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ZILLAPANCHAYATH, RAMANAGARA

**Department of Public Instruction,
Ramanagara, District**

YASHASSU

SCIENCE

2018-19

ನೇತೃತ್ವ
ಶ್ರೀ ಎಂ.ಹೆಚ್. ಗಂಗಮಾರೇಗೌಡರವರು,
ಉಪನಿರ್ದೇಶಕರು(ಆಡಳಿತ),
ಸಾರ್ವಜನಿಕ ಶಿಕ್ಷಣ ಇಲಾಖೆ, ರಾಮನಗರ,
ರಾಮನಗರ ಜಿಲ್ಲೆ.

ಸಲಹೆ ಮತ್ತು ಮಾರ್ಗದರ್ಶನ

ಶ್ರೀ ಸೋಮಲಿಂಗಯ್ಯ ಪಿ
ಶಿಕ್ಷಣಾಧಿಕಾರಿಗಳು
ಉಪನಿರ್ದೇಶಕರ ಕಛೇರಿ
ರಾಮನಗರ ಜಿಲ್ಲೆ

ಶ್ರೀ ಸುರೇಶ್
ಶಿಕ್ಷಣಾಧಿಕಾರಿಗಳು
ಉಪನಿರ್ದೇಶಕರ ಕಛೇರಿ
ರಾಮನಗರ ಜಿಲ್ಲೆ

ಶ್ರೀಮತಿ ಪವಿತ್ರಾದೇವಿ
ವಿಜ್ಞಾನ-ವಿಷಯ ಪರಿವೀಕ್ಷಕರು
ಉಪನಿರ್ದೇಶಕರ ಕಛೇರಿ, ರಾಮನಗರ ಜಿಲ್ಲೆ

ಸಂಪನ್ಮೂಲ ಅಭಿವರ್ಧನ ತಂಡ:

- 1) ಶ್ರೀ ರಾಘವೇಂದ್ರ ಮಯ್ಯ ಎಂ. ಎನ್. ಸಹಶಿಕ್ಷಕರು. ಸರ್ಕಾರಿ ಪ್ರೌಢಶಾಲೆ, ಭೈರಪಟ್ಟಣ, ಚನ್ನಪಟ್ಟಣ ತಾಲ್ಲೂಕು
- 2) ಶ್ರೀ ವಿನಯ್ ಡಿ ಸಹಶಿಕ್ಷಕರು. ಸರ್ಕಾರಿ ಪ್ರೌಢಶಾಲೆ, ಕೂನಗಲ್, ರಾಮನಗರ ತಾಲ್ಲೂಕು
- 3) ಶ್ರೀ ರಮೇಶ್ ಪಂಡಿತ್ ಡಿ ಎನ್. ಸಹಶಿಕ್ಷಕರು. ಸರ್ಕಾರಿ ಪ್ರೌಢಶಾಲೆ, ಸುಗ್ಗನಹಳ್ಳಿ, ಮಾಗಡಿ ತಾಲ್ಲೂಕು
- 4) ಶ್ರೀ ಅನಿಲ್ ಕುಮಾರ್ ಸಿ ಎನ್. ಸಹಶಿಕ್ಷಕರು. ಸರ್ಕಾರಿ ಪ್ರೌಢಶಾಲೆ ಕೂನಗಲ್, ರಾಮನಗರ ತಾಲ್ಲೂಕು
- 5) ಶ್ರೀ ಸ್ವಾಮಿ ಟಿ . ಸಹಶಿಕ್ಷಕರು. ಸರ್ಕಾರಿ ಬಾಲಕಿಯರ ಸರ್ಕಾರಿ ಪ, ಪು. ಕಾಲೇಜು, ಚನ್ನಪಟ್ಟಣ
- 6) ಶ್ರೀ ವಿನಯ್ ಕುಮಾರ್. ಸಹಶಿಕ್ಷಕರು. ಕರ್ನಾಟಕ ಪಬ್ಲಿಕ್ ಸ್ಕೂಲ್, ಅರಳಾಳುಸಂದ್ರ , ಚನ್ನಪಟ್ಟಣ ತಾಲ್ಲೂಕು.

CHAPTER WISE ALLOTMENT OF MARKS

NCERT chapter number	Chapter	Marks allotted
1	CHEMICAL REACTIONS AND EQUATIONS	4
2	ACID, BASES, AND SALTS	6
3	METALS AND NON-METALS	6
4	CARBON AND ITS COMPOUNDS	6
5	PERIODIC CLASSIFICATION OF ELEMENTS	3
6	LIFE PROCESSES	6
7	CONTROL AND COORDINATION	5
8	HOW DO ORGANISMS REPRODUCE	5
9	HERIDITY AND EVOLUTION	6
10	LIGHT- REFLECTION AND REFRSCTION	7
11	THE HUMAN EYE AND THE COLOURFUL WORLD	5
12	ELECTRICITY	7
13	MAGNETIC EFFECT OF ELECTRIC CURRENT	6
14	SOURCES OF ENERGY	3
15	OUR ENVIRONMENT	2
16	SUSTAINABLE MANAGEMENT ON NATURAL RESOURCES	3
	TOTAL	80

Fuse wire is placed in series in alive wire of electric circuit. If the current in the circuit is increased the fuse wire gets heated and melts. This results in breakdown of an electric circuit.

9. How much energy is given to each coulomb of charge passing through a 6V battery?

Solution:

Data: $Q = 1$ Coulomb, Potential difference (V) = 6V, work done or energy given = ?

work done or energy given = $VQ = 6 \times 1 = 6J$

10. How much work is done in moving a charge of 2C across 2 points having a potential difference 12V?

11. A charge of 400C flows through a conductor for 13 minutes and 20 seconds. Find the magnitude of current flowing through the conductor.

Solution:

Data: $Q = 400$ Coulomb, time (t) = 13 min 20 s = 800 s, Current (I) = ?

$$\text{Current } I = \frac{Q}{t} = \frac{400}{800} = 0.5A$$

12. A charge of 5000C flows through a conductor for 2 hours and 30 minutes .Find the magnitude of current flowing through the conductor.

13. The specific resistance of copper is $1.62 \times 10^{-8} \Omega m$. What do you mean by the statement.

The resistance offered by copper wire of length 1m, area of cross section $1m^2$ is $1.62 \times 10^{-8} \Omega$

14. Three resistors 3Ω , 6Ω , 4Ω are connected in series. Calculate the total resistance of the circuit.

Solution : As resistors are connected in series, $R_s = R_1 + R_2 + R_3$

$$\therefore R_s = 3 + 6 + 4 = 13\Omega$$

15. Three resistors 3Ω , 6Ω , 4Ω are connected in parallel. Calculate the total resistance of the circuit.

Solution : As resistors are connected in parallel, $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

$$\therefore \frac{1}{R_p} = \frac{1}{3} + \frac{1}{6} + \frac{1}{4} = \frac{4 + 2 + 3}{12} = \frac{9}{12} = \frac{3}{4}$$

$$\therefore R_p = \frac{4}{3} = 1.33\Omega$$

16. If the total resistance between the points A and B is 2Ω then calculate r_3 .

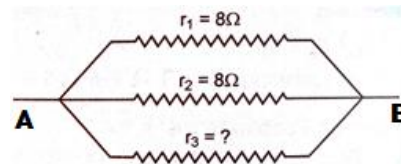
Solution : As resistors are connected in parallel,

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

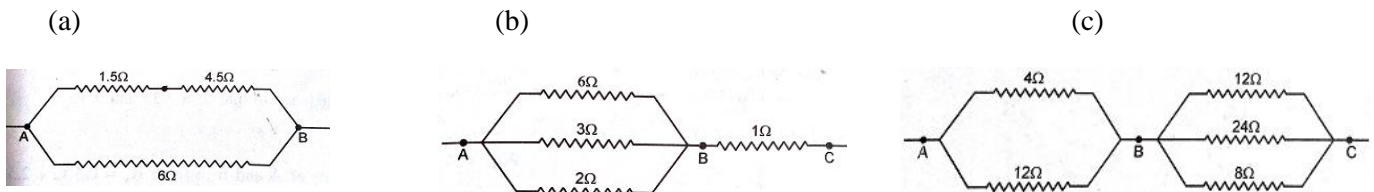
$$\therefore \frac{1}{2} = \frac{1}{8} + \frac{1}{8} + \frac{1}{r}$$

$$\begin{aligned} \frac{1}{r} &= \frac{1}{2} - \frac{1}{8} - \frac{1}{8} \\ &= \frac{4 - 1 - 1}{8} = \frac{2}{8} = \frac{1}{4} \end{aligned}$$

$$\therefore r = 4\Omega$$



17. Calculate the total resistance in the following circuits.



18. Calculate the monthly bill for a heater of resistance 40Ω , which is used on $220V$ mains, such that its daily use is for 5 hours. The cost of electric energy is Rs 3.60 per kWh. Solution:

Resistance of heater = 40Ω , Potential Difference = $220V$, time = 5 hrs

$$\text{Power} = \frac{v^2}{r} = \frac{220 \times 220}{40} = 1210W$$

$$\text{Energy consumed in 5 hrs} = p \times t = 1210 \times 5 = 6050 \text{ Wh}$$

$$\text{Energy consumed in a month} = 6050 \times 30 = 181500\text{Wh} = \frac{181500}{1000} \text{ kWh} = 181.5 \text{ kWh}$$

$$\text{Monthly bill} = 181.5 \times 3.6 = \text{Rs } 653.40$$

19. Calculate the monthly bill for a heater of resistance 20Ω , which is used on $240V$ mains, such that its daily use is for 2 hours. The cost of electric energy is Rs 4.30 per kWh.

20. An electric heater is rated as $1200W - 220V$. Calculate the current flowing through it and resistance of heating element.

21. Remember:-(a) $1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$

(b) $1 \text{ HP} = 750 \text{ W}$

(c) $1 \text{ C} = \text{Total charge on } 6.25 \times 10^{18} \text{ electrons}$

(d) Charge on one electron = $1.6 \times 10^{-19} \text{ C}$

22. Define specific resistance.

It is the amount of resistance offered by a conductor of unit length and unit area of cross section

SI unit is Ωm . It is mathematically expressed as $\rho = R \frac{a}{l}$

23. Observe the following table:

Which of the following is best suitable for usage in electric circuits . Justify your answer.

Silver is best conductor. Out of the given conductors its specific resistance or resistivity is the least. i.e., $1.6 \times 10^{-8} \Omega m$ and hence offers less resistance for the flow of electric current through it.

Material	Specific resistance
	(ρ) Ωm
Silver	1.6×10^{-8}
Nickel	6.84×10^{-8}
Germanium	0.45
Glass	$10^{10} - 10^{14}$

24. How many 9Ω resistors(in parallel) are required to carry 4A on 12V battery ?

Solution:

Current (I) = 4A, Potential Difference (V) = 12 V,

Total resistance of the circuit (when resistors are in parallel) $(R_p) = \frac{V}{I} = \frac{12}{4} = 3\Omega$

$$\frac{1}{R_p} = \frac{1}{r_1} + \frac{1}{r_2} + \dots \dots \dots n$$

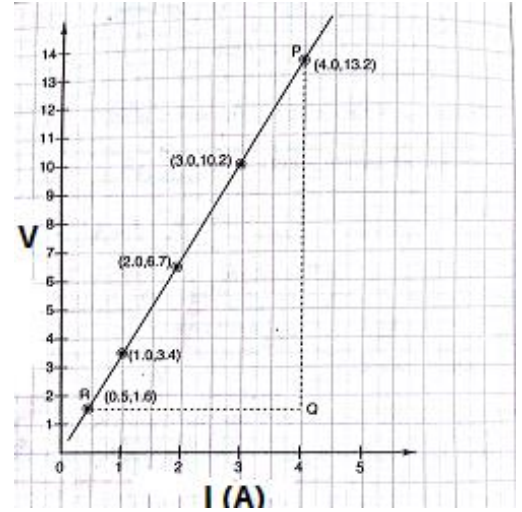
$$\frac{1}{3} = \frac{1}{9} + \frac{1}{9} + \dots \dots \dots n$$

$$\frac{1}{3} = \frac{n}{9}$$

$$\therefore n = 3$$

25. How many 12Ω resistors(in parallel) are required to carry 2A on 4V battery ?

26. The adjoining graph is a V-I graph. Calculate resistance from the graph.



27. Remember:

ಕ್ರ. ಸಂ	ಆಕಾರ	ಚಿಹ್ನೆಗಳು
1	ವಿದ್ಯುತ್ ಕೋಶ (ಸೆಲ್)	
2	ಶುಷ್ಕ ಕೋಶ ಅಥವಾ ವಿದ್ಯುತ್ ಕೋಶಗಳ ಸಂಯೋಜನೆ	
3	ಫ್ಲಗ್ ಹೀ ಅಥವಾ ಸ್ವಿಚ್ (ತೆರೆದ)	
4	ಫ್ಲಗ್ ಹೀ ಅಥವಾ ಸ್ವಿಚ್ (ಮುಚ್ಚಿದ)	
5	ತಂತಿಯ ತಲು	
6	ಸೇವ್‌ಡಯೋಲದ ಬಾಟಲ ತಂತಿ	
7	ವಿದ್ಯುತ್ ಬಲ್ಲ	
8	ರೋಧಕದ ರೋಧ 'R'	
9	ಪರಿವರ್ತಕದ ರೋಧ ಅಥವಾ ರಿಯೋಸ್ಟಾಟ್	
10	ಅಮ್ಮೀಟರ್	
11	ವೋಲ್ಟಮೀಟರ್	

Chapter-2: LIGHT- Reflection and Refraction

1. Terms related to Mirrors and Lenses

Pole of mirror	Center of the Spherical Mirror
Optic Center	Center of the Lens
Center of Curvature	The center of the sphere of which the reflecting (refracting) surface of a spherical mirror(lens) forms a part.
Radius of Curvature	The radius of the sphere of which the reflecting (refracting) surface of a spherical mirror(lens) forms a part
Principal Axis	A straight line passing through the pole and the center of curvature of a spherical mirror.
Principal Focus	The point on principal axis at which the rays after reflection(refraction) actually (or appear to) meet
Focal Length	The distance between the centre of mirror (lens) and the principal focus
Aperture	The diameter of the reflecting surface of spherical Mirror

2. State laws of reflection.

- 1.The angle of incidence is equal to the angle of reflection.
2. The incident ray , the normal to the mirror at the point of incidence and the reflected ray all lie in the same plane.

3. State laws of Refraction.

1. The incident ray, refracted ray and the normal to the interface of two transparent media at the point of incidence all lie in the same plane.
2. The ratio of sine of angle of incidence to the sine of angle of refraction is a constant for the light of a given colour and for the given pair of media. (Snell's Law)

4. List the difference between Reflection and Refraction of Light.

Reflection of Light	Refraction of Light
When light is incident on a smooth polished surface it bounces back to same medium. Eg: when light is incident on mirrors it reflects	1. when light travels obliquely from one medium to other medium of varying optical densities it changes its path(bends) Eg: when light tavel from air to water it bends

5. List out the differences between Real image and Virtual image

Real Image	Virtual Image
1.It can be taken on a screen.	1. It can't be taken on a screen.
2. It is formed in front of the mirror.	2. It is formed behind the mirror.
3. It is always inverted	3. It is always erect
4. The rays of light actually meet at a point after reflection or refraction.	4. The ray of light appear to diverge from a point after reflection or refraction.

6. What are the differences between Concave and Convex Mirrors.

Concave Mirror	Convex Mirror
1. Both real and virtual images are formed	1. Images are always virtual and very small
2. Both inverted and erect images are formed	2. Images are always erect

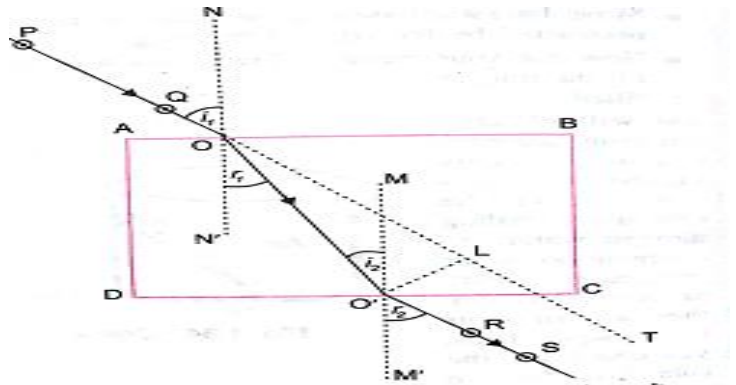
7. List out the characteristics of image formed by a plane mirror.

1. The Image formed is always virtual and erect
2. The size of the image is equal to that of the object.
3. The image is laterally inverted.

8. Explain the experiment of Refraction through a Rectangular Glass Slab.

- PO – Incident Ray
- O'S – Emergent ray
- OO'- Refracted ray
- MM' – perpendicular drawn
- NN'- perpendicular drawn
- ABCD- Glass Slab

- O- ಪತನಬಿಂದು
- O'- ಹೊರಹೋಗುವಬಿಂದು



When the light ray is incident on glass slab obliquely it travels from a rarer medium to a denser medium, that is from air to glass and the light ray bends towards the normal. Later the light ray emerging out from the glass slab travels from glass to air that is from a denser medium to a rarer medium and now the light ray bends away from the normal. Emergent ray is parallel to the direction of the incident ray.

9. On what factors do refractive Index of a material depend?

1. Nature of an object 2. Density of medium 3. The relative speed of propagation of light

10. On what factors do the lateral shift(displacement) of light depend during refraction of light?

1. Angle of incidence 2. Refractive index of the medium 3. Nature of the medium
4. Wavelength of incident ray.

11. List the uses of Mirrors and Lenses.

Concave Mirror	Torch, Search-light, Vehicle headlights, Shaving mirrors, Solar furnace, Dentist use Concave mirror to see large images of the teeth
Convex Mirror	Rear view Mirror
Concave Lens	Spectacles, Binoculars, Torch lights
Convex Lens	Microscopes, Telescopes, Binoculars

12. Mention the reason for the refraction of light.

The change in the speed of the light when travelling from one medium to another medium

13. What is refractive Index? Mention the refractive index of water.

The extent of the change in direction that take place in a given pair of media is expressed in term of Refractive Index.

Refractive index of water $n=1.33$.

14. Define The power of a lens. Write its SI unit.

The power of lens is defined as the reciprocal of its focal length. Or

The degree of measure of ability of lens to converge or diverge the rays of light incident on it.

SI unit : dioptre

$$P = 1/f$$

15. What is Magnification?

The ratio between the height of the image to the height of the object.

16. Define 1 dioptre. mention the Power of Concave and Convex lenses.

A lens is said to have a power of 1 dioptre, if its focal length is 1 metre. $1D=1m^{-1}$. The power of a convex lens is positive and concave lens is negative.

Points to remember:

$$\text{Snell's law: } n = \frac{\sin i}{\sin r} = \text{Constant}$$

$$\text{Absolute refractive Index} = \frac{\text{Speed of light in air}}{\text{Speed of light in medium}}$$

	Mirror	Lens
	$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$	$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$
Focal Length	$f = \frac{R}{2}$	$f = \frac{R}{2}$
Magnification	$m = \frac{h^I}{h} = -\frac{v}{u}$	$m = \frac{h^I}{h} = \frac{v}{u}$
Power		$P = \frac{1}{f(m)} \text{ or } \frac{100}{f(cm)}$

Problems:

Note :

- The focal length of concave mirror is -ve and that of a convex mirror is +ve
- The focal length of concave lens is -ve and that of a convex lens is +ve
- The power of concave lens is -ve and that of a convex lens is +ve
- The object distance is always negative (both in mirror and lens)
- Magnification, **m=1**, Height of object is equal to height of image
m>1 Height of object is lesser than height of image
m<1 Height of object is greater than height of image
- Magnification of real image is -ve
- Magnification of virtual image is +ve.
- If the Magnification of an object of 1m is 2, find the height of the Image?
 $h = 1m, h^I = ?, m = 2$
 $m = \frac{h^I}{h}$
 $2 = \frac{h^I}{1}$
 $h^I = 2 \times 1 = 2m$
- If the radius of curvature of a mirror is 30cm then find the Focal length $R = 30cm, f = ?$
 $f = \frac{R}{2}$
 $f = \frac{30}{2} = 15cm$
- If the angle of incidence of a light ray in air medium is 45° , angle of refraction in the medium of glass is 30° , then find the refractive Index.
 $i = 45^\circ, r = 30^\circ$
 $n = \frac{\sin i}{\sin r}$
 $n = \frac{\sin 45^\circ}{\sin 30^\circ}$

$$n = \frac{1}{\frac{\frac{1}{\sqrt{2}}}{\frac{1}{2}}}$$

$$= \sqrt{2}$$

- The image is formed at the distance of 15 cm by a concave lens of focal length 20 cm. Find the Object distance.

$$f = -20\text{cm}, v = -15\text{cm}$$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{-20} = \frac{1}{-15} - \frac{1}{u}$$

$$\frac{1}{u} = \frac{-1}{15} + \frac{1}{20}$$

$$\frac{1}{u} = \frac{-1}{60}$$

$$u = -60\text{cm}$$

- The focal length of a convex lens is 10cm. Find the Power of Lens.

$$f = 10\text{cm} = 0.1\text{m}$$

$$P = \frac{1}{f}$$

$$P = \frac{1}{0.1} = +10\text{D}$$

- A student uses a lens of focal length +50cm and another student uses a lens of -50cm . discuss the nature and find power of lens
- The power of a lens is -2.0 D find the nature and focal length of the lens.
- An object of height 5 cm is placed at a distance of 40cm from a convex lens of focal length 50cm. Calculate the size, position and nature of image formed.
- The speed of light in water is 2.25×10^8 m/s and in vacuum it is 3×10^8 m/s Calculate the refractive index of water.
- An object of height 2 cm is placed at a distance of 16cm from a concave mirror. The mirror forms a real image of height 3cm. Calculate position of image formed and the focal length of the mirror.

Chapter -3 : Magnetic Effect of Electric Current

1. What is meant by magnetic field?

Magnetic field is a region around a magnetic material or a moving electric charge in which the force of magnetism acts.

2. How is the direction of magnetic field at a point determined?

The direction of magnetic field at a point is determined by placing a small compass needle at that point.

3. Why does a compass needle get deflected when brought near a bar magnet?

The compass needle gets deflected due to the magnetic field around a bar magnet.

4. Why do not two magnetic lines of force intersect with each other?

If two magnetic lines of force intersect each other it would mean that there are two directions of the magnetic field at the point of intersection, which is not possible.

5. What does the degree of closeness of magnetic field lines near the poles signify?

The degree of closeness of magnetic field lines near the poles signifies that magnetic field in that region is strong.

6. State the conclusions that can be drawn from the observation that a current carrying wire deflects a magnetic needle placed near it.

The conclusion that can be drawn is that a magnetic field exists around a current carrying conductor.

7. Why are magnetic field lines closed curves?

The magnetic field lines originate from north pole of a magnet and end at its south pole. Inside the magnet it is directed from south pole to north pole. Therefore, the magnetic field lines are closed curves.

8. Mention the shape of the magnetic field lines around a current carrying straight conductor.

The magnetic field lines around a current carrying straight conductor are concentric circle whose centres lie on the wire.

9. Identify the region, where the magnetic field around a current carrying solenoid is uniform.

Inside the solenoid, the magnetic field is uniform.

10. How can you magnetise a piece of magnetic material?

A piece of magnetic material can be magnetised by keeping it inside a current carrying solenoid.

11. What type of core used to make an electromagnet?

Soft iron core is used to make an electromagnet.

12. What does the divergence of magnetic field lines near the ends of a current carrying straight solenoid indicate?

The divergence of magnetic field lines indicates the increase in strength of magnetic field near the ends of the solenoid.

13. Name the rule which gives the direction of induced current in a conductor.

The rule that gives the direction of induced current is called Fleming's right hand rule.

14. Under what orientation, the induced current produced in moving conductor in a magnetic field can be maximum?

The current induced in a conductor is maximum when direction of motion of conductor is at right angle to the magnetic field.

15. State the rule which is used to find the direction of induced current. Or State Fleming's right hand rule.

Fleming's right hand rule states that, if the fore finger, middle finger and thumb of the right hand are stretched at right angles to each other, with the fore finger in the direction of the field and the thumb in the direction of the motion of the wire, then the current in the wire is in the direction of the middle finger.

16. State Fleming's right hand rule.

Fleming's left hand rule states that, if the forefinger, thumb and middle finger of left hand are stretched mutually perpendicular and the forefinger points along the direction of external magnetic field, middle finger indicates the direction of current, then thumb points the direction of force acting on the conductor.

17. What is electromagnetic induction?

An electric current produced in a closed circuit by a changing magnetic field is called an induced current. This phenomenon is called electromagnetic induction.

18. List three methods of producing magnetic fields.

Three methods of producing magnetic field are as given below:

- (i) Passing electric current through a straight conductor/circuit.
- (ii) Passing electric current through a circular loop.
- (iii) Passing electric current through a solenoid.

19. What are magnetic field lines? How is the direction of magnetic field at a point determined? Mention two important properties of magnetic field lines?

- The imaginary lines representing magnetic field around a magnet are known as magnetic field lines.
- The direction of the magnetic field at a point can determined using Maxwell's right hand thumb rule.
- Two important properties of magnetic field lines are:
 - (i) The magnetic field lines are closed and continuous curves.
 - (ii) They never intersect each other.

20. What are magnetic field lines? Justify the following statements.

- (i) **Two magnetic field lines never intersect each other.**
- (ii) **Magnetic field lines are closed curves.**

The imaginary lines representing magnetic field around a magnet are known as magnetic field lines.

- (i) If two field lines intersect each other, this would mean that at the point of intersection the direction of magnetic field is in two directions, which is not possible.
- (ii) The direction of field lines outside a magnet is from North pole to South pole while it is from South to North pole inside the magnet and thus forms closed curves.

21. Draw a labelled circuit diagram of a simple electric motor.

Ref text.

22. Name some sources of direct current.

Some sources of direct current are electrochemical dry cells, solar cells, lead acid accumulator batteries, DC generators, etc.

23. Which sources produce Alternating Current?

Some sources that produce alternating current are AC generators, thermal power stations, car alternators, etc.

24. How is induced current in a secondary coil related to current in a primary coil?

When current in primary coil changes, then a current is induced in the secondary coil.

25. Why is an alternating current considered to be advantageous over direct current for long range transmission of electric energy?

Alternating current can be transmitted to long distant places without much loss of electric energy. That's why it is considered to be advantageous over direct current for long range transmission of electric energy.

26. An alternating current has frequency of 50 Hz. How many times does it change its direction in one second?

The given frequency is 50 Hz, so AC completes 50 cycles in 1 s.

Therefore, it reverses its direction 100 times in one second.

27. How is the type of current that we receive in domestic circuit different from one that runs a clock?

The current that we receive in domestic circuit is alternating current (AC), while that which runs a clock is direct current (DC).

28. How can it be shown that a magnetic field exists around a wire through which a direct current is passing?

For this place a compass near the wire. As the current starts to flow through the wire, the needle gets deflected. This shows that a magnetic field exists.

29. Name the type of current: (a) used in household supply, (b) given by a cell.

(a) Alternating current (AC)

(b) Direct current (DC)

30. An electric oven of 2 kW power rating is operated in a domestic circuit (220 V) that has a current rating of 5 A. What result do you expect? Explain.

$$\therefore \text{Current, } I = \frac{P}{V} = \frac{2000W}{220V} > 5A$$

Since, current drawn by oven is greater than the rated value of current, which may cause overloading and excessive heating of the circuit.

31. What precautions should be taken to avoid the overloading of domestic electric circuits?

The following precautions should be taken to avoid the overloading domestic electric circuits as given below:

- (i) The circuits should be of proper current rating and appliances should be connected accordingly.
- (ii) Wires should be checked from time to time and those wires whose insulation is worn, should be immediately replaced.
- (iii) Connection of too many appliances in a single socket must be avoided.

Chapter-4 : Sources of energy

1. **Conventional sources of energy:** Firewood, Flowing water, Fossil fuels(coal, petroleum, diesel, kerosene)
2. **Non- Conventional sources of energy:** Solar energy, wind energy, bio mass, geothermal energy, tidal energy, nuclear energy.
3. **Renewable sources of energy:** Solar energy, wind energy, Firewood, flowing water
4. **Non Renewable sources of energy:** Fossil fuels (coal, petroleum products)
5. **List out the characteristics of good sources of energy**

1.High efficiency 2. Easily available 3. Easy to store and transport 4. Economical

6. **How are fossil fuels formed? Mention the effects caused by using such fuels?**

Millions of years ago large number of animals and plants (Bio mass) got buried beneath the Earth. Under humid conditions, high pressure, temperature of the earth and bacterial decomposition in absence of air decomposed to form Fossil fuels. Eg. Coal and petroleum products.

Effects- Air pollution, Acid rain, green house effect, Global warming.

7. **What is Solar energy? List out solar devices and their functions.**

The energy received from Sun in the form of heat and light. Or The energy radiated by sun in the form of electromagnetic waves.

Solar devices:-

Solar cooker : Uses heat energy of sun to cook food.

Solar cell: Device used to convert light energy into electrical energy.

Solar water heater: Uses heat and light energy for getting hot water.

8. **Define Solar constant.**

The amount of energy reaching perpendicularly per square metre per second in the outermost boundary of earth's atmosphere. i.e. , $1.4\text{kJm}^{-2}\text{s}^{-1}$.

9. **List out the disadvantages of Solar cooker.**

1. Consumes more time 2. Is not convenient to prepare food In all seasons.

10. **Write the function of glass top of solar cooker.**

The glass top prevents heat losses due to conduction, convection and radiation.

11. **What is wind energy? List out the merits and demerits**

The kinetic energy of the moving wind is used to rotate blades to produce electrical energy

Merits	Demerits
1. Doesn't cause pollution 2. It is renewable source of energy	1. Setting up of wind energy farms is expensive. 2. Cannot be established in all places and requires more land. 3. Minimum speed of wind is 15km/h

12. What is geothermal energy? It is not much useful, Why?

Due to high pressure and temperature in the Earth's crust, the underground water comes in contact with hotspots and changes into steam. The steam so formed can be used to turn turbines and generate electricity.

Demerits:- Geologically it is only a few places and it is expensive

13. Name the major constituents of Bio-gas. List out the merits of Bio mass

The major constituents of Bio-gas is Methane (about 75%) and hydrogen.

Merits of bio mass : 1. Causes less pollution 2. Improves fertility of soil

14. Differentiate between wave energy and tidal energy.

Wave energy	Tidal energy
The kinetic energy of waves in sea is used to produce electricity.	The gravitational force of moon and earth causes tides. This rise and fall of tides can be used to produce electrical energy.

15. Differentiate between nuclear fission and nuclear fusion reactions.

Nuclear fission	Nuclear fusion
The process by which a heavy unstable nucleus is broken into medium weight nuclei by the bombardment of a slow neutron, so as to liberate more neutrons and tremendous amount of energy eg: Fission of Uranium (U-235)	The process of combining two lighter nuclei to form an element. Enormous amount of energy is liberated. Eg: Fusion of hydrogen

16. Establishing Nuclear reactors causes pollution by radiation. How?

During nuclear fission process harmful radiations are emitted out and even during the disposal of the spent fuel, causes environmental contamination which can affect health of millions of people.

17. Use of CNG is highly effective. How?

Compared to other fuel CNG is a cleaner source of energy. So it can be used to reduce pollution also.

18. How do thermal power plants work? Why it is not eco-friendly?

By burning coal, the heat produced is used to convert water into steam. This steam is used to turn turbines and hence generate electricity.

Burning of coal causes pollution it releases oxides of carbon, nitrogen and sulphur into atmosphere.

19. Most of the environmentalist opposes for construction of dams. Why?

By construction of dams most of the agricultural lands are submerged and the submerged vegetation rots and produces large amount of methane gas.

20. The sources of energy must be conserved. why?

Most of the sources of are non renewable and are depleting at a very faster rate. In order to make it available to next generation it is to be conserved also to avoid pollution and save environment.

Chapter 5: The Human Eye and the colourful world

1. Write the different parts of the eye and their functions.

Sl. No.	Parts of the eye	Functions
1	Sclera	It protects the eye ball
2	Coroid	It consists of blood vessels and nerve. Receives pain
3	Retina	A light sensitive membrane. Helps to form image.
4	Rod cells	Receives dim light but doesnot identify colours.
5	Cone cells	Receives bright light and identify colours.
6	Corona	A transparent membrane through which light ray enter.
7	Irish	It controls the size of the pupil and gives colour to the eye.
8	Pupil	It regulates and controls the amount of light entering the eye.
9	Crystalline lens	It refract the light rays and enables the accomodation of the eye.
10	Ciliary muscles	It enables the crystalline lens to fix in its place.
11	Vitreous and aqueous humou	Avoids loosening of layers of the eye and helps in reflection of light.
12	Optic nerve	Sends signals to the optic centre of the brain.
13	Light sensitive cells	Gets activated upon illumination and generates electrical signals.

2. Explain defects of vision and their remedies.

Defects of vision	Meaning	Reason	Remedies
Myopia	A person with myopia can see nearby objects clearly but cannot see distant objects distinctly.	1. Far points is nearer than infinity. 2. excessive curvature of the eye lens. 3. elongation of the eyeball.	Usage of concave lens of suitable power.
Hyper metropia	A person with hyper metropia can see distant objects clearly but cannot see nearby objects distinctly	1. The near point is farther away from the normal near point (25 cm). 2. The focal length of the eye	Usage of a convex lense of appropriate power.

		lens is too long. 3. The eyeball has come too small.	
Presbyopia	The power of accommodation of the eye usually decreases with aging. The near point gradually recedes away.	1. Diminishing flexibility of the eye lens. 2. Gradual weakening of the ciliary muscles.	Usage of concave and convex lens of appropriate power.
Astigmatism	Incomplete curvature of the eye lens	Defect in refraction of eye lens.	Usage of appropriate lens.
Cataract	The crystalline lens of people at old age become milky and cloudy.		It is possible to restore vision through a cataract surgery.

3. What is vision range? Write the near and farthest point of the eye.

The difference between the near and farthest point which a normal eye can see is called the vision range. The near point of the eye is about 25cm and farthest point is infinity.

4. What is Tyndall effect? Explain.

The phenomenon of scattering of light by the colloidal particles is called Tyndall effect.

Very fine particles scatter light of shorter wave lengths while particles of larger size scatter light of longer wavelengths.

5. What is spectrum? Give an example for natural spectrum.

The band of the coloured components of the light beam is called its spectrum. Rainbow is a natural spectrum.

6. What is dispersion of light? Name the colours formed due to the dispersion of white light.

When a white light is incident on a prism it gets refracted and splits up into 7 components colours. This phenomenon is called dispersion of light. The colours so formed are violet, indigo, blue, green, yellow, orange and red.

7. Give reason for the dispersion of light.

Different colours have different wavelengths and during refraction, every colour of light bends through its own angle with respect to the incident ray.

8. Describe Newton's experiment which explains dispersion of light.

Two identical prisms were taken. One was placed erect whereas the second prism is placed in an inverted position. When white light was incident on an erect prism it was refracted and dispersed into the spectrum of seven colours. When the spectrum was incident on the inverted prism, white light was emerged. This experiment of Newton shows that white light is made up of 7 colours.

Fig. 11.6

9. Describe the process of formation of formation of a rainbow.

A rainbow is caused by dispersion of sunlight by tiny water droplets, present in the atmosphere. It is formed in a direction opposite to that of sun. The water droplets acts like a small prisms. They refract and disperse the incident sunlight, then reflect it internally and finally refract it again when it comes out of the raindrop. Due to the dispersion of light and internal reflection spectrum of different colour is formed.

10. Why do stars blinked?

The twinkling of a stars is due to atmospheric refraction of starlight. The starlight on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth. As the path of rays of light coming from the stars goes on varying slightly, the apparent position of the star fluctuates and causes twinkling of stars.

11. Why planets do not twinkle?

The planets are much closer to the earth, and are thus seen as extended sources but as point sized sources of light. So the planets do not twinkle.

12. Why will there be advanced sunrise and delayed sunset?

The sun is visible about 2 minutes before the actual sunrise and about 2 minutes after the actual sunset because of atmospheric refraction.

13. Why is the colour of the clear sky blue?

The molecules of air and other fine particles in the atmosphere have size smaller than the wavelength of visible light. These are more effective in scattering light of shorter wavelength at the blue end.

14. Why is the sea water blue in colour?

Sea water absorbs the colours of longer wavelength in large quantity than the blue colour of shorter wavelength. So, form the white light entering the sea, only blue colour is reflected.

15. Why is the colour of the sun red at sunrise and sunset?

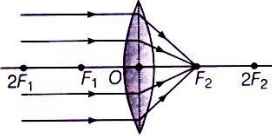
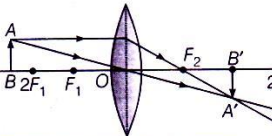
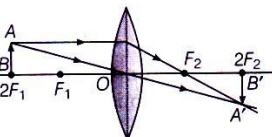
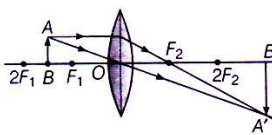
During sunrise and sunset, since the light form the sun travels a longer distance in the atmosphere, red colour of longer wavelength scatters more.

16. why are danger signal lights red in colour? OR why are red lights used to stop the vehicles in traffic signals?

The red colour is least scattered by fog or smoke and has longer wavelength.

Formation of Image by a Convex Lens

The table given below illustrates the ray diagrams along with the position and nature of image, formed by convex lens for various positions of the object.

S. No.	Position of Object	Ray Diagram	Position of Image	Nature and Size of Image
1.	At infinity		At F_2	Real, inverted and extremely diminished
2.	Beyond $2F_1$ (at finite distance)		Between F_2 and $2F_2$	Real, inverted and diminished
3.	At $2F_1$		At $2F_2$	Real, inverted and of same size as that of object
4.	Between F_1 and $2F_1$		Beyond $2F_2$	Real, inverted and magnified

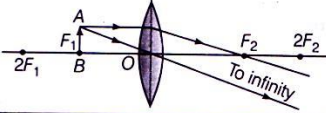
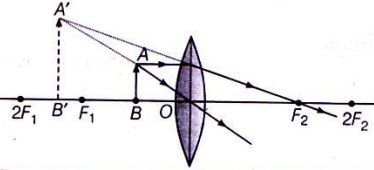
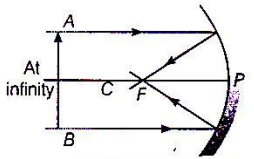
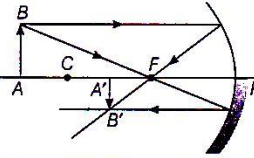
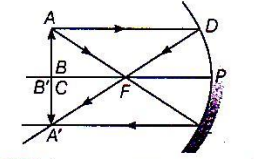
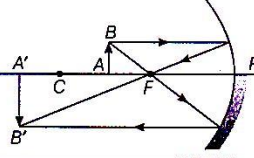
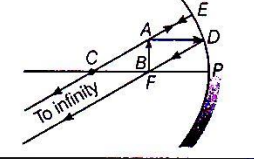
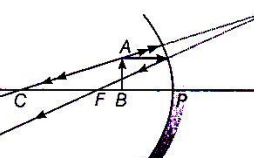
S. No.	Position of Object	Ray Diagram	Position of Image	Nature and Size of Image
5.	At F_1		At infinity	Real, inverted and highly magnified
6.	Between lens and F_1		On same side of the lens as the object	Virtual, erect and magnified

Image Formation by a Concave Mirror

The table given below illustrates the ray diagram along with the position and nature of image, formed by a concave mirror for various positions of the object.

Formation of Image by Concave Mirror for Different Positions of Object

S. No.	Position of Object	Ray Diagram	Position of Image	Nature and Size of Image
1.	At infinity		At focus or in the focal plane	Real, inverted, extremely diminished in size
2.	Beyond the centre of curvature but at finite distance from mirror		Between focus and the centre of curvature	Real, inverted and diminished
3.	At the centre of curvature		At the centre of curvature	Real, inverted and same size as that of object
4.	Between focus and centre of curvature		Beyond the centre of curvature	Real, inverted and magnified
5.	At the focus		At infinity	Real, inverted and extremely magnified
6.	Between the pole and focus		Behind the mirror	Virtual, erect and magnified

CHEMISTRY

Chapter 1: Chemical Reactions and Equations

1. What is balanced chemical equation?

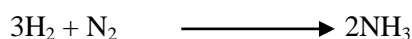
When the number of atoms of different elements on reactant side and product side are equal, such chemical equation is called a balanced chemical equation.

2. Why chemical equation should be balanced?

According to the law of conservation of mass 'mass can neither be created nor be destroyed during a chemical reaction', hence a chemical equation should be balanced.

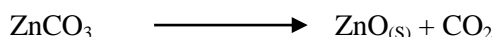
3. What is chemical combination reaction? Give example.

A reaction in which two or more reactants combine to form a single product is called chemical combination.



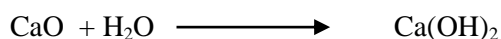
4. What is chemical decomposition reaction? Give example.

A reaction in which a single reactant breaks down to form two or more products is known as chemical decomposition reaction.



5. What are exothermic reactions?

The which are involved in the evolution of heat are called exothermic reactions.



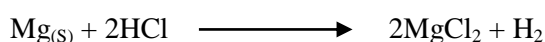
6. What are endothermic reactions?

The reactions which occurs by the absorption of heat are called endothermic reactions.



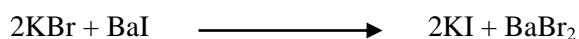
7. What is displacement reaction? Give example.

When a more reactive element displaces less reactive element from its compound is called displacement reaction.



8. What is double displacement reaction? Give example.

The reaction in which two different ions or group of atoms in the reactant molecules are displaced by each other is called double displacement reaction.



9. What is oxidation reaction? Give example.

The process of addition of oxygen to a substance or removal of hydrogen from a substance is called oxidation reaction.

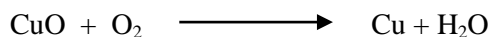


Copper Oxygen Copper oxide

Cu is oxidized to CuO

10. What is reduction reaction? Give example.

The processes of removal of oxygen from a substance or addition of hydrogen to a substance are called reduction reaction.



CuO is reduced to Cu

11. What are redox reactions?

The reactions in which oxidation and reduction takes place simultaneously are called redox reactions.

12. What is thermal decomposition?

The reactions use the energy in the form of heat for decomposition of the reactant.



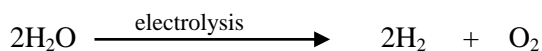
13. What is photochemical decomposition? Give example.

These are the chemical reactions which involve the light energy for the purpose of decomposition.



14. What is electrolysis? Give example.

The reactions involve the use of electrical energy for the decomposition of the reactant molecule.



15. Why do we apply paint on iron articles?

By applying paint on iron articles, they can be prevented from corrosion (rusting). Paint does not allow oxygen and moisture to come in contact with the surface of iron.

16. What is corrosion?

The phenomenon in which metals are slowly eaten away by the reaction of air, water, chemicals present in the atmosphere is called corrosion.

Ex: The black coating on silver and the green coating on copper.

17. What is Rancidity?

The process of slow oxidation of oil and fat present in the food materials resulting in the change of smell and taste in them is called rancidity.

18. How do you prevent the rancidity of food?

- By keeping food materials in air tight container.
- Refrigeration of cooked food at low temperature.
- Packing of food items like potato chips in packs containing nitrogen gas instead of air, it prevents oils and fat reacts with air.
- Avoid keeping the cooked food and food materials in direct contact with air.
- By adding anti-oxidants. Ex: BHA (Butylated Hydroxy Anisole)

19. Write one use of quicklime or burnt lime.

It is used in the manufacture of cement.

20. Name two metals which undergo corrosion.

Iron, copper, silver etc.,

21. What is the precautionary measures taken during the burning of magnesium strip with in the laboratory.

It should be kept away from the eyes and Should wear safety glasses.

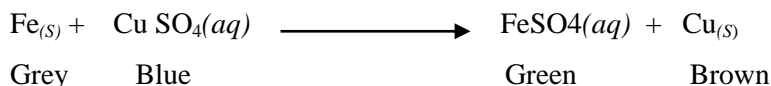
22. Why do we stored silver chloride in dark coloured bottles?

Silver chloride is converted into silver metal and chlorine when it kept in direct sun light.

Dark green bottles interrupt the path of light, it cannot reach the silver chloride contained in the dark coloured bottles, and its decomposition is prevented.

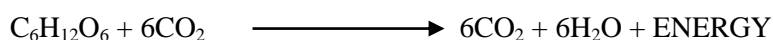
23. Why does the colour of the copper sulphate solution changed when an iron nail is dipped in it?

Because, iron is more reactive than copper. It displaces copper metal from aqueous copper sulphate solution. Thus, blue colour of copper sulphate faded away to give green colour solution of copper sulphate.



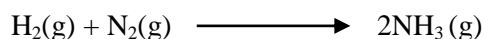
24. Why is respiration considered as an exothermic reaction? Explain.

The food taken by the living beings is ultimately broken down to glucose by the digestive system. The glucose formed is slowly oxidised to carbon dioxide and water with the release of heat energy. Thus, respiration is an exothermic reaction.

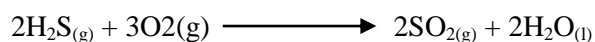


25. Write the following chemical reactions statements into balanced chemical equation?

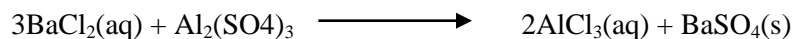
i) Hydrogen gas reacts with nitrogen gas to form ammonia



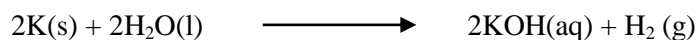
ii) Hydrogen sulphide gas burnt in air to give water and carbon dioxide.



iii) Barium chloride reacts with aluminium sulphate gives aluminium chloride and precipitate of barium sulphate.

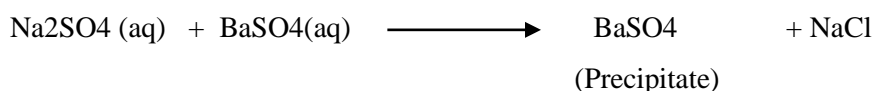


iv) Potassium metal reacts with water gives potassium hydroxide hydrogen gas.



26. What is precipitation reaction? Explain with an example.

The chemical, which is involved in the formation of water insoluble precipitation, is called precipitation reaction.



Chapter-2: Acid Base and Salt

- Acids are those chemical substances which are sour in taste and change the colour of blue litmus solution to red.
- Bases are those chemical substances, which are bitter in taste, soapy to touch and turn red litmus solution to blue.
- Acids react with bases to produce salt and water.
- In presence of water, acids give H^+ ions.
- Indicators are the substances that change their colour or odour when added into an acid or an alkaline solution.
- Litmus solution is a purple dye, which is extracted from lichen, a plant belonging to the division thallophyta, and is commonly used as an indicator.
- Olfactory indicators are the substances whose odour changes in acidic or basic media.
- Larger the number of H^+ ions produced by an acid, stronger is the acid and vice-versa,
- Strength of an acid or base depends on the number of H^+ ions OH^- ions produced by them respectively.
- pH is a number which indicates the acidic or basic nature of a solution.
- Salts are produced by the neutralisation reaction between acid and base.
- Bleaching powder is produced by the action of chlorine on dry slaked lime $[Ca(OH)_2]$. It is represented as $CaOCl_2$.
- Sodium hydrogen carbonate is an ingredient of antacids, which neutralises excess acid in the stomach and provides relief from indigestion.
- The chemical name of baking soda is sodium hydrogen carbonate, $NaHCO_3$ and plaster of Paris is $CaSO_4 \cdot \frac{1}{2}H_2O$
- Water of crystallization is the fixed number of water molecules present in one formula unit of a salt.

1. Mention any two properties of acids.

- Acids are sour in taste.
- Change the colour of blue litmus to red litmus.

2. Mention any two properties of bases .

- Acids are bitter in taste.
- Change the colour of red litmus to blue litmus

3. Which gas is liberated when acid reacts with metals generally?

Hydrogen gas.

4. Why does dry HCl gas not change the colour of dry litmus paper?

Dry HCl gas does not contain any H^+ or H_3O^+ ions, so it does not show any acidic property. Hence, it does not change the colour of dry litmus paper. To show its acidic behavior, it needs wet litmus paper.

5. What is the effect concentration of H^+ ions on the solution?

H^+ ions concentration increases the pH ranges between 1 to 6.9 and the solution become acidic.

H^+ ions concentration decreases from pH 7.0 to 14.0 , the solution become basic.

6. What is the common name of CaOCl₂ ?

Bleaching powder.

7. Name the sodium compound used to convert hard water to soft water.

Washing soda- Na₂CO₃·10 H₂O

8. Which type of drugs used in the treatment of indigestion?

Antacids

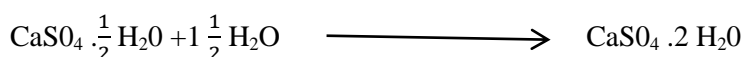
9. Why do not acids show acidic behavior in the absence of water?

Ions are produced only in aqueous medium and presence of H⁺ ions are responsible for the existence of acidic properties. Hence, acids show acidic behavior only in the presence of water and not in its absence.

10. Plaster of paris should be stored in moisture proof containers. Explain why?

Plaster of Paris (POP) is chemically calcium sulphate hemihydrate (CaSO₄ · $\frac{1}{2}$ H₂O).

When it comes in contact with water it sets into a hard solid mass, called gypsum. To prevent this Plaster of Paris must be stored in moisture-proof containers.

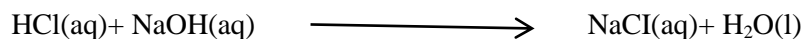
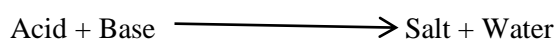


11. Why milk and sours food substances are not stored in copper and brass container?

Because, milk and sours food reacts with brass and copper release hydrogen gas and some toxic substances.

12. What is neutralization reaction? Give example.

The reaction between an acid and base to form salt and water is called neutralization reaction.



13. Write the uses of washing soda.

Uses of washing soda are:

- (i) It is used as a cleansing agent (detergents).
- (ii) It is used to remove permanent hardness of water.

14. Give two important uses of baking soda.

Uses of baking soda are:

- (i) It is used in bakery.
- (ii) It is used for extinguishing fire (in soda-acid fire extinguishers).

15. What is a salt?

The substance produced by the neutralization reaction between acid and base are called salt.

16. What is chloro-alkali process?

When electricity is passed through an aqueous solution of sodium chloride (called brine), it decomposes to form sodium hydroxide. This process is called chloro-alkali process. (because of the products formed).

17. Name two chemical compounds manufactured from common salt.

Sodium hydroxide and Baking soda.

18. Even though baking soda is best disinfectant, why should it not to be used excessively?

Because, when it reacts with water liberate chlorine gas and it is responsible for ozone layer depletion.

19. How acid rain affects the aquatic life?

Acid rain destroys eggs of aquatic organisms.

20. Solutions of glucose and alcohol does not exhibit acidic property, Why?

Solutions of glucose and alcohol does not exhibit acidic property because they does not dissociates into ions.

21. While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

Dilution of a concentrated acid is a highly exothermic reaction and a lot of heat is generated.

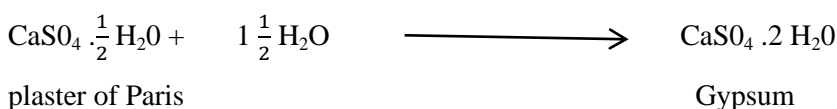
Care must be taken while mixing concentrated acid with water. The acid must always be added slowly to water with constant stirring.

Water is added to the concentrated acid, the heat generated may cause the mixture to splash out and cause burns. The glass container may also break due to excessive local heating.

22. Write the uses of baking powder?

- i) It is used as bleaching agent in textile industry and paper industry
- ii) Used as disinfectant for water to make it germ free.
- iii) Used as an oxidising agent in many chemical industry,

23. Write the chemical equation to show the reaction between plaster of Paris and water.



24. Write the uses of plaster of Paris.

- i) It used by the doctors for joining the fractured bones at right position ie., for making plaster to support fractured bones.
- ii) It is used to making decorative pieces and for making design on ceilings.

25. Draw diagram to show acid solution in water conducts electricity.

26. Draw diagram to show reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning.

Chapter-3: Metals and Non-Metals

- At present about 118 elements are known.
- Elements, which form positive ions by losing electrons, are called **metals**.
- Metals are lustrous, ductile, malleable and good conductors of heat and electricity. They are solids at room temperature except **mercury**, which is a liquid.
- **Metallic luster in pure state**, metals have a bright shining surface. This property is called metallic lustre. Metals like gold, silver and platinum are known for their shining surface.
- **Hardness Most of the metals are hard**. The hardness varies from metal to metal. Some alkali metals like lithium, sodium and potassium are so soft that they can be easily cut with a knife.
- **Ductility Metals are generally ductile**. It is the property due to which a metal can be drawn into thin wires. Gold is the most ductile metal.
- **Malleability Most of the metals are malleable**. It is the property of metal due to which it can be beaten into thin sheets. **Gold and silver** are the most malleable metals.

- **Electrical conductivity** : Most of the metals are good conductors of electricity in solid state. However, conductivity may vary from one metal to another. The conduction of electricity or flow of electric current occurs due to the flow of free electrons present in the metal.
- **Good conductor of heat**: Generally metals are good conductors of heat, except lead and mercury, which are poor conductors of heat. Metals like copper and silver are among the best conductors of heat.
- **Sonority**: The metals that produce a sound on striking a hard surface are said to be sonorous. Using this property, school bells are made up of metals.
- **Melting and boiling points** : Metals generally have high melting and boiling points. **Tungsten** has the highest melting point among metals, while **gallium and cesium** have very low melting points. These two metals will melt if we keep them on our palm.
- Almost all the metals combine with oxygen (or air) to form metal oxides that are basic in nature except aluminium oxide and zinc oxide which are amphoteric in nature.
- Metallic oxides are insoluble in water but some of them dissolve in water to form hydroxides known as **alkalis**.
- Metals react with water and produce a metal hydroxide and hydrogen gas,
- Except a few less reactive metals (such as Cu, Hg, Ag, Au, Pt, etc), all metals react with dil. sulphuric acid, hydrochloric acid to produce salt and hydrogen gas.
- Aqua-regia is a freshly prepared mixture of concentrated hydrochloric acid and concentrated nitric acid in the ratio of 3:1.
- Reactive metal can displace a comparatively less reactive metal from its compounds in aqueous salt solution or in molten form.
- Metals above hydrogen in the reactivity series can displace hydrogen from dilute acids.
- Hydrogen also have non-metallic properties but, due to its electropositive nature, it has been placed in the reactivity series.
- Non-metals are those which form negative ions by gaining electrons.
- Non-metals do not react with water or steam to evolve hydrogen gas.
- Non-metals do not react with dilute acids to release hydrogen gas. They react with hydrogen to form hydrides.
- Ionic compounds (like sodium chloride) do not exist as discrete molecules but indeed they are the aggregates of oppositely charged particles.
- The elements or compounds which occur naturally in the earth crust are known as minerals.
- Minerals from which metals can be extracted profitably are called ores. Removal of unwanted material (gangue) from the ore is called enrichment or concentration of ore.
- The process of purification of the metal obtained after reduction is called refining of metals.
- Many metals like Cu, Sn, Ni, Ag, etc., are refined electrolytically.
- Corrosion is the slow process of eating away of metals by the reaction of atmospheric air and moisture.
- Rusting of iron is prevented by galvanizing, by making alloys, painting, greasing or oiling and tin-plating and chromium plating.
- An alloy is a homogeneous mixture of two or more metals or a non-metal.

1) **Name a metal which is non-lustrous and a non-metal which is lustrous.**

Iron (due to corrosion on the surface) is a metal that is non-lustrous and iodine is a non-metal which is lustrous.

2) **Which of the following metals will melt at body temperature (37°C)?**

Gallium, magnesium, caesium and aluminium.

Gallium and caesium melt at body temperature (37°C).

3) **Name two metals which react with dil.HNO₃ to evolve hydrogen gas.**

Manganese (Mn) and magnesium (Mg) are the examples of two metals that react with dil. HNO₃ to evolve hydrogen gas.

4) **Arrange the following metals in the decreasing order of reactivity Na, K, Cu and Ag.**

The decreasing order of reactivity of the given metals is $K > Na > Cu > Ag$.

5) **Although metals form basic oxides, name one metal which forms an amphoteric oxide.**

Aluminium is a metal which forms an amphoteric oxide.

6) **Why is tungsten metal selected for making filaments of incandescent lamp bulbs?**

Tungsten has a high melting point. Therefore, it is used for making filament of bulbs.

7) **How do metals and non-metals combine?**

Metals and non-metals combine by the transfer of electrons from metals to non-metals to form ionic bonds.

8) **Name a solvent in which electrovalent compounds are soluble and a solvent in which they are insoluble.**

Water is a (polar) solvent in which electrovalent compounds are soluble and petrol is a non-polar solvent in which they are insoluble.

9) **Name one metal which reacts neither with cold water, nor with hot water, but reacts with steam to produce hydrogen gas.**

Iron is the metal which does not react with cold and hot water but reacts with steam to produce hydrogen gas.

10) **A piece of granulated zinc was dropped into copper sulphate solution. After sometime, the colour of the solution changed from blue to colourless. Why?**

Blue copper sulphate is converted to colourless zinc sulphate, as zinc, being more reactive, displaces copper from CuSO₄ solution and forms a colourless solution of zinc sulphate.

11) **Name one property which is not shown by ionic compounds.**

Ionic compounds do not conduct electricity in the solid state.

12) **Why does calcium float in water?**

Calcium reacts with water to form hydrogen gas. Although, calcium is heavier than water, but due to the sticking of the H₂ gas bubbles on calcium metal surface, it starts floating.

13) **What is anode mud?**

The impurities collected down below anode during electrolytic refining of metals is called anode mud.

14) **A green layer is gradually formed on a copper plate when left exposed to air for a week in a bathroom. What could this green substance be?**

This green substance is basic copper carbonate CuCO₃ · Cu(OH)₂.

15) **Name two electrolysis form. metals that are obtained by of their chlorides in molten form.**

Sodium and calcium are obtained by electrolysis of their chlorides in molten form.

16) Name the metals which are usually alloyed with gold to make it harder.

Copper and silver are usually alloyed with gold to make it harder.

17) What is meant by 22 carat gold?

An alloy consisting of 22 parts by weight of pure gold and 2 parts by weight of copper or silver is called 22 carat gold.

Pure gold of 24 carat is not used for making jewellery as it is very soft to hold gems and pearls.

18) Name any two alloys whose electrical conductivity is less than that of pure metals.

In brass and bronze, electrical conductivity is lower than that of pure metal.

19) Can rusting of iron nail occur in distilled water?

No, because distilled water has no dissolved oxygen in it. Hence, rusting will not occur.

20) Name an alloy that contains a non-metal as one of its constituents.

Steel (iron + carbon) is an alloy that contains a non-metal as one of its constituents.

21) Name an alloy which has mercury as one of its constituents.

Zinc amalgam is an alloy that has mercury as one of its constituents.

22) Explain what happens if bauxite containing iron and silica as impurities is directly subjected to the process of electrolytic reduction without prior purification.

Crude bauxite contains iron oxide and silica as impurities. If any amount of iron is present in the bauxite, it will get deposited at the cathode in preference to aluminium because iron is less electropositive than aluminium.

23) Name a metal which (i) is a good conductor of heat. (ii) has a very low melting point. (iii) does not react with oxygen even at high temperature. (iv) is most ductile

(i) Silver, Copper

(ii) Gallium/Caesium

(iii) Silver

(iv) Gold

24) Give reason for the following: (i) School bells are made up of metals.

(ii) Electrical wires are made up of copper.

(i) Metals are sonorous (produce sound on being hit), so school bells are made up of metals.

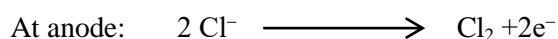
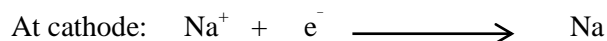
(ii) Copper is a very good conductor of electricity. So, it is used for making electrical wires.

25) A non-metal X exists in two different forms Y and Z. Y is hardest natural substance, whereas Z is a good conductor of electricity. Identify X, Y and Z.

- A non-metal X is carbon (C).
- Carbon exists in two different forms called the allotropes of carbon. These allotropes are diamond and graphite.
- Y is diamond because diamond is the hardest natural substance and Z is graphite which is a good conductor of electricity.

26) What is meant by electrolytic reduction? How is sodium obtained from its molten chloride? Explain.

- In electrolytic reduction, the metals are extracted by the electrolysis of their salts.
- Sodium obtained by the electrolysis of their molten chlorides.
- The metals are deposited at the cathode (the negatively charged electrode), whereas chlorine is liberated at the anode (the positively charged electrode).



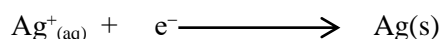
27) During extraction of metals, electrolytic refining is used to obtain pure metals.

- (i) Which material will be used as anode and cathode for refining of silver metal by this process?
- (ii) Suggest a suitable electrolyte also.
- (iii) In this electrolytic cell, where do we get pure silver after passing electric current?

i) Anode impure block of silver metal, Cathode Pure thin strip of silver metal

ii) Aqueous solution of a silver salt like AgNO_3 can be used as an electrolyte.

iii) We get pure silver at cathode, because at cathode, reduction reaction will take place.



28) Explain the process of electrolytic refining for copper with the help of a labeled diagram.

Diagram: Ref text book Fig:3.12 page no. 53

- In electrolytic process, the impure metal is made the anode and a thin strip of pure metal is made the cathode.
- A solution of the metal salt is used as an electrolyte.
- On passing the current through the electrolyte, the pure metal from the anode dissolves into the electrolyte.
- An equivalent of pure metal from the electrolyte is deposited on the cathode.
- At cathode $\text{Cu}^{2+} + 2\text{e}^- \longrightarrow \text{Cu}$ (deposited)
- At anode $\text{Cu}_{(\text{s})} \longrightarrow \text{Cu}^{2+}_{(\text{aq})} + 2\text{e}^-$
(Impure metal) (Dissolved)

29) What is roasting?

Roasting It is the process in which a sulphide ore is heated below its melting point in the presence of excess air to convert it into metal oxide.

30) What is calcination?

Calcination It is a process in which a carbonate ore is heated below its melting point in the absence of air to convert it into metal oxide.

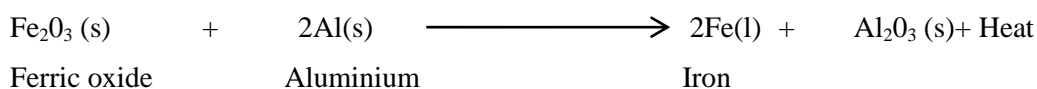
31) What is thermite reaction? Explain with an example.

The reaction of metal oxide to form metal by using aluminium powder as a reducing agent is known as **thermite reaction**. (Exothermic reaction)

The amount of heat produced is so high in this reaction, hence the metals are produced in the molten state.

The reaction of iron (III)oxide (Fe_2O_3) with aluminium to produce iron in molten state.

It is used to join railway tracks or cracked machine parts. This process is called **thermite welding**.



32) What is an alloy? Give example along with their components.

An alloy is a homogeneous mixture of two or more metals or a metal and a non-metal. It is prepared by mixing the metals in molten form and then cooling the mixture.

e.g. Brass, an alloy of copper and zinc (Cu and Zn)

Bronze, an alloy of copper and tin (Cu and Sn)

Solder, an alloy of lead and tin

33) What is amalgam?

If an alloy contains mercury as one of its components, it is called amalgam,

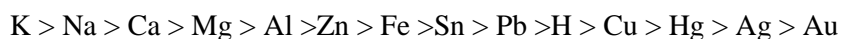
e.g. sodium-mercury amalgam, silver-mercury amalgam etc.

34) Write important properties of alloy.

- The electrical conductivity and melting point of an alloy is less than that of pure metals.
- Can change the metallic property by adding various components like metals and non-metals.

35) What is reactivity series? Write the order of reactivity series of metals.

The reactivity series is a list of metals arranged in the order of their decreasing activities.

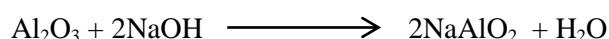
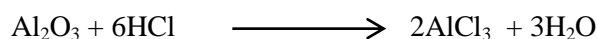


36) What are amphoteric oxides? Give two examples of amphoteric oxides.

The metallic oxides which show the properties of acids as well as bases are called amphoteric oxides.

It means that they react with both bases and acids to form salt and water.

e.g. ZnO and Al₂O₃



37) Name two metals which will displace hydrogen from dilute acids, and two metals which will not.

Zinc and magnesium displace H₂ from dilute acids while copper and silver do not.

38) Why do ionic compounds have high melting points?

In ionic compounds, strong electrostatic forces of attraction are present between the oppositely charged ions.

When these compounds are heated, a lot of heat energy is consumed to break these strong electrostatic forces of attraction during melting. Therefore, ionic compounds have high melting and boiling points.

39) Define the following terms: (i) Mineral (ii) Ore (iii) Gangue

(I) The naturally occurring elements or compounds of metals present in the earth's crust are called minerals.

(II) Ores are those minerals from which a particular metal can be extracted profitably.

(III) The undesirable impurities present in the ore are called gangue or matrix.

40) Name two metals which are found in nature in the free state.

Gold and platinum are the two metals that are found in nature in free state.

41) Draw labeled diagram to show the action of steam on metals.

42) Draw labeled diagram of testing the conductivity of a salt solution.

Chapter-4 : Carbon and its compounds

- **Covalent bonds:** These are formed by sharing of electrons between two atoms, so that both can achieve a completely filled outermost shell.
- **Catenation:** The property of self linking of elements mainly C-atoms through covalent bonds to form long, straight or branched chains and rings of different sizes is called catenation.
- Carbon shows maximum catenation in the periodic table due to its small size and strong C - C bond. Hence, stable.
- **Tetravalency of Carbon:** Carbon belongs to group 14 of the periodic table. Its atomic number is 6 and the electronic configuration is 2, 4. Thus, it has four electrons in the outermost shell. Hence, its valency is four, i.e. it is capable of bonding or pairing with four other carbon atoms or with the atoms of some other monovalent elements like hydrogen, halogen (chlorine, bromine) etc.
- Hydrocarbons are the compounds of carbon and hydrogen only.
- They are of two types, i.e. saturated hydrocarbon having only one single bond between two carbon atoms and unsaturated hydrocarbon have at least one multiple bond (ie., double or triple bond) between two carbon atoms along with the single bonds.
- **Alkanes:** These have carbon-carbon single bonds. Their general formula is C_nH_{2n+2}
- **Alkenes:** These have carbon-carbon double bonds along with single bonds. Their general formula is C_nH_{2n}
- **Alkynes:** These have at least one carbon-carbon triple bond along with single bonds. Their general formula is C_nH_{2n-2}
- **Isomerism:** Organic compounds with same molecular formula but different structural formula are called isomers. The phenomenon is called isomerism.
- **The functional groups:** such as alcohol (R -OH), aldehydes (R -CHO), ketones (R - CO- R') and carboxylic acid (R -COOH) decide characteristic properties of the carbon compounds that contain them.
- **Homologous series:** A series of compounds having same functional group but a difference of $-CH_2$ unit (14 unit mass) between two successive members is called homologous series.
- **Oxidation:** It is the process of addition of oxygen and removal of hydrogen.
- The substances which provide oxygen to other substances are called oxidising agents.
- Alcohols can be oxidised to carboxylic acid by heating them either in presence of oxidising agents like **alkaline $KMnO_4$ (potassium permanganate)** or **acidified $K_2Cr_2O_7$ (potassium dichromate)**.
- **Combustion :** It is the reaction in which CO_2 and H_2O are obtained by burning organic compound. Saturated hydrocarbons burn with blue flame due to their complete combustion.
- **Addition reaction :** In this reaction, the reagents add completely to the substrate, e.g. hydrogenation to vegetable oil to obtain ghee.
- **Substitution reaction:** In this reaction, an atom or group of atoms replace another atom or group from the substrate.
- Carbon and its compounds are some of the major sources of fuel, e.g. coal, petroleum etc.

- Flame is the region where combustion of gases occur. It is of two type: blue flame (or non-luminous flame) and yellow flame (or luminous flame).
- Ethanol, C_2H_5OH is soluble in water. It gives ethene on reaction with conc. H_2SO_4 at $160^\circ C$. It gives sodium ethoxide with Na.
- Ethanoic acid, CH_3COOH also called acetic acid. Its 5- 8% aqueous solution is called vinegar.
- It gives CO_2 gas with sodium carbonate and bicarbonates.
- Soaps are sodium or potassium salts of long chain fatty acid ($RCOONa$) here, $R = C_{15}H_{31}$, $C_{17}H_{35}$.
- Detergents are ammonium or sulphonate salts of long chain carboxylic acids.

1. what are covalent bonds?

The bonds which are formed by the sharing of an electron pair between the atoms (either same or different atoms) are known as covalent bonds.

2. Write the properties of covalent compounds?

The compounds containing covalent bonds are called covalent compounds.

It has the following properties:

- Covalent compounds have low melting and boiling points due to small intermolecular forces of attraction between the atoms.
- Covalent compounds are generally poor conductors of electricity. This is because the electrons are shared between atoms and no charged particles are formed in these compounds.
- Covalent compounds are generally volatile in nature.

3. What are the two properties of carbon, which lead to the huge number of carbon compounds, we see around us? Explain.

Two main properties which led the carbon to form a huge number of carbon compounds are:

- Catenation:** The property of self-linking of elements mainly C-atoms through covalent bonds to form long, straight or branched chains and rings of different sizes is called catenation.
Carbon shows maximum catenation in the periodic table due to its small size and strong C - C bond. Hence, stable.
- tetravalency of carbon;** it has four electrons in the outermost shell. Hence, its valency is four, i.e. it is capable of bonding or pairing with four other carbon atoms or with the atoms of some other monovalent elements like hydrogen, halogen (chlorine, bromine) etc.

4. Mention four differences between saturated and unsaturated hydrocarbons.

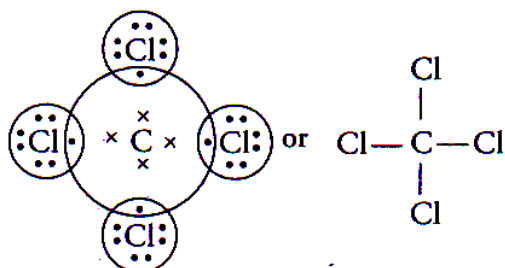
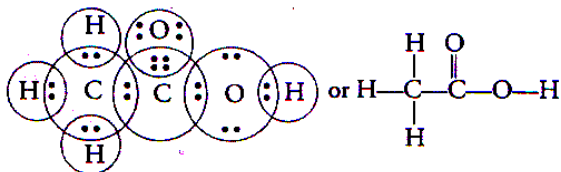
saturated hydrocarbons		unsaturated hydrocarbons	
I.	Only single bond is present in between carbon-carbon atoms.	I.	Double or triple bond is also present in between carbon-carbon atoms.
II.	Substitution reaction occurs.	II.	Addition reaction occurs.
III.	It burns with blue flame.	III.	It burns with sooty flame.
IV.	Less reactive	IV.	Highly reactive.

5. Write the general formula of alkane, alkene, and alkyne.

Alkane: C_nH_{2n+2} Alkene: C_nH_{2n} and Alkyne: C_nH_{2n-2}

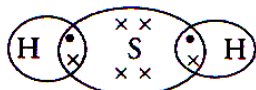
6. Draw the electron dot structures for (a) Ethanoic acid (b) H_2S (c) Propanone (d) F_2 e) CCl_4 f) CO_2

(a) Ethanoic acid



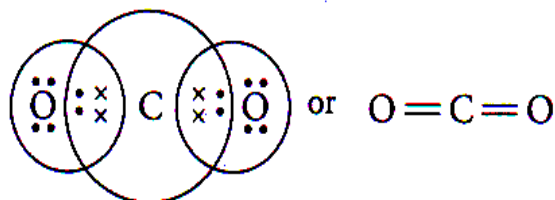
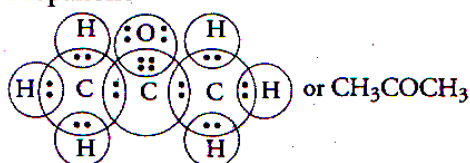
Carbon tetrachloride (CCl_4)

(b) Electron dot structure for H_2S



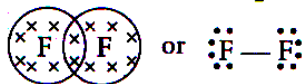
or $H-S-H$

(c) Propanone



Carbon dioxide (CO_2)

(d) Electron dot structure for F_2



7. Write the molecular formula and structural formula of methane, ethane, propane and butane.

Name of alkane	Molecular formula	Structural formula
Methane	CH_4	$\begin{array}{c} H \\ \\ H-C-H \\ \\ H \end{array}$
Ethane	C_2H_6	$\begin{array}{c} H & H \\ & \\ H-C & -C-H \\ & \\ H & H \end{array}$
Propane	C_3H_8	$\begin{array}{c} H & H & H \\ & & \\ H-C & -C & -C-H \\ & & \\ H & H & H \end{array}$
Butane	C_4H_{10}	$\begin{array}{c} H & H & H & H \\ & & & \\ H-C & -C & -C & -C-H \\ & & & \\ H & H & H & H \end{array}$

8. Write the molecular formula and structural formula of ethene, propene and butene.

Name of alkane	Molecular formula	Structural formula
Ethene	C_2H_4	$\begin{array}{c} H & & H \\ & \diagdown & / \\ & C=C & \\ & / & \diagdown \\ H & & H \end{array}$

Propene	C_3H_6	$ \begin{array}{c} H \\ \\ H-C-C=C-H \\ \quad \quad \\ H \quad H \quad H \end{array} $
Butene	C_4H_8	$ \begin{array}{c} H \quad H \quad H \\ \quad \quad \\ H-C-C-C=C-H \\ \quad \quad \\ H \quad H \quad H \end{array} $

9. Write the molecular formula and structural formula of ethyne and propyne.

Name of alkane	Molecular formula	Structural formula
Ethyne	C_2H_2	$H-C \equiv C-H$
Propyne	C_3H_4	$ \begin{array}{c} H \\ \\ H-C-C \equiv C-H \\ \\ H \end{array} $
Butane	C_4H_8	$ \begin{array}{c} H \quad H \\ \quad \\ H-C-C-C \equiv C-H \\ \quad \\ H \quad H \end{array} $

10. What is a homologous series? Explain with an example.

A series of similarly constituted compounds in which the members present have the same functional group and similar chemical properties and any two successive members in a particular series differ in their molecular formula by (- CH_2) unit, is called a homologous series.

e.g. alkane series C_nH_{2n+2}

CH_4 Methane

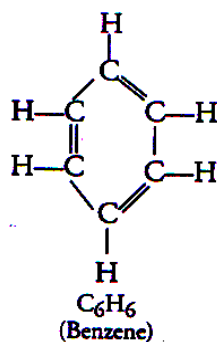
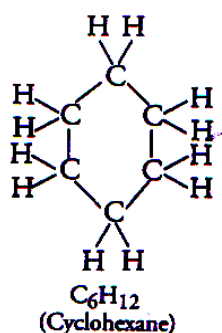
C_4H_{10} Butane

C_2H_6 Ethane

C_5H_{12} Pentane.

C_3H_8 Propane

11. Compare the structure of benzene and cyclohexane by drawing them.



Structure of benzene and cyclohexane are:

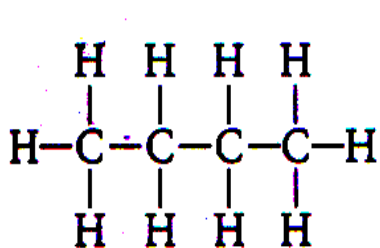
Benzene (C_6H_6) has six C-atoms and six H-atoms, it contains three double bonds alternately between two C-atoms.

Cyclohexane (C_6H_{12}) has six C-atoms each possessing two H-atoms, thus twelve H-atoms in total. It does not consist

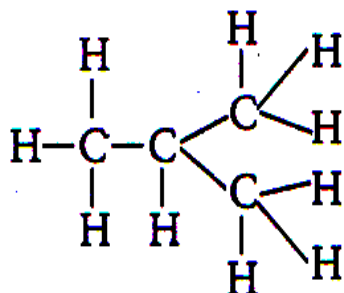
of any double bond.

12. Define structural isomer and draw the isomeric structures of butane.

Carbon compounds having same molecular formula but different structural formula are called structural isomers.



Straight chain structure



Branched chain structure

13. What is functional group? Name the different functional group.

Functional groups may be defined as an 'atom' or a 'group of atoms' which makes a carbon compound (or organic compound) reactive and decide its properties (or functions) regardless of the length and nature of carbon chain.

Some functional groups in carbon compounds

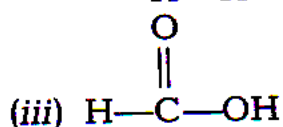
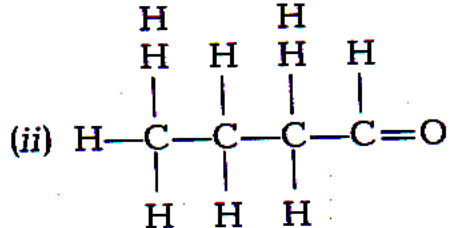
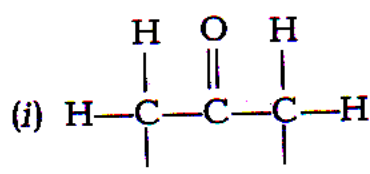
<i>Hetero atom</i>	<i>Functional group</i>	<i>Formula of functional group</i>
Cl/Br	Halo- (Chloro/bromo)	—Cl, —Br (substitutes for hydrogen atom)
Oxygen	1. Alcohol	—OH
	2. Aldehyde	$ \begin{array}{c} \text{H} \\ \diagup \\ -\text{C} \\ \diagdown \\ \text{O} \end{array} $
	3. Ketone	$ \begin{array}{c} -\text{C}- \\ \\ \text{O} \end{array} $
	4. Carboxylic acid	$ \begin{array}{c} \text{O} \\ \\ -\text{C}-\text{OH} \end{array} $

14. Nomenclature of functional group.

Nomenclature of functional groups

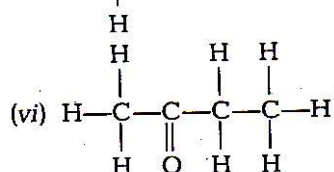
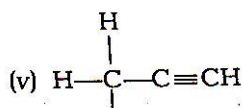
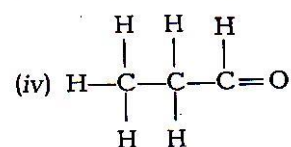
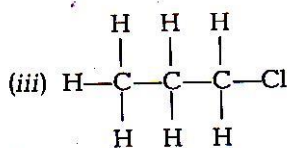
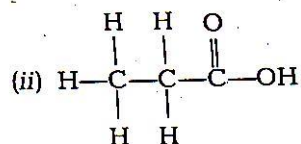
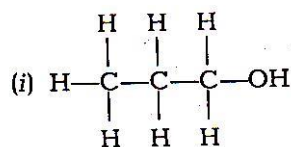
Functional group	Prefix/Suffix	Example
1. Halogen	Prefix-chloro, bromo, etc.	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{Cl} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ Chloropropane
		$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{Br} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ Bromopropane
2. Alcohol	Suffix - ol	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ Propanol
3. Aldehyde	Suffix - al	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{O} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ Propanal
4. Ketone	Suffix - one	$\begin{array}{c} \text{H} \quad \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{O} \quad \text{H} \end{array}$ Propanone
5. Carboxylic acid	Suffix - oic acid	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ Propanoic acid
6. Double bond (alkenes)	Suffix - ene	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}=\text{C} \\ \quad \quad \\ \text{H} \quad \quad \text{H} \end{array}$ Propene
7. Triple bond (alkynes)	Suffix - yne	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C}\equiv\text{C}-\text{H} \\ \\ \text{H} \end{array}$ Propyne

15. Name the following compounds.



- i) Propanone
- ii) Butanal
- iii) Methanoic acid

16. Name the following compounds.



- (i) Propan-1-ol or propanol
- (ii) Propanoic acid
- (iii) chloropropane
- (iv) Propanal
- (v) Prop-1-yne or propyne
- (vi) Butan-2-one

17. Write the uses of ethanol and acetic acid.

Uses of ethanol are:

- i) It is used as an active ingredient in all alcoholic drinks.
- ii) It is useful in medicines like tincture of iodine, cough syrups and many other tonics.
- iii) Alcohol is used as an additive in petrol, since it is a cleaner fuel and gives rise to only CO_2 and H_2O when burnt in sufficient air.

Uses of Acetic Acid

- i) It is used for making vinegar.
- ii) It is widely used as a preservative in pickles.
- iii) It is used for the synthesis of other compounds like esters.

18. What is esterification reaction?

When ethanol (an alcohol) reacts with acetic acid (a carboxylic acid) in the presence of an acid as catalyst, a fruity (sweet) smelling liquid called ester is obtained. This reaction is called esterification.

Chapter -5: Periodic Classification of Elements

- Elements are classified on the basis of similarities in their properties. Initially, elements are grouped as metals and non-metals.
 - **Dobereiner** grouped the elements into triads. Dobereiner showed that when the three elements in a triad were arranged in the order of increasing atomic masses, the atomic mass of the middle element was roughly the average of the atomic masses of the other two elements.
 - **Newlands' Law of Octaves**, states that when the elements are arranged in the increasing order of their atomic mass, every eighth element has properties similar to first one.
 - **Mendeleev** arranged the known 63 elements in increasing order of their atomic masses and according to their chemical properties.
 - Mendeleev adjusted few elements with slightly greater atomic mass before the elements with slightly lower atomic mass. So, that elements with similar properties could be grouped together.
 - Mendeleev also predicted the existence of some yet to be discovered elements on the basis of the **gaps in his periodic table**.
 - **According to Modern Periodic Law**. "the physical and chemical properties of the elements are a periodic function of their atomic number".
 - Elements in the Modern Periodic Table are arranged in **18 vertical columns** called **groups** and **7 horizontal rows** called **periods**.
 - The periodic repetition of elements having similar properties after regular intervals is known as periodicity.
 - Valency denotes the combining capacity of the atom of an element.
 - Valency depends on the number of electrons in the outer most shell. If the number is 1, 2, 3, 4 then, valency is same as 1, 2, 3, 4 but if the electrons present in the outer shell are 5, 6, 7, 8 then, valency is $8 - 5 = 3$, $8 - 6 = 2$, $8 - 7 = 1$, $8 - 8 = 0$ respectively. Similar, trend is seen in atomic size.
 - **Atomic radius** decreases on moving from left to right along a period due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduces the size of the atom. **Similar trend is seen in atomic size**.
 - Metallic character increases on moving down a group and decreases across a period.
 - While non-metallic character decreases on moving down a group and increases across a period.
 - Oxides of metals are basic and of non-metals are acidic.
 - The acidic nature of oxides increases along a period from left to right and decreases on moving down a group.
 - Electronegativity is the relative electron attracting tendency of an atom for a shared electron pair in a covalent bond with other atom. It increases along a period from left to right and decreases on moving down a group.
- 1. State Dobereiner's law of triads.**
Dobereiner's law states that "when the three elements in a triad were arranged in the order of increasing atomic masses, the atomic mass of the middle element was roughly equals to the average of the atomic masses of the other two elements.

2. **Chlorine, bromine and iodine form a Dobereiner's triad. The atomic masses of chlorine and iodine are 35.5 and 126.9, respectively. Predict the atomic mass of bromine.**

In Dobereiner's triad, the atomic mass of the middle element was roughly the average of the atomic masses of the other two elements.

Thus, the atomic mass of bromine

$$= \frac{\text{Average atomic mass of Cl} + \text{Atomic mass of I}}{2}$$

$$= \frac{35.5 + 126.9}{2} = 81.2\text{u}$$

Atomic mass of bromine is 81.2 u. 81.2 u

3. **Up to which element, the Law of Octaves was found to be applicable?**

Law of octaves was applicable up to calcium (Ca, atomic mass = 40).

4. **A and B are the two elements having similar properties which obey Newlands' Law of Octaves. How many elements are there in between A and B?**

According to Newlands' law of octaves, every eighth element has properties similar to that of the first. The elements A and B have similar properties which obey Newlands' law of octaves.

Thus, there are 6 elements in between A and B.

5. **Why are noble gases missing from Newlands' Octaves?**

The noble gases were not known at that time and therefore, they are missing from Newland's octaves.

6. **What is meant by periodicity in properties of elements with reference to periodic table?**

The repetition of the properties of elements after regular intervals, when the elements are arranged in the order of their increasing atomic numbers, is called periodicity.

7. **Atomic number is considered to be a more appropriate parameter than atomic mass for classification of elements in a periodic table. Why?**

The properties of elements depend upon valence electrons in the atom which in turn depends on the total number of electrons, i.e. atomic number. Therefore, atomic number is a more appropriate parameter than atomic mass for the classification of elements.

8. **Write the atomic numbers of two elements X and Y having electronic configuration 2,8,2 and 2,8,6 respectively.**

$$\text{Atomic number of X} = 2 + 8 + 2 = 12$$

$$\text{Atomic number of Y} = 2 + 8 + 6 = 16$$

9. **Write the valency and usual number of valence electrons of group 18 of the periodic table.**

$$\text{Valency} = 0, \text{ Number of valence electrons} = 8$$

10. **Where would you locate the element with electronic configuration 2, 8 in the modern periodic table?**

Since, the element contains 8 valence electrons, thus, it belongs to group 18 and it has two shells therefore it belongs to second period of the modern periodic table.

11. **Elements A, B, C and D have atomic numbers 1, 8, 11 and 19 respectively. Choose the odd element and give reason for your answer.**

Odd element is B having atomic number 8.

Reason B has six electrons in its valence shell but A, C and D have one electron in their valence shells.

12. **Out of the two elements X and Y which has bigger atomic radius?**

(i) **X has atomic number = 18 and atomic mass = 40.**

(ii) **Y has atomic number = 20 and atomic mass = 40.**

Radius of Y is bigger than that of X. This is because in X, the number of shells is three (2, 8, 8) while in Y, it is four (2, 8, 8, 2).

13. **Write the correct increasing order of the atomic radii of O, F and N.**

$F < O < N$ because atomic radii decreases as the atomic number increases due to increase in effective nuclear charge.

14. **Out of two elements, potassium and sodium, which one can lose electron easily? Give reason for your answer.**

Potassium, because the tendency to lose electron increases as we move down a group.

15. Which group of elements will form an acidic oxide?

Elements of group 15, 16, 17 form acidic oxides as these are non-metals.

16. The element with atomic number 14 is hard and forms acidic oxide and a covalent halide. To which of the categories does the element belong?

Non-metal, because it forms acidic oxide which is a characteristic of non-metals.

17. Mention the type of compounds formed between group 1 and group 17 elements.

Ionic compounds.

18. An element X is in second period of group 16 of the periodic table. Is it metal or non-metal? Give reason for your answer.

Second period suggests that there are two shells present in an element, while group 16 suggests that there are 6 valence electrons. Thus, electronic configuration is 2, 6. Its atomic number is 8 and it is a non-metal as it contains 6 valence electrons.

19. An element X forms a chloride with formula XCl_3 . The element X would most likely be in the same group of the periodic table as is Na, Mg, Al or Ca.

The formula of chloride is XCl_3 , that means the valency of the element X is 3. The element having valency 3 will be present in group 13 (10 + 3).

Among the given choices, aluminium (Al) belongs to group 13

20. In Mendeleev's periodic table, why does tellurium with atomic mass = 127.6 appear before iodine having atomic mass = 126.9?

Tellurium with atomic mass = 127.6 was placed before iodine (atomic mass = 126.9 u) so that elements having similar properties could be grouped together. The properties of tellurium (Te) were similar to those of molybdenum (Mo) and tungsten (W) while properties of iodine (I) were similar to those of chlorine (Cl) and bromine (Br).

21. Write the formulae of chlorides of Eka-silicon and Eka-aluminium, the elements predicted by Mendeleev.

Eka-silicon is germanium (Ge). It lies in group 4 of Mendeleev's periodic table and thus, has a valency of 4.
∴ The formula of its chloride is $GeCl_4$.

Eka-aluminium is gallium (Ga). It lies in group 3 of Mendeleev's periodic table and thus, has a valency of 3.
∴ The formula of its chloride is $GaCl_3$.

22. State the reason for the following: (i) The elements of the same group have similar chemical properties. (ii) The elements of the same period have different properties.

i) Due to same number of valence electrons.

ii) Due to different number of valence electrons.

23. Atomic number of three elements X, Y and Z are given below:

Element Atomic number X=4, Y= 13, Z= 18

Identify the period, group and block to which these elements belong.

Element	Electronic configuration	Period	Group	Block
X=4	$1S^2 2S^2$		2^{nd}	2 S
Y=13	$1S^2 2S^2 2P^6 3S^2 3P^1$	3^{rd}	13	P
Z=18	$1S^2 2S^2 2P^6 3S^2 3P^6$	3^{rd}	18	P

24. A part of the periodic table has been shown below.

Group → Period ↓	1	2	13	14	15	16	17	18
1		C						
2	A						E	G
3	B			D			F	

Answer the following questions on the basis of position of elements in the above table.

- (i) Which element is a noble gas? Give reason.
- (ii) Which element is most electronegative? Give reason.
- (iii) Write the electronic configuration of (a) B and (b) E.
 - i) G is a noble gas, because it is present in group 18 and has zero valency.
 - ii) E is the most electronegative element due to its smallest atomic size and larger tendency to gain electrons.
 - iii) (a) Electronic configuration of B = $1s^2 2s^2 2p^6 3s^1$
 (b) Electronic configuration of E = $1s^2 2s^2 2p^6 3s^2 3p^5$

25. What is meant by group in the modern periodic table?

How do the following changes occur on moving from top to bottom in a group?

- (i) Number of valence electrons
- (ii) Number of occupied shells
- (iii) Size of atoms
- (iv) Metallic character of element
- (v) Effective nuclear charge experienced by valence electrons

The vertical column of the periodic table consisting elements of similar properties is called group.

- i) Number of valence electrons remains same.
- ii) Number of occupied shells increases.
- iii) Size of atoms increases (as number of shell increases).
- iv) Metallic character increases on going down the group.
- v) Effective nuclear charge (Z_{eff}) decreases on going down the group.

26. The position of three elements X, Y and Z in the periodic table is given below.

Group 16	Group 17
—	—
—	Y
—	—
X	Z

Giving reason, answer the following questions.

- (i) Out of Y and Z which element will be more metallic?
- (ii) Will atomic size of Z be smaller or larger than that of X?
- (iii) Out of Y and Z which element will be more electronegative?
 - i) Z is more metallic than Y, as the size of element Z is more than that of Y and tendency to lose electron increases as we go down the group.
 - ii) Atomic size of Z is smaller than that of X as atomic size decreases on moving from left to right along a period due to increase in effective nuclear charge.
 - iii) Y is more electronegative than Z as electronegativity decreases on going down the group due to increase in atomic size.

27. Table, which shows Trends in the modern periodic table.

	Periodic trends	Move from left to right in the periodic table →	Move from top bottom in the group of periodic table. ↓
1	Atomic size	Decreases	increases
2	Ionization energy	Increases	Decreases
3	Metallic property	Decreases	Increases
4	Electro positivity	Decreases	Increases
5	Electronegativity	Increases	Decreases

BIOLOGY
Chapter: 1: LIFE PROCESSES

1) **Through which process carbon and energy is available to autotrophs.**

Photosynthesis

2) **Write the equation of photosynthesis.**



3) **What is translocation?**

The process of transportation of food from leaves to other part so plant body is called translocation.

4) **What is transpiration?**

The process of loss of water from plant body in the form of water vapour especially through stomata is called transpiration.

5) **What is heterotrophism ?**

The process by which organisms obtain food from other organisms is called heterotrophism.

6) **Name the secretions secreted from Gastric glands.**

Hydrochloric acid (HCl), Pepsin, Rennin, Mucous and small amount of Gastric lipase.

7) **Which muscles controls the movement of food form stomach.**

Spinctor muscles.

8) **Which part of digestive system helps in complete digestion of carbohydrates, proteins and lipids ?**

Small intestine

9) **Which enzymes of pancreas helps in efficient digestion of protein ?**

Trypsin and chymotrypsin.

10) **Name the intermediate and final products obtained during aerobic respiration.**

Intermediate product – pyruvate or pyruvic acid

Final products – carbon dioxide and water

11) **What is the amount of energy obtained during aerobic and anaerobic respiration while the break down of one glucose molecule ?**

Aerobic respiration – 38 ATP and 686 Kcal of heat energy.

Anaerobic respiration – 2 ATP and 56 Kcal of heat energy.

12) **Which acid responsible for the cramping of muscles?.**

Lactic acid.

13) **What is the transportation of material ?**

It is the process of movement of oxygen, CO₂, waste substances and secretion of glands form the region of availability to the region of storage or excretory organs.

14) **Name the following blood vessels.**

a) The blood vessels which transport blood form heart to different parts of the body.

b) From different parts of the body to heart.

A) a) Arteries

b) Veins

15) **What is emulsification ? What is its significations.**

The process of breakdown of larger fat droplets into smaller droplets of fat with the help of bile salts present in bile juice.

It helps to increase the surface area for enzyme action.

16) **Which is the structural and functional unit of human kidney?**

Nephrons

17) **What is excretion ?**

The process of removal of nitrogenous waste substances from produced during metabolic activities of the body is called excretion.

18) **Which is the excretory substances excreted form human kidney ?**

Urea.

19) Name the two glands, which secretes Amylase enzyme.

Salivary glands and pancreas.

20) Which process helps in the removal of waste substances form blood while kidney failure ?

Dialysis.

Two marks questions :

21) What are the conditions necessary for Autotrophic nutrition ? Name its product.

Necessary conditions : Carbon dioxide, chlorophyll, sunlight, water, proper temperature.

Products : Glucose and oxygen.

22) What are the important events of photosynthesis ?

The main events occurs during photosynthesis are

i) Absorption of light energy by chlorophyll

ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.

iii) Reduction of carbon dioxide to carbohydrates.

23) Differentiate between autotrophic nutrition and heterotrophic nutrition.

Autotrophic nutrition	Heterotrophic nutrition
1) In which organic food is manufactured	1) In which organic food is obtained from various sources
2) An external source of energy is required form synthesis of organic food	2) Energy is obtained by oxidation of food
3) The organisms lives and depends on inorganic medium	3) The organisms depends and must live in contact with sources of organic matter
4) It is found in green plans	4) It is found in animals, man, non-green plants, fungi and most of bacteria.

24) How is the small intestine designed to absorb digested food ?

- Small intestine has several finger like projections called villi.
- These are specially designed for absorption.
- They have a dense network of blood capillaries and lymph, which helps to carry the absorbed food lymph which helps to carry the absorbed food materials in blood to different parts of the body.

25) Differentiate between saprophytes and parasites.

Saprophytes	Parasites
1) Obtain the food from dead and decaying organisms	1) Obtain food from living hosts of different species
2) Extra digestion process is identified	2) Digestion process is absent
3) Only digested food is taken into the body	3) Digested, partially digested or undigested food is taken into the body
4) Do not have any organs for absorption	4) They have organs meant for absorption of food.

26) What is the importance of nutrition ?

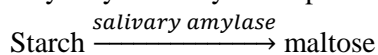
- 1) The food taken in during the process of nutrition used in cells, to provide energy for various life processes.
- 2) It provides materials necessary for repairing and replacement of body parts.
- 3) Hormones and enzymes synthesized from food components controls various activities of the body.
- 4) Defensive system formed form food components provide protection against various disease causing microorganisms.

27) What is the importance for photosynthesis ?

- 1) The food synthesized through photosynthesis nourishes all the organisms on the Earth.
- 2) Photosynthesis is the main process involved in the recycling of oxygen.
- 3) It helps in the controlling of CO₂ level in the environment.

28) What is the role of salivary juice in the digestion of human beings?

- Salivary juice contains water, mucus, lysozyme and salivary amylase enzyme.
- Water and mucus soften the food material
- Lysozyme enzyme helps to kill the bacteria.
- Salivary amylase enzyme helps in the conversion of starch or glycogen into maltose.

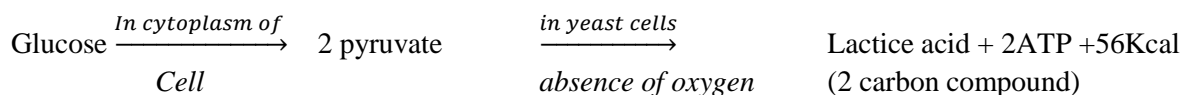


29) List the role of hydrochloric acid in stomach.

- i) It helps to soften the fibrous food material.
- ii) It helps to kill the bacteria present in the food.
- iii) It helps to provide acidic media for enzyme action.
- iv) It helps to convert inactive pepsinogen and prorennin into active pepsin and rennin.

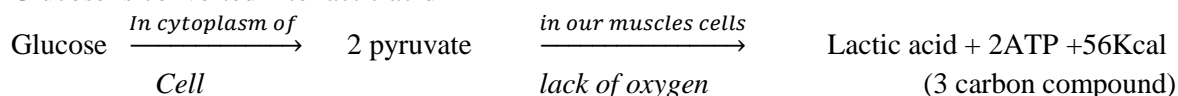
30) What are the different ways in which glucose is oxidized to provide energy in various organisms ?

- a) In yeast cell glucose is broken down in the absence of oxygen to form ethyl alcohol and carbon dioxide along with 2ATP and 56 Kcal of heat energy.

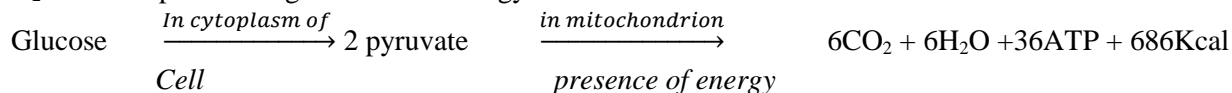


- b) In skeletal muscles of humans, in the deficiency of oxygen.

Glucose is converted into lactic acid



- c) In the cells of higher organisms, in mitochondria, presence of oxygen glucose is converted into CO₂ and H₂O. In this process large amount of energy is liberated.



31) Write the important components and their functions of blood.

The components of blood are

- i) Plasma : It helps in the transport of nutrients, salt waste materials, hormones and antibodies.
- ii) Red blood corpuscles : helps in the transportation of oxygen and carbon dioxide.
- iii) White blood corpuscles : helps in protection by destroying disease causing micro organisms
- iv) Blood platelets : helps in the synthesis of thromboplastin for the clotting of blood.

32) Write three types of blood vessels and their functions.

- i. Arteries – Helps in the transport of oxygenated blood from heart to different parts of the body (except pulmonary artery – carries deoxygenated blood)
- ii. Veins: Helps in the transport of deoxygenated blood from different parts of the body to heart. (Except pulmonary vein – carries oxygenated blood)
- iii. Capillary blood vessels : helps in the transport of substances between blood and body cells through tissue fluid.

33) What is blood pressure ? explain briefly.

The force that blood exerts against the wall of elastic blood vessels is called blood pressure.

Blood pressure is measured with an instrument called sphygmomanometer.

The pressure of the blood inside the artery during ventricular systole (contraction) is called systolic pressure. It is about 120mm Hg.

The pressure of the blood inside the artery during ventricular diastole (relaxation) is called diastolic pressure. It is of about 80mm Hg. The blood pressure of normal healthy person is mentioned as 120/80 mm Hg.

34) Match the following :

- | A | B |
|---------------------|---|
| i) Pulmonary artery | a) Transport deoxygenated blood to right auricle |
| ii) Pulmonary veins | b) Transport oxygenated blood to right auricle |
| iii) Aorta | c) Transport deoxygenated blood from lungs of left auricle |
| iv) Veins | d) Transport oxygenated blood from lungs to left auricle |
| | e) Transport blood to lungs to get oxygen from right ventricle |
| | f) Transport oxygenated blood from left auricle to different parts of the body. |
| | g) Transport blood to lungs from left ventricle to get oxygen. |

Ans: 1) e), 2) d), 3) f), 4) c)

35)

- | A | B |
|---------------------|-----------------------------------|
| 1) Salivary amylase | a) Breakdown of Emulsified fat |
| 2) Pepsin | b) create acidic media |
| 3) Bile juice | c) Converts starch into maltose |
| 4) Lipase | d) Protein digestion |
| | e) Converts maltose into glucose |
| | f) Protects inner wall of stomach |
| | g) Emulsification of fat |

Ans: 1) c), 2) d), 3) g), 4) a)

- 36) Draw labeled diagram of digestive system of human.**
37) Draw labeled diagram of vertical section of human heart.
38) Draw labeled diagram of excretory system of human.
39) Draw labeled diagram of Nephron.
40) Draw labeled diagram of opening and closing of stomata.
41) Draw labeled diagram of cross section of leaf.
42) Differentiate between Arteries and Veins.

Arteries	Veins
1) Transport blood to different parts of the body	1) Transport blood from different parts of the body to heart
2) Blood flows very fast in it	2) Blood flows very slowly
3) Blood flows in very high blood pressure	3) Blood flows very slowly with low blood pressure
4) It carries oxygenated blood (except pulmonary artery)	4) It carries deoxygenated blood (except pulmonary vein)

Chapter :2
CONTROL AND COORDINATION

1) What is coordination?

Various organs of living organisms working together in a systematic, controlled and efficient way to produce proper response to various stimuli is known as coordination.

2) What are the two systems responsible for control and coordination in humans?

Nerves system – through electrical impulse
Endocrine glands – through hormones

3) What is synapse?

A small gap between two adjacent neurons, where the nerve impulse passes from one neuron to another neuron in one direction.

4) What is reflex action? Which is the center of reflex action?

An automatic and rapid response to a stimulus is called reflex action.
It is controlled by spinal cord (center of reflex action)

5) What is reflex arc?

A) The pathway taken by nerve impulses in a reflex action is called reflex.

6) Which part of the brain maintains posture and equilibrium of the body?

Cerebellum

7) Which part of the brain controls involuntary actions like salivation in mouth and vomiting?

Medulla oblongata

8) Why is the use of iodized salt advisable ?

It is essential for the synthesis of thyroxin hormone from thyroid gland.

9) What are plant hormones?

These are the chemical substances naturally produced in higher plants, which controls the growth and development, responses and other physiological functions of the plants.,

10) Why hormones are called chemical messengers?

The hormones secreted from endocrine glands reach the target organs through the blood and stimulate particular function. Hence, hormones are called chemical messengers.

11) What are sensory neurons ?

The neurons which carry nerve impulses from receptors (sense organs) to brain or spinal cord are called sensory neurons.

12) What are Motor neurons ?

The neurons, which carry nerve impulse from brain or spinal cord to the effectors (muscles or glands), are called motor neurons.

13) How the brain and spinal cord is protected?

- A delicate organ the brain is present inside a bony box. Inside the box, the brains contained in a fluid filled balloon like structure, which provides further shock absorption.
- The vertebral column or backbone protects the spinal cord.

14) Differentiate between reflex action and walking.

Reflex action	Walking
1) It is involuntary action	1) It is voluntary action
2) It is sudden and fast taking place in response to action	2) It is not spontaneous. It is a conscious effort
3) It is controlled by spinal cord	3) It is controlled by brain
4) The connection between the neurons and spinal cord muscles forms the reflex arc form reflex action to take place	4) There is no reflex arc for it

15) What happens at the synapse between two neurons ?

- A small gap between two adjacent neurons is called synapse. It helps in the transfer of nerve impulse from one neuron to another.
- At the nerve endings of a neuron, the electrical signals releases chemicals.
- These chemicals cross the gap / synapse and again start a similar electrical impulse travels as electrical signals along the nerve and passes to another nerve by chemicals.

16) What is the role of the brain in reflex action ?

- Reflex action is an involuntary action i.e., an action that does not need a thought / thinking or will to control it. It is spontaneous and controlled by spinal cord.
- Therefore brain does not play any role in it.

17) What are growth promoting phytohormones ?

The plant hormones which increases the growth of the plant are called growth promoting phytohormones.

Ex : Auxins, gibberellins and cytokinins.

18) Give example for growth inhibiting phytohormone .

- Abscissic acid – It is responsible for the wilting of leaves.
- Ethylene – It helps in ripening of fruit.

19) List the functions of the following plant hormones.

i) Auxins ii) Gibberellin iii) Cytokinins iv) Abscissic acid

i) Auxins :

- It helps in the elongation of cells.
- It helps in the bending of stem towards light source.

ii) Gibberellins :

- It helps in the growth of the stem and flower

iii) Cytokinins :

- It promotes cell division
- It helps in rapid cell division in fruits & seeds.
- It helps in opening of stomata during day time

iv) Abscissic acid :

- It inhibits the growth of plant.
- It is responsible for wilting of leaves
- It helps in the closing of stomata during night.

20) Define the following terms :

1) Phototropism 2) Geotropism 3) Hydrotropism 4) Chemotropism

1) **Phototropism:** The movement of plant parts in response to light is called phototropic movement. The phenomenon is called phototropism.

Ex : The shoot grows towards the light, while the growth of root is away from the light.

2) **Geotropism:** The movement of plant parts in response to gravity is called geotropic movement. The phenomenon is called geotrophism.

Ex : Root always move towards the centre of gravity, while shoots usually grow away from the gravity.

3) **Hydrotropism:** The growth of the plant in response to water is called hydrotropic movement. The phenomenon is called hydrotropism;

4) Chemotropism :

The growth of plant in response to chemical stimulus is called chemotropic movement. The phenomenon is called chemotropism.

Ex : Growth of pollen tube towards ovules during fertilization.

21) What are the secretions of pituitary gland and mention their functions ?

- It secretes growth hormone.
- Function : It promotes growth in all the organs.

22) List the important hormones and functions of the following glands.

i) Thyroid gland ii) testis iii) ovaries iv) Adrenal gland v) Pancreas

i) Thyroid gland :

Hormone : Thyroxin hormone

Functions : It regulates carbohydrate protein and fat metabolism in the body.

ii) Testis :

Hormones : Testosterone

Functions : It helps in growth of secondary sexual characters in male.

2) helps in the formation of sperms.

iii) Ovaries :

Hormone : Estrogen and progesterone

Function :

Estrogen 1) Helps in the development of female sex organs.

2) It controls menstrual cycle.

Progesterone :

1) Helps to prepare the wall of uterus for the attachment of fertilized egg and maintains pregnancy.

iv) Adrenal gland :

Hormone – Adrenalin hormone

Function: It controls heartbeat, respiration and blood pressure during emergency situation.

v) Pancreas :

Hormone : Insulin

Function : regulates the blood sugar level.

23) “The timing and amount of hormone released are regulated by feedback mechanisms”. Justify the statement with one example.

The timing and amount of hormone released are regulated by feedback mechanism.

For example, if the sugar level in blood rise, they are detected by the cells of the pancreas which respond by producing more insulin. As the blood sugar level falls, insulin secretion is reduced.

24) Why are some patients of diabetes treated by giving injections of insulin ?

Patients of diabetes are given insulin injection to control the blood glucose level. Because their pancreas cannot /does not produced the required amount of insulin in the body.

25) Why is the use of iodized salt is advisable ?

- Iodine is required for the production of thyroxin hormone. Iodine is available in iodised salt.
- When iodized salt used in diet /food, supplies the required amount to the body for maintenance and thyroxin formation.
- The deficiency of iodine in diet leads to goiter.(a disorder of thyroid gland) and also development of brain is affected in developing babies. So used of iodized salt is advisable.

26) What are the components of reflex arc?

- The components of reflex arc are:
 - i) Receptors : Sense organs which receive the stimulus
 - ii) Sensory neuron: it convey the stimulus form receptors to spinal cord.
 - iii) Associative neuron (spinal cord) : it interprets the stimulus and gives appropriate command to motor neuron.
 - iv) Motor neuron : The neuron convey motor commands to effectors.
 - v) Effectors : it execute the effect by neuromuscular movementEx : Muscles and glands.

27) List the functions of the following parts of the brain :

- i) Hypothalamus
- ii) Medulla oblongata
- iii) Thalamus
- iv) Pons
- v) cerebrum
- vi) cerebellum

Organs	Functions
i) Hypothalamus	1) Controls body temperature 2) Maintain water balance 3) Controls urge of eating, drinking 4) Controls pituitary gland
ii) Medulla oblongata	1) It controls involuntary actions such as breathing, blood pressure (BP) movement of alimentary canal etc. 2) It regulates reflex responses like salivation and vomiting/
iii) Thalamus	1) Send sensory information to cerebrum
iv) Pons	1) It control breathing rate 2) It controls facial expression, mastication of food etc.
v) Cerebrum	1) It is the main thinking part of brain. 2) It is responsible for reasoning, speech intelligence, sight, hearing and usage of information
vi) Cerebellum	1) It controls and coordinates different muscular actions 2) It maintains posture and equilibrium of the body during various activities such as walking, drinking, riding etc,

28) Draw labeled diagram of human brain.

29) Draw labeled diagram of spinal cord, which shows the flow of nerve impulse.

30) Draw labeled diagram of neuron.

Chapter: 3 OUR ENVIRONMENT

1) What are the components of an ecosystem ?

- a) Biotic components : Plants, animals and microorganisms.
- b) Abiotic components : water, soil, wind, temperature etc.

2) What are the reasons for the depletion of ozone layer ?

The chemicals like, chlorofluorocarbons (CFC's), carbon tetra chloride, halogens, methane, aerosols etc., are responsible for ozone layer depletion.

3) What is food chain ?

The unidirectional flow of energy from one organisms to another in the form of food is called food chain.

Grass → insects → snake → hawk

4) Why green plants are called producers ?

All green plants and blue green algae produce food by the process of photosynthesis and this is the source of nutrition for rest of animals present in the ecosystem. Hence plants are called producers.

5) The flow of energy is unidirectional in an ecosystem. Why?

Because, there is no recycling to previous level.

6) Identify biodegradable waste from the following DDT, agricultural waste, skin, glass.

Agricultural waste, skin.

7) In the food chain including snake, insect, grass and frog identify the trophic level of frog.

	Grass	→	insect	→	frog	→	snake
Trophic level	I		II		III		IV

Frog included under third trophic level.

8) Name any two non-biodegradable waste substances.

A) Plastic material, polythene bags, insecticides like DDT.

9) Which among the following belong to 1st trophic level ?

Grasshopper, rose plant, neem plant, cockroach.

Rose plant, Neem plant.

10) Phytoplanktons → zooplanktons → fish → bird.

In the above food chain

- a) Which organism get more energy.
 - b) In which organism deposition of insecticide is more
- a) Phytoplankton's b) birds

11) What is bio magnification? Give example.

It is a phenomenon of progressive increase in the concentration of toxic substance at each progressive trophic level.

Ex: Pesticides like DDT sprinkled on plants enters the body of humans through food chain.

Bio magnification of DDT

Water →	phytoplanktons →	fish →	birds
0.002ppm	0.05 ppm	2.4 ppm	16 ppm

12) In the food chain includes lion, plants and sheeps.

a) Which transfers more energy ?

b) Which receives less energy ?

a) plants

b) lion

13) What is represented by the following diagram.

Phytoplanktons → zooplanktons → small fish → large fish
500 kJ 50 kJ 5kJ 0.5kJ

The above diagram represent s:the 10% law of energy flow proposed by Lindeman.

14) In the following food chain, the availability of energy to human being is 5 kJ. What is the amount of energy present in the producers level.

Plants → sheep → human beings

500 J

15) What is ozone ? How does it affect any ecosystem ?

- Ozone is a triatomic molecule i.e., made up of three atoms of oxygen joined together. Its molecular formula is O₃.
- It can affect any ecosystem in the following ways
 - i) It forms thin sheet over Earth's atmosphere and it protects against ultraviolet rays.
 - ii) If ozone layer is depleted, UV radiation enters the Earth's atmosphere and causes eye irritation, skin cancer in humans reduce productivity in plants etc.,

16) Give any two ways in which biodegradable substances would affect the environment.

1. Decomposition of biodegradable substances may releases certain gases in the atmosphere and they polluting the environment.
2. They may become the breeding places of files and other pests, their causing diseases.

17) What is Grazing food chain ?

The food chain which extends form producers through herbivores to carnivores is called grazing food chain.

Grass → rabbit → wolf

18) What will happen if we kill all the organisms in or trophic level ?

If we kill all the organisms in one trophic level, the lower trophic level will grow more in number and the higher trophic level will not survive because flow of energy from one trophic level to other will not take place.

19) List two methods of safe disposal of the no-biodegradable waste.

- i) By underground dumping (landfills)
- ii) By recycling
- iii) Composting,
- iv) Biogas production
- v) Incineration – bringing of substance at high temperature to form ash.

20) What is terrestrial food chain and aquatic food chain ?> Give example.

- i) Terrestrial food chain : The food chain present on the land is called terrestrial food chain.
Ex : Grass → insects → snake → hawk
- ii) Aquatic food chain : The food chain present in different water bodies are called aquatic food chain.
Ex. : Phytoplanktons → zooplanktons → fish → shark

21) What are the advantages of cloth bags over plastic bags during shopping?

Advantages of cloth bags over plastic bags during shopping are

- i) Cloth bags are biodegradable thus can be easily decomposed by microorganisms
- ii) Cloth bags can be used again, can be washed and do not cause any harm to the environment.
- iii) Plastic bags are non-biodegradable and hence can pollute the environment.

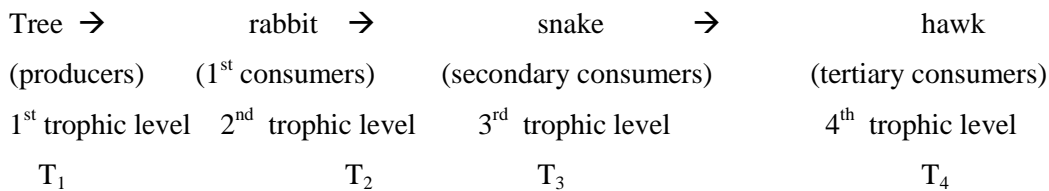
22) What is food web ? Give one example.

Interconnecting food chains of an ecosystem is called food web. There each organism is generally eaten by two or more other kinds of organisms.

Diagram refer page 139 fig. 15.3

23) What are trophic levels ? Give an example of food chain and state the trophic levels in it.

Each step of food chain through which food is transferred is called trophic level. Each food chain contains three to four trophic levels.



24) What is biodegradable and non-biodegradable substance? Give example.

The substances which are easily degraded by the enzymes of saprophytes and get converted into simpler substances are called biodegradable substances.

Ex : Paper, cloth, agriculture waste etc.,

The substances, which are not easily degraded by the enzymes of saprophytes, are called non – biodegradable substances.

Ex : DDT, plastic etc.,

25) What are the consequences of ozone layer depletion ?

- i) UV radiation enters into the atmosphere causes skin cancer, cataract in humans.
- ii) It affects the growth and physiological function of both plants and animals
- iii) Causes variation in the number of phytoplanktons, through which it affects the ecosystem.
- iv) Causes change in the composition of gases in the atmosphere.

26) Why should biodegradable and non-biodegradable wastes be discarded in two separate dustbins?

Biodegradable materials are broken down by microorganisms in nature into simple harmless substances.

Non – biodegradable materials need a different treatment like heat and temperature for disposal and hence, both should be discarded into two different dustbins.

27) We often observe domestic waste decomposing in the residential colonies causes problems. Suggest ways to make people that the improper disposal of waste is harmful to the environment.

- i) Banners and signboards can be hanged in residential colonies in order to educate people about the ill effects of improper waste disposal
- ii) Street plays can be organized for highlighting this issue.

28) What is the role of decomposers in the ecosystem?

- Organisms that feed on dead plants and animals are called decomposers.
Eg : bacteria, fungi etc.
- They breakdown the complex organic compounds present in the dead remains into simpler substance and obtain nutrition from them. These substances are released into the soil and the atmosphere.

29) How can you help in reducing the problem of waste disposal ? Give any two methods.

- i) Minimize the use of disposable items.
- ii) Recycle the materials to be used.
- iii) Reduce the usage of non-biodegradable substances like plastic , polythene bags etc.,
- iv) Reduce the usage of non-biodegradable pesticides etc.,

30) What is the importance of food chain and food web ?

- i) It helps in the transfer of energy from one trophic level to another.
- ii) Provides information about biotic components of an ecosystem.
- iii) It helps to analyse the interaction between the organisms of an ecosystem/

31) Usually more than four trophic levels are not exist in an ecosystem. Why ?

The number of trophic levels in an ecosystem is restricted up to 4 – 5 because only 10 percent of the energy is transferred to each trophic level from the lower trophic level. Energy present in the last trophic level is not enough to the existence of next trophic level.

Chapter 4: How do Organisms Reproduce ?

1) What is Reproduction?

Living organisms produce new individuals of their own kind and maintain their existence generation after generation this process is known as reproduction.

2) Why reproduction is essential?

It is essential for

- i) Continuation of life on Earth
- ii) Replacement of dead organisms
- iii) To maintain the size of the population
- iv) Transfer of variation from one generation to another

3) What is the importance of DNA replication / copying in reproduction process?

Correct copying of DNA during the process of replication ensures correct body design. Any change in it will produce changed DNA i.e, the blue print, that will change the synthesis of proteins and in turn the body design i.e, it will causes variation.

4) Why is variation beneficial to the species but not necessary for the individual ?

- Variation is a change in the body design of an individual.
- Variation allows organisms to exist in diverse habitat or niches. In its absence, a species may remain restricted to a particular area.
- If this area is drastically altered due to various natural or manmade causes, the species may be wiped out.
- However, if some variations are present in few individuals, it would help them to colonize in other habitats and survive.
- However, if variations were present in a single organism, there would be a very little chance of survival.

5) Name the chemical substance present in blueprint necessary for body design of an organism.

Deoxy Ribonucleic Acid (DNA)

6) How DNA is responsible for changing of body structure of an organism?

- DNA present in the nucleus of an organism contains information for the synthesis of protein.
- If the information present on DNA is altered the protein synthesized by the DNA is also altered ultimately it is responsible for change in body design of an organism.

7) Why DNA copying is an essential part of the process of reproduction?

- Chromosomes in the nucleus of a cell contain information for the transformation of character from parents to next generation in the formation of DNA, which is the information source of making proteins.
- Therefore, copying of DNA is essential to transfer information from parents to the offsprings by creating new DNA of the same kind.

8) What is asexual reproduction ? Give example.

Production of offspring's by a single parent without the formation and fusion of gametes is called asexual reproduction.

Ex : Binary fission in Amoeba, Budding in Hydra etc.,

9) What are the advantages of sexual reproduction over asexual reproduction ?

Sexual reproduction is considered to be superior over asexual reproduction because it brings about variation in the progeny.

These variations allow organisms to live in diverse habitats with the help of adaptations.

On the other hand, asexual reproduction does not bring about variations among the progeny.

10) Differentiate between Binary fission and multiple fission.

Binary fission	Multiple fission
1) The parent body divides into two identical daughter cells at a time	1) In which parent body divides into more than two daughter cells at a time
2) Nucleus divides only once	2) Nucleus divides more than one time (many times)
3) Takes place during favorable environmental conditions Ex : Amoeba, paramecium	3) Takes place during unfavorable Ex : Plasmodium

11) **What is regeneration?**

Planaria can be cut into any number of pieces and each piece grows into a complete organism. This is known as regeneration.

12) **Draw labeled diagram to show Binary fission in Amoeba.**

13) **Along with a diagram, explain the process of budding in Hydra.**

Diagram :

- It is a type of asexual reproduction where a daughter organism is formed from a small projection known as bud.
- It develops as an outgrowth due to repeated cell division on the parent body.
- When fully grown it detaches to grow into a new independent individual.

14) **What is vegetative propagation ? List the advantages of vegetative propagation.**

- It is a type of asexual reproduction in which, a new plant is developed from a portion of a plant body. It is known as vegetative propagation.
- Plant parts like root, stem and leaves develop into a new plant.

Ex : Layering, stem cuttings, grafting etc.

Advantages :

- a) Plants that have lost their ability to produce seeds can be propagated by this method.
- b) All the plants are genetically similar to their parents. There is no variation in them. Therefore the superior quality of the parental plant is maintained in progeny.
- c) Vegetatively propagated plants produce flowers and fruits earlier than sexually reproducing plants.

15) **How will an organism be benefited, if it reproduces through spores ?**

- i) Spores are produced in large numbers. So the population of this species will increase soon on their growth.
- ii) Spores have a protective coat, that help them to resist unfavorable environmental conditions that are harmful to the plants.
- iii) Spores are carried a long distance by wind. This helps in their distribution and growth.

16) Give an example to the plant which is reproduce through spores.

Rhizopus, penicillium

17) Write the characteristic feature of sexual reproduction.

- i) It involves male and female individuals to produce new organism.
- ii) It involves the formation and fusion of male and female gametes.
- iii) New individuals exhibit variation, it helps in the processes of adaptation.
- iv) Cell division involves meiosis.

18) Name the plant reproduce through leaves. How it is reproduced?

- Bryophyllum
- During this type of reproduction, the leaves detached from plant fall on the soil surface. The leaf buds are formed at the notches of leaves. These buds mature and detach from the parent and down into new plant.

19) Why sexual mode of reproduction is essential in an organism?

- Variations ensure retaining of a species with in the community. The variation is due to sexual mode of reproduction involves the combination of two different DNA of two organisms of same species.
- Sexual reproduction helps in crossing over, it is essential for variation, and it is essential for variation.
- The variation allows organisms to live in diverse habitat with the help of adaptation.
- During this type of reproduction fusion of gametes take place. It helps to maintain constant number of chromosomes throughout the species.

20) Draw labeled diagram of vertical section of a flower.

21) Name two reproductive parts of the flower.

- i) Stamens – male reproductive part – produce pollen grains,
- ii) Pistil – female reproductive part – produces ovules.

22) How unisexual flower is different from bisexual flower.

- i) Unisexual flower have only male (stamens) or female (pistils) reproductive structures.
- ii) Bisexual flower contains both stamens (male) and pistils (female) reproductive structures

23) What is pollination? Explain the types of pollination?

- The process of transfer of pollen grain from another to the stigma is called pollination
- Pollination is of two types, they are
 - Self-pollination
 - Cross pollination

i) Self-pollination :

The process of transfer of pollen grain from anther to the stigma of the same flower is called self-pollination.

ii) Cross pollination :

The process of transfer of pollen grain from another to the stigma of anther flower born on same plant or another plant.

24) Draw labelled diagram to show the germination of pollen grain on the stigma of a flower.

25) How pollination is different from fertilization ?

Pollination	Fertilization
<ul style="list-style-type: none">• It is the process of transfer of pollen grain from anther to stigma	<ul style="list-style-type: none">• It is the process of fusion of male and female gametes
<ul style="list-style-type: none">• Pollination ends with fertilization	<ul style="list-style-type: none">• Fertilization ends with the formation of seeds and fruit

26) What are the agents, which helps in cross-pollination?

During cross-pollination, pollen grains transfer through the agents like air, water and different types of animals.

27) What are the advantages of plants by the production of seeds?

Advantages are

- Seeds can
- Seed can remain for longer period without germination. It helps to overcome unfavorable conditions.
- Seeds are small and light in weight. It helps in seed dispersal.
- It helps to variation in plants.

28) Write the difference between male gametes and female gametes.

Male gametes	Female gametes
1) Generally smaller in size	1) Generally larger in size
2) It contains small amount of reserve food	2) It contains large amount of reserve food
3) Male gametes are usually motile	3) Female gametes are usually

29) What are the functions of testis in human beings?

- It helps in the formation of sperms
- It helps in the synthesis of testosterone hormone.

30) What is the role of seminal vesicles and prostate glands?

- Seminal vesicle :**
It produces a nutritive secretion needed for the sperm and it promotes the movement of sperm.
- Prostate glands :**
It produces a fluid medium necessary for transport of the sperms.

31) What changes seen in girl's at the time of puberty?

Following changes are seen in girls at the time of puberty.

- Breasts enlarge and skin around the nipples darkens.

- ii) Menstruation starts with monthly vaginal bleeding.
- iii) Uterus, vagina, fallopian tube enlarges and pelvis widens.
- iv) Growth of hairs in armpits and public region.

32) How does the embryo get nourishment inside the mother's body ?

Placenta supplies the nourishment to the embryo inside the mother's body from the mother's blood.

33) What are the functions of placenta ?

- i) Provide nutrition to the developing embryo.
- ii) Helps in the exchange of CO₂ and oxygen.
- iii) It helps in the removal of waste substance formed in the developing foetus.
- iv) It helps in the attachment of foetus to the wall of uterus.

34) What are the hormones secreted in girls at the time of puberty ?

Estrogen and progesterone.

35) What are the diseases spread through sexual contact? Name the casual organism and methods of prevention.

1) Gonorrhoea

Casual organism : *Neisseria gonorrhoea*

2) Syphilis

Casual organism : *Treponema pallidum*

3) AIDS

Casual organism : Human immunodeficiency virus (HIV)

Preventive measures :

- i) By preventing sexual contact with infected person.
- ii) By using condoms.

36) If a woman is using copper-T, will it help in protecting her from sexually transmitted diseases?

No, copper -T does not prevent the transmission of sexually transmitted diseases.

- The only safe method that can be used to transmission of sexually transmitted disease is condoms.

Chapter-5: Sustainable Management of Natural Resources

1. The presence of which bacteria indicates pollution of water?

Coliform bacteria

2. Give any four reasons to stop the usage of firewood as a source of fuel.

- 1) It leads to cause deforestation
- 2) It has low calorific value
- 3) It requires in large quantity
- 4) It leads to cause high pollution.

3. Name the two peoples who get advantages from the forests.

1. People live around the forest and tribal peoples
2. Industrialists.

4. Name any one micro biodiversity habitat.

Forests.

5. Which part of human body coliform bacteria's are present.

Small intestine.

6. Give any two reasons for the failure of sustainable management of ground water.

- i) Use of ground water throughout the year (it is recharged only during rainy seasons)
- ii) Rain water technique is not properly implemented.

7. Name any two materials, which can be easily recycled and generally thrown out, as trash.

Used paper, polythene bags, metal waste, etc.

8. What is Rainwater harvesting?

Collection of rain water through different methods and use throughout the year is called rain water harvesting.

9. What is eutrophication?

A number of nutrients such as nitrogen and phosphorus reach the lake through the stream. It causes natural aging of a lake due to increasing of plants is called eutrophication.

10. What is sustainable management of natural resources?

The controlled use of resources in such a way that, its present availability and continuous flow to the future generation is ensured without any disturbance to the environment.

11. Mention any two major benefits of dams.

- i) Implementation of irrigation project.
- ii) Production of electricity.

12. Why did Amrita Devi Bishnoi sacrificed her life?

In 1731, Amrita Devi Bishnoi along with 363 other people sacrificed their life for the protection of khejri trees in khejrali village near Jodhpur in Rajasthan.

13. Suggest some consequences due to the loss of biodiversity?

The food chain and food webs will get disturbed.

Resources will not be available for the next generation.

14. List two measures that you would suggest for the better management of water resources.

Two measures for the better management of water resources are.

- i). Rain water harvesting
- ii). Construction of dams.

15. List any four stakeholders, which may help in conservation of forests.

- The stakeholder which may help in conservation of forest are.
 - Locals living in villages near the forest area
 - Industrialists practicing recycling.
 - Wildlife and nature enthusiasts
 - Forest development of the government.

16. List any four harms of destruction of forests.

- i) Decrease in the forest produce
- ii) Adverse effect in quality of soil.
- iii) Adverse effect on sources of water.
- iv) Loss of wild life, thus adverse effects on ecosystem.

17. Mention any two reasons for which environmentalist protested against raising the height of “Sardar Sarovar Dam” on river Narmada.

- i) Submergence of additional land
- ii) Displacement of more people from their homes and loss of employment.

18. What are the poisonous gasses released during the burning of fossil fuel?

Carbon monoxide, Sulphur oxides and Nitrogen oxides.

19. What changes can you make in your habits to become more environmental friendly?

The following changes can be made to be environmental friendly

- 1) Check the wastage of water, close the tap properly.
- 2) Use solar water heater and cookers, install solar panel for electricity.
- 3) Reduce the garbage by not throwing such items.
- 4) Switch over to CFL and LED lights to save electricity
- 5) Use cloth bags instead of polythene bags.

20. Why do we conserve forest and wild life?

- i) Forests are biodiversity hot spots: number of species found in an area measures it.
- ii) Forests help in protection of land and retaining soil water.
- iii) Forest checks floods and maintain ecosystem.
- iv) Wild life is important because
- v) They provide great aesthetic value for human beings.
- vi) They help in maintaining ecological balance.

21. Suggest some approaches towards the conservation of forests.

- i) Afforestation – growth of forest in new open area.
- ii) Deforestation should be banned.
- iii) People should be made more aware about importance of forest
- iv) There should be proper law’s for exploitation of forest resources.

v) Growth of agricultural forest.

22. Reuse is better than recycling of materials give reasons to justify the statement.

- Reduce is better than recycling because,
 - i) Reuse of material does not use any energy.
 - ii) It reduces the stress on environment.
 - iii) Things are maximally utilized, as they are used again and again, instead of being thrown away.

23. Hydroelectric power is also an indirect form of solar energy. How?

Hydroelectric power is also an indirect form of solar energy because, the water which is stored in dams is rainwater and the rainfall occurs due to the evaporation of water from water bodies due to the heat of sun.

24. Why do we need alternative source of energy?

Our resources are limited and with the increase in population the demand for all the resources is increasing in exponential rate. So to save these resources we need alternative sources of energy.

25. What are 5R practices which protect environment. Explain briefly.

1) Refuse 2) Reduce 3) Reuse 4) Repurpose 5) Recycle

1) **Refuse:** Refuse to buy products that can harm you and the environment.

Say no to single use plastic carry bags.

2) **Reduce:** This means that you use less. You save electricity by switching off.

Unnecessary lights and fans. You can save water by repairing leaky taps. Do not waste food.

3) **Reuse :** This is actually even better than recycling because the process of recycling uses some energy you simply use things again and again. Instead of throwing away used envelopes, you can reverse it and use it again.

The plastic bottles in which you buy various food items like jam and pickle can be used for storing things in the kitchen.

4) **Repurpose :** This means when a product can no more be used for the original purpose, think carefully and use it for some other useful purpose.

For eg: Caps with broken handles can be used to grow small plants and as feeding vessels for birds.

5) **Recycle:** This means that you collect plastic, paper, glass and metal items and recycle these materials to make required things.

26. Why do we need to manage our resources carefully?

- Because,
 - i) These are not continuously available
 - ii) The demand for these resources keeps on increasing.
 - iii) These resources also need to be preserved for future generations
 - iv) These are equally distributed amongst the rich and the poor.

27. Write some of the simple choices that can make a difference in our energy consumption patterns.

Some of the simple choices that can make a difference in our energy consumption ways and proved to be environmental friendly are.

- i) Walking / cycling instead of taking a bus or driving car.
- ii) Using stairs instead of a lift to climb up.

- iii) Wearing an extra sweater rather than using a heater which runs on electricity.

28. What was “Chipko Andolan” ? How did this Andolan ultimately benefit local people and the environment?

The movement, which was started in Reni village in Garhwal to protect the trees by hugging them and not allowing cutting of these trees, was called “Chipko Andolan”

- i) The chipko movement quickly spread across communities and media and forced the government, to whom the forest belongs, to rethink their priorities in the name of forest produce.
- ii) Due to participation of local people, it led to the efficient management of forests.
- iii) It explains that the loss of forest is not only influenced on forest product, but also influenced on water reservoirs and quality of the soil.

29. What are greenhouse gasses? What is the effect of increasing of greenhouse gasses in the environment?

- Carbon dioxide, Methane, CFC’s and Oxides of nitrogen.
- It increases average earths atmospheric temperature by trapping infrared radiations.

30. List the methods to reduce the carbon dioxide concentration in the atmosphere.

- a. Using public transport.
- b. Using compressed natural gas (CNG).
- c. Increase the growth of forest and prevent deforestation.
- d. Conversion of waste into compost instead of burning.
- e. Using bicycles instead of motor cycle.

31. What are the advantages of storage of water under the soil (as ground water)?

The various advantages of underground water are.

- It does not evaporate.
- Spreads to recharge well.
- It provides moisture for vegetation over a wide area.
- It does not provide breeding grounds for mosquitoes like stagnant water.
- It is protected from contamination by human and animal waste.

32. How do we reduce the pressure on the environment.

- By adopting refuse, Reduce, Reuse, Repurpose and Recycle strictly in our day-to-day life.

Chapter-6: Heredity and Evolution

1. Parents transmit some of their characteristics into their offspring's. How?

The transmission of characters from parents to offspring's occurs via inheritance or heredity.

2. Inheritance/heredity is possible because of a certain factor present in organisms. What is this factor? Or What is gene?

Gene is the unit of heredity, which is linear segment of DNA in the chromosome. It takes part in expressing a particular character.

3. Reproduction leads to variation. How?

Sexual reproduction involves the fusion of male and female gametes, which leads to the mixing of characters of parents and thus, causes variations in characters.

4. In any population, .no two individuals are similar. Why?

Variations occur in the genes of the organisms produced due to the mutations, exchange of genes and inheritance of acquired traits during the evolutionary process, which make all individuals different from one another.

5. What is the cause of variation in asexually reproducing organisms?

Environmental factors and mutations.

6. Why is the progeny always tall when a tall pea plant is crossed with a short pea plant?

The trait, which represents the tallness in a pea plant, is dominant over another trait, shortness (dwarf), so progeny becomes tall.

7. How many pairs of chromosomes are present in human beings?

23 pairs of chromosomes are present in human beings.

8. Give an example where sex is determined by environmental factors.

In snail, sex is determined by environmental factors (temperature).

9. In human females, the gametes formed have X-chromosomes in all. Give reason.

Human females have two X-chromosomes. At the time of gamete formation in meiosis, only one of these X-chromosome enters the gamete thus, ensuring possession of X-chromosome in all gametes.

10. Why is it that the unit of evolution is population, not the individual?

- Population is a group of one species present in a particular area and individuals of which can interbreed.
- Evolution is considered only if such a group of species or individuals shows a common advance trait not a single individual showing an evolved trait.

11. In a beetle population, the number of green beetles is more than blue and red beetles. Give a reason behind this situation.

It is because of natural selection.

12. Give the respective scientific terms used for studying

- i. the mechanism by which variations are created and inherited.
- ii. the development of new types of organisms from the existing ones.
 - Genetics is the study of mechanism by which variations are created and inherited.

- Evolution is used for studying the development of new species of organisms from the existing ones.

13. Write one word for the formation of new species due to gradual change over long period.

Speciation.

14. Explain Mendel's observation when he crossed a homozygous tall (TT) plant with homozygous dwarf (tt) plant followed by self-cross.

- When Mendel crossed pure tall pea plant (TT) with pure dwarf pea plant (tt), he obtained all hybrid tall pea plants (Tt) in F1-generation.
- In F2-generation, he got 3:1 phenotypic ratio of plant with 3 out of 4 being tall and 1 is dwarf.

15. In Mendel's experiment of inheritance in which he took two contrasting characters, i.e. round green and wrinkled yellow seeds,

(i) What was the phenotype of offspring is in F1-generation?

(ii) What was the ratio of offspring is in F2-generation?

Ans. (i) All were round yellow (1)

(ii) Round yellow-9, Round green -3, Wrinkled yellow -3, Wrinkled green -1

Hence, the ratio of offspring's in F2-generation was 9:3:3:1. (1)

16. Why do all the gametes formed in human females have an X-chromosome?

Human females have two X-chromosomes called sex chromosome.

- During meiosis at the time of gamete formation, one X-chromosome enters each female gamete.
- Hence, all the gametes formed in human females possess an X-chromosome.

17. In human beings, the statistical probability of getting either a male or female child is 50 : 50. Give a suitable explanation.

- The sperm determines the sex of the child in human.
- This is because half of the sperms have X-chromosomes, i.e. (22 + X) and the other half have Y-chromosome, i.e. (22 + X) and (22 + Y), both in equal numbers.
- Thus, there is 50% chance of a (22 + Y) boy and 50% chance of a (22 + X) girl being born to the parents.
- Thus, making the statistical probability 50-50%.

18. In a pea plant, find the contrasting trait if

(i) the position of flower is terminal

(ii) the flower is white in colour

(iii) shape of pod is constricted

Ans: Contrasting traits were used by Mendel and were classified as dominant or recessive

	Character	Given Trait	Contrasting Trait
(i)	Position of flower	Terminal	Axial
(ii)	Colour of flower	White	Violet
(iii)	Shape of pod	Constricted	Full

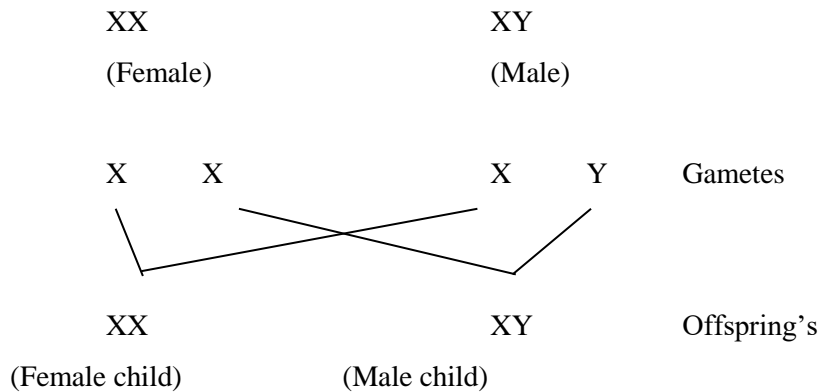
19. What is speciation? List four factors that could lead to speciation. Speciation is the process by which new species develop from the existing species.

The four factors that could lead to speciation are:

- (i) Genetic drift (ii) Mutation (iii) Natural selection (iv) Migration

20. How is the sex of a child determined in human beings?

- A male germinal cell which forms gametes carries one X and one Y-chromosome while a female germinal cell carries only XX-chromosomes.
- Therefore, sex of the child depends upon what happens during fertilisation.
- If a sperm carrying X-chromosome fertilises the egg, the child born will be female (XX).
- If a sperm carrying Y-chromosome fertilises the egg, the child born will be male (XY).
- Thus, the sperm (the male gamete) determines the sex of the child.



21. What are the different ways in which individuals with a particular trait may increase in a population?

- There are different ways in which an individual with a particular trait may increase in a population.
- These include genetic drift (i.e. the change in a type of genes in a population because of the random nature of reproduction) and natural selection.

22. Will geographical isolation be a major factor in the speciation of a self-pollinating plant species? Why or why not?

- No, geographical isolation will not be a major factor in the formation of new species of self-pollinated plants.
- This is because self-pollinated plants receive pollen grains from the same flower or another flower on the same plant and its distance from other plants hardly affects its reproduction. Moreover, self-pollinated plants rarely show variations in characters.

23. Give an example of characteristics being used to determine how close two species are in evolutionary terms?

- Homologous characteristic is can help to identify an evolutionary relationship between apparently different species.
- For example, mammals have four limbs, as do birds, reptiles and amphibians. The basic structure of the limbs is similar though it has been modified to perform different functions in various vertebrates. These are homologous organs.

24. Can the wing of a butterfly and the wing of a bat be considered homologous organs? Why or why not?

- Butterfly belongs to the phylum-Arthropod, which have a chitinous exoskeleton.
- The bat belongs to class-Mammalia, which have wings made up of skin folds.

- Since, both butterfly and bat use their wings for flying, but do not share any resemblance in their wings structure, they are not homologous, but analogous organs, i.e. having similar functions, but dissimilar structure.

25. What are fossils? What do they tell us about the process of evolution?

- Fossils are the remains or impressions of organisms that lived in the ancient times.
- Fossils provide the evidence that the present animals have originated from previously existing ones through the process of continuous evolution.
- Fossils can be used to reconstruct evolutionary history of an organism.
- Ex: Fossils are helpful in the study of evolution as:
 - (i) They give us an idea of the time in history when different species were formed or became extinct.
 - (ii) Fossils also help us to trace the evolutionary history of some animals.
 - (iii) Fossils also indicate connecting links between two groups of organisms, e.g. Archaeopteryx is a connecting link between reptiles and birds.

26. Why are human beings who look so different from each other in terms of size, colour and looks said to belong to the same species?

- All human beings, even though they have different size, colour and looks, belong to the same species (Homo sapiens) because they have similar DNA sequences and have descended from same ancestors. Also, they are capable of reproducing among themselves.
- These variations may have arisen due to the environmental factors, mutation and mixing of characters during reproduction.

27. In evolutionary terms, can we say which among bacteria, spiders, fishes and chimpanzees have a 'better' body design? Why or why not?

- Evolution is the generation of diversity due to environmental selection. More and more complex body designs have emerged over time.
- Among bacteria, spiders, fishes and chimpanzees, we can say that the chimpanzees have a better body design because of their more complex body.
- Various organisms evolve in their own separate ways to give rise to the current forms and have a basic difference in their body design because of specialisation of all types of tissues.
- The chimpanzees are best adapted to survive the present day conditions and have proper division of labour in their body, i.e. they have different organs for performing different vital functions inside the body.

28. How are the areas of study of evolution and classification interlinked?

- The study of classification of various organisms gives us an idea about the evolutionary history of the organisms. Organisms, which have certain similar characteristics are placed in one group.
- It can be thus concluded that the organisms placed in one group may have evolved from common ancestors and may have a common evolutionary history.

29. Explain the terms analogous and homologous organs with examples.

- Homologous organs have the same basic structure and origin, but perform different functions.

e.g. the forelimbs of a frog, a bird and a man have same basic design of bones, but they perform different functions (frog uses them to jump, birds use them to fly and man uses them to grasp things).

- Analogous organs have different basic structure and origin but have similar appearance and perform similar functions,

e.g. wings of insects and wings of birds have different basic structure as the wings of insect is a fold of membrane and wings of a bird are modified forelimbs, but have similar functions, i.e. flying.
