SCIENCE

STUDY MATERIAL FOR X TH STD

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SCIENCE - PHYSICS

LESSON -1 - LAWS OF MOTION

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

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

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

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

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

a) swimming b) tennis **c) cycling** d) hockey

6) The unit of 'g' is m s^{-2}. It can be also expressed as

a) cm s^{-1} **b) N kg^{-1}** c) N m^2 kg^{-1} d) cm^2 s^{-2}

7) One kilogram force equals to

a) 9.8 dyne b) 9.8 × 104 N **c) 98 × 10^4 dyne** d) 980 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) 2M c) M/4 **d) M**

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%**

10) To project the rockets which of the follow-ing 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**

II. FILL IN THE BLANKS:

1. To produce a displacement **force** is required
2. Passengers lean forward when sudden brake is applied in a moving vehicle. This can be explained by **inertia of motion**
3. By convention, the clockwise moments are taken as **negative** and the anticlockwise moments are taken as **positive**
4. **Gear** is used to change the speed of car.
5. A man of mass 100 kg has a weight of **980 N** at the surface of the Earth

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. - False

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

2. Apparent weight of a person is always equal to his actual weight - False

Both apparent weight and actual weight can be greater or lesser according to the movement of the person inside the lift.

3. Weight of a body is greater at the equator and less at the polar region. - False

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

4. Turning a nut with a spanner having a short handle is so easy than one with a long handle. - False

Turning effect (i.e torque) depends on perpendicular distance of the line of action of the applied force N = F x *d*

5. There is no gravity in the orbiting space station around the Earth. So the astronauts feel weightlessness. - False

When space station and astronauts have equal acceleration, they are under free fall condition, so both astronaut and space station are in the state of weightlessness.

IV. MATCH THE FOLLOWING

Column I	Column II
a. Newton's I law	Propulsion of a rocket
b. Newton's II law	Stable equilibrium of a body
c. Newton's III law	Law of force
d. Law of conservation of Linear momentum	Flying nature of bird

Answer:

(a) Newton's law - stable equilibrium of a body

(b) Newton's II law - Law of force

(c) Newton's III law - Flying nature of bird

(d) Law of conservation of Linear momentum- propulsion of a rocket

V. TWO MARKS:

1. Define inertia. Give its classification.

- The inherent property of a body to resist any change in its state of rest or motion is called inertia.**Types of inertia:** 1. Inertia of rest. 2. Inertia of motion 3. Inertia of direction

2. Classify the types of force based on their application.

(i) Contact force: Example: pushing or pulling an object,

(ii) Non - contact force Example: gravitational force

3. Differentiate mass and weight.

Mass	Weight
Quantity of matter	Gravitational force exerted
Scalar quantity	Vector quantity
SI unit is kg	SI unit is N
Measured using a physical balance	Measured using a spring balance

4. Define moment of a couple.

Couple: Two equal and unlike parallel forces applied simultaneously at two distinct points constitute a couple. **Ex: Turning a tap**

5. State Newton's second law.

- The force acting on a body is directly proportional to **the rate of change of linear momentum** of the body and the change in momentum takes place in the direction of force. **F = m x a**

6. Why a spanner with a long handle is preferred to tighten screws in heavy vehicles?

- ❖ Larger the perpendicular distance, lesser is the force required to turn the body.
- ❖ **$\tau = F \times d$.**

7. While catching a cricket ball the fielder lowers his hands backwards. Why?

When the fielder pulls back his hands he experiences a smaller force for a longer interval of time leading to less damage to his hands.

8. How does an astronaut float in a space shuttle?

- ❖ Space station and astronauts have equal acceleration, they are under free fall condition.
- ❖ Hence, both the astronauts and the space station are in the state of weightlessness.

VI. ANSWER IN DETAIL:

1. What are the types of inertia? Give an example for each type.

Types of Inertia 1. Inertia of rest 2. Inertia of motion 3. Inertia of direction

a) Inertia of rest: To resist a body to change its state of rest

Ex: Shaking the trees leaves fall down

b) Inertia of motion: To resist a body to change its state of Motion

Ex: An athlete runs for long jumping

c) Inertia of direction To resist a body to change its direction.

Ex: Sharp turn while driving a car

2. State Newton's laws of motion?

a) Newton's First law:

Everybody continues to be in its state of rest or the state of uniform motion along a straight line unless it is acted upon by some external force.

b) Newton's second law:

The force acting on a body is directly proportional to the rate of change of linear momentum of the body **F = ma**

c) Newton's third law: For every action, there is an equal and opposite reaction.

3. Deduce the equation of a force using Newton's second law of motion.

Let us consider, m - mass of the body, u - Initial velocity , v - Final velocity

t - time taken , F - External force

Proof: Initial momentum (Pi) = mu Final momentum (Pf) = mv

$\therefore$ change in momentum (ΔP) = Pf – Pi = mv – mu = m(v –u)

According to Newton's second law of motion ,

F α rate of change in momentum

F α change in momentum / time

F α m (v – u) / t

F = k m (v –u) / t , k – is constant(k = 1)

F = m (v – u) / t $\therefore$Acceleration (a) = (v – u) / t

F = ma or Force = mass x acceleration

4. Describe rocket propulsion.

- ❖ Based on Law of conservation of linear momentum and Newton's III law of motion.
- ❖ Filled with fuel in the propellant tank
- ❖ When the rocket is fired, producing a huge momentum.
- ❖ This momentum makes the rocket project forward.

- ❖ The mass of the rocket gradually decreases, until the fuel is completely burnt out.
- ❖ The mass of the rocket decreases with altitude, which results in gradual increase in velocity of the rocket.
- ❖ At one stage, it reaches escape velocity.

5. Give the applications of universal law gravitation.

- ❖ Dimensions of heavenly bodies can be measured
- ❖ Mass, radius of the Earth, acceleration due to gravity can be calculated.
- ❖ Helps in discovering new stars and plants.
- ❖ To Explain the germination of roots using geotropism.
- ❖ To predict the path of the astronomical bodies.

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LESSON -2 -OPTICS

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

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

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

4. Magnification of a convex lens is

a) Positive b) negative **c) either positive or negative** d) zero

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

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

a) 4m b) –40m **c) –0.25 m** d) –2.5 m

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

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

a) convex lens b) concave lens c) convex mirror **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

10. If VB, VG, VR 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) VB = VG = VR b) VB > VG >VR **c) VB < VG < VR** d) VB < VG > VR

II. FILL IN THE BLANKS:

1. The path of the light is called as **ray**
2. The refractive index of a transparent medium is always greater than **one**

3. If the energy of incident beam and the scattered beam are same, then the scattering of light is called as **elastic** scattering.
4. According to Rayleigh's scattering law, the amount of scattering of light is inversely proportional to the fourth power of its **wavelength**
5. Amount of light entering into the eye is controlled by **Iris**

III. TRUE OR FALSE. IF FALSE CORRECT IT.

1. Velocity of light is greater in denser medium than in rarer medium - **False**
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 - **True**
3. Increase in the converging power of eye lens cause 'hypermetropia' - **True**
4. The convex lens always gives small virtual image. - **False**
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	f Power of accommodation

Answer:
(1) Retina - Screen of the eye
(2) Pupil - Path way of light
(3) Ciliary muscles - Power of accommodation
(4) Myopia - Far point comes closer
(5) Hypermetropia - near point moves away

V. TWO MARKS:

1. What is refractive index?
- ❖ It is defined as ratio of the **speed of light in air (or) vacuum** to **the speed of light in medium.** $\mu = c / v$

2. State Snell's law.
- ❖ 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.
- ❖ $\sin i / \sin r = \mu 2 / \mu 1$

3. Define dispersion of light
- ❖ When a beam of white light refracted through any transparent media. It is split into its component colours.
- ❖ This phenomenon is called dispersion of light.

4. State Rayleigh's law of scattering
- ❖ The amount of scattering of light is inversely proportional to the fourth power of its wavelength.
- ❖ $S \propto 1 / \lambda^4$

5. Differentiate convex lens and concave lens.

Convex lens	Concave lens
Thicker in the middle than at edge	Thinner in the middle than at edge.
Converging lens	Diverging lens
It is used to treat Hypermeteropia	It is used to treat myopia
Produces mostly real images	Produces virtual images

6. What is power of accommodation of eye?

The ability of the eye lens to focus nearby as well as the distant objects is called power of accommodation of the eye.

7. What are the causes of 'Myopia'?

- Lengthening of eye ball.
- The focal length of eye lens is reduced.
- The image of distance objects are formed before retina.

8. Why does the sky appear in blue colour?

- The blue colour of shorter wavelength is scattered to a great extent.
- This scattering causes the sky to appear in blue colour.

9. Why are traffic signals red in colour?

- Red light has longest wavelength.
- The Red light travels long distance.
- So red colour used in traffic signals.

VI. ANSWER IN DETAIL:

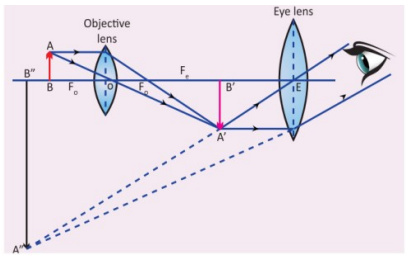
1. List any five properties of light.

- Light is a form of energy.
- Light always travels along a straight line.
- Light does not need medium for its propagation.
- The speed of light in air is C = 3 × 108ms^{-1}
- Light is in the form of waves.
- Violet light has the lowest wavelength, and red light has the highest wavelength.

2. Differentiate the eye defects: Myopia and Hypermeteropia

Myopia	Hypermeteropia
Short sightedness	Long sightedness.
Lengthening of eye ball	Shortening of eye ball.
Nearby objects can be seen clearly	Distant objects can be seen clearly
The image formed before retina.	The image formed behind retina.
Corrected by using concave lens.	Corrected by using concave lens.

3. Explain the construction and working of a 'Compound Microscope'. Construction:



- It consists of two convex lenses.
- The lens placed near the object called as **objective lens**
- The lens placed near the observer's eye is called as **eye lens**
- Both the lenses are fixed in a narrow tube with adjustable provision.

Working:

- The object AB is placed at a distance slightly greater than the focal length of objective lens.
- **A real, inverted and magnified image** A'B' is formed at the other side of the objective lens.
- This image behave as the **object** for the eye lens.
- The position of the eye lens is adjusted in such a way, that the image (A'B') falls within the principal focus of the eye piece.
- This eye piece forms a virtual, enlarged and erect image (A"B") on the same side of object.

ADDITIONAL QUESTIONS:

1. Applications of convex lenses:

- Used as camera lenses, magnifying lenses
- Used in making microscope, telescope and slide projectors.
- Used to correct hypermetropia

2. Applications of concave lenses:

- Used to correct 'myopia'
- Used as eye lens of 'Galilean Telescope'
- Used in wide angle spy hole indoors.

3. Uses of Simple microscope:

- Used by watch repairers and jewellers.
- Used to read small letters clearly.
- Used to observe parts of flower, insects etc.
- Used to observe finger prints in the field of forensic science.

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LESSON – 3 THERMAL PHYSICS

I. CHOOSE THE CORRECT ANSWER:

1. The value of universal gas constant

a) 3.81 mol^{-1} K^{-1} b) 8.03 mol^{-1} K^{-1} c) 1.38 mol^{-1} K^{-1} **d) 8.31 mol^{-1} 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

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

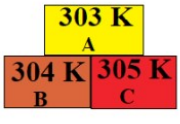
a) X or –X b) Y or –Y **c) both (a) and (b)** d) (a) or (b)

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

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



a) A ← B, A ← C, B ← C
b) A → B, A → C, B → C
c) A → B, A ← C, B → C
d) A ← B, A → C, B ← C

Ans: a) A ← B, A ← C, B ← C

II. FILL IN THE BLANKS:

1. The value of Avogadro number **6.023 x 10^{23} / mol (or) mol^{-1}**
2. The temperature and heat are **Scalar** quantities
3. One calorie is the amount of heat energy required to raise the temperature of **1 gm** of water through **1°C**.

4. According to Boyle's law, the shape of the graph between pressure and reciprocal of volume is **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. - **False**

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. - **True**

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

Volume is **directly proportional** to temperature at constant pressure.

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

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

Answer:

1. Linear expansion - Change in length
2. Superficial expansion - change in area
3. Cubical expansion - change in volume
4. Heat transformation - hot body to cold body
5. Boltzmann constant - 1.381×10^{-23} JK^{-1}

V. TWO MARKS:

1. Define one calorie.

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

2. Distinguish between linear, arial and superficial expansion.

i) Liner Expansion: When a body is heated, the length of the body changes.

$$\alpha_L = \Delta L / L_0 \Delta T$$

ii) Arial Expansion and superficial expansion: When a body is heated, the area of the body changes . $\alpha_A = \Delta A / A_0 \Delta T$

3. What is co-efficient of cubical expansion?

The ratio of increase in volume of the body per degree rise in temperature to its unit volume is called as co-efficient of cubical expansion. It's unit is K^{-1}.

4. State Boyle's law

When the temperature is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure.

$$P \propto 1/V \qquad PV = \text{constant}$$

5. State-the law of volume

According to this law, when the pressure of gas is kept constant, the volume of a gas is directly proportional to the temperature of the gas. **$V \propto T$ or V/T = constant**

6. Distinguish between ideal gas and real gas.

Ideal gas	Real gas
If the atoms or molecules of a gas do not interact with each other	If the molecule or atom of a gas interact with each other
Force of attraction is very weak	There is no force of attraction

7. What is co-efficient of real expansion?

The ratio of true rise in the volume of the liquid to unit original volume when the temperature rises by one kelvin". Its SI unit is K^{-1}.

8. What is co-efficient of apparant expansion?

The ratio of the apparent rise in the volume of the liquid per degree rise in temperature to its unit volume. Its SI unit is K^{-1}.

VI. ANSWER IN DETAIL:

1. Derive the ideal gas equation.

An ideal gas obeys Boyle's law and Charles's law and Avogadro's law.

⇒Boyle's law, **PV = constant** ... (1)

⇒Charles's law, **V/T = constant** ... (2)

⇒Avogadro's law, **V/n = constant** ... (3)

Combining three equations, **PV/nT = constant** ... (4)

Substitute $n = \mu N_A$

Equation (4) can be written as $PV/ \mu N_A T = \text{constant}$

Constant, k_B Boltzmann's constant.

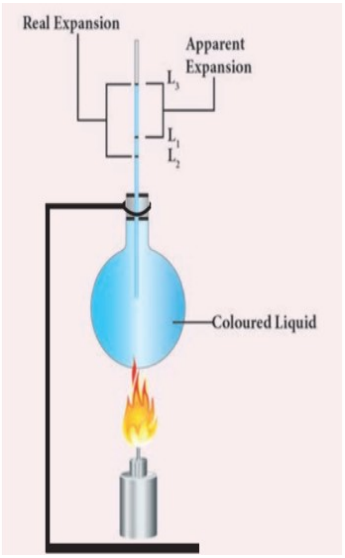
$PV/ \mu N_A T = k_B$

$PV = \mu N_A k_B T$

$\therefore \mu N_A k_B = R$ (universal gas constant)

$PV = RT$ ... (5) This is called **ideal gas equation.**

2. Explain the experiment of measuring the real and apparent expansion of a liquid with a neat diagram.



- The liquid whose real and apparent expansion is to be determined is poured in a container up to a level. **Mark this level as L_1.**
- Now, heat the container and the liquid using a burner. Initially, the container receives the thermal energy and it expands.
- As a result, the volume of the liquid appears to have reduced. **Mark this reduced level of liquid as L_2.**
- On further heating, the thermal energy is supplied to the liquid resulting in the expansion of the liquid.
- Hence, **the level of liquid rises to L_3.**
- Now, the difference between the levels L_1 and L_3 is called as **apparent expansion,** and the difference between the levels L_2 and L_3 is called **real expansion.**
- The real expansion is always more than the apparent expansion.

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LESSON – 4 ELECTRICITY

I. CHOOSE THE BEST 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.

2. SI unit of resistance is

a) mho b) joule **c) ohm** d) ohm meter

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.

4. Kilowatt hour is the unit of

a) resistivity b) conductivity **c) electrical energy** d) electrical power

II. FILL IN THE BLANKS:

1. When a circuit is open, **current** cannot pass through it.
2. The ratio of the potential difference to the current is known as **resistance**.
3. The wiring in a house consists of **parallel** circuits.
4. The power of an electric device is a product of **voltage** and **current**.
5. LED stands for **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. - False

Ohm's law states the relationship between current and voltage.

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

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

The SI unit for electric current is the ampere

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

One unit of electrical energy consumed is equal to kilowatt hour

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

The effective resistance of three resistors connected in series is greater than the highest of the individual resistances.

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

Column - I	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

Answer:

(i) electric current - ampere

(h) potential difference - volt

(iii) specific resistance - ohm meter

(iv) electrical power - watt

V. VERY SHORT ANSWER QUESTIONS.

1. Define the unit of current.

- A **charge of one coulomb flows** across any cross section of conductor in one second.
- Ampere **(A)**∴ 1 Ampere = **1 coulomb / 1 second.**

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

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

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

i. e., R α 1/A

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

- Tungsten has a **very high melting point.**
- It will **not melt** when a large amount of current is passed through it and the appliance will be **damaged.**

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

VI. SHORT ANSWER QUESTIONS:

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

- 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.

2. State Ohm's law.

At a constant temperature, the steady current 'I' flowing through a conductor is directly proportional to the potential difference 'V' between two ends of the conductor.

V = IR

3. Distinguish between the resistivity and conductivity of a conductor.

Resistivity	Conductivity
The resistance of a conductor of unit length and unit of cross section.	The reciprocal electrical resistivity
It's unit is ohm metre	It's unit is mho metre-1

4. What connection is used in domestic appliances and why?

- **Parallel connection.**
- **Reason:** Each appliance will get the full voltage. Each of them can be put ON / OFF independently.

VII. ANSWER IN DETAIL:

1. a) What is meant by electric current?

- The rate of flow of charges in a conductor. **I = Q/t**

b) Name and define its unit.

- Ampere (A)
- 1 Ampere = 1 coulomb / 1 second.
- A **charge of one coulomb flows** across any cross section of conductor in one second

c) Which instrument is used to measure the electric current? How should it be connected in a circuit?

Ammeter. It should be connected in a series in a circuit.

2. a) State Joule's law of heating.

Joules' law of heating states that the heat produced in any resistor is Directly proportional to

- the square of the current passing through the resistor.
- the resistance of the resistor.
- the time for which the current passing through the resistor.
- **$H = I^2Rt$**

b) An alloy of nickel and chromium is used as the heating element. Why?

(i) It has high resistivity.
(ii) It has a high melting point.
(iii) It is not easily oxidized.

c) How does a fuse wire protect electrical appliances

When a large current passes through the circuit, the fuse wire melts due to joule's heating effect and hence the circuit gets disconnected.

3. Explain about domestic electric circuits.

- Important components of the main box are (i) a fuse box and (ii) meter.
- Two insulated wire 1) Red wire → Live wire 2) Black wire → neutral wire.
- An electrical potential at 220 V.
- Both, the live wire and the neutral wire enter into box where the main switch
- It passes to main switch which has to two separate circuits.
- i)5A rating. ii) 15 A rating.
- It should be noted that all the circuits in a house are connected in parallel.

4. a) What are the advantages of LED TV over the normal TV?

- It has brighter picture quality.
- It is thinner in size.
- It used less power and consumes very less energy.
- Its life span is more.
- It is more reliable.

b) List the merits of LED bulb.

- Low power, No loss of energy
- It is not harmful to the environment.
- A wide range of colours is possible here.
- Mercury and other toxic material are not required.

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LESSON – 5 - ACOUSTICS

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

2. Velocity of sound in a gaseous medium is 330 m s–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 m s^{-1} b) 660 m s^{1} **c) 156 m s^{-1}** d) 990 m s^{-1}

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

a) 50 kHz **b) 20 kHz** c) 15000 kHz d) 10000 kHz

4. The velocity of sound in air at a particular temperature is 330 m s–1. What will be its value when temperature is doubled and the pressure is halved?

a) 330 m s^{-1} b) 165 m s^{-1} **c) 330 × √2 m s^{-1}** d) 320 / √ 2 m s^{-1}

5. If a sound wave travels with a frequency of 1.25 × 104 Hz at 344 m s–1, the wavelength will be

a) 27.52 m b) 275.2 m **c) 0.02752 m** d) 2.752 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**

7. Velocity of sound in the atmosphere of a planet is 500 m s–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

II. FILL UP THE BLANKS:

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

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

3. A whistle giving out a sound of frequency 450 Hz, approaches a stationary observer at a speed of 33 m s–1. The frequency heard by the observer is (speed of sound = 330 ms^{-1}) **500 Hz**.

4. A source of sound is travelling with a velocity 40 km/h towards an observer and emits a sound of frequency 2000 Hz. If the velocity of sound is 1220 km/h, then the apparent frequency heard by the observer is **2068 Hz**.

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

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

Sound waves **cannot** travel through vacuum

2. Waves created by Earth Quake are Infrasonic. - **True**

3. The velocity of sound is independent of temperature. - **False**

The velocity of sound is **dependent** of temperature.

4. The Velocity of sound is high in gases than liquids. - **False**

The velocity of sound is high in **liquids** than **gases.**

IV. MATCH THE FOLLOWING:

1. Infrasonic	(a) Compressions
2. Echo	(b) 22 kHz
3. Ultrasonic	(c) 10 Hz
4. High pressure region	(d) Ultrasonography

Answer:

1. Infrasonic - 10 Hz
2. Echo - Ultrasonography
3. Ultrasonic - 22 kHz
4. High pressure region - Compressions

V. ANSWER BRIEFLY:

1. What is a longitudinal wave?

These are the waves in which the particles of the medium vibrate along the direction of wave motion is called longitudinal wave.

2. Why does sound faster on a rainy day than on a dry day?

- Presence of moisture in air decreases the density of air.
- Velocity increases with the decrease in density.
- Hence, velocity of sound increases on a rainy day.

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

The amplitude of vibration of air molecules is greater than liquid molecules, so empty vessel produces more sound than a filled one.

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

- The ceiling of concert halls are made curved so that sound, after reflection from the curved ceiling, reaches all the paths of the hall.
- A curved ceiling actually acts like a large concave soundboard and reflection sound down onto the audience sitting in the Hall.

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

- When source (S) and listener (L) both are at rest.
- When source S and L are moving in mutually perpendicular direction.
- When S and L move in such a way that distance between them remains constant.

VI. ANSWER IN DETAIL:

1. What are the factors that affect the speed of sound in gases?

- **Effect of density :**
  The velocity decreases as the density of the gas increases. V $\alpha \sqrt{1}/d$
- **Effect of temperature :**
  The velocity of sound in a gas increases with the increase in temperature. V $\propto \sqrt{T}$.
- **Effect of relative humidity :**
  Humidity increases, the speed of sound increases.

2. a) What do you understand by the term 'ultrasonic vibration'?

These are sound waves with a frequency greater than 20 kHz.

b) State three uses of ultrasonic vibrations.

- Used in SONAR to measure the depth of sea.
- Used for scanning the position of stones in the kidney.
- To make an image of a person's internal body structure.

c) Name three animals, which can hear ultrasonic vibrations.

1. Mosquito, 2. Dogs, 3. Bats

3. What is an echo?

An echo is the sound reproduced due to the reflection of the original sound

a) Two conditions necessary for hearing an echo:

1. The minimum time gap between the original sound and an echo must be 0.1 s.
2. The minimum distance required to hear an echo is 17.2 m.

b) The medical applications of echo:

Echo is used in obstetric ultrasonography

c) Calculation speed of sound :

Speed of Sound = Distance travelled / Time taken = 2d/t

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LESSON – 6 NUCLEAR PHYSICS

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**

2. Unit of radioactivity is _____

a. roentgen b. curie c. Becquerel **d. all the above**

3. Artificial radioactivity was discovered by _____

a. Bequerel **b. Irene Curie** c. Roentgen d. Neils Bohr

4. In which of the following, no change in mass number of the daughter nuclei takes place i) α decay ii) β decay iii) γ decay iv) neutron decay

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

5. _____ isotope is used for the treatment of cancer.

a. Radio Iodine **b. Radio Cobalt** c. Radio Carbon d. Radio Nickel

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

7. _____ aprons are used to protect us from gamma radiations

a. Lead oxide b. Iron **c. Lead** d. Aluminium

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

i. α particles are photons ii. Penetrating power of γ radiation is very low
iii. Ionization power is maximum for α rays
iv. Penetrating power of γ radiation is very high
a. (i) & (ii) are correct b. (ii) & (iii) are correct c.(iv) only correct **d. (iii) & (iv) are correct**

9. Proton - Proton chain reaction is an example of _____

a. Nuclear fission b. α – decay **c. Nuclear fusion** d. β – decay

10. In the nuclear reaction $_{6}X^{12} \xrightarrow{\alpha \text{ decay}} {}_{Z}Y^{A}$ **, the value of A & Z.**

a. 8, 6 b. 8, 4 **c. 4, 8** d. cannot be determined with the given data

11. Kamini reactor is located at _____

a. Kalpakkam b. Koodankulam c. Mumbai d. Rajasthan

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

II. FILL IN THE BLANKS:

1. One roentgen is equal to **3.7×10^{10}** disintegrations per second
2. Positron is an **antiparticle of electron**.
3. Anemia can be cured by **Radio iron** isotope
4. Abbreviation of ICRP **International Commission on Radiological Protection**
5. **Dosi meter** is used to measure exposure rate of radiation in humans.
6. **Gamma rays** has the greatest penetration power.
7. ${}_{z}Y^{A} \rightarrow {}_{z+1}Y^{A} + X$; Then, X is **Beta particle**
8. ${}_{z}X^{A} \rightarrow {}_{z}Y^{A}$ This reaction is possible in **Gamma** decay.
9. The average energy released in each fusion reaction is about **3.84×10^{12}** J.
10. Nuclear fusion is possible only at an extremely high temperature of the order of **10^{7} to 10^{9} K** K.
11. The radio isotope of **phosphorous** helps to increase the productivity of crops.
12. If the radiation exposure is 100 R, it may cause **leukemia**.

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

1. Plutonium -239 is a fissionable material. **- True**
2. Elements having atomic number greater than 83 can undergo nuclear fusion. **- False**
Elements having atomic number greater than 83 can undergo nuclear fusion not fusion.
3. Nuclear fusion is more dangerous than nuclear fission. **- True**
4. Natural uranium U-238 is the core fuel used in a nuclear reactor. **- False**
Natural uranium **U-235** is the core fuel used in a nuclear reactor.
5. If a moderator is not present, then a nuclear reactor will behave as an atom bomb.
- False
If a moderator is not present, then a nuclear reactor will **not** behave as an atom bomb.
6. During one nuclear fission on an average, 2 to 3 neutrons are produced. **- True**
7. Einstein's theory of mass energy equivalence is used in nuclear fission and fusion.
- True

IV. MATCH THE FOLLOWING

MATCH: I

a. BARC	Kalpakkam
b. India's first atomic power station	Apsara
c. IGCAR	Mumbai
d. First nuclear reactor in India	Tarapur

Answer:
(a) BARC – Mumbai
(b) India's first atomic power station - Tarapur
(c) IGCAR – Kalpakkam
(d) First nuclear reactor in India - Apsara

MATCH: II

a. Fuel	lead
b. Moderator	heavy water
c. Coolant	cadmium rods
d. Shield	uranium

Answer:

(a) Fuel – uranium

(b) Moderator - cadmium rods

(c) Coolant - heavy water

(d) Shield - lead

MATCH: III

a. Soddy Fajan	Natural radioactivity
b. Irene Curie	Displacement law
c. Henry Bequerel	Mass energy equivalence
d. Albert Einstein	Artificial Radioactivity

Answer:

(a) Soddy and Fajan - Displacement law

(b) Irene Curie - Artificial Radio activity

(c) Henry Becquerel - Natural radio activity

(d) Albert Einstein - Mass energy equivalence

MATCH: IV

a. Uncontrolled fission reaction	Hydrogen Bomb
b. Fertile material	Nuclear Reactor
c. Controlled fission reaction	Breeder reactor
d. Fusion reaction	Atom bomb

Answer:

(a) Uncontrolled fission reaction - Atom bomb

(b) Fertile Material - Breeder reactor

(c) Controlled fission reaction - Nuclear Reactor

(d) Fusion reaction - Hydrogen Bomb

MATCH: V

a. Co - 60	Age of fossil
b. I - 131	Function of Heart
c. Na - 24	Leukemia
d. C - 14	Thyroid disease

Answer:

(a) Co-60 - Leukemia

(b) I - 131 - Thyroid disease

(c) Na-24 - Function of Heart

(d) C- 14 - Age of fossil

V. ARRANGE THE FOLLOWING IN THE CORRECT SEQUENCE:

1. Arrange in descending order, on the basis of their penetration power

Alpha rays, beta rays, gamma rays, cosmic rays

(i) gamma rays (ii) beta rays (iii) Alpha rays (iv) cosmic rays

2. Arrange the following in the chronological order of discovery

Nuclear reactor, radioactivity, artificial radioactivity, discovery of radium.

(i) radioactivity (ii) discovery of radium (iii) artificial radio activity (iv) Nuclear reactor

VI. USE THE ANALOGY TO FILL IN THE BLANK

1. Spontaneous process : Natural Radioactivity, Induced process : **Artificial radioactivity**
2. Nuclear Fusion : Extreme temperature, Nuclear Fission : **Room temperature**
3. Increasing crops : Radio phosphorous, Effective functioning of heart : **Radio sodium**
4. Deflected by electric field : α ray, Null Deflection : **γ - ray**

VII. SHORT ANSWER QUESTIONS:

1. Define critical mass.

❖The minimum mass of a fissile material necessary to **sustain** the **chain reaction.**

❖Depends on the **nature, density** and the size.

2. Define one roentgen.

❖The quantity of radioactive substance which produces a charge of **2.58x10-4 coulomb** in 1 kg of air at STP and humidity.

3. Give the function of control rods in a nuclear reactor.

❖Control rods are used to control the number of neutrons in order to have **sustained chain reaction.**

❖They **absorb** the **neutrons.**

4. What is stellar energy?

Fusion reaction that takes places in the **cores** of the sun and other stars results in an **enormous** amount of **energy.**

5. Give any two uses of radio isotopes in the field of agriculture?

❖**Radio isotope of P32 – Increase the productivity of crops.**

❖**Radio isotopes** can be used to **kill** the **insects** and **parasites.**

6. Write any three features of natural and artificial radioactivity.

Natural radioactivity	**Artificial radioactivity**
It cannot be controlled	It can be controlled
Spontaneous process	**Induced process**
Alpha, beta and **gamma**	**Elementary particles**-neutron Positron
Z > 83	**Z < 83**

7. State Soddy and Fajan's displacement law.

❖When a radioactive element emits an **alpha particle,** a daughter nucleus is formed whose **mass number** is **less** by **4 units** and the **atomic number** is less by **2 units.**

❖A radioactive element emits a **beta particle,** a daughter nucleus is formed whose **mass number** is the **same** and the **atomic number** is **more** by **1 unit.**

8. In Japan, some of the newborn children are having congenital diseases. Why?

- ❖ Due to high exposure of radiation
- ❖ Caused by atom bomb during second world war

9. Mr. Ramu is working as an X - ray technician in a hospital. But, he does not wear the lead aprons. What suggestion will you give to Mr. Ramu?

- Lead coated aprons and lead gloves should be used .
- Avoid eating while handling radioactive materials.
- Dosimeters should be worn by the users to check the level of radiation.

VIII. ANSWER IN DETAIL:

1. Explain the process of controlled and uncontrolled chain reactions.

Controlled chain reaction:

- The number of neutrons released is maintained to be one.
- The energy released due to this reacttio can be utilized for constructive purposes.
- Used in a nuclear reactor to produce energy in a sustained and controlled manner.

Uncontrolled chain reaction:

- The number of neutrons multiplies indefinitely and causes fission in a large amount of the fissile material.
- This results in the release of a huge amount of energy within a fraction of a second.

2. Compare the properties of alpha, beta and gamma radiations.

PROPERTIES	α rays	β rays	γ rays
Definition	Helium nucleus	electrons	Photons.
Charge	Positively charged	Negatively charged	Neutral particles.
Ionising power	greater than β rays and γ rays.	Comparatively low	Very less ionization power
Penetrating power	Low penetrating	Greater than that of α rays.	High penetrating power
Effect of electric and magnetic field	Deflected by both fields	Deflected by both fields	Not deflected by both fields
Speed	1/10 to 1/20 times the speed of light.	9/10 times the speed of light.	They travel with the speed of light.

3. What is a nuclear reactor? Explain its essential parts with their functions.

- **Nuclear reactor:**
  A device in which the nuclear fission reaction takes place in a controlled manner to produce electricity.
- **Fuel:**
  A fissile material is used as the fuel. Ex.Uranium.
- **Moderator:**
  - It is used to slow down the high energy neutrons to provide slow neutrons.
  - Graphite and heavy water
- **Control rod:**
  - To control the number of neutrons in order to have sustained chain reaction.
  - Boron or Cadmium rods

- **Coolant:**
  - A coolant is used to remove the heat produced in the reactor core, to produce steam.
  - Water, air and helium are some of the coolants
  - This steam is used to run a turbine in order to produce electricity.
- **Protection wall**

  A thick concrete lead wall is built around the nuclear reactor in order to prevent the harmful radiations.

4. Compare Nuclear fission and nuclear fusion.

Nuclear Fission	Nuclear Fusion
The process of breaking up of a heavy nucleus into two smaller nuclei	Combination of two lighter nuclei to form a heavier nucleus.
Can be performed at room temperature.	Extremely high temperature and pressure is needed.
Alpha, beta and gamma radiations are emitted.	Alpha rays, positrons, and neutrinos are emitted.
Fission leads to emission of gamma radiation.	Only light and heat energy is emitted.

5. Explain uses of Radioactivity in medicine

- Radio sodium (Na^{24}) is used for the effective functioning of heart.
- Radio – Iodine (I^{131}) is used to cure goiter.
- Radio - iron is (Fe^{59}) is used to diagnose anemia and also to provide treatment for the same.
- Radio phosphorous (P^{32}) is used in the treatment of skin diseases.
- Radio cobalt (Co^{60}) and radio - gold (Au^{198}) are used in the treatment of skin cancer.

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CHEMISTRY

LESSON – 7 ATOMS AND MOLECULES

I. CHOOSE THE BEST ANSWER.

1. Which of the following has the smallest mass?

a. 6.023 × 10^{23} atoms of He **b. 1 atom of He**

c. 2 g of He d. 1 mole atoms of He

2. Which of the following is a triatomic molecule?

a. Glucose b. Helium **c. Carbon dioxide** d. Hydrogen

3. The volume occupied by 4.4 g of CO_2 at S.T.P

a. 22.4 litre **b. 2.24 litre** c. 0.24 litre d. 0.1 litre

4. Mass of 1 mole of Nitrogen atom is

a. 28 amu b. 14 amu **c. 28 g** d. 14 g

5. Which of the following represents 1 amu?

a. Mass of a C – 12 atom b. Mass of a hydrogen atom

c. 1/12th of the mass of a C – 12 atom d. Mass of O – 16 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 × 10^{23} electrons.

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

8. In the nucleus of $_{20}Ca^{40}$, 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

9. The gram molecular mass of oxygen molecule is

a. 16 g b. 18 g **c. 32 g** d. 17 g

10. 1 mole of any substance contains ____ molecules.

a. 6.023 × 10^{23} b. 6.023 × 10^{-23} c. 3.0115 × 10^{23} d. 12.046 × 10^{23}

II. FILL IN THE BLANKS:

1. Atoms of different elements having **same** mass number, but **different** atomic numbers are called isobars.
2. Atoms of different elements having same number of **neutrons** are called isotones.
3. Atoms of one element can be transmuted into atoms of other element by **artificial transmutation**
4. The sum of the numbers of protons and neutrons of an atom is called its **mass number**
5. Relative atomic mass is otherwise known as **standard atomic weight**
6. The average atomic mass of hydrogen is **1.0079** amu.
7. If a molecule is made of similar kind of atoms, then it is called **Homo** atomic molecule.
8. The number of atoms present in a molecule is called its **atomicity**
9. One mole of any gas occupies **22400** ml at S.T.P
10 Atomicity of phosphorous is **4**

III. MATCH THE FOLLOWING:

1. 8 g of O_2	4 moles
2. 4 g of H_2	0.25 moles
3. 52 g of He	2 moles
4. 112 g of N_2	0.5 moles
5. 35.5 g of Cl_2	13 moles

Answer:

1. 8 g of O_2 - 0.25 moles
2. 4 g of H_2 - 2 moles
3. 52 g of He - 13 moles
4. 112 g of N_2 - 4 moles
5. 35.5 g of Cl_2 - 0.5 moles

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

1. Two elements sometimes can form more than one compound. - **True**
2. Noble gases are Diatomic - **False** **Noble gases are monoatomic.**
3. The gram atomic mass of an element has no unit - **False**

The gram atomic mass of an element is exposed in **grams.**

4. 1 mole of Gold and Silver contain same number of atoms - **True**
5. Molar mass of CO_2 is 42g. – **False** **Molar mass of CO_2 is 44g.**

V. SHORT ANSWER QUESTIONS:

1. Define: Relative atomic mass.

The Relative Molecular Mass of a molecule is the ratio between the mass of one molecule of the substance to 1/12th mass of an atom of Carbon-12.

$$\text{Relative atomic mass Ar} = \frac{\text{Average mass of the isotopes of the element}}{\text{1 /12th of the mass of one carbon 12 atom}}$$

2. Write the different types of isotopes of oxygen and its percentage abundance.

Isotope	Mass (amu)	% abundance
$_8O^{16}$	15.9949	99.757
$_8O^{17}$	16.9991	0.038
$_8O^{18}$	17.9992	0.205

3. Define: Atomicity

The number of atoms present in the molecule is called as its atomicity.

Ex. HCl- no. of atoms: 2 – Atomicity -2

4. Give any two examples for heterodiatomic molecules.

Examples of heterodiatomic HCl, CO.

5. What is Molar volume of a gas?

(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.

% of nitrogen in NH_3 = [Mass of nitrogen / Molar mass of NH_3] x 100

= (14/17) X 100 = 82%

VI. ANSWER IN DETAIL:

1. Give the salient features of "Modern atomic theory".

- An atom is no longer indivisible.
- Atoms of the same element may have different atomic mass.
  Ex – isotopes $_{17}Cl^{35}$, $_{17}Cl^{37}$.
- Atoms of different elements may have same atomic masses.
  Ex – Isobars $_{18}Ar^{40}$, $_{20}Ca^{40}$.
- Atoms of one element can be transmuted into atoms of other elements.
- Atoms may not always combine in a simple whole number ratio.
  Eg: Glucose $C_6H_{12}O_6$
- Atom is the smallest particle that take part in a chemical reaction.
- Mass of an atom can be converted into energy. **$E = mc^2$.**

2. Difference between Atom and Molecule.

Atom	Molecule
Smallest particle of an element	Smallest particle of an element or compound.
Does not exist in free state except in noble gas	Exists in a free a state
Highly reactive	Less reactive
Does not have a chemical bond	Atoms in a molecule are held by chemical bonds

3. Write the application of Avogadro's law

- It explains Gay – Lussac's Law.
- To determine Atomicity of gases
- To derive molecular formula of gases
- To derive the relationship between molecular mass and vapour density
- To determine gram molecular mass (22.4 litre at STP)

4. Derive the relationship between Relative molecular mass and Vapour density

(i) Relative Molecular Mass $= \frac{\textbf{Mass of 1 molecule of gas at STP}}{\textbf{Mass of 1 atom of H}}$

(ii) Vapour density $= \frac{\textbf{Mass of a given volume of gas at STP}}{\textbf{Mass of the same Volume of Hydrogen}}$

According to Avogadro's law,

Vapour density (at STP) $= \frac{\textbf{Mass of a n molecule of a gas at STP}}{\textbf{Mass of n molecule of Hydrogen}}$

Hydrogen is diatomic molecule so,

Vapour density $= \frac{\textbf{Mass of a 1 molecule of a gas at STP}}{\textbf{2 X Mass of 1 atom of Hydrogen}}$

2 x Vapour density $= \frac{\textbf{Mass of a 1 molecule of a gas at STP}}{\textbf{Mass of 1 atom of Hydrogen}}$

2 x Vapour density = **Relative Molecular Mass**

Relative Molecular Mass = 2 x Vapour density

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LESSON – 8 PERIODIC CLASSIFICATION OF ELEMENTS

I. CHOOSE THE BEST 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**

2. The basis of modern periodic law is_____.

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

3. _____ group contains the member of halogen family.

a) 17th b) 15th c) 18th d) 16th

4. _____ is a relative periodic property

a) atomic radii b) ionic radii c) electron affinity **d) electronegativity**

5. Chemical formula of rust is _____.

a) FeO.xH_2O b) FeO_4.xH_2O **c) Fe_2O_3.xH_2O** d) FeO

6. In the alumino thermic process the role of Al is _____.

a) oxidizing agent **b) reducing agent**

c) hydrogenating agent d) sulphurising 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

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

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

9. Neon shows zero electron affinity due to _____.

a) stable arrangement of neutrons **b) stable configuration of electrons**

c) reduced size d) increased density

10. _____ is an important metal to form amalgam.

a) Ag **b) Hg** c) Mg d) Al

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 **ionic**
2. **6th** is the longest period in the periodical table.
3. **Atomic number** forms the basis of modern periodic table.
4. If the distance between two Cl atoms in Cl_2 molecule is 1.98Å, then the radius of Cl atom is **0.99 A**.
5. Among the given species A–,A+, and A, the smallest one in size is **A^+**.
6. The scientist who propounded the modern periodic law is **Henry Moseley**.
7. Across the period, ionic radii **decreases** (increases,decreases).
8. **Lanthanides** and **Actinides** are called inner transition elements.
9. The chief ore of Aluminium is **Bauxite**.
10. The chemical name of rust is **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

Answer

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. - False

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

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

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

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

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

Al wires are used in electric cables as they are **good condutors.**

5. An alloy is a heterogenous mixture of metals. - False

An alloy is a homogeneous mixture of metals.

V. SHORT ANSWER QUESTIONS:

1. A is a reddish brown metal, which combines with O_2 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.

Reddish brown metal A is copper.

$$2\,Cu + O_2 \xrightarrow{\text{below 1370K}} 2\,CuO$$

(copper II oxide- black)

$$4\,Cu + O_2 \xrightarrow{\text{above 1370K}} 2\,Cu_2O$$

(copper I oxide – red)

A	**Cu**	**Copper**
B	**CuO**	**Copper II oxide**
C	**Cu_2O**	**Copper I oxide**

2. A is a silvery white metal. A combines with O_2 to form B at 800°C, the alloy of A is used in making the aircraft. Find A and B

Silvery white metal is aluminium.

$4Al + 3O_2 \rightarrow 2Al_2O_3$ (Aluminium oxide)

A	**Al**	**Aluminium**
B	**Al_2O_3**	**Aluminum oxide**

3. What is rust? Give the equation for formation of rust.

When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust and the phenomenon of formation of rust is known as rusting.

$4Fe + 3O_2 + x\,H_2O \rightarrow 2Fe_2O_3.xH_2O$ (rust)

4. State two conditions necessary for rusting of iron.

(i) Presence of moist air (ii) Presence of water (iii) Presence of oxygen

5. Define Alloys?

It is a homogeneous mixture of two or more metals or one or two more metals with non metals.

6. What is Amalgam ? Give Example?

An alloy of mercury with another metal **Ex: Silver tin Amalgam**

7. State the modern periodic law.

The physical and chemical properties of the elements are the periodic function of their atomic number.

VI. ANSWER IN DETAIL:

1. Give reasons for alloying.

- To modify appearance and colour.
- To modify chemical activity.
- To lower the melting point.
- To increase hardness and tensile strength.
- To increase resistance to electricity.

2. What are the methods include to preventing of corrosion.

(i) Alloying : The metals can be alloyed to prevent the process of corrosion.

Eg: Stainless steel.

(ii) Surface Coating: It involves application of a protective coating over the metal.

It is of the following types.

Galvanization	Zinc on iron sheets
Electroplating	Coating the metal by electric current.
Anodizing	Change the corrosion resistant. Ex: Aluminium
Cathodic Protection	Corrodible metal act as anode and the protected metal act as cathode

3. a) State the reason for addition of caustic alkali to bauxite ore during purification of bauxite.

Caustic soda solution at 150° is added to bauxite ore to obtain Sodium Meta Aluminate

b) Along with cryolite and alumina, another substance is added to the electrolyte mixture. Name the substance and give one reason for the addition.

Fluorspar is added to the electrolyte mixture so as to lower the fusion temperature of the electrolyte.

4. The electronic configuration of metal A is 2, 8, 18, 1. The metal A when exposed to air and moisture forms B a green layered compound. A with con. H_2SO_4 forms C and D along with water. D is a gaseous compound. Find A,B,C and D.

Metal A is copper

$$\Rightarrow \underset{[A]}{2Cu} + O_2 + CO_2 + H_2O \rightarrow \underset{[B]}{CuCO_3.Cu(OH)_2}$$

$$\Rightarrow \underset{[A]}{Cu} + 2H_2SO_4 \rightarrow \underset{[C]}{CuSO_4} + \underset{[D]}{SO_2} \uparrow + H_2O$$

Compound	Formula	Name
A	Cu	Copper
B	$CuCO_3.Cu(OH)_2$	Basic copper carbonate
C	$CuSO_4$	Copper sulphate
D	SO_2	Sulphur-di-oxide

5. Metal A belongs to period 3 and group 13. A in red hot condition reacts with steam to form B. A with strong alkali forms C. Find A,B and C with reactions.

$$\Rightarrow 2Al + 3H_2O \rightarrow Al_2O_3 + 3H_2$$
[A] [B]

$$\Rightarrow 2Al + 2NaOH + 2H_2O \rightarrow 2NaAlO_2 + 3H_2 \uparrow$$
[A] [C]

Compound	Formula	Name
A	Al	Aluminium
B	Al_2O_3	Aluminium oxide
C	$NaAlO_2$	Sodium meta aluminate

6. Name the acid that renders aluminium passive. Why?

- The acid that renders aluminium passive is dilute orconcentrated nitric acid.
- Aluminium becomes passive due to the formation of anoxide film on its surface.

7. a) Identify the bond between H and F in HF molecule. Ionic bond

b) What property forms the basis of identification? Electronegativity

c) How does the property vary in periods and in groups?

- Along the period, from left to right in the periodic table, the electronegativity increases.
- On moving down a group, the electronegativity of the elements decreases.

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LESSON - 9 - SOLUTIONS

I. CHOOSE THE CORRECT ANSWER:

1. A solution is a _____ mixture.

a. homogeneous b. heterogeneous
c. homogeneous and heterogeneous d. non homogeneous

2. The number of components in a binary solution is _____

a. 2 b. 3 c. 4 d. 5

3. Which of the following is the universal solvent?

a. Acetone b. Benzene **c. Water** d. Alcohol

4. 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

5. 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**

6. When pressure is increased at constant temperature the solubility of gases in liquid _____.

a. No change **b. increases** c. decreases d. no reaction

7. 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

8. 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

9. Deliquescence is due to _____

a. Strong affinity to water b. Less affinity to water

c. Strong hatred to water d. Inertness to water

10. Which of the following is hygroscopic in nature?

a. ferric chloride b. copper sulphate penta hydrate

c. silica gel d. none of the above

II. FILL IN THE BLANKS:

1. The component present in lesser amount, in a solution is called **Solute**
2. Example for liquid in solid type solution is **Mercury with sodium (amalgam)**
3. Solubility is the amount of solute dissolved in **100** g of solvent.
4. Polar compounds are soluble in **polar** solvents
5. Volume persentage decreases with increases in temperature because **polar of expansion of liquids**

III. MATCH THE FOLLOWING

1. Blue vitriol	$CaSO_4 .2H_2O$
2. Gypsum	CaO
3. Deliquescence	$CuSO4 .5H_2O$
4. Hygroscopic	NaOH

Answer:

1. Blue vitriol – $CuSO_4 .5H_2O$
2. Gypsum – $CaSO_4 .2H_2O$
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. - False

Solutions which contain three components are called **Trinary** solution.

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

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

4. The molecular formula of green vitriol is $MgSO_4.7H_2O$ - False

The molecular formula of green vitriol is **Mg $SO_4.7H_2O$.**

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

V. SHORT ANSWERS:

1. Define the term: Solution

A solution is a homogeneous mixture of two or more substances.

2. What is mean by binary solution.

A solution consisting of two components are called binary solution.

3. Give an example each i) gas in liquid ii) solid in liquid iii) solid in solid iv) gas in gas

i) Gas in liquid - soda water
ii) Solid in liquid – salt in water
iii) Solid in solid - copper dissolved in gold
iv) Gas in gas - mixture of Helium and oxygen.

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

Aqueous solution	The solution in which water acts as a solvent	**E.g : salt in water**
Non - Aqueous solution	The solution in which any liquid other than water acts as a solvent	**E.g : Sulphur dissolved in CS_2**

5. Define Volume percentage

The percentage by volume of solute (in ml) present in the given volume of the solution.

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

The solubility of gas is more at lower temperature where as it decreases with increasing temperature.

7. Define Hydrated salt.

The ionic substances, which contain water of crystallization, are known as hydrated salts.

8. A hot saturated solution of copper sulphate forms crystals as it cools. Why?

Solubility increases with increase in temperature while decreases with decrease in temperature. The solubility of copper sulphate at 25^{0}C is 20.7 g in 100g of water

9. Classify the following substances into deliquescent, hygroscopic.

(Conc. Sulphuric acid, Copper sulphate penta hydrate, Silica gel, Calcium chloride, and Gypsum salt.)

Deliquescent substances	**Hygroscopic substances**
Calcium chloride	Conc. Sulphuric acid, Silica gel, Gypsum salt

VI. ANSWER IN DETAIL:

1. Write notes on i) saturated solution ii) unsaturated solution

i) Saturated solution:

A solute in which no more solute can be dissolved in a definite amount of the solven at a given temperature.

Ex : 36 g of NaCl in 100g of water at 25^{0}C

ii) Un saturated solution:

Solution is one that contains less solute than that of the saturated solution at a given temperature.

Ex :10 g or 20 g of NaCl dissolved in 100g of water at 25℃

2. Write notes on various factors affecting solubility.

i) Nature of the solute and solvent

❖ Non polar compound do not dissolve in polar solvents. Polar compounds do not dissolved in Non polar solvents.

ii) Effect of temperature

a) Solubility of solid in liquid:

❖ Solubility of a solute in a liquid solvent increases with increase in temperature.

b) Solubility of gases in liquid:

❖ The solubility of gas is more at lower temperature whereas it decreases with increasing temperature.

iii) Effect of Pressure:

❖ When the pressure is increased, the solubility of a gas is also increased.

3. a) What happens when $MgSO_4.7H_2O$ is heated? Write the appropriate equation

When magnesium sulphate heptahydrate crystals are gently heated, it loses seven water molecules and becomes anhydrous magnesium sulphate.

$$MgSO_4 \cdot 7H_2O \underset{\text{Cooling}}{\overset{\text{Heating}}{\rightleftharpoons}} MgSO_4 + 7H_2O$$

b) Define solubility

Solubility is defined as the number of grams of a solute that can be dissolved in 100g of a solvent to form its saturated solution at a given temperature and pressure.

4. In what way hygroscopic substances differ from deliquescent substances.

Hygroscopic substances	Deliquescence substances
1. They absorb moisture and do not dissolve.	1. They absorb moisture and dissolve.
2. Do not change its physical state	2. Change its physical state
3.Amorphous solids or liquids.	3. Substance are crystalize solids.
Ex: Silica gel	Ex: NaOH

5. Vinu dissolves 50 g of sugar in 250 ml of hot water, Sarath dissolves 50 g of same sugar in 250 ml of cold water. Who will get faster dissolution of sugar? and Why?

50 g of sugar in 250 ml of hot water will dissolve faster as solubility of solid solute in liquid solvent increases with increase in temperature.

6. 'A' is a blue coloured crystaline salt. On heating it loses blue colour and to give 'B'. When water is added, 'B' gives back to 'A'. Identify A and B, write the equation.

$$\underset{\text{(Copper sulphate pentahydrate)}}{CuSO_4 \cdot 5H_2O} \underset{\text{Cooling}}{\overset{\text{Heating}}{\rightleftharpoons}} \underset{\text{(Anhydrous copper sulphate)}}{CuSO_4 + 5H_2O}$$

(A) $\rightarrow$**$CuSO_4.5H_2O$** : Copper sulphate Pentahydrate - **Blue**

(B)$\rightarrow$**$CuSO_4$** : Anhydrous Copper sulphate - **White**

7. Will the cool drinks give more fizz at top of the hills or at the foot? Explain

Cool drinks will fizz more at the top of the hill since when pressure decrease solubility of a gas in liquid decreases so CO_2 bubbles out as a gas in a soda can.

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LESSON - 10 -TYPES OF CHEMICAL REACTIONS

I. CHOOSE THE CORRECT ANSWER.

1. $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$ is a

a. Decomposition Reaction **b. Combination Reaction**

c. Single Displacement Reaction d. Double Displacement Reaction

2. Photolysis is a decomposition reaction caused by _____

a. heat b. electricity **c. light** d. mechanical energy

3. A reaction between carbon and oxygen is represented by $C(s) + O_2(g) \rightarrow CO_2(g)$ + Heat. In which of the type(s), the above reaction can be classified?

(i) Combination Reaction **(ii) Combustion Reaction**

(iii) Decomposition Reaction **(iv) Irreversible Reaction**

a. i and ii b. i and iv c. i, ii and iii **d. i, ii and iv**

4. The chemical equation $Na_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s)\downarrow + 2NaCl(aq)$ represents which of the following types of reaction?

a. Neutralisation b. Combustion **c. Precipitation** d. Single displacement

5. Which of the following statements are correct about a chemical equilibrium?

(i) It is dynamic in nature

(ii) The rate of the forward and backward reactions are equal at equilibrium

(iii) Irreversible reactions do not attain chemical equilibrium

(iv) The concentration of reactants and products may be different

a. i, ii and iii b. i, ii and iv c. ii, iii and iv d. i, iii and iv

6. A single displacement reaction is represented by $X(s) + 2HCl(aq) \rightarrow XCl_2(aq) + H_2(g)$. Which of the following(s) could be X.

(i) Zn **(ii) Ag** **(iii) Cu** **(iv) Mg.**

Choose the best pair. a. i and ii b. ii and iii c. iii and iv **d. i and iv**

7. Which of the following is not an "element + element → compound" type reaction?

a. $C(s) + O_2(g) \rightarrow CO_2(g)$ b. $2K(s) + Br_2(l) \rightarrow 2KBr(s)$

c. $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$ d. $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$

8. Which of the following represents a precipitation reaction?

(a) $A_{(s)} + B_{(s)} \rightarrow C_{(s)} + D_{(s)}$ (b) $A_{(s)} + B_{(aq)} \rightarrow C_{(aq)} + D_{(l)}$

(c) $A_{(aq)} + B_{(aq)} \rightarrow C_{(s)} + D_{(aq)}$ (d) $A_{(aq)} + B_{(s)} \rightarrow C_{(aq)} + D_{(l)}$

9. The pH of a solution is 3. Its [OH−] concentration is

a. 1×10^{-3} M b. 3 M **c. 1×10^{-11} M** d. 11 M

10. Powdered $CaCO_3$ reacts more rapidly than flaky CaCO3 because of _____.

a. large surface area b. high pressure c. high concentration d. high temperature

II. FILL IN THE BLANKS:

1. A reaction between an acid and a base is called **neutralization**.
2. When lithium metal is placed in hydrochloric acid, **hydrogen** gas is evolved.
3. The equilibrium attained during the melting of ice is known as **physical equilibrium**.
4. The pH of a fruit juice is 5.6. If you add slaked lime to this juice, its pH **Increases** (increse/decrese)
5. The value of ionic product of water at 250 C is **1.00×10^{-14}**.
6. The normal pH of human blood is **7.35 - 7.45**
7. Electrolysis is type of **decomposition** reaction

8. The number of products formed in a synthesis reaction is **one**
9. Chemical volcano is an example for **decomposition** type of reaction
10. The ion formed by dissolution of H+ in water is called **Hydronium ion**

III. MATCH THE FOLLOWING

REACTION	TYPE	ANSWER
1. $NH_4OH_{(aq)} + CH_3COOH_{(aq)} \rightarrow CH_3COONH_{4(aq)} + H_2O_{(l)}$	a) Single Displacement	1- c
2. $Zn_{(s)} + CuSO_{4(aq)} \rightarrow ZnSO_{4(aq)} + Cu_{(s)}$	b) Combustion	2- a
3. $ZnCO_{3(s)} + Heat \rightarrow ZnO_{(s)} + CO_{2(g)}$	c) Neutralization	3 – d
4. $C_2H_{4(g)} + 4O_{2(g)}) \rightarrow 2CO_{2(g)} + 2H_2O_{(g)} + Heat$	d) Thermal decomposition	4- b

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

1. Silver metal can displace hydrogen gas from nitric acid. - False
Silver metal will not be displace hydrogen gas from nitric acid.
2. The pH of rain water containing dissolved gases like SO_3, CO_2, NO_2 will be less than 7. - True
3. At the equilibrium of a reversible reaction, the concentration of the reactants and the products will be equal. - False
At the equilibrium of a reversible reaction, there is no change in the concentration of the reactants and the products.
4. Periodical removal of one of the products of a reversible reaction increases the yield. - True
5. On dipping a pH paper in a solution, it turns into yellow. Then the solution is basic. - False
On dipping a pH paper in a solution, it turns into yellow. Then the solution is natural.

V. SHORT ANSWER QUESTIONS:

1. When an aqueous solution of potassium chloride is added to an aqueous solution of silver nitrate, a white precipitate is formed. Give the chemical equation of this reaction.

$$KCl + AgNO_3 \rightarrow KNO_3 + AgCl \downarrow$$

2. Why does the reaction rate of a reaction increase on raising the temperature?
Increase in temperature provides energy to break more bonds and thus speeds up the reaction.
3. Define combination reaction. Give one example for an exothermic combination reaction.

- A combination reaction is a reaction in which two or more reactants combine to form a compound.
- **Ex:** On burning magnesium in air, it combines with oxygen to form magnesium oxide. **$2Mg(s) + O_2(g) \rightarrow 2\ MgO(s)$**

4. Can a nickel spatula be used to stir copper sulphate solution? Justify your answer.
Nickel spatula cannot be used to stir the $CuSO_4$ solution. Since Ni will displace Cu from $CuSO_4$ solution and Cu will be deposited on the Nickel spatula.

5. Differentiate reversible and irreversible reactions

Reversible Reaction	Irreversible reaction
i) It can be reversed under suitable conditions	It cannot be reversed
ii) Both forward and backward reactions take place simultaneously	It proceeds only in forward direction
iii) It attains equilibrium	Equilibrium is not attained
iv) It is relatively slow	It is fast

VI. ANSWER IN DETAIL:

1. What are called thermolysis reactions?

In this type of reaction, the reactant is decomposed by applying heat.

As the molecule is dissociated by absorption of heat

$$2HgO_{(s)} \xrightarrow{Heat} 2Hg(l) + O_{2(g)}$$

2. Explain the types of double displacement reactions with examples.

(i) Precipitation Reactions :

When aqueous solutions of two compounds are mixed, if they react to form an insoluble compound and a soluble compound.

$$Pb(NO_3)_{2(aq)} + 2KI_{(aq)} \rightarrow PbI_{2(s)}\downarrow + 2KNO_{3(aq)}$$

(ii) Neutralization Reactions :

- Acid reacts with the base to form a salt and water.
- It is called neutralization reaction as both acid and base neutralise each other.

Acid + Base → Salt + Water

$$HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$$

3. Explain the factors influencing the rate of a reaction.

- **Nature of reactant:**
  - ✓ The reaction of sodium with hydrochloric acid is faster than that with acetic acid.
- **Concentration of the reactants:**
  - ✓ Changing the amount of the reactants also increases the reaction rate.
- **Temperature:**
  - ✓ Most of the reactions go faster at higher temperature.
- **Pressure:**
  - ✓ If the reactants are gases, increasing their pressure increases the reaction rate.
- **Catalyst:**
  - ✓ A catalyst is a substance, which increases the reaction rate without being consumed in the reaction.
- **Surface area of the reactants:**
  - ✓ Powered reactants have more surface area. The collision of reactant particle is increased.

4. How does pH play an important role in everyday life?

- Our body works within the pH range of **7.0 to 7.8.** If any increases (or) decreases leads to diseases.
- pH of the saliva normally ranges between **6.5 to 7.5.** When the pH of the mouth saliva falls below **5.5**, the enamel get weathered.

- **Toothpastes** are generally basic it can neutralize the excess acid and prevent **tooth decay.**
- Citrus fruits require **slightly alkaline soil**, while rice require **acidic soil** and sugarcane requires **neutral soil**.
- The pH of rain water is approximately **7.** Its pH less than 7. It is called **acid rain**.

5. What is a chemical equilibrium? What are its characteristics?

Chemical equilibrium: Rate of forward reaction = Rate of backward reaction.

$$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$$

Characteristics of equilibrium:

- In a chemical equilibrium the rates of the forward and backward reactions are equal.
- Pressure, concentration, colour, density, viscosity etc., of the system remain unchanged with time.
- Both the forward and backward reactions continue to occur even though it appears static externally.
- In physical equilibrium, the volume of all the phases remains constant.

6. A solid compound 'A' decomposes on heating into 'B' and a gas 'C'. On passing the gas 'C' through water, it becomes acidic. Identify A, B and C.

$\Rightarrow$ $CaCO_3 \rightarrow CaO + CO_2\uparrow$

[A] [B] [C]

$\Rightarrow$ $CO_2 + H_2O \rightarrow H_2CO_3$

[C] (Carbonic acid)

A	**$CaCO_3$**	**Calcium carbonate**
B	**CaO**	**Calcium oxide**
C	**CO_2**	**Carbon di oxide**

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LESSON 11 - CARBON AND ITS COMPOUNDS

I. CHOOSE THE BEST 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

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**

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

a. – ol b. – oic acid **c. – al** d. - one

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

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

a. Reduction of ethanol **b. Combustion of ethanol**

c. Oxidation of ethanoic acid d. Oxidation 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 %

7. Which of the following are used as anaesthetics?

a. Carboxylic acids **b. Ethers** c. Esters d. Aldehydes

8. TFM in soaps represents _____ content in soap

a. mineral b. vitamin **c. fatty acid** d. carbohydrate

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.

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 **functional group**.
2. The general molecular formula of alkynes is **C_nH_{2n-2}**
3. In IUPAC name, the carbon skeleton of a compound is represented by **root word** (root word / prefix / suffix)
4. (Saturated / Unsaturated) **Unsaturated** compounds decolourize bromine water.
5. Dehydration of ethanol by conc. Sulphuric acid forms **ethene** (ethene/ ethane)
6. 100 % pure ethanol is called **absolute alcohol**
7. Ethanoic acid turns **Blue** litmus to **Red**
8. The alkaline hydrolysis of fatty acids is termed as **Saponification**
9. Biodegradable detergents are made of **straight**(branched / straight) chain hydrocarbons

III. MATCH THE FOLLOWING:

Functional group –OH	Benzene
Heterocyclic	Potassium stearate
Unsaturated	Alcohol
Soap	Furan
Carbocyclic	Ethene

Answer:

1. Functional group -OH : Alcohol

2. Heterocyclic : Furan

3- Unsaturated : Ethene

4- Soap : Potassium stearate

IV. SHORT ANSWER QUESTIONS:

1. Name the simplest ketone and give its structural formula.

- Simplest Ketone is **acetone**
- Structural formula - **CH_3COCH_3**

2. Classify the following compounds based on the pattern of carbon chain and give their structural formula: (i) Propane (ii) Benzene (iii) Cyclobutane (iv) Furan

(i) Propane : **Acyclic** (ii) Benzene : **Cyclic, Aromatic**

(iii) Cyclo butane : **Alicyclic** (iv) Furan : **Hetetrocyclic**

3. How is ethanoic acid prepared from ethanol? Give the chemical equation.

Ethanoic acid is prepared in large scale, by the oxidation of ethanol in the presence of alkaline potassium permanganate or acidified potassium dichromate.

$$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow[2[O]]{KMnO_4/\,OH^-} \underset{\text{Ethanoic acid}}{CH_3COOH} + H_2O$$

4. How do detergents cause water pollution? Suggest remedial measures to prevent this pollution?

- Some detergents having a branched hydrocarbon chain are not fully biodegradable by microorganisms present in water. So they cause water pollution.
- **Remedial measures**
- Replaceing detergents with branched hydro carbon chains with linear hydro carbon chains which are biodegradable

5. Differentiate soaps and detergents.

Soap	Detergent
Sodium salt of long chain fatty acids.	Sodium salt of sulphonic acids.
It is prepared from animal fats or vegetable oils.	It is prepared from crude oil.
Its effectiveness is reduced when used in hard water.	It is effective even in hard water.
It forms a scum in hard water.	Does not form a scum in hard water.
Poor foaming capacity.	Rich foaming capacity.
Biodegradable.	Non-biodegradable.

V. LONG ANSWER QUESTIONS:

1. What is called homologous series? Give any three of its characteristics?

A group of organic compounds having same general formula and similar chemical are called homologous series.

Important characteristics of homologous series:

i) Each series differs from CH_2 group

ii) All members of homologous series contain the same elements and function group.

iii) Chemical properties of the members of a homologous series are similar

iv) All the members can be prepared by a common method.

2. Arrive at, systematically, the IUPAC name of the compound: CH_3–CH_2–CH_2–OH.

- Step 1 - It contains 3 carbon atoms (Prop).
- Step 2 - It contains single bond (ane).
- Step 3 - It contains alcohol group –OH (al)
- IUPAC of the given formula is **(propanol)**

3. How is ethanol manufactured from sugarcane?

- Ethanol is manufactured from **molasses.**
- Molasses obtained the manufacture of sugar from **sugarcane.**

(i) Dilution of molasses: Molasses is first diluted with water

(ii) Addition of Nitrogen Source

If the nitrogen content of the molasses is poor, **ammonium salts** is added

(iii) Addition of yeast

- The solution obtained is collected to in **large fermentation tanks** and **yeast** is added to it.
- The mixture is kept at about **303 K** for few days.
- During this period, the enzymes **invertase** about the conversion of sucrose.

$$\underset{\text{Sugar}}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{\text{invertase}} \underset{\text{glucose}}{C_6H_{12}O_6} + \underset{\text{fructose}}{C_6H_{12}O_6}$$

$$\underset{\text{glucose or fructose}}{C_6H_{12}O_6} \xrightarrow{\text{zymase}} \underset{\text{ethanol}}{2C_2H_5OH} + 2\,CO_2$$

(iv) Distillation of Wash.

- The fermented liquid containing **15 to 18 %** alcohol
- It is subjected to fractional distillation and becomes **rectified spirit with 95.5 % alcohol**
- And then its refluxed over **quick lime for about 5 to 6 hours** and then allowed to stand for 12 hours
- On distillation of this mixture, **pure alcohol (100%) is** obtained.

4. Give the balanced chemical equation of the following reactions:

(i) Neutralization of NaOH with ethanoic acid.

Ethanoic acid reacts with sodium hydroxide to form sodium ethanoate and water.

$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$

(ii) Evolution of carbon dioxide by the action of ethanoic acid with $NaHCO_3$.

Ethanoic acid reacts with sodium bicarbonate and liberates CO_2, with brisk effervescence. **$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2\uparrow + H_2O$**

(iii) Oxidation of ethanol by acidified potassium dichromate.

Ethanol is oxidized to ethanoic acid with alkaline $KMnO_4$

$$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow[2[O]]{KMnO_4/\,OH^-} \underset{\text{Ethanoic acid}}{CH_3COOH} + H_2O$$

(iv) Combustion of ethanol.

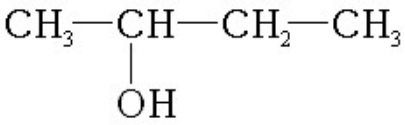
Ethanol is highly inflammable liquid. It burns with oxygen to form carbon dioxide and water. **$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$**

5. Explain the mechanism of cleansing action of soap.

- Polar end is attracted to water.
- Non-polar end is attracted to dirt on the cloth.
- The non polar end of the soap molecule traps the dirt
- The polar end make the entire molecule soluble in water.
- When a soap is dissolved in water, the molecules join together as clusters called micelles.
- The polar end of the soap molecules makes the micelles soluble in water.
- Thus the dirt is washed away with the soap.

6. The molecular formula of an alcohol is $C_4H_{10}O$. The locant number of its –OH group is 2.

(i) Draw its structural formula.



(ii) Give its IUPAC name. – Butan-2-ol.

(iii) Is it saturated or unsaturated? - Saturated

2. An organic compound 'A' is widely used as a preservative and has the molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound 'B'.

(i) Identify the compound 'A'. Ethanoic acid (acetic acid).

(ii) Write the chemical equation for its reaction with ethanol to form compound 'B'.

$$\underset{\text{Ethanol}}{C_2H_5OH} + \underset{\text{Ethanoic acid}}{CH_3COOH} \xrightarrow{\text{conc.}H_2SO_4} \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5} + H_2O$$

(iii) Name the process. - Esterification.

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BIOLOGY

LESSON-12 PLANT ANATOMY AND PLANT PHYSIOLOGY

I. CHOOSE THE CORRECT ANSWER:

1. Casparian strips are present in the _____ of the root.

a) cortex b) pith c) pericycle **d) endodermis**

2. The endarch condition is the characteristic feature of

a) root **b) stem** c) leaves d) flower

3. The xylem and phloem arranged side by side on same radius is called _____

a) radial b) amphivasal **c) conjoint** d) None of these

4. Which is formed during anaerobic respiration

a) Carbohydrate **b) Ethyl alcohol** b) Acetyl CoA d) Pyruvate

5. Kreb's cycle takes place in

a) chloroplast **b) mitochondrial matrix**

c) stomata d) inner mitochondrial membrane

6. Oxygen is produced at what point during photosynthesis ?

a) when ATP is converted to ADP b) when CO_2 is fixed

c) when H_2O is splitted d) All of these

II. FILL IN THE BLANKS:

1. Cortex lies between **epidermal and vascular tissues**.
2. Xylem and phloem occurring on the same radius constitute a vascular bundle called **conjoint**.
3. Glycolysis takes place in **cytoplasm**.
4. The source of O_2 liberated in photosynthesis is **water**.
5. **Mitochondria** is ATP factory of the cells

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. - **False**

Phloem tissue is involved in the transport of **food** in plant.

2. The waxy protective covering of a plant is called as cuticle. - **True**

3. In monocot stem cambium is present in between xylem and phloem. - **False**

In **dicot** stem cambium is present between xylem and phloem.

4**. Palisade parenchyma cells occur below upper epidermis in dicot root.** - **False**

Palisade parenchyma cells occur below upper epidermis in dicot leaf.

5. Mesophyll contains chlorophyll. - **True**

6. Anaerobic respiration produces more ATP than aerobic respiration. - **False**

Aerobic respiration produces more ATP than **anaerobic** respiration.

IV. MATCH THE FOLLOWING:

1. Amphicribal	*Dracaena*
2. Cambium	Translocation of food
3. Amphivasal	Fern
4. Xylem	Secondary growth
5. Phloem	Conduction of water

Answer:

1. Amphicribal - Fern
2. Cambium - Secondary growth
3. Amphivasal - Dracaena
4. Xylem - Conduction of water
5. Phloem - Translocation of food

V. ANSWER IN A SENTENCE:

1. What is collateral vascular bundle?

Collateral vascular bundle is one type of conjoint vascular bundle in which Xylem lies towards the centre and phloem lies towards the periphery. **Eg :** Dicot stem.

2. Where does the carbon that is used in photosynthesis come from?

The carbon that is used in photosynthesis comes from carbon dioxide in the air.

3. What is the common step in aerobic and anaerobic pathway?

Glycolysis is the common step in aerobic and anaerobic pathway.

4. Name the phenomenon by which carbohydrates are oxidized to release ethyl alcohol.

Fermentation or anaerobic respiration.

VI. SHORT ANSWERS:

1. What is collateral vascular bundle?

Xylem lies towards the centre and phloem lies towards the periphery.

2. Where does the carbon that is used in photosynthesis come from?

Carbon dioxide taken from atmosphere

3. What is the common step is aerobic and anaerobic path way? Glycolysis

4. Name the phenomenon by which carbohydrates are oxidized to release ethyl alcohol. Anaerobic respiration.

5. Give an account on vascular bundle of dicot stem.

- ❖ Vascular bundles of dicot stem are conjoint collateral, endarch and open.
- ❖ They are arranged in the form of a ring around the pith

6. Write a short note on mesophyll.

- ❖ In a leaf, the tissue present between the upper and lower epidermis is called mesophyll.
- ❖ It is differentiated into palisade parenchyma and Spongy parenchyma.

7. Name the three basic tissue system in flowering plants.

- ❖ Dermal (or) Epidermal tissue system
- ❖ Ground tissue system
- ❖ Vascular tissue system

8. What is photosynthesis and where in a cell does it occur?

- ❖ Photosynthesis is a process by which autotrophic organisms like green plants, algae and chlorophyll
- ❖ Containing bacteria utilize the energy from sunlight to synthesize their own food.
- ❖ Photosynthesis occur in the chloroplast.

9. Why should the light dependent reaction occur before the light independent reaction?

- ❖ During light independent reactions, CO_2 is reduced into carbohydrates with the help of ATP and NADPH2.
- ❖ So light dependent reaction occur before the light independent reaction.

10. Write the reaction for photosynthesis.

$$6CO_2 + 12H_2O \xrightarrow[\text{chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6H_2O + 6O_2\uparrow$$

Carbon dioxide + Water → Glucose + Water + Oxygen

11. What is R.Q?

It is the ratio of volume of carbon dioxide liberates and the volume of oxygen consumed during respiration.

$$RQ = \frac{\text{Volume of } CO_2 \text{ liberated}}{\text{Volume of } O_2 \text{ consumed}}$$

12. Write down the functions of chloroplast

i) Photosynthesis ii) Storage of starch
iii) Synthesis of fatty acids iv) Storage of lipids.

13. What are the factors affecting photosynthesis

- ➢ External factors → Light, CO_2, temperature, water and mineral elements.
- ➢ Internal factors → Pigments, leaf age, accumulation of carbohydrates and hormones.

II. ANSWER IN DETAIL:

1. Differentiate the following: a) Monocot root and Dicot root

	Dicot Root	**Monocot Root**
No. of Xylem	Tetrarch	Polyarch
Cambium	Present	Absent
Secondary Growth	Present	Absent
Pith	Absent	Present

b) Aerobic and Anaerobic respiration:

Aerobic respiration	**Anaerobic respiration**
Presence of oxygen.	Absence of oxygen.
It occurs in most plants and animals	It occurs in some bacteria
Glucose is converted into carbon dioxide.	Glucose is converted into ethanol
Products : CO_2, $H_2O$and energy	Products : **C_2H_5OH** and energy

2. Describe and name three stages of cellular respiration that aerobic organisms use to obtain energy from glucose.

I) Glycolysis:

- ❖ It is the breakdown of one molecule of glucose (6 carbon) into two molecules of pyruvic acid (3carbon).
- ❖ Glycolysis takes place in cytoplasm of the cell.

II) Krebs cycle:

- ❖ This cycle occurs in mitochondria matrix.
- ❖ At the end of glycolysis, the oxidation of two molecules of pyruvic acid enter into into CO_2 and water.

III) Electron Transport chain:

❖ $NADH_2$ and $FADH_2$ molecules formed during glycolysis and Kreb's cycle are oxidised to NAD^+ and FAD^+ to release the energy via electrons.

❖ The electrons as they more through the system, release energy which is trapped by ADP to synthesize ATP.

❖ This process O_2 the ultimate acceptor of electrons gets reduced to water.

3. How does the light dependent reaction differ from the light independent reaction? What are the end product and reactants in each? Where does each reaction occur within the chloroplast?

Light dependent Reaction	Light independent Reaction
It needs sunlight	It does not needs sunlight
The end products are ATP and NADPH2 and O_2	End product is carbohydrate, ADP and NADP
The reactants are 3 chlorophyll, sunlight and water	The reactants are CO_2, ATP and NADPH2.
It occurs in thylakoid membrane of the chloroplast.	It occurs in the stroma of the chloroplast

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LESSON - 13 STRUCTURAL ORGANISATION IN ANIMALS

I. CHOOSE THE CORRECT ANSWER:

1. In leech locomotion is performed by

a) Anterior sucker b) Posterior sucker c) Setae **d) None of the above**

2. The segments of leech are known as

a) Metameres (somites) b) Proglottids c) Strobila d) All the above

3. Pharyngeal ganglion in leech is a part of

a) Excretory system **b) Nervous system**

c) Reproductive system d) Respiratory system

4. The brain of leech lies above the

a) Mouth b) Buccal Cavity **c) Pharynx** d) Crop

5. The body of leech has

a) 23 segments **b) 33 segments** c) 38 segments d) 30 segments

6. Mammals are _____ animals.

a) Cold blooded **b) Warm blooded** c) Poikilothermic d) All the above

7. The animals which give birth to young ones are

a) Oviparous **b) Viviparous** c) Ovoviviparous d) All the above

II. FILL IN THE BLANKS

1. The posterior sucker is formed by the fusion of the **last 7** segments.
2. The existence of two sets of teeth in the life of an animal is called **diphyodont** dentition.
3. The anterior end of leech has a lobe-like structure called **anterior sucker**.
4. The blood sucking habit of leech is known as **sanguivorous**.
5. **Kidney** separate nitrogenous waste from the blood in rabbit.

6. **37 pairs** spinal nerves are present in rabbit.

III. IDENTIFY WHETHER THE STATEMENTS ARE TRUE OR FALSE. CORRECT THE FALSE STATEMENT:

1. An anticoagulant present in saliva of leech is called heparin. - **False**
   Anticoagulant present in saliva of leech is called hirudin.
2. The vas deferens serves to transport the ovum. - **False**
   The vas deferens serves to transport the **sperm.**
3. The rabbit has a third eyelid called tympanic membrane which is movable. - **False**
   The rabbit has a third eyelid called **nictitating** membrane which is movable.
4. Diastema is a gap between premolar and molar teeth in rabbit. - **False**
   Diastema is a gap between **incisors and premolar** in rabbit.
5. The cerebral hemispheres of rabbit are connected by band of nerve tissue called corpora quadrigemina. - **False**
   The cerebral hemispheres of rabbit are connected by a band of nerve tissue **called corpus callosum.**

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

Answer:

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.
Indian Cattle Leech.

2. How does leech respire?
Leech respires through the skin

3. Write the dental formula of rabbit.
(Canines- 2/0, Incisors – 0/0, Pre Molar – 3/2, Molar – 3/3).

4. How many pairs of testes are present in leech?
Eleven (11) pairs of testes are present in leech.

5. How is diastema formed in rabbit?
The gap between incisors and premolar forms the diastema. Diastema helps in mastication and chewing of food in rabbit.

6. What organs are attached to the two bronchi?
Lungs are attached to the two bronchi

7. Which organ acts as suction pump in leech?
Pharynx acts as suction pump in leech.

8. What does CNS stand for?
CNS stands for Central Nervous System.

9. Why is the teeth of rabbit called heterodont?

As there are three different kinds of teeth (Incisors, Premolars and Molars) in rabbit, the dentition is called heterodont.

10. How does leech suck blood from the host?

Leech attaches itself to the body of the host by suckers. Jaws of mouth causes wound. Then the blood is sucked by pharynx.

VI. SHORT ANSWER QUESTIONS:

1. Why are the rings of cartilages found in trachea of rabbit?

Tracheal walls are supported by rings of cartilage. Cartilage is flexible tissue. They help in the free passage of air.

2. List out the parasitic adaptations in leech.

- Blood is sucked by pharynx.
- Anterior and posterior suckers help the leech attacks 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.
- Blood is stored in the crop.

VII. LONG ANSWER QUESTIONS:

1. How is the circulatory system designed in leech to compensate the heart structure?

- Haemocoelic system - No true blood vessels.
- Haemocoelic channels – contains blood like fluid.
- There are four longitudinal channels are there:
- Dorsal channel - lies above alimentary canal
- Ventral channel - lies below alimentary canal
- Lateral channel - lies either sides of the canals.
- All the four channels connected together at 26th segment.

2. How does locomotion take place in leech?

Locomotion in leech takes place by

(i) Looping or crawling movement and (ii) Swimming movement.

i) Looping or crawling movement :

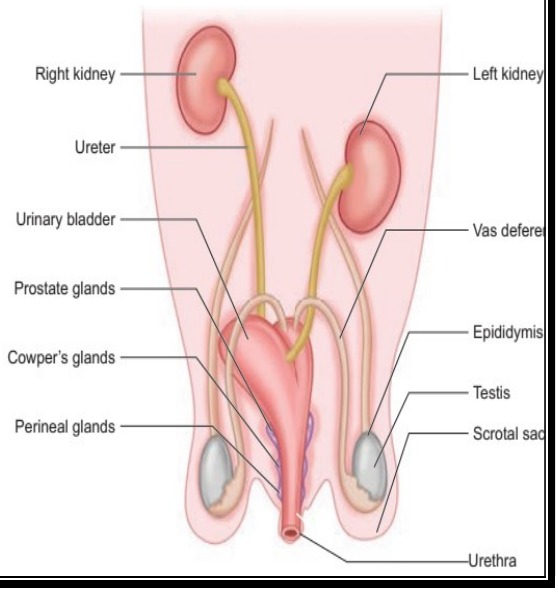
- This type of movement is brought about by the contraction and relaxation of muscles.
- The two suckers serve for attachment during movement on a substratum.

ii) Swimming movement :

- Leeches swim very actively and perform undulating movements in water.

3. Explain the male reproductive system of rabbit with a labelled diagram.

- Male reproductive system of rabbit consists of a pair of testes.
- Testes are enclosed by scrotal sacs.
- Each testis consists of numerous fine tubules called seminiferous tubule.
- Epididymis leads to vas deferens.



- The vas deferens join in the urethra just below the urinary bladder.
- The urethra runs backward and passes into the penis.
- There are three accessory glands namely prostate gland, cowper's gland and perineal gland.
- Their secretions are involved in reproduction.

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LESSON - 14 TRANSPIRATION IN PLANTS AND CIRCULATION IN HUMANS

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**

2. Water which is absorbed by roots is transported to aerial parts of the plant through a) cortex b) epidermis c) phloem **d) xylem**

3. During transpiration there is loss of

a) carbon dioxide b) oxygen **c) water** d) none of the above

4. Root hairs are

a) cortical cell b) projection of epidermal cell c) unicellular **d) both b and c**

5. Which of the following process requires energy?

a) active transport b) diffusion c) osmosis d) all of them

6. The wall of human heart is made of

a) Endocardium b) Epicardium c) Myocardium **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

8. A patient with blood group O was injured in an accident and has blood loss. 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

9. 'Heart of heart' is called

a) SA node b) AV node c) Purkinje fibres d) Bundle of His

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**

II. FILL IN THE BLANKS:

1. **Transpiration** involves evaporative loss of water from aerial parts.
2. Water enters the root cell through a **root hair** plasma membrane.
3. Structures in roots that help to absorb water are **root hairs**.
4. Normal blood pressure is **120/80 m Hg**.
5. The normal human heartbeat rate is about **72** time per minute.

III. MATCH THE FOLLOWING:

Section I

1. Symplastic pathway	Leaf
2. Transpiration	Plasmodesmata
3. Osmosis	Pressure in xylem
4. Root Pressure	Pressure gradient

Answer:

1. Symplastic pathway - Plasmodesmata
2. Transpiration - Leaf
3. Osmosis - Pressure gradient
4. Root pressure - Pressure in xylem

Section II

1. Leukemia	Thrombocytes
2. Platelets	Phagocyte
3. Monocytes	Decrease in leucocytes
4. Leucopenia	Blood Cancer
5. AB blood group	Allergic condition
6. O blood group	Inflammation
7. Eosinophil	Absence of antigen
8. Neutrophils	Absence of antibody

Answer:

1. Leukemia - Blood cancer
2. Platelets - Thrombocytes
3. Monocytes - Phagocyte
4. Leucopenia - Decrease in leucocytes
5. AB blood group - Absence of antibody
6. O blood group - Absence of antigen
7. Eosinophil - Allergic condition
8. Neutrophils - Inflammation

IV. STATE WHETHER TRUE OR FALSE. IF FALSE WRITE THE CORRECT STATEMENT:

1. The phloem is responsible for the translocation of food. - True
2. Plants lose water by the process of transpiration. - True
3. The form of sugar transported through the phloem is glucose. - False

The form of sugar transported through the phloem is sucrose.

4. In apoplastic movement the water travels through the cell membrane and enter the cell. - False

In apoplastic movement the water travels through the **intercellular spaces and walls of the cells.**

5. When guard cells lose water the stoma opens. - False

When guard cells **become** turgid the stoma opens.

6. Initiation and stimulation of heart beat take place by nerves. - False

nitiation and stimulation of heart beat take place by **muscles.**

7. All veins carry deoxygenated blood. - False

All veins carry deoxygenated blood **except pulmonary vein which carries oxygenated blood.**

8. WBC defend the body from bacterial and viral infections. - True
9. The closure of the mitral and tricuspid valves at the start of the ventricular systole produces the first sound 'LUBB'. - True

V. ANSWER IN A WORD OR SENTENCE:

1. Name two layered protective covering of human heart.

Two layered protective covering of human heart is Pericardium.

2. What is the shape of RBC in human blood?

RBCs of human blood are biconcave or disc-shaped.

3. Why is the colour of the blood red?

Blood is colour red due to the pigment hemoglobin.

4. Which kind of cells are found in the lymph?

White Blood cells (WBC) are found in the lymph.

5. Name the heart valve associated with the major arteries leaving the ventricles.

Semilunar valves are associated with the major arteries leaving the ventricles.

6. Mention the artery which supplies blood to the heart muscle.

Coronary artery supplies blood to the heart muscles.

VI. SHORT ANSWER QUESTIONS:

1. What causes the opening and closing of guard cells of stomata during transpiration?

- The opening and closing of the stomata is due to the change in turgidity of the guard cells.
- When turgidity increases within the two guard cells stoma opens.
- When the guard cells lose water, it becomes flaccid and the stoma closes

2. What is cohesion?

The force of attraction between molecules of water is called cohesion

3. Trace the pathway followed by water molecules from the time it enters a plant root to the time it escapes into the atmosphere from a leaf.

Root hair → Root → Xylem → Stem → Leaf → Stomata → Water is evaporated

4. What would happen to the leaves of a plant that transpires more water than its absorption in the roots?

- When transpiration exceeds water absorption by the roots, the plant dehydrates.
- Dehydration affects growth, photosynthesis etc. which can result in wilting and dying of the plant.

5. Describe the structure and working of the human heart.

- Heart is a pumping organ.
- Human heart is four chambered.
- Two upper thin walled artium.
- Two lower thick walled ventricles.
- Right atrium receives deoxygenated blood from varies parts of the body.
- Right and left auricles blood into the right and left ventricles.
- Aorta supplies oxygenated blood to varies parts of the body.
- The coronary arteries supply blood to the heart.

6. Why is the circulation in man referred to as double circulation?

When the blood circulates twice through the heart in one complete cycle, it is called double circulation.

7. What are heart sounds? How are they produced?

- Lubb during the closure of tricuspid and bicuspid valve.
- Dubb during the closure of semilunar valve.

8. What is the importance of valves in the heart?

Valves regulate the blood into a single direction and prevent back flow of blood.

9. Who discovered Rh factor? Why was it named so?

- Landsteiner and weiner discovered Rh factor in 1940.
- It was found in rhesus monkey so it is called as Rh factor.

10. How are arteries and veins structurally different from one another?

Artery	Vein
Distributing vessel	Collecting vessel
Pink in colour	Red in colour
Deep location	Superficial in location
Blood flow with high pressure	Blood flow with low pressure
Internal valves are absent	Internal valves are present

11. Why is the Sinoatrial node called the pacemaker of heart?

- SA node acts as the pace maker of the heart
- It is capable of initiating impulse which can simulate the heart muscles to contract.

12. Guard cells are responsible for opening and closing of stomata.

- The opening and closing of the stomata is due to the change in turgidity of the guards cells.
- When water enters into guard cells, they become turgid and the stoma open.
- When the guard cells lose water, it become flaccid and the stoma closes.

13. The walls of the right ventricle are thicker than the right auricles.

- ***Reason:*** The walls of the right ventricles are thicker than the right auricles.
- From the right ventricle arises the pulmonary trunk, which bifurcates to, from right and left pulmonary arteries.

14. Differentiate between systemic circulation and pulmonary circulation.

Systemic circulation	Pulmonary circulation
It occurs between the heart and the entire body.	It occurs between heart and the lungs.
It carries oxygenated from the heart to around the body.	It carries deoxygenated blood from heart to lungs.
It carries deoxygenated blood to the heart.	It carries oxygenated blood to heart from lungs.

15. The complete events of cardiac cycle last for 0.8 sec. What is the timing for each event?

- Arterial systole - 0.1 sec.
- Ventricle systole - 0.3 sec.
- Ventricle diastole - 0.4 sec.

VII. LONG ANSWER QUESTIONS:

1. How do plants absorb water? Explain.

- Water is absorbed along with minerals, by the root hairs, purely by diffusion.
- Root hairs are thin walled, slender extension of epidermal cell that increase the surface area of absorption.
- Once the water enters the root hairs, the concentration of water molecules in the root hair cells become more than that of the cortex.
- Thus water from the root hair moves to the cortical cells by osmosis and then reaches the xylem.
- From there the water is transported to the stem and leaves.

- Once water is absorbed by the root hairs, it can move deeper into root layers by two distinct pathways:
- **Apoplast pathway** : Movement of water occurs exclusively through the intercellular
- spaces and the walls of the cells.
- **Symplast pathway** : Movement the water travels through the cells.

2. What is transpiration? Give the importance of transpiration.

- Transpiration is the evaporation of water in plants through stomata in the leaves.

Importance of Transpiration:

- Creates transpirational pull for transport of water.
- Supplies water for photosynthesis.
- Transports minerals from soil to all parts of the plant.
- Cools the surface of the leaves by evaporation.
- Keeps the cells turgid; hence, maintains their shape.

3. Why are leucocytes classified as granulocytes and agranulocytes? Name each cell and mention its functions.

Granulocyctes :

1. **Neutrophils :** increased during infection and inflammation
2. **Eosinophils :** detoxification of toxins.
3. **Basophils :** They release chemicals during the process of inflammation.

Agranulocytes

1. **Lymphocytes :** They produce antibodies during bacterial and viral infections
2. **Monocytes :** They are phagocytic and can energy bacteria

4. Differentiate between systole and diastole. Explain the conduction of heart beat.

Systole	Diastole
One complete contraction of the atrium and ventricles of the heart constitute heart beat.	One complete relaxation of the atrium and ventricles of the heart constitute heart beat.

Conduction of heart beat:

- The human heart is myogenic in nature.
- It is situated in the wall of the right atrium
- The wave of contraction from SA node reaches the atrioventricular (AV) node
- An impulse of contraction spreading to the ventricular bundle and the Purkinje fibres.

5. Enumerate the functions of blood.

Functions of blood

- Transport of respiratory gases
- Transport of digested food materials to the different body cells.
- It is involved in protection of the body and defense against diseases.
- It acts as buffer and helps in regulation of pH and body temperature.
- It maintains proper water balance in the body.

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LESSON -15 - NERVOUS SYSTEM

I. CHOOSE THE CORRECT ANSWER:

1. Bipolar neurons are found in

(a) retina of eye (b) cerebral cortex (c) embryo (d) respiratory epithelium

2. Site for processing of vision, hearing, memory, speech, intelligence and thought is

(a) kidney (b) ear **(c) brain** (d) lungs

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**

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

5. The outer most of the three cranial meninges is

(a) arachnoid membrane (b) piamater **(c) duramater** (d) myelin sheath

6. There are _____ pairs of cranial nerves and _____ pairs of spinal nerves.

(a) 12, 31 (b) 31, 12 (c) 12, 13 (d) 12, 21

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

8. Which nervous band connects the two cerebral hemispheres of brain?

(a) thalamus (b) hypothalamus **(c) corpus callosum** (d) pons

9. Node of Ranvier is found in

(a) muscles **(b) axons** (c) dendrites (d) cyton

10. Vomiting centre is located in

(a) medulla oblongata (b) stomach (c) cerebrum (d) hypothalamus

11. Nerve cells do not possess

(a) neurilemma **(b) sarcolemma** (c) axon (d) dendrites

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**

II. FILL IN THE BLANKS:

1. **Neuron** is the longest cell in our body.
2. Impulses travels rapidly in **multipolar** neurons.
3. A change in the environment that causes an animal to react is called **stimulus**.
4. **Dendrite** carries the impulse towards the cell body.
5. The two antagonistic component of autonomic nervous system are **sympathetic nerves** and **para sympathetic nerves**.
6. A neuron contains all cell organelles except **centrioles**
7. **cerebro spinal fluid** maintains the constant pressure inside the cranium.
8. **sulci** and **gyri** increases the surface area of cerebrum.
9. The part of human brain which acts as relay center is **thalamus**.

III. STATE WHETHER TRUE OR FALSE, IF FALSE WRITE THE CORRECT STATEMENT:

1. Dendrons are the longest fibres that conducts impulses away from the cell body. - False

Dendrone are the longest fibres and they conduct **impulses towards cell body.**

2. Sympathetic nervous system is a part of central nervous system. - False

Sympathetic nervous system is a part of **autonomous nervous system.**

3. Hypothalamus is the thermoregulatory centre of human body. - True

4. Cerebrum controls the voluntary actions of our body. - False

Cerebellum controls the voluntary actions of our body.

5. In the central nervous system myelinated fibres form the white matter. - True

6. All the nerves in the body are covered and protected by meninges. - False

The brain and spinal cord are covered and protected by meninges.

7. Cerebrospinal fluid provides nutrition to brain. - True

8. Reflex arc allows the rapid response of the body to a stimulus. - True

9. Pons helps in regulating respiration. - True

IV. MATCH THE FOLLOWING

Column I	*Column II*
A. Nissil's granules	Cyton
B. Hypothalamus	Forebrain
C. Cerebellum	Hindbrain
D. Schwann cell	Peripheral Nervous system

V. SHORT ANSWERS:

1. Define stimulus.

It refers to the changes in the environmental condition.

2. Name the parts of the hind brain.

(i) cerebellum (ii) pons (iii) medulla oblongata

3. What are the structures involved in the protection of brain?

(i) Duramater (ii) Arachnoid (iii) Piamater

4. Give an example for conditioned reflexes.

Playing harmonium by striking a particular key on seeing a music note is an example of conditioned reflexes.

5. Which acts as a link between the nervous system and endocrine system?

Hypothalamus

6. Define reflex arc.

The pathway taken by nerve impulse to accomplish reflex action is called reflex arc.

VI. ANSWER IN DETAIL:

1. A) Voluntary and involuntary actions.

Voluntary action	Involuntary action
Controlled by the brain	Controlled by the spinal cord.
Initiates by our own conscious.	Without your own conscious.
Under the control of the will.	Not under the control of the will.
For Ex :- Breathing, eating	For EX:- heartbeat, sneezing

b)Medullated and non-medullated nerve fibre.

Medullated (Myelinated) Nerve Fibres	Non-medullated (Nonmyelinated) Nerve Fibres
Myelin sheath is present.	Myelin sheath is absent.
White matter of brain.	Grey matter of brain.
Nodes of Ranvier are present	Nodes of Ranvier are absent.
They carry impulses faster.	They carry impulses slower.

2. With a neat labelled diagram explain the structure of a neuron.

A neuron typically consists of three basic parts:

Cyton, Dendrites and Axon.

(i) Cyton: (cell body or perikaryon)

❖ It help in transmission of nerve impulses to and from the cell body.

(ii) Dendrites:

❖ These are the numerous branched cytoplasmic processes that project from the surface of the cell body.

❖ They conduct nerve impulses towards the cyton.

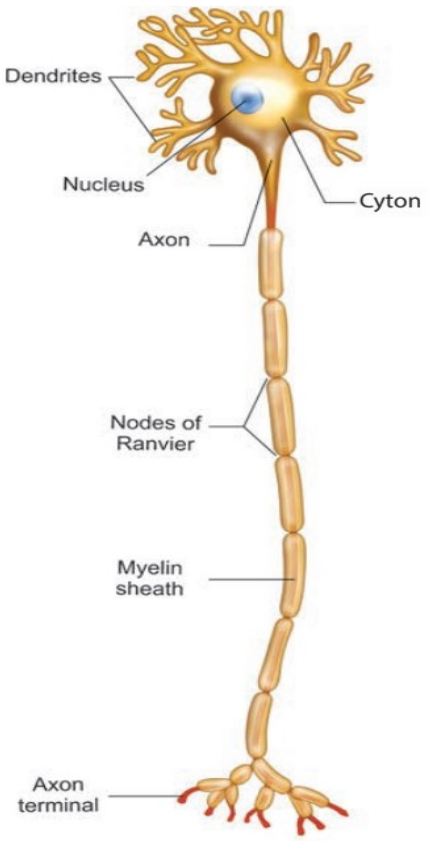
(iii) Axon:

❖ The axon is a single, elongated, slender projection.

❖ The axons may be covered by a protective sheath called

❖ **Myelin sheath** is further covered by a layer of **Schwann cells** called **neurilemma**.

❖ Myelin sheath breaks at intervals by depressions called **Nodes of Ranvier**. The region between the nodes is called as **internode**.



3. Illustrate the structure and functions of brain.

Structure	Functions
Cerebral cortex	Sensory perception, control of voluntary functions, language, thinking, memory, decision making, creativity
Thalamus	Acts as relay station.
Hypothalamus	Temperature control, thirst, hunger, urination, important link between nervous system and endocrine glands.
Cerebellum	Maintenance of posture and balance, coordinate voluntary muscle activity.
Pons and medulla	Role in sleep-awake cycle, cardiovascular, respiratory and digestive control centers

4. What will you do if someone pricks your hand with a needle? Elucidate the pathway of response with a neat-labelled diagram.

(i) When someone pricks your hand with a needle, the stimulus is the pain, which is sensed by receptor called as **pain receptors** in our hand.

(ii) The **sensory neuron** transmits the message to the spinal cord.

(iii) **Spinal cord** interprets the stimulus and the impulse is passed on to the relay neuron, which in turn transmits it to a motor neuron.

(iv) **Motor neurons** carry command from spinal cord to our arm.

(v) Muscle in our arm contracts and we withdraw our hand immediately from the needle.

5. Classify neurons based on its structure.

Based on structure the neurons classified as follows:

i) Unipolar neurons:

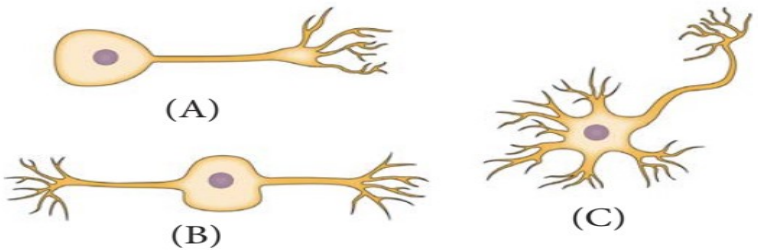
- Only one nerve process arises from the cyton which acts as both axon and dendron.
- They found in early embryos but not in adult.

ii) Bipolar neurons:

- The cyton gives rise to two nerve processes of which one acts as an axon while another as a dendron.
- They found in retina of eye and olfactory epithelium of nasal chambers.

iii) Multipolar neurons:

- The cyton gives rise to many dendrons and an axon.
- They found in cerebral cortex of brain



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LESSON-16. PLANT AND ANIMAL HORMONES

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

2. The hormone which has positive effect on apical dominance is:

a) Cytokinin **b) Auxin** c) Gibberellin d) Ethylene

3. Which one of the following hormones is naturally not found in plants:

a) 2, 4-D b) GA3 c) Gibberellin d) IAA

4. Avena coleoptile test was conducted by

a) Darwin b) N. Smit c) Paal **d) F.W. Went**

5. To increase the sugar production in sugarcanes they are sprayed with _____

a) Auxin b) Cytokinin c) Gibberellins **d) Ethylene**

6. LH is secreted by

a) Adrenal gland b) Thyroid gland **c) Anterior pituitary** d) Hypothalamus.

7. Identify the exocrine gland

a) Pituitary gland b) Adrenal gland **c) Salivary gland** d) Thyroid gland

8. Which organ acts as both exocrine gland as well as endocrine gland

a) Pancreas b) Kidney c) Liver d) Lungs

9. Which one is referred as "Master Gland"?

a) Pineal gland **b) Pituitary gland** c) Thyroid gland d) Adrenal gland

II. FILL IN THE BLANKS:

1. **Auxin** causes cell elongation, apical dominance and prevents abscission.
2. **Ethylene** is a gaseous hormone involved in abscission of organs and acceleration of fruit ripening.
3. **Abscissic acid** causes stomatal closure.
4. Gibberellins induce stem elongation in **rosette** plants.
5. The hormone which has negative effect on apical dominance is **cytokinin**.
6. Calcium metabolism of the body is controlled by **parathormone**.
7. In the islets of Langerhans, beta cells secrete **insulin**.
8. The growth and functions of thyroid gland is controlled by **thyroid stimulating hormone**.
9. Decreased secretion of thyroid hormones in the children leads to **cretinism**.

III A) MATCH COLUMN I WITH COLUMNS II AND III

Column I	Column II	Column III
Auxin	*Gibberella fujikuroi*	Abscission
Ethylene	Coconut milk	Internodal elongation
Abscisic acid	Coleoptile tip	Apical dominance
Cytokinin	Chloroplast	Ripening
Gibberellins	Fruits	Cell division

Answer:

Column I : Column II : Column III
Auxin : Coleoptile tip : Apical dominance
Ethylene : Fruits : Ripening

Abscisic acid : Chloroplast : Abscission
Cytokinin : Coconut milk : Cell division
Gibberellins : Gibberella fujikuroi : Internodal elongation

III B) MATCH THE FOLLOWING HORMONES WITH THEIR DEFICIENCY STATES

Hormones	*Disorders*
a) Thyroxine	Acromegaly
b) Insulin	Tetany
c) Parathormone	Simple goitre
d) Growth hormone	Diabetes insipidus
e) ADH	Diabetes mellitus

Answer:
a) Thyroxine - Simple goitre
b) Insulin - Diabetes mellitus
c) Parathormone - Tetany
d) Growth hormone - Acromegaly
e) ADH - Diabetes insipidus

IV. STATE WHETHER TRUE OR FALSE, IF FALSE WRITE THE CORRECT STATEMENT:

1. A plant hormone concerned with stimulation of cell division and promotion of nutrient mobilization is cytokinin. - True
2. Gibberellins cause parthenocarpy in tomato. - True
3. Ethylene retards senescence of leaves, flowers and fruits. - False
Ethylene **hastens senescence** of leaves, flowers and fruits.
4. Exopthalmic goiter is due to the over secretion of thyroxine. - True
5. Pituitary gland is divided into four lobes. - **False**
Pituitary gland is divided into **three** lobes.
6. Estrogen is secreted by corpus luteum. - False
Estrogen is secreted by the **graffian follicles of the ovars.**

V. SHORT ANSWERS:

1. Which hormone promotes the production of male flowers in Cucurbits?
Gibberellin
2. Write the name of a synthetic auxin. 2,4 D
3. Which hormone induces parthenocarpy in tomatoes? Gibberellin
4. What is the hormone responsible for the secretion of milk in female after child birth? Prolactin or lactogenic hormone
5. Name the hormones, which regulates water and mineral metabolism in man.
Minneralocorticoids - Aldosterone
6. Which hormone is secreted during emergency situation in man?
Adrenaline or Epinephrine
7. Which gland secretes digestive enzymes and hormones? Pancreas
8. Name the endocrine glands associated with kidneys. Adrenal

VI. SHORT ANSWER QUESTIONS:

1. What are synthetic auxins? Give examples.

- Artificially synthesized auxins that have properties like auxins are called as synthetic auxins.
- Example: 2, 4 D (2,4 Dichlorophenoxy Acetic Acid).

2. What is bolting? How can it be induced artificially?

- **Bolting :** Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called bolting.
- It is induced by artificial treatment with plant hormone gibberellin.
- It causes stem elongation in plants under normal condition.

3. Bring out any two physiological activities of abscisic acid.

- ABA promotes the process of abscission (separation of leaves)
- ABA promotes senescence in leaves by causing loss of chlorophyll.

4. What will you do to prevent leaf fall and fruit drop in plants? Support your answer with reason.

- We can spray auxins to prevent leaf fall and fruit drop in plants.
- Auxins prevent the formation of abscission layer thus delay the abscission of leaves and fruits.
- So leaf and fruit can remain attached to the stem long time.

5. What are chemical messengers?

Hormones are powerful messengers that control and coordinate essential processes such as growth, metabolism and fertility by carrying messges from endocrine glands to target cells and tissues.

6. Write the differences between endocrine and exocrine gland.

Endocrine gland	Exocrine gland
They secrete hormones	They secrete enzymes, saliva and milk
They are ductless gland	They may have or may not have ducts
They are transported through blood stream	They are transported through ducts or tubes

7. What is the role of parathormone?

- The parathormone regulates calcium and phosphorus metabolism in the body.
- They act on bone, kidney and intestine to maintain blood calcium levels.

8. What are the hormones secreted by posterior lobe of the pituitary gland? Mention the tissues on which they exert their effect.

Hormoes	Effects
Vasopressin or Antidiuretic hormone	Tissues of kidney tubules
Oxytocin	Tissues of uterus and mammary gland

9. Why are thyroid hormones referred as personality hormone?

- Thyroid hormones **Triiodothyronine and Thyroxine**
- It is essential for normal physical, mental and personality development, they are also known as personality hormone.

10. Which hormone requires iodine for its formation? What will happen if intake of iodine in our diet is low?

- Triiodothyronine (T3) and Tetraiodothyronine.
- Less intake of Iodine leads to Goitre

VII. ANSWER IN DETAIL:

1. (a) Name the gaseous plant hormone. Describe its three different actions in plants. Ethylene.

Its three different actions in plants.

- Ethylene promotes the ripening of fruits.
- Ethylene inhibits the elongation of stem and root in dicots.
- Ethylene hastens the senescence of leaves and flowers.

(b) Which hormone is known as stress hormone in plants ? Why?

- Abscisic acid. Because it increases tolerance of plants to various kinds of stress.
- So, it is also called as stress hormone.

2. Describe an experiment which demonstrates that growth stimulating hormone is produced at the tip of coleoptile.

- In First experiment, Went removed the tips of Avena coleoptiles.
- The cut tips did not grow indicating that the tips produced something essential for growth.
- In his second experiment, he placed the agar blocks on the decapitated coleoptile tips.
- The coleoptile tips did not show any response.
- In his next experiment, he placed the detached coleoptile tips on agar blocks.
- After an hour, it grew straight up indicating that some chemical had diffused from the cut coleoptile tips into the agar block, which stimulated the growth.

3. Write the physiological effects of gibberellins.

- Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called bolting.
- Gibberellins promote the production of male flowers in monoecious plants (Cucurbits).
- Gibberellins break dormancy of potato tubers.
- Gibberellins are efficient than auxins in inducing the formation of seedless fruit – Parthenocarpic fruits e.g. Tomato.

4. Where are estrogens produced? What is the role of estrogens in the human body?

Estrogen is produced by the **Graafian follicles** of the ovary.

Functions of estrogens:

- It brings about the changes that occur during puberty.
- It initiates the process of oogenesis.
- It stimulates the maturation of ovarian follicles in the ovary.
- It promotes the development of secondary sexual characters

5. What are the conditions which occur due to lack of ADH and insulin? How are the conditions different from one another?

- It Reduces reabsorption of water
- It causes an increase in urine output (polyuria)

Diabetes insipidus	Diabetes mellitus
Increase in urine output	Increase in blood suger level

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LESSON 17 REPRODUCTION IN PLANTS AND ANIMALS

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**

2. Asexual reproduction takes place through budding in _____ .

a) Amoeba **b) Yeast** c) Plasmodium d) Bacteria

3. Syngamy results in the formation of _____ .

a) Zoospores b) Conidia **c) Zygote** d) Chlamydospores

4. The essential parts of a flower are _____ .

a) Calyx and Corolla b) Calyx and Androecium

c) Corolla and Gynoecium **d) Androecium and Gynoecium**

5. Anemophilous flowers have _____ .

a) Sessile stigma b) Small smooth stigma c) Colored flower **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

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**

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

9. The large elongated cells that provide nutrition to developing sperms are

a) Primary germ cells **b) Sertoli cells** c) Leydig cells d) Spermatogonia

10. Estrogen is secreted by

a) Anterior pituitary b) Primary follicle **c) Graffian follicle** d) Corpus luteum

11. Which one of the following is an IUCD?

a) Copper – T b) Oral pills c) Diaphragm d) Tubectomy

II. FILL IN THE BLANKS:

1. The embryo sac in a typical dicot at the time of fertilization is **7 celled**.
2. After fertilization the ovary develops into **fruit** .
3. *Planaria* reproduces asexually by **Regeneration** .
4. Fertilization is **Internal** in humans
5. The implantation of the embryo occurs at about **7th** day of fertilization
6. **Colostrum** is the first secretion from the mammary gland after child birth
7. Prolactin is a hormone produced by **pituitary gland** .

III (A) MATCH THE FOLLOWING

Column 1	Column 2
Fission	Spirogyra
Budding	Amoeba
Fragmentation	Yeast

Answer:

Fission : Amoeba

Budding : Yeast

Fragmentation : Spirogyra

(B) MATCH THE FOLLOWING TERMS WITH THEIR RESPECTIVE MEANINGS

a) Parturition	1) Duration between pregnancy and birth
b) Gestation	2) Attachment of zygote to endometrium
c) Ovulation	3) Delivery of baby from uterus
d) Implantation	4) Release of egg from Graafian follicle

Answer:

a) Parturition - Delivery of baby from uterus
b) Gestation - Duration between pregnancy and birth
c) Ovulation - Release of egg from Graafian follicle
d) Implantation - Attachment of zygote to endometrium

IV. STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE. CORRECT THE FALSE STATEMENT

1. Stalk of the ovule is called pedicle. - False
Stalk of the ovule is called **funicle.**
2. Seeds are the product of asexual reproduction. - False
Seeds are the product of **sexual** reproduction.
3. Yeast reproduces asexually by means of multiple fission. - False
Yeast reproduces asexually by **budding.**
4. The part of the pistil which serves as a receptive structure for the pollen is called as style. - False
The part of the pistil which serves as a receptive structure for the pollen is called stigma.
5. Insect pollinated flowers are characterized by dry and smooth pollen. - False
Wind pollinated flowers are characterized by dry and smooth pollens, (or)
Insect pollinated flowers are characterized by large and spiny pollens.
6. Sex organs produce gametes which are diploid. - False
Sex organs produce gametes which are **haploid,**
7. LH is secreted by the posterior pituitary. -False
LH is secreted by the anterior pituitary.
8. Menstrual cycle ceases during pregnancy. - True
9. Surgical methods of contraception prevent gamete formation. - False
Surgical methods of contraception prevent **fertilization.**
10. The increased level of estrogen and progesterone is responsible for menstruation. - False
The **decrease** in level of estrogen and progesterone is responsible for menstruation.

V. ANSWER IN A WORD OR SENTENCE:

1. If one pollen grain produces two male gametes, how many pollen grains are needed to fertilize 10 ovules?

- Ten pollen grains are needed to fertilize 10 ovules.
- Because of double fertilization.

2. In which part of the flower germination of pollen grains takes place?

- Stigma surface of the flower.

3. Name two organisms which reproduces through budding.

- Yeast and Bryophyllum.

4. Mention the function of endosperm.

- Nutritive tissue.
- It provides food to the developing embryo.

5. Name the hormone responsible for the vigorous contractions of the uterine muscles.

- Oxytocin

6. What is the enzyme present in acrosome of sperm?

- Hyaluronidase – helps to enter sperm into developing embryo.

7. When is World Menstrual Hygiene Day observed? May 28.

8. What is the need for contraception ?

- Contraception is one of the best birth control measures.

9. Name the part of the human female reproductive system where the following occurs. **a. Fertilization** - Ampulla of fallopian tube

b. Implantation - in the uterus.

VI. SHORT ANSWER QUESTION:

1. What will happen if you cut planaria into small fragments?

- If we cut a Planaria into small fragments, over time each piece will regenerate into a complete worm by the process regeneration.

2. Why is vegetative propagation practiced for growing some type of plants?

- Some plants have reduced power of sexual reproduction.
- Seeds of some plants have long dormant period or poor viability.
- It is a rapid and easier method.
- Good characters can be preserved

3. How does binary fission differ from multiple fission?

Binary fission	Multiple fission
A single parent cell divides into two daughter cells	A single parent cell divides into many daughter cells
It occurs during favourable conditions eg: Amoeba	It occurs during unfavourable conditions eg: Plasmodium

4. Define triple fusion.

- The fusion of second sperm (n) with secondary nucleus (2n) is known as triple fusion. As the result of triple fusion endosperm nucleus is formed.
- Second sperm (n) + Secondary nucleus (2n) = Endosperm nucleus (3n).

5. Write the characteristics of insect pollinated flowers.

- To attract insects these flowers are brightly coloured, have smell and nectar.
- The pollen grains are larger in size, the exine is pitted, spiny etc., so they can be adhered firmly on the sticky stigma.

6. Name the secondary sex organs in male

- Penis.
- Prostate gland.
- Vas deferens, etc.

7. What is colostrum? How is milk production hormonally regulated?

- The first fluid which is released from the mammary gland after child birth is called as colostrum.
- Milk production is stimulated by prolactin secreted from the anterior pituitary.
- The ejection of milk is stimulated by posterior pituitary hormone oxytocin.

8. How can menstrual hygiene be maintained during menstrual days?

- Sanitary pads should be changed regularly.
- Use of warm water to clean genitals helps to get rid of menstrual cramps.
- Wearing of loose clothing.

9. How does developing embryo gets its nourishment inside the mother's body?

- The embryo gets nutrition from the mother's blood with the help of special tissue called placenta.
- Umbilical cord connects the placenta and foetus.

10. Write the events involved in the sexual reproduction of a flowering plant

a. Discuss the first event and write the types:

Pollination. 1. Self-pollination 2. Cross pollination

b. Mention the advantages and the disadvantages of that event.

Advantages:

- Self-pollination is possible in certain bisexual flowers.
- Flowers do not depend on agents for pollination.
- More viable seeds are produced.

Disadvantages:

- More wastage of pollen grains.
- The seeds are less in numbers.
- It may introduce some unwanted characters.

12. Why are the human testes located outside the abdominal cavity? Name the pouch in which they are present.

- Because spermatogenesis need slightly lower than the normal temperature.
- Testes are present in the scrotum.

13. Luteal phase of the menstrual cycle is also called the secretory phase. Give reason.

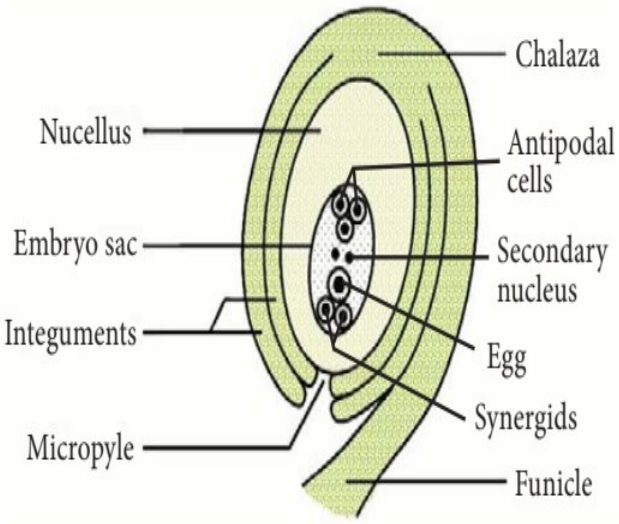
- Female hormones like Estrogen and progesterone secrete in this phase. So it is called secretory phase.

VIII. ANSWER IN DETAIL:

1. With a neat labelled diagram describe the parts of a typical angiospermic ovule.

Structure of the Ovule :

- **Nucleus** is enclosed by two integuments leaving an opening called as **micropyle**.
- The ovule is attached to the ovary wall by a stalk known as **funiculus**.
- **Chalaza** is the basal part.
- The embryo sac contains seven cells and the eighth nuclei located within the **nucelus**.
- Three cells at the **micropylar** end form the egg apparatus
- The three cells at the **chalaza** end are the antipodal cells.



2. What are the phases of menstrual cycle? Indicate the changes in the ovary and uterus.

Phase	Days	Changes in Ovary	Changes in Uterus
Menstrual phase	4-5 days	Development of primary follicles	Breakdown of uterine endometrial lining leads to bleeding
Follicular phase	6th-13th day	Primary follicles grow into mature Graafian follicle	Endometrium regenerates through proliferation
Ovulatory phase	14th day	The Graafian follicle ruptures, and releases the ovum(egg)	Increase in endometrial thickness
Luteal phase	15th-28th day	Emptied Graafian follicle develops into corpus luteum	If fertilization take place - Endometrium prepared for implantation. If fertilization does not take place - corpus luteum regenerate.

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LESSON - 18 GENETICS

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

2. 9 : 3 : 3 : 1 ratio is due to

a) Segregation b) Crossing over **c) Independent assortment** d) Recessiveness

3. The region of the chromosome where the spindle fibres get attached during cell division

a) Chromomere b) Centrosome **c) Centromere** d) Chromonema

4. The centromere is found at the centre of the _____ chromosome.

a) Telocentric **b) Metacentric** c) Sub-metacentric d) Acrocentric

5. The _____ units form the backbone of the DNA.

a) 5 carbon sugar b) Phosphate c) Nitrogenous bases **d) Sugar phosphate**

6. Okasaki fragments are joined together by _____.

a) Helicase b) DNA polymerase c) RNA primer **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.

8. The loss of one or more chromosome in a ploidy is called _____.

a) Tetraploidy **b) Aneuploidy** c) Euploidy d) polyploidy

II. FILL IN THE BLANKS:

1. The pairs of contrasting character (traits) of Mendel are called **alleles**.
2. Physical expression of a gene is called **phenotype**
3. The thin thread like structures found in the nucleus of each cell are called **chromosomes**.
4. DNA consists of two **polynucleotide** chains

5. An inheritable change in the amount or the structure of a gene or a chromosome is called **mutation**.

III. IDENTIFY WHETHER THE STATEMENT ARE TRUE OR FALSE. CORRECT THE FALSE STATEMENT:

1. A typical Mendelian dihybrid ratio of F2 generation is 3:1. - **False**
A typical mendelian dihybrid ratio of F2 generation is **9:3:3:1.**
2. A recessive factor is altered by the presence of a dominant factor. - **False**
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. - **True**
4. Hybrid is an offspring from a cross between genetically different parent. - **True**
5. Some of the chromosomes have an elongated knob-like appendages known as telomere. - **False**
Some of the chromosome have an elongated knob-like appendage known as satellite.
6. New nucleotides are added and new complementary strand of DNA is formed with the help of enzyme DNA polymerase. - **True**
7. Down's syndrome is the genetic condition with 45 chromosomes. - **False**
Down's syndrome is the genetic condition with **47 chromosmes.**

IV. MATCH THE FOLLOWING:

1. Autosomes	Trisomy 21
2. Diploid condition	9:3:3:1
3. Allosome	22 pair of chromosome
4. Down's syndrome	2n
5. Dihybrid ratio	23rd pair of chromosome

Answer:
1. Autosomes - 22 pairs of chromosome
2. Diploid condition - 2n
3. Allosome - 23rd pair of chromosome
4. Downs syndrome - Trisomy 21
5. Dihybrid ratio - 9:3:3:1

V. ANSWER IN A SENTENCE:

1. What is a cross in which inheritance of two pairs of contrasting characters are studied?

A cross in which inheritance of two pairs of contrasting characters are studied is called Dihybrid cross.

2. Name the conditions when both the alleles are identical?

Homozygous - the conditions when both the alleles are identical (TT or tt)

3. A garden pea plant produces axial white flowers. Another of the same species produced terminal violet flowers. Identify the dominant trait?

The dominant trait is axial white flower.

4. What is the name given to the segments of DNA, which are responsible for the inheritance of a particular character?

Gene is the segments of DNA, which are responsible for the inheritance of a particular character

5. Name the bond which binds the nucleotides in a DNA.

Hydrogen bond binds the nucleotides in a DNA.

VI. SHORT ANSWERS QUESTIONS:

1. Why did Mendel select pea plant for his experiments?

- The flowers are bisexual.
- It is easy to cross-pollinate.
- It has a short life span.
- It has deeply defined contrasting characters.

2. What do you understand by the term phenotype and genotype?

- Phenotype : External expression of a particular trait.
- Genotype : Genetic expression of an organism.

3. What are allosomes?

- Sex chromosomes.
- Responsible for sex determination.
- A male has XY chromosome.
- A female has XX chromosome.

4. What are Okazaki fragments?

Okazaki fragments are short sequences of DNA nucleotides which are synthesized discontinuously and later linked together by enzyme DNA ligase to create the lagging strand during DNA replication.

5. Why is euploidy considered to be advantageous to both plants and animals?

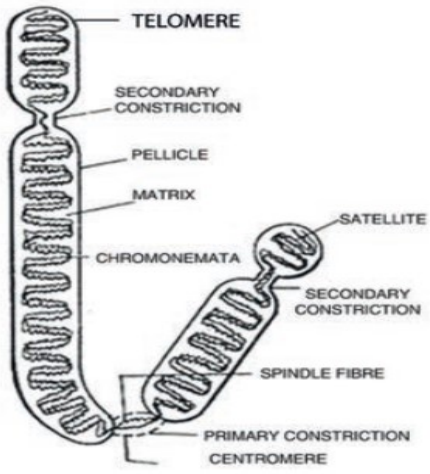
- Organisms with multiples of the basic chromosome set are called euploid.
- Plants with euploidy condition have increased fruit and flower size.
- Plants and animals with euploidy condition are typically sterile.

6. A pure tall plant (TT) is crossed with pure dwarf plant (tt), what would be the F1 and F2 generations? Explain.

- F1 plants are Hybrid tall (Tt)
- In the F2 generation 3 different type were obtained.
  - Tall Homozygous - TT - pure - 1
  - Tall Heterozygous - Tt - 2
  - Dwarf Homozygous - tt – F1 plants are Hybrid tall (Tt)

7. Explain the structure of a chromosome.

- Chromosome made up of two sister chromatids.
- Joined together by centromere.
- The chromosomes are made up of DNA, RNA, chromosomal proteins (Histones and non-histones) and certain metallic ions.
- These proteins provide structural support to the chromosome.
- Some chromosomes has a knob like structure called satellite.
- Chromosomes with satellite called SAT chromosome.



8. Label the parts of the DNA in the diagram given below. Explain the structure briefly.

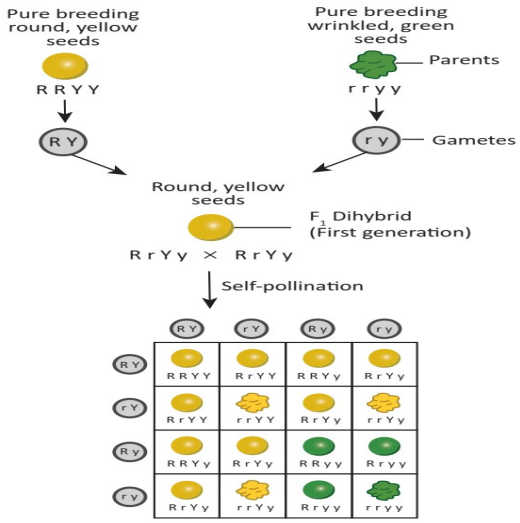
- A sugar molecules – Deoxyribose sugar.
- A nitrogenous base. There are two types of nitrogenous bases in DNA.
- They are; Purines (Adenine and Guanine).
- Pyrimidines (Cytosine and Thymine).

- A phosphate group.

VII. LONG ANSWER QUESTIONS:

1. Explain with an example the inheritance of dihybrid cross. How is it different from monohybrid cross?

Monohybrid cross	Dihybrid cross
The inheritance of one pair of contrasting characteristics	The inheritance of two pairs of contrasting characteristics
The phenotypic ratio is 3:1	The phenotypic ratio is 9:3:3:1



- Dihybrid cross involves the inheritance of two pairs of contrasting characteristics (or contrasting traits) at the same time.
- Characters (a) Yellow Round and (b) Green wrinkled.
- The parental gametes are RY and ry.
- The F1 generation were RrYy.
- The F1 hybrids are self fertilized for F2 generation.
- The ratio of each phenotype (or appearance) of seeds in the F2 generation is 9:3:3:1.
- This is known as the Dihybrid ratio.

2. How is the structure of DNA organised? What is the biological significance of DNA?

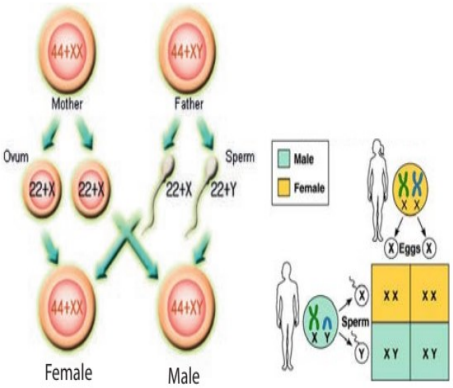
Structure of DNA:

- DNA – Deoxy Ribose Nucleic Acid.
- Proposed by Watson and Crick in 1959.
- DNA is made up of 4 Base pairs of Nucleotides.
- Adenine always pairs with Thymine with two hydrogen bond.
- Guanine always pairs with Cytosine with three hydrogen bond.
- Each turn of the double helix is 34 A˚

Significance:

- It is responsible for the transmission of hereditary information from one generation to next generation.
- It contains information required for the formation of proteins.
- It controls the developmental process and life activities of an organism.

3. The sex of the new born child is a matter of chance and neither of the parents may be considered responsible for it. What would be the possible fusion of gametes to determine the sex of the child?



- Humans have 23 pairs of chromosomes.
- 22 pairs are called Autosomes.
- 23rd pair called Allosomes.
- Males are heterogametic (44 XX+ XY)
- Females are homogametic (44XX + XX)
- Father determines the sex of the child.

LESSON 19 ORIGIN AND EVOLUTION OF LIFE

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

2. The 'use and disuse theory' was proposed by _____.

a) Charles Darwin b) Ernst Haeckel **c) Jean Baptiste Lamarck** d) Gregor Mendel

3. Paleontologists deal with

a) Embryological evidences **b) Fossil evidences**

c) Vestigial organ evidences d) All the above

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)

5. The term Ethnobotany was coined by

a) Khorana **b) J.W. Harsbberger** c) Ronald Ross d) Hugo de Vries

II. FILL IN THE BLANKS

1. The characters developed by the animals during their life time, in response to the environmental changes are called **adaptation**.
2. The degenerated and non-functional organs found in an organism are called **vestigial organs**.
3. The forelimbs of bat and human are examples of **homologous** organs.
4. The theory of natural selection for evolution was proposed by **Charles Darwin**.

III. STATE TRUE OR FALSE. CORRECT THE FALSE STATEMENTS

1. The use and disuse theory of organs' was postulated by Charles Darwin. - **False**

   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. - **False**

   The homologous organs look **dissimilar** and perform different functions but they have **similar origin** and developmental pattern.

3. Birds have evolved from reptiles. - **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

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? Homologous organs.

2. Which organism is considered to be the fossil bird?

Archaeopteryx is considered to be the fossil bird.

3. What is the study of fossils called?

The study of fossils is called Palaeontology.

VI. SHORT ANSWERS QUESTIONS:

1. The degenerated wing of a kiwi is an acquired character. Why is it an acquired character?

- The kiwi was flying bird in New Zealand.
- They did not attempt to fly because of no enemies on the land.
- Generation after generation resulting degeneration of wings and loss flight.
- This character is acquired due to environmental changes.
- So the degenerated wing of a kiwi is an acquired character.

2. Why is Archaeopteryx considered to be a connecting link?

- Archaeopteryx is the oldest known fossil bird.
- It is considered as a connecting link between birds and reptiles.
- It had wings and feathers like birds.
- It had a long tail, clawed digits and conical teeth like a reptiles.

3. Define Ethnobotany and write its importance.

- Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

Importance of Ethnobotany:

- It provides traditional uses of plant.
- It gives information about certain unknown and known useful plants.
- The ethnomedicinal data will serve as a useful source of information for the chemists,
- pharmacologists and practitioners of herbal medicine.
- 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?

- The age of fossils is determined by radioactive elements present in it. They may be carbon, uranium, lead or potassium.

Radioactive carbon (C14) dating method :

- This method was discovered by W.F. Libby (1956).
- Carbon consumption of animals and plants stops after death and since then, only the decaying process of C^{14} occurs continuously. The time passed since death of a

plant or animal can be calculated by measuring the amount of C^{14} present in their body.

5. How do you differentiate homologous organs from analogous organs?

Homologous organs	Analogous organs
They have inherited from common ancestors with similar developmental pattern in embryos	They have different origin with different development pattern
Homologous organs look dissimilar and adapted for different functions.	The analogous organs look similar and perform similar functions.

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LESSON 20 PLANT BREEDING AND BIOTECHNOLOGY

I. CHOOSE THE CORRECT ANSWER

1. Which method of crop improvement can be practised by a farmer if he is inexperienced?

a. clonal selection **b. mass selection**
c. pureline selection d. hybridisation

2. Pusa Komal is a disease resistant variety of _____.

a. sugarcane b. rice **c. cow pea** d. maize

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**

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

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)**

6. We can cut the DNA with the help of

a. scissors **b. restriction endonucleases** c. knife d. RNAase

7. rDNA is a

a. vector DNA b. circular DNA
c. recombinant of vector DNA and desired DNA d. satellite DNA

8. DNA fingerprinting is based on the principle of identifying _____ sequences of DNA

a. single stranded b. mutated c. polymorphic **d. repetitive**

9. Organisms with modified endogenous gene or a foregin gene are also known as

a. transgenic organisms b. genetically modified c. mutated **d. both a and b**

10. In a hexaploid wheat(2n = 6 x = 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**

II. FILL IN THE BLANKS

1. Economically important crop plants with superior quality are raised by **plant breeding**.
2. A protein rich wheat variety is **Atlas 66**.
3. **Colchicine** is the chemical used for doubling the chromosomes.

4. The scientific process which produces crop plants enriched with desirable nutrients is called **fortification**.
5. Rice normally grows well in alluvial soil, but **atomita 2** is a rice variety produced by mutation breeding that grows well in saline soil.
6. **Gene therapy** technique made it possible to genetically engineer living organism.
7. Restriction endonucleases cut the DNA molecule at specific positions known as **restriction site**.
8. Similar DNA fingerprinting is obtained for **identical twins**.
9. **Callus** cells are undifferentiated mass of cells.
10. In gene cloning the DNA of interest is integrated in a **vector**.

III. STATE WHETHER TRUE OR FALSE. IF FALSE, WRITE THE CORRECT STATEMENT

1. Raphano brassica **is a man-made tetraploid produced by colchicine treatment.** - **True**

2. The process of producing an organism with more than two sets of chromosome is called mutation. - **False**

The process of producing an organism with more than two sets of chromosome is called **polyploidy.**

3. A group of plants produced from a single plant through vegetative or asexual reproduction are called a pureline. - **False**

A group of plants produced from a single plant through vegetative or asexual reproduction are called a **Clone.**

4. Iron fortified rice variety determines the protein quality of the cultivated plant - **False**

Amino acid rich fortified rice variety **containing more amino acids** determines the protein quality of the cultivated plant.

5. Golden rice is a hybrid. - **False**

Golden rice is a genetically modified plant.

6. Bt gene from bacteria can kill insects. - **False**

Bt gene from bacteria **produces a toxin** that can kill insects.

7. In vitro fertilisation **means the fertilisation done inside the body.** - **False**

In vitro fertilisation means the fertilisation taking place **outside the body by artificial** means.

8. DNA fingerprinting technique was developed by Alec Jeffrey. - **True**

9. Molecular scissors refers to DNA ligases. - **False**

Molecular scissors refers to **restriction endonucleases.**

IV. MATCH THE FOLLOWING:

Column A	Column B
1. Sonalika	Phaseolus mungo
2. IR 8	Sugarcane
3. Saccharum	Semi-dwarf wheat
4. Mung No. 1	Ground nut
5. TMV– 2	Semi-dwarf Rice
6. Insulin	Bacillus thuringienesis
7. Bt toxin	Beta carotene
8. Golden rice	first hormone produced using rDNA technique

Answer

1. Sonalika - Semi-dwarf wheat
2. IR8 - Semi-dwarf Rice
3. Saccharum - Sugarcane
4. Mung No. 1 - Phaseolus mungo
5. TMV-2 - Ground nut
6. Insulin - first hormone produced using rDNA technique
7. Bt toxin - Bacillus thuringienesis
8. Golden rice - Beta carotene

V. ANSWER IN A SENTENCE:

1. Give the name of wheat variety having higher dietary fibre and protein.

Atlas 66

2. Define genetic engineering.

- It is technique of transfer of genes from one organism to another organism to create a new DNA called r DNA.
- It is also called recombinant DNA technology.

3. Name the types of stem cells.

- Somatic stem cell.
- Embryonic stem cell.

4. What are transgenic organisms?

- Plants or animals expressing a modified endogenous gene or a foreign gene is known as transgenic organisms.

5. State the importance of biofertiliser.

- It is used to develop the crop plants enriched with high level of desirable nutrients like vitamins, proteins and minerals.

VII. SHORT ANSWERS QUESTIONS:

1. Discuss the method of breeding for disease resistance.

- Plant diseases are caused by pathogens like viruses, bacteria and fungi.
- This affects crop yield. Hence, it is important to develop disease resistant varieties of crops, that would increase the yield and reduce the use of fungicides and bactericides.

2. Name three improved characteristics of wheat that helped India to achieve high productivity.

- Higher yield with better quality. eg: Protein Rich Atlas 66
- Resistance to diseases. eg: Himgiri
- Shorter duration / Semidwarf. eg: Sonalika and Kalyan Sona.

3. Name two maize hybrids rich in amino acid lysine.

Lysine (Amino acid) rich maize hybrids are; Protina, Shakti and Rathna.

4. Distinguish between a. somatic gene therapy and germ line gene therapy

Somatic Gene Therapy	Germ line Gene Therapy
It is the replacement of defective gene in somatic cell.	It is the replacement of defective gene in germ cell (sperm and egg)

Correction of genetic defects is beneficial to patient. It may not be carried to next generation	It may not be carried to next generation and will be beneficial to next generation.

B. Undifferentiated cells and differentiated cells

Undifferentiated cells	Differentiated cells
They are unspecialized mass of cells.	They become specialized cells for doing certain jobs
Example: Cells in early embryos are undifferentiated.	Example: These cells become a liver cell, a blood cell, or a neuron, muscle cells, skin cells, etc.

5. State the applications of DNA fingerprinting technique.

- ❖ It is used in forensic lab to identify the culprit.
- ❖ It is also used for paternity testing in case of disputes.
- ❖ It is also helps in the study of genetic diversity of population, evolution and speciation.

6. How are stem cells useful in regenerative process?

- ❖ In treating neurodegenerative disorders like Parkinson's disease and Alzheimer's disease neuronal stem cells can be used to replace the damaged or lost neurons.

7. Differentiate between out breeding and inbreeding.

Out breeding	In breeding
It is the breeding of unrelated animals.	It is the breeding of closely related animals.
Cross between two different species with desirable features of economic value are mated.	Superior males and superior females of the same breed and identified and mated in pairs.

VIII. LONG ANSWERS QUESTIONS:

1. What are the effects of hybrid vigour in animals.

- ❖ Increased production of milk by cattle.
- ❖ Increased production of egg by poultry.
- ❖ High quality of meat is produced.
- ❖ Increased growth rate in domesticated animals.

2. Describe mutation breeding with an example.

Mutation Breeding is defined as the sudden heritable change in the nucleotide sequence of DNA in an organism.

Achievements of Mutation breeding

- ❖ Sharbati Sonora wheat produced from Sonora 64 by using gamma rays.
- ❖ Atomita 2 rice with saline tolerance and pest resistance.
- ❖ Groundnut with thick shells

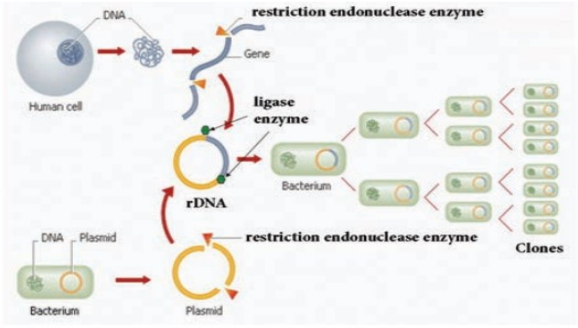
3. Biofortification may help in removing hidden hunger. How?

- ❖ It is the scientific process of developing crop plants enriched with high levels of desirable nutrients like vitamins, proteins and minerals.
- ❖ Bio fortification is effective in removing hidden hunger and improving the nutritional value.
- ❖ Iron rich fortified rice variety.

- Atlas 66, a protein rich wheat variety.
- Vitamins enrich carrots, pumpkin and spinach.

4. With a neat labelled diagram explain the techniques involved in gene cloning.

- Cloning – making of an identical copies.
- Isolate the gene of interest.
- Cut by using restriction enzymes.
- Insert in bacteria with plasmid.
- Transfer r DNA into a bacterial cell.
- Selection and multiplication.



5. Discuss the importance of biotechnology in the field of medicine.

- Insulin used in the treatment of diabetes.
- HGH for growth deficiencies.
- Blood clotting factors for haemophilia.
- Tissue plasminogen activator to dissolve blood clot and to prevent heart attack.
- Vaccines for hepatitis B and Vaccines for rabies.

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LESSON 21 - HEALTH AND DISEASE

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

2. World 'No Tobacco Day' is observed on

a) May 31 b) June 6 c) April 22 d) October 2

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**

4. Which type of cancer affects lymph nodes and spleen?

a) Carcinoma b) Sarcoma c) Leukemia **d) Lymphoma**

5. Excessive consumption of alcohol leads to

a) Loss of memory **b) Cirrhosis of liver**
c) State of hallucination d) Supression of brain function

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**

7. Cancer of the epithelial cells is called

a) Leukemia b) Sarcoma **c) Carcinoma** d) Lipoma

8. Metastasis is associated with

a) Malignant tumour b) Benign tumour
c) Both (a) and (b) d) Crown gall tumour

9. Polyphagia is a condition seen in

a) Obesity **b) Diabetes mellitus**
c) Diabetes insipidus d) AIDS

10. Where does alcohol effect immediately after drinking?

a) Eyes b) Auditory region c) Liver **d) Central nervous system**

II. STATE WHETHER TRUE OR FALSE, IF FALSE WRITE THE CORRECT STATEMENT

1. AIDS is an epidemic disease. - True

2. Cancer causing genes are called Oncogenes. - True

3. Obesity is characterized by tumour formation. - False

Cancer is characterized by tumour formation.

4. In leukemia both WBCs and RBCs increase in number. - False

In Leukemia **WBC increases** in number.

5. Study of cause of disease is called etiology. - True

6. AIDS is not transmitted by contact with a patient's clothes. - True

7. Type 2 diabetes mellitus results due to insulin deficiency. - False

Type 2 diabetes mellitus results due to **low activity** by Insulin.

8. Carcinogens are cancer causing agents. - True

9. Nicotine is a narcotic drug. - True

10. Cirrhosis is associated with brain disorder. - False

Cirrhosis is associated with liver disorder.

III. EXPAND THE FOLLOWING ABBREVIATIONS:

1. **IDDM** - Insulin Dependent Diabetes mellitus.
2. **HIV** - Human Immuno-deficiency Virus
3. **BMI** - Body Mass Index.
4. **AIDS** - Acquired Immuno deficiency Syndrome.
5. **CHD** - Coronary Heart Disease.
6. **NIDDM** - Non Insulin Dependent Diabetes Mellitus.

IV. MATCH THE FOLLOWING:

1. Sarcoma	Stomach cancer
2. Carcinoma	Excessive thirst
3. Polydipsia	Excessive hunger
4. Polyphagia	Lack of blood flow to heart muscle
5. Myocardial Infarction	-Connective tissue cancer

Answer:

1. Sarcoma - Connective tissue cancer

2. Carcinoma - Stomach cancer

3. Polydipsia - Excessive thirst

4. Polyphagia - Excessive hunger

5. Myocardial Infarction - Lack of blood flow to heart muscle

V. FILL IN THE BLANKS:

1. Cirrhosis is caused in liver due to excessive use of **Alcohol**
2. A highly poisonous chemicals derived from tobacco is **Nicotine**
3. Blood cancer is called **Leukemia**.
4. Less response of a drug to a specific dose with repeated use is called **tolerance**
5. Insulin resistance is a condition in **Type II** diabetes mellitus

VI. ANALOGY TYPE QUESTIONS. IDENTIFY THE FIRST WORDS AND THEIR RELATIONSHIP AND SUGGEST A SUITABLE WORD FOR THE FOURTH BLANK

1. Communicable: AIDS: Non communicable: **Diabetes mellitus**
2. Chemotherapy: Chemicals: Radiation therapy: **Radiation**
3. Hypertension:Hypercholesterolomia: Glycosuria: **Hyperglycemia**

VII. ANSWER IN A SENTENCE:

1. What are psychotropic drugs?

- **Psychotropic drugs** - which acts on the brain and alter the behavior, consciousness, power of thinking and perception.
- They are referred as mood altering drugs.

2. Mention the diseases caused by tobacco smoke.

- Lung cancer
- Bronchitis
- Pulmonary tuberculosis
- Emphysema, etc.

3. What are the contributing factors for Obesity?

- Obesity is due to genetic factors, physical inactivity, eating habits (overeating) and endocrine factors.

4. What is adult onset diabetes?

Non insulin dependent diabetes mellitus.

5. What is metastasis?

The cancerous cells migrate to distant parts of the body and affect new tissues. This process is called metastasis.

6. How does insulin deficiency occur?

Insulin deficiency occurs due destruction of β-cells of the pancreas.

VIII. SHORT ANSWER QUESTIONS:

1. What are the various routes by which transmission of human immuno deficiency virus takes place?

- Sexual contact with infected person.
- Use of contaminated needles or syringe.
- Transfusion of affected blood and blood products.
- From infected mother to child through placenta

2. How is a cancer cell different from a normal cell?

Cancer cell	Normal cell
The size of the nucleus is large.	Normal, small size of nucleus is present.
Multiply indefinitely.	The cells are normally divide.
They are less differentiated.	They are will differentiated.

3. Differentiate between Type-I and Type-II Diabetes mellitus.

Factors	Type I - Insulin dependent diabetes mellitus (IDDM)	Type II - Non-insulin dependent diabetes mellitus (NIDDM)
Prevalence	10 - 20%	80 - 90%
Age of Onset	Juvenile onset (< 20 years)	Maturity onset(> 30 years)
Body weight	Normal or Underweight	Obese

Defect	Insulin deficiency due to destruction of β-cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine.

IX. ANSWER IN DETAIL:

1. Suggest measures to overcome the problems of an alcoholic.

- **Education and counseling:**
  - Counseling the alcoholics to overcome their problems and stress, to accept failures in their life.
- **Physical activity:**
  - Activities like reading, music, sports, yoga and meditation.
- **Seeking help:**
  - The affected individuals should seek help and guidance from parents and peers.
  - This will help them to share their wrong doing and get rid of the habit.
- **Medical assistance:**
  - Seek the help from psychologists and psychiatrists to lead a peaceful life.
  - Alcohol de-addiction and rehabilitation programmes are helpful to the individual to live a normal and healthy life.

2. Changes in lifestyle is a risk factor for occurrence of cardiovascular diseases. Can it be modified? If yes, suggest measures for prevention.

- **Diet Management:**
  - Reduction in the intake of calories, low saturated fat and cholesterol rich food, low
  - carbohydrates and common salt are some of the dietary modifications.
  - Diet rich in polyunsaturated fatty acids (PUFA) is essential.
- **Physical activity:**
  - Regular exercise, walking and yoga are essential for body weight maintenance.
- **Addictive substance avoidance:**
  - Alcohol consumption and smoking are to be avoided

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LESSON - 22 - ENVIRONMENTAL MANAGEMENT

I. FILL IN THE BLANKS:

1. Deforestation leads to **decrease** in rainfall.
2. Removal of soil particles from the land is called **soil erosion**.
3. Chipko movement is initiated against **deforestation**.
4. **Nilgiris** is a biosphere reserve in Tamilnadu.
5. Tidal energy is **renewable** type of energy.
6. Coal, petroleum and natural gas are called **fossil** fuels.
7. **Coal** is the most commonly used fuel for the production of electricity.

II. STATE WHETHER TRUE OR FALSE. CORRECT THE STATEMENTS WHICH ARE FALSE:

1. Biogas is a fossil fuel. - **True**
2. Planting trees increases the groundwater level. - **True**
3. Habitat destruction cause loss of wild life. - **True**
4. Nuclear energy is a renewable energy. - **False**

Nuclear energy is a **non renewable** source of energy.

5. Overgrazing prevents soil erosion. - **False**

Overgrazing **can lead** to soil erosion.

6. Poaching of wild animals is a legal act. - **False**

Poaching of wild animals **is illegal.**

7. National park is a protected park. - **True**
8. Wild life protection act was established in 1972. - **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_2
6. Wind	non-renewable energy
7. Solid waste	lead and heavy metals

Answer:

1. Soil erosion - removal of vegetation
2. Bio gas - CO_2
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:

1. 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

2. 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**

3. The gas released from vehicles exhaust are

i. carbon monoxide ii. Sulphur dioxide iii. Oxides of nitrogen

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

4. Soil erosion can be prevented by

a) deforestation **b) afforestion** c) over growing d) removal of vegetation

5. A renewable source of energy is

a) petroleum b) coal c) nuclear fuel **d) trees**

6. Soil erosion is more where there is

a) no rain fall b) low rainfall **c) rain fall is high** d) none of these

7. An inexhaustible resources is

a) wind power b) soil fertility c) wild life d) all of the above

8. Common energy source in village is

a) electricity b) coal c) biogas **d) wood and animal dung**

9. Green house effect refers to

a) cooling of earth b) trapping of UV rays

c) cultivation of plants **d) warming of earth**

10. A cheap, conventional, commercial and inexhaustible source of energy is

a) hydropower b) solar energy c) wind energy d) thermal energy

11. Global warming will cause

a) raise in level of oceans b) melting of glaciers

c) sinking of islands **d) all of these**

12. Which of the following statement is wrong with respect to wind energy

a) wind energy is a renewable energy

b) the blades of wind mill are operated with the help of electric motor

c) production of wind energy is pollution free

d) usage of wind energy can reduce the consumption of fossil fuels

V. ANSWER IN A SENTENCE:

1. What will happen if trees are cut down?

- Ecological problems like floods and drought
- Soil erosion
- Loss of wild life
- Extinction of species
- Imbalance of Biogeochemical cycles.
- Desertification.

2. What would happen if the habitat of wild animals is disturbed?

The habitat provides food, shelter and protection to the animals. If the habitat is disturbed then the animals become unprotected and may decline in numbers and become endangered.

3. What are the agents of soil erosion?

- High velocity of wind
- Air currents
- Flowing water
- Landslide
- Human activities (deforestation, farming and mining) and
- Overgrazing by cattle.

4. Why fossil fuels are to be conserved?

- They are limited. Once they are exhausted there will be none.
- There are no ideal alternative for fossil fuels.
- We have to use in a control way to control global warming.

5. Solar energy is a renewable energy. How?

- Solar energy is the energy obtained from the sun.
- It is a renewable free source of energy that is sustainable and totally inexhaustible, unlike fossil fuels which are finite.

6. How are e-wastes generated?

- E-wastes are generally called as electronic wastes.

- They are generated from the spoiled, outdated, non repairable electrical and electronic devices.

VI. SHORT ANSWER QUESTIONS

1. What is the importance of rainwater harvesting?

- Reduces flood and soil erosion.
- Overcome the rapid depletion of ground water levels.
- To meet the increase demand of water.
- Water stored in ground is not contaminated by human and animal wastes and hence can be used for drinking purpose.

2. What are the advantages of using biogas?

- It is safe and convenient to use.
- It burns without smoke and less pollution.
- It can reduce the amount of greenhouse gases emitted.

3. What are the environmental effect caused by sewage?

- Untreated sewage or wastewater generated from domestic and industrial process is the leading polluter of water sources in India.
- Sewage water results in agricultural contamination and environmental degradation.

4. What are the consequences of deforestation?

- Ecological problems like floods and drought
- Soil erosion
- Loss of wild life
- Extinction of species
- Imbalance of Biogeochemical cycles.
- Desertification.

VII. LONG ANSWER QUESTIONS

1. How does rainwater harvesting structures recharge ground water?

- Rainwater harvesting is a technique of collecting and storing rainwater for future use.
- It is a traditional method of storing rain water.
- Purpose - to recharge 'groundwater level'.

Methods of rainwater harvesting :

- Roof top rainwater harvesting: Roof-tops are excellent rain catchers.
- The rain water that falls on the roof of the houses is collected and stored in the surface tank and can be used for domestic purpose.

Recharge pit:

- In this method, the rainwater is first collected from the roof tops or open spaces and is directed into the percolation pits through pipes for filtration.
- After filtration the rainwater enters the recharge pits or ground wells

2. How will you prevent soil erosion?

- Retain vegetation cover, so that soil is not exposed.
- Cattle grazing should be controlled.
- Crop rotation and soil management improve soil organic matter.
- Runoff water should be stored in the catchment.
- Reforestation, terracing and contour ploughing.

- ❖ Wind speed can be controlled by planting trees in form of a shelter belt.

3. What are the sources of solid wastes? How are solid wastes managed?

❖ Solid wastes mainly include municipal wastes, hospital wastes, industrial wastes and e - wastes etc.

Methods of solid wastes disposal

a) Segregation:

- ➢ It is the separation of different type of waste materials like biodegradable and non-bio degradable wastes.

b) Sanitary landfill:

- ➢ Solid wastes are dumped into low-lying areas. The layers are compacted by trucks to allow settlement.
- ➢ The waste materials get stabilized in about 2-12 months. The organic matter under goes decomposition.

c) Incineration:

- ➢ It is the burning of non-biodegradable solid wastes (medical wastes) in properly constructed furnace at high temperature.

d) Composting:

- ➢ Biodegradable matter of solid wastes is digested by microbial action or earth worms and converted into humus

4. Enumerate the importance of forest.

- ❖ Forests are vital for human life
- ❖ it is a source for a wide range of renewable natural resource.
- ❖ They provide wood, food, fodder, fibre and medicine.
- ❖ They act as carbon sink, regulate climatic conditions, increase rainfall, reduce global warming, protect wildlife.
- ❖ They also play a vital role in maintaining the ecological balance.

5. What are the consequences of soil erosion?

- ❖ Soil erosion causes a significant loss of humus, nutrients and decrease the fertility of soil.
- ❖ It affects the fertility of the soil.
- ❖ It affects the ground water level.
- ❖ Vegetation cover cannot be recovered

****

LESSON 23 VISUAL COMMUNICATION

I. CHOOSE THE BEST ANSWER:

1. Which software is used to create animation ?

a) Paint b) PDF c) MS Word **d) Scratch**

2. All files are stored in the _____

a) Folder b) box c) Paint d) scanner

3. Which is used to build scripts?

a) Script area b) Block palette c) stage d) sprite

4. Which is used to edit programs?

a) Inkscape **b) script editor** c) stage d) sprite

5. Where you will create category of blocks?

a) Block palette **b) Block menu** c) Script area d) sprite

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

Answer:

(1) Script area - Build scripts

(2) Folder - Store files

(3) Scratch - Animation software

(4) Costume editor - Edit programs

(5) Notepad - Type notes

I. ANSWER THE FOLLOWING:

1. What is Scratch?

- ‘Scratch’ is a software used to create animations, cartoons and games easily.
- It is a visual programming language.

2. Write a short note on editor and its types?

- Script editor / costume editor: Where you edit your programs or your sprite’s pictures.
- The script editor has three main parts:
- Script area
- Block menu
- Block palette

3. What is Stage?

- Stage is the background appearing when we open the scratch window.
- The background will most often be white.
- We can change the background colour as you like.

4. What is Sprite?

- The characters on the background of a Scratch window are known as Sprite.
- Usually a Cat appears as a sprite.

SCIENCE PRACTICAL - PHYSICS

EX. NO:1 **DATE:**

DETERMINATION OF WEIGHT OF AN OBJECT USING THE PRINCIPLE OF MOMENTS

Aim:

To determine the weight of an object using the principle of moments.

Apparatus required:

A metre scale, a knife edge, slotted weights, thread

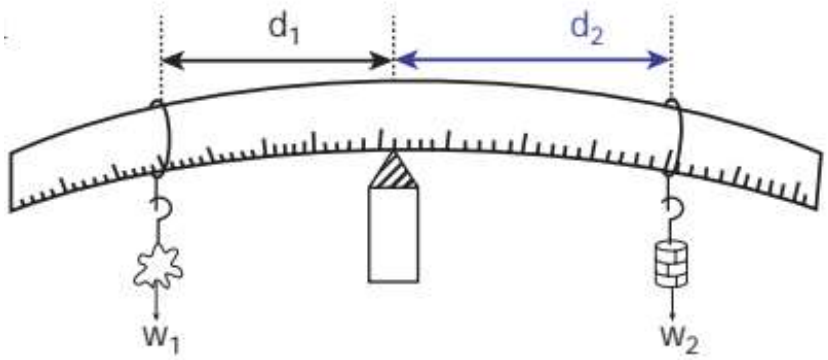
Formula:

According to the principle of moments = $W_1 \times d_1 = W_2 \times d_2$

$$W2 = \frac{W1 \times d1}{d2}$$

- W_1→Known weight (In grams)
- W_2→un known weight (in grams)
- d_1→distance of the known weight(in cm)
- d_2→ distance of the unknown weight(in cm)

Diagram:



Procedure:

- A meter scale is supported at its centre of gravity by a knife edge so that the scale is in the horizontal position.
- Ensure that he scale is in equilibrium position.
- A known weight W1 and an unknown weight W2 are suspended from either side of the scale using the weight hangers.
- Fix the position of one weight hanger and adjust the position of the second weight hanger such that the scale is in equilibrium.
- Measure the distance d1 and d2 of the two weight hangers from the centre of the scale.
- The experiment is repeated for different positions of the unknown weight. Measure the distances.
- The readings are tabulated as follows:

Observation:

S.NO	Known weight (W1) in gram	Distance of the known weight(d1) in cm	Distance of the unknown weight(d2) in cm	Unknown weight $W2 = \frac{W1 \times d1}{d2}\ gm$
1	50	10	10	50
2	100	10	20	50
			average	50

Calculations:

- Moment of a force can be calculated using the formula
- Moment of the force = Force x distance
- Clock wise moment by unknown weight = $W_1 \times d_1$
- Anticlockwise moment by known weight = $W_2 \times d_2$

Unknown weight = $W1 = [W_2 \times d_2] / d_1$

$$1.\ W2 = \frac{W1 \times d1}{d2} = \frac{50 \times 10}{10} = 50$$

$$2.\ W2 = \frac{W1 \times d1}{d2} = \frac{100 \times 10}{20} = 50$$

Result:

Using the principle of moments, the weight of the unknown body W_1 = 50gms

EX. NO: 2 **DATE:**

DETERMINATION OF FOCAL LENGTH OF A CONVEX LENS

Aim:

To determine the focal length of a convex lens by using

1. Distant object method
2. uv method

Apparatus required:

A convex lens, stand, wire gauze object, screen and measuring scale.

Formula:

$$f = \frac{u \times v}{u+v} \text{ cm}$$

Here,

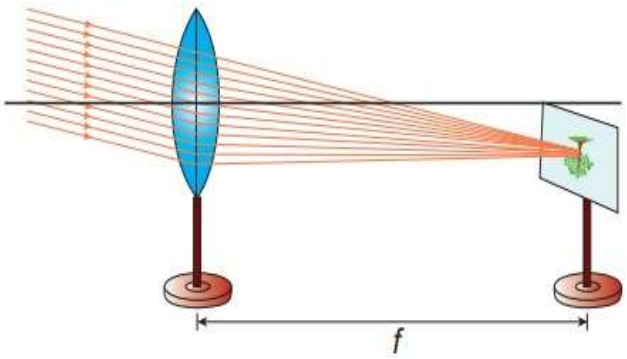
u → is the distance between the object (light source) and the convex lens

v → is the distance of the image (screen) from the convex lens

f → is the focal length of the convex lens

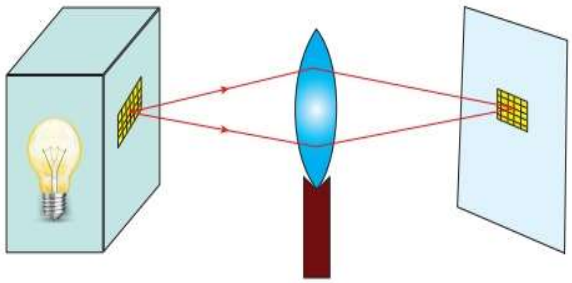
1. Distant Object Method:

- Fix the given convex lens on the stand and place it towards the distance object
- Place the screen behind the lens and adjust the position of the lens to get the sharp image
- Measure the distance between the lens and screen. This gives the focal length of the given lens



2. uv - Method:

- Fix the given convex lens on the stand and place it on the left side of the illuminated wire gauze say at distance less than 2f.
- Measure the distance between lens and object as u.
- Place the screen on the right side of the lens and adjust the position of the screen to get the sharp image.



- Measure the distance between lens and screen as v.
- Repeat the same procedure by changing the object distance and tabulate your observations.

Observation:

Focal length of the convex lens by distance object method (f) = 10.5 cm

2f = 21 cm

S.NO	Object distance (u) cm	Image distance (v)cm	Focal length $f = \frac{u \times v}{u+v}$ cm
1	16	32	10.6
2	24	19	10.6
		average	10.6

Calculation:

1. $f = \frac{u \times v}{u+v} = \frac{16 \times 32}{16+32} = \frac{512}{48} = 10.6$ cm

2. $f = \frac{u \times v}{u+v}$ $f = \frac{24 \times 19}{24+19} = \frac{456}{43} = 10.6$ cm

Result:

The focal length of the given convex lens

1. By distance object method f = 10. 5 cm
2. By 'uv' method f = 10.6 cm

EX. NO: 3 DATE:

DETERMINATION OF RESISTIVITY

Aim:

To determine the resistivity of the material of the given coil of wire.

Equipment required:

A coil of wire, screw gauge, a metre scale, battery, key, ammeter, voltmeter, rheostat and connecting Wires.

Formula:

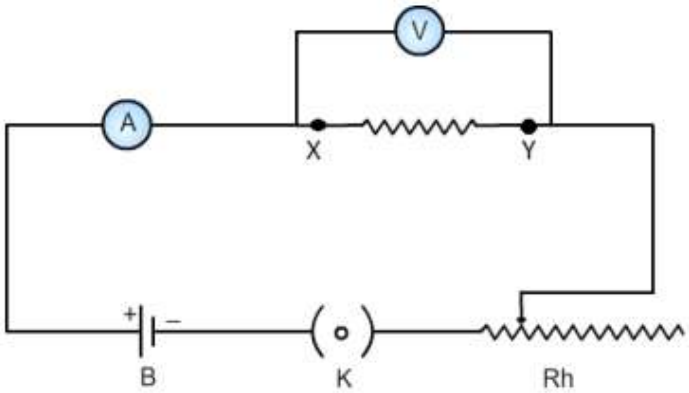
The resistivity of the given wire $\rho = \left(\frac{L}{A}\right) \times R\ \Omega\ m$

A→ Cross section of the wire

L → Length of the wire(m)

R→ Resistance of the wire (Ω)

Circuit Diagram:



Procedure:

- Connect the battery, ammeter, given wire, rheostat and key in series.
- Connect the voltmeter in parallel to the unknown resistor.
- Adjust the rheostat such that the ammeter reads a current of 0.5 ampere. Note down voltmeter reading.
- Adjust the rheostat and change the current of 0.75A Note down voltmeter reading.
- Tabulate the observations.

Observations:

(i) To find the resistance:

S.NO	Ammeter reading (ampere)	Voltmeter reading-V(volts)	Resistance R = V / I (ohm)
1.	0.5	2	4
2.	1.0	4	4
3.	1.5	6	4
		average	4

(ii) To find the diameter of the wire using screw gauge:

S. No	PSR (mm)	HSC	HSR=HSC×LC (mm)	TR =PSR + HSR (mm)
1	0	50	0.50	0.50
2	0	50	0.50	0.50
			Mean Diameter	0.50 mm

Calculations:

i) To find the resistance:

1. R= V/I = 2/0.5 = 4 ohm 2. R= V/I = 4/1.0 = 4 ohm 3. R= V/I = 6/1.5 = 8 ohm

ii) Resistivity of the coil:

Radius of the given wire (r) = $\frac{diameter}{2} = \frac{0.50}{2}$ = 0.25mm

$\Rightarrow$ r = 0.25mm = 0.25 x 10^{-3} m

Length of the given wire (l) = 100 cm =1 meter

Area of cross section of the given wire $A = \pi r^2$

$A = 3.14 \times (0.25 \times 10^{-3})^2$

$= 0.196 \times 10^{-6} m^2$

Resistance of the given wire R = 4 ohm

Resistivity of the given wire $\rho = (\frac{L}{A}) \times R\ \Omega$ m

$$\rho = (\frac{0.196 \times 10^{-6}}{1}) \times 4\ \Omega\ m \quad \rho = 0.784 \times 10^{-6}\ \Omega\ m$$

Result:

The resistivity of the material of the wire, $\rho = 0.784 \times 10^{-6}\ \Omega$ m

SCIENCE PRACTICAL- CHEMISTRY

EX. NO: 4 **DATE:**

IDENTIFY THE DISSOLUTION OF THE GIVEN SALT WHETHER IT IS EXOTHERMIC OR ENDOTHERMIC.

Aim:

To test the dissolution of given salt is exothermic or endothermic

Apparatus required:

Two beakers, Thermometer, stirrer, 5g amount of two samples

Principle:

- If the reaction liberates the heat, then it is called exothermic.
- If the reaction absorbs the heat, then it is called endothermic

Procedure:

- Take 50ml of water in two beakers and label them as A and B.
- Note the temperature ofthe water from the beaker A and B.
- Then, add 5g of sample A into the beaker A and stir well until it dissolves completely.
- Record final temperature of the solution.
- Now, repeat the same for the sample B. Record the observation

Observation:

S.NO	Sample	Temperature before addition of sample	Temperature after addition of sample	Inference
1	A	28°C	32°C	Temperature increases
2	B	28°C	19°C	Temperature decreases

Result: From the inferences made

i) The dissolution of sample A is Exothermic

ii) The dissolution of sample B is Endothermic

EX. NO: 5 DATE:

TESTING THE SOLUBILITY OF THE SALT

Aim:

To test the solubility of the given salt based on the saturation and un saturation of the solution at a given temperature.

Principle:

- A solution in which no more solute can be dissolved in the solvent -saturated solution
- If the solvent can dissolve more solute -unsaturated solution

Materials Required:

A 250 ml beaker, a stirrer, distilled water, 100 ml measuring jar, table salt weighing as 25g, 11g, and 1g.

Procedure:

- Take 100ml of water in a beaker. Add 25g of salt in it and stir it very well
- Now add 11 g of salt and stir and then add 1 g of salt and stir it
- Record your observations.

Observation:

S.NO	Amount of salt added	Observation (salt dissolved/ undissolved)	Inference (unsaturated/ saturated /supersaturated)
1	25g	dissolved	unsaturated
2	11g	dissolved	saturated
3	1g	un dissolved	supersaturated

Result:

From the above observation, it is inferred that the amount of salt required for saturation is 36g.

EX. NO: 6 **DATE:**

TESTING THE WATER OF HYDRATION OF SALT

Aim:

To veify whether the given sample of salt possesses 'Water of Hydration' or not.

Materials Required:

A pinch of given sample of salt ,test tube, tongs, spirit lamp.

Principle:

- Water of hydration is the phenomenon shown by certain salts in which water molecules are present inside the crystals
- e.g. Crystalline Copper sulphate $CuSO_4.5H_2O$

Procedure:

- A pinch of given salt is taken in a test tube and heated for some time.
- Water droplets are seen on the inner walls of the test tube.
- This shows that the given salt contains water of crystallization.
- If the above observation is not noticed for the given salt, the water of hydration is absent.

Result:

In the given sample of salt, Water of crystallization / hydration is Present.

EX. NO: 7A DATE:

TEST THE GIVEN SAMPLE FOR THE PRESENCE OF ACID

Aim:

To identify the presence of an acid or a base in a given sample.

Materials Required:

Test tubes, test tube stand, glass rod, phenolphthalein, methyl orange, sodium carbonate salt and the given sample.

Principle:

In acid medium	In Base medium,
(a) Phenolphthalein is colourless	(a) Phenolphthalein is pink in colour
(b) Methyl orange is yellow in colour	(b) Methyl orange is pink in colour
(c) Sodium carbonate gives brisk effervescence.	(c) Sodium carbonate does not give brisk effervescence.

Procedure:

S.NO	EXPERIMENT	OBSERVATION	INFERENCE
1	Take 5 ml of test solution in a test tube and add few drops of phenolphthalein in it	No change in colour	Presence of acid
2	Take 5 ml of test solution in a test tube and add few drops of methyol orange in it	Solution turns in pink in colour	Presence of acid
3	Take 5 ml of test solution in a test tube and add a pinch of sodium carbonate in it	Brisk effervescence occurs	Presence of acid

Result :

The given test solution contains acid

EX. NO: 7B DATE:

TEST THE GIVEN SAMPLE FOR THE PRESENCE OF BASE

Aim:

To identify the presence of an acid or a base in a given sample.

Materials Required:

Test tubes, test tube stand, glass rod, phenolphthalein, methyl orange, sodium carbonate salt and the given sample.

Principle:

In acid medium	In Base medium,
(a) Phenolphthalein is colourless	(a) Phenolphthalein is pink in colour
(b) Methyl orange is yellow in colour	(b) Methyl orange is pink in colour
(c) Sodium carbonate gives brisk effervescence.	(c) Sodium carbonate does not give brisk effervescence.

Procedure:

S.NO	EXPERIMENT	OBSERVATION	INFERENCE
1	Take 5 ml of test solution in a test tube and add few drops of phenolphthalein in it	Solutions turns pink in colour	Presence of base
2	Take 5 ml of test solution in a test tube and add few drops of methyol orange in it	Solution turns in yellow in colour	Presence of base
3	Take 5 ml of test solution in a test tube and add a pinch of sodium carbonate in it	No Brisk effervescence occurs	Presence of base

Result :

The given test solution contains base.

EX. NO: 8 DATE:

PHOTOSYNTHESIS-TEST TUBE AND FUNNEL EXPERIMENT

Aim:

To prove that oxygen is evolved during photosynthesis.

Materials required:

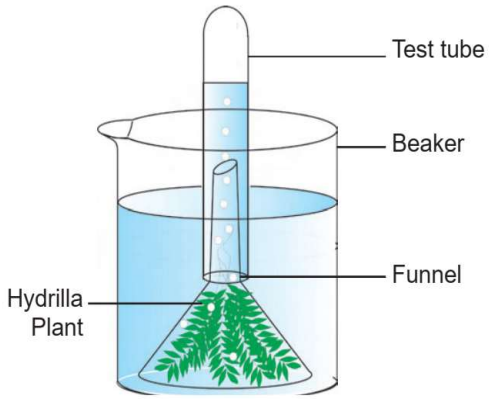
Test tube, funnel, beaker, pond water and Hydrilla plant.

Procedure:

- Take a few twigs of Hydrilla plant in a beaker containing pond water.
- Place an inverted funnel over the plant.
- Invert a test tube filled with water over the stem of the funnel.
- Keep the apparatus in the sunlight for a few hours.

Observation:

- After one hour, it is noted that water gets displaced down from the test tube.



Inference:

- During photosynthesis, oxygen is evolved as a by-product.
- Gas bubbles liberated from the Hydrilla plant reach the top of the test tube and it displaces the water downwards.
- Take the test tube and keep the burning stick near the mouth of the test tube. Increased flame will appear.

Result:

- Hence, it is proved that oxygen is evolved during photosynthesis.

EX. NO: 9 **DATE:**

PARTS OF A FLOWER

Aim:

To dissect and display the parts of the given flower and observe the Calyx, Corolla, Androecium and Gynoecium. Draw labelled sketches.

Materials Required:

Flower, needle and paper

Procedure :

1.Calyx, Corolla, Androecium and Gynoecium of the flower of Hibiscus rosasinensis are separated and pasted on a white paper.

2. The parts of Androecium and Gynoecium such as anther, filament, ovary, style and stigma are labeled.

With the help of the needle dissect the different whorls of the flower

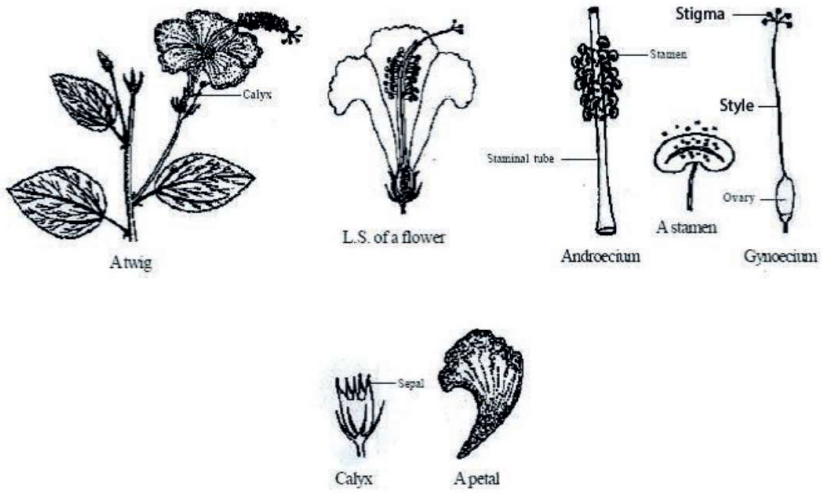
Floral Parts:

Calyx
Corolla } Accessory organ

Androecium - Male part of the flower
Gynoecium - Female part of the flower } Reproductive organ

Observation:

Draw and label the parts of the flower.



Result:

The floral parts like Calyx, Corolla, Androecium and Gynoecium of the given flower is dissected and displayed.

EX. NO: 10 **DATE:**

TO STUDY THE LAW OF DOMINANCE

Aim:

To study the law of dominance by using model / picture / photograph. To find out the genotypic ratio and phenotypic ratio in pea plant using checker board

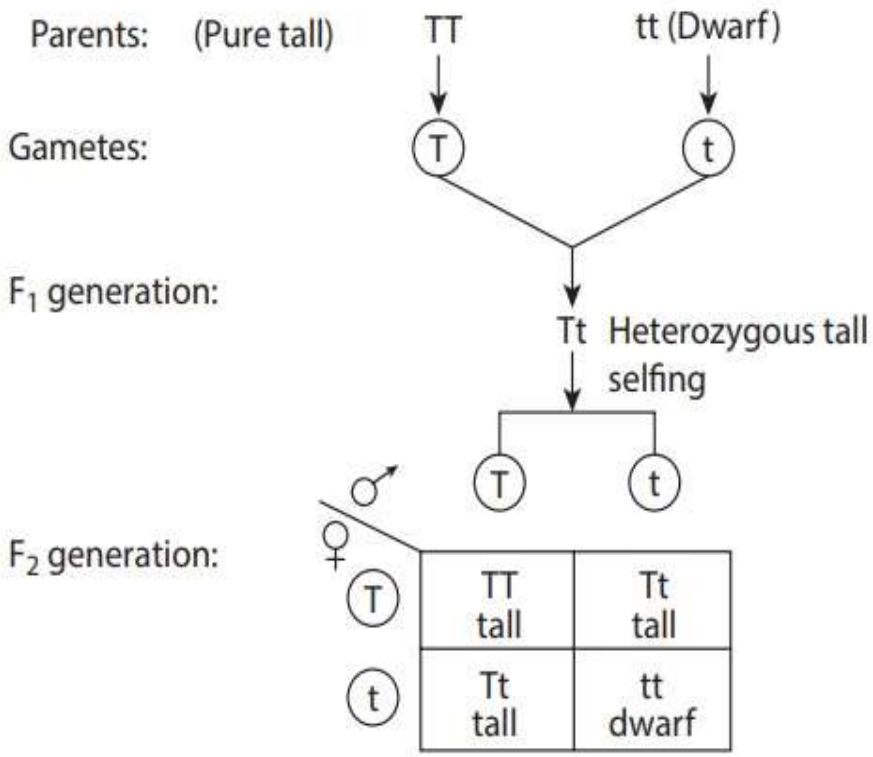
Definition:

Cross involving one pair of contrasting characters is called monohybrid cross.

Procedure:

1. Pure breeding tall plant is crossed with pure breeding dwarf plant.
2. All the F1 hybrid plants were tall (Tt)
3. Selfing the F1 hybrid plants resulted in tall and dwarf plants in F2 generation.

Depict parental generation and the gametes using colour chalk pieces



Result:

- Phenotypic ratio 3:1
- Genotypic ratio 1:2:1
- A cross between two forms of a single trait like a cross between tall and dwarf pea plant.

EX. NO: 11 A DATE:

OBSERVATION OF TRANSVERSE SECTION OF DICOT STEM

Aim:

To observe transverse section (T.S) of Dicot Stem and Dicot Root from permanent slides.

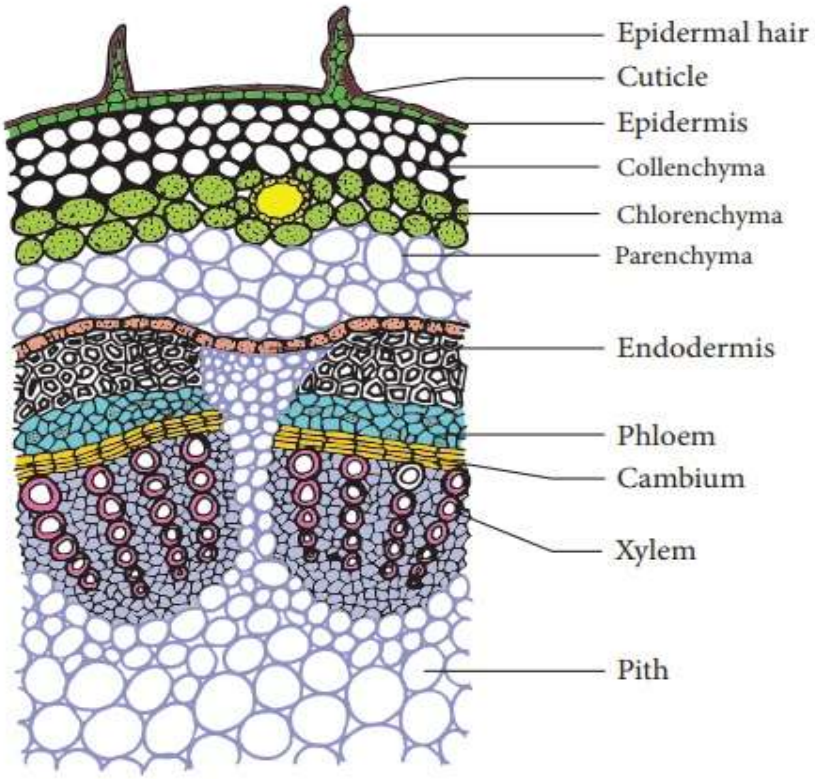
Identification:

The given slide is identified as T.S of Dicot Stem

Reason:

T.S of Dicot Stem

- Vascular bundles are arranged in a ring.
- Conjoint, collateral, endarch and open vascular bundle.
- Ground tissued differentiated into cortex, endodermis, pericycle and pith.
- 3 to 6 layer of collenchymas tissues present in hypodermis.



Result :

A. The given slide is identified as T.S of Dicot Stem.

EX. NO: 11B DATE:

OBSERVATION OF TRANSVERSE SECTION OF DICOT ROOT

Aim:

To observe transverse section (T.S) of Dicot Root from permanent slides.

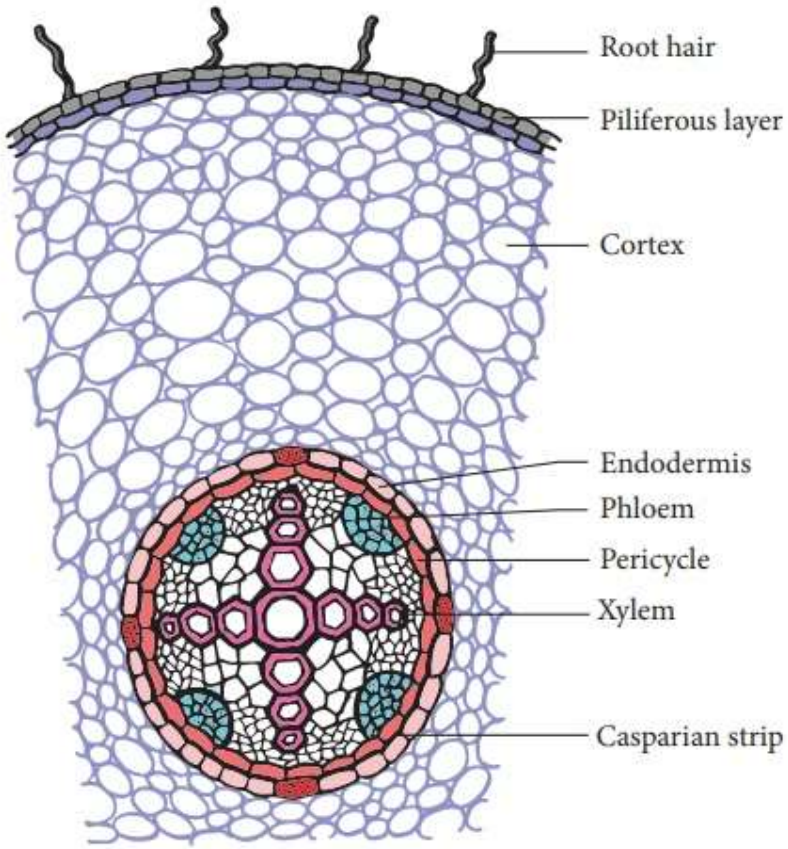
Identification:

The given slide is identified as T.S of Dicot Root

Reason:

T.S of Dicot Root

- Radial vascular bundle.
- 2 to 4 xylem present.
- Cambium present.
- Cortex is made up of parenchymatous cells



Result :

B. The given slide is identified as T.S of Dicot Root.

EX. NO: 12 A **DATE:**

IDENTIFICATION OF LONGITUDINAL SECTION (L.S) OF THE HUMAN HEART.

Aim:

To observe and draw a labelled sketch of L.S of human heart and write the structure.

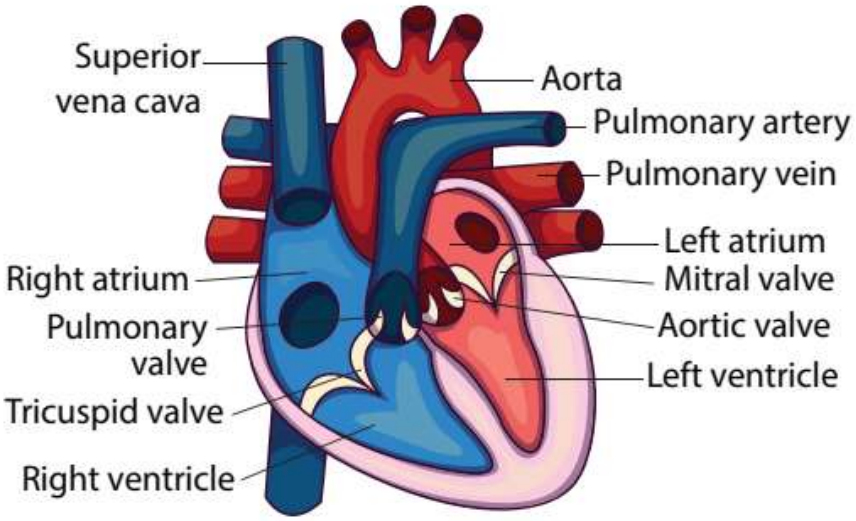
Materials Required:

Model showing the L.S of human heart

Identification:

The given model is identified as L.S. of human heart

Diagram:



Observation:

- The human heart has four chambers. It is made up of two auricles and two ventricles.
- The chambers are separated by interauricular and interventricular septum.
- It prevents the mixing of oxygenated and deoxygenated blood.
- Tricuspid valve - It is located between the right auricle and the right ventricle
- Bicuspid valve - It is located between the left auricle and the left ventricle.
- The heart is covered by a protective double walled membrane called pericardium.

Result :

The given model is identified as L.S. of human heart.

EX. NO: 12 B DATE:

IDENTIFICATION OF LONGITUDINAL SECTION (L.S) OF THE HUMAN BRAIN

Aim:

To observe and draw a labelled sketch of L.S of human brain and indicate the different regions of the brain.

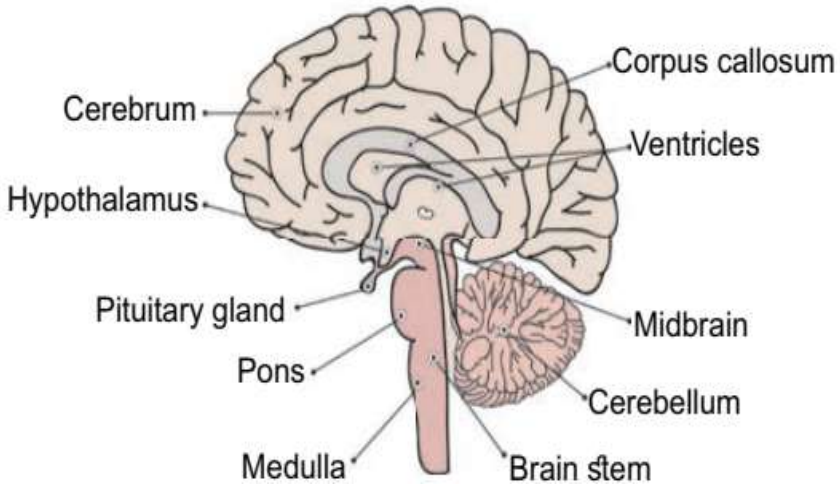
Materials Required:

Model showing the L.S of human brain

Identification:

The given model is identified as L.S. of human brain.

Diagram:



Observation:

- The brain is enclosed in the cranial cavity.
- It is the controlling centre of all the body activities.
- It is covered by three connective tissue membrane or meninges: Duramater Arachnoid membrane and Piamater.
- The human brain is divided into three parts namely forebrain, midbrain and hindbrain.

Result:

The given model is identified as L.S. of human Brain

EX. NO: 13 A DATE:

IDENTIFICATION OF BLOOD CELLS

Aim:

- Identification of blood cells (Red blood cells and white blood cells).
- To draw a neat labelled diagram and write a note on the blood cells identified.

Materials Required:

Microscope, Permanent prepared slides of blood cells.

Identification:

The given slide is identified as Red blood cells.

Diagram:

Notes:

- They are biconcave and disc shaped.
- They are also known as erythrocytes.
- Mature mammalian RBC's do not have nucleus.
- Haemoglobin is a respiratory pigment which gives red colour.
- It transports oxygen from lungs to tissues and carbon- dioxide from tissues to lungs

Result:

The given slide is identified as Red blood cells.

EX. NO: 13 B DATE:

IDENTIFICATION OF BLOOD CELLS

Aim:

- Identification of blood cells (Red blood cells and white blood cells).
- To draw a neat labelled diagram and write a note on the blood cells identified.

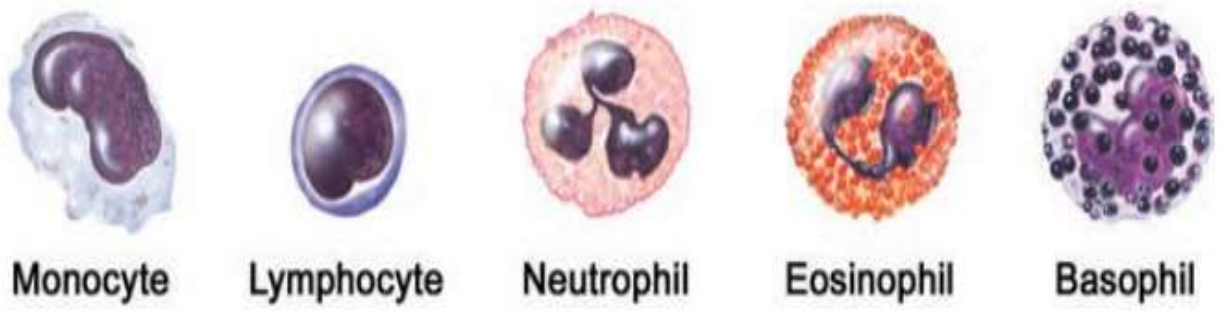
Materials Required:

Microscope, Permanent prepared slides of blood cells.

Identification:

The given slide is identified as White blood cells.

Diagram:



Notes:

- WBC's are colourless and they have nucleus.
- They are also known as Leucocytes
- They show amoeboid movements.
- They fight against germs and other foreign bodies and thus protect the body from microbial infections and diseases.
- There are five different types of WBC named as Neutrophils, Eosinophils, Basophils, Lymphocytes and Monocytes.

Result:

The given slide is identified as White blood cells.

EX. NO: 14 A **DATE:**

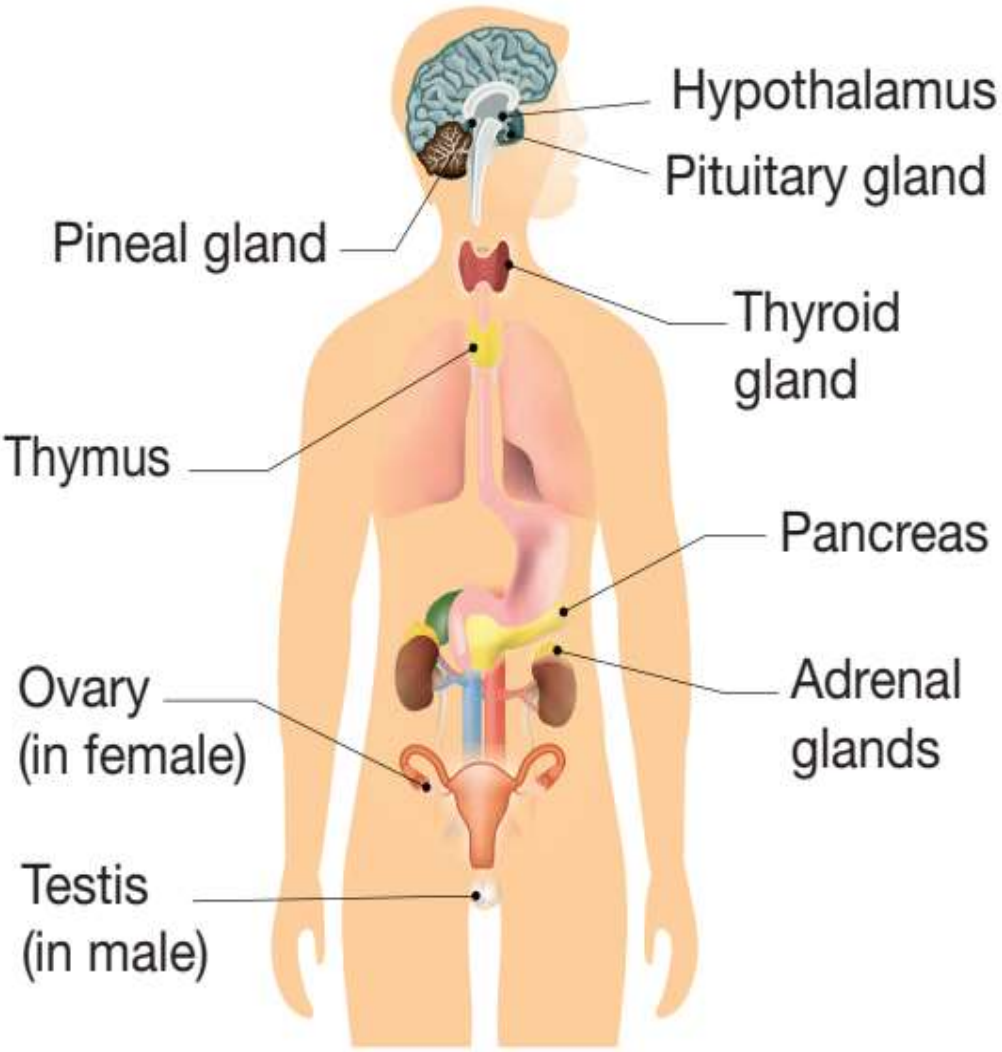
IDENTIFICATION OF ENDOCRINE GLANDS

Aim:

To identify the endocrine gland, its location, hormone secreted and functions - Thyroid gland.

Materials Required:

- Endocrine gland – (a) Thyroid gland
- For the purpose of flag labelling a model / a chart / photograph showing all endocrine glands should be used.



A) THYROID GLAND

Identification: The flag labelled endocrine gland is identified as Thyroid gland

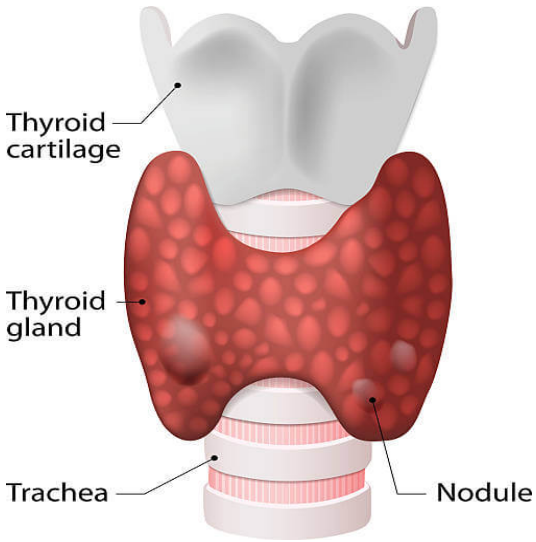
Location:

Thyroid gland is a bilobed gland located in the neck region on either side of the trachea.

Hormones secreted:

Triiodothyronine (T3) and Thyroxine (T4)

Diagram:



Functions of Hormones:

- Thyroid hormones increases the basal metabolic rate (BMR).
- It increases the body temperature.
- It regulates metabolism.
- It is required for normal growth and development.
- It is also known as personality hormone..
- Deficiency of thyroxine results in simple goiter, myxoedema (in adults) and cretinism (in children).
- Excess secretion causes Grave's diseases.

Result:

The flag labelled endocrine gland is identified as Thyroid gland

(B) PANCREAS – ISLETS OF LANGERHANS

Identification:

The flag labelled endocrine gland is identified as Islets of Langerhans in the Pancreas.

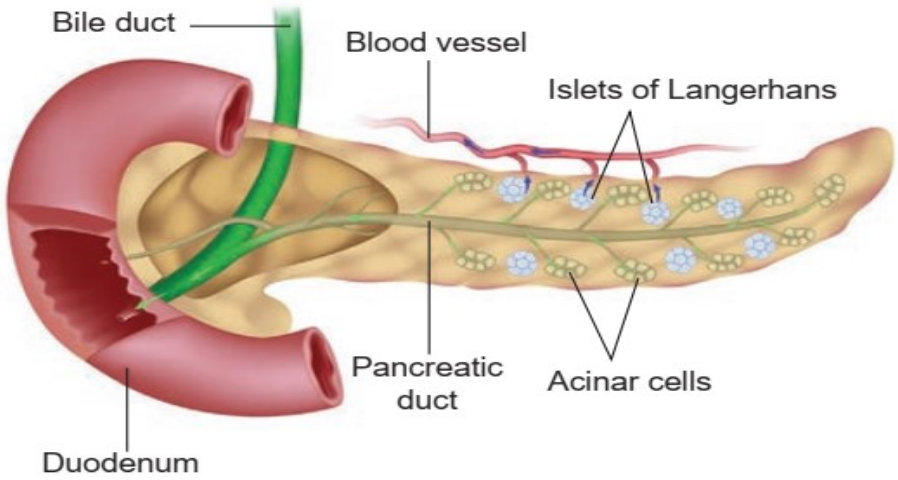
Location:

Islets of Langerhans are seen embedded in the pancreas which is located in the abdominal region.

Hormones secreted:

- α cells secrete glucagon
- β cells secrete insulin

Diagram:



Functions of Hormones:

- Insulin converts glucose into glycogen and stores it in liver and muscles.
- Glucagon converts glycogen into glucose.
- Insulin and glucagon maintain the blood sugar level (80 – 120 mg/dl) by their antagonistic function.
- Decrease in insulin secretion causes diabetes mellitus.

Result:

The flag labelled endocrine gland is identified as Islets of Langerhans in the Pancreas.

PUBLIC EXAMINATION APRIL – 2024

SCIENCE ANSWER KEY

Time Allowed : 3.00 Hours Maximum Marks: 75

PART - I

Note: (i) Answer all the questions. (12 x 1 = 12)

(ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.

1. The endarch condition is the characteristic feature of _____.

(a) root **(b) stem** (c) leaves (d) flower

2. TFM in soaps represents _____ content in soap.

(a) mineral (b) vitamin **(c) fatty acid** (d) carbohydrate.

3. The value of universal gas constant:

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

4. Kilowatt hour is the unit of:

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

5. **An enzyme which cuts DNA is :**

(a) Protease **(b) Restriction endonuclease** (c) DNA Ligase (d) RNAase

6. One mole of any substance contains molecules.

(a) 6.023×10^{23} (b) 6.023×10^{-23} (c) 3.0115×10^{23} (d) 12.046×10^{23}

7. Which one is referred to as "Master Gland"?

(a) Pineal gland **(b) Pituitary gland** (c) Thyroid gland (d) Adrenal gland

8. **Which among the following is not the characteristic of anemophilous plants?**

(a) the flowers produce enormous amount of pollen grains.

(b) the stigmas are large and protruding.

(c) the flowers are brightly coloured, have smell and nectar.

(d) pollen grains are small and dry

9. Inertia of a body depends on:

(a) Weight of the object (b) Acceleration due to gravity of planet

(c) Mass of the object (d) Both (a) and (b)

10. Which is the correct sequence of blood flow?

(a) Ventricle → Atrium → Vein → Arteries

(b) Atrium → Ventricle → Vein → Arteries

(c) Atrium → Ventricle → Arteries → Vein

(d) Ventricle → Vein → Atrium → Arteries

11. Which of the following is not an "element + element → compound" type reaction?

(a) $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ (b) $2K_{(s)} + Br_{2(l)} \rightarrow 2KBr_{(s)}$

(c) $2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$ (d) $4Fe_{(s)} + 3O_{2(g)} \rightarrow 2Fe_2O_{3(s)}$

12. Cancer of the epithelial cells is called:

(a) Leukemia (b) Sarcoma **(c) Carcinoma** (d) Lipoma

PART – II

Note: Answer any seven questions. Question No. 22 is compulsory. (7 x 2 = 14)

13. What is coefficient of apparent expansion?

(i) The ratio of the apparent rise in the volume of the liquid per degree rise in temperature to its unit volume.

(ii) It's SI unit is K^{-1}

14. Why is tungsten metal used in bulbs but not used as fuse wires?

- Tungsten has a **very high melting point.**
- It will **not melt** when a large amount of current is passed through it and the appliance will be **damaged.**

15. What is rust? Give the equation for the formationof rust.

When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust and the phenomenon of formation of rust is known as rusting.

$4Fe + 3O_2 + x\ H_2O \rightarrow 2Fe_2O_3.xH_2O$ (rust)

16. What is stage?

- Stage is the background appearing when we open the scratch window.
- The background will most often be white.
- We can change the background colour as you like.

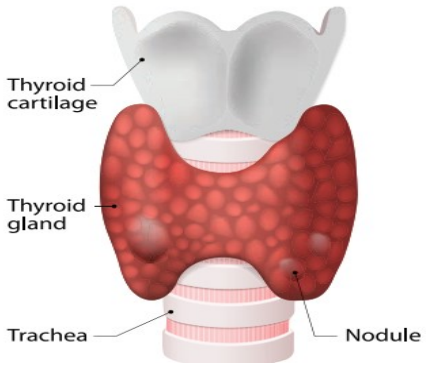
17. Why is sinoatrial node called as pacemaker of heart?

- SA node acts as the pace maker of the heart
- It is capable of initiating impulse which can simulate the heart muscles to contract.

18. What are the parts of the hind brain?

(i) cerebellum (ii) pons (iii) medulla oblongata

19. Identify the parts A, B, C, and D in the given Figure.



20. What is colostrum? How is milk production hormonally regulated?

- The first fluid which is released from the mammary gland after child birth is called as colostrum.
- Milk production is stimulated by prolactin secreted from the anterior pituitary.
- The ejection of milk is stimulated by posterior pituitary hormone oxytocin

21. What is metastasis?

- ❖ The cancerous cells migrate to distant parts of the body and affect new tissues.
- ❖ This process is called metastasis

22. If the pH of a solution is 4.5, Find the value of its pOH.

Solution:

pH + pOH = 14 $\Rightarrow$ pOH = 14 – 4.5 = 9.5

pOH =9.5

PART – III

Note: Answer any seven questions. Question No. 32 is compulsory (7 x 4 = 28)

23. Explain the various types of inertia with examples.

Types of Inertia 1. Inertia of rest 2. Inertia of motion 3. Inertia of direction

a) Inertia of rest: To resist a body to change its state of rest

Ex: Shaking the trees leaves fall down

b) Inertia of motion: To resist a body to change its state of Motion

Ex: An athlete runs for long jumping

c) Inertia of direction To resist a body to change its direction.

Ex: Sharp turn while driving a car

24. (a) Write any three features of natural and artificial radioactivity.

Natural radioactivity	**Artificial radioactivity**
It cannot be controlled	It can be controlled
Spontaneous process	**Induced process**
Alpha, beta and **gamma**	**Elementary particles**-neutron Positron
Z > 83	**Z < 83**

(b) Name any two devices, which are working on the heating effect of current.

Electric iron box, electric toaster

25. a) What happens when $MgSO_4.7H_2O$ is heated? Write the appropriate equation

When magnesium sulphate heptahydrate crystals are gently heated, it loses seven water molecules and becomes anhydrous magnesium sulphate.

$$MgSO_4 \cdot 7H_2O \underset{\text{Cooling}}{\overset{\text{Heating}}{\rightleftharpoons}} MgSO_4 + 7H_2O$$

b) Define solubility

Solubility is defined as the number of grams of a solute that can be dissolved in 100g of a solvent to form its saturated solution at a given temperature and pressure.

$$\text{Solubility} = \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100$$

26. (a) What is Respiratory Quotient?

It is the ratio of volume of carbon dioxide liberates and the volume of oxygen consumed during respiration.

$$RQ = \frac{\text{Volume of } CO_2 \text{ liberated}}{\text{Volume of } O_2 \text{ consumed}}$$

(b) Why should the light dependent reaction occur before light independent reaction during photosynthesis?

- During light independent reactions, CO_2 is reduced into carbohydrates with the help of ATP and NADPH2.
- So light dependent reaction occur before the light independent reaction.

27. Write the dental formula of rabbit.

Dental formula is $(I\ \frac{2}{1},\ C\frac{0}{0},\ PM.\ \frac{3}{2},\ M\ \frac{3}{3})$ in rabbit which is written as $\frac{2033}{1023}$

28. (a) Why is Euploidy considered to be advantageous to both plants and animals?

- Euploid plants often result in increased fruit and flower size. Therefore it is advantageous for them.
- The euploid animals are sterile

(b) Classify Neurons based on its structure.

Based on structure the neurons classified as follows:

i) Unipolar neurons:

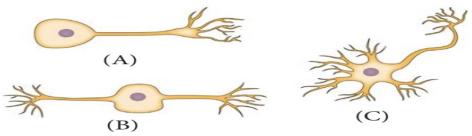
- Only one nerve process arises from the cyton which acts as both axon and dendron.
- They found in early embryos but not in adult.

ii) Bipolar neurons:

- The cyton gives rise to two nerve processes of which one acts as an axon while another as a dendron.
- They found in retina of eye and olfactory epithelium of nasal chambers.

iii) Multipolar neurons:

- The cyton gives rise to many dendrons and an axon.
- They found in cerebral cortex of brain



29. How are Arteries and Veins structurally different from one another?

Artery	Vein
Distributing vessels	Collecting vessel
Deep location	Superficial in location
Blood flow with high pressure	Blood flow with low pressure
Wall of artery is strong thick and elastic	Wall of vein is weak thin and non-elastic
All arteries carry oxygenated blood except pulmonary arteries	All veins carry deoxygenated blood except pulmonary veins

30. Define Ethnobotany and write its importance.

- Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

Importance of Ethnobotany:

- It provides traditional uses of plant.
- It gives information about certain unknown and known useful plants.
- The ethnomedicinal data will serve as a useful source of information for the chemists,
- Pharmacologists and practitioners of herbal medicine.

31. (a) What are the consequences of deforestation?

- Flood, Drought, Soil erosion
- Loss of wild life
- Extinction of species
- Imbalance of biogeochemical cycles
- Alteration of climate condition.
- Desertification

(b) State the applications of DNA finger printing technique.

- **I**t is used in forensic lab to identify the culprit.
- It is also used for paternity testing in case of disputes.
- It is also helps in the study of genetic diversity of population, evolution and speciation.

32. (a) Name the acid that renders Aluminium passive. Why?

- The acid that renders aluminium passive is dilute orconcentrated nitric acid.
- Aluminium becomes passive due to the formation of anoxide film on its surface.

(b) Calculate the number of moles in 1.51×10^{23} molecules of NH_4Cl.

$$\text{No. of moles} = \frac{No.of\ molecules}{Avogadro\ no} = \frac{1.51 \times 10^{23}}{6.023 \times 10^{23}} = 0.25 \text{ mole}$$

PART – IV

Note : Answer all the questions. Draw diagrams wherever necessary. (3 x 7 = 21)

33. (a) (i) What are the uses of convex lens?

- Convex lenses are used as camera lenses.
- Used as magnifying lenses.
- Used in making microscope, telescope and slide projectors.
- Used to correct the defect of vision called hypermetropia.

(ii) Define dispersion of light.

- When a beam of white light or composite light is refracted through any transparent media such as glass or water, it is split into its component colours.
- This phenomenon is called as dispersion of light

(iii) Why are traffic signals red in colour?

- As the red light has highest wavelength among all thecolours, it is scattered least.
- It travels a longer distance in the atmosphere.

(iv) What is the least count of travelling microscope?

Least count of travelling microscope : 0.01 mm

(OR)

(b) (i) What is an echo?

An echo is the sound reproduced due to the reflection of the original sound

ii) Two conditions necessary for hearing an echo:

1. The minimum time gap between the original sound and an echo must be 0.1 s.
2. The minimum distance required to hear an echo is 17.2 m.

iii) The medical applications of echo:

Echo is used in obstetric ultrasonography

To create real-time visual images of the developing embryo or fetus in the mother's uterus

iv) Calculation speed of sound :

Speed of Sound = Distance travelled / Time taken = 2d/t

34. (a) (i) Under same conditions of temperature and pressure, if youcollect 3 litre O_2, 5 litre of Cl_2 and 6 litre of H_2.

(A) Which has the highest number of molecules? 6 litre of H_2

(B) Which has the lowest number of molecules? 3 litre of O_2

(ii) Give the salient features of 'Modern Atomic theory'.

- An atom is no longer indivisible.
- Atoms of the same element may have different atomic mass.
  Ex – isotopes $_{17}Cl^{35}$, $_{17}Cl^{37}$.
- Atoms of different elements may have same atomic masses.
  Ex – Isobars $_{18}Ar^{40}$, $_{20}Ca^{40}$.
- Atoms of one element can be transmuted into atoms of other elements.
- Atoms may not always combine in a simple whole number ratio.
  Eg: Glucose $C_6H_{12}O_6$
- Atom is the smallest particle that take part in a chemical reaction.
- Mass of an atom can be converted into energy. **$E = mc^2$.**

(OR)

(b) (i) How do detergents cause water pollution?

Some detergents having a branched hydrocarbon chain are not fully biodegradable by microorganisms present in water. So, they cause water pollution.

(ii) An organic compound 'A' is widely used as a preservative and has the molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound 'B'.

(i) Identify the compound 'A'. Ethanoic acid (acetic acid).

(ii) Write the chemical equation for its reaction with ethanol to form compound 'B'.

$$\underset{\text{Ethanol}}{C_2H_5OH} + \underset{\text{Ethanoic acid}}{CH_3COOH} \xrightarrow{\text{conc.}H_2SO_4} \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5} + H_2O$$

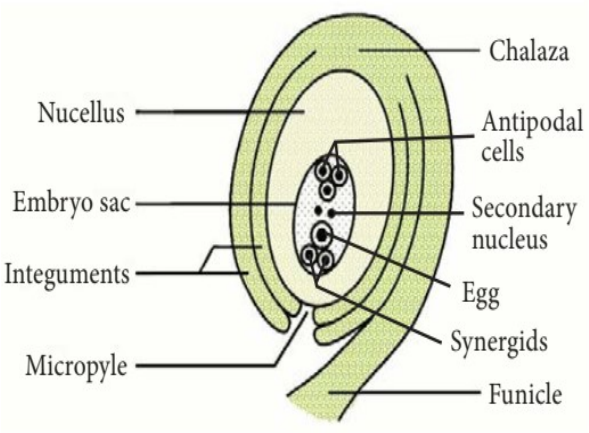
(iii) Name the process. - Esterification.

35. (a) (i) What are synthetic auxins? Give an example.

- Artifically synthesized auxin that have properties like auxinsare called synthetic auxins.
- Eg : 2-4-D

(ii) With a neat labelled diagram, describe the parts of the typical angiospermic ovule.

- Nucleus is enclosed by two integuments leaving an opening called as micropyle.
- The ovule is attached to ovary wall by a stalk known as funiculus.
- Chalaza is the basal part
- The embryo sac contains seven cells and the eighth nuclei located within the nucleus
- Three cells at the micropylar end form the egg apparatus.
- The three cells at the chalaza end are the antipodal cells.



(OR)

(b) (i) Who is called the "Father of Indian Green Revolution"?

Dr.M.S.Swaminathan

(ii) Differentiate between out-breeding and in-breeding.

Out breeding	In breeding
It is the breeding of unrelated animals.	It is the breeding of closely related animals.
Cross between two different species with desirable features of economic value are mated.	Superior males and superior females of the same breed and identified and mated in pairs.
Ex. Mule	Ex: Sheep Hissardale

(iii) Differentiate between Type-I and Type-II Diabetes mellitus.

Factors	Type I - Insulin dependent diabetes mellitus (IDDM)	Type II - Non-insulin dependent diabetes mellitus (NIDDM)
Prevalence	10 - 20%	80 - 90%
Age of Onset	Juvenile onset (< 20 years)	Maturity onset(> 30 years)
Body weight	Normal or Underweight	Obese
Defect	Insulin deficiency due to destruction of β-cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine.