene  
(c) alkyne (d) alcohol

[Ans. (b) alkene]

2. The IUPAC name of an organic compound is 3-Methyl butan-1-ol. What type compound it is?

- (a) Aldehyde (b) Carboxylic acid  
(c) Ketone (d) Alcohol

[Ans. (d) Alcohol]

3. The secondary suffix used in IUPAC nomenclature of an aldehyde is \_\_\_\_\_

- (a) - ol (b) - oic acid  
(c) - al (d) - one

[Ans. (c) - al]

4. Which of the following pairs can be the successive members of a homologous series?

- (a)  $C_3H_8$  and  $C_4H_{10}$   
(b)  $C_2H_2$  and  $C_2H_4$   
(c)  $CH_4$  and  $C_3H_6$   
(d)  $C_2H_5OH$  and  $C_4H_8OH$

[Ans. (a)  $C_3H_8$  and  $C_4H_{10}$ ]

5.  $C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O$  is a

- (a) Reduction of ethanol  
(b) Combustion of ethanol  
(c) Oxidation of ethanoic acid  
(d) Oxidation of ethanal

[Ans. (b) Combustion of ethanol]

6. Rectified spirit is an aqueous solution which contains about \_\_\_\_\_ of ethanol

- (a) 95.5 % (b) 75.5 %  
(c) 55.5 % (d) 45.5 %

[Ans. (a) 95.5 %]

7. Which of the following are used as anaesthetics?

- (a) Carboxylic acids (b) Ethers  
(c) Esters (d) Aldehydes

[Ans. (b) Ethers]

8. TFM in soaps represents \_\_\_\_\_ content in soap

- (a) mineral (b) vitamin  
(c) fatty acid (d) carbohydrate

[Ans. (c) fatty acid]

9. Which of the following statements is wrong about detergents?

- (a) It is a sodium salt of long chain fatty acids  
(b) It is sodium salts of sulphonic acids  
(c) The ionic part in a detergent is  $-SO_3^-Na^+$   
(d) It is effective even in hard water.

[Ans. (a) It is a sodium salt of long chain fatty acids]

II. FILL IN THE BLANKS :

1. An atom or a group of atoms which is responsible for chemical characteristics of an organic compound is called \_\_\_\_\_.

[Ans. functional group]

2. The general molecular formula of alkynes is \_\_\_\_\_

[Ans.  $C_nH_{2n-2}$ ]

3. In IUPAC name, the carbon skeleton of a compound is represented by \_\_\_\_\_ (root word / prefix / suffix)

[Ans. root word]

4. (Saturated / Unsaturated) \_\_\_\_\_ compounds decolourize bromine water.

[Ans. Unsaturated]

5. Dehydration of ethanol by conc. Sulphuric acid forms \_\_\_\_\_ (ethene/ ethane)

[Ans. ethene]

6. 100 % pure ethanol is called \_\_\_\_\_

[Ans. absolute alcohol]

7. Ethanoic acid turns \_\_\_\_\_ litmus to \_\_\_\_\_

[Ans. Blue, Red]

8. The alkaline hydrolysis of fatty acids is termed as \_\_\_\_\_

[Ans. Saponification]

9. Biodegradable detergents are made of \_\_\_\_\_ (branched / straight) chain hydrocarbons

[Ans. straight]

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

1. Which among the following is / are the properties of organic compounds.

- (i) are covalent in nature
- (ii) exhibit isomerism
- (iii) have low melting and boiling point
- (a) (i) and (ii)                      (b) (i) and (iii)
- (c) (i), (ii) and (iii)              (d) only (iii)

[Ans. (c) (i), (ii) and (iii)]

2. Cyclobutane is an example of \_\_\_\_\_ compounds.

- (a) a cyclic                              (b) cyclic
- (c) aromatic                            (d) alicyclic

[Ans. (d) alicyclic]

3. General molecular formula of alkynes is \_\_\_\_\_.

- (a)  $C_nH_{2n+2}$                           (b)  $C_nH_{2n}$
- (c)  $C_nH_{2n-2}$                           (d)  $C_nH_{2n+1}$

[Ans. (c)  $C_nH_{2n-2}$ ]

4. Ethene is an \_\_\_\_\_.

- (a) alkane
- (b) alkene
- (c) alkyze
- (d) aromatic hydrocarbon

[Ans. (b) alkene]

5. Methylene group is

- (a)  $CH_4$                                   (b)  $-CH_3$
- (c)  $-CH_2-$                               (d)  $-CH-$

[Ans. (c)  $-CH_2-$ ]

6. Identify the ketone among the following

- (a)  $CH_3COCH_3$
- (b)  $CH_3CHO$
- (c)  $CH_3COOH$
- (d)  $CH_3COOCH_3$

[Ans. (a)  $CH_3COCH_3$ ]

7. The organic compound contains 2 carbon atoms, the root word according IUPAC is

- (a) Meth -                                  (b) Eth -
- (c) Prop -                                  (d) But -

[Ans. (b) Eth -]

8. According to IUPAC rules, the secondary suffix used to represent carboxylic acids is \_\_\_\_\_.

- (a) al    (b) ol
- (c) ate                                        (d) oic [Ans. (d) oic]

9. The enzymes present in yeast is / are \_\_\_\_\_.

- (a) invertase
- (b) zymase
- (c) both (a) and (b)
- (d) neither (a) nor (b)

[Ans. (c) both (a) and (b)]

10. Rectified spirit contains

- (a) 95.5% of ethanol and 4.5% of water
- (b) 100 % pure alcohol
- (c) 4.5% of ethanol and 95.5% of water
- (d) 50% of ethanal and 50% of water

[Ans. (a) 95.5% of ethanol and 4.5% of water]

11. Alcohols + Acids  $\xrightarrow{\text{conc } H_2SO_4}$  Esters.

This reaction is \_\_\_\_\_.

- (a) Ester hydrolysis                      (b) Esterification
- (c) Dehydrogenation                      (d) Oxidation

[Ans. (b) Esterification]

12. When ethanol reacts with acidified  $K_2Cr_2O_7$ , the orange color of  $K_2Cr_2O_7$  changes to \_\_\_\_\_.

- (a) yellow                                  (b) red
- (c) purple                                    (d) green

[Ans. (d) green]

13. Chemical formula of acetaldehyde is \_\_\_\_\_.

- (a)  $CH_3CHO$                               (b)  $CH_3CH_2OH$
- (c)  $CH_3COOCH_3$                       (d)  $CH_3-O-CH_3$

[Ans. (a)  $CH_3CHO$ ]

14. Ethanol is used as \_\_\_\_\_.

- (a) a preservative for biological specimen
- (b) an antifreeze
- (c) an antiseptic
- (d) all the above

[Ans. (d) all the above]

# UNIT 12

## PLANT ANATOMY AND PLANT PHYSIOLOGY



### CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Casparian strips are present in the \_\_\_\_\_ of the root.

- (a) cortex (b) pith  
(c) pericycle (d) endodermis

[Ans. (d) endodermis]

2. The endarch condition is the characteristic feature of

- (a) root (b) stem  
(c) leaves (d) flower

[Ans. (b) stem]

3. The xylem and phloem arranged side by side on same radius is called \_\_\_\_\_.

- (a) radial (b) amphivasal  
(c) conjoint (d) None of these

[Ans. (c) conjoint]

4. Which is formed during anaerobic respiration

- (a) Carbohydrate (b) Ethyl alcohol  
(c) Acetyl CoA (d) Pyruvate

[Ans. (b) Ethyl alcohol]

5. Krebs's cycle takes place in

- (a) chloroplast  
(b) mitochondrial matrix  
(c) stomata  
(d) inner mitochondrial membrane

[Ans. (d) inner mitochondrial membrane]

6. Oxygen is produced at what point during photosynthesis?

- (a) when ATP is converted to ADP.  
(b) when CO<sub>2</sub> is fixed.  
(c) when H<sub>2</sub>O is splitted.  
(d) All of these.

[Ans. (c) when H<sub>2</sub>O is splitted]

II. FILL IN THE BLANKS :

1. Cortex lies between \_\_\_\_\_.

[Ans. epidermal and vascular tissues]

2. Xylem and phloem occurring on the same radius constitute a vascular bundle called \_\_\_\_\_.

[Ans. conjoint]

3. Glycolysis takes place in \_\_\_\_\_.

[Ans. cytoplasm]

4. The source of O<sub>2</sub> liberated in photosynthesis is \_\_\_\_\_.

[Ans. water]

5. \_\_\_\_\_ is ATP factory of the cells.

[Ans. Mitochondria]

III. STATE WHETHER THE STATEMENTS ARE TRUE OR FALSE. CORRECT THE FALSE STATEMENT :

1. Phloem tissue is involved in the transport of water in plant.

Ans. False.

Correct Statement : Phloem tissue is involved in the transport of food in plant.

2. The waxy protective covering of a plant is called as cuticle.

Ans. True.

3. In monocot stem cambium is present in between xylem and phloem.

Ans. False.

Correct Statement : In dicot stem cambium is present between xylem and phloem.

4. Palisade parenchyma cells occur below upper epidermis in dicot root.

Ans. False.

Correct Statement : Palisade parenchyma cells occur below upper epidermis in dicot leaf.

5. Mesophyll contains chlorophyll.

Ans. True.

6. Anaerobic respiration produces more ATP than aerobic respiration.

Ans. False.

Correct Statement : Aerobic respiration produces more ATP than anaerobic respiration.

- (iii) Water is split during light reaction and oxygen is produced as a by-product. At the same time water is again released as a by-product of dark reaction.
- (iv) Thus many molecules such as ATP, NADPH<sub>2</sub>, water, CO<sub>2</sub> acceptor molecules are recycled during the biochemical pathway of photosynthesis.

2. Where do the light dependent reaction and the Calvin cycle occur in the chloroplast?

- Ans. (i) The light dependent reaction refers to the light reaction of photosynthesis or Hill reaction and occurs in the grana of chloroplast.
- (ii) The Calvin cycle occurs in the stroma of chloroplast.

### ADDITIONAL QUESTIONS AND ANSWERS

#### CHOOSE THE CORRECT ANSWER 1 MARK

1. Amphivasal bundle belongs to \_\_\_\_\_ type of vascular bundle.

- (a) concentric (b) collateral  
(c) conjoint (d) radial

[Ans. (a) concentric]

2. Exarch and tetrarch xylem are a feature of \_\_\_\_\_.

- (a) dicot stem (b) dicot leaf  
(c) monocot root (d) dicot root

[Ans. (d) dicot root]

3. The \_\_\_\_\_ is called starch sheath in a dicot stem.

- (a) epidermis (b) pericycle  
(c) endodermis (d) hypodermis

[Ans. (c) endodermis]

4. Protoxylem lacuna refers to a \_\_\_\_\_.

- (a) thickening (b) arrangement of xylem  
(c) a cavity (d) exarch xylem

[Ans. (c) a cavity]

5. Mitochondria was discovered by \_\_\_\_\_.

- (a) Sachs (b) Kelvin  
(c) Melvin (d) Kolliker

[Ans. (d) Kolliker]

6. \_\_\_\_\_ are racket shaped particles seen in inner mitochondrial membrane.

- (a) Porin (b) ATP  
(c) Oxysome (d) Grana

[Ans. (c) Oxysome]

7. Respiratory quotient for aerobic respiration is \_\_\_\_\_.

- (a) 2 (b) infinity  
(c) 1 (d) 0 [Ans. (c) 1]

8. \_\_\_\_\_ is the outer most layer.

- (a) Stomata  
(b) Epidermis  
(c) Periderm  
(d) Skin

[Ans. (b) Epidermis]

9. \_\_\_\_\_ helps in transpiration.

- (a) Stomata (b) Epidermis  
(c) Trichomes (d) Root hairs

[Ans. (a) Stomata]

10. \_\_\_\_\_ help in absorption of water and minerals.

- (a) Root hairs (b) Stomata  
(c) Epidermis (d) Trichomes

[Ans. (a) Root hairs]

11. \_\_\_\_\_ is the outermost layer of the root.

- (a) Epiblema (b) Cortex  
(c) Endodermis (d) Stele

[Ans. (a) Epiblema]

12. Name the tissue present between the upper and lower epidermis.

- (a) Lower epidermis tissue  
(b) Pith  
(c) Upper epidermis tissue  
(d) Mesophyll

[Ans. (d) Mesophyll]

**7. What is protoxylem lacuna?**

**Ans. Reason :** Xylem vessels are arranged in V or Y shape. In mature vascular bundle, the lower most protoxylem disintegrates and form a cavity. This is called protoxylem lacuna.

**8. How are Plastids classified.**

- Ans. Reason :** There are three types of plastids.
- (i) Chloroplast - green coloured plastids
  - (ii) Chromoplast - yellow, red, orange coloured plastids
  - (iii) Leucoplast - colourless plastids

**SHORT ANSWER QUESTIONS 2 MARKS**

**1. Name the tissue systems as classified by Sachs.**

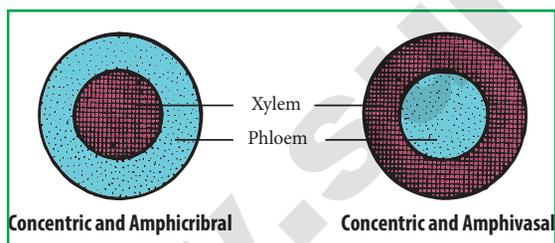
- Ans. (i)** Dermal or Epidermal tissue system  
**(ii)** Ground tissue system  
**(iii)** Vascular tissue system

**2. What are casparian strips?**

**Ans.** The cells of endodermis in roots of show band like thickenings on their radial and inner tangential walls called **casparian strips**.

**3. Draw diagrams to represent the types of concentric vascular bundles.**

**Ans.**



**4. What is starch sheath?**

**Ans.** In a dicot stem endodermis is the inner most layer of cortex. It consists of a single layer of barrel shaped cells, which contain starch grains and is called starch sheath.

**5. What are bulliform cells?**

**Ans.** In monocot leaf some cells of upper epidermis are large and thin walled. They are known as **bulliform cells**.

**6. What are grana?**

- Ans. (i)** In the strong of a chloroplast some of the thylakoids are arranged in the form of discs stacked one above the other.  
**(ii)** These stacks are termed as grana. They are interconnected to each other by membranous lamellae called **Fret channels**.

**7. Name the internal factors affecting photosynthesis.**

- Ans. (i)** Pigments.  
**(ii)** Leaf age.  
**(iii)** Accumulation of carbohydrates.  
**(iv)** Hormones.

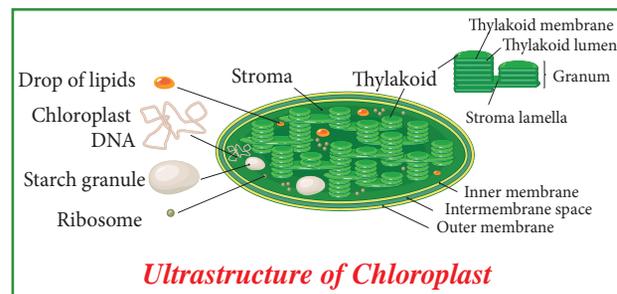
**8. Differentiate Dicot leaf and Monocot leaf.**

**Ans.**

S. No.	Dicot Leaf	Monocot Leaf
1.	Dorsiventral leaf	Isobilateral leaf
2.	Mesophyll is differentiated into palisade and spongy parenchyma.	Mesophyll is not differentiated into palisade and spongy parenchyma.

**9. Draw the ultrastructure of a chloroplast and label the parts.**

**Ans.**



**10. List the functions of chloroplast.**

- Ans. (i)** Photosynthesis.  
**(ii)** Storage of starch.  
**(iii)** Synthesis of fatty acids.  
**(iv)** Storage of lipids.  
**(v)** Formation of chloroplasts.

**11. What is reaction centre in photosynthesis?**

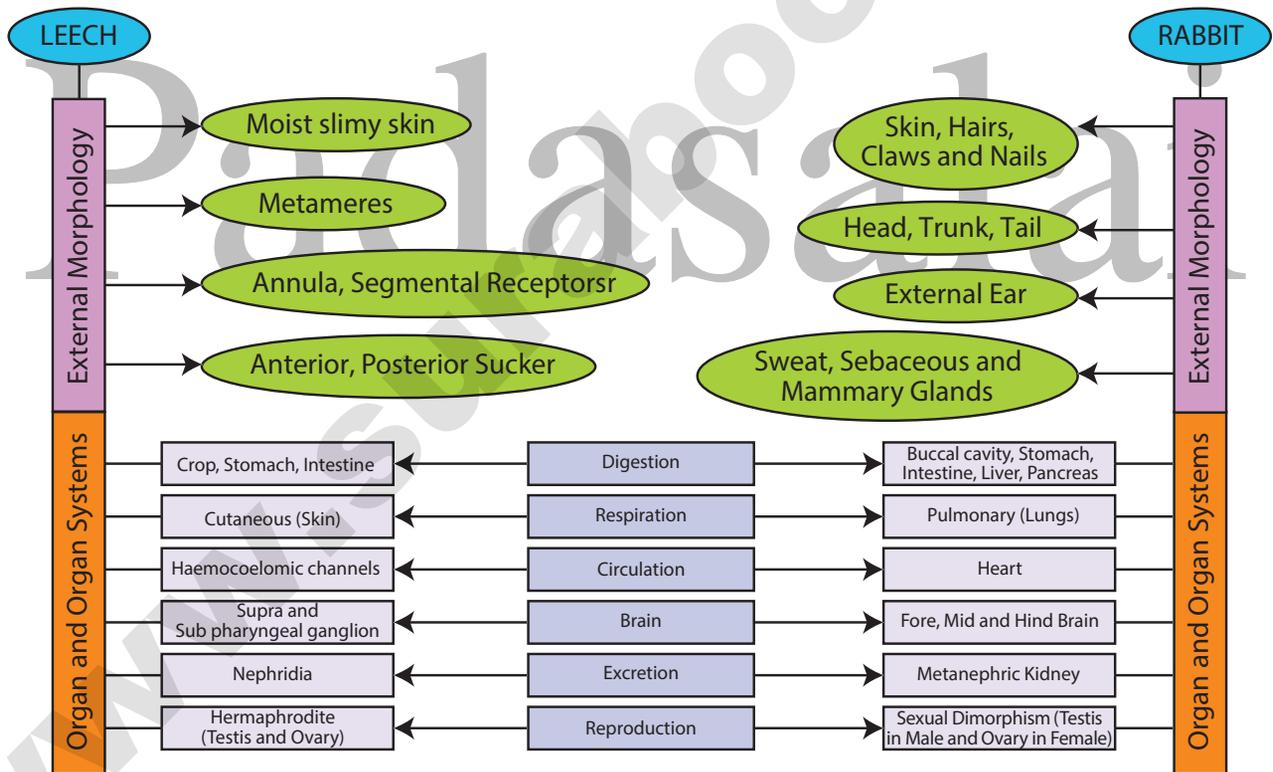
**Ans.** Chlorophyll 'a' is the primary pigment that traps solar energy and converts it into electrical and chemical energy. Thus it is called the reaction centre in photosynthesis.

# UNIT 13

# STRUCTURAL ORGANISATION OF ANIMALS



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

- In leech locomotion is performed by  
(a) Anterior sucker  
(b) Posterior sucker  
(c) Setae  
(d) None of the above  
[Ans. (d) None of the above]
- The segments of leech are known as  
(a) Metamerer (somites) (b) Proglottids  
(c) Strobila (d) All the above  
[Ans. (a) Metamerer (somites)]
- Pharyngeal ganglion in leech is a part of  
(a) Excretory system  
(b) Nervous system  
(c) Reproductive system  
(d) Respiratory system  
[Ans. (b) Nervous system]
- The brain of leech lies above the  
(a) Mouth (b) Buccal Cavity  
(c) Pharynx (d) Crop  
[Ans. (c) Pharynx]
- The body of leech has  
(a) 23 segments (b) 33 segments  
(c) 38 segments (d) 30 segments  
[Ans. (b) 33 segments]
- Mammals are \_\_\_\_\_ animals  
(a) Cold blooded (b) Warm blooded  
(c) Poikilothermic (d) All the above  
[Ans. (b) Warm blooded]
- The animals which give birth to young ones are  
(a) Oviparous (b) Viviparous  
(c) Ovoviviparous (d) All the above  
[Ans. (b) Viviparous]

II. FILL IN THE BLANKS :

- The posterior sucker is formed by the fusion of the \_\_\_\_\_ segments. [Ans. last 7]
- The existence of two sets of teeth in the life of an animal is called \_\_\_\_\_ dentition.  
[Ans. diphyodont]

- The anterior end of leech has a lobe-like structure called \_\_\_\_\_. [Ans. anterior sucker]
- The blood sucking habit of leech is known as \_\_\_\_\_. [Ans. sanguivorous]
- \_\_\_\_\_ separate nitrogenous waste from the blood in rabbit. [Ans. kidney]
- \_\_\_\_\_ spinal nerves are present in rabbit. [Ans. 37 pairs]

III. IDENTIFY WHETHER THE STATEMENTS ARE TRUE OR FALSE. CORRECT THE FALSE STATEMENT :

- An anticoagulant present in saliva of leech is called heparin.  
Ans. False.  
Correct Statement : Anticoagulant present in saliva of leech is called hirudin.
- The vas deferens serves to transport the ovum.  
Ans. False.  
Correct Statement : The vas deferens serves to transport the sperm.
- The rabbit has a third eyelid called tympanic membrane which is movable.  
Ans. False.  
Correct Statement : The rabbit has a third eyelid called nictitating membrane which is movable.
- Diastema is a gap between premolar and molar teeth in rabbit.  
Ans. False.  
Correct Statement : Diastema is a gap between incisors and premolar in rabbit.
- The cerebral hemispheres of rabbit are connected by band of nerve tissue called corpora quadrigemina.  
Ans. False.  
Correct Statement : The cerebral hemispheres of rabbit are connected by a band of nerve tissue called corpus callasum.

#### IV. MATCH COLUMNS I, II AND III

CORRECTLY :

Organs	Membranous covering	Location
Brain	pleura	abdominal cavity
Kidney	capsule	mediastinum
Heart	meninges	enclosed in thoracic cavity
Lungs	pericardium	cranial cavity

Ans.

Organs	Membranous Covering	Location
Brain	meninges	cranial cavity
Kidney	capsule	abdominal cavity
Heart	pericardium	mediastinum
Lungs	pleura	enclosed in thoracic cavity

#### V. ANSWER IN A SENTENCE :

1. Give the common name of the *Hirudinaria granulosa*.

Ans. Indian cattle leech is the common name of *Hirudinaria granulosa*.

2. How does leech respire?

Ans. Leech respire through the skin.

3. Write the dental formula of rabbit.

Ans.  $(I \frac{2}{1}, C \frac{0}{0}, PM \frac{3}{2}, H \frac{3}{3})$ .

4. How many pairs of testes are present in leech?

Ans. 11 pairs of testes are present in leech.

5. How is diastema formed in rabbit?

Ans. The gap between the incisors and premolar is called diastema. It helps in mastication and chewing of food.

6. What organs are attached to the two bronchi?

Ans. Lungs are attached to the two bronchi.

7. Which organ acts as suction pump in leech?

Ans. Muscular pharynx acts as suction pump in leech.

8. What does CNS stand for?

Ans. Central Nervous System.

9. Why is the teeth of rabbit called heterodont?

Ans. Different types of teeth are present. (Incisors, Premolars & Molars). Hence it is called heterodont.

10. How does leech suck blood from the host?

Ans. Muscular pharynx helps the leech to suck blood from the host.

#### VI. SHORT ANSWER QUESTIONS :

1. Why are the rings of cartilages found in trachea of rabbit?

Ans. Trachea is the wind pipe. Tracheal walls are supported by rings of cartilage which help in the free passage of air.

2. List out the parasitic adaptations in leech.

Ans. Leeches lead a parasitic mode of life by sucking the blood of vertebrates, and show several important modifications in their structure.

- Blood is sucked by pharynx.
- Anterior and posterior ends of the body are provided with suckers by which the animal attaches itself to the body of the host.
- The three jaws inside the mouth, causes a painless Y-shaped wound in the skin of the host.
- The salivary glands produce hirudin which does not allow the blood to coagulate. Thus, a continuous supply of the blood is maintained.
- Parapodia and setae are completely absent
- Blood is stored in the crop. It gives nourishment to the leech for several months.

#### VII. LONG ANSWER QUESTIONS :

1. How is the circulatory system designed in leech to compensate the heart structure?

- Ans. (i) In leech, circulation is brought about by **haemocoelic system**.
- (ii) There are no true blood vessels. The blood vessels are replaced by channels called **haemocoelic channels or canals** filled with blood-like fluid. The coelomic fluid contains haemoglobin.

- (ii) Digestion takes place in stomach by the action of **proteolytic enzyme**. The digested food is then absorbed slowly by the intestine.
- (iii) Blood is stored in the crop. It gives nourishment to the leech for several months.
- (iv) Due to this reason there is no elaborate secretion of the digestive juices and enzymes.

**2. How is the digestive system of rabbit suited for herbivorous mode of feeding?**

- Ans. (i)** The digestive system of rabbit includes the alimentary canal and digestive gland.
- (ii)** The alimentary canal consists of mouth, buccal cavity, pharynx, oesophagus, stomach, small intestine, caecum, large intestine and anus. The digestive system is suited to the herbivorous mode of nutrition seen in rabbit.

- (iii) Caecum is a thin walled sac present at the junction of small intestine and large intestine. It contains bacteria that helps in digestion of cellulose.
- (iv) In rabbit the teeth are of different types. Hence, the dentition is called heterodont.
- (v) There are four kinds of teeth in mammals viz. the Incisors (I), Canines (C), Premolars (PM) and Molars (M). This is expressed in the form of a dental formula.
- (vi) There are three kinds of teeth in rabbits.
- (vii) In rabbit it is written as  $\frac{2033}{1023}$  Canines are absent. The gap between the incisors and premolar is called **diastema**. It helps in mastication and chewing of food in herbivorous animals.

**ADDITIONAL QUESTIONS AND ANSWERS**

**CHOOSE THE CORRECT ANSWER 1 MARK**

- 1. Leeches have \_\_\_\_\_.**  
(a) heart (b) lungs  
(c) true blood vessels (d) excretory organs  
**[Ans. (d) excretory organs]**
- 2. In leeches there are \_\_\_\_\_ pairs of nephridia.**  
(a) 18 (b) 15 (c) 17 (d) 12  
**[Ans. (c) 17]**
- 3. In leeches sperms are stored in**  
(a) epididymis (b) vas deferens  
(c) testis (d) ejaculatory duct  
**[Ans. (a) epididymis]**
- 4. The ovaries of leech lies in the \_\_\_\_\_ segment.**  
(a) 10<sup>th</sup> (b) 11<sup>th</sup> (c) 13<sup>th</sup> (d) 15<sup>th</sup>  
**[Ans. (b) 11<sup>th</sup>]**

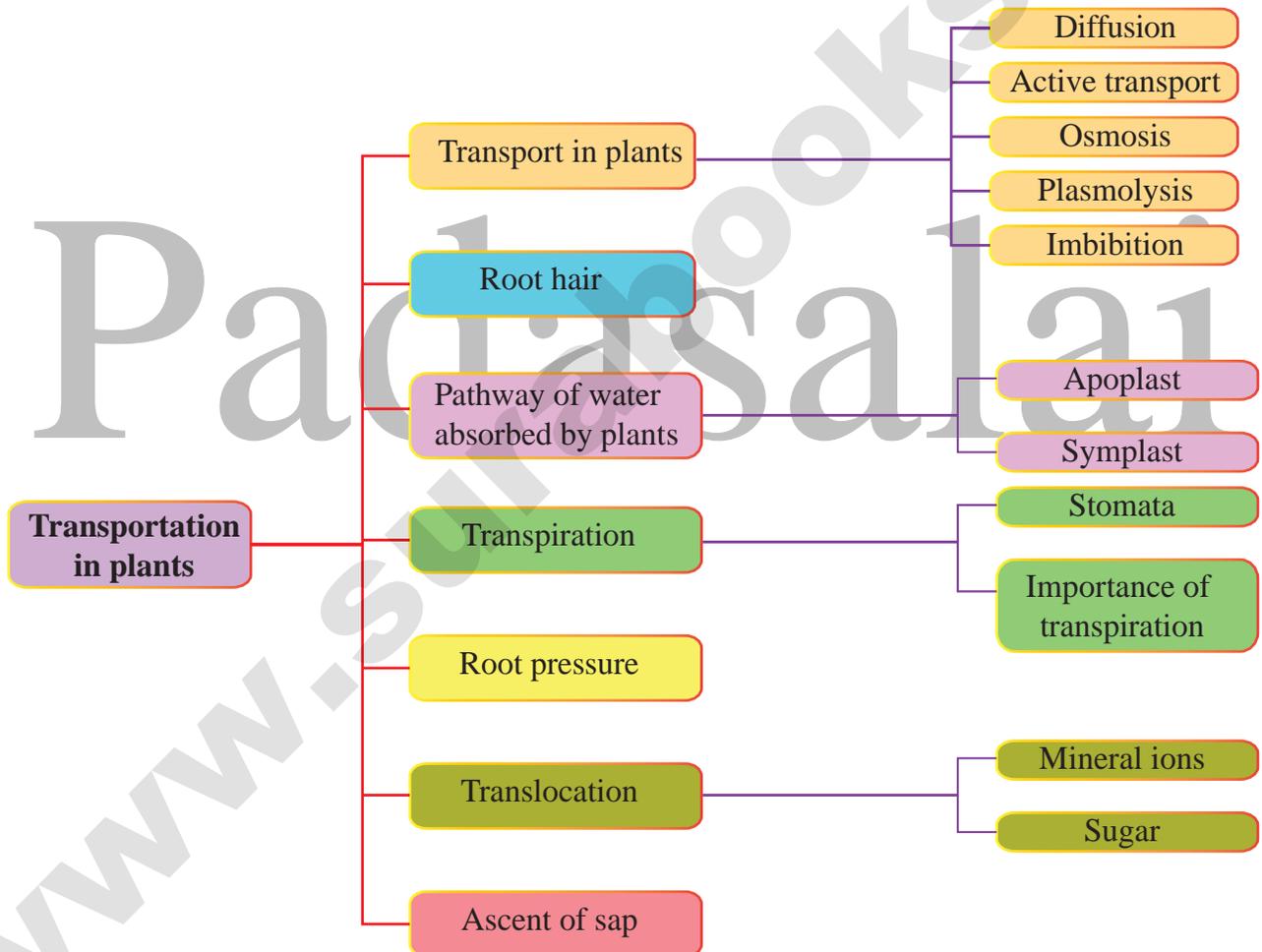
- 5. The number of cranial and spinal nerves in rabbit are \_\_\_\_\_ respectively.**  
(a) 11 and 36  
(b) 12 and 37  
(c) 12 and 36  
(d) 10 and 37  
**[Ans. (b) 12 and 37]**
- 6. The urinogenital canal of female rabbit is formed by union of \_\_\_\_\_.**  
(a) urethra and vagina  
(b) urinary bladder and urethra  
(c) cowper's gland and urinary bladder  
(d) urinary bladder and vagina  
**[Ans. (d) urinary bladder and vagina]**
- 7. The \_\_\_\_\_ glands are modified glands of the skin.**  
(a) perineal (b) mammary  
(c) gastric (d) salivary  
**[Ans. (b) mammary]**

# UNIT 14

## TRANSPORTATION IN PLANTS AND CIRCULATION IN ANIMALS



### CONCEPT MAP



TEXTBOOK EVALUATION

**I. CHOOSE THE CORRECT ANSWER :**

- 1. Active transport involves**  
 (a) movement of molecules from lower to higher concentration  
 (b) expenditure of energy  
 (c) it is an uphill task  
 (d) all of the above

[Ans. (d) all of the above]

- 2. Water which is absorbed by roots is transported to aerial parts of the plant through**

- (a) cortex (b) epidermis  
 (c) phloem (d) xylem

[Ans. (d) xylem]

- 3. During transpiration there is loss of**

- (a) carbon dioxide (b) oxygen  
 (c) water (d) none of the above

[Ans. (c) water]

- 4. Root hairs are**

- (a) cortical cell  
 (b) projection of epidermal cell  
 (c) unicellular  
 (d) both b and c

[Ans. (d) both b and c]

- 5. Which of the following process requires energy?**

- (a) active transport (b) diffusion  
 (c) osmosis (d) all of them

[Ans. (a) active transport]

- 6. The wall of human heart is made of**

- (a) Endocardium (b) Epicardium  
 (c) Myocardium (d) All of the above

[Ans. (d) All of the above]

- 7. Which is the sequence of correct blood flow**

- (a) ventricle - atrium - vein - arteries  
 (b) atrium - ventricle - veins - arteries  
 (c) atrium - ventricle - arteries - vein  
 (d) ventricles - vein - atrium - arteries

[Ans. (c) atrium - ventricle - arteries - vein]

- 8. A patient with blood group O was injured in an accident and has lost blood. Which blood group the doctor should effectively use for transfusion in this condition?**

- (a) O group (b) AB group  
 (c) A or B group (d) all blood group

[Ans. (a) O group]

- 9. 'Heart of heart' is called**

- (a) SA node (b) AV node  
 (c) Purkinje fibres (d) Bundle of His

[Ans. (a) SA node]

- 10. Which one of the following regarding blood composition is correct**

- (a) Plasma - Blood + Lymphocyte  
 (b) Serum - Blood + Fibrinogen  
 (c) Lymph - Plasma + RBC + WBC  
 (d) Blood - Plasma + RBC + WBC + Platelets

[Ans. (d) Blood - Plasma + RBC + WBC + Platelets]

**II. FILL IN THE BLANKS :**

- 1.** \_\_\_\_\_ involves evaporative loss of water from aerial parts. [Ans. Transpiration]

- 2.** Water enters the root cell through a \_\_\_\_\_ plasma membrane. [Ans. root hair]

- 3.** Structures in roots that help to absorb water are \_\_\_\_\_. [Ans. root hairs]

- 4.** Normal blood pressure is \_\_\_\_\_. [Ans.  $\frac{120}{80}$  mm Hg]

- 5.** The normal human heartbeat rate is about \_\_\_\_\_ time per minute. [Ans. 72]

**III. MATCH THE FOLLOWING :**

*Section I*

1.	Symplastic pathway	-	Leaf
2.	Transpiration	-	Plasmodesmata
3.	Osmosis	-	Pressure in xylem
4.	Root pressure	-	Pressure gradient

## ADDITIONAL QUESTIONS AND ANSWERS

### CHOOSE THE CORRECT ANSWER 1 MARKS

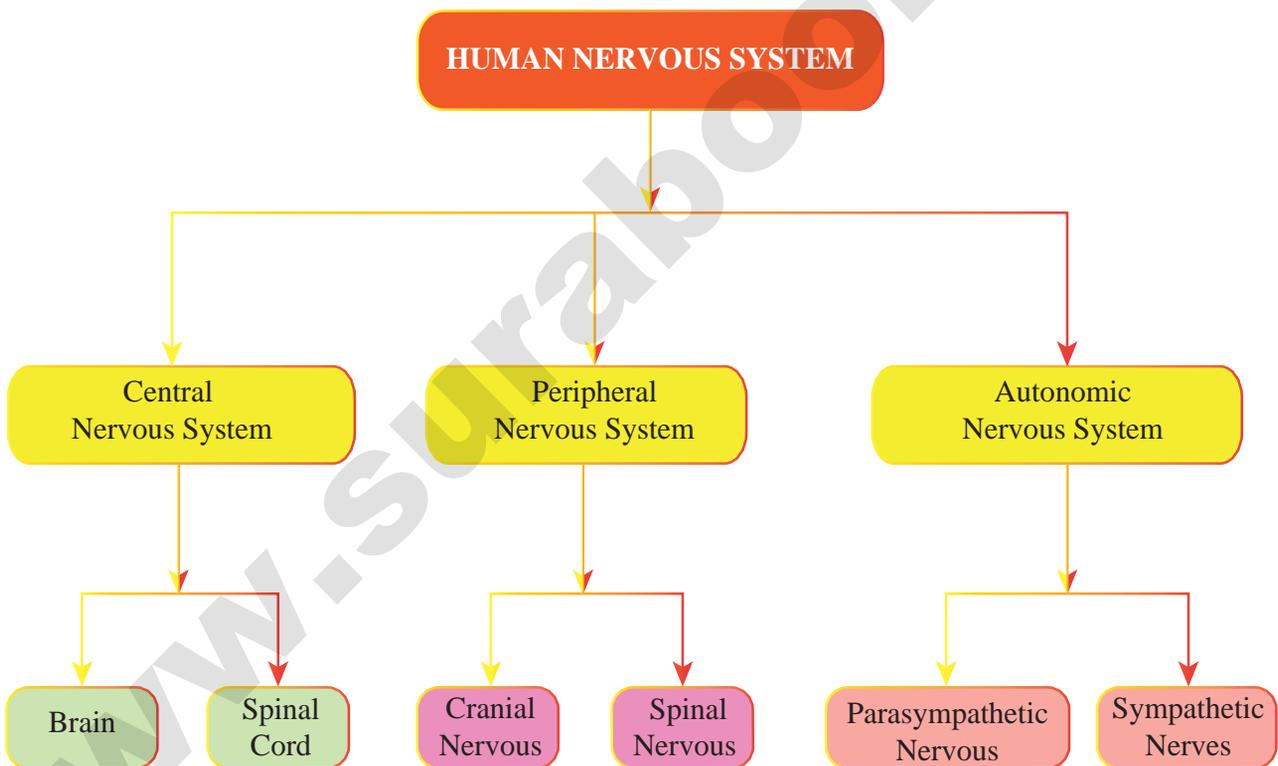
1. Persons with \_\_\_\_\_ blood group can receive blood from 'AB' group individuals.  
(a) 'A' only (b) B only  
(c) AB and O (d) A, B, AB and O  
[Ans. (d) A,B, AB and O]
2. The number of \_\_\_\_\_ increases during allergy.  
(a) Basophil (b) RBC  
(c) Eosinophil (d) Monocyte  
[Ans. (c) Eosinophil]
3. The \_\_\_\_\_ are also called polymorpho nuclear leucocytes.  
(a) eosinophil (b) thrombocyte  
(c) neutrophil (d) lymphocyte  
[Ans. (c) neutrophil]
4. The \_\_\_\_\_ are the largest of leucocytes.  
(a) neutrophil (b) monocyte  
(c) basophil (d) lymphocyte  
[Ans. (b) monocyte]
5. The life span of platelets is \_\_\_\_\_.  
(a) 3 weeks (b) 1 month  
(c) 2-3 days (d) 40 days  
[Ans. (c) 2-3 days]
6. \_\_\_\_\_ is not a feature of veins.  
(a) Red in colour (b) Non-elastic walls  
(c) Lack internal valves  
(d) Blood flow with low pressure  
[Ans. (c) Lack internal valves]
7. Angiology is the study of \_\_\_\_\_.  
(a) heart (b) heart attack  
(c) blood vessels  
(d) diseases of blood [Ans. (c) blood vessels]
8. Two chambered heart is seen in \_\_\_\_\_.  
(a) fish (b) amphibian  
(c) reptiles (d) mammals  
[Ans. (a) fish]
9. \_\_\_\_\_ is not a feature of osmosis.  
(a) Semi permeable membrane  
(b) Movement of solvent  
(c) Both a and b  
(d) Involves energy  
[Ans. (d) Involves energy]
10. Absorption of water by modern frames of windows in rainy reason is an example of \_\_\_\_\_.  
(a) diffusion (b) osmosis  
(c) imbibition (d) transpiration  
[Ans. (c) imbibition]
11. Salt added to pickles brings about \_\_\_\_\_.  
(a) diffusion (b) plasmolysis  
(c) imbibition (d) translocation  
[Ans. (b) plasmolysis]
12. Transpiration does not \_\_\_\_\_.  
(a) help in ascent of sap  
(b) help in keeping cells turgid  
(c) helps in cooling leaves  
(d) helps in translocation  
[Ans. (d) helps in translocation]
13. Identify the wrong statement.  
(a) Guttation occurs through stomata.  
(b) Water molecules stick to xylem because of adhesion.  
(c) Stoma closes when guard cells are not turgid.  
(d) Elements like calcium are not remobilised.  
[Ans. (a) Guttation occurs through stomata]
14. By active transport \_\_\_\_\_ moves into the cells where it is utilised or stored.  
(a) glucose (b) sucrose  
(c) fructose (d) water  
[Ans. (b) sucrose]
15. Water from soil enters the root hairs due to \_\_\_\_\_.  
(a) capillary Action (b) cohesion  
(c) adhesion (d) osmosis  
[Ans. (d) osmosis]

# UNIT 15

# NERVOUS SYSTEM



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Bipolar neurons are found in

- (a) retina of eye
- (b) cerebral cortex
- (c) embryo
- (d) respiratory epithelium

[Ans. (a) retina of eye]

2. Site for processing of vision, hearing, memory, speech, intelligence and thought is

- (a) kidney
- (b) ear
- (c) brain
- (d) lungs

[Ans. (c) brain]

3. In reflex action, the reflex arc is formed by

- (a) brain, spinal cord, muscle
- (b) receptor, muscle, spinal cord
- (c) muscle, receptor, brain
- (d) receptor, spinal cord, muscle

[Ans. (d) receptor, spinal cord, muscle]

4. Dendrites transmit impulse \_\_\_\_\_ cell body and axon transmit impulse \_\_\_\_\_ cell body.

- (a) away from, away from
- (b) towards, away from
- (c) towards, towards
- (d) away from, towards

[Ans. (b) towards, away from]

5. The outer most of the three cranial meninges is

- (a) arachnoid membrane
- (b) piamater
- (c) duramater
- (d) myelin sheath

[Ans. (c) duramater]

6. There are \_\_\_\_\_ pairs of cranial nerves and \_\_\_\_\_ pairs of spinal nerves.

- (a) 12, 31
- (b) 31, 12
- (c) 12, 13
- (d) 12, 21

[Ans. (a) 12, 31]

7. The neurons which carries impulse from the central nervous system to the muscle fibre.

- (a) afferent neurons
- (b) association neuron
- (c) efferent neuron
- (d) unipolar neuron

[Ans. (c) efferent neuron]

8. Which nervous band connects the two cerebral hemispheres of brain?

- (a) thalamus
- (b) hypothalamus
- (c) corpus callosum
- (d) pons

[Ans. (c) corpus callosum]

9. Node of Ranvier is found in

- (a) muscles
- (b) axons
- (c) dendrites
- (d) cyton

[Ans. (b) axons]

10. Vomiting centre is located in

- (a) medulla oblongata
- (b) stomach
- (c) cerebrum
- (d) hypothalamus

[Ans. (a) medulla oblongata]

11. Nerve cells do not possess

- (a) neurilemma
- (b) sarcolemma
- (c) axon
- (d) dendrites

[Ans. (b) sarcolemma]

12. A person who met with an accident lost control of body temperature, water balance, and hunger. Which of the following part of brain is supposed to be damaged?

- (a) Medulla oblongata
- (b) cerebrum
- (c) pons
- (d) hypothalamus

[Ans. (d) hypothalamus]

II. FILL IN THE BLANKS :

1. \_\_\_\_\_ is the longest cell in our body.

[Ans. Neuron]

2. Impulses travels rapidly in \_\_\_\_\_ neurons.

[Ans. multipolar]

3. A change in the environment that causes an animal to react is called \_\_\_\_\_.

[Ans. stimulus]

4. \_\_\_\_\_ carries the impulse towards the cell body.

[Ans. Dendrite]

5. The two antagonistic component of autonomic nervous system are \_\_\_\_\_ and \_\_\_\_\_.

[Ans. sympathetic nerves, para sympathetic nerves]

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

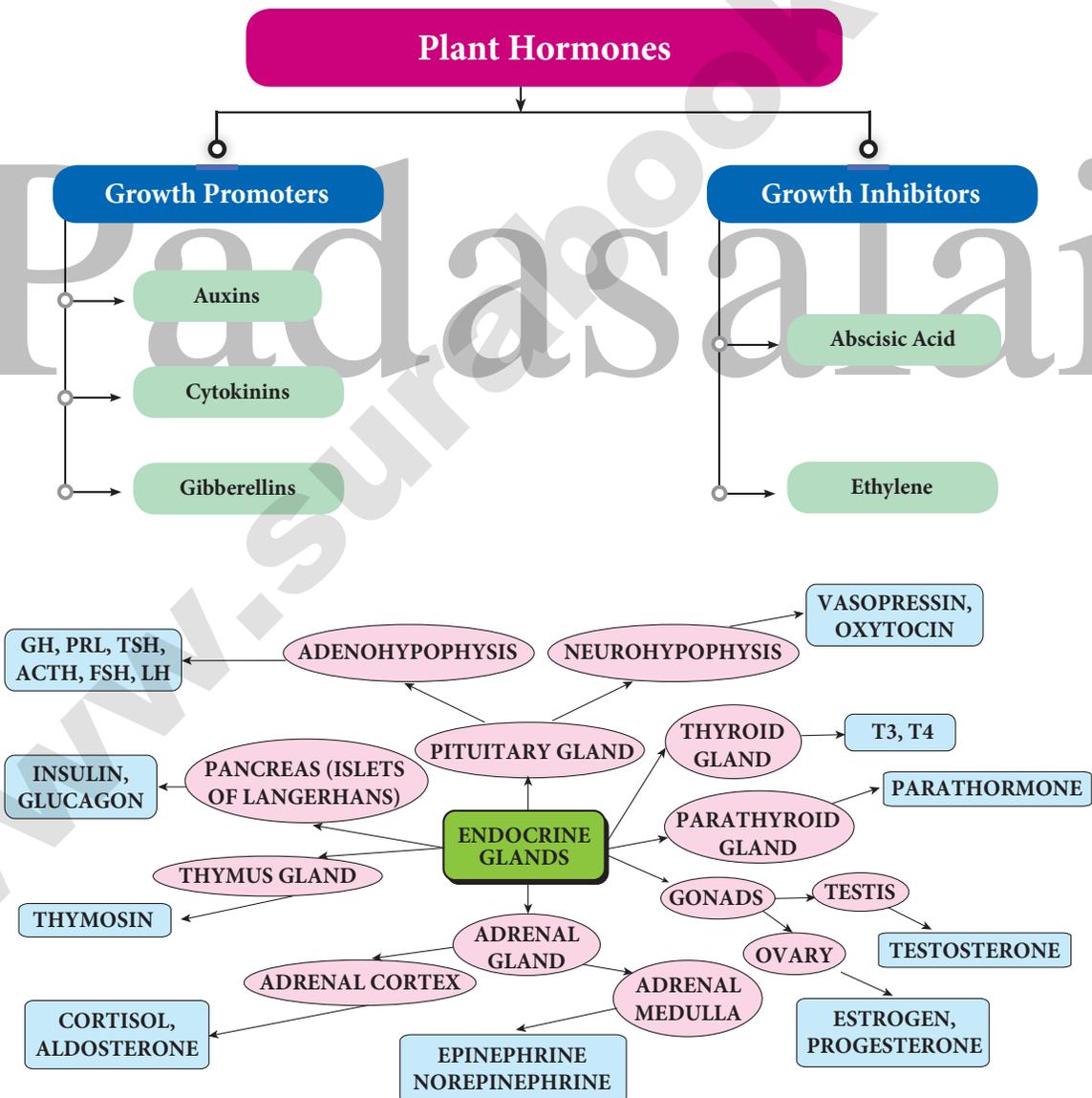
1. The autonomic nervous system is regulated by \_\_\_\_\_ of brain.  
(a) cerebrum (b) pons  
(c) hypothalamus (d) medulla  
[Ans. (c) hypothalamus]
2. Sneezing, yawning etc are examples of \_\_\_\_\_.  
(a) voluntary actions  
(b) involuntary actions  
(c) reflex actions  
(d) planned actions  
[Ans. (c) reflex actions]
3. The \_\_\_\_\_ has a role in sleep cycle.  
(a) cerebrum (b) spinal cord  
(c) pons (d) hypothalamus  
[Ans. (c) pons]
4. \_\_\_\_\_ is not a characteristic of neuron.  
(a) dendrites (b) axon  
(c) axolemma (d) can divide  
[Ans. (d) can divide]
5. The \_\_\_\_\_ is the second largest part of the brain.  
(a) cerebrum (b) medulla  
(c) cerebellum (d) pons  
[Ans. (c) cerebellum]
6. \_\_\_\_\_ is the longest cell of the human body.  
(a) Neuron (b) Neuroglia  
(c) Nerve fibres (d) Cyton  
[Ans. (a) Nerve fibres]
7. Neuroglia are also called as \_\_\_\_\_.  
(a) nerve fibres (b) glial cells  
(c) neuron (d) nerve cell  
[Ans. (b) glial cells]
8. Cyton is also called cell body or \_\_\_\_\_.  
(a) axon (b) perikaryon  
(c) neuroglia (d) neuron  
[Ans. (b) perikaryon]
9. The cytoplasm has granular body called \_\_\_\_\_.  
(a) nissl's granules  
(b) nerve fibres  
(c) glial cells  
(d) nerve cells  
[Ans. (a) nissl's granules]
10. Neurons do not have the ability to \_\_\_\_\_.  
(a) multiply (b) divide  
(c) regenerate (d) receive  
[Ans. (b) divide]
11. The plasma membrane of axon is called \_\_\_\_\_.  
(a) axolemma  
(b) axoplasm  
(c) myelin sheath  
(d) schwann cells  
[Ans. (a) axolemma]
12. The axons may be covered by a protective sheath called \_\_\_\_\_.  
(a) Myelin (b) Nodes of ranvier  
(c) Schwann cells (d) Nissl's granules  
[Ans. (a) Myelin]
13. \_\_\_\_\_ acts as an insulator.  
(a) myelin sheath (b) synaptic junction  
(c) nodes of ranvier (d) glial cells  
[Ans. (a) myelin sheath]
14. \_\_\_\_\_ carry impulses from the sense organ to the central nervous system.  
(a) unipolar neurons (b) efferent neurons  
(c) motor neurons (d) sensory neurons  
[Ans. (d) sensory neurons]
15. Each neuron can transmit \_\_\_\_\_ nerve impulses per second.  
(a) 2000 (b) 3000  
(c) 1000 (d) 5000  
[Ans. (c) 1000]
16. The \_\_\_\_\_ is the controlling centre of all the body activities.  
(a) heart (b) brain  
(c) kidney (d) liver  
[Ans. (b) brain]

# UNIT 16

# PLANT AND ANIMAL HORMONES



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Gibberellins cause :

- (a) Shortening of genetically tall plants
- (b) Elongation of dwarf plants
- (c) Promotion of rooting
- (d) Yellowing of young leaves

[Ans. (b) Elongation of dwarf plants]

2. The hormone which has positive effect on apical dominance is :

- a) Cytokinin
- b) Auxin
- c) Gibberellin
- d) Ethylene

[Ans. (b) Auxin]

3. Which one of the following hormones is naturally not found in plants :

- a) 2, 4 - D
- b) GA3
- c) Gibberellin
- d) IAA

[Ans. (a) 2, 4 - D]

4. Avena coleoptile test was conducted by

- a) Darwin
- b) N. Smit
- c) Paal
- d) F.W. Went

[Ans. (d) F.W. Went]

5. To increase the sugar production in sugarcanes they are sprayed with \_\_\_\_\_.

- a) Auxin
- b) Cytokinin
- c) Gibberellins
- d) Ethylene

[Ans. (d) Ethylene]

6. LH is secreted by

- a) Adrenal gland
- b) Thyroid gland
- c) Anterior pituitary
- d) Hypothalamus

[Ans. (c) Anterior pituitary]

7. Identify the exocrine gland

- a) Pituitary gland
- b) Adrenal gland
- c) Salivary gland
- d) Thyroid gland

[Ans. (c) Salivary gland]

8. Which organ acts as both exocrine gland as well as endocrine gland

- a) Pancreas
- b) Kidney
- c) Liver
- d) Lungs

[Ans. (a) Pancreas]

9. Which one is referred as "Master Gland"?

- a) Pineal gland
- b) Pituitary gland
- c) Thyroid gland
- d) Adrenal gland

[Ans. (b) Pituitary gland]

II. FILL IN THE BLANKS :

1. \_\_\_\_\_ causes cell elongation, apical dominance and prevents abscission.

[Ans. Auxin]

2. \_\_\_\_\_ is a gaseous hormone involved in abscission of organs and acceleration of fruit ripening.

[Ans. Ethylene]

3. \_\_\_\_\_ causes stomatal closure.

[Ans. Abscissic acid]

4. Gibberellins induce stem elongation in \_\_\_\_\_ plants.

[Ans. rosette]

5. The hormone which has negative effect on apical dominance is \_\_\_\_\_.

[Ans. cytokinin]

6. Calcium metabolism of the body is controlled by \_\_\_\_\_.

[Ans. parathormone]

7. In the Islets of Langerhans, beta cells secrete \_\_\_\_\_.

[Ans. insulin]

8. The growth and functions of thyroid gland is controlled by \_\_\_\_\_.

[Ans. thyroid stimulating hormone]

9. Decreased secretion of thyroid hormones in the children leads to \_\_\_\_\_.

[Ans. cretinism]

III. MATCH THE FOLLOWING :

a) Match Column I with Columns II and III :

Column I	Column II	Column III
Auxin	<i>Gibberella fujikuroi</i>	Abscission
Ethylene	Coconut milk	Internodal elongation
Abscissic acid	Coleoptile tip	Apical dominance
Cytokinin	Chloroplast	Ripening
Gibberellins	Fruits	Cell division

3. Senthil has high blood pressure, protruded eyeball and an increased body temperature. Name the endocrine gland involved and hormone secretion responsible for this condition.

**Ans.** Endocrine gland – Thyroid gland.  
Hormone – Thyroxine (Excess secretion).

4. Sanjay is sitting in the exam hall. Before the start of the exam, he sweats a lot, with increased rate of heart beat. Why does this condition occur?

**Ans.** Sanjay is sitting in the exam hall. He is tensed about the exam and is worried. In stressful situation, the hormone Adrenaline is produced by Adrenal gland. It helps the body to handle stressful situations as follows and is produced during conditions of stress and emotion.

- (i) It increases heart beat and blood pressure.
  - (ii) It decreases blood flow through the skin.
- Thus Sanjay sweats a lot and has increased rate of heart beat.

5. Susan's father feels very tired and frequently urinates. After clinical diagnosis he was advised to take an injection daily to maintain his blood glucose level. What would be the possible cause for this? Suggest preventive measures.

- Ans.**
- (i) Susans' father must be suffering from Diabetes mellitus.
  - (ii) Due to deficiency of the hormone insulin produced by the pancreas his blood sugar level would have increased.
  - (iii) Therefore he would have been advised to take insulin injection daily to maintain his blood glucose level.
  - (iv) Frequent urination is a symptom of the disease and excess glucose is also lost from the body through urine. Therefore he would feel tired.

**Preventive measures for Diabetes Mellitus :**

- (i) Intake of foods rich in protein and avoid sugary foods like fruit juices, fruits, starchy vegetables.
  - (ii) Regular physical exercise.
- Intake of whole grains and wheat based products.

**ADDITIONAL QUESTIONS AND ANSWERS**

**CHOOSE THE CORRECT ANSWER 1 MARK**

1. The term Auxin was introduced by \_\_\_\_\_.

- (a) Went (b) Kogl
- (c) Charles Darwin (d) Kurosawa

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

2. Auxins were identified by \_\_\_\_\_.

- (a) Darwin (b) Kogl
- (c) Went (d) Funk

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

3. \_\_\_\_\_ is essential for Morphogenesis.

- (a) Auxin and Gibberellin
- (b) Ethylene
- (c) Auxin and Cytokinin
- (d) Cytokinin and Abscissic acid

**[Ans. (c) Auxin and Cytokinin]**

4. \_\_\_\_\_ is a powerful inhibitor of lateral bud growth in Tomato.

- (a) Auxin (b) Cytokinin
- (c) ABA (d) Ethylene

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

5. \_\_\_\_\_ induces bud dormancy towards approach of winter in trees.

- (a) Auxin (b) Ethylene
- (c) ABA (d) Cytokinin

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

6. \_\_\_\_\_ is a growth inhibitor.

- (a) Auxin (b) GA
- (c) Cytokinin (d) Ethylene

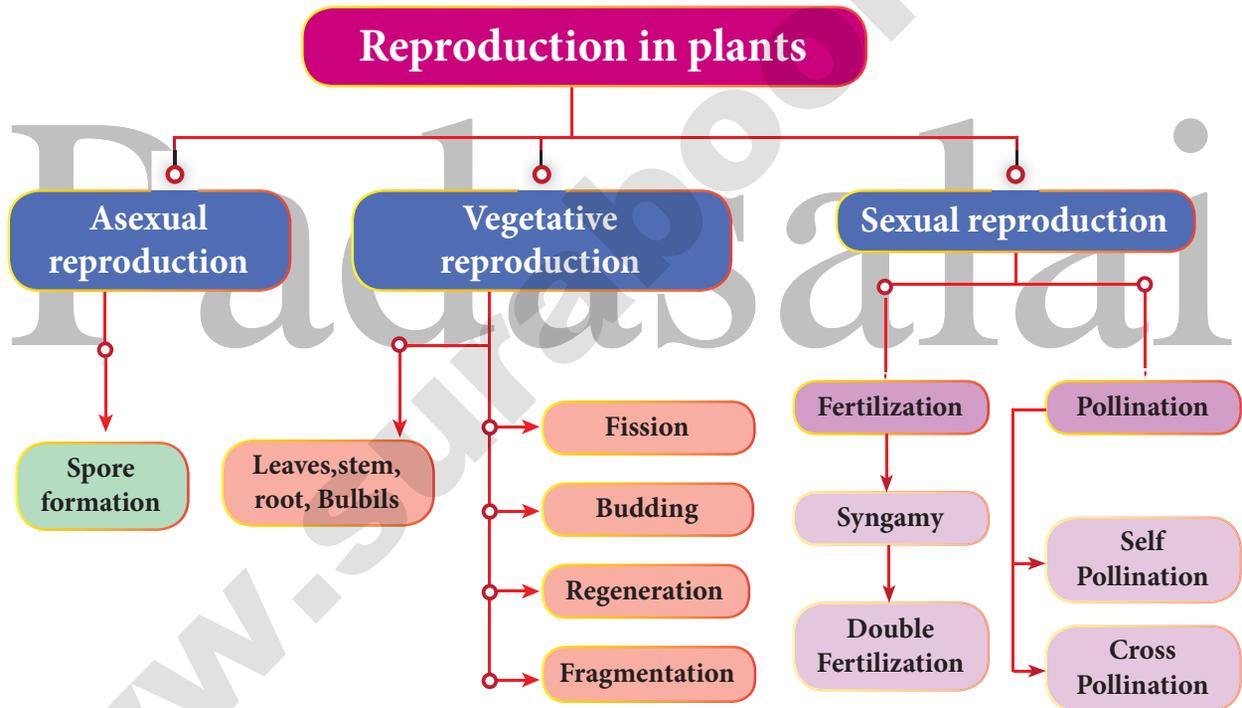
**[Ans. (d) Ethylene]**

# UNIT 17

## REPRODUCTION IN PLANTS AND ANIMALS



### CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. The plant which propagates with the help of its leaves is \_\_\_\_\_ .

- (a) Onion (b) Neem  
(c) Ginger (d) *Bryophyllum*

[Ans. (d) *Bryophyllum*]

2. Asexual reproduction takes place through budding in \_\_\_\_\_ .

- (a) *Amoeba* (b) Yeast  
(c) *Plasmodium* (d) Bacteria

[Ans. (b) Yeast]

3. Syngamy results in the formation of \_\_\_\_\_ .

- (a) Zoospores (b) Conidia  
(c) Zygote (d) Chlamydozoospores

[Ans. (c) Zygote]

4. The essential parts of a flower are \_\_\_\_\_ .

- (a) Calyx and Corolla  
(b) Calyx and Androecium  
(c) Corolla and Gynoecium  
(d) Androecium and Gynoecium

[Ans. (d) Androecium and Gynoecium]

5. Anemophilous flowers have \_\_\_\_\_ .

- (a) Sessile stigma  
(b) Small smooth stigma  
(c) Colored flower  
(d) Large feathery stigma

[Ans. (d) Large feathery stigma]

6. Male gametes in angiosperms are formed by the division of \_\_\_\_\_ .

- (a) Generative cell  
(b) Vegetative cell  
(c) Microspore mother cell  
(d) Microspore

[Ans. (a) Generative cell]

7. What is true of gametes?

- (a) They are diploid.  
(b) They give rise to gonads.  
(c) They produce hormones.  
(d) They are formed from gonads.

[Ans. (d) They are formed from gonads]

8. A single highly coiled tube where sperms are stored, get concentrated and mature is known as

- (a) Epididymis  
(b) Vasa efferentia  
(c) Vas deferens  
(d) Seminiferous tubules

[Ans. (a) Epididymis]

9. The large elongated cells that provide nutrition to developing sperms are

- (a) Primary germ cells (b) Sertoli cells  
(c) Leydig cells (d) Spermatogonia

[Ans. (b) Sertoli cells]

10. Estrogen is secreted by

- (a) Anterior pituitary (b) Primary follicle  
(c) Graffian follicle (d) Corpus luteum

[Ans. (c) Graffian follicle]

11. Which one of the following is an IUCD?

- (a) Copper - T (b) Oral pills  
(c) Diaphragm (d) Tubectomy

[Ans. (a) Copper - T]

II. FILL IN THE BLANKS :

1. The embryo sac in a typical dicot at the time of fertilization is \_\_\_\_\_ . [Ans. 7 celled]

2. After fertilization the ovary develops into \_\_\_\_\_ . [Ans. fruit]

3. *Planaria* reproduces asexually by \_\_\_\_\_ . [Ans. Regeneration]

4. Fertilization is \_\_\_\_\_ in humans. [Ans. Internal]

5. The implantation of the embryo occurs at about \_\_\_\_\_ day of fertilization. [Ans. 7<sup>th</sup>]

6. \_\_\_\_\_ is the first secretion from the mammary gland after child birth. [Ans. Colostrum]

7. Prolactin is a hormone produced by \_\_\_\_\_ . [Ans. pituitary gland]

(c) Do you think that Rahini's objection towards her parents was correct? If so, Why?

**Ans. (a) Menarche :** It occurs at the age of 11 - 13 years.

**(b) Napkin hygiene :** The parents and teachers are to create awareness among the school girls about the use of napkins and their proper disposal. Girls should be educated in the following ways :

1. The sanitary pad and tampons should be wrapped properly and discarded because they can spread infections.

2. Sanitary pad or tampon should not be flushed down the toilet.

3. Napkin incinerators are to be used properly for disposal of used napkins.

**(c)** Yes, her objection was right. The advertisements create awareness. Thus by watching such advertisements girls and their parents will gain knowledge about such products and their usage.

### ADDITIONAL QUESTIONS AND ANSWERS

#### CHOOSE THE CORRECT ANSWER 1 MARK

1. Fragmentation is seen in \_\_\_\_\_.

- (a) Spirogyra (b) *Bryophyllum*  
(c) Yeast (d) *Hydra*

[Ans. (a) Spirogyra]

2. Regeneration is seen in \_\_\_\_\_.

- (a) Plasmodium (b) Spirogyra  
(c) *Hydra* (d) Amoeba

[Ans. (c) *Hydra*]

3. The pollen is produced in \_\_\_\_\_.

- (a) Filament (b) Anther  
(c) Ovule (d) Stigma

[Ans. (b) Anther]

4. There are \_\_\_\_\_ polar nuclei in the embryo sac.

- (a) 2 (b) 3 (c) 4 (d) 1

[Ans. (a) 2]

5. After fertilization the \_\_\_\_\_ disintegrates.

- (a) Ovule (b) Polar nuclei  
(c) Antipodals (d) Endosperm

[Ans. (c) Antipodals]

6. Endometrium is prepared for implantation in \_\_\_\_\_.

- (a) Follicular phase (b) Ovulatory phase  
(c) Luteal phase (d) Menstrual phase

[Ans. (c) Luteal phase]

7. \_\_\_\_\_ takes place after implantation.

- (a) Cleavage (b) Fertilization  
(c) Gastrulation (d) Organogenesis

[Ans. (c) Gastrulation]

8. \_\_\_\_\_ from anterior pituitary stimulates milk secretion

- (a) Oxytocin (b) Prolactin  
(c) Progesterone (d) Oestrogen

[Ans. (b) Prolactin]

9. Pollination with the help of insects like honey bees, flies are called \_\_\_\_\_.

- (a) Entomophily (b) Anemophily  
(c) Hydrophily (d) Zoophily

[Ans. (a) Entomophily]

10. Approximately \_\_\_\_\_ of the pollination done by the insects is carried by honey bees.

- (a) 70% (b) 80%  
(c) 50% (d) 60%

[Ans. (b) 80%]

11. \_\_\_\_\_ is a basal part of the Ovule.

- (a) Chalaza (b) Micropyle  
(c) Nucellus (d) Funiculus

[Ans. (a) Chalaza]

12. An outgrow arises on the parent body during \_\_\_\_\_.

- (a) Fragmentation (b) Fission  
(c) Budding (d) Regeneration

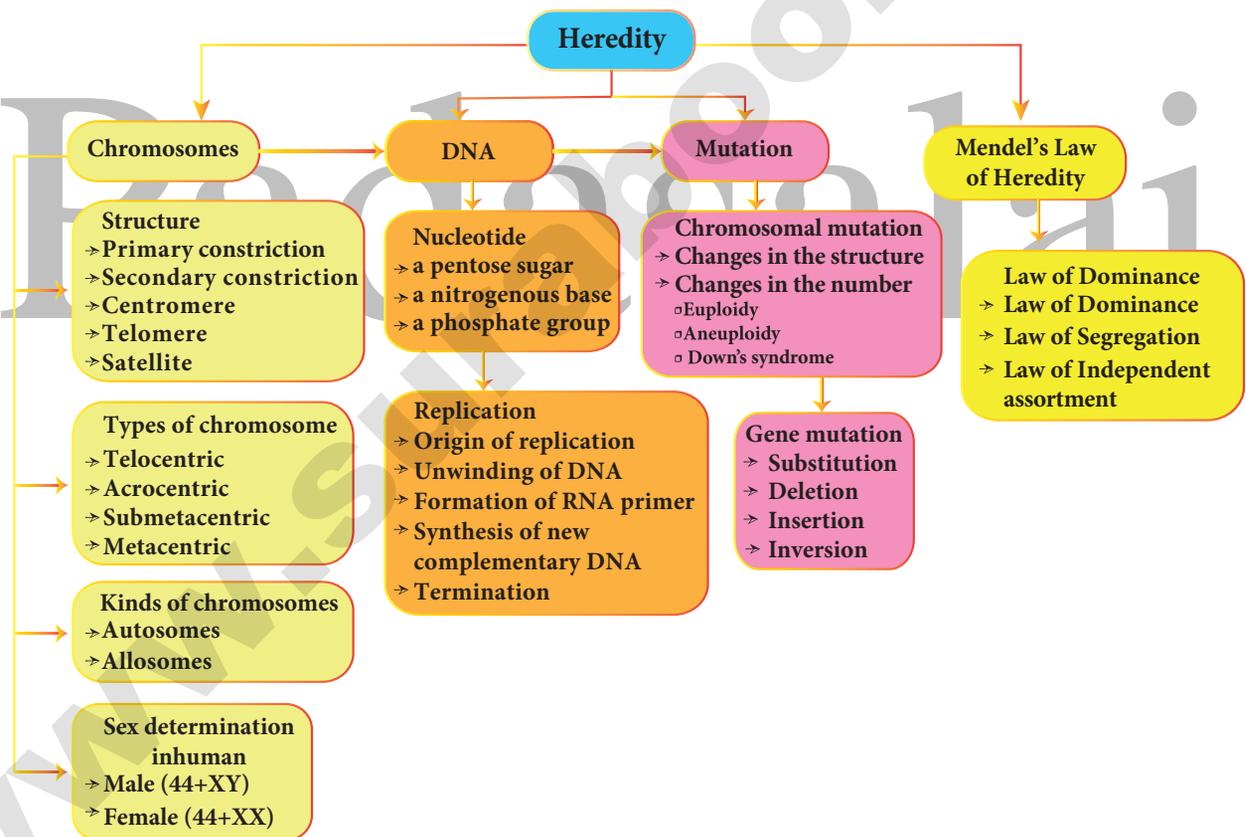
[Ans. (c) Budding]

# UNIT 18

# HEREDITY



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. According to Mendel alleles have the following character

- (a) Pair of genes
- (b) Responsible for character
- (c) Production of gametes
- (d) Recessive factors

[Ans. (b) Responsible for character]

2. 9 : 3 : 3 : 1 ratio is due to

- (a) Segregation
- (b) Crossing over
- (c) Independent assortment
- (d) Recessiveness

[Ans. (c) Independent assortment]

3. The region of the chromosome where the spindle fibres get attached during cell division

- (a) Chromomere
- (b) Centrosome
- (c) Centromere
- (d) Chromonema

[Ans. (c) Centromere]

4. The centromere is found at the centre of the \_\_\_\_\_ chromosome.

- (a) Telocentric
- (b) Metacentric
- (c) Sub-metacentric
- (d) Acrocentric

[Ans. (b) Metacentric]

5. The \_\_\_\_\_ units form the backbone of the DNA.

- (a) 5 carbon sugar
- (b) Phosphate
- (c) Nitrogenous bases
- (d) Sugar phosphate

[Ans. (d) Sugar phosphate]

6. Okazaki fragments are joined together by \_\_\_\_\_.

- (a) Helicase
- (b) DNA polymerase
- (c) RNA primer
- (d) DNA ligase

[Ans. (d) DNA ligase]

7. The number of chromosomes found in human beings are \_\_\_\_\_.

- (a) 22 pairs of autosomes and 1 pair of allosomes.
- (b) 22 autosomes and 1 allosome.
- (c) 46 autosomes.
- (d) 46 pairs autosomes and 1 pair of allosomes.

[Ans. (a) 22 pairs of autosomes and 1 pair of allosomes]

8. The loss of one or more chromosome in a ploidy is called \_\_\_\_\_.

- (a) Tetraploidy
- (b) Aneuploidy
- (c) Euploidy
- (d) polyploidy

[Ans. (b) Aneuploidy]

II. FILL IN THE BLANKS :

1. The pairs of contrasting character (traits) of Mendel are called \_\_\_\_\_ [Ans. alleles]

2. Physical expression of a gene is called \_\_\_\_\_ [Ans. phenotype]

3. The thin thread like structures found in the nucleus of each cell are called \_\_\_\_\_. [Ans. chromosomes]

4. DNA consists of two \_\_\_\_\_ chains [Ans. polynucleotide]

5. An inheritable change in the amount or the structure of a gene or a chromosome is called \_\_\_\_\_. [Ans. mutation]

III. IDENTIFY WHETHER THE STATEMENT ARE TRUE OR FALSE. CORRECT THE FALSE STATEMENT :

1. A typical Mendelian dihybrid ratio of F<sub>2</sub> generation is 3:1.

Ans. False.

Correct Statement : A typical mendelian dihybrid ratio of F<sub>2</sub> generation is 9:3:3:1.

2. A recessive factor is altered by the presence of a dominant factor.

Ans. False.

Correct Statement : The expression of a recessive factor is altered by the presence of a dominant factor.

3. Each gamete has only one allele of a gene.

Ans. True.

4. Hybrid is an offspring from a cross between genetically different parent.

Ans. True.

5. Some of the chromosomes have an elongated knob-like appendage known as telomere.

Ans. False.

Correct Statement : Some of the chromosome have an elongated knob-like appendage known as satellite.

## ADDITIONAL QUESTIONS AND ANSWERS

### CHOOSE THE CORRECT ANSWER 1 MARK

1. V shaped chromosomes are called \_\_\_\_\_.

- (a) metacentric (b) acrocentric  
(c) submetacentric (d) telocentric

[Ans. (a) metacentric]

2. The sex chromosomes in a human cell refer to the \_\_\_\_\_.

- (a) 22<sup>nd</sup> pair (b) 20<sup>th</sup> pair  
(c) 23<sup>rd</sup> pair (d) 21<sup>st</sup> pair

[Ans. (c) 23<sup>rd</sup> pair]

3. The haploid condition in a human cell refers to \_\_\_\_\_ chromosomes.

- (a) 44 (b) 23 (c) 46 (d) 22

[Ans. (b) 23]

4. L shaped chromosomes are described as \_\_\_\_\_.

- (a) acrocentric  
(b) metacentric  
(c) submetacentric  
(d) telocentric

[Ans. (c) submetacentric]

5. \_\_\_\_\_ is not a nitrogenous base.

- (a) Adenine (b) Thymine  
(c) Leucine (d) Cytosine

[Ans. (c) Leucine]

6. Choose the correct pair

- (a) A ≡ T (b) G ≡ A  
(c) A ≡ C (d) G ≡ C

[Ans. (d) G ≡ C]

7. Franklin and Wilkin were awarded nobel prize for \_\_\_\_\_.

- (a) studying DNA replication.  
(b) studying about RNA.  
(c) X - ray diffraction studies of DNA.  
(d) isolating DNA.

[Ans. (c) X - ray diffraction studies of DNA]

8. Down's syndrome is a case of \_\_\_\_\_.

- (a) Euploidy (b) Deletion  
(c) Translocation (d) Aneuploidy

[Ans. (d) Aneuploidy]

9. \_\_\_\_\_ is a gene mutation.

- (a) Deletion (b) Duplication  
(c) Translocation (d) Ploidy

[Ans. (a) Deletion]

10. The enzyme called \_\_\_\_\_ bind to the origin of replication site.

- (a) Replicase (b) Helicase  
(c) Amylase (d) Ligase

[Ans. (b) Helicase]

11. In human, each cell normally consists \_\_\_\_\_ of chromosomes.

- (a) 23 pairs (b) 22 pairs  
(c) 20 pairs (d) 12 pairs

[Ans. (a) 23 pairs]

12. Hydrogen bonds between the nitrogenous bases make the DNA molecule \_\_\_\_\_.

- (a) unstable (b) stable  
(c) unbalanced (d) disturbed

[Ans. (b) stable]

### FILL IN THE BLANKS

1. The protein part of which molecule is disturbed in sickle cell anemia \_\_\_\_\_.

[Ans. haemoglobin]

2. Mendel was a native of \_\_\_\_\_.

[Ans. Austria]

3. A cross involving two traits is called \_\_\_\_\_.

[Ans. dihybrid cross]

4. The laws of heredity were proposed by \_\_\_\_\_.

[Ans. Mendel]

5. The number of chromosomes present in a human cell is \_\_\_\_\_.

[Ans. 46]

6. The spindle fibres are attached to the \_\_\_\_\_ of a chromosome.

[Ans. centromere]

7. The end of a chromosome is called \_\_\_\_\_.

[Ans. telomere]

8. \_\_\_\_\_ stated base pair rule. [Ans. Chargaff]

9. DNA is a \_\_\_\_\_ chain. [Ans. polynucleotide]

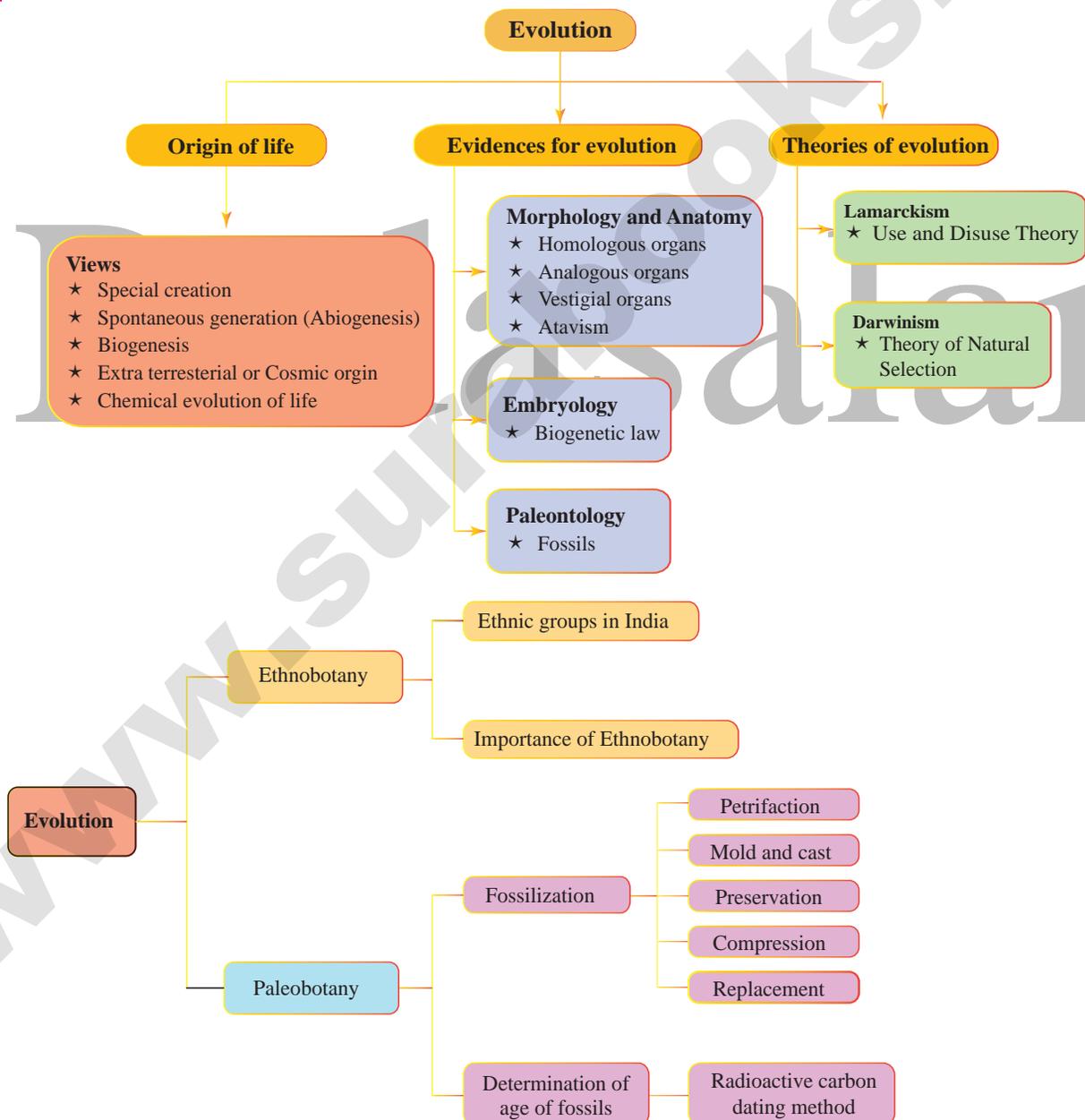
10. The enzyme \_\_\_\_\_ binds to origin of replication site in DNA. [Ans. helicase]

# UNIT 19

# ORIGIN AND EVOLUTION OF LIFE



## CONCEPT MAP



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Biogenetic law states that \_\_\_\_\_.  
(a) Ontogeny and phylogeny go together  
(b) Ontogeny recapitulates phylogeny  
(c) Phylogeny recapitulates ontogeny  
(d) There is no relationship between phylogeny and ontogeny

[Ans. (b) Ontogeny recapitulates phylogeny]

2. The 'use and disuse theory' was proposed by \_\_\_\_\_.

- (a) Charles Darwin (b) Ernst Haeckel  
(c) Jean Baptiste Lamarck  
(d) Gregor Mendel

[Ans. (c) Jean Baptiste Lamarck]

3. Paleontologists deal with

- (a) Embryological evidences  
(b) Fossil evidences  
(c) Vestigial organ evidences  
(d) All the above

[Ans. (b) Fossil evidences]

4. The best way of direct dating fossils of recent origin is by

- (a) Radio - carbon method  
(b) Uranium lead method  
(c) Potassium - argon method  
(d) Both (a) and (c)

[Ans. (a) Radio - carbon method]

5. The term Ethnobotany was coined by

- (a) Khorana (b) J.W. Harsbberger  
(c) Ronald Ross (d) Hugo de Vries

[Ans. (b) J.W. Harsbberger]

II. FILL IN THE BLANKS :

1. The characters developed by the animals during their life time, in response to the environmental changes are called \_\_\_\_\_.

[Ans. adaptation]

2. The degenerated and non- functional organs found in an organism are called \_\_\_\_\_.

[Ans. vestigial organs]

3. The forelimbs of bat and human are examples of \_\_\_\_\_ organs. [Ans. homologous]

4. The theory of natural selection for evolution was proposed by \_\_\_\_\_.

[Ans. Charles Darwin]

III. STATE WHETHER TRUE OR FALSE. IF FALSE WRITE THE CORRECT STATEMENT:

1. The use and disuse theory of organs' was postulated by Charles Darwin.

Ans. False.

Correct Statement : The Use and Disuse theory of organs was postulated by Lamarck.

2. The homologous organs look similar and perform similar functions but they have different origin and developmental pattern.

Ans. False.

Correct Statement : The homologous organs look dissimilar and perform different functions but they have similar origin and developmental pattern.

3. Birds have evolved from reptiles.

Ans. True.

IV. MATCH THE FOLLOWING :

	Column A	Column B
(a)	Atavism	caudal vertebrae and vermiform appendix
(b)	Vestigial organs	a forelimb of a cat and a bat's wing
(c)	Analogous organs	rudimentary tail and thick hair on the body
(d)	Homologous organs	a wing of a bat and a wing of an insect
(e)	Wood park	radiocarbon dating
(f)	W. F. Libby	Thiruvakkarai

Ans.

	Column A	Column B
(a)	Atavism	rudimentary tail and thick hair on the body
(b)	Vestigial organs	caudal vertebrae and vermiform appendix
(c)	Analogous organs	a wing of a bat and a wing of an insect
(d)	Homologous organs	a forelimb of a cat and a bat's wing
e)	Wood park	Thiruvakkarai
f)	W. F. Libby	radiocarbon dating

### V. ANSWER IN A WORD OR SENTENCE :

1. A human hand, a front leg of a cat, a front flipper of a whale and a bat's wing look dissimilar and adapted for different functions. What is the name given to these organs?

Ans. Homologous organs.

2. Which organism is considered to be the fossil bird?

Ans. Archaeopteryx.

3. What is the study of fossils called?

Ans. Palaeontology.

### VI. SHORT ANSWERS QUESTIONS :

1. The degenerated wing of a Kiwi is an acquired character. Why is it an acquired character?

Ans. (i) When there is a change in the environment, the animals respond to the change.

(ii) They develop adaptive structures. The characters developed by the animals during their life time, in response to the environmental changes are called **acquired characters**.

(iii) Lamarck's **use and disuse theory** states that if an organ is used constantly, the organ develops well and gets strengthened. When an organ is not used for a long time, it gradually degenerates. Degenerated wing of kiwi is an example for organ of disuse

Degeneration of wings in kiwi is due to disuse of wings over generations since they have learned to walk on land for all their needs. This is an acquired character in response to their habitat. According to Lamarck such characters are passed to the offspring by inheritance.

2. Why is Archaeopteryx considered to be a connecting link?

(i) Archaeopteryx is the oldest known fossil bird.

(ii) It is considered to be a connecting link between reptiles and birds. It had wings with feathers, like a bird. It had long tail, clawed digits and conical teeth, like a reptile.

3. Define Ethnobotany and write its importance.

Ans. (i) Ethnobotany is the **study of a region's plants and their practical uses** through the traditional knowledge of the local culture of people.

(ii) The term Ethnobotany was coined by **J. W. Harshberger in 1895** to include the study of plants used by the primitive and aboriginal people.

#### Importance of Ethnobotany :

(i) It provides traditional uses of plant.

(ii) It gives information about certain unknown and known useful plants.

(iii) The ethnomedicinal data will serve as a useful source of information for the chemists, pharmacologists and practitioners of herbal medicine.

(iv) Tribal communities utilize ethnomedicinal plant parts like bark, stem, roots, leaves, flower bud, flowers, fruits, seeds, oils, resins, dyes, gum for the treatment of diseases like diarrhoea, fever, headache, diabetes, jaundice, snakebites, leprosy, etc.

4. How can you determine the age of the fossils?

Ans. (i) The age of fossils is **determined by radioactive elements** present in it.

(ii) They may be carbon, uranium, lead or potassium. It is used in paleobotany and anthropology for determining the age of human fossils and manuscripts.

(vi) Majority of the plant fossils are disarticulated parts of plants, it is rare to find plants to be preserved as whole.

**Importance of fossils :**

- (i) They throw light on phylogeny and evolution of plants.
- (ii) Fossil plants give a historical approach to plant kingdom.
- (iii) Thus even if fossils are not available as a whole, imprints or separated parts will also be able to give us lot of information about evaluation.

3. Octopus, cockroach and frog all have eyes. Can we group these animals together to establish a common evolutionary origin. Justify your answer.

- Ans. (i) No. These animals cannot be grouped together. Only the presence of eyes is not a factor to group animals together.
- (ii) The interrelationship of the organism must be supported by evidence from other disciplines of biology.
- (iii) Octopus and cockroach belong to phylum Arthropoda. (Invertebrates) Frog belongs to phylum Chordata. (Vertebrates).
- (iv) Based on the presence of a single character, animals cannot be grouped to establish a common evolutionary origin.

**ADDITIONAL QUESTIONS AND ANSWERS**

**CHOOSE THE CORRECT ANSWER 1 MARK**

1. Biogenesis was speculated by \_\_\_\_\_.

- (a) Haldane
- (b) Pasteur
- (c) Darwin
- (d) Lamarck

[Ans. (b) Pasteur]

2. The idea of Chemical Evolution of life was developed by \_\_\_\_\_.

- (a) Haldane and Oparin
- (b) Pasteur
- (c) Libby
- (d) Leonardo da vinci

[Ans. (a) Haldane and Oparin]

3. \_\_\_\_\_ is not an example of vestigial organ.

- (a) Coccyx
- (b) Appendix
- (c) Thick hair
- (d) Nictitating membrane

[Ans. (c) Thick hair]

4. \_\_\_\_\_ is called the Father of Palaeontology.

- (a) Pasteur
- (b) Birbal sahani
- (c) Haeckel
- (d) Leonardo da vinci

[Ans. (d) Leonardo da vinci]

5. Ancon Sheep is an example of \_\_\_\_\_.

- (a) vestigial organ
- (b) discontinuous variation
- (c) acquired character
- (d) natural selection

[Ans. (b) discontinuous variation]

6. The Father of Paleobotany / Founder of Modern Paleobotany is \_\_\_\_\_.

- (a) Leonardo da Vinci
- (b) Sternberg
- (c) Haldane
- (d) Sahani

[Ans. (b) Sternberg]

7. \_\_\_\_\_ is the only planet in the Goldilock. zone.

- (a) Jupiter
- (b) Mars
- (c) Earth
- (d) Venus

[Ans. (c) Earth]

8. Biogenetic law or Recapitulation theory was given by \_\_\_\_\_.

- (a) Leonardo da vinci
- (b) Ernst Haeckel
- (c) Oparin
- (d) Haldane

[Ans. (b) Ernst Haeckel]

9. The Big Bang theory explains the \_\_\_\_\_.

- (a) Origin of Universe
- (b) Origin of sea
- (c) Origin of mountain
- (d) Origin of water

[Ans. (a) Origin of Universe]

TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Which method of crop improvement can be practised by a farmer if he is in experienced?

- (a) clonal selection (b) mass selection  
(c) pureline selection (d) hybridisation

[Ans. (b) mass selection]

2. Pusa Komal is a disease resistant variety of \_\_\_\_\_.

- (a) sugarcane (b) rice  
(c) cow pea (d) maize

[Ans. (c) cow pea]

3. Himgiri developed by hybridisation and selection for disease resistance against rust pathogens is a variety of \_\_\_\_\_.

- (a) chilli (b) maize  
(c) sugarcane (d) wheat

[Ans. (d) wheat]

4. The miracle rice which saved millions of lives and celebrated its 50th birthday is \_\_\_\_\_.

- (a) IR 8 (b) IR 24  
(c) Atomita 2 (d) Ponni

[Ans. (a) IR 8]

5. Which of the following is used to produce products useful to humans by biotechnology techniques?

- (a) enzyme from organism  
(b) live organism  
(c) vitamins  
(d) both (a) and (b)

[Ans. (d) both (a) and (b)]

6. We can cut the DNA with the help of

- (a) scissors  
(b) restriction endonucleases  
(c) knife  
(d) RNAase

[Ans. (b) restriction endonucleases]

7. rDNA is a

- (a) vector DNA  
(b) circular DNA  
(c) recombinant of vector DNA and desired DNA  
(d) satellite DNA

[Ans. (c) recombinant of vector DNA and desired DNA]

8. DNA fingerprinting is based on the principle of identifying \_\_\_\_\_ sequences of DNA

- (a) single stranded (b) mutated  
(c) polymorphic (d) repetitive

[Ans. (d) repetitive]

9. Organisms with modified endogenous gene or a foreign gene are also known as

- (a) transgenic organism  
(b) genetically modified  
(c) mutated  
(d) both a and b

[Ans. (d) both a and b]

10. In a hexaploid wheat ( $2n = 6x = 42$ ) the haploid ( $n$ ) and the basic ( $x$ ) number of chromosomes respectively are

- (a)  $n = 7$  and  $x = 21$  (b)  $n = 21$  and  $x = 21$   
(c)  $n = 7$  and  $x = 7$  (d)  $n = 21$  and  $x = 7$

[Ans. (d)  $n = 21$  and  $x = 7$ ]

II. FILL IN THE BLANKS :

1. Economically important crop plants with superior quality are raised by \_\_\_\_\_.

[Ans. plant breeding]

2. A protein rich wheat variety is \_\_\_\_\_.

[Ans. Atlas 66]

3. \_\_\_\_\_ is the chemical used for doubling the chromosomes.

[Ans. Colchicine]

4. The scientific process which produces crop plants enriched with desirable nutrients is called \_\_\_\_\_.

[Ans. fortification]

5. Rice normally grows well in alluvial soil, but \_\_\_\_\_ is a rice variety produced by mutation breeding that grows well in saline soil.

[Ans. atomita 2]

## ADDITIONAL QUESTIONS AND ANSWERS

### CHOOSE THE CORRECT ANSWER 1 MARK

- Dr. Norman was an \_\_\_\_\_ agronomist.  
(a) American (b) Asian  
(c) Russian (d) British  
[Ans. (a) American]
- Dr. Norman received the Nobel peace prize in \_\_\_\_\_.  
(a) 1960 (b) 1980 (c) 1956 (d) 1970  
[Ans. (d) 1970]
- The International rice research institute is located at \_\_\_\_\_.  
(a) New Delhi (b) Mexico  
(c) Phillipines (d) China  
[Ans. (c) Phillipines]
- The rice variety peta was from \_\_\_\_\_.  
(a) China (b) Mexico  
(c) Indonesia (d) India  
[Ans. (c) Indonesia]
- Dr. M. S. Swaminathan did experiments in \_\_\_\_\_.  
(a) rice (b) cotton  
(c) flax (d) linseed  
[Ans. (a) rice]
- Pusa snowball is a disease resistant variety of \_\_\_\_\_.  
(a) cowpea (b) cauliflower  
(c) wheat (d) rice  
[Ans. (b) cauliflower]
- Pusa sawani is a insect resistant variety of \_\_\_\_\_.  
(a) cowpea (b) flat bean  
(c) lady's finger (d) brassica  
[Ans. (c) lady's finger]
- \_\_\_\_\_ is an example of auto triploid  
(a) Coffee (b) Banana  
(c) Potato (d) Peanut  
[Ans. (b) Banana]
- Blood clotting factors produced by biotechnology helps patients suffering from \_\_\_\_\_.  
(a) haemophilia (b) homeostasis  
(c) cerebral palsy (d) CHD  
[Ans. (a) haemophilia]
- In human beings, \_\_\_\_\_ of the DNA base sequences are the same and this is called as bulk genomic DNA.  
(a) 99% (b) 50%  
(c) 90% (d) 70%  
[Ans. (a) 99 %]
- The human genome has \_\_\_\_\_ base pairs.  
(a) 3 billion (b) 3 million  
(c) 30 million (d) 30 billion  
[Ans. (a) 3 billion]
- DNA finger printing was developed by  
(a) Dr. Ian Wilmut (b) Alec Jeffrey  
(c) Lilly (d) Dr. Norman  
[Ans. (b) Alec Jeffrey]
- \_\_\_\_\_ is father of "Indian Green Revolution"  
(a) Dr. M. S. Swaminathan (b) Dr. Norman (c) Alec Jeffrey  
(d) Dr. Ian Wilmut  
[Ans. (a) Dr. M. S. Swaminathan]
- \_\_\_\_\_ is a hybrid of wheat and rye  
(a) *Triticale* (b) Raphano brassica  
(c) Bananas (d) Water melons  
[Ans. (a) *Triticale*]
- An organism having more than two sets of chromosomes is called  
(a) Diploid (b) Haploid  
(c) Monoploid (d) Polyploid  
[Ans. (d) Polyploid]

# UNIT 21

# HEALTH AND DISEASES



## CONCEPT MAP

### Abuses and Disorders due to Lifestyle Modification



TEXTBOOK EVALUATION

I. CHOOSE THE CORRECT ANSWER :

1. Tobacco consumption is known to stimulate secretion of adrenaline. The component causing this could be

- (a) Nicotine (b) Tannic acid  
(c) Curcumin (d) Leptin

[Ans. (a) Nicotine]

2. World 'No Tobacco Day' is observed on

- (a) May 31 (b) June 6  
(c) April 22 (d) October 2

[Ans. (a) May 31]

3. Cancer cells are more easily damaged by radiations than normal cells because they are

- (a) Different in structure  
(b) Non-dividing  
(c) Mutated Cells  
(d) Undergoing rapid division

[Ans. (d) Undergoing rapid division]

4. Which type of cancer affects lymph nodes and spleen?

- (a) Carcinoma (b) Sarcoma  
(c) Leukemia (d) Lymphoma

[Ans. (d) Lymphoma]

5. Excessive consumption of alcohol leads to

- (a) Loss of memory  
(b) Cirrhosis of liver  
(c) State of hallucination  
(d) Suppression of brain function

[Ans. (b) Cirrhosis of liver]

6. Coronary heart disease is due to

- (a) *Streptococci* bacteria  
(b) Inflammation of pericardium  
(c) Weakening of heart valves  
(d) Insufficient blood supply to heart muscles

[Ans. (d) Insufficient blood supply to heart muscles]

7. Cancer of the epithelial cells is called

- (a) Leukemia (b) Sarcoma  
(c) Carcinoma (d) Lipoma

[Ans. (c) Carcinoma]

8. Metastasis is associated with

- (a) Malignant tumour  
(b) Benign tumour  
(c) Both (a) and (b)  
(d) Crown gall tumour

[Ans. (a) Malignant tumour]

9. Polyphagia is a condition seen in

- (a) Obesity (b) Diabetes mellitus  
(c) Diabetes insipidus (d) AIDS

[Ans. (b) Diabetes mellitus]

10. Where does alcohol effect immediately after drinking?

- (a) Eyes  
(b) Auditory region  
(c) Liver  
(d) Central nervous system

[Ans. (d) Central nervous system]

II. STATE WHETHER TRUE OR FALSE, IF FALSE WRITE THE CORRECT STATEMENT :

1. AIDS is an epidemic disease.

Ans. True.

2. Cancer causing genes are called Oncogenes.

Ans. True.

3. Obesity is characterized by tumour formation.

Ans. False.

Correct Statement : Cancer is characterized by tumour formation.

4. In leukemia both WBCs and RBCs increase in number.

Ans. False.

Correct Statement : In Leukemia WBC increases in number.

5. Study of cause of disease is called etiology.

Ans. True.

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

- \_\_\_\_\_ is not related to NIDDM.  
(a) Insulin administration  
(b) Controlled by medicine  
(c) Obese  
(d) Insulin action impaired  
[Ans. (a) Insulin administration]
- \_\_\_\_\_ is a symptom of CHD.  
(a) Glycosuria (b) Ischemia  
(c) Hyperglycemia (d) Polyphagia  
[Ans. (b) Ischemia]
- \_\_\_\_\_ help reduce blood sugar levels.  
(a) Sweet potato (b) Tomato  
(c) Beet root (d) Cane sugar  
[Ans. (b) Tomato]
- \_\_\_\_\_ is not a method of treatment for cancer.  
(a) Surgery  
(b) Immunotherapy  
(c) Vasectomy  
(d) Radiation therapy [Ans. (c) Vasectomy]
- AIDS affects the \_\_\_\_\_ system.  
(a) circulatory  
(b) nervous  
(c) immune  
(d) digestive [Ans. (c) immune]
- \_\_\_\_\_ is not a symptom of AIDS.  
(a) Increase in number of WBC  
(b) Lack of appetite  
(c) Weight loss  
(d) Swelling of lymph nodes  
[Ans. (a) Increase in number of WBC]
- World AIDS day is observed on \_\_\_\_\_.  
(a) 1<sup>st</sup> December  
(b) 15<sup>th</sup> December  
(c) 24<sup>th</sup> November  
(d) 1<sup>st</sup> May  
[Ans. (a) 1<sup>st</sup> December]
- Obesity is not a risk factor for \_\_\_\_\_.  
(a) AIDS (b) diabetes  
(c) arthritis (d) CHD  
[Ans. (a) AIDS]

- Excess hunger is called \_\_\_\_\_.  
(a) polyphagia (b) polydipsia  
(c) polyuria (d) glycosuria  
[Ans. (a) polyphagia]
- Sexually abused children show symptoms of \_\_\_\_\_.  
(a) frequent urinary infection  
(b) head ache  
(c) sore head  
(d) migraine  
[Ans. (a) frequent urinary infection]

FILL IN THE BLANKS

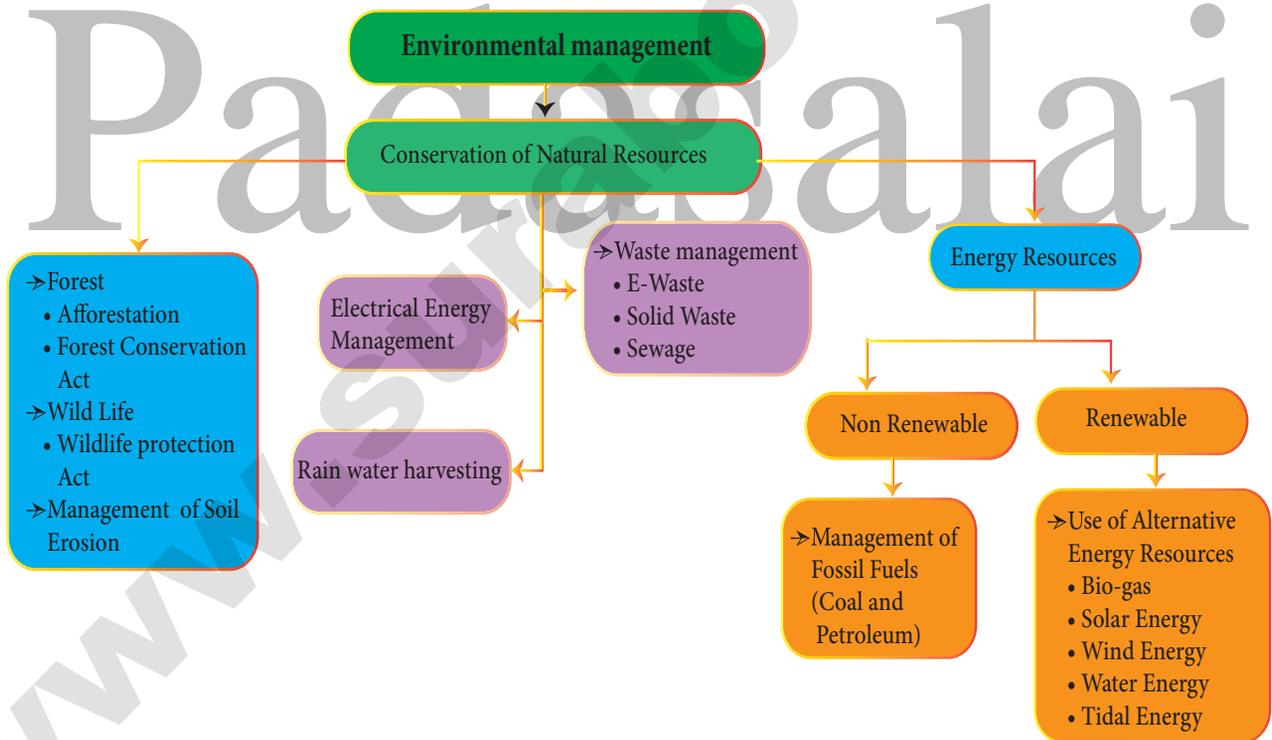
- The \_\_\_\_\_ act aims to protect children from sexual offences. [Ans. Posco]
- The \_\_\_\_\_ provides a social worker who can help an abused child. [Ans. child helpline]
- The National Commission for protection of Child Rights was set up in \_\_\_\_\_. [Ans. 2007]
- The psychotropic drugs are classified based on their mode of action on the \_\_\_\_\_. [Ans. brain]
- \_\_\_\_\_ present in tobacco smoke causes lung cancer. [Ans. Benzopyrene]
- \_\_\_\_\_ is an example of a metabolic disorder. [Ans. Diabetes mellitus]
- Desirable level for blood serum cholesterol should be less than \_\_\_\_\_ for Indians. [Ans. 200 mg / dl]
- PUFA stands for \_\_\_\_\_. [Ans. Polyunsaturated fatty acids]
- Non Malignant tumours are also called \_\_\_\_\_. [Ans. benign tumour]
- HIV belongs to a group of viruses called \_\_\_\_\_. [Ans. retroviruses]
- World Cancer Day is observed on \_\_\_\_\_ every year. [Ans. 4<sup>th</sup> February]
- Intake of flax seeds can help reduce blood \_\_\_\_\_ levels. [Ans. sugar]

# UNIT 22

# ENVIRONMENTAL MANAGEMENT



## CONCEPT MAP



TEXTBOOK EVALUATION

I. FILL IN THE BLANKS :

- Deforestation leads to \_\_\_\_\_ in rainfall. [Ans. decrease]
- Removal of soil particles from the land is called \_\_\_\_\_. [Ans. soil erosion]
- Chipko movement is initiated against \_\_\_\_\_. [Ans. deforestation]
- \_\_\_\_\_ is a biosphere reserve in Tamilnadu. [Ans. Nilgiris]
- Tidal energy is \_\_\_\_\_ type of energy. [Ans. renewable]
- Coal, petroleum and natural gas are called \_\_\_\_\_ fuels. [Ans. fossil]
- \_\_\_\_\_ is the most commonly used fuel for the production of electricity. [Ans. Coal]

II. STATE WHETHER TRUE OR FALSE. CORRECT THE STATEMENTS WHICH ARE FALSE :

- Biogas is a fossil fuel.  
Ans. True.
- Planting trees increases the ground water level.  
Ans. True.
- Habitat destruction cause loss of wild life.  
Ans. True.
- Nuclear energy is a renewable energy.  
Ans. False.  
Correct Statement : Nuclear energy is a **non renewable** source of energy.
- Overgrazing prevents soil erosion.  
Ans. False.  
Correct Statement : Overgrazing **can lead** to soil erosion.

6. Poaching of wild animals is a legal act.

Ans. False.  
Correct Statement : Poaching of wild animals is **illegal**.

7. National park is a protected park.

Ans. True.

8. Wild life protection act was established in 1972.

Ans. True.

III. MATCH THE FOLLOWING :

1	Soil erosion	-	energy saving
2	Bio gas	-	acid rain
3	Natural gas	-	removal of vegetation
4	Green house gas	-	renewable energy
5	CFL bulbs	-	CO <sub>2</sub>
6	Wind	-	non - renewable energy
7	Solid waste	-	Lead and heavy metals

Ans.

1	Soil erosion	-	removal of vegetation
2	Bio gas	-	CO <sub>2</sub>
3	Natural gas	-	non - renewable energy
4	Green house gas	-	acid rain
5	CFL bulbs	-	energy saving
6	Wind	-	renewable energy
7	Solid waste	-	Lead and heavy metals

IV. CHOOSE THE CORRECT ANSWER :

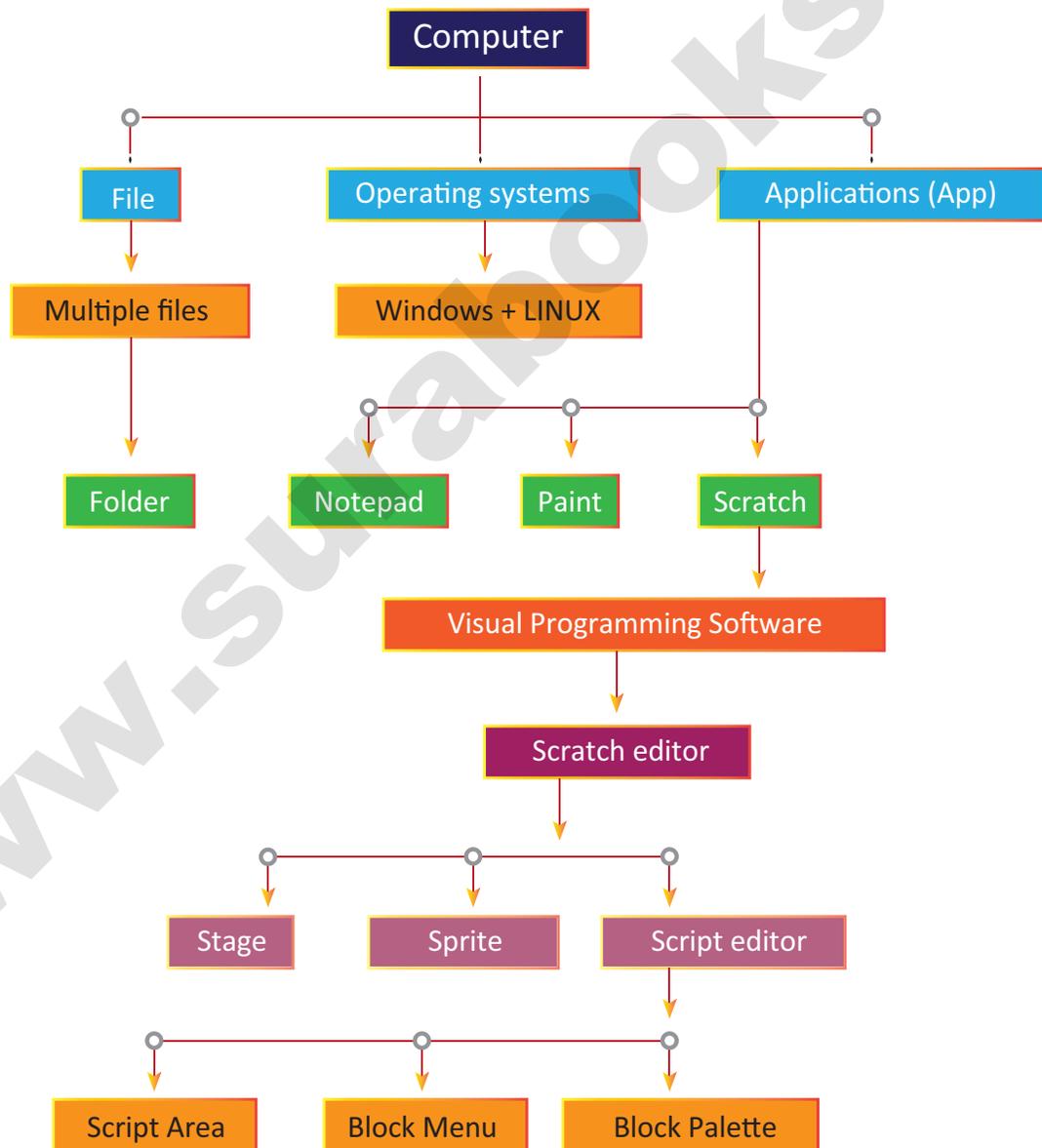
- Which of the following is / are a fossil fuel?  
i. Tar      ii. Coal      iii. Petroleum  
(a) i only      (b) i and ii  
(c) ii and iii      (d) i, ii and iii  
[Ans. (c) ii and iii]
- What are the steps will you adopt for better waste management?  
(a) reduce the amount of waste formed  
(b) reuse the waste  
(c) recycle the waste  
(d) all of the above [Ans. (d) all of the above]



# UNIT 23

# VISUAL COMMUNICATION

## CONCEPT MAP



### MUST KNOW DEFINITIONS

<b>File</b>	: The output we get from any application is commonly referred as 'file'.
<b>Folder</b>	: A folder is a storage space that contains multiple files.
<b>Notepad</b>	: As per it's name we can type notes in 'Notepad' and save the created files in a folder.
<b>Visual Communication Device</b>	: The device which helps in explaining the concepts easily through pictures is known as ' <b>Visual Communication Device</b> '.
<b>Paint</b>	: In the 'Paint' application we can draw and edit pictures.
<b>Scratch</b>	: 'Scratch' is a software used to create animations, cartoons and games easily. Scratch, on the other hand, is a visual programming language.
<b>Stage</b>	: Stage is the background appearing when we open the scratch window.
<b>Sprite</b>	: The characters on the background of a Scratch window are known as Sprite.
<b>Script editor / Costume editor</b>	: Where you edit your programs or your sprite's pictures.
<b>Script area</b>	: Where you build scripts.
<b>Block menu</b>	: Where you choose the category of blocks (programming statements) to use.
<b>Block palette</b>	: Where you choose the blocks to use.

Unit 23

### TEXTBOOK EVALUATION

#### I. CHOOSE THE CORRECT ANSWER :

1. Which software is used to create animation ?

- (a) Paint (b) PDF  
(c) MS Word (d) Scratch

[Ans. (d) Scratch]

2. All files are stored in the \_\_\_\_\_

- (a) Folder (b) Box  
(c) Pai (d) Scanner

[Ans. (a) Folder]

3. Which is used to build scripts?

- (a) Script area (b) Block palette  
(c) Stage (d) Sprite

[Ans. (a) Script area]

4. Which is used to edit programs?

- (a) Inkscape (b) Script editor  
(c) Stage (d) Sprite

[Ans. (b) Script editor]

5. Where you will create category of blocks?

- (a) Block palette (b) Block menu  
(c) Script area (d) Sprite

[Ans. (b) Block menu]

## II. MATCH THE FOLLOWING :

(1)	Script area	-	Type notes
(2)	Folder	-	Animation software
(3)	Scratch	-	Edit programs
(4)	Costume editor	-	Store files
(5)	Notepad	-	Build scripts

Ans.

(1)	Script area	-	Build scripts
(2)	Folder	-	Store files
(3)	Scratch	-	Animation software
(4)	Costume editor	-	Edit programs
(5)	Notepad	-	Type notes

## III. ANSWER THE FOLLOWING :

### 1. What is Scratch?

Ans. (i) '**Scratch**' is a software used to create animations, cartoons and games easily.

(ii) Scratch is a **Visual Programming Language**.

(iii) It was developed in **Massachusetts Institute of Technology Media Lab** to make programming easier and more fun to learn.

### 2. Write a short note on editor and its types?

Ans. **The Scratch editor has three main parts:** They are Stage, Sprite and Script editor.

(i) **Stage:** Stage is the background appearing when we open the scratch window. The background will most often be white. You can change the background colour as you like.

(ii) **Sprite:** The characters on the background of a Scratch window are known as **Sprite**. Usually a cat appears as a sprite when the Scratch window is opened. The software provides facilities to make alternations in sprite.

(iii) **Script editor / costume editor:** Where you edit your programs or your sprite's pictures.

### 3. What is Stage?

Ans. Stage is the **background appearing** when we open the scratch window. The background will most often be white. You can **change the background colour** as you like.

### 4. What is Sprite?

Ans. The **characters on the background** of a Scratch window are known as **Sprite**. Usually a cat appears as a sprite when the Scratch window is opened. The software provides facilities to make alternations in sprite.

## ADDITIONAL QUESTIONS AND ANSWERS

### CHOOSE THE CORRECT ANSWER 1 MARK

1. The output of any application is commonly known as \_\_\_\_\_.

- (a) File (b) Folder  
(c) Disk (d) Output

[Ans. (a) File]

2. Multiple files are stored in a \_\_\_\_\_.

- (a) Script Editor  
(b) Paint  
(c) Notepad  
(d) Folder

[Ans. (d) Folder]

3. Which button we use to select a required program?

- (a) Program button (b) Restart Button  
(c) My Computer (d) Start Button

[Ans. (d) Start Button]

4. Notes can be collected, edited and printed using \_\_\_\_\_.

- (a) Paint (b) Scratch  
(c) Notepad (d) LINUX

[Ans. (c) Notepad]

5. Which one is used to draw and edit pictures?

- (a) Notepad (b) Paint  
(c) Scratch (d) Windows OS

[Ans. (b) Paint]