

SCHOOL EDUCATION DEPARTMENT
CHIEF EDUCATIONAL OFFICER
CHENNAI DISTRICT

10TH Std
SCIENCE
EM

LEARNING MATERIAL
2022 - 2023

PREPARED BY

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We convey our sincere gratitude to our respected Chief Education Officer who has given us this opportunity to compile this minimum supporting material for the students of class X.

PREFACE

The aim of this compilation is to provide students with a comprehensive and easy to understand minimum supporting material.

The material prepared is based on selected chapters from the textbook. This includes 1 mark, 2 mark, 4 mark and 7 mark questions in all 23 chapters.

Students are encouraged to use this material for easy learning. The minimum material focuses on aiding learner's in achieving their goals.

All the best & God Bless!

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Science

Minimum Learning

Material One-mark Questions:

1. To project the rockets which of the following principle is/are require?

- A) Newton's third law of motion
- B) Newton's law of gravitation
- C) Law of conservation of linear momentum
- D) Both A and C

ANS :D

2. Inertia of a body depends on

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

ANS: C

3. A man of mass 100 kg has a weight of 980 N at the surface of the Earth. (980 N}

4. By convention, the clockwise moments are taken as _____ and then anticlockwise Moments are taken as _____. (Negative, Positive)

5. The eye defect 'presbyopia' can be corrected by _____

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

ANS: d

6. Amount of light entering into the eye is controlled by _____ (Iris)

7. The value of the universal gas constant.

- a) 3.81 J mol⁻¹ K⁻¹
- (b) 8.31 J mol⁻¹ K⁻¹
- c) 1.38 J mol⁻¹ K⁻¹
- (d) 8.31 J mol⁻¹ K⁻¹

ANS: d

8. The temperature and heat are _____ quantities (Scalar)

9. SI unit of resistance is _____ .{Ohm)

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

10. Kilowatt hour is the unit of

a) resistivity b) conductive c) electrical energy d) electrical power
ANS: c

11. The wiring in a house consists of _____ circuit. (Parallel)

12. The frequency, which is audible to the human ear is _____

a) 50 kHz b) 20 kHz c) 15000 kHz d) 1000 kHz
ANS: a

13. Unit of Radioactivity is

a) Curie b) Curie c) Becquerel d) All the above

ANS: d

14. Which isotope is used for the treatment of cancer

a) Radio Iodine b) Radio Cobalt c) Radio carbon d) Radio Nickel
ANS: b

15. Kamini reactor is located at _____

a) Kalpakkam b) Koodankulam c) Mumbai d) Rajasthan
ANS: a

16. Anemia can be cured by _____ isotope. (Radio-Iron)

17. Which of the following is a triatomic molecule?

a) Glucose b) Helium c) Carbon dioxide
d) Hydrogen
ANS: c

18. The molecular mass of oxygen molecule is

a) 16g b) 18g c) 32g d) 17g
ANS: c

19. The sum of the numbers of protons and neutrons of an atom is called its _____ . (Mass Number)

20. The number of periods and groups in the periodic table

are ____ . a) 6, 16 b) 7, 17 c) 8, 18 d) 7, 18
ANS: d

21. _____ group contains the members of halogen family.

a) 17'h b)15•h c) 1Bth d)

16th ANS:a

2. is an important metal to form amalgam

a} Ag b} Hg c} Mg d} Al

ANS:

b

23 . The number of components in a binary solution is _

_____ a)2 b)3 c)4 d) 5

ANS:2

24. which of the following in the Universal solvent'

a) Acetone b) Benzene c) water d) Alcohol

ANS:c

25 Example for liquid in solid type solution is____.(amalgam)

26. The normal PH of human blood is____(.7.3 - 7.5}

27. Chemical volcano is an example of_____type of reaction.(decomposition)

28. 100% pure ethanol is called _____.(absolute alcohol)

29. Which is formed during anaerobic respiration.

a) carbohydrate b) Ethyl alcohol c) Acetyl CoA d) pyruvate ANS:b

30. is ATP factory of the cell (Mitochondria)

31. The body of Leech has

a) 23 segments b) 33 segments c) 38 segments d) 30 segments. ANS: b

32. Mammals are_____ animals.

a) cold-blooded b) warm-blooded. c) Poikilothermic d) All the above ANS:b

33. 'Heart of Heart' is called.

a) SA node b) AV node c) Purkinje fibers d) Bundle of His. ANS:a

34. Bipolar neurons are found in_____

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

35. The part of the human brain which acts as a relay center is_____.(Thalamus)

36. _____ causes cell elongation apical dominance and prevents abscission.

(Auxin) 37. The growth and functions of the thyroid gland are controlled by .

(Thalamus)

30. The plant which propagates with the help of its leaves is _____

a) Onion b) Neem c) Ginger

d) Bryophyllum. ANS: d

37. The essential parts of a flower are

(a) calyx corolla b) calyx Andrecium c) Corolla gynoecium d) Andloecium and Gynoecium

ANS :d

40. After fertilization the int Ovary develops into_____.(zygote)

41. Fertilization is _____ in humans. (Internal)

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

(a) 5 carbon sugar b) Phosphate (c) Nitrogenous bases d) Sugar phosphate ANS: d

43. The number of chromosomes found in human beings is called_.(23 pair)

44) Physical expression of a gene is called_____.(phenotype)

45 DNA consists of two_____chains.(polynucleotide)

46. The best way of direct dating fossils. of recent origin is by_____.(Radio-carbon method)

47. The theory of natural selection for evolution was proposed by_____.
(Charles Darwin)

48: DNA fingerprinting is based on the principle of identifying.sequences of DNA.

a) Single-stranded b) mutated c) polymorphic d) repetitive ANS:d

49. A protein-rich wheat variety is_____.(Atlas 66)

50. Wor Id No Tobacco Day is observed on

a) May 31 b) June 6 c) April 22 d) October 2

ANS a

51. Where does alcohol affect Immediately after dunking?

a) central nervous system. b) Auditory region c) Eyes d) Liver

ANS:a

52. Blood cancer is called _____.(Leukaerria)

53. Deforestation leads to_____in rainfall.(decreases)

54. Tidal energy is _____ type of energy (renewable)

55. All files are stored in the _____

a) Folder b)Box c)Paint d)Scanner.

ANS:a

WPS Office

1. LAWS OF MOTION

1. Define inertia. Give its classification.

Inertia:

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?

Types of Force: 1. Like parallel force 2. Unlike parallel force

3. If a 5 N and a 15 N forces are acting opposite to one another. Find the resultant force and the direction of action of the resultant force

Given, $F_1 = 5\text{N}$ $F_2 = 15\text{N}$

Two forces acting opposite to one another. Therefore, Resultant force is,

$$F_{\text{net}} = F_2 - F_1$$

$$F_{\text{net}} = 15 - 5 = 10\text{N}.$$

Resultant Force = 10 N. The direction of F_{net} is 15 N.

4. Differentiate mass and weight.

Mass	Weight
Fundamental quantity	Derived quantity
Quantity of matter	Gravitational force
Its unit Kg	Its unit Newton
scalar quantity	vector quantity

5. Define moment of a couple.

oT The product of the forces and the perpendicular distance is called moment of a couple $M = F \times S$

oT Its SI unit is Nm.

6. State the principle of moments.

oT At equilibrium, the algebraic sum of the moments of all the individual forces about any point is equal to zero.

7. State Newton's second law.

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

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

oT High torque with less force

oT Moment of force = $F \times d$

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

oT Increase the time of contact

oT Decrease the impulse

oT Thus he pulls back his hand while catching the ball.

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

oT Space station and astronauts have equal acceleration, they are under free fall condition.

oT Hence, both the astronauts and the space station are in the state of weightlessness.

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:

oT To resist a body to change its state of rest Ex: After Shaking leaves fall down

b) Inertia of motion:

oT To resist a body to change its state of Motion Ex: An athlete runs some distance before jumping

c) Inertia of direction

oT To resist a body to change its direction. Ex: a sharp turn while driving a car, you tend to lean side ways.

2. State Newton's laws of motion?

a) Newton's First law

oT 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

oT 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

oT For every action, there is an equal and opposite reaction. $F_B = - F_A$

3. Describe rocket propulsion.

oT Based on Law of conservation of linear momentum and Newton's III law of motion.

oT Filled with fuel in the propellant tank

oT When the rocket is fired, producing a huge momentum.

oT This momentum makes the rocket project forward.

oT The mass of the rocket gradually decreases, until the fuel is completely burnt out.

oT The mass of the rocket decreases with altitude, which results in gradual increase in velocity of the rocket.

oT At one stage, it reaches escape velocity

4. Give the applications of universal law of gravitation.

oT Dimensions of heavenly bodies can be measured

oT Mass, radius of the Earth, acceleration due to gravity can be calculated.

oT Helps in discovering new stars and planets.

oT To Explain the germination of roots using geotropism.

oT To predict the path of the astronomical bodies.

2. OPTICS

Short Answers

1. What is refractive index?

oT The ratio of speed of light in vacuum to the speed of light in a medium is refractive index.

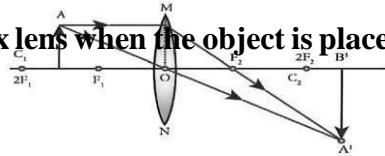
$$\mu = \frac{c}{v}$$

2. State Snell's law.

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

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

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



4. Define dispersion of light

oT 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.

5. State Rayleigh's law of scattering

oT The amount of scattering of light is inversely proportional to the fourth power of its wavelength.

$$s \propto \frac{1}{\lambda^4}$$

6. 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 Hypermetropia	It is used to treat myopia
Produces mostly real images	Produces virtual images

7. What is power of accommodation of eye?

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

8. What are the causes of 'Myopia'?

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

9. Why does the sky appear in blue colour?

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

10. Why are traffic signals red in colour?

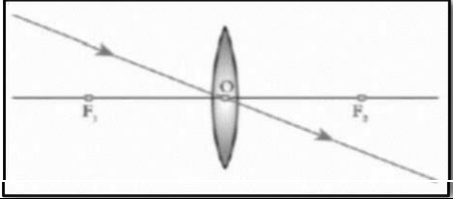
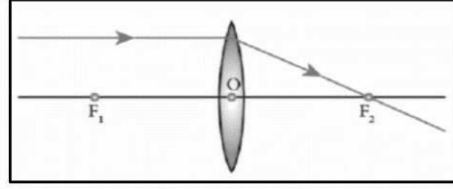
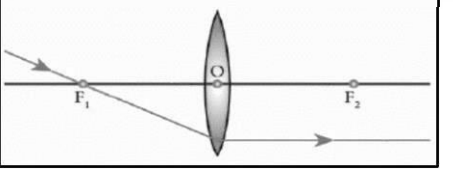
- oT Red light has longest wavelength.
- oT The Red light travels long distance. Therefore, red colour used in traffic signals.

Answer in detail:

1. List any five properties of light. (Write any five points)

- oT Light is a form of energy.
- oT Light always travels along a straight line.
- oT Light does not need medium for its propagation.
- oT The speed of light in air is $C = 3 \times 10^8 \text{ms}^{-1}$
- oT Light is in the form of waves, $C = \nu \lambda$
- oT Violet light has the lowest wavelength, and red light has the highest wavelength.

2. Explain the rules for obtaining images formed by a convex lens with the help of ray diagram.

<p>Rule 1 When a ray of light strikes the convex lens obliquely at its optical centre, it continues to follow its path without any deviation.</p>	
<p>Rule 2 When rays parallel to the principal axis strikes a convex lens, the refracted rays are converged to the principal focus.</p>	
<p>Rule 3 When a ray passing through the principal focus strikes a convex lens the refracted ray will be parallel to the principal axis.</p>	

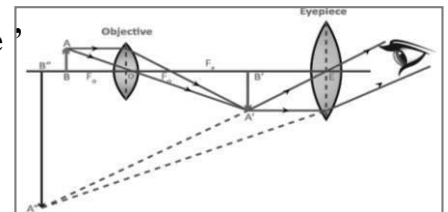
3. Differentiate the eye defects: Myopia and Hypermeteropia

Myopia	Hypermeteropia
short sightedness	long sightedness.
Lengthening of eye ball	Shortening of eye ball.
Nearby objects can be seen clearly but distant objects cannot be seen clearly.	Distant objects can be seen clearly but nearby objects cannot be seen clearly.
The image of distant objects are formed before retina.	The image of nearby objects are formed behind retina.
This defect can be corrected using concave lens.	This defect can be corrected using convex lens.

4. Explain the construction and working of a 'Compound Microscope'

Construction

- It consists of two convex lenses
- The lens is placed near the object is called as objective lens
- The lens with near the observer's eye is called eye lens
- Both lens area 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 A'B' behaves as the object for the eye lens.
- The position of the eye lens is adjusted in such a way, that the image falls within the principal focus of the eyepiece.
- This eyepiece forms a virtual, enlarged and erect image A''B'' on the same side of the object.

3. THERMAL PHYSICS

Short Answers

1. Define one calorie.

oT One calories is defined as the amount of heat energy required to rise the temperature of 1 gram of water through 1°C.

2. Distinguish between linear, arial and superficial expansion.

Linear Expansion	Arial / Superficial Expansion
When a body is heated, the length of the body changes	When a body is heated, the area of the body changes
Coefficient of linear expansion $a_L = \frac{\Delta L}{L_0 \Delta T}$	Coefficient of Arial expansion $a_A = \frac{\Delta A}{A_0 \Delta T}$

3. What is co-efficient of cubical expansion?

oT The ratio of increase in volume of the body per degree rise in temperature to its unit volume is called as coefficient of cubical expansion.

oT The SI unit is K^{-1} $a_v = \frac{\Delta V}{V_0 \Delta T}$

4. State Boyle’s law.

oT When the temperature of a gas is kept constants, the volume of a fixed mass of gas is inversely proportional to its pressure. $P \propto \frac{1}{V}$

5. State-the law of volume.

oT When the pressure of gas is kept constant, the volume of a gas is directly proportional to the temperature of the gas. $V \propto T$

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?

oT The ratio of the true rise in the volume of the liquid per degree rise in temperature to its unit volume.

oT The SI unit is K^{-1}

8. What is co-efficient of apparent expansion?

oT The ratio of the apparent rise in the volume of the liquid per degree rise in temperature to its unit volume.

oT The SI unit is K^{-1} .

9. State Avogadro’s Law?

oT At constant pressure and temperature, the volume of a gas is directly proportional to number of atoms or molecules present in it. $V \propto n$

10. What is Avogadro’s number?

oT Avogadro’s number (N_A) is the total number of atoms per mole of the substance.

oT It is equal to $6.023 \times 10^{23}/\text{mol}$.

Answer in detail:

1. Derive the ideal gas equation.

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

According to Boyle's law $PV = \text{Constant}$

According to Charles's law $\frac{V}{T} = \text{Constant}$

According to Avogadro's law $\frac{V}{n} = \text{Constant}$

Combine these three equations

$$\frac{PV}{nT} = \text{Constant}$$

Substitute $n = \mu N_A$ value we get $\frac{PV}{\mu N_A T} = \text{Constant}$

The Constant = K_B (Boltzman constant)

$$\frac{PV}{\mu N_A T} = K$$

$$PV = \mu N_A K_B T$$

Here $\mu N_A K_B = R$. (Universal Constant)

$$R = 8.31 \text{ mol}^{-1}\text{K}^{-1}$$

$$PV = RT$$

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

oT The liquid whose real and apparent expansion is to be determined is poured in container up to a level. Mark this level as L_1 .

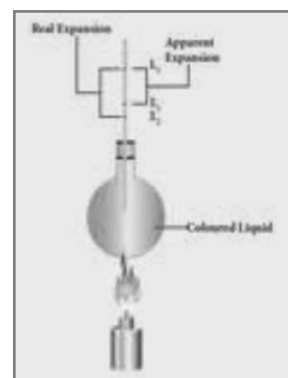
oT Now, heat the container and the liquid using a burner. Initially the container receives the thermal energy and it expands.

oT As a result, the volume of the liquid appears to have reduced. Mark this reduced level of liquid as L_2 .

oT On further heating, the thermal energy supplied to the liquid through the container results in the expansion of the liquid. Hence, the level of liquid rises to L_3 .

oT The difference between the levels L_1 and L_3 is called as apparent expansion. Apparent expansion = $L_3 - L_1$

oT The difference between the levels L_2 and L_3 is called real expansion. Real expansion = $L_3 - L_2$



4. ELECTRICITY

Short Answers

1. Define the unit of current.

oT The SI unit of electric current is ampere (A).

oT The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross section of a conductor, in one second. , $1 \text{ ampere} = \frac{1 \text{ coulomb}}{1 \text{ second}}$

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

oT The resistance decreases, as the conductor is made thicker.

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

oT Tungsten has high melting point, it can bear high heat for glowing.

oT But in fuse wire, the wire used in it should melt.

oT So a metal wire which has low melting point should be used in a fuse wire, but not tungsten wire.

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

1. Electric iron
2. Electric heater.

5. Define electric potential and potential difference.

Electric potential

oT The amount of work done in moving a unit positive charge from infinity to that point against the electric force.

Potential difference.

oT The electric potential difference between two points is defined as the amount of work done in moving a unit positive charge from one point to another point against the electric force. $V = \frac{W}{Q}$

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

- oT The earth wire provides a low resistance path to the electric current.
- oT The earth wire sends the current from the body of the appliance to the earth
- oT Thus, the earth wire serves as a protective conductor, which saves us from electric shocks.

7. State Ohm's law.

oT 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.
 $V = IR$

8. 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 .

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

oT All the circuits in a house are connected in parallel, so that the disconnection of one circuit does affect the other circuit.

Answer in detail:

1. a) What is meant by electric current? b) Name and define its unit. c) Which instrument is used to measure the electric current? How should it be connected in a circuit?

a) Electric current

oT The rate of flow of charges in a conductor. $I = \frac{Q}{t}$

b) Name and define its unit.

oT The SI unit of electric current is ampere (A).

oT The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross section of a conductor, in one second. , $1 \text{ ampere} = \frac{1 \text{ coulomb}}{1 \text{ second}}$

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. b) An alloy of nickel and chromium is used as the heating element. Why? c) How does a fuse wire protect electrical appliances?

a) Joule's law of heating

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

oT Directly proportional to the square of the current passing through the resistor.

oT Directly proportional to the resistance of the resistor.

oT Directly proportional to 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?

oT 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.(circuit diagram not required)

oT Important components of the main box are (i) a fuse box and (ii) meter.

oT Two insulated wires 1) Red wire  Live wire 2) Black wire  neutral wire.

oT An electrical potential at 220 V.

oT Both, the live wire and the neutral wire enter into box where the main switch

oT It passes to main switch which has two separate circuits.

1) 5A rating. 2) 15 A rating.

oT 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? b) List the merits of LED bulb.

a) The advantages of LED TV over the normal TV

oT It has brighter picture quality.

oT It is thinner in size.

oT It uses less power and consumes very less energy.

oT Its life span is more.

oT It is more reliable.

b) List the merits of LED bulb.

oT Low power, No loss of energy

oT It is not harmful to the environment.

oT A wide range of colours is possible here.

oT Mercury and other toxic material are not required.

5. ACOUSTICS

Short Answers

1. What is a longitudinal wave?

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

2. What is the audible range of frequency?

oT 20 Hz to 20 kHz

3. What is the minimum distance needed for an echo?

oT 17.2 m

4. Name three animals, which can hear ultrasonic vibrations.

1) Mosquito 2) Dogs 3) Bats

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

oT Presence of moisture in air decreases the density of air.

oT Velocity increases with the decrease in density

oT Hence, velocity of sound increases on a rainy day.

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

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

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

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

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

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

9. Difference between the Sound and Light waves.

SOUND	LIGHT
Medium is required for the propagation	Medium is not required for the propagation.
Longitudinal.	Transverse.
A speed of about 340ms^{-1} at NTP.	A speed of $3 \times 10^8 \text{ms}^{-1}$.

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. $V \propto \frac{1}{d}$

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? a) State two conditions necessary for hearing an echo. b) What are the medical applications of echo?c) How can you calculate the speed of sound using echo?

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,

a) Calculation speed of sound :

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

6. NUCLEAR PHYSICS

Short Answers

1. Who discovered natural radioactivity? Henri Becquerel
2. Which radioactive material is present in the ore of pitchblende? Uranium, Radium
3. Write any two elements, which are used for inducing radioactivity? Boron, Aluminium
4. Write the name of the electromagnetic radiation, which is emitted during a natural radioactivity. Gamma
5. If A is a radioactive element which emits an α - particle and produces ${}_{104}\text{Rf}^{259}$. Write the atomic number and mass number of the element A. Mass number = 263, Atomic number = 106
6. What is the average energy released from a single fission process? 200MeV (or) 3.2×10^{-11} J
7. Which hazardous radiation is the cause for the genetic disease? Gamma ray
8. What is the amount of radiation that may cause death of a person when exposed to it? 600 R
9. When and where was the first nuclear reactor built? 1942 at Chicago, U.S.A
10. Give the SI unit of radioactivity. Becquerel (Bq)
11. Which material protects us from radiation? Lead
12. Write any three features of natural and artificial radioactivity.

Natural radioactivity	Artificial radioactivity
Self- disintegration of a nucleus.	Disintegration of nucleus through induced process.
Alpha, beta and gamma radiations are emitted.	Mostly elementary particles such as neutron, positron, etc. are emitted.
Spontaneous process.	Induced process.
This cannot be controlled.	This can be controlled.

13. Define Critical mass.

oT The minimum mass of a fissile material necessary to sustain the chain reaction is known as 'critical mass'.

14. Define one Roentgen.

oT The quantity of radioactive substance which produces a charge of 2.58×10^{-4} coulomb in 1 kg of air under standard conditions of pressure, temperature and humidity.

15. State Soddy and Fajan's displacement law.

oT 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, than the mass number and atomic number of the parent nucleus.

oT When 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, than the atomic number of the parent nucleus.

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

oT To control the number of neutrons

oT To control chain reaction.

oT Mostly boron or cadmium rods are used as control rods.

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

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

18. 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?

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

19. What is stellar energy?

- oT Fusion reaction that takes place in the cores of the stars like Sun emit a large amount of energy, which is called as ‘stellar energy’.

20. Give any two uses of radioisotopes in the field of agriculture?

- oT The radioisotope of phosphorous (P-32) helps to increase the productivity of crops.
- oT To kill the insects and parasites and prevent the wastage of agricultural products.

Answer in detail:

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

Controlled chain reaction:

- oT In the controlled chain reaction, the number of neutrons released is maintained to be one.
- oT The energy released due to a controlled chain reaction can be utilized for constructive purposes.
- oT Controlled chain reaction is used in a nuclear reactor to produce energy in a sustained and controlled manner.

Uncontrolled chain reaction:

- oT In the uncontrolled chain reaction, the number of neutrons multiplies indefinitely and causes fission in a large amount of the fissile material.
- oT This results in the release of a huge amount of energy within a fraction of a second.
- oT This kind of chain reaction is used in the atom bomb to produce an explosion.

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

α rays	β rays	γ rays
Helium nucleus	electrons ($-1e^0$),	photons.
Positively charged	Negatively charged	Neutral particles.
Ionising power greater than β rays and γ rays.	Ionising power Comparatively low	Ionising power Very less ionization power
Penetrating power Low	Penetrating power is greater than that of α rays.	They have a very high penetrating power
Deflected by both Effect of electric of magnetic field	Deflected by both Effect of electric of magnetic field	They are not deflected by both Effect of electric of magnetic field
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:

- oT A device in which the nuclear fission reaction takes place in a self-sustained and controlled manner to produce electricity.

Fuel:

- oT A fissile material is used as the fuel.
- oT The commonly used fuel material is uranium.

Moderator:

- oT It is used to slow down the high energy neutrons to provide slow neutrons.
- oT Graphite and heavy water are the commonly used moderators.

Control rod:

- oT To control the number of neutrons in order to have sustained chain reaction.
- oT Mostly boron or cadmium rods are used as control rods.

Coolant:

- oT A coolant is used to remove the heat produced in the reactor core, to produce steam.
- oT This steam is used to run a turbine in order to produce electricity.

Protection wall

- oT A thick concrete lead wall is built around the nuclear reactor in order to prevent the harmful radiations from escaping into the environment.
- oT Water, air and helium are some of the coolants.

4. Compare Nuclear fission and nuclear fusion.

Nuclear Fission	Nuclear Fusion
The process of breaking up (splitting) of a heavy nucleus into two smaller nuclei is called ' nuclear fission '.	Nuclear fusion is the combination of two lighter nuclei to form a heavier nucleus.
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**Uses of Radioactivity in medicine**

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

7. ATOMS AND MOLECULES**Short Answers****1. Define: Relative atomic mass.**

Relative atomic mass of an element is the ratio between the average mass of its isotope to $1/12^{\text{th}}$ part of the mass of a carbon-12 atom.

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

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

Isotope	Mass (amu)	% abundance
${}^8_8\text{O}^{16}$	15.9949	99.757
${}^8_8\text{O}^{17}$	16.9991	0.038
${}^8_8\text{O}^{18}$	17.9992	0.205

$$\begin{aligned} \text{The atomic mass of oxygen} &= (15.9949 \times 0.99757) + (16.9991 \times 0.00038) + (17.9992 \times 0.00205) \\ &= 15.999 \text{ amu.} \end{aligned}$$

3. Define: Atomicity.

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

4. Give any two examples for heterodiatomic molecules.

HCl, HF

5. What is Molar volume of a gas?

oT Molar volume of a gas: One mole of any gas occupies 22.4 litre (or) 22400 ml at STP.
This volume is called Molar Volume.

6. Find the percentage of nitrogen in ammonia. (N-14, H-1)

$$\begin{aligned}\text{Molar mass of NH}_3 &= 14 + 3 = 17 \text{ g} \\ \text{Mass \% of Nitrogen} &= \frac{14}{17} \times 100 = 82.35 \%\end{aligned}$$

7. Calculate the number of water molecule present in one drop of water, which weighs 0.18 g.

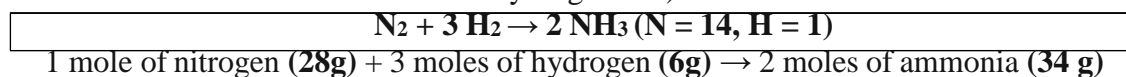
$$\begin{aligned}\text{Number of molecules} &= \frac{\text{Avogadro number} \times \text{mass of water}}{\text{Gram molecular mass}} \\ &= \frac{6.023 \times 10^{23} \times 0.18}{18} = 0.06023 \times 10^{23} \\ \text{The no of water molecules} &= 6.023 \times 10^{25}.\end{aligned}$$

8. $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$

(The atomic mass of nitrogen is 14, and that of hydrogen is 1)

1 mole of nitrogen (28 g) + 3 moles of hydrogen (6 g) \rightarrow 2 moles of ammonia (34 g)

(The atomic mass of N is 14 and that of hydrogen is 1)



9. Calculate the number of moles in

i) 27g of Al ii) 1.51×10^{23} molecules of NH_4Cl

i) 27g of Al:

$$\text{Number of moles} = \frac{\text{Mass of Al}}{\text{Atomic mass of Al}} = \frac{27}{27} = 1 \text{ mole.}$$

ii) 1.51×10^{23} molecules of NH_4Cl :

Molecular mass of NH_4Cl = 53.5 g

$$\begin{aligned}\text{Number of mole} &= \frac{\text{Number of Molecules}}{\text{Avogadro's number}} \\ &= \frac{1.51 \times 10^{23}}{6.023 \times 10^{23}} = \frac{1}{4} = 0.25 \text{ mole.}\end{aligned}$$

Answer in detail:

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

- oT An atom is no longer indivisible (after the discovery of electron; Proton and neutron)
- oT Atoms of the same element may have different atomic mass (isotopes $_{17}\text{Cl}^{35}$, $_{17}\text{Cl}^{37}$)
- oT Atoms of different elements may have same atomic masses (isobars $_{18}\text{Ar}^{40}$, $_{20}\text{Ca}^{40}$).
- oT Atom of one element can be transmuted into atoms of other elements. In other words, atom is no longer indestructible (artificial transmutation).
- oT Atoms may not always combine in a simple whole number ratio. (Eg: Glucose).
- oT Atom is the smallest particle that takes part in a chemical reaction.
- oT The mass of an atom can be converted into energy. ($E = mc^2$)

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

(i) Relative Molecular Mass (Hydrogen scale)

The Relative Molecular Mass of a gas is the ratio between the mass of one molecular of the gas of one atom of Hydrogen

(ii) Vapour Density:

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

$$\text{Vapour density (V.D)} = \frac{\text{mass of a given volume of gas at STP}}{\text{mass of the same volume of Hydrogen}}$$

According to Avogadro's law

$$\text{Vapour Density(at STP)} = \frac{\text{mass of } n \text{ molecules of a gas at STP}}{\text{mass of } n \text{ molecules of hydrogen}}$$

Hydrogen is diatomic molecule so,

$$\text{Vapour Density} = \frac{\text{mass of 1 molecule of gas at STP}}{2 \times \text{mass of 1 atom of hydrogen}}$$

$$2 \times \text{Vapor density} = \frac{\text{Mass of 1 molecule of a gas at STP}}{\text{mass of 1 atom of hydrogen}}$$

$$2 \times \text{Vapour density} = \text{Relative molecular mass of a gas.}$$

$$\text{Relative molecular mass} = 2 \times \text{Vapour density.}$$

3. Distinguish between atoms and molecules.

Atom	Molecule
The smallest particle of an element.	The smallest particle of an element or compound
Does not exist in free state (Except Noble gas)	Molecule exists in free state.
highly reactive. (Except Noble gas)	Molecules are less reactive.
Atom does not have a chemical bond.	Atoms in a molecule are held by chemical bonds.

4. Write the application of Avogadro's law

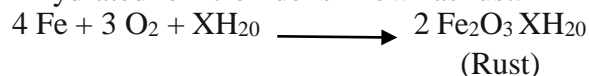
- oT Explains Gay – Lussac's Law.
- oT To determine Atomicity of gases
- oT To derive molecular formula of gases
- oT To derive the relationship between molecular mass and vapour density
- oT To determine gram molecular mass (22.4 litre at STP)

8. PERIODIC CLASSIFICATION OF ELEMENTS

Short Answers

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

hydrated ferric oxide is known as rust.



2. State two conditions necessary for rusting of iron.

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

3. Define Alloys?

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

4. What is Amalgam ? Give Example?

- oT An alloy of mercury with metal
- oT Ex: Silver tin Amalgam

Answer in detail:

1. 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

- 2. a) State the reason for addition of caustic alkali to bauxite ore during purification of bauxite.
- b) Along with cryolite and alumina, another substance is added to the electrolyte mixture. Name the substance and give one reason for the addition.
 - a) Bauxite ore does not dissolved in ordinary solution by adding caustic soda it can be dissolved
 - b) Fluorspar – Lowers the fusion – temperature of electrolyte

9. SOLUTIONS

Short Answers

1. Define the term: Solution

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

2. What is mean by binary solution.

oT 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 (NaCl dissolved 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, Sugar in water,
Non - Aqueous solution	The solution in which any liquid other than water acts as a solvent	E.g : Sulphur dissolved in carbon - disulphide

5. Define Volume percentage

oT 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?

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

7. Define Hydrated salt.

oT 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?

oT solubility increases with increase in temperature while decreases with decrease in temperature.
The solubility of copper sulphate at 25°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

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 solvent at a given temperature.

Example : 36 g of sodium chloride in 100g of water at 25°C forms saturated solution.

ii) Un saturated solution:

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

Example : 10 g or 20 g or 30 g of sodium chloride dissolved in 100g of water at 25°C forms an unsaturated solution.

2. Write notes on various factors affecting solubility.

There are three main factors which govern the solubility of a solute.

They are,

- i) Nature of the solute and solvent
- ii) Effect of Temperature
- iii) Pressure

i) Nature of the solute and solvent

- Non polar compounds do not dissolve in polar solvents. Polar compounds do not dissolve 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.
- In endothermic process solubility increases with increase in temperature.
- In exothermic process, solubility decreases 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.

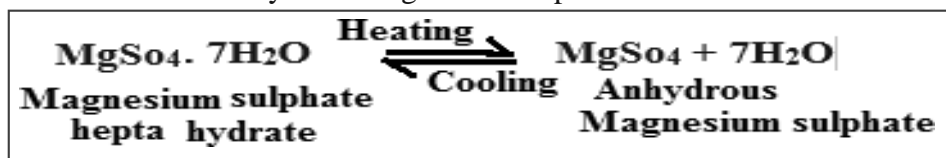
iii) Effect of Pressure:

- Effect of pressure is observed only in the case of solubility of a gas in a liquid. When the pressure is increased, the solubility of a gas is also increased.

3. a) What happens when MgSO₄.7H₂O is heated? Write the appropriate equation

b) Define solubility

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



b) 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.

Ex: 36 g of sodium chloride need to be dissolved in 100g of water to form its saturated solution.

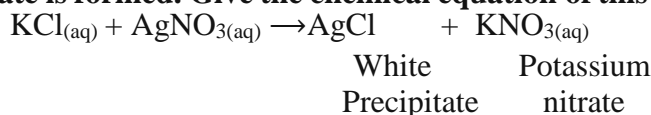
4. In what way hygroscopic substances differ from deliquescent substances.

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.

10. TYPES OF CHEMICAL REACTION

Short Answers

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.



2. Why does the reaction rate of a reaction increase on raising the temperature?
oT Most of the reactions go faster at higher temperature. Because adding heat to the reactants, oT it provides energy to break more bonds. So, speed of the reaction is increased.
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 : $\text{H}_2(\text{g}) + \text{H}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$
4. Differentiate reversible and irreversible reactions.

Reversible reaction	Irreversible reaction
It can be reversed under suitable condition.	It cannot be reversed
Both forward and backward reactions take place relatively slow	It proceeds only in forward direction. completely converted into products.
It attain equilibrium	Equilibrium is not attained.

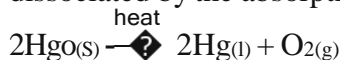
Answer in detail:

1. What are called thermolysis reactions?

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

Example: 1

Mercury II oxide is decomposed into mercury metal and oxygen gas. As the molecule is dissociated by the absorption of heat. It is otherwise called "Thermolysis."



Example: 2

Calcium carbonate is heated, it breaks down into calcium oxide and carbon dioxide. It is a type of compound to compound / compound decomposition reaction.



Commonly decomposition reactions are endothermic reaction.

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

oT When two compounds react with each other if their ions are interchanged, then the reaction is called double displacement reaction.

(i) Precipitate reaction :

When the clear aqueous solutions of potassium iodide and lead II nitrate are mixed, a double displacement reaction takes place between them.

Potassium and lead displace to one other and form a yellow precipitate of lead II oxide.

(ii) Neutralization reaction :

Sodium hydroxide with hydrochloric acid is a typical neutralization reaction. Here sodium replaces hydrogen from hydrochloric acid forming sodium chloride and water.

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

1. Nature of reactant:

oT The reaction of sodium with hydrochloric acid is faster than that with acetic acid.

2. Concentration of the reactants:

oT Changing the amount of the reactants also increases the reaction rate.

3. Temperature:

oT Most of the reactions go faster at higher temperature.

4. Pressure:

oT If the reactants are gases, increasing their pressure increases the reaction rate.

5. Catalyst:

oT A catalyst is a substance, which increases the reaction rate without being consumed in the reaction.

6. Surface area of the reactants:

oT Powdered reactants have more surface area. The collision of reactant particle is increased.

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

oT Our body works within the pH range of 7.0 to 7.8. If any increases (or) decreases in this value leads to disease.

oT 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.

oT Toothpastes are generally basic it can neutralize the excess acid and prevent tooth decay.

oT Citrus fruits require slightly alkaline soil, while rice require acidic soil and sugarcane requires neutral soil.

oT The P^H of rain water is approximately 7. its P^H 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.



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 remain constant.

11. CARBON AND ITS COMPOUNDS

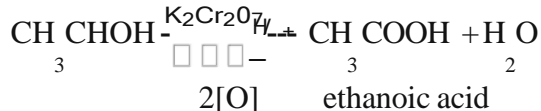
Short Answers

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

oT (CH₃COCH₃) - Acetone

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

Ethanol is oxidized to ethanoic acid with alkaline K₂Cr₂O₇ or acidified K₂Cr₂O₇



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

oT Some detergents having a branched hydrocarbon chain are not fully biodegradable by micro-organisms present in water. So they cause water pollution.

Remedial measures

oT Replacing detergents with branched hydrocarbon chains with linear hydrocarbon chains which are biodegradable.

5. Differentiate soaps and detergents.

Soap	Detergent
Sodium salt of long chain fatty acid	Sodium salts of sulphonic acids.
Biodegradable.	Non-biodegradable.
Poor foaming capacity	Rich foaming capacity
Prepared from animal fats or vegetable oils.	Prepared from hydrocarbon obtained from crude oil.
It form a scum in hard water.	Does not form a scum in hard water

Answer in detail:

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

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

Important characteristics of homologous series:

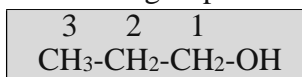
- Each series differs from CH_2 group, molecular mass of 14 amu.
- All members of homologous series contain the same elements and function group.
- Chemical properties of the members of a homologous series are similar
- All the members can be prepared by a common method.

2. Arrive at, systematically, the IUPAC name of the compound: $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$.

Step1: The present chain consists of 3 carbon atoms. The root word is “prop”

Step2: There are single bonds between the carbon atoms of the chain. So the primary suffix is “ane”.

Step3: The compound contain -OH group, it is an alcohol. The carbon chain is numbered from the end which is closest to -OH group.



Step 4: The locant number of -OH group is 1 and thus the secondary suffix is 1-ol

So the name of the compound is

Prop + ane + 1 – ol = Propan – 1 – ol

3. How is ethanol manufactured from sugarcane?

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

(i) Dilution of molasses

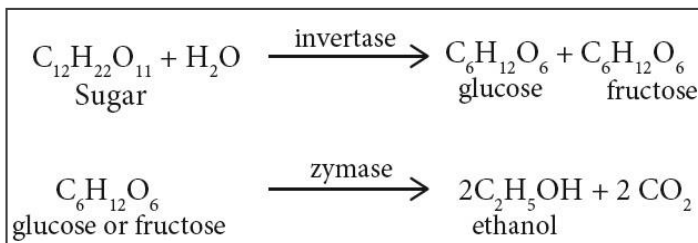
oT Molasses is first diluted with water to bring down the concentration of sugar to about 8 to 10 percent.

(ii) Addition of Nitrogen Source

oT If the nitrogen content of the molasses is poor, it may be fortified by the addition of ammonium sulphate (or) ammonium phosphate.

(iii) Addition of yeast

oT The solution obtained in step (ii) 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.



(iv) Distillation of Wash.

- oT The fermented liquid containing 15 to 18 percent alcohol, is now subjected to fractional distillation.
- oT The main fraction drawn is an aqueous solution of ethanol which contains 95.5 % ethanol and 4.5 % of water. This is called rectified spirit.
- oT This mixture is then refluxed over quick lime for about 5 to 6 hours and then allowed to stand for 12 hours.
- oT On distillation of this mixture, pure alcohol (100%) is obtained. This is called absolute alcohol.

5. Explain the mechanism of cleansing action of soap.

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

6. Write the important of organic compound in our daily life.

- oT Fuels like LPG, petrol, kerosene.
- oT Polymeric materials like tyre, plastic containers.
- oT Alcohols used as a solvent and an antiseptic agent.
- oT Formaldehyde used as a disinfectant.
- oT Ketones used as a solvent and stain remover.
- oT Ethers are used to anaesthetic agent and pain killer.
- oT All the cooking oils and lipids contain esters.

12. PLANT ANATOMY AND PLANT PHYSIOLOGY

Short Answers

1. What is collateral vascular bundle?

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

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

- oT Carbon dioxide taken from atmosphere

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

- oT Glycolysis

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

- oT Anaerobicrespiration.

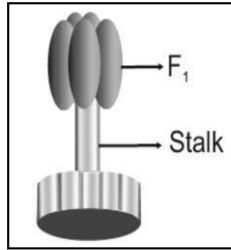
5. Give an account on vascular bundle of dicot stem.

- 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. Draw and label the structure of oxysomes.



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

- oT Dermal (or) Epidermal tissue system
- oT Groundtissuesystem
- oT Vascular tissue system

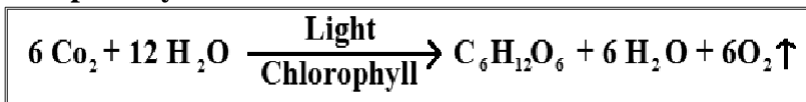
9. What is photosynthesis and where in a cell does it occur?

- oT 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.
- oT Photosynthesis occur in the chloroplast.

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

- oT During light independent reactions, CO₂ is reduced into carbohydrates with the help of ATP and NADPH₂.
- oT So light dependent reaction occur before the light independent reaction.

11. Write the reaction for photosynthesis.



12. What is R.Q?

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

$$\text{RQ} = \frac{\text{volume of Co}_2 \text{ liberated}}{\text{volume of o}_2 \text{ consumed}}$$

13. Write down the functions of chloroplast

- oT Photosynthesis
- oT Storage of starch
- oT Synthesis of fattyacids.
- oT Storage of lipids.

14. What are the factors affecting photosynthesis

- oT External factors → Light, CO₂, temperature, water and mineral elements.
- oT Internal factors → Pigments, leaf age, accumulation of carbohydrates and hormones.

Answer in detail:

1. Differentiate the following.

- a) Monocot root and Dicot root
 - b) Aerobic and Anaerobic respiration
- a) Monocot root and Dicot root:**

Dicot Root	Monocot Root
Tetrarch Xylem	Polyarch Xylem
Cambium Present	Cambium absent
Secondary Growth Present	Secondary Growth absent
Pith absent	Pith 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
carbon dioxide, water and energy	Ethanol and energy

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

Glycolysis:

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

Krebs cycle:

- oT This cycle occurs in mitochondria matrix.
- oT At the end of glycolysis, the oxidation of two molecules of pyruvic acid enter into into CO₂ and water

Electron Transport chain:

- ❖ NADH₂ and FADH₂ 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 O₂ 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 NADPH ₂ 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 NADPH ₂ .
It occurs in thylakoid membrane of the chloroplast.	It occurs in the stroma of the chloroplast.

13. STRUCTURAL ORGANISATION OF ANIMALS

Short Answers

1. Give the common name of the *Hirudinaria granulosa*. The Indian Leech
2. How does leech respire? Respiration takes place through the skin in leech.
3. Write the dental formula of rabbit. Dental formula is $I \bar{2}, C \bar{0}, PM \bar{3}, M \bar{3} \quad \overline{2033}$

1 0 2 3 1023
4. How many pairs of testes are present in leech? 11 pairs of testis.

5. **How is diastema formed in rabbit?** The gap between the incisors and premolar is called diastema
6. **What organs are attached to the two bronchi?** Lungs
7. **Which organ acts as suction pump in leech?** Muscular pharynx
8. **What does CNS stand for?** CNS → Central Nervous System.
9. **Why is the teeth of rabbit called heterodont?** In Rabbit teeth are of different types
10. **How does leech suck blood from the host?**
 oT Leech make a triadate or Y shaped incision in the skin of the host and the blood is sucked by Muscular pharynx.
11. **Why are the rings of cartilages found in trachea of rabbit?**
 oT Tracheal walls are supported by rings of cartilage, which helps in the free passage of air.
12. **List out the parasitic adaptations in leech.**
 oT Blood is sucked by pharynx.
 oT The three jaws inside the mouth, caused a painless y shaped wound in the skin of the host.
 oT The salivary glands produced hirudin which does not allow the blood to coagulate.
 oT Parapodia and setae are completely absent.

Answer in detail:

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

- oT In leech, circulation is brought about by haemocoelic system.
- oT There are no true blood vessels.
- oT The blood vessels are replaced by channels called haemocoelic channels (or) canal filled with blood like fluid.
- oT The coelomic fluid contain haemoglobin.
- oT There are four longitudinal channels.
 - ✚ One channel lies above (dorsal) the alimentary canal.
 - ✚ One below (ventral) the alimentary canal.
 - ✚ The other two channels lie on either (lateral) side of the alimentary canal, which serve as heart and have inner valves.
- oT All the four channels are connected together posteriorly in the 26th segment.

2. How does locomotion take place in leech?

- Locomotion in leech take place by
- oT Looping(or) crawling movement.
 - oT Swimming movement.

Looping or crawling movement:

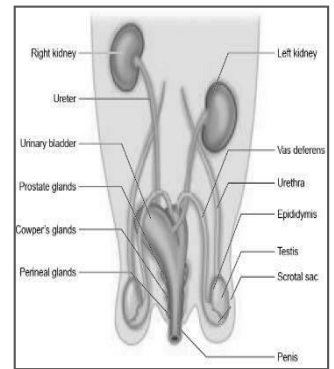
- oT This type of movement is brought about by the contraction and relaxation of muscles.
- oT The two suckers serve for attached during movement.

Swimming movement:

- oT Leech swim very actively and perform
- oT undulating movements in water.

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

- oT The male reproductive system of rabbit consists of a pair of testes, which are ovoid in shape.
- oT Testes are enclosed by scrotal sacs in the abdominal cavity.
- oT Each testis consists of numerous fine tabulates called seminiferous tubules.
- oT This network of tubules lead into a coiled tubule called epididymis, which leads into the sperm duct called vas deferens.
- oT The vas deferens joins in the urethra just the penis.
- oT The urethra runs backward and passes into the penis.



14. TRANSPORTATION IN PLANTS AND CIRCULATION IN ANIMALS

Short Answers

1. Name two layered protective covering of human heart. Pericardium
2. What is the shape of RBC in human blood? Biconcave and disc shaped.
3. Why is the colour of the blood red ? Presence of haemoglobin in RBC
4. Which kind of cells are found in the lymph? Lymphocytes
5. Name the heart valve associated with the major arteries leaving the ventricles.
oT Semi - lunar valves
6. Mention the artery which supplies blood to the heart muscle. The coronary artery
7. What causes the opening and closing of guard cells of stomata during transpiration?
oT The opening and closing of the stomata is due to the change in turgidity of the guards cells.
oT When water enters into guard cells, they become turgid and the stoma open.
oT When the guard cells lose water, it become flaccid and the stoma closes.
8. What is cohesion?
oT The force of attraction between molecules of water is called cohesion.
9. 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
10. What would happen to the leaves of a plant that transpires more water than its absorption in the roots?
oT If the leaves of a plant transpires more than its absorption in the roots,
oT The plant will get dehydrated and it affects plant growth, photosynthesis and transpiration
11. Describe the structure and working of the human heart.
The structure of the human heart
oT The human heart is four chambered. There are two atrium and two ventricles.
Working of the human heart
oT The right atrium receives deoxygenated blood from different parts of the body
oT The right and left articles pump blood into the right and left ventricles respectively.
oT From the right ventricle arises the pulmonary trunk, which bifurcates to form right and left pulmonary arteries.
oT The right and left pulmonary arteries supply deoxygenated blood to the lungs of the respective side.

oT The left ventricle gives rise to aorta. The oxygenated blood is supplied by the aorta to various organs of the body.

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

oT For Human it is double circulation because the heart contains completely separated four chambers

oT The Oxygenated blood donot mix with the deoxygenated blood

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

oT The rhythmic closure and opening of the valves cause the sound of the heart.

oT The first sound LUBB is longer duration and produced by the closure of the tricuspid

oT The second sound DUPP is of a shorter duration and produced by the closure of semilunar valves

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

oT Regulate the flow of blood in a single direction

oT Preventbackflow of blood.

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

oT Rh factor was discovered by Landsteiner and Wiener in Rhesus Monkey.

oT So it is named as Rh factor.

16. 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
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 expect pulmonary veins
Internal valves are absent	Internal valves are present

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

oT SA node acts as the pace maker of the heart

oT It is capable of initiating impulse which can simulate the heart muscles to contract.

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

oT The opening and closing of the stomata is due to the change in turgidity of the guards cells.

oT When water enters into guard cells, they become turgid and the stoma open.

oT When the guard cells lose water, it become flaccid and the stoma closes.

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

oT **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.

Answer in detail:

1. How do plants absorb water? Explain.

oT There are millions of root hairs on the tip of the root, which absorb water and minerals by diffusion.

oT Root hairs are thin walled, slender extension of epidermal cell that increase the surface area of absorption.

oT Once the water enters the root hairs, the concentration of water molecules in the root hairs cells become more than that of the cortex.

oT Thus water from the root hair more to the cortical cells by osmosis and then reaches the xylem.

oT From there the water is transported to the stem and leaves.

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

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

Importance of transpiration:

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

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

Granulocytes : 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 engulf 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:

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

5. Enumerate the functions of blood.

Functions of blood

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

6. Tabulate different types of blood groups.

Blood Group	Antigens on RBC	Antibodies in Plasma	Can donate to	Can receive from
A	Antigen A	Anti – B	A and AB	A and O
B	Antigen B	Anti – A	B and AB	B and O
AB	Antigen A and B	No antibody	AB	A, B, AB and O recipient
O	No Antigen	Both anti A and B	A, B, AB and O (Universal Donor)	O

15. NERVOUS SYSTEM

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.

oT 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.

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

Answer in detail:

1. 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 example- Breathing, eating	For example-heartbeat, sneezing

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.	the 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)

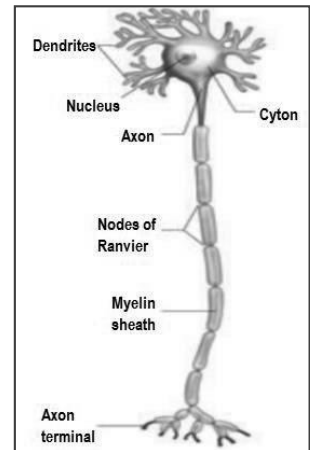
- It help in transmission of nerve impulses to and from the cell body.

(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**
- **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.

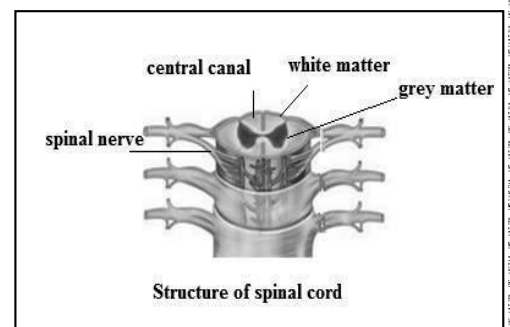
Hypothalamus	Temperature control, thirst, hunger, urination, important link between nervous system and endocrine glands.
Cerebellum	Maintenance of posture and balance, coordinate voluntary muscle activity.
Pons and medulla	Role in sleep-awake cycle, cardiovascular, respiratory and digestive control centers.

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. Describe the structure of spinal cord.

- oT Spinal cord is a cylindrical structure lying in the neural canal of the vertebral column
- oT It extends from the lower end of medulla oblongata to the first lumbar vertebra.
- oT The posterior most region of spinal cord tapers into a thin fibrous thread like structure called **filum terminale**.
- oT Internally, the spinal cord contains a cerebrospinal fluid filled cavity known as the **central canal**.
- oT The grey matter of spinal cord is 'H' shaped.
- oT The upper end of letter 'H' forms **posterior horns** and lower end forms **anterior horns**.
- oT A bundle of fibres passes into the posterior horn forming **dorsal** or **afferent root**.
- oT Fibres pass outward from the anterior horn forming **ventral** or **efferent root**.



16. PLANT AND ANIMAL HORMONES

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.
Mineralocorticoids - 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

9. What are synthetic auxins? Give examples.

oT Artificially synthesized auxins that have properties like auxins are called as synthetic auxins.

Example: 2, 4 D (2,4 Dichlorophenoxy Acetic Acid)

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

oT Sudden shoot elongation followed by flowering is known as **bolting**.

oT It can be artificially induced on rosette plants by the treatment of Gibberellin

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

oT ABA promotes– Abscission

oT During water stress and drought conditions ABA causes stomatal closure.

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

oT Auxins prevent the formation of **abscission layer**.

13. What are chemical messengers?

oT Hormone.

14. Write the differences between endocrine and exocrine gland.

Endocrine glands	Exocrine glands
Without ducts	With ducts
Secrete hormones	Produce enzymes
Ex. Pituitary, Thyroid	Salivary glands, Gastric glands

15. What is the role of parathormone?

oT It regulates calcium and phosphorus metabolism in the body.

oT They act on bone, kidney and intestine to maintain blood calcium levels.

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

oT Vasopressin or Antidiuretic hormone (ADH)

oT Oxytocin: They exert their effect on uterus and mammary gland.

17. Why are thyroid hormones referred as personality hormone?

oT Essential for normal physical, mental and personality development. It is also known as **personality hormone**.

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

oT Thyroid hormone requires iodine for its formation.

oT If it is low Goitre and Cretinism for childrens. Myxoedema for adults.

Answer in detail:

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

Ethylene.

Its three different actions in plants.

oT Ethylene promotes the ripening of fruits.

oT Ethylene inhibits the elongation of stem and root in dicots.

oT 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.

- oT In First experiment, Waemolt went removed the tips of Avena coleoptiles.
- oT Thecuttipsdidnotgrowindicatingthatthetipsproducesomethingessentialforgrowth.
- oT In his second experiment, he placed the agar blocks on the decapitated coleoptile tips.
- oT The coleoptile tips did not show any response.
- oT In his next experiment, he placed the detached coleoptile tips on agar blocks.
- oT 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.

Physiological effects of Gibberellins:

- oT Treatment of rosette plants with gibberellin induces sudden shoot elongation followed by flowering. This is called bolting.
- oT Gibberellins promote the production of male flowers in monoecious plants (Cucurbits).
- oT Gibberellins break dormancy of potato tubers.
- oT 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?

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

Functions of estrogens:

- oT It brings about the changes that occur during puberty.
- oT It initiates the process of oogenesis.
- oT It stimulates the maturation of ovarian follicles in the ovary.
- oT 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?

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

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

17. REPRODUCTION IN PLANTS AND ANIMALS

Short Answers

1. **If one pollen grain produces two male gametes, how many pollen grains are needed to fertilize 10 ovules?**
10 pollen grains needed.
2. **In which part of the flower germination of pollen grains takes place?** Stigma
3. **Name two organisms which reproduces through budding.** Yeast, Hydra
4. **Mention the function of endosperm.** Provides food to the developing embryos.
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
7. **When is World Menstrual Hygiene Day observed?** May 28th
8. **What is the need for contraception?** It is the best birth control measure.