

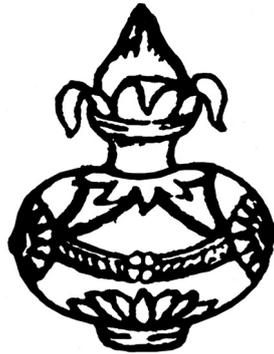
**TELANGANA OPEN SCHOOL SOCIETY  
HYDERABAD**

**S.S.C (TOSS) COURSE**

# **212 Science and Technology**

**(English Medium)**

**STUDY MATERIAL**



**Telangana Open School Society (TOSS), Hyderabad**

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**This Study Material is Prepared on the basis of Original Science and Technology (212)  
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## FORE WARD

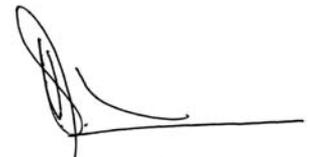
Education plays an important role in the modern society. Many innovations can be achieved through Education. Hence the Department of Education is giving equal importance to non-formal education through Open Distance Learning (ODL) mode on the lines of formal education. This is the first State Open School established in the country in the year 1991 offering courses up to Upper primary Level till 2008. From the academic year 2008-2009 SSC Course was introduced and Intermediate Course from the year 2010-2011. The qualified learners from the Open School are eligible for both higher studies and employment. So far 7,67,190 learners were enrolled in the Open Schools and 4,50,024 learners have successfully completed their courses.

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I wish the learners of Open School make best use of the study material to brighten their future opportunities and rise up to the occasion in building Bangaru Telangana.

With best wishes .....



**S. Venkateshwara Sharma**  
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# 212 - Physics and Chemistry

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# 212 Biology

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# Module - 1

## 1

### Lesson

# Measurements in Science and Technology

## Objectives

- State limitations of the use of senses and body parts for measurement and justify the need for a standard to measure anything exactly.
- define least count of measuring instrument.
- name various devices and instruments used to measure length, mass and time stating the standard in each case.
- measure area of regular and irregular figures.
- measure volume of regular and irregular figures.

## Important Points

- Any quantity which can be measured is called a physical quantity.  
Ex : length, mass, volume, density etc.,
- There are seven base quantities namely length, mass, time, electric current, temperature, luminous intensity of light and amount of substance.
- These seven physical quantities are called as base or fundamental physical quantities. The units of base quantities are known as fundamental units.
- The quantities which are not base quantities are called derived quantities.
- The units which are not fundamental units are called as derived units.
- A meter scale is used to measure large lengths. To measure small lengths we use vernier calipers or screw gauge.

- Area is measured in square metre ( $m^2$ )
- Graph papers are used for estimating the areas of irregular figures.
- The total space occupied by any piece of matter is called its volume. It is measured in cubic metre ( $m^3$ )
- The unit litre is also used to measure the volume of liquids
- Standard measuring vessels are used to measure volumes of liquids like milk. Kerosene oil, mobile oil at petrol pumps etc.
- In the laboratory, we use graduated cylinder and an overflow can to measure the volume of large irregular bodies.

### 3 Marks

**1. Give 3 cases for measuring lengths in daily life. Name the instrument used in measuring the same.**

- Measuring the dimensions of the body by tailor for stitching the cloth.
- the instrument used is measuring tape
- For measuring out height - the instrument used is tape
- For calculating the area of the land measuring length and breadth - the instrument used is measuring tape or surveyer's chain or yard stick.
- For cutting the required length of the cloth by shop keeper - the instrument used is metre scale or half metre scale.
- To solve the problems in geometry for measuring different dimensions of geometrical objects - Instrument used is ordinary scale.

**2. Give 3 cases for measuring mass of different objects in daily life. Name the instrument used in measuring the same.**

- while buying groceries from the shop - instrument used is ordinary balance or digital balance.
- For measuring our weight - weighing machine.
- For weighing the iron rods used in construction - Jital balance, Roman steel yard.
- For finding the weight of the fruits like mango, Guava etc - table balance or ordinary balance.
- For weighing Gold ornaments - simple balance or digital balance.

**3. Give 3 cases for measuring volume in daily life. Name the instrument used for measuring the same.**

- For measuring the volume of the milk - Instrument used is cylindrical measuring jar.
- For measuring the volume of mineral water - 20 Recans, 1 litre bottle
- Measuring the volume of diesel and petrol while filling the oil tank in vehicles - digital metre.
- For measuring the volume of kerosine - Instrument used is conical measuring jar.

**4. Give 3 cases for measuring time in daily life.**

- To do our daily routine on time we measure time - Ex: time for taking lunch, office time, school hours etc.
- We measure time taken while travelling from one place to other place
- we measure time for performing few activities like taking medicine on time.
- We measure time in years while calculating the age of a person.
- In sports and games like Kabadi, kho-kho two teams will be given the same amount of time.

**5. Give 3 cases for measuring area in daily life.**

- We measure the area of plots and agriculture lands while buying or selling.
- While purchasing the cloth covers for dinning table or cot, we estimate the area.
- While laying carpet or stone in a room we measure area.
- we measure surface area of a car or any other vehicle to purchase the covers.
- When vehicles has to move in an arrow lane we compare the area of vehicles surface area and land area of the road.

**6. For stitching two shirts we require one type of cloth of two metres and another type of cloth of 21/2 metres. Why do we need two different lengths ? Explain.**

- To stitch the shirt every person requires specific area of cloth

area of cloth = length of the cloth × breadth of the cloth

- For area to be constant when length increases breadth decreases and vice versa. Hence we have to take less length of cloth from the place whose breadth is more and vice versa.
- we usually call the breadth of the cloth as panna. That is why we have to take big panna cloth of two metres and small panna cloth of 21/2 metres.

**7. How much area of cloth is required to cover a circular table of 1 metre radius.**

- If radius is 1 metre then the diameter =  $2r$

$$= 2 \times 1 \text{ m}$$

$$= 2 \text{ m.}$$

- Hence we can cover the table with a cloth of 2m length and 2m breadth.

Then the area of the cloth = length  $\times$  breadth

$$= 2 \text{ m} \times 2 \text{ m}$$

$$= 4 \text{ m}^2$$

$\therefore$  we require 4 square metre area of cloth to cover the table (because it is not possible to measure the cloth in circular shape)

**8. To cover the floor of a room of 12 feet length and 10 feet breadth, how many stone pieces of 2m length and 2m breadth are required.**

- Area of the room = length  $\times$  breadth

$$= 12 \text{ ft} \times 10 \text{ ft}$$

$$= 120 \text{ sq. ft}$$

- Area of the stone piece = length  $\times$  breadth

$$= 2 \text{ ft} \times 2 \text{ ft}$$

$$= 4 \text{ sq.ft}$$

- Number of stone pieces required to cover the floor of the room

$$= \frac{\text{area of the room}}{\text{area of the stone piece}} = \frac{120 \text{ sq. ft}}{4 \text{ sq.ft}} = 30$$

we require 30 number of 4 sq. ft stone pieces.

**9. If we can paint 1 sq metre in 10 minutes. How much time is required to paint 15m length and 2m height compound wall.**

- Area of the compound wall = length  $\times$  height

$$= 15 \text{ m} \times 2 \text{ m}$$

$$= 30 \text{ sq.m.}$$

Time taken to paint one sq.m of wall = 10 minutes

Time taken to paint 30 sq.m of wall = 30sq. m × 10 minutes

= 300 minutes

- since 60 minutes = 1 hour.

300 minutes = 300/ 60 hour

5 hour is required.

**10. If we have to pour milk in a cylindrical jar of 5cm radius and 14 cm height into 10 cm radius of cylindrical jar. What should be the minimum height of a jar.**

- Volume of the first cylindrical jar = area of the base × height

$$= \pi r^2 \times h$$

$$= \frac{22}{7} \times 5 \times 5 \times 14 = 1100 \text{ cm}^3$$

- second jar should also have the same volume.

$$\text{its volume } \pi r^2 \times h = 1100 \text{ cm}^3$$

$$\frac{22}{7} \times 10 \times 10 \times h = 1100$$

$$h = 1100 \times \frac{7}{22} \times \frac{1}{10} \times \frac{1}{10}$$

$$= 3.5 \text{ cm.}$$

It means the second jar should have 3.5 cm height.

**11. Define physical quantity ? Give four examples.**

∞. Any quantity which can be measured is called a physical quantity.

Examples for physical quantity.

length, mass, volume, density etc.

**12. When can we call a quantity as physical quantity and give 4 examples for physical quantities.**

∞. Any quantity which can be measured is called a physical quantity

Examples for physical quantities

length, time, Area, force etc.

**13. Classify the following quantities into fundamental and derived quantities. (or)**

**Identify and list the following quantities into fundamental and derived quantities.**

**(or) kilogram, kelvin, metre<sup>2</sup>, second, Newton Ampere**

<b>Ans.</b>	<b>fundamental quantity</b>	<b>derived quantity</b>
	1. Kilogram	1. metre <sup>2</sup>
	2. Kelvin	2. Newton
	3. Ampere	
	4. second	

**14. Derive units for the following physical quantities**

(a) **volume** (b) **density** (c) **velocity**

A. Volume = length × breadth × height  
metre × metre × metre  
metre<sup>3</sup> (or) cubic metre

$$\text{density} = \frac{\text{Mass}}{\text{volume}} = \frac{\text{Kilogram}}{\text{metre}^3}$$

$$\text{Velocity} = \frac{\text{distance}}{\text{time}} = \frac{\text{metre}}{\text{second}}$$

**15. Distinguish between fundamental units and derived units.**

- A. 1) There are only 7 fundamental units.  
2) Fundamental units are independent.  
3) Derived units can be obtained from fundamental units.

**16. What is the least count of an instrument and give the least count of wrist watch.**

- A. The minimum or least quantity that can be precisely measured by a given instrument is called its least count.  
– least count of ordinary scale is 1 mm  
– least count of wrist watch is 1 second.

**17. Which physical quantities are termed as fundamental physical quantities (or)**

**How many fundamental physical quantities are there ? what are they.**

Ans. Length, mass, time, temperature, electric current, amount of substance, luminous intensity. These 7 physical quantities are termed as fundamental physical quantities.

(or)

- There are 7 fundamental physical quantities. They are length, mass, time, temperature, electric current, amount of substance, luminous intensity.

**18. If you place a circular card board of 7 cm radius on a table how much surface area it occupies.**

Ans. Formula for area of a circle is  $\pi r^2$

$$\pi = \frac{22}{7}, \text{ radius } r = 7 \text{ cm}$$

$$\pi r^2 = \frac{22}{7} \times 7 \text{ cm.} \times 7 \text{ cm}$$

$$= 154 \text{ cm}^2$$

Circular card board occupies  $154 \text{ cm}^2$  surface area on the table.

**19. How much water over flows when a 20 cm length, 4 cm breadth and 1 cm height cuboid shaped stone is dropped into a bucket full of water.**

$$(1 \text{ cm}^3 = 1 \text{ ml.})$$

Ans. Area of the cuboid = length  $\times$  breadth  $\times$  height

$$\text{Volume of the stone} = 20 \text{ cm} \times 4 \text{ cm} \times 3 \text{ cm}$$

$$= 240 \text{ cm}^3$$

$$= 240 \text{ ml}$$

when that stone is dropped in the bucket of water, 240 ml of water will over flow.

**20. Mention 3 cases where you have used your senses to estimate and measure.**

**Ans.** Based on my height, estimated my friend's height.

- Based on my weight, estimated my friend's weight.
- Estimated the travelling time during the journey.
- Estimated the length and breadth of a room in my house.
- Estimated the temperature of tea and coffee
- Estimated the temperature of a person with fever.

**21. Mention the limitations in measuring the different, physical quantities using out body parts.**

- We can not measure the height or length exactly by using our eyes.
- because the dimensions of body parts of different persons are different. Hence the measurement made by our body will not be the same as the measurement made by the other persons.
- Estimate of the measurement made by us without using instrument may not be correct in all situations.

**22. What is meant by measurement ? Explain it with examples.**

**Ans.** Measurement is usually a comparison. Measurement consists of a number with a unit.

Ex : Let us consider my weight 54 kg. In this 54 is number and kg is unit.

**23. How much water can be filled in a tank of base radius 1mm and height 3.5 m.**

**Ans.** Formula for volume of a cylinder =  $\pi \times r^2 \times h$

$$\text{Cylindrical tank volume} = \frac{22}{7} \times 3.5 \text{ m} \times 3.5 \text{ m} \times 1 \text{ m}$$

$$= 38.5 \text{ m}^3$$

$$= 38.5 \times 1000 \text{ lt}$$

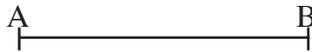
$$= 38,500 \text{ lt}$$

We can fill 38,500 lt of water in the tank.

**24. Name the fundamental physical quantities and give their units.**

Ans.	Fundamental physical quantity	S.I. units
	length	metre
	mass	kilogram
	time	second
	Temperature	Kelvin
	Electric current	Ampere
	Amount of substance	mole
	luminuous intensity	Candela

**25. Measure the length of the line segment using metre scale and explain method of measurement.**



Ans. length of the line segment = 5.5 cm

**Method of measurement:** Metre scale is kept parallel along the line segment.

- The zero end of the scale is made coincident with one end A of the line segment.
- The other end of the line segment B coincided with mark on the scale of 5cm, 5mm. Hence the length of the line segment is 5cm + 5mm = 5.5 cm.

**5 Marks**

**1. What is the periodic system in time measurement. Give two examples from daily life.**

**A. Periodic system :** A system which repeats it self at regular intervals of time is called periodic system.

Examples : The following events occure periodically.

1. Sun rise and sun set.
2. day and night .
3. occurence of seasons.

**2. The length and breadth of a rectangular shape card board are 10cm and 5cm. What is its area. How many times the area will increase if its length and breadth are increased 3 times.**

Ans. Area of the rectangle = length  $\times$  breadth

$$\begin{aligned}\text{Area of the card board} &= 10 \text{ cm} \times 5 \text{ cm} \\ &= 50 \text{ sq.cm}\end{aligned}$$

If length and breadth increased 3 times

increased length =  $3 \times 10\text{cm} = 30\text{ cm}$

increased breadth =  $3 \times 5\text{cm} = 15\text{ cm}$

area of the cardboard after increase of length & breadth =  $30\text{ cm} \times 15\text{ cm}$   
=  $450\text{ cm}$

$$\begin{aligned}\text{Increase in area} &= \frac{\text{Increased area}}{\text{Initial area}} = \frac{450\text{sq.cm}}{50\text{sq.cm}} \\ &= 9\end{aligned}$$

It means when length and breadth increased 3 times area increases by 9 times.

**3. How do you find the area of a leaf ? (or) Describe the method for finding out the area of an irregular body.**

**Ans.** Area of the leaf can be determined by using graph.

- put the leaf on the graph sheet and draw the outline of the leaf so that draw the shape of the leaf on the graph sheet.
- Remove the leaf from the graph sheet, count the number of complete squares.
- While counting the incomplete squares, count only those squares that lie half or more within the figure and neglect other incomplete squares.
- The total number of squares thus counted gives the approximate area of the given leaf in  $\text{cm}^2$ .

**4. Describe the method for finding out the volume of the stone using graduated jar and water (or) Describe the method for finding out the area of an irregular body.**

**Ans.** Take a graduated cylinder and take water in it so that the stone can immerse in the water.

- note the volume of the water in the graduated cylinder.
- dip the stone to which volume is to be determined in it after tying it with thread.
- Since the stone is immersed in water, the water level equal to the volume of the stone rises in the cylinder. Rised water level i.e., volume of the water and stone should be noted.

- Thus the difference in the readings of the water level before and after the insertion of the stone gives the volume of the solid.
- Here the volume of stone is in milli metres.

**5. How much volume of water can be stored in spherical tank of 1m radius. If the radius is doubled how many times the volume of the water in it increases.**

Ans. Volume of the sphere =  $\frac{4}{3} \pi r^3$

$$\begin{aligned} \text{Volume of 1m radius spherical tank} &= \frac{4}{3} \times \frac{22}{7} \times 1\text{m} \times 1\text{m} \times 1\text{m} \\ &= \frac{88}{21} \text{ m}^3 \\ &= 4.19 \text{ m}^3 \end{aligned}$$

volume of water contained in the tank =  $4.19 \times 1000$  litre = 4190 litre

$$\begin{aligned} \text{If the radius of sphere is 2m, its volume} &= \frac{4}{3} \times \frac{22}{7} \times 2\text{m} \times 2\text{m} \times 2\text{m} \\ &= \frac{704}{21} \text{ m}^3 \\ &= 33.5 \text{ m}^3 \end{aligned}$$

Total volume of water contained in it =  $33.5 \times 1000$ litre = 33,500 litre

When radius of the sphere increases by 1m to 2m, the water contained in it is increase by

$$= \frac{33500}{4190} = 8 \text{ times.}$$

### Fill in the blanks

- ..... year the metric system was introduced for measurements. (1956)
- The smallest unit of length in chandra Gupta Mouryau's time ..... (paramaanu)
- Rough measurements made by our senses is known as ..... (estimation)
- In India the practice of measuring length in inch, feet and yard is due to influence of ..... country. (England)

5. 1 mile = ..... km is still in usage in America to measure the length (1.61)
6. 1 foot = ..... inches (12)
7. 1 yard = ..... foot (3)
8. Weight of the substance equal to the mass of atom is known as ..... (1 mole)
9.  $\frac{1}{86400}$  part in day is called as ..... (second)
10. Units which are obtained by the combination of base units are known as ..... (derived units)
11. Mass of a large ship is 9,00,000 kg. when it is written in powers of ten = ..... ( $9 \times 10^5$  kg.)
12. 23 mm are expressed in cm ..... (2.3 cm)
13. While measuring a line segment two ends of it coincided with 2 cm and 9.3 cm. Then the length of the line segment is ..... (7.3 cm.)
14. length of the line in figure ..... (1.7 cm)
15. .... instrument is used to measure the length or thickness of a solid substance accurately upto 0.01 cm (vernier calipers)
16. Least count of vernier calipers ..... cm. (0.01)
17. .... instrument is used to measure the length or thickness of a solid substance accurately upto 0.001 cm (Screw gauge)
18. Least count of screw guage = ..... cm (0.001)
19. Least count of the ordinary scale = ..... (1 mm)
20. The instrument which can measure the weight of the body accurately upto milligram is ..... (common balance)
21. Distance between A to B or A to C in fig ..... is known as ..... (amplitude)
22. .... is the mean position out of A, B, C positions in fig. (A)

23. The maximum distance of the pendulum from its mean position when it is oscillating ..... (amplitude)
24. Time taken for one oscillation to the pendulum is ..... (time period)
25. .... scientist invented pendulum (Galileo)
26. Pendulum clock is made by ..... (Christian Huygens)
27. The surface of the body or the surface occupied by the body is called ..... (area)
28. S.I. unit of area = ..... (meter<sup>2</sup> (or) square meter)
29. The area of the sheet of length 6cm and breadth 4cm = ..... (24 sq.cm(or) 24 cm<sup>2</sup>)
30. The space occupied by a body is called ..... (volume)
31. S.I. unit of volume = ..... (m<sup>3</sup> (or) cubic metre)
32. 1 litre = ..... cubic centimetre (1000)
33. Litres of water can be filled in 1 cubic metre tank (1000)
34. In olden days people learnt to tell ..... from the length of the shadows. (time)
35. Which clock tells time, based on the shadow is called as ..... (sundial)

### Multiple Choice Questions

1. Which one of the following is not a fundamental physical quantity ( 3 )  
 (1) temperature (2) Mass (3) Area (4) length
2. In a day, second is ( 4 )  
 (1) 46800<sup>th</sup> part (2) 64800<sup>th</sup> part (3) 84600<sup>th</sup> part (4) 86400<sup>th</sup> part
3. The mass of a big ship is 9,00,000 kg. when it is expressed in powers of ten ( 3 )  
 (1)  $9 \times 10^6$  (2)  $90 \times 10^5$  (3)  $9 \times 10^5$  (4)  $9 \times 10^4$
4. Which one of the following is the unit of area ( 4 )  
 (1) metre<sup>3</sup> (2) metre (3) metre<sup>-3</sup> (4) metre<sup>2</sup>
5. Which one of the following is fundamental physical quantity ( 2 )  
 (1) density (2) temperature (3) Volume (4) Force

6. Which one of the following is fundamental unit ( 3 )  
 (1) square metre (2) Joule (3) Ampere (4) Newton
7. Which of the following is derived unit ( 1 )  
 (1) Newton (2) Kelvin (3) Ampere (4) Candela
8. The unit of length used in U.S.A is 1 mile. Its value in km. ( 2 )  
 (1) 1.51 km (2) 1.61 km (3) 2 km (4) 2.61 km
9. 237 millimetres are written in terms of metres ( 2 )  
 (1) 2.37 m. (2) 0.237 m. (3) 23.7 m. (4) 0.0237 m.
10. A line segment was measured using a scale. When the two ends of the line segment coincide with 2cm and 4.2 cm marks on the scale, then the length of the line segment ( 4 )  
 (1) 2 cm (2) 4.2 cm (3) 2.4 cm (4) 2.2 cm
11. Minimum length that can be measured with vernier calipers ( 2 )  
 (1) 0.01 mm. (2) 0.01 cm. (3) 0.001 cm. (4) 1 mm.
12. Least count of screw gauge ( 3 )  
 (1) 0.01 cm. (2) 0.1cm. (3) 0.001cm. (4) 1 cm.
13. When 1 litre of volume is expressed in cubic centimeters ( 4 )  
 (1) 1 (2) 10 (3) 100 (4) 1000
14. Which of the following is not S.I unit ( 2 )  
 (1) metre (2) pound (3) kilogram (4) second
15. If the volume of a liquid is 1 microgram. It is equal to ( 1 )  
 (1)  $10^{-6}$  (2)  $10^{-12}$  (3)  $10^{-9}$  (4)  $10^{-3}$
16. Time taken to travel between city A to city B is 5 hours 30 minutes. Average velocity of the bus is 50 km per hour. What is distance between those two cities. ( 4 )  
 (1) 250 km (2) 300 km (3) 280 km (4) 275 km

## Matching the following

### 1. Match the following physical quantities with their S.I. Units (Under Standing)

length	→	Metre
Mass	→	Kilogram
time	→	second
temperature	→	Kelvin
electric current	→	Ampere
luminuous intensity	→	Candela
Amount of substance	→	mole
Area	→	square metre
volume	→	cubic metre
velocity	→	metre / second
Acceleration	→	metre / second <sup>2</sup>
Force	→	Newton (kilogram metre/second <sup>2</sup> )
Work	→	Joule (Kilogram square metre / second <sup>2</sup> )
pressure	→	Pascal
Power	→	watt

### 2. Match the following quantities with their symbols (Under Standing)

Metre	→	M
Kilogram	→	Kg
second	→	S
Kelvin	→	K
Mole	→	mol
Ampere	→	A
Candela	→	Cd
Newton	→	N
Pascal	→	Pa
Joule	→	J
Watt	→	W

**3. Match the following multiples of '10' with their names. (Under Standing)**

$10^1$	→	Deca
$10^2$	→	Hecta
$10^3$	→	Kilo
$10^6$	→	Mega
$10^9$	→	Giga
$10^{12}$	→	Terra
$10^{-1}$	→	Deci
$10^{-2}$	→	centi
$10^{-3}$	→	milli
$10^{-6}$	→	micro
$10^{-9}$	→	Nano
$10^{-12}$	→	Pico

**4. Match the fundamental physical quantities with their units.**

**(or)**

5 x 1/2 = (2 1/2 Marks)

**Identify the units of physical quantities and match.**

1. length	( )	(a) second
2. mass	( )	(b) candela
3. time	( )	(c) kilogram
4. Temperature	( )	(d) mole
5. Electric current	( )	(e) metre
	( )	(f) Kelvin
	( )	(g) Ampere

**6. Match the following physical quantities with their derived quantities.**

5 x 1/2 = (2 1/2 Marks)

- |                 |        |                                       |
|-----------------|--------|---------------------------------------|
| 1. Area         | (    ) | (a) kilogram/ metre <sup>3</sup>      |
| 2. Volume       | (    ) | (b) metre / sec <sup>2</sup>          |
| 3. density      | (    ) | (c) kilogram metre / sec <sup>2</sup> |
| 4. Velocity     | (    ) | (d) metre <sup>3</sup>                |
| 5. Acceleration | (    ) | (e) kilogram                          |
|                 | (    ) | (f) metre / second                    |
|                 |        | (g) metre <sup>2</sup>                |

**7. Match the units in part A with symbols in part B.**

5 x 1/2 = (2 1/2 Marks)

- | A          |        | B       |
|------------|--------|---------|
| 1. metre   | (    ) | (a) mol |
| 2. kelvin  | (    ) | (b) Kg  |
| 3. second  | (    ) | (c) Cd  |
| 4. mole    | (    ) | (d) A   |
| 5. candela | (    ) | (e) M   |
|            | (    ) | (f) S   |
|            |        | (g) K   |

## Module - 2

# 2

### Lesson

## Structure of matter & Properties

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### Objectives

- Depending upon the contents of the matter, they are classified into compounds, elements and mixtures.
- Defining Isotopes, Atomic weight and molecular weights.
- Difference between molecules and atoms.
- Defining Daltons atomic theory.
- Defining mole concept, molar weight, molar volume.
- Defining Galussac's law and Avogadro's law..
- Solving mathematical problems of the above entities.

### Important Points

- Matter is that which has weight and occupy space.
- Matter can be divided into solid, liquid and gaseous states.
- Depending on chemical composition, or structure, it can be classified into elements, compounds or mixtures.
- Element is the basic substance which can not be divided into small entities.
- A compound is a substance in which most of the elements combine chemically in a specific weight ratio.
- Mixture is a substance containing one or more elements or compounds in a ratio.

- A solution is a homogenous mixture of two or more compounds
- The component which is in higher Quantity in a solution is called solvent.
- Indivisible part of a substance is called atom.
- The combining capacity of an element is called valency.
- A molecular formula of a compound is denoted with symbols of its elements, in a molecule.
- Brief explanation of a chemical reaction is called chemical equation.

### 3 Marks

#### 1. Define the following and give an example.

- A) **Galussac's law** : At constant temperature and pressures when volumes are measured the volume of reactants and products in most gaseous reactions, will have a relation with their atomic number.
- B) **Avogadro's law** : Equal volumes of all gases under the same conditions of temperature and pressure contain equal number of molecules or moles.



#### 2. $\text{C}_3\text{H}_8$ , $\text{PCl}_5$ , $\text{SO}_3$ , $\text{H}_2\text{O}_2$ , $\text{CO}_2$ Find the molecular weights.

C – 12, H – 1, p – 30, cl – 35.5, S – 32, O – 16 (Atomic weights)

$$(1) \text{C}_3\text{H}_8 \text{ molecular weight} = 3 \times \text{C} + 8 \times \text{H} = 3 \times 12 \text{ U} + 8 \times 1 \text{ U} = 36 + 8 \text{ U} = 44 \text{ U}$$

$$(2) \text{pcl}_5 \text{ molecular weight} = \text{p} + 5 \times \text{Cl} = 30\text{U} + 5 \times 35.5 \text{ U} = 30 + 177.5 \text{ U} = 207.5 \text{ U}$$

$$(3) \text{SO}_3 \text{ molecular weight} = \text{S} + 3 \times \text{O} = 32 \text{ U} + 3 \times 16\text{U}$$

$$= 32 + 48 \text{ U}$$

$$= 80 \text{ U}$$

$$(4) \text{H}_2\text{O}_2 \text{ molecular weight} = 2 \times \text{H} + 2 \times \text{O}$$

$$= 2 \times 1 + 2 \times 16$$

$$= 2 + 32$$

$$= 34 \text{ U}$$

$$(5) \text{CO}_2 \text{ molecular weight} = 1 \times \text{C} + 2 \times \text{O}$$

$$= 12 + 32$$

$$= 44 \text{ U}$$

### 3. What is the weight of the following.

- (i)  $6.022 \times 10^{23}$  oxygens atoms                      (iv)  $6.022 \times 10^{23}$  molecules of phosphours  
(ii)  $6.022 \times 10^{23}$  oxygens molecules                      (v)  $6.022 \times 10^{23}$  Atoms of carbon  
(iii)  $6.022 \times 10^{23}$  Atoms of phosphorous

**Ans.** There are  $N(6.022 \times 10^{23})$  molecules in 1 gram molecular weight

- (i)  $6.022 \times 10^{23}$  (O) oxygen's atomic weight = 16 g  
(ii)  $6.022 \times 10^{23}$  oxygen ( $O_2$ ) molecular weight = 32 g.  
(iii)  $6.022 \times 10^{23}$  Phosphorous (P) atomic weight = 31.0 g.  
(iv)  $6.022 \times 10^{23}$  Phosphorous ( $P_4$ ) molecular weight =  $4 \times 31.0$  g. = 124.0 g.  
(v)  $6.022 \times 10^{23}$  Carbons atomic weight =  $1 \times 12.0$  g. = 12.0g.

### 4. Balance the given equations.

- (i)  $H_3PO_3 \rightarrow H_3PO_4 + PH_3$   
(ii)  $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$   
(iii)  $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$   
**A.**(i)  $4H_3PO_3 \rightarrow 3H_3PO_4 + PH_3$   
(ii)  $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$   
(iii)  $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

### 5. Number of moles in 48 gms oxygen.

Oxygen's molar weight = 32 gms / mole

Oxygen generally exists in molecular  $O_2$  so

$$\begin{aligned} \text{Number of moles of oxygen} &= \frac{\text{Oxygen weight}}{\text{oxygen molar wt}} = \frac{48 \text{ gm}}{32 \text{ gm / mole}} \\ &= \frac{48}{32} \text{ Mole} \\ &= \frac{24}{16} \text{ Mole} \\ &= \frac{3}{2} \text{ Mole} \\ &= 1.5 \text{ Mole} \end{aligned}$$

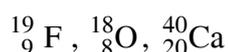
## 5 Marks

### 1. Explain Dalton's atomic theory.

#### Dalton's theory

- (1) Elements are made up of indivisible parts called atoms.
- (2) Atoms of an element are alike. Their atomic size, mass and chemical properties are alike.
- (3) The properties for different elements are different.
- (4) In a compound there will be more than one atoms of different elements.
- (5) With a chemical reaction, atoms can be separated, combined or exchanged. Atoms can not be created or destroyed.
- (6) In a compound, atoms will have equal characters.

### 2. Mention the number of protons, neutrons and electrons in the following.



1. Atomic number can be written as the proton number.
2. Protons number in an atom is equal to the number of electrons
3. Number of neutrons in an atom.

∴ Number of protons in F atom = 9    Neutrons number =  $19 - 9 = 10$

Number of Electrons = 9

Number of protons in oxygen atom = 8.    Neutrons number =  $18 - 8 = 10$

Number of Electrons = 8

Number of protons in Ca atom = 20.    Number of neutrons =  $40 - 20 = 20$

Number of Electrons = 20

The number obtained when protons number is subtracted from atomic mass.

**3. Three Isotopes of silicon have 14, 15 and 16 neutrons. Write their mass number and their symbols.**

Atomic number of Silicon = 14, So it has 14 protons.

Its symbol is Si

∴ If Si form 3 isotopes.

First isotope's mass = Number of protons + Number of neutrons

$$= 14 + 14$$

$$= 28$$

∴ First Isotope's symbol =  ${}_{14}^{28}\text{Si}$

second Isotope's mass = Number of protons + Number of neutrons

$$= 14 + 15$$

$$= 29$$

∴ second Isotope's symbol =  ${}_{14}^{29}\text{Si}$

Third Isotope's mass = 14 + 16

$$= 30$$

∴ Third Isotope's symbol =  ${}_{14}^{30}\text{Si}$

∴ Three Isotopes of Si =  ${}_{14}^{28}\text{Si}$ ,  ${}_{14}^{29}\text{Si}$ ,  ${}_{14}^{30}\text{Si}$

**4. State the physical state of the following.**

- |                   |                       |                   |             |
|-------------------|-----------------------|-------------------|-------------|
| (1) Nitrogen      | (2) copper            | (3) Bromine       | (4) Oxygen  |
| (5) Ethyl alcohol | (6) Hydrogen peroxide | (7) carbondioxide | (8) Mercury |
| (9) Gold          | (10) Hydrogen         |                   |             |

- A. (1) Nitrogen - Gas (4) oxygen-gas (7) carbondioxide - gas  
(2) copper - solid (5) Ethyl alcohol - liquid (8) Mercury - liquid  
(3) Bromine - liquid (6) Hydrogen peroxide - liquid (9) Gold - solid  
(10) Hydrogen - gas.

5. What is valency ? Write the valencies in compounds of Nitrogen with oxygen.

(or)

Nitrogen exhibit valencies 1 to 5. Explain with examples.

Every element has a capacity to react with another element.

The capacity of an element to react is called valency.

Nitrogen reacts with oxygen and form its oxides  $N_2O$ ,  $N_2O_2$ ,  $N_2O_3$ ,  $N_2O_4$  and  $N_2O_5$

Valency of Nitrogen in

$N_2O$  is 1

$N_2O_2$  is 2

$N_2O_3$  is 3

$N_2O_4$  is 4

$N_2O_5$  is 5

6. Write the formulae for the following

Question	Answer
(a) Carbon dioxide	$CO_2$
(b) Megnesim oxide	$MgO$
(c) Phosphorous tri bromide	$PBr_3$
(d) Ammonia	$NH_3$
(e) water	$H_2O$
(f) Hydro chloric acid	$HCl$
(g) Phosphorous pentoxide	$P_2O_5$

(Any five from the above)

**7. Write the empirical and molecular formulae of the following compounds**

- (1) water      (2) Ammonia   (3) Ethane   (4) Hydrogen peroxide   (5) Carbon dioxide

<b>Ans. Substance</b>	<b>Empirical formula</b>	<b>molecular formula</b>
(1) water	H <sub>2</sub> O	H <sub>2</sub> O
(2) Ammonia	NH <sub>3</sub>	NH <sub>3</sub>
(3) Ethane	CH <sub>3</sub>	C <sub>2</sub> H <sub>6</sub>
(4) Hydrogen peroxide	HO	H <sub>2</sub> O <sub>2</sub>
(5) carbon dioxide	CO <sub>2</sub>	CO <sub>2</sub>

**8. Classify the following into mono, di, tri, tetra penta and hexamolecular molecules.**

**H<sub>2</sub>, P<sub>4</sub>, SF<sub>4</sub>, SO<sub>2</sub>, PCl<sub>3</sub>, C<sub>2</sub>H<sub>2</sub>, CH<sub>3</sub>OH, PCl<sub>5</sub>, H<sub>2</sub>O<sub>2</sub>, HCl, Cl<sub>2</sub>O, He**

<b>Ans.</b> mono atomic	-	He
Di atomic	-	H <sub>2</sub> , HCl
Tri atomic	-	SO <sub>2</sub> , Cl <sub>2</sub> O
tetra atomic	-	PCl <sub>3</sub> , C <sub>2</sub> H <sub>2</sub> , H <sub>2</sub> O <sub>2</sub> , P <sub>4</sub>
penta atomic	-	SF <sub>4</sub>
hexa atomic	-	CH <sub>3</sub> OH, PCl <sub>5</sub>

**9. Classify the following substances depending on their physical states.**

- |              |   |        |              |   |        |              |   |        |
|--------------|---|--------|--------------|---|--------|--------------|---|--------|
| 1) chair     | - | solid  | 6) coal      | - | solid  | 11) computer | - | solid  |
| 2) sea water | - | liquid | 7) air       | - | gas    | 12) tree     | - | solid  |
| 3) smoke     | - | gas    | 8) Ice cream | - | solid  | 13) milk     | - | liquid |
| 4) Apple     | - | solid  | 9) honey     | - | liquid | 14) oxygen   | - | gas    |
| 5) oil       | - | liquid | 10) cloud    | - | gas    | 15) powder   | - | solid  |

**10. What is a mixture? Air is a mixture. Justify.**

- (1) The substance formed by the combination of different compositions is called mixture
- (2) If that mixture is homogenous it is called a solution. Air is a mixture of many gases.
- (3) Though there are oxygen, Nitrogen, water vapour, carbon dioxide etc gases, it appears homogenous. Hence it is homogenous mixture and air is a solution containing many gases.

**11. How many oxygen molecules are there in 8 grams of O<sub>2</sub>. If O<sub>2</sub> molecule dissociates into O how many oxygen atoms are produced.**

gm molecular weight of oxygen = 32 gm. gm atomic weight of oxygen = 16 gm.

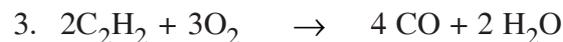
Number of molecules present in 32 gms of O<sub>2</sub> molecule =  $6.02 \times 10^{23}$  So

$$\begin{aligned} \text{Number of molecules in 8 gms of O}_2 &= \frac{8\text{gms} \times 6.022 \times 10^{23} \text{ molecule}}{32 \text{ gms}} \\ &= \frac{1 \times 6.022 \times 10^{23}}{4} \text{ molecule} = 1.505 \times 10^{23} \text{ molecules.} \end{aligned}$$

Number of atoms in 16 gms of oxygen atom =  $6.022 \times 10^{23}$  atoms.

$$\begin{aligned} \text{Therefore number of atoms in 8 gms of O} &= \frac{6.022 \times 10^{23}}{2} = \left( \frac{8 \times 6.022 \times 10^{23}}{16} \right) \\ &= 3.011 \times 10^{23} \text{ Atoms.} \end{aligned}$$

**12. Balance the following equations.**



**13. Suppose 80% water is present in human body, what is the number of water molecules in a human being having 65 k.g.**

**(grammolecular weight of water = 18 g.)**

Ans. Therefore If 80% water is present in human body,

water content in 65 kgs human being =  $65 \text{ kg} \times 80\%$

$$= 65 \text{ kg} \times \frac{80}{100}$$

$$= 13 \text{ kg} \times 4$$

$$= 52 \text{ kg.}$$

$\therefore$  Water molecules in 18 gms of water =  $6.022 \times 10^{23}$  (According to Avagadro law)

$$\text{Hence water molecules in 52 kg water} = \frac{52\text{kg} \times 6.022 \times 10^{23}}{18 \text{ gm.}}$$

$$= \frac{52 \times 1000 \text{ gm} \times 6.022 \times 10^{23}}{18 \text{ gm}}$$

$$= \frac{52 \times 6.022 \times 10^{26}}{18}$$

$$= 1.7 \times 10^{27}.$$

**14. Write any four elements present in earth's crust, and in human being and mention which element is in highest proportion in human being.**

**Main Elements present in Earth's crust**

**Main Elements present in human beings**

(1) Oxygen

(1) oxygen

(2) Silicon

(2) carbon

(3) Aluminium

(3) Hydrogen

(4) Iron

(4) Nitrogen

(5) Calcium

(5) Calcium

Oxygen is one of the most abundant element in earth's crust.

The same element is in high proportion in human body.

**15. What is molecular formula ? Write the molecular formula of Hydrogen peroxide and calculate the released oxygen on dissociation of 17 gms of Hydrogen peroxide.**



Ans. Molecular formula is the one which tells the correct atomic number of every element in a molecule

Formula of Hydrogen peroxide -  $H_2O_2$



$$2 \times 34 \text{ gm.} \quad 2 \times 18 \text{ gm.} \quad 32 \text{ gm.}$$

$$68 \text{ gm.} \quad 36 \text{ gm.} \quad 32 \text{ gm.}$$

From the above equation if 68 gms of  $H_2O_2$  dissociates 32 gms of oxygen is released weight of oxygen on dissociation of 17 gms of the gas  $H_2O_2$ .

$$\begin{aligned} &= \frac{17 \text{ gms} \times 32 \text{ gms}}{68 \text{ gms}} \\ &= 8 \text{ gms.} \end{aligned}$$

**16. Write the following Isotopes' formulae in  ${}^A_ZX$  form.**

**(i) Atomic number 19, Mass number 40                      (iv) Atomic number 6, Mass number 13**

**(ii) Atomic number 18, Mass number 40                      (v) Atomic number 8, Mass number 17**

**(iii) Atomic number 7, Mass number 15**

(i) Element with Atomic number 19 is potassium

$$\therefore \text{ formula } {}^{40}_{19}\text{K}$$

(ii) Element with Atomic number 18 is Argon

$$\therefore \text{ formula } {}^{40}_{18}\text{Ar}$$

(iii) Element with Atomic number 7 is Nitrogen

$$\therefore \text{ formula } {}^{15}_7\text{N}$$

(iv) Element with Atomic number 6 is Carbon

$$\therefore \text{ formula } {}^{13}_6\text{C}$$

(v) Element with Atomic number 8 is Oxygen

$$\therefore \text{ formula } {}^{17}_8\text{O}$$

**17. Some Atomic numbers are given. Write the names of the elements in order**

**Atomic numbers : 6, 3, 8, 11, 2, 1, 14, 18, 10, 20.**

**Ans.** Element having Atomic Number 1 - Hydrogen

Element having Atomic Number 2 – Helium

Element having Atomic Number 3 – Lithium

Element having Atomic Number 6 – Carbon : Element having Atomic Number 14 – Silicon.

Element having Atomic Number 8 – Oxygen : Element having Atomic Number 18 – Argon

Element having Atomic Number 10 – Neon : Element having Atomic Number 20 – Calcium

Element having Atomic Number 11 – Sodium

**Fill in the Blanks**

1. Atoms in sulphur molecule ..... [ 8 ]
2. Symbol for sulphur molecule ..... [ S<sub>8</sub> ]
3. Valency of Carbon is ..... [ 4 ]
4. Formula for phosphorous pentoxide ..... [P<sub>2</sub>O<sub>5</sub>]
5. Proton's charge is ..... [ positive ]
6. Electron's charge is..... [ negative ]
7. Molecular weight of CO<sub>2</sub> [ 44.0 amu]
8. 1 mole molecular weight of H<sub>2</sub>O is ..... [ 18 g. ]
9. Number of oxygen atoms in 16 gms of oxygen is ..... [6.022×10<sup>23</sup>]
10. Number of protons in nucleus of the atom is called..... [Atomic number]

**Multiple choice Questions**

1. which one is not an element [ 4 ]  
(1) Gold (2) Aluminum (3) oxygen (4) milk
2. Which one is not a mixture [ 4 ]  
(1) Air (2) Milk (3) cooldrink (4) Iron

3. A solution from the following [ 3 ]  
 (1) Mercury (2) Coal (3) Air (4) Milk
4. Which one forms a homogenous mixture [ 2 ]  
 (1) water + sand (2) water + sugar  
 (3) sand + copper sheets (4) water + oil
5. Who defined an element as basic thing for a compound [ 3 ]  
 (1) Rutherford (2) Neils Bohr  
 (3) Antony Lorenj Loveiger (4) Thomson
6. Which is a metal [ 2 ]  
 (1) Ice cube (2) Iron (3) Air (4) Hydrochloric acid
7. Example for diatomic molecule [ 1 ]  
 (1)  $\text{Cl}_2$  (2)  $\text{CO}_2$  (3)  $\text{H}_2\text{O}$  (4)  $\text{P}_4$
8. Atoms present in  $\text{C}_2\text{H}_5\text{OH}$  [ 1 ]  
 (1) 9 (2) 4 (3) 3 (4) 8
9. Formula for common salt [ 2 ]  
 (1)  $\text{Na}_2\text{SO}_4$  (2)  $\text{NaCl}$  (3)  $\text{NaOH}$  (4)  $\text{NaNO}_3$
10. Whose empirical and molecular formulae are different? [ 3 ]  
 (1) water ( $\text{H}_2\text{O}$ ) (2) Ammonia ( $\text{NH}_3$ )  
 (3) Hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) (4) Carbon dioxide ( $\text{CO}_2$ )
11. Particles in Atomic nucleus [ 1 ]  
 (1) protons + Neutrons (2) protons + Electrons  
 (3) Neutrons + Electrons (4) Electrons
12. Number of Neutrons in  $^{12}_6\text{C}$  ..... [ 1 ]  
 (1) 6 (2) 12 (3) 18 (4) 10
13.  $^{16}_8\text{O}$ ,  $^{17}_8\text{O}$  and  $^{18}_8\text{O}$  are oxygen's [ 3 ]  
 (1) compounds (2) Atoms (3) isotopes (4) Mixtures
14. Unit for Atomic weight [ 1 ]  
 (1) amu (2) KG (3) STP (4) GRAM
15. Main gas in cooking gas is [ 4 ]  
 (1) Methane (2) Nitrogen (3) Helium (4) Butane

## Matching

### 1. Match the compounds with the formulae.

- |                               |   |                          |
|-------------------------------|---|--------------------------|
| 1) Ammonia                    | - | $\text{NH}_3$            |
| 2) Hydrogen Peroxide          | - | $\text{H}_2\text{O}_2$   |
| 3) Ethane                     | - | $\text{C}_2\text{H}_6$   |
| 4) Hydrazene                  | - | $\text{N}_2\text{H}_4$   |
| 5) Carbon dioxide             | - | $\text{CO}_2$            |
| 6) Sodium Phosphate           | - | $\text{Na}_3\text{PO}_4$ |
| 7) Sulphur trioxide           | - | $\text{SO}_3$            |
| 8) Barium chloride            | - | $\text{BaCl}_2$          |
| 9) Calcium carbonate          | - | $\text{CaCO}_3$          |
| 10) Magnesium sulphate        | - | $\text{MgSO}_4$          |
| 11) Sodium chloride           | - | $\text{NaCl}$            |
| 12) Methane                   | - | $\text{CH}_4$            |
| 13) Barium oxide              | - | $\text{BaO}$             |
| 14. Sodium sulphate           | - | $\text{Na}_2\text{SO}_4$ |
| 15. Magnesium oxide           | - | $\text{MgO}$             |
| 16. Hydrogen chloride         | - | $\text{HCl}$             |
| 17. Nitrogen dioxide          | - | $\text{NO}_2$            |
| 18) Phosphorous pentachloride | - | $\text{PCl}_5$           |
| 19) Water                     | - | $\text{H}_2\text{O}$     |
| 20) Phosphorous tribromide    | - | $\text{P Br}_3$          |

## 2. Match the elements and symbols

1) Sulphur	-	S
2) Lithium	-	Li
3) Phosphorous	-	P
4) Mercury	-	Hg
5) Hydrogen	-	H
6) Boran	-	B
7) Flourine	-	F
8) Argon	-	Ar
9) Sodium	-	Na
10) Calcium	-	Ca
11) Aluminium	-	Al
12) Carbon	-	C
13) Helium	-	He
14) Neon	-	Ne
15) Oxygen	-	O
16) Chlorine	-	Cl
17) Zinc	-	Zn
18) Iodine	-	I
19) Titanium	-	Ti
20) Uranium	-	U

# 3

## Lesson

# Atomic Structure

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### Objectives

- Reasons for the failure of Dalton's atomic theory.
- Revision of different Atomic models.
- Demerits in Bohr's atomic theory.

### Important Points

- Rutherford's Atomic theory says that Most of the mass and total positive charge of an atom is situated in the nucleus. Electrons will be revolving around the nucleus.
- Neutrons are the neutral sub particles in the nucleus
- Protons number in the nucleus is called Atomic number.
- Number of protons and neutrons in the atom is called mass number.
- Atoms with same Atomic number and different mass number are called Isotopes.
- Electrons are arranged in different orbits in their ascending order in an atom.

### 3 Marks Questions

1. What is neutron ? Find the number of neutrons present in  $^{18}_8\text{O}$  ?

A. The sub atomic particle having more weight to some extent than the proton's weight is called neutron.

mass number in  $^{18}_8\text{O}$  Isotope is 18

Atomic number = 8

$\therefore A - Z = N$  So number of neutrons is =  $18 - 8 = 10$

2. Write the electronic configuration and the valencies of the following elemental atoms.

(1) Lithium      (2) Sodium      (3) Neon

A. Element	Electronic configuration	Valency
1. Lithium	2, 1	1
2. Sodium	2, 8, 1	1
3. Neon	2, 8	0

3. What is stable orbit ? What is the maximum number of electron in L orbit.

A. (1) Every electron will be having a circular orbit

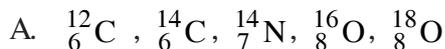
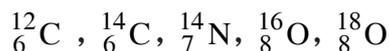
(2) Energy of the electron in this orbit is constant and hence this is called as a stable orbit.

(3) The maximum electrons present in L-orbit are 8.

4. What are the differences between proton and electron.

A. Proton	Electron
1. present in nucleus	1. present outside the nucleus
2. has positive charge	2. has negative charge
3. weight is more than electron	3. weight is less than proton.

**5. How will you know the Isotopes from the following.**



Isotopes of carbon are  ${}^{12}_6\text{C}, {}^{14}_6\text{C}$

Isotopes of oxygen  ${}^{16}_8\text{O}, {}^{18}_8\text{O}$

because isotopes would have same atomic number and different atomic weight.

**6.  ${}^{16}_8\text{O}, {}^{18}_9\text{F}, {}^{14}_7\text{N}, {}^{23}_{11}\text{Na}, {}^{12}_6\text{C}$  Find the number of neutrons.**

A.  ${}^{16}_8\text{O}$  Number of neutrons =  $16 - 8 = 8$

b)  ${}^{18}_9\text{F}$  Number of neutrons =  $18 - 9 = 9$

c)  ${}^{14}_7\text{N}$  Number of neutrons =  $14 - 7 = 7$

d)  ${}^{23}_{11}\text{Na}$  Number of neutrons =  $23 - 11 = 12$

e)  ${}^{12}_6\text{C}$  Number of neutrons =  $12 - 6 = 6$

**7. Find the atomic mass of the atom having 7 protons and 8 neutrons and discuss whether it is an isotope of that atom.**

A. Number of atomic mass = Number of protons + number of Neutrons

$$= 7 + 8$$

$$= 15$$

This element atom has 7 protons so its atomic number is 7.

$$\therefore \text{Atom of the Element is } = {}^{15}_7\text{N}$$

$\therefore$  The element having atomic number 7 is Nitrogen  ${}^{14}_7\text{N}$ , hence  ${}^{15}_7\text{N}$  is an isotope of Nitrogen.

**8. How can you say that all substances have electrons.**

A. When JJ Thomson studied about the electrical flow in a discharge tube,

1. He stated that "when electricity is introduced between two electrodes, negative charged electrons release from the negative electrode.
2.  $\text{mass} = \text{charge of electron} / \text{standard mass charge of electron.}$

$$= e/m = 9.10 \times 10^{-28} \text{ gms.}$$

3. Though the negative electrode is made up of any metal, and any gas is filled in the discharge tube, electrons are released. Hence we can say that all atoms contain electrons.

**9. Describe the properties of Canal rays on Anode rays.**

A. The electrons released at negative electrode collide with the gas atoms in the discharge tube and one or more electrons are released and these electrons push back the positive charged ions. If the negative electrode has pores, these positive ions move from these pores and hence these are called as canal rays and since these are released at Anode, these are called Anode rays.

**10. Define Atomic number, Mass numbers and explain how they are indicated in all elements.**

A. **Atomic number :-** The number of protons present in the nucleus of the atom is called Atomic number. This is denoted with 'Z'.

**Mass number :-** The number of protons and neutrons present in the nucleus of an elemental atom is called mass number. This is denoted with 'A'.

An element X's atomic number and mass number can be indicated as  ${}^A_Z X$ .

**11. Describe water melon or plum - pudding or Resin pudding model.**

- A. (1) J.J. Thomson stated that an atom contains positive charge and to the same extent electrons with negative charge are arranged in it.
- (2) This model resembles water melon and hence this is called as water melon model
  - (3) In this atomic model electrons are spread over like dried grapes in the pudding dish. Hence this is called as plum - pudding model or resin pudding model.

**12. Atomic number of oxygen is 8 mass number is 16 Justify that charge wise oxygen atom is neutral and find the number of neutrons.**

A. (1) Atomic number of oxygen is 8. Hence 8 protons and 8 electrons are present

(2) protons positive charge is +8, electrons negative charge is -8 and hence oxygen's charge is neutral.

(3) number of neutrons in oxygen =  $16 - 8 = 8$ .

**Instructions : Write answers for all the Questions.**

**1. Describe about the basic particles in the atom briefly from what you have learnt.**

A. 1. Basic particles in the atom are (1) Electron (2) proton (3) Neutron

2. Electron is present outside the nucleus and it has negative charge

3. Proton is present in nucleus and has positive charge.

4. Neutron is present in nucleus and has no charge.

5. Proton and neutron have weight but electron has no weight.

**2. Write briefly about atomic model and mention its demerits.**

A. 1. Most of the atomic mass and the total positive charge is located in a very small part called nucleus

2. Electrons revolve around the nucleus in a circular way like planets around the sun.

3. Rutherford says that this is called nuclear or Nuclear planet model.

Demerits: (1) Atomic weights are not explained

(2) Atomic stability is not explained.

**3. What does the letters in  $\frac{A}{Z}X$  indicate? Find the number of neutrons in  ${}^12_6C$  with this.**

A.  $\frac{A}{Z}X$  'X' Elemental atom

'A' Atomic mass number

'Z' Atomic number

In  ${}^12_6C$  Number of neutrons = Mass number - Atomic number

$$= 12 - 6$$

$$= 6.$$

**4. State two postulates in Bohr's atomic model and mention the main reason for its failure.**

- A. To explain the stability of atom, taking Hydrogen atom, Bohr has proposed two postulates. They are
1. Every electron revolves in circular orbit. These circular pathways are called orbits or energy levels. These orbits will have specific energy.
  2. When an electron attains energy it enters into a higher energy level. In the reverse way when an electron enters into a lower energy level, energy is released.
  3. When an electron stays in the same energy level, it will not accept energy or release energy.

Demerits : (1) It did not explain the atoms with more than 2 electrons

**5. Write the atomic number of the following elements and write their electronic configuration**

(1) Lithium      (2) Calcium      (3) Neon      (4) Argon      (5) Magnesium

A.

atomic number	Number of elements	electronic configuration
1. Lithium	3	2, 1
2. Calcium	20	2, 8, 8, 2
3. Neon	10	2, 8
4. Argon	18	2, 8, 8
5. Magnesium	12	2, 8, 2

**6. How do you find the maximum number of electrons in an orbit ? What is the maximum number of electrons in K, L, M, N orbits.**

- A. By using  $2n^2$  the maximum number of electrons in an orbit can be found out. In  $2n^2$ , if  $n$  value is 1, 2, 3, 4, they can be indicated by K, L, M, N.

∴ In the first orbit K maximum number of electrons is  $= 2 \times 1^2 = 2$

In the second orbit L maximum number of electrons is  $= 2 \times 2^2 = 8$

In the third orbit M maximum number of electrons  $= 2 \times 3^2 = 18$

In the fourth orbit N maximum number of electrons  $= 2 \times 4^2 = 32$

**7. Mass of Iron is 56, there are 30 neutrons in its atom. Find out its Atomic number.**

A. Mass of an element is the sum of the number of protons and the number of neutrons. Hence

Mass number = protons number + Neutrons number. But the number of protons is the atomic number and hence

Mass number = protons number + Neutrons number.

$$\therefore \text{Atomic number} = \text{Mass number} - \text{Neutrons number}$$

$$\therefore \text{Atomic number of Iron} = 56 - 30$$

$$= 26.$$

**8. Write the electronic configuration and valency of the following elements.**

(1) Lithium    (2) Nitrogen    (3) Sodium    (4) Argon    (5) Calcium

A. Element	Atomic Number	Electronic configuration	Valency
1. Lithium	3	2, 1	1
2. Nitrogen	7	2, 5	3
3. Sodium	11	2, 8, 1	1
4. Argon	18	2, 8, 8	0
5. Calcium	20	2, 8, 8, 2	2

**9. Depending upon the electronic configuration Recognise the element and mention which is the outer most orbital in them.**

(1) 2, 8, 7    (2) 2, 8, 8, 1    (3) 2, 8, 1    (4) 2, 1    (5) 2

A. Electronic configuration	Atomic number	Element	Outer most orbital
1. 2, 8, 7	17	Chlorine	M
2. 2, 8, 8, 1	19	Potassium	N
3. 2, 8, 1	11	Sodium	M
4. 2, 1	3	Lithium	L
5. 2	2	Helium	K

## I. Fill in the Blanks

1. Scientist who invented electron is ..... (J.J.Thomson)
2. Rays evolved at negative electrode is ..... (Electrons)
3. Canal rays have ..... charge. (Positive)
4. Charge of Anode rays is ..... (Positive Rays)
5. Nucleus of Helium is called ..... (Positive Rays)
6. When two electrons are removed from Helium atom the ray formed is ..... (Alpha ray)
7. Atoms possess ..... Charge. (neutral)
8. J.J. Thomsons atomic model resembles ..... (water melon)
9. Ruther ford's atomic model resembles ..... (Solar system)
10. The scientist who proposed nuclear model ..... (Rutherford)
11. According to nuclear model, electrons revolve in ..... way around the nucleus . (circular)
12. A particle having more weight than proton and having neutral state is ..... (Neutron)
13. The number of neutrons in Alpha particle is ..... (2)
14. Scientist who proved that neutrons are present in atomic nucleus .....(James chardwick)
15. Atomic number is denoted with ..... Letter (Z)
16. Atomic mass number is denoted with.....Letter (A)
17. In  ${}^{12}_6\text{C}$  the mass number of carbon is ..... (12)
18. Mass of oxygen is 16, Atomic number is 8 then number of neutrons is ..... (8)
19. Atoms with same Atomic number and different Atomic masses are called..... (Isotopes)
20. Mass of Atom with 7 protons and 8 neutrons ..... (15)
21. One Atom has mass 15, Atomic number 7. The number of neutrons in it is ..... (8)
22. According to Neil bohr, electrons revolve around the Nucleus in .....orbits. (Circular)

23. The circular pathway in which electrons revolve around nucleus in an atom are called as .....  
(orbit or Energy level)
24. When electrons gain energy they enter into ..... (higer orbit)
25. When electrons enter into lower orbit from higher orbit energy is ..... (released)
26. When electrons enter into lower orbit into higher orbit, energy is ..... (gained)
27. Energy of electron in higher energy state is  $E_2$ , lower Energy is  $E_1$  then released energy  $\Delta E =$   
..... ( $E_2 - E_1$ )
28. According to bohr Atomic model, circular orbits are denoted with ..... letters.  
(K, L, M, N)
29. In every orbit, the maximum number of electrons is equal to ..... ( $2n^2$ )
30. Maximum electrons in First orbit (K) is ..... (2)
31. Maximum electrons in second orbit (L) is ..... (8)
32. Maximum electrons in Third orbits (M) is ..... (18)
33. Maximum electrons inThird orbit (N) is ..... (32)
34. S, p, d, f letters are used to indicate ..... (sub orbits)
35. K, L, M, N letters are used to indicate ..... (orbits)
36. Electronic configuration of Lithium is ..... (2, 1)
37. Element with 2, 5 electronic configuration is ..... (Nitrogen)
38. Electronic configuration of carbon is ..... (2, 4)
39. The place where protons and neutrons in an atom is ..... (Nucleus)
40. The small part of the element having chemical properties is ..... (Atom)
41. The number of protons and neutrons in nucleus of the atom is equal to the ..... mass  
number (Atomic)
42. The particles present outside the nucleus in the atom is ..... (Electrons)
43. Electronic configuration of Sodium (11) is ..... (2, 8, 1)
44. Number of electrons in Sulphur atom ..... (16)
45. Electronic configuration of  ${}_{20}\text{Ca}$  is ..... (2, 8, 8, 2)
46. Element with Atomic number 17 is ..... (Chlorine)

47. Electronic configuration of chlorine (17) atom is ..... (2, 8, 7)
48. Valency of Argon (18) is ..... (0)

**II** Select the correct answer for the following.

1. Electron is invented by [ B ]  
(A) Rutherford (B) J.J.Thomson (C) Neilsbohr (D) James chadwik
2. Discharge tube means [ D ]  
(A) Rubber tube without air (B) glass tube with air  
(C) A Rubber tube with air (D) A glass tube without air
3. Negatively charged rays [ C ]  
(A) Neutrons (B) Protons (C) Electrons (D) Alpha rays
4. The Helium nucleus is [ D ]  
(A)  $\beta$ -rays (B) X-rays (C)  $\gamma$ -rays (D)  $\alpha$ -rays
5. An alpha particle contains [ B ]  
(A) Two protons + two electrons (B) two protons + two neutrons  
(C) Two electrons + Two neutrons (D) two protons + 4 electrons
6. Isotopes have [ B ]  
(A) same atomic mass units (B) same Atomic numbers  
(C) different atomic numbers (D) same atomic number and atomic mass numbers
7. Weight of neutron is [ B ]  
(A) less than the weight of proton (B) More than the weight of proton  
(C) Equal to protons weight (D) double the proton's weight
8. Solar system atomic model is proposed by [ C ]  
(A) Chadwik (B) Thomson (C) Rutherford (D) Neilsbohr
9. Filling up of second orbit start with the atomic configuration [ A ]  
(A) Li (B) He (C) C (D) N
10. Maximum number of electrons present in the first orbit (K) is [ A ]  
(A) 2 (B) 8 (C) 18 (D) 32
11. Maximum number of electrons present in the second orbit (L) is [ D ]  
(A) 2 (B) 18 (C) 32 (D) 8

12. Maximum number of electrons in every orbit (K) is [ A ]  
 (A)  $2n^2$  (B)  $n^2$  (C)  $2n$  (D)  $n$
13. Number of neutrons in alpha particle is [ D ]  
 (A) 3 (B) 4 (C) 1 (D) 2
14. Which element is having fully filled orbitals in the following [ C ]  
 (A) H (B) O (C) Ne (D) Mg
15. Electronic configuration of chlorine is [ D ]  
 (A) 2, 8 (B) 2, 8, 4 (C) 2, 8, 6 (D) 2, 8, 7
16. According to solar model, electrons will be revolving in the following way around the nucleus [ C ]  
 (A) square (B) circle (C) elliptical (D) rectangle
17. The element having 2, 8, 8 electronic configuration [ C ]  
 (A) Chlorine (B) Calcium (C) Argon (D) Potassium
18. Filling up of electrons in the third shell starts with [ A ]  
 (A) Sodium (B) Magnesium (C) Neon (D) Lithium
19. Filling up of electrons in the second shell completes with [ B ]  
 (A) Sodium (B) Neon (C) Fluorine (D) Oxygen
20. Valency of Neon is [ C ]  
 (A) 1 (B) 2 (C) 0 (D) 3

## Matching

### 1. Match the following with the scientists.

- |                  |                   |     |
|------------------|-------------------|-----|
| 1. Electron      | a) James Chadwick | ( ) |
| 2. Nuclear Model | b) Neils Bohr     | ( ) |
| 3. Proton        | c) Rutherford     | ( ) |
| 4. Neutron       | d) Goldstein      | ( ) |
| 5. Stable orbits | e) Thomson        | ( ) |

Answers: 1 -e, 2-c, 3-d, 4-a, 5-b.

## 2. Match the elements with their valencies.

- |              |      |     |
|--------------|------|-----|
| 1. Carbon    | a) 1 | ( ) |
| 2. Hydrogen  | b) 2 | ( ) |
| 3. Aluminium | c) 3 | ( ) |
| 4. Neon      | d) 4 | ( ) |
| 5. Megnesium | e) 0 |     |

Answers: 1 -d, 2-a, 3-c, 4-e, 5-b.

## 3. Match the elements with electronic configuration

- |                 |            |
|-----------------|------------|
| 1. Hydrogen     | 1          |
| 2. Helium       | 2          |
| 3. Lethium      | 2, 1       |
| 4. Beryllium    | 2, 2       |
| 5. Boron        | 2, 3       |
| 6. Carbon       | 2, 4       |
| 7. Nitrogen     | 2, 5       |
| 8. Oxygen       | 2, 6       |
| 9. Flurine      | 2, 7       |
| 10. Neon        | 2, 8       |
| 11. Sodium      | 2, 8, 1    |
| 12. Megnisium   | 2, 8, 2    |
| 13. Aluminium   | 2, 8, 3    |
| 14. Silicon     | 2, 8, 4    |
| 15. Phosphorous | 2, 8, 5    |
| 16. Sulphur     | 2, 8, 6    |
| 17. Chlorine    | 2, 8, 7    |
| 18. Argon       | 2, 8, 8    |
| 19. Potassium   | 2, 8, 8, 1 |
| 20. Calcium     | 2, 8, 8, 2 |

# 4

## Lesson

# Periodic Classification of Elements

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### Objectives

- Salient features of Mendeleev's periodic table, its demerits.
- Long form of periodic table, description of properties
- description of periodicity of the properties in periodic table.

### Important Points

- According to Dabur Neir's classification, In a triad, the centre element's atomic weight is equal to the average of the other two element's atomic weights.
- According to Neuland octet law, when the elements are arranged in their atomic weights ascending order, First and eighth elements resemble in their properties.
- Mendeleev's periodic law : The physical and chemical properties of the elements are periodic properties of their atomic weights.
- Modern periodic law : The physical and chemical properties are the periodic properties of their atomic number.
- Electron affinity : When an electron is gained by a gaseous atom, the energy change that occurs is called electronic affinity.
- Electro negativity : Tendency of an atom to attract the electrons pair towards it, which are bonded in the molecule.
- Ionic Radius : The distance between the centre and the outer orbit.

- Ionisation energy : The energy required to remove an electron from the outermost orbital of a gaseous neutral, isolated atom.
- In a group, Ionisation energy, electron affinity and Electro negativity decreases from top to bottom.
- Valency electrons number, Ionisation energy, electron affinity Electro negativity increases in a period from left to right.

### 3 Marks Questions

#### 1. Mention the group and period of the element having atomic number 20.

1. Element with atomic number 20 is calcium.
2. Calcium element is in the 2nd group of the periodic table.
3. Calcium is arranged in 4th period after K. This element is considered as alkaline earth metal.

#### 2. State New land octet rule and give two examples.

**Octet Law** :- When elements are arranged in the ascending order of their atomic weights, First and eighth element's properties resemble each other.

Upto calcium, elements are arranged according to octet law.

Ex:- (1) Li      Be    B    C    N    O    F    -    Elements  
                 6.9      9.0    10.8    12.0    14.0    16.0    19.0                  Atomic weights

(2)      Na    Mg    Al    Si    P    S    Cl    K    Ca - Elements  
             23.0    24.3    27.0    28.1    31.0    32.1    35.5    39.1    40.1    Atomic weights

#### 3. On which property of the atoms mendeliefs periodic table is formulated and mention the number of groups and periods in this table.

1. Mendelief's periodic table is formulated basing upon atomic weights functions. The physical and chemical properties of elements are periodic functions of their atomic weights.
2. The Horizontal rows are called periods and they are indicated with 1 to 7 Arabic numbers.
3. The vertical rows are called groups. There are 9 such rows. These are indicated with I to VIII and O Roman numbers.
4. I to VII groups are classified into A and B. O and VIII gps do not have subgroups.
5. All elements in a group have the same chemical form.

**4. Explain briefly the demerits of Mendelief's periodic table.**

There are some demerits in Mendelief's periodic table.

1. Position of Hydrogen :-  $H^+$  is formed like Alkali metal ions ( $Na^+$ ),  $H^-$  is formed like halide ion ( $Cl^-$ ). Hence Hydrogen can not be placed either in 1<sup>st</sup> group or in VII group.

1. Position of isotopes :- Isotopes of an element have different atomic weights hence they must be kept in different places. But since they resemble in their properties they should be arranged in the same place.

3. Abnormal pairs of elements :- Argon with Atomic weigh 39.9 is arranged before potassium (39.1).

**5. Describe the reason for arranging Argon (Atomic weight 40) before potassium (Atomic wieght 39).**

Though the atomic weight of Argon (40) is more than potassium (39), depending upon the atomic number argon is kept before potassium. Based upon atomic number and also since Argon resembles the other VIII gp elements, it is kept before potassium in the periodic table.

**6. Define Atomic radius and describe its trend in brief along the period and along the group.**

1. Atomic radius :- When two atoms are bound by a covalent bond, half of the distance between these two nuclei is called Atomic radius.

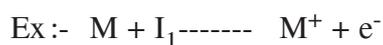
2. In a period Atomic radius decreases from left to right because, from left to right in a period, the number of orbits remains the same and nuclear charge increases and the valence electrons get attracted by the nucleus more and hence atomic radius decreases.

3. In a group, atomic radius increases from top to bottom. Because, in a group from top to bottom orbits number increases and gradually atomic radius increases.

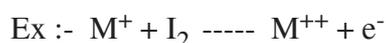
**7. Define Ionisation energy. Mention the first and second Ionisation energies.**

1. The energy required to remove an electron from the outer most orbital of a gaseous neutral isolated atom. Its units are k.j/mole

2. The energy required to remove an electron from the outer most orbital of a gaseous isolated neutral atom is called First ionisation energy.



3. The energy required to remove the second electron from the outer most orbital of a gaseous isolated ion is called second ionisation energy.



**8. Explain the trend of Ionisation energy in a group with an example.**

Ionisation energies in groups :- Example, Alkali elements are Igp elements. From Li to Fr Number of orbits are gradually increasing and hence the valence electrons getting attracted towards nucleus is less since the distance between the nucleus and the valence electrons increases.

Since Nuclear attraction is decreasing in alkali metals from top to bottom, Ionisation energy values decrease. Hence in every group from top to bottom the ionisation energy values decrease.

**5 Marks Questions**

**1. Explain in brief Dabur neirtriods and give an example.**

1. Dabur neir has grouped some elements (three each) and called them as triods.
2. According to Dabur neir classification, the properties of all the elements will be the same. The Atomic weight of the centre atom will be equal to the average of the other two elements Atomic weight .

Ex :-

Element	Atomic weight
Lithium (Li)	7
Sodium (Na)	23
Potassium (K)	39

Lithium, sodium, potassium are a Dabur neir's triod. So the average of the Atomic weights of Lithium and potassium is equal to the Atomic weight of the centre element

$$\text{Atomic weight} = \frac{7 + 39}{2} = 23$$

23 is the Atomic weight of the centre element sodium.

**2. Explain the important features of periodic table with mendel lief periodic Law .**

1. Mendeleif has classified the elements based on atomic weight property. Physical and chemical properties of elements are periodic functions of their atomic weights.
2. When elements are arranged in the ascending order of their atomic weights, in definite intervals elements resemble and they are called groups.

Important features

1. According to this Mendelief periodic table the 7 Horizontal rows are called periods and these are indicated with 1-7 numbers.
2. The vertical rows are called groups. These are indicated with I to VII, 0 and 8 numbers.

3. In a period, left to right elements exhibit variations in properties. In a group elements will have same chemical form but exhibit variation in physical and chemical properties.

**3. Explain Mendelief's periodic classification and mention its 2 demerits.**

Significances: - 1. Elements are arranged in a correct order for the first time.

2. Mendelief has proposed some empty spaces for the new elements which are going to be discovered.

3. About position of hydrogen :- Hydrogen can form  $H^+$  ions like Alkali metals and  $H^-$  ions like Halogens. Hence it can not be kept in Igp or VII gp. This is one demerit.

4. Position of isotopes: Isotopes of an element will have different atomic weights. So these must be given different positions. Isotopes will have chemical resemblance. Hence all isotopes must be kept at one place. This is a demerit.

5. Element's abnormal pairs. In some positions, elements with more atomic weight were kept before the element with less atomic weight. This is also a demerit.

**4. With respect to modern periodic law, explain the groups in periodic table.**

Modern periodic law : Physical and chemical properties of the elements are the periodic functions of their atomic number.

1. According to this law there are 18 vertical rows which are called groups Elements in these groups have same type electronic configuration and have same valence electrons number.

2. Periodic table starts with 1st group Alkali metals and ends with 18th group inert gases. 1st, 2nd groups, 13th to 17th groups elements are called representative elements. These will have incomplete orbits.

3. In the periodic table from 3rd group to 12th group, elements are called transition elements. The outer most two orbits of these are incomplete.

4. Four teen elements from atomic number 58 to 71 are called Lanthanides. With lanthamim (57) which is in 6th period and in group 3, these are shown separately down for the convenience.

5. 14 elements from atomic number 90 to 103 are called ar Acts inides. With Actinium which is in 7th period and in 3rd group these are shown separately down along with lanthanides for convenience.

**5. How modern periodic table is more applicable than Mendeliefs periodic table. (or)**

**What are the demerits of mendeliefts periodic table which were corrected by the modern periodic table.**

Mendelief's periodic table is based on the Atomic weight property. Modern periodic table is based upon the most important property Atomic number and has removed the demerits of mendelief's periodic table. Hence modern periodic table is more applicable.

**Applications :**

1. The demerit of Mendelief's periodic table, position of isotopes is discussed in modern periodic table. Though isotopes of an element have different atomic weights they have same atomic number. So they are placed in the same place. Since they have same chemical properties they are placed in one position.
2. Abnormal pairs of elements : When Mendelief arranged elements according to their atomic weights, Argon is (39.1) kept before potassium (39.1). This is Explained by Modern periodic table. According to atomic number, Argon (18) is kept before potassium (19).

**6. In modern periodic table, among groups and periods, Ionisation energy values have variations. Explain the reasons.**

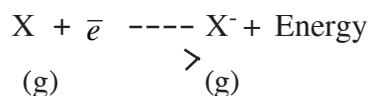
1. Ionisation energy :- The energy required to remove an electron from the outer most orbital of a gaseous isolate neutral atom.



2. In a group Ionisation energy values decrease from top to bottom.
3. Reason is, From top to bottom, in a group the number of orbits increases so the attraction between the valence electrons and nucleus decreases and hence a valence electron can be easily removed and hence the Ionisation energy is less.
4. In a period Ionisation energy values increases from left to right.
5. Reason is in a period from left to right Atomic number increases, nuclear charge also increases and attraction between valence electrons and the nucleus increases. Hence the energy required to remove the valence electron increases.

**7. In modern periodic table, How the electron affinity values change in a group and in a period.**

1. Electron affinity :- The energy change which occurs when an electron is added to the outer most orbital of a gaseous atom.



2. In groups electron affinity value decreases from top to bottom.
3. Reason is in groups from top to bottom, number of orbits increases. Atomic size increases and the attraction of nucleus on valence electrons decreases and hence less amount of energy is released when an electron is added. So electron affinity values decrease.
4. In a period electron affinity values increase from left to right.
5. Reason is in a period from left to right attraction of nucleus on the outer most orbital is more and when an electron is gained by the atom, more energy is released. Hence in a period, electron affinity values increase.

**8. Explain the trend of Electro negativity in a group and in a period in the modern periodic table with Examples.**

1. Electronegativity : The tendency of atoms in a bond to attract the bonded electrons towards them is called Electro negativity.
2. This is a directionless entity. From top to bottom in a group, number of orbits increases and nuclear attraction decreases on the electrons and hence Electro negativity values gradually decrease.
3. Example :- Decreasing order of Electro negativity in 1st group elements.

Elements	Electronegativity
Li	1.0
Na	0.9
K	0.8
Rb	0.8

4. In a period from left to right nuclear attraction on the outer most electrons increases and the tendency of attracting the electrons increases. Hence from left to right in a period Electro negativity increases.

5. Ex:- 1st period

Elements	Li	Be	B	C	N	O	F
Electronegativity	1.0	1.5	2.0	2.5	3.0	3.5	4.0

**9. What are valence electrons ? How do the valency values change in 1st group ?**

The number of electrons present in the outer most orbital of an atom are called as its valency electrons.

1 <sup>st</sup> group	
Elements	Electronic configuration
Lithium	2,1
Sodium	2,8,1
Potassium	2,8,8,1
Rubidium	2,8,8,8,1

All Elements present in 1<sup>st</sup> group have 1 valence electron. So In I group from top to bottom all elements exhibit same valency that is 1.

**10. Atomic weight of an element is 32. There are 16 neutrons in its nucleus. To which group does this element belong ? Mention two compounds of other elements present in that group.**

Atomic weight of the element = 32.

Number of neutrons in the nucleus = 16

Atomic number of that element = Atomic weight - Number of neutrons

$$= 32 - 16$$

$$= 16$$

Elements having Atomic number 16 is sulphur = S

Sulphur having atomic number 16 is kept in 16<sup>th</sup> group below oxygen.

Other elements present in this group are O, Se, Te, Po

Compounds of oxygen are :- (1) MgO (2) H<sub>2</sub>O (3) CO<sub>2</sub> (4) ZnO

Compounds of sulphur are :- (1) SO<sub>2</sub> (2) H<sub>2</sub>SO<sub>4</sub> (3) ZnS

**11. Explain the valencies of 17<sup>th</sup> group elements.**

17<sup>th</sup> group

Elements	Electronic configuration
F	2,7
Cl	2,8,7
Br	2,8,8,7
I	2,8,8,8,7

Elements of 17<sup>th</sup> group have 7 valence electrons. With respect to oxygen these elements from top to bottom exhibit valency 7 and with respect to Hydrogen they exhibit valency 1.

**12. Mention any five differences between Mendeleif and Modern periodic Tables**

Mendeleif periodic Table	Modern periodic table
1. This periodic table is based upon Atomic weights	1. based upon Atomic number.
2. Number of groups is 9	2. Number of groups is 18.
3. In this table some groups are classified into A and B.	3. No classification
4. Proposed some gaps for the new elements.	4. No gaps were proposed.
5. different places should be given to the isotopes with respect to the atomic weights.	5. According to Atomic number one place could be provided.

**13. In the following pairs which is having large size. Explain.**

(a) Li and Ne

Among (a) and (b), 5 marks can be given for writing either (a) or (b).

(a) Li and Ne

1. Atomic Number of Li is 3. its electronic configuration is 2, 1.
2. There are two orbits in Lithium N and L.
3. Atomic number of Ne is 10, its electronic configuration is 2, 8.
4. There are two orbits even in Neon N and L.
5. Though the number of orbits are same since nuclear charge is more in Neon than lithium, valence electrons are entering into the same orbit, they get attracted by the nucleus and the atomic size reduces. So among Lithium and Neon, Lithium is larger than Neon.

**14. Among oxygen and sulphur pair which is Larger in size ? Explain.**

1. Atomic number of oxygen is 8. Its electronic configuration is 2, 8, 6.
2. There are three orbits in this
3. Atomic number of sulphur is 16. Its electronic configuration is 2, 8, 6.
4. There are three orbits in this.
5. Among oxygen and sulphur, Sulphur is larger having more number of orbits. As the number of orbits increase size increases. Oxygen and sulphur belong to the same group. In a group from top to bottom atomic size gradually increases due to the number of orbits increase gradually.

**15. Explain which element in the following is having high ionisation energy ?**

1. Na and Cl

1. Atomic number of sodium is 11. Its configuration is 2, 8, 1. In this valence electron is one. So if it loses one electron it attains stable configuration. Since it is ready to lose electrons, its ionisation energy value will be less.
2. Atomic number of chlorine is 17. Its configuration is 2, 8, 7. Its valence electrons number is 7. So it prefers gaining one electron than losing seven electrons to attain stable configuration. Since it is not ready to lose electrons its ionisation energy value will be more.
3. On comparing Na and Cl, both are present in the same period so number of orbitals are same. Nuclear charge increases from Na to Cl and hence the energy required to remove electrons increases gradually from Na to Cl. So among Na and Cl, chlorine will have high ionisation energy.

**16. Taking an elemental atom and its positive ion pair as an example, Explain which is larger in its size.**

1. Na is an element. Its positive ion is  $\text{Na}^+$

2. Electronic configuration of Na is 2, 8, 1

Number of orbits are 3.

On removing one valence electron from Na, it becomes  $\text{Na}^+$ . Then the electronic configuration will be 2, 8. Now the number of orbits is 2.

Nuclear charge is same in both.

(3) Among Na and  $\text{Na}^+$ , Na atom has 3 orbits.  $\text{Na}^+$  has 2 orbits. Hence Na is larger than  $\text{Na}^+$ .

**17. Discuss the position of lanthanides and Actinides in the modern periodic Table.**

1. Since elements having atomic numbers from 58 to 71 have close relation with lanthanum, these are placed with lanthanum having atomic number 57 in the 3rd group of 6th period in the periodic table. Hence these are called Lanthanides.
2. Since elements with atomic number from 90 to 103 have close relation with Actinium, these are placed with Actinium having atomic number 89 in the 3rd group of 7th period in the periodic table. Hence these are called Actinides.
3. For our convenience sake Lanthanides and Actinides are placed separately at the bottom of the periodic table.

**Fill in the blanks**

1. Triads are the groups having ..... elements. (Three)
2. Atomic weight of the centre element in a triad is equal to the average of First and third elements atomic weights ..... (Atomic weights)
3. If Lithium, sodium and potassium is a triad, atomic weights of Lithium and potassium are 7, 39 then atomic weight of sodium is ..... (23)
4. In a triad, first and third element's atomic weights are 23, 27 then the atomic weight of the centre element is ..... (25)
5. A law which arrange eight elements with their atomic weights in their ascending order is ..... (Octet rule)
6. Periodic table means arranging the elements with ..... Law. (periodic)
7. The scientist who has classified the elements with their Atomic weight is ..... (Mendelief)
8. Mendelief has classified the elements based upon their ..... (Atomic weight)
9. The Horizontal rows present in the periodic table are called ..... (periods)
10. In the periodic table periods are ..... (Horizontal rows)
11. In the periodic table groups are ..... (Vertical rows)
12. In the periodic table vertical rows are called ..... (groups)
13. Proposed number of groups in Mendelief periodic table are ..... (9)
14. The element proposed by Mendelief which resembles Eka Aluminium is ..... (Gallium)

15. The scientist who proposed Modern periodic law ..... (Henry Hosley)
16. The law which is based upon the atomic number is ..... (Modern periodic law)
17. Modern periodic law depend upon the elements' aomic ..... (Number)
18. Number of groups in modern periodic table is ..... (18)
19. Number of periods in modern periodic table is ..... (7)
20. Inert gases are present in ..... group of the periodic table (18)<sup>th</sup>
21. In the first group of the periodic table there are ..... metals (Alkali)
22. The metals present in the 2nd group of the periodic table are ..... (Alkaline Earth metals)
23. Alkali metals are present in ..... group of the periodic table (1st)
24. Alkaline earth metals are present in ..... group of the periodic table (2nd)
25. Halogens are present in ..... group of the periodic table (17th)
26. F<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, I<sub>2</sub> elements are ..... (Halogens)
27. The family of elements in extreme left of the periodic table is ..... (Alkali metal)
28. The family of elements in extreme right of the periodic table is ..... (Inert gases)
29. The number of elements present in the first period of the modern periodic table are ..... (2)
30. The number of elements present in 2nd or 3rd period of the long form of periodic table are ..... (8)
31. The number of elements present in 4th or 5th period of the long form of periodic table are ..... (18)
32. The period which has 32 elements in the long form of periodic table ..... (6<sup>th</sup> or 7<sup>th</sup>)
33. Half the distance between the two nuclei of the two atoms bound by a covalent bond is .....  
(Atomic radius)
34. Valency of Alkali metals is ..... (1)
35. Atomic radii in a period gradually ..... (decreases)
36. Atomic radii in groups gradually ..... (increases)
37. In a group from top to bottom ionic radii gradually ..... (increases)
38. In a period from left to right ionic radii gradually ..... (decreases)
39. The energy required to remove an electron from the gaseous atom is ..... (ionisation energy)

40. From Left to right Ionisation energy in a period gradually ..... (increases)
41. From top to bottom in a group Ionisation energy values gradually ..... (decreases)
42. The energy required to add an electron to a gaseous atom or the energy accepted by the atom is..... (Electron affinity)
43. In a group from top to bottom Electron affinity gradually ..... (decreases)
44. In a period from left to right Electron affinity gradually ..... (increases)
45. The tendency of bonded atoms to attract the electrons present in the bond towards them is called ..... (Electro negativity)
46. In a group from top to bottom electro negativity gradually ..... (decrease)
47. In a period from left to right Electro negativity gradually ..... (increase)
48. Elements which have electropositive and can be made into wires and sheets are ..... (metals)
49. In a group from top to bottom ..... characters increase. (metallic)
50. In a period from left to right metallic characters ..... (decrease)
51. In a period attraction between nucleus and electrons ..... (increases)
52. Ionisation energy of the 1<sup>st</sup> element in a period will be ..... (minimum)
53. The radius of its cation is ..... than the radius of neutral atom of an element. (small)
54. In the same period if First element sodium is metal, the last element chlorine (Cl) is ..... (non metal)
55. In the same group if First element carbon is a non metal, the last element lead (Pb) is ..... (metal)
56. Metallic characters of elements depends upon ..... energy. (ionisation)
57. The element which has low ionisation energy contains ..... charge. (positive)
58. Example for a metalloid ..... (silicon or Germanium)
59. Electropositive nature means ..... (Electron losing nature)
60. Electro negative nature means ..... (Electron Accepting nature)
61. Reactivity of an element having less ionisation energy is ..... (more)
62. Reactivity of an element having more ionisation energy is ..... (less)

## Multiple Questions

1. Triad means ( 3 )  
(1) group of 5 elements (2) group of 4 elements  
(3) groups of 3 elements (4) group of 8 elements
2. The rule which arrange eight elements in their Atomic weight ( 3 )  
(1) Mendelief periodic law (2) Modern periodic law  
(3) Octet rule (4) Dabur Neir triods
3. Mendelief periodic table is based upon ( 2 )  
(1) Atomic number (2) Atomic weight (3) Atomic size (4) Atomic volume
4. In a group from top to bottom, Ionisation enrgy ( 2 )  
(1) Increase (2) decreases (3) No change (4) Increses and decreases
5. The element which resembles Eka aluminium is ( 2 )  
(1) Indium (2) Galium (3) Aluminium (4) Scandium
6. Alkali metal in the following is ( 1 )  
(1) sodium (2) Megnesium (3) Oxygen (4) Helium
7. Inertgas from the following ( 3 )  
(1) Chlorine (2) oxygen (3) Argon (4) Hydrogen
8. The group of elements having high electro positivity ( 1 )  
(1) I and II (2) III and IV (3) IV and V (4) V and VI
9. Atomic weight of the centre element in Dabur Neir triod is ( 4 )  
(1) Equal to the product of 1st and 3rd element Atomic weight  
(2) Equal to the Ratio of 1st and 3rd elements Atomic weight  
(3) Equal to the sum of 1st and 3rd elements atomic weight  
(4) Equal to the average of 1st and 3rd elements atomic weights.
10. The number of groups in Mendelief's periodic Table is ( 2 )  
(1) 5 (2) 9 (3) 8 (4) 18
11. The scientist who proposed the modern periodic law ( 2 )  
(1) Dabur Neir (2) Mosely (3) Mendelief (4) Newlong

12. Which one is not an Inertgas ( 4 )  
 (1) Helium (2) Neon (3) Argon (4) chlorine
13. The number of groups in modern periodic table ( 1 )  
 (1) 18 (2) 8 (3) 10 (4) 9
14. The element present before potassium in Alkalimetal group is ( 1 )  
 (1) sodium (2) Lithium (3) Rubidium (4) Hydrogen
15. Valency of 1<sup>st</sup> group elements is ( 1 )  
 (1) 1 (2) 3 (3) 4 (4) 2
16. The abnormal pair of Elements in the following ( 3 )  
 (1) H and He (2) Ne and Ar  
 (3) Ar and K (4) K and O
17. To which group Inertgases belong ( 4 )  
 (1) 15 (2) 17 (3) 16 (4) 18
18. Valency of Inert gases is ( 4 )  
 (1) 8 (2) 7 (3) 1 (4) 0
19. In periodic table Alkaline earth metals are present in group ? ( 3 )  
 (1) I (2) III (3) II (4) VII
20. The number of periods and groups present in modern periodic table are ( 4 )  
 (1) 9,7 (2) 7,9 (3) 18,7 (4) 7,18
21. In the long form of periodic table Halogens are ( 4 )  
 (1) 1<sup>st</sup> group elements (2) 5<sup>th</sup> group elements  
 (3) 18<sup>th</sup> group elements (4) 17<sup>th</sup> group elements
22. Which one is not a halogen ? ( 1 )  
 (1) O<sub>2</sub> (2) Cl<sub>2</sub> (3) F<sub>2</sub> (4) Br<sub>2</sub>

23. The family of elements present in the left side of the periodic table is ( 3 )  
 (1) Alkaline earth metals (2) Halogen family (3) Alkali metals (4) Inertgas family
24. The elements present in the 1st period of the modern periodic table ( 4 )  
 (1) 4 (2) 8 (3) 1 (4) 2
25. The elements present in 2nd period of the modern periodic table ( 2 )  
 (1) 2 (2) 8 (3) 18 (4) 32
26. The number of elements present in 5th period of the modern periodic table ( 4 )  
 (1) 15 (2) 16 (3) 17 (4) 18
27. The period which contains 32 elements in the long form periodic table ( 3 )  
 (1) 5 (2) 8 (3) 6 (4) 4
28. The element which has zero valency is ( 4 )  
 (1) Na (2) H (3) Al (4) Xe
29. The element which is not a metal ( 4 )  
 (1) Mg (2) Na (3) Al (4) C
30. Si and Ge elements are ( 3 )  
 (1) metals (2) non metals (3) metalloids (4) Halogens
31. Carbon is ( 2 )  
 (1) metal (2) non metal (3) Inert substance (4) metalloid
32. The group which contains the maximum elements in periodic table is ( 3 )  
 (1) 3 (2) 4 (3) 1 (4) 2
33. Elements of II group. ( 3 )  
 (1) B, C, N (2) Ar, K, Ca (3) Be, Mg, Ca (4) Se, Te, As
34. Example for Dobson's triad ( 4 )  
 (1) Li, Be, B (2) Be, B, C (3) Li, O, F (4) Li, Na, K
35. Elements in Newland's Arrangement ( 1 )  
 (1) 8 (2) 18 (3) 32 (4) 3

36. Elements having eight electrons in outer most orbital ( 3 )  
(1) Halogens (2) Alkali metals (3) Inert gases (4) Alkaline earth metals
37. Element having stable electronic configuration in outer most orbital ( 2 )  
(1) Hydrogen (2) Argon (3) sodium (4) chlorine
38. Lanthanides are ( 1 )  
(1) Elements from 58 to 71 (2) Elements from 71 to 90  
(3) Elements from 90 to 103 (4) Elements from 91 to 103
39. Actinides are ( 4 )  
(1) Elements from 58 to 71 (2) Elements from 71 to 90  
(3) Elements from 58 to 103 (4) Elements from 90 to 103

# 5

## Lesson

# Chemical Bonds

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### Objectives

- To explain the reasons for the formation of chemical bonds
- To explain the formation of ionic bond with examples.
- To explain the properties of ionic compounds
- To explain the differences between polar, non polar, ionic covalent bonds
- To explain the bonding in metals and Hydrogen bond.

### Important Points

- 1) Atoms Combine to attain a stable electronic configuration with eight electrons in the outer most orbital.
- 2) Ionic bond is the electrostatic force of attraction that holds the cation and anion together.
- 3) The bond formed by sharing the electrons between two atoms is called covalent bond.
- 4) The angle between the two bonds in a covalent molecule is called bond angle.
- 5) The energy required to break one mole of covalent compound is called bond energy.
- 6) The bond formed by sharing four electrons or two pairs of electrons is called a double bond.
- 7) Heterogenous molecule : A molecule formed by two different type of atoms.
- 8) Homogenous molecule : A molecule formed by two same type of atoms

- 9) Single bond is a bond formed by sharing two electrons or a pair of electrons.
- 10) Triple bond is formed by sharing six electrons or three pairs of electrons.

### 3 Marks

#### 1. What is a chemical bond ? Explain the chemical bond formation between atoms.

The force of attraction between atoms in a compound is called chemical bond.

By the formation of a chemical bond, the compounds energy decreases. The energy of a compound is less than the energies of its atoms.

By decrease in the energy, the compounds stability increases. So the main reason for the formation of a chemical bond is compound's stability.

#### 2. Mention three properties of Ionic compounds.

Ionic compounds are crystalline solids. They are hard in nature.

Boiling points and Melting points are high for the Ionic compounds.

Ionic compounds conduct electricity in their liquid state and also in their aqueous solutions.

Ionic compounds are generally soluble in water. They are not soluble in carbon solvents like ether, alcohol, carbon tetra chloride etc.

#### 3. Define Ion? Mention two types of ions.

Atom containing positive or negative charge is called ion.

Two types of Ions. (1) Cation

(2) Anion

#### 4. Define Ionic bond and give two examples for ionic compounds.

Ionic bond is the electro static force of attraction that holds the cation and anion together.

Ionic compounds : (1) Sodium chloride or NaCl

(2) Magnesium oxide or MgO

(3) Magnesium chloride or Mg Cl<sub>2</sub>

(4) Calcium chloride or CaCl<sub>2</sub>

**5. Define covalent bond and give two examples for covalent compounds.**

A bond formed by sharing of electrons between atoms is called covalent bond.

Covalent compounds :

1. Hydrochloric Acid or HCl

2. Hydrogen or  $H_2$

3. Chlorine or  $Cl_2$

4. Oxygen or  $O_2$

5. Nitrogen or  $N_2$

6. Carbon Dioxide or  $CO_2$

7. Water or  $H_2O$

**6. Mention three properties of covalent compounds.**

Covalent compounds exist in gaseous, liquid or solid state.

The melting, boiling points of covalent compounds are less than ionic compounds.

Covalent compounds do not conduct electricity. These are called as bad conductors.

Generally covalent compounds do not dissolve in water but dissolve in carbon solvents like alcohol, chloroform, benzene.

**7. What are bond entities? Mention any two bond entities.**

Covalent bond is associated with some specific values.

These are called bond entities.

Some bond entities : Bond length, Bond angle.

Bond energy, Bond polarity.

**8. What is Bond length, give the bond lengths of C-C and C=C.**

The distance between the two nuclei in a covalent bond is called as bond length.

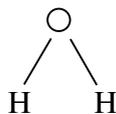
C - C length = 154 pico meters

C = C Bond length = 134 pico meters.

**9. What is bond angle ? Draw the water molecule structure and write the bond angle**

- The angle between the two bonds in a covalent compound is called bond angle.

- Structure of water molecule



- Bond angle of water molecule  $104.5^\circ$

**10. Define Bond energy write the bond energies in N-N and N = N.**

The energy required to dissociate one mole of molecules present in a covalent compound is called Bond energy.

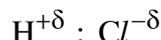
$$\text{N-N Bond energy} = 160 \text{ KJ/mol.}$$

$$\text{N = N Bond energy} = 418 \text{ KJ/mol.}$$

**11. Define bond polarity. Explain with an example.**

When a covalent bond is formed between heterogenous atoms, the shared electron pair of electron is attracted more towards more electro negative atom. Due to this the molecule acquires partial ionic character or polarity.

Example : In HCl molecule, the shared electron pair moves more towards more electro negative chlorine. As a result of this Hydrogen positive pole, chlorine negative poles are formed



This chareacter shown by HCl is called as polarity.

**12. How many orbits are present in magnesium atom ? Draw the electron arrangement in those orbits.**

Electronic configuration of Mg is, 2, 8, 2

number of orbits is 3.

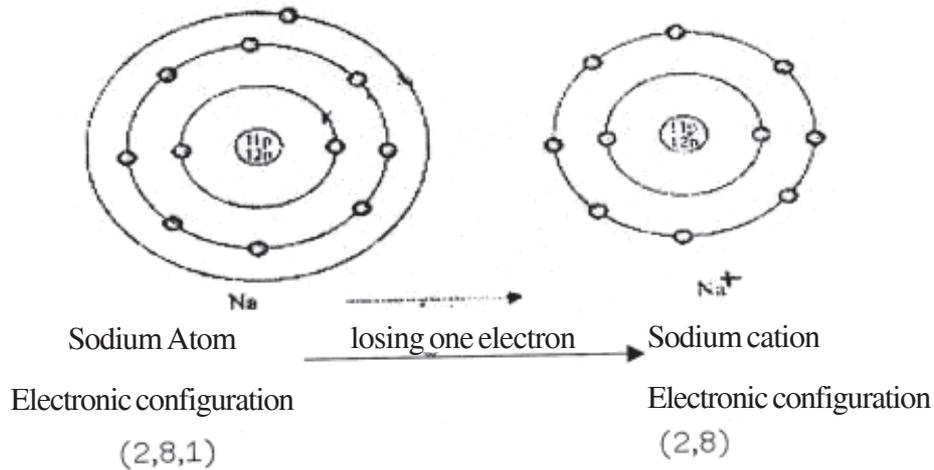
Arrangement of electrons in magnesium

Mg

Mg<sup>+2</sup>

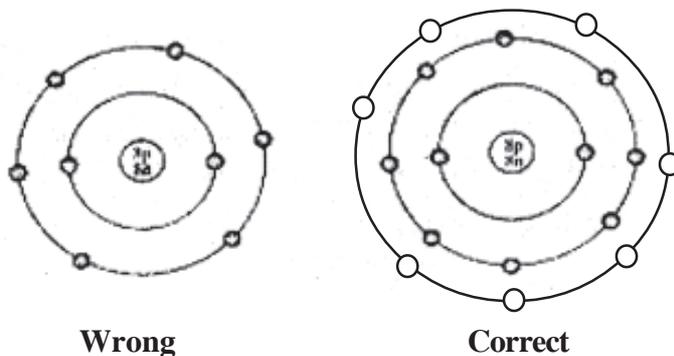
**13. How sodium ion is formed ? Draw the arrangement of electrons in Na and Na<sup>+</sup>.**

- Atomic number of Na is 11. Its Electronic configuration is 2, 8, 1.
- On losing its one electron present in the outer most orbit, sodium becomes Na<sup>+</sup> ion.



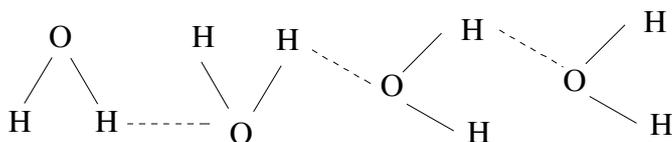
**14. Correct the defect given in the diagram showing the electronic arrangement in chlorine atom.**

- Atomic number of chlorine is 17. Its electronic configuration is 2, 8, 7.
- So there should be 7 electrons in the outer most orbit.
- There are only 6 electrons in the outer most orbit in the given diagram.
- Correction.



**15. Draw the diagram showing hydrogen bond in water molecules.**

Hydrogen bond in water molecule.



**16. Define hydrogen bond. Give two examples for the compounds in which hydrogen bond is formed.**

When Hydrogen form abond with an electronegative element, there will be a possibility of hydrogen of that molecule gets attracted by the adjuscent electronegative atom.

- Compounds having hydrogen bond    1)  $H_2O$

2)  $HF$

**17. Define cation and Anion. Give an example for each.**

Cation :- The ion formed by losing electrons from the atom is called cation

Example :-  $Na^+$ ,  $Mg^{2+}$ ,  $Al^{3+}$ ,  $Ca^{2+}$ ,  $K^+$

Anion :- The ion formed by gaining electrons by the atom is called Anion.

Example :-  $Cl^-$ ,  $F^-$ ,  $O^{2-}$ ,  $N^{3-}$

**18. Classify the following ions into cations and Anions.**

$NH_4^+$ ,  $SO_4^{2-}$ ,  $Na^+$ ,  $H^+$ ,  $F^-$ ,  $Br^-$

Cations

Anions

$NH_4^+$ ,  $Na^+$ ,  $H^+$

$SO_4^{2-}$ ,  $F^-$ ,  $Br^-$

**19. Classify the following compounds into ionic and covalent compounds.**

$HCl$ ,  $NaCl$ ,  $MgCl_2$ ,  $H_2O$ ,  $CO_2$ ,  $HF$

Ionic compounds

Covalent compounds

$NaCl$ ,  $MgCl_2$

$HCl$ ,  $H_2O$ ,  $HF$ ,  $CO_2$

**20. Classify the following molecules into polar and non polar molecules.**

$H_2O$ ,  $O_2$ ,  $Cl_2$ ,  $HCl$ ,  $CO_2$ ,  $H_2$

Polar molecules

non polar molecules

$HCl$ ,  $H_2O$ ,  $CO_2$

$O_2$ ,  $Cl_2$ ,  $H_2$

## 5 Marks

1. Write the electronic configuration of Ne and Na. Explain the difference of their reactivity.

Electronic configuration of Ne is 2,8

Electronic configuration of Na 2, 8, 1.

Atoms having 8 electrons in the outermost orbit are stable and they do not form any compounds.

Ne is stable as it contains 8 electrons in outer most orbit. Ne do not participate in reactions.

Na contains one electron in outer most orbit. Hence Na tend to lose that electron and get stability and participates in reactions.

2. Illustrate the formation of Ionic bond with an Example. Explain.

NaCl is an ionic compound.

Na has atomic number 11, Its electronic configuration is 2, 8, 1.

It loses the electron in the outer most orbit and becomes  $\text{Na}^+$ .

Atomic number of chlorine is 17. Its electronic configuration is 2, 8, 7.

It gains an electron and becomes  $\text{Cl}^-$ .

$\text{Na}^+$ ,  $\text{Cl}^-$  ions thus formed gets attracted by the electrostatic force. This is called ionic bond.

3. Explain the formation of covalent bond. Explain the bond formation in HCl.

HCl is a covalent compound.

Atomic number of hydrogen is 1. Its electronic configuration 1.

Atomic number of chlorine is 17. Its electronic configuration is 2, 8, 7.

Hydrogen and chlorine atoms require one electron each to attain stability. These two atoms share their electrons and attain stable configuration.



The bond thus formed is called covalent bond.

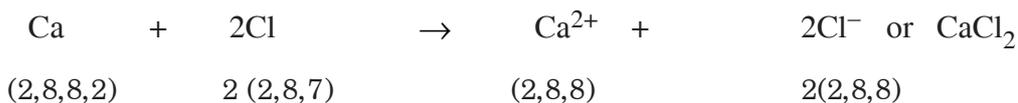
#### 4. Explain the formation of calcium Chloride.

Atomic number of calcium is 20. Its configuration is 2, 8, 8, 2.

To attain octet, calcium atom loses its two electrons from the outer most orbit and becomes  $\text{Ca}^{2+}$ .

Atomic number of chlorine is 17. Its electronic configuration is 2, 8, 7.

Chlorine gains one electron to get eight electrons in the outer most orbit and becomes  $\text{Cl}^-$  two such chlorine ions and calcium ion come closer and form  $\text{CaCl}_2$  compound.



#### Fill in the blanks with the correct Answers.

1. When the atoms of different elements combine ..... are formed (compounds)
2. Same type of atoms combine and form ..... (element)
3. The properties of a compound depends upon the ..... between its atoms. (nature of bonds)
4. Helium, Neon, Argon, Krypton, Xenon, Radon are called ..... (Inertgases)
5. The attain stability, the atom should contain ..... electrons in the outer orbit (8)
6. The attraction force between the atoms in a compounds is ..... (Chemical bond)
7. Ion having ..... charge is Anion. (negative)
8. Ion having ..... charge is cation. (positive)
9. Ion having negative charge is ..... (Anion)
10. Ion having positive charge is ..... (cation)
11. An atom having positive or negative charge is called ..... (Ion)
12. Atomic number of sodium is 11. Its electronic configuration is ..... (2, 8, 1)
13. Chlorine having atomic number 17. Its electronic configuration is ..... (2, 8, 7)
14. The electro static force which keeps the cation and anion together is called ..... (Ionic bond)
15. Atomic number of Magnesium is 12. Its electronic configuration is ..... (2, 8, 2)

16. Atomic number of oxygen is 8. Its electronic configuration is ..... (2, 6)
17. The three dimensional system arrangement of its Anions and cations in the crystal is called .....  
(Crystal lattice)
18. Generally Ionic compounds dissolve in ..... (water)
19. The bond formed by sharing of electrons between atoms is called ..... bond (covalent)
20. The bond indicated by between two atoms is ..... (covalent bond)
21. When covalent bond is formed, the distance between two nuclei is ..... (bond length)
22. A molecule having a bond formed between two atoms of the same element is .....  
(homo nuclear molecule)
23. A molecule having a bond formed between two atoms of different atoms is .....  
(heterogenous molecule)
24. The shape of oxygen molecule is ..... (linear)
25. The shape of Nitrogen molecule is ..... (linear)
26. The shape of Carbon dioxide molecule is ..... (linear)
27. The shape of water molecule is ..... (Angular)
28. The shape of methane is ..... (Tetrahedron)
29. The shared electron pair in  $\text{HCl}$  molecule is towards ..... (Chlorine)
30. Covalent compounds dissolve in ..... solvents. (carbon)
31. Atoms attaining 8 electrons in outer orbit is ..... (octet rule)
32. The bond formed by sharing two pairs of electrons ..... (double bond)
33. The bond formed by sharing three pairs of electrons..... (Triple bond)

### Multiple Choice Questions

1. Which one is not an Inertgas in the following ( 3 )  
(1) Ne (2) He (3) Mg (4) Ar

2. Ionic compounds dissolve in ( 2 )  
(1) Alcohol (2) water (3) Ether (4) Carbontetra chloride
3. The bond angle in water molecule is ( 4 )  
(1)  $109.5^{\circ}$  (2)  $106.4^{\circ}$  (3)  $105.4^{\circ}$  (4)  $104.5^{\circ}$
4. Ionic compound in the following ( 2 )  
(1) HCl (2) NaCl (3)  $H_2O$  (4)  $CO_2$
5. Covalent compound in the following ( 1 )  
(1) HCl (2) NaCl (3)  $MgCl_2$  (4)  $CaCl_2$
6. Which is not an ionic compound property in the following ( 3 )  
(1) Ionic compounds are crystalline solids  
(2) Melting and boiling points of Ionic compounds are high  
(3) Ionic compounds are electrical conductors in solid state.  
(4) Ionic compounds generally dissolve in water
7. To attain octet chlorine atom needs the following number of electrons ( 1 )  
(1) 1 (2) 2 (3) 3 (4) 4
8. Which is not a covalent compound property among the following ( 4 )  
(1) Covalent compounds are in gaseous, liquid or solid state compounds  
(2) The melting and boiling points of covalent compounds are higher than Ionic compounds  
(3) Covalent compounds are bad electrical conductors.  
(4) covalent compounds generally dissolve in water.
9. The shape of carbon dioxide molecule is ( 1 )  
(1) Linear (2) Angular (3) Tetrahedron (4) Crystal
10. Which energy increases with the number of bonds between two atoms ( 1 )  
(1) Bond energy increases with the number of bonds between two atoms  
(2) Bond length increases with the number of bonds between two atoms  
(3) Bond energy decreases with the number of bonds between two atoms.  
(4) Bond length does not change with the number of bonds between two atoms

11. To attain octet Magnesium has to ( 4 )  
(1) Accept one electron (2) lose one electron  
(3) Accept two electrons (4) lose two electrons
12. The charge of sodium ion is ( 2 )  
(1) 1 - (2) 1 + (3) 2 - (4) 2 +
13. The electronic configuration of Aluminium is ( 3 )  
(1) 2,8,1 (2) 2,8,2 (3) 2,8,3 (4) 2,8,4
14. The nearest Inertgas electron configuration for pottasium is ( 3 )  
(1) 2 (2) 2,8 (3) 2,8,8 (4) 2,8,18,8

# 6

## Lesson

# Chemical Reactions and Chemical Arthematics

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### Objectives

- Explaining the types of chemical reactions.
- Defining Acid, Base and salts with examples.
- Describing Acid, base neutralisation in water solution.
- Defining  $P^H$  and solving some common problems on  $p^H$ .

### Important Points

- Chemical combination : Two or more compounds react and forms a compound in a chemical reaction it is called chemical combination.
- Splitting of a compound into two or more small compounds in a chemical reaction it is called as chemical decomposition.
- If one element is removed by another element it is called chemical displacement.
- Homogenous reactions are those in which reactants and products are in the same state.
- Heterogenous reactions are those in which reactants and products are in different states.
- If the chemical reactions proceed in slow rate they are called as slow reactions.
- If the chemical reactions proceed in fast rate, they are called as Fast reactions.

- Most of the reactions are not so fast and not so slow. Such reactions are called as moderate reactions.
- If heat is released in a chemical reaction, it is called as exothermic reactions.
- If heat is absorbed during the chemical reaction it is called as endothermic reaction.
- A compound containing  $H^+$  ions in its aqueous solution is called Acid.
- If a compound contains  $OH^-$  in its aqueous solution it is called base.
- A compound formed by the combination of acid and base in presence of water is called salt.
- Losing electrons in a reaction is called oxidation.
- Gaining electrons in a reaction is called reduction.

### 3 Marks

#### 1. Explain chemical combination with two examples.

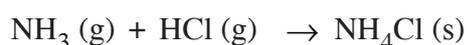
A. Examples for chemical combination reaction.



carbon + oxygen  $\rightarrow$  carbon Dioxide

Carbon combines with oxygen to give carbon dioxide.

b) Ammonia combines with Hydrogen chloride to give Ammonium chloride.



If two or more compounds react to give a new compound in a chemical reaction, it is called chemical combination.

#### 2. Give four examples for chemical decomposition.

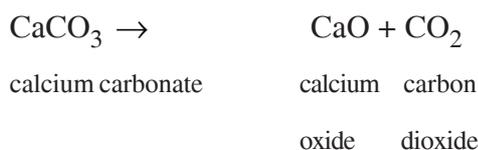
A. In a chemical reaction, if a compound is splitting into two or more small compounds, it is called as chemical decomposition.

Examples for chemical decomposition.

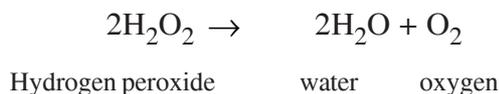
a) If potassium chlorate is heated it decomposes and give potassium chloride and oxygen.



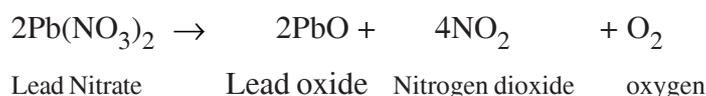
b) If calcium carbonate is heated, It decomposes into calcium oxide and carbondioxide



c) If hydrogen peroxide is heated it decomposes into water and oxygen.



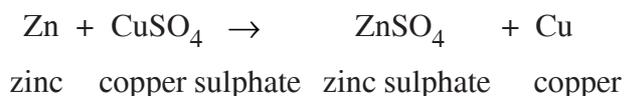
d) Lead nitrate decomposes into lead monoxide, Nitrogen dioxide and oxygen



### 3. Give four examples for chemical displacement.

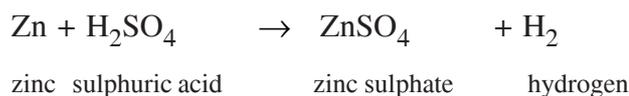
A. Examples for chemical displacement.

1. Displacement of a meatal with a more reactive metal



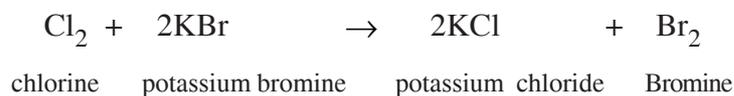
2. More active metals displace Hydrogen from its acid solutions.

Zinc displaces Hydrogen from dilute sulphuric acid.

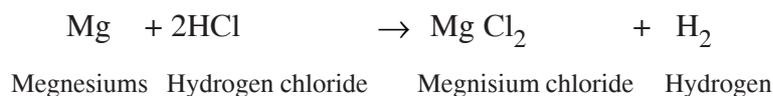


3. Halogen gets displaced by more reactive halogen.

chlorine displaces bromine from potassium bromide solution.



4. Megnesium displaces Hydrogen from dilute hydro chloric acid.

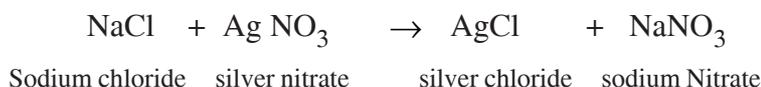


If one element displaces another element in a chemical reaction it is called as chemical displacement.

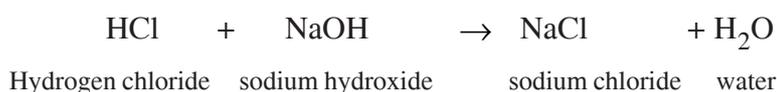
#### 4. Explain double decomposition with two examples.

A. Two examples for double decomposition.

a) In the reaction between sodium chloride and silver nitrate, silver chloride and sodium Nitrate are formed.



b) On neutralising Hydrochloric acid with sodium hydroxide, sodium chloride and water are formed.



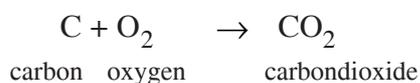
A chemical reaction, in which the ions of ionic compounds exchange is called a double decomposition reaction.

#### 5. Give any two examples for oxidation and Reduction reaction.

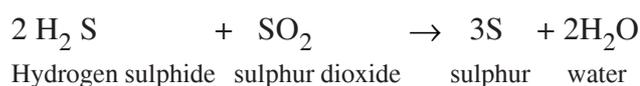
A. At the same time. One compound oxidises and the other reduces. The reactions in which oxidation and reductions are present are called as Red - Ox reactions.

Examples

a) Carbon takes oxygen and gets oxidised and oxygen gets reduced. Carbon reacts with oxygen and gives carbon dioxide.

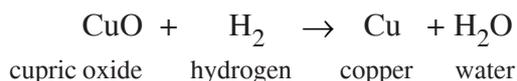


b) Hydrogen sulphide reacts with sulphur dioxide and form Sulphur and water.



Here, hydrogen sulphide has lost hydrogen and gets oxidised. Sulphur dioxide lost oxygen and sulphur is formed by reduction.

c) Cuprioxide reacts with hydrogen and gives water and copper.



Here cupric oxide lost oxygen and gets reduced Hydrogen reacts with oxygen and gets oxidised and form water.

**Oxidation:** In this process electrons are lost.

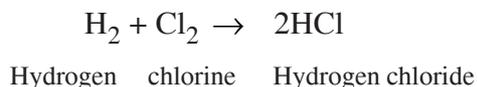
**Reduction :-** In this process electrons are gained.

## 6. Explain homogenous reactions with two examples.

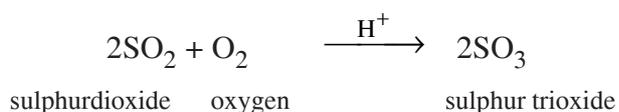
A. Examples for gaseous homogenous reactions.

In this reaction reactants and products are in gaseous state.

a) Hydrogen reacts with chlorine and form hydrogen chloride.



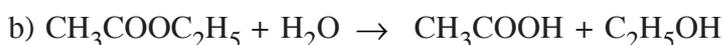
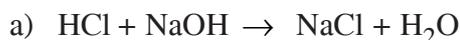
b) Sulphur dioxide reacts with oxygen and form sulphur trioxide



## Liquid homogenous reactions.

In this reaction reactants and products are in liquid state.

Hydrochloric acid reacts with sodium hydroxide and give sodium chloride and water.



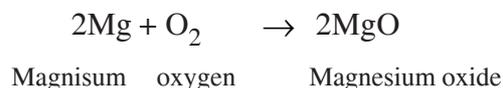
The reactions in which reactants and products are in same state are called homogenous reactions.

These reactions are possible only in solid and gaseous states.

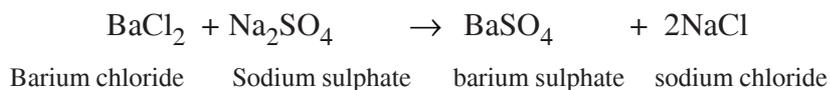
## 7. Explain heterogenous reactions with two examples.

A. Example for heterogenous reaction.

(a) Magnesium reacts with oxygen and gives Magnesium oxide.



(b) Barium chloride reacts with sodium sulphate and gives barium sulphate and sodium chloride.



Reactions in which reactants and products are present in more than one physical states, they are called heterogenous reactions. These reactions are possible between at least one solid and one or more solid, liquid or gaseous compounds.

### 8. Describe slow and fast reactions with two examples each.

- A. If the chemical reactions proceed slow they are called slow reactions. When reactions proceed fast they are called as fast reactions.

#### Examples for slow reactions

- a) Rusting of Iron.
- b) Milk changing into curds

Both of these reactions are slow in nature.

#### Examples for fast reactions

- a) Acid reaction on litmus paper.
- b) Explosion of crackers.

Different reactions proceed with different speed. Depending upon the speed of the chemical reactions there are classified into slow and fast reactions.

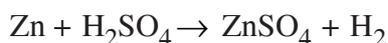
### 9. Differences between exothermic and Endothermic reactions.

A. Exothermic reactions	Endothermic reactions
1) If heat is released in a chemical reaction, that reaction is called Exo-thermic reaction	1) If a chemical reaction is proceeded by absorbing heat, it is called endothermic
2) Heat is indicated as a product in these Examples for Exothermic reactions.	2) Heat is shown as a reactant in these Examples for endothermic reactions
a) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + 571.5 \text{ kJ}$	a) $\text{N}_2 + \text{O}_2 + \text{heat} \rightarrow 2\text{NO}$
b) $\text{C} + \text{O}_2 \rightarrow \text{CO}_2 + 393.5 \text{ KJ}$	b) $2\text{KClO}_3 + \text{heat} \rightarrow 2\text{KCl} + \text{O}_3$
c) $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O} + 57.3 \text{ KJ}$	c) $2\text{Pb}(\text{NO}_3)_2 + \text{heat} \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$

### 10. Describe moderate reactions with two examples

- A. Examples for moderate reactions

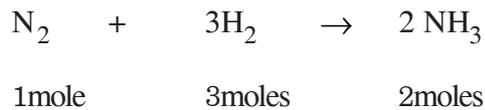
- a) Burning of candle thread
- b) When zinc is treated with sulphuric acid, zinc sulphate and hydrogen are formed.



Most reactions proceed in such way that they are not too fast or not too slow. Such reactions are called as moderate reactions.



**15. How much Nitrogen and Hydrogen are required to get 680 gms of NH<sub>3</sub> Ammonia.**



Atomic number of N = 7. Atomic weight of Nitrogen = 14;  $\text{N}_2 = 14 \times 2 = 28\text{gms}$

Atomic number of H = 1; Atomic weight = 2.  $3\text{H}_2 = 6 \text{ gms.}$

$$2\text{NH}_3 = 34 \text{ gms.}$$

Hence to get 34 gms of Ammonia, 28 gms of N<sub>2</sub> is required. For 680 gms of Ammonia,

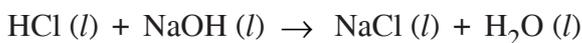
$$28 \times \frac{680}{34} = 560\text{gms of N}_2 \text{ is required.}$$

In the same way 34 gms of Ammonia can be produced from 6gms Hydrogen.

$$680 \text{ gms of Ammonia requires } 6 \times \frac{680}{34} = 120\text{gms. of Hydrogen is required.}$$

**16. How much Hydrochloric acid is required to neutralise 1kg. Sodium hydroxide.**

A. The neutralisation reaction between Hydro chloric acid and sodium hydroxide is in the following way.



1 mole          1mole

$$1+35.5 \quad 23+16+1 = 40\text{gms}$$

HCl Atomic weight = 36.5g

NaOH Atomic weight = 40 g.

Weight of HCl required to neutralise 40 gms of NaOH = 36.5 gms.

1 Kg means 1000 gms Hence

weight of HCl required to neutralise NaOH

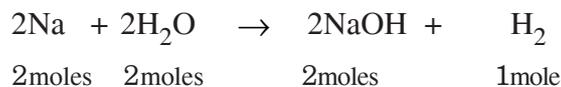
$$\text{weight of HCl} = 36.5 \times \frac{1000}{40} = 912.5\text{gm.}$$

$$\text{weight of HCl} = 912.5 \text{ gm.}$$

17. From the following equation calculate  $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$

a) The number of moles of sodium which react with 4 moles of water.

b) Weight of sodium hydroxide formed when 4.6 gms of sodium reacted with excess water.



Na = Atomic number of sodium = 11; Atomic weight = 23

H = Atomic number = 1 Atomic weight 1 ;  $\text{H}_2 = 2$

O = Atomic number of oxygen = 8 Atomic weight 16;  $\text{O} = 16$

$\text{H}_2\text{O}$  Atomic weight = 18

2 moles of water react with 2 moles of sodium.

4 moles of water can be reacted with 4 moles of sodium.

b) 46 gms of sodium produce 80 gms of sodium hydroxide.

Weight of sodium hydroxide that formed by the reaction of 4.6 gm of sodium with excess of water =

$$80 \times \frac{4.6}{46} = 8.0\text{gms.}$$

weight of sodium hydroxide = 8.0 gms.

18. An acid A and base B react with water and form a compound CD. When cation and anion of that compound are monovalent,

a) What type of substance is CD

b) Among CD, A and B which one changes the Red litmus into blue.

c) Among CD, A and B which is having sour taste.

A. a) CD is a salt.

b) Among CD, A and B, B changes the Red litmus into blue.

c) Among CD, A and B, A will have sour taste.

19. Calculate pH of 0.001 molar solution of HCl.

A. HCl is a strong acid and it decomposes completely in its solution.



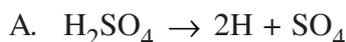
concentration of  $\text{H}^+$  ion is 0.001 molar. or  $1 \times 10^{-3}$  moles/lit.

Hence  $[\text{H}^+] = 1 \times 10^{-3}$  moles/lit

$$\text{pH} = -\log [\text{H}^+] = -(-3) = 3$$

Hence pH = 3.

**20. When the concentration of sulphuric acid is  $5 \times 10^{-5}$  M, What is its  $p^H$  in its aqueous solution?**



1 mole sulphuric acid gives two moles of  $H^+$  ions in the solution.

one litre of  $5 \times 10^{-5}$  molar solution contains  $5 \times 10^{-5}$  moles  $H_2SO_4$ .

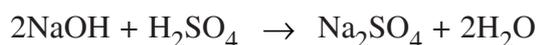
Thus  $5 \times 10^{-5} \times 2 = 10 \times 10^{-5} = 10^{-4}$  moles of  $H^+$  is obtained.

So  $[H^+] = 10^{-4}$  moles /lit.

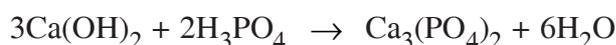
$$pH = -\log [H^+] = -\log 10^{-4} = (-4) = 4.$$

**21. Explain neutralisation with two examples.**

A. a) Sodium hydroxide reacts with sulphuric acid and form sodium sulphate and water. This is an acid base reaction.



b) Formation of calcium phosphate and water from calcium hydroxide and phosphoric acid is an example for the acid base reaction.



The substance formed by the reaction of an acid with a base is called salt.

In this, cation of the base and Anion of the acid are present.

This reaction between acids and bases is called neutralisation reaction.

**22. Explain Electrolytesubstances and non electrolyte substance with examples.**

A. Acids, bases and salts are electrolytes.

When sodium chloride dissolves in water electrolytic solution is formed. This dissociates into positively charged sodium ion  $Na^+$  and negatively charged chloride ion  $Cl^-$ . In alcohol and water solutions, it dissociates. So Electrolyte substance is the one which conducts electricity in liquid or in dissolved state. Some electrolytes completely dissociate into ions. These are called strong electrolytes. Examples for the strong electrolyte substances are potassium hydroxide and Hydrochloric acid.

The molecules in non electrolytic substances do not possess electrical charges. They do not dissociate in their liquid state. For example when sugar is dissolved in water, sugar molecules are united and then do not dissociate. A non electrolytic substance is the one which does not conduct electricity in its liquid state.

**23. Describe the decomposition of Acids with examples.**

A. Acids decompose in two ways. They are

- 1) Dissociation of strong acids.
- 2) Dissociation of weak acids

- 1) From 1 mole of Hydrochloric acid, one mole hydrogen ions and chloride ions are formed.



HCl is completely converted into its ions. So  $\text{H}^+$  ion concentration is equal to the HCl.

- 2) Acetic acid partially dissociate into its ions. It is a weak electrolyte.



This is reversible reaction. An equilibrium is formed between dissociated and undissociated Acetic acid. So sum of  $\text{H}^+$  and  $\text{CH}_3\text{COO}^-$  ions is less than the  $\text{CH}_3\text{COOH}$ . When one mole acetic acid is dissolved in one litre solution, the formed  $\text{H}^+$  ions are less by 1 mole/lit. It dissociates less than 1%. Its equilibrium equation is

$$K_a = \frac{[\text{H}^+][\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]}$$

**24. Explain the decomposition of bases.**

A. Dissociation of bases is two types

1. Dissociation of strong bases
2. Dissociation of weak bases.

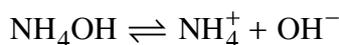
Strong bases like sodium hydroxide dissociate completely in its solution.



NaOH completely changes in to its ions.

From one mole of NaOH we get one mole sodium ion and 1 mole of hydroxide ion. Ions concentration is equal to the NaOH's contraction.

Weak bases like Ammonium hydroxide dissolve in some quantity and dissociate in small quantity.



$\text{NH}_4\text{OH}$  partially dissociates.

This dissociation is a reversible reaction between Dissociated and undissociated.  $\text{NH}_4\text{OH}$  form equilibrium. The sum of  $\text{OH}^-$  ions and  $\text{NH}_4^+$  ions will be less than the Ammonium hydroxides quantity. Equation for the equilibrium state is

$$K_b = \frac{[\text{NH}_4^+][\text{OH}^-]}{[\text{NH}_4\text{OH}]}$$

## I. Fill in the blanks

1. A substance having Hydrogen  $H^+$  ions in its solution, is called as..... (Acid)
2. A substance having  $OH^-$  ion in its solution is called ..... (base)
3. When two or more substance react and form a new compound by a reaction, it is called as ..... (combination)
4. When a compound decompose into two or more compounds during a reaction that reaction is called as..... (decomposition)
5. When two ions from two ionic compounds displace one another that reaction is called as..... (double displacement)
6. A substance in its molten state or liquid state conduct electricity is called as ..... (Electrolyte)
7. Reactions which absorb heat are ..... reactions. (Endothermic)
8. Reactions which release heat are..... reactions. (Exothermic)
9. When there is no change in the properties of a system, it is called as..... (Equilibrium state)
10. When reactants and products are in different states it is called as..... (Heterogeneous reaction)
11. When reactants and products are in same state it is called as..... (Homogeneous reaction)
12. Number of moles of substance in 1 litre volume is ..... (molarity)
13. When an acid react with a base and form salt, it is ..... (neutralisation)
14. Losing electrons in a reaction is ..... (oxidation)
15. Gaining electrons in a reaction is ..... (Reduction)
16. In specific conditions, when forward and backward reactions are proceeding at the same time it is called as ..... (Reversible reaction)
17. Acids and bases react with water and form..... (salt)
18. The amount of the substance in the standard volume is called ..... (Concentration)
19. The equilibrium attained by reversible chemical reactions is called ..... equilibrium. (kinetic)

20. Units for the molarity ..... (moles/lit<sup>-1</sup>)
21. Acids have ..... taste. (sour)
22. Bases have..... taste. (bitter)
23. Pure water will be in ..... state (neutral)
24. pH of water is ..... (7.0)
25. Solutions having pH less than 7 are called ..... (Acids)
26. Solutions having pH more than 7 are called ..... (bases)
27. Substances which turn blue litmus paper to red are called ..... (Acids)
28. Substances which turn Red litmus paper to blue are called ..... (bases)
29. Reactions which proceed only in forward direction are called ..... (irreversible reactions)

**I. Choose the correct answer and write in the brackets.**

1. Example for the chemical combination reaction is [ b ]
- (a)  $2\text{KClO}_3 \rightarrow 2\text{KCl} + \text{O}_3$  (b)  $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- (c)  $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$  (d)  $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$
2.  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$  equation indicates the reaction [ d ]
- (a) chemical combination (b) chemical decomposition
- (c) Chemical displacement (d) Chemical double decomposition
3. Example for chemical decomposition. [ c ]
- (a)  $\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl}$  (b)  $\text{Mg} + \text{CuSO}_4 \rightarrow \text{MgSO}_4 + \text{Cu}$
- (c)  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$  (d)  $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$
4. Example for chemical displacement [ d ]
- (a)  $\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl}$  (b)  $2\text{KClO}_3 \rightarrow 2\text{KCl} + \text{O}_3$
- (c)  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$  (d)  $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$
5. Example for chemical double decomposition [ a ]
- (a)  $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$  (b)  $\text{P}_4 + 10\text{Cl}_2 \rightarrow 4\text{PCl}_5$
- (c)  $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$  (d)  $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
6. Example for a slow reaction [ c ]
- (a) burning of a candle (b) Explosion of a cracker
- (c) Rusting of Iron (d) none of these

7. Example for moderate reaction [ d ]  
 (a) curds formation from milk (b) Explosion of a cracker  
 (c) burning of coal (d) burning of candle
8. The following equation indicates [ b ]  

$$\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O} + 57.3 \text{ K.J.}$$
 (a) Endothermic reaction (b) Exothermic reaction  
 (c) Reversible reaction (d) None of these
9.  $\text{H}_2 + \text{I}_2 \rightleftharpoons 2\text{HI}$  This equation indicates [ d ]  
 (a) Irreversible reaction (b) Endothermic reaction  
 (c) Exothermic reaction (d) Reversible reaction
10. Irreversible reaction from the following is [ d ]  
 (a)  $\text{N}_2 + 2\text{O}_2 \rightleftharpoons 2\text{NO}$  (b)  $2\text{KClO}_3 \rightleftharpoons 2\text{KCl} + \text{O}_3$   
 (c)  $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$  (d)  $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$
11. Acid in curds is [ c ]  
 (a) Acetic acid (b) citric acid (c) lactic acid (d) Amino acid
12. Acid in lime is [ d ]  
 (a) Amonoacid (b) Acetic acid (c) lactic acid (d) citric acid
13. Acid in proteins is [ b ]  
 (a) Acetic acid (b) Amino acid (c) lactic acid (d) citric acid
14. Acid in venegar is [ a ]  
 (a) Acetic acid (b) Amino acid (c) citric acid (d) lactic acid
15. Strong electrolyte form the following [ c ]  
 (a) Ammoniums hydroxide (b) citric acid  
 (c) Ptassium hydroxide (d) None of these
16. Weak electrolyte from the follwing is [ d ]  
 (a) Sodium chloride (b) Potosium hydroxide  
 (c) Acetic acid (d) Ammonium hydroxide
17. Lithum, sodium, potassium, Rubedium and cerium hydroxides are called as [ b ]  
 (a) Acids (b) bases (c) Neutral solutions (d) None of these
18. Example for a slow reaction [ c ]  
 (a) Exploision (b) burning of candle  
 (c) clothes losing colour (d) none of the above

19. The following equation indicates [ a ]  

$$\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + 571.5 \text{ K.J}$$
 (a) Exothermic reaction (b) Endothermic reaction  
 (c) Reversible reaction (d) None of these
20. The reaction between Ethylacetate and water [ a ]  
 (a) Slow reaction (b) Fast reaction (c) moderate reaction (d) None of these
21. Burning of car petrol is [ b ]  
 (a) Homogenous reaction (b) Heterogenous reaction  
 (c) Hygroscopic reaction (d) none of the above
22. A solution's  $\text{p}^{\text{H}}$  is equal to [ b ]  
 (a)  $\log [\text{H}^+]$  (b)  $-\log [\text{H}^+]$  (c)  $\log[\text{OH}^-]$  (d)  $-\log[\text{OH}^-]$
23. The reaction having reactants and products in same state is [ a ]  
 (a) homogenous (b) Heterogenous (c) Exothermic (d) None of these
24. The reaction having reactants and products in different states. [ b ]  
 (a) homogenous (b) Heterogenous (c) Endothermic (d) None of these
25. Losing of electrons in a reaction is [ a ]  
 (a) oxidation (b) Reduction (c) Neutralisation (d) None of these

### Match the Chemical Equations

1.  $\text{C} + \text{O}_2 \longrightarrow \text{CO}_2$
2.  $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
3.  $\text{P}_4 + 10\text{Cl}_2 \longrightarrow 4\text{PCl}_5$
4.  $\text{NH}_3 + \text{HCl} \longrightarrow \text{NH}_4\text{Cl}$
5.  $2\text{KClO}_3 \longrightarrow 2\text{KCl} + \text{O}_3$
6.  $\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$
7.  $2\text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O} + \text{O}_2$
8.  $2\text{H}_2\text{O} \longrightarrow 2\text{H}_2 + \text{O}_2$
9.  $2\text{Pb}(\text{NO}_3)_2 \longrightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
10.  $\text{Zn} + \text{CuSO}_4 \longrightarrow \text{ZnSO}_4 + \text{Cu}$
11.  $\text{Mg} + \text{CuSO}_4 \longrightarrow \text{MgSO}_4 + \text{Cu}$
12.  $\text{Zn} + \text{H}_2\text{SO}_4 \longrightarrow \text{ZnSO}_4 + \text{H}_2$
13.  $\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$
14.  $\text{Cl}_2 + 2\text{KBr} \longrightarrow 2\text{KCl} + \text{Br}_2$

15.  $\text{NaCl} + \text{AgNO}_3 \longrightarrow \text{AgCl} + \text{NaNO}_3$
16.  $\text{HCl} + \text{NaOH} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$
17.  $2\text{H}_2\text{S} + \text{SO}_2 \longrightarrow 3\text{S} + 2\text{H}_2\text{O}$
18.  $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$
19.  $2\text{Na} + \text{Cl}_2 \longrightarrow 2\text{NaCl}$
20.  $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O} \longrightarrow \text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH}$
21.  $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$
22.  $\text{BaCl}_2 + \text{Na}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$
23.  $\text{Zn} + 2\text{HCl} \longrightarrow \text{ZnCl}_2 + \text{H}_2$
24.  $2\text{HgO} \longrightarrow 2\text{Hg} + \text{O}_2$
25.  $\text{H}_2 + \text{I}_2 \longrightarrow 2\text{HI}$
26.  $\text{N}_2 + 3\text{H}_2 \longrightarrow 2\text{NH}_3$
27.  $2\text{SO}_2 + \text{O}_2 \longrightarrow 2\text{SO}_3$
28.  $\text{Na} + 2\text{H}_2\text{O} \longrightarrow 2\text{NaOH} + \text{H}_2$
29.  $3\text{Ca}(\text{OH})_2 + 2\text{H}_3\text{PO}_4 \longrightarrow \text{Ca}_3(\text{PO}_4)_2 + 6\text{H}_2\text{O}$
30.  $2\text{NaOH} + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$

## Module - 3

# 7

## Lesson

# Motion and its Explanation

### Objectives

- Define the terms Scalar and Vector quantities, Displacement, Speed, Velocity and Acceleration
- Distinguish between the following
  1. Rest and Motion
  2. Scalar and vector quantities
  3. Speed and Velocity
- Differentiate between Uniform velocity and non uniform velocity
- Establish the three equations of motion

### Important points

- When the position of the body changes with time it is said to be in motion.
- When a body moves along the same straight line path with change of time it is said to be in rectilinear motion.
- If a body moves in a circular path it is said to be in circular motion.
- The to and fro motion of a body is known as oscillatory motion.
- A quantity which has only magnitude but no direction is known as Scalar quantity
- A quantity which has both magnitude and direction is known as vector quantity

- The total path length covered by a body in its travel is called distance.
- Difference between the initial and final position of the body is known as displacement
- The distance travelled by a body in a certain time interval is known as Speed.
- The displacement of a body per unit time is known as velocity
- A quantity which comes when change in velocity is divided by the time interval during which the change occurs is known as acceleration.
- The motion of a body in which its velocity is constant is called uniform motion

### 3 Marks

**1. What is speed and velocity ? Give units of speed and velocity ?**

The distance travelled by a body in certain time interval is known as Speed

The displacement of a body per unit time is known as velocity

Unit of speed m / sec (or) k.m/hour

Unit of velocity m / sec (or) k.m/hour

**2. If a body travels a distance of 61 k.m in 2 hour what is its speed ?**

Speed = distance travelled / time taken

Speed of the car = 61 k.m / 2 hour = 30.5 k.m/hour

**3. Recognise the circular and oscillatory motions in the following motions.**

motion of a swing

motion of a body in a merry go round

motion of a pendulum

motion of needle of a sewing machine

and motion of the blades of an electric fan

Circular motion : motion of a body in a merry go Round, and motion of the blades of an electric fan

Oscillator motion : motion of a swing, motion of a pendulum, motion of needle of a sewing machine.

**4. Recognise Scalar and Vector quantities from the following.**

Distance, Speed, mass, velocity, acceleration

Vector quantities : velocity, Acceleration

Scalar Quantities : Distance, Speed, mass

**5. Recognise Scalar and Vector quantities from the following**

Time, temperature, displacement, momentum impulse, force,

Vector quantities : Displacement, momentum , force

Scalar quantities : time, temperature.

**6. What is meant by acceleration ? Is it a scalar quantity or vector quantity ? Give units to acceleration.**

Acceleration : Change in velocity is divided by time interval gives the quantity acceleration

$$\text{Accelerator} = \frac{\text{change in velocity}}{\text{time interval}}$$

Acceleration is vector quantity units of Acceleration  $\text{m} / \text{sec}^2$ .

**7. Deduce the relation between  $v$ ,  $u$ ,  $a$  and  $t$ .**

$$\text{Acceleration} = \frac{\text{change in velocity}}{\text{time interval}}$$

$$\text{(or) } a = \frac{v-u}{t}$$

$$\text{(or) } v = u + at.$$

**8. The initial velocity of the car 25 m/sec. When brakes, are applied car comes to rest after 2 sec. what is two acceleration of the car ?**

$$v = 0 \quad u = 25 \text{ m/sec}, \quad t = 2.0 \text{ sec.}$$

$$v = u + a t$$

$$0 = 25 + a (2.0)$$

$$2a = -25 : a = -\frac{25}{2} = a = -12.5 \text{ m.sec.}$$

**9. Derive the relation between  $s$ ,  $u$ ,  $a$  and  $t$ .**

Displacement = (average velocity)  $\times$  (time interval)

$$s = \left( \frac{v+u}{2} \right) t \quad \text{but } v = u + a t$$

$$\text{Hence } s = \frac{1}{2} (u + at + u) t = ut + \frac{1}{2} at^2$$

$$s = ut + \frac{1}{2} at^2$$

10. An object with an initial velocity of 4.0 m/sec is accelerated at 6.0 m/sec<sup>2</sup> for 2.0 sec. How far does the object travel during this period.

$$u = 4.0 \text{ m/sec}, \quad t = 2.0 \text{ sec.} \quad a = 6.0 \text{ m sec}^{-2}$$

Substituting all the above value in the formula  $s = ut + \frac{1}{2} at^2$

$$s = (4.0) (2.0) + \frac{1}{2} (6.0) (2.0)^2$$

$$s = 8.0 + \frac{1}{2} (6.0) (4.0)$$

$$s = 8.0 + 12 = 20 \text{ m.}$$

11. An object with an initial velocity of 4.0 m sec<sup>-1</sup> is accelerated at 6.0 m sec<sup>-2</sup> for 2.0 sec. How far would the object travel if it were initially at rest.

$$u = 0 \quad t = 2.0 \text{ sec.} \quad a = 6.0 \text{ sec m}^{-2}$$

substituting the values in the formula

$$s = ut + \frac{1}{2} at^2$$

$$s = 0 \times 2. + \frac{1}{2} (6.0 \text{ m. sec}^{-2}) (2.0 \text{ sec})^2$$

$$s = 0 + \frac{1}{2} (6) (4)$$

$$s = 12 \text{ m.}$$

12. Obtain the relation between  $u$ ,  $v$  and  $s$  or

$$s = \left( \frac{u+v}{2} \right) t$$

and  $a = \frac{v-u}{t}$

multiplying these two equations

$$a.s = \left( \frac{v-u}{t} \right) \left( \frac{v+u}{2} \right) t = \frac{v^2 - u^2}{2}$$

$$\text{or } v^2 = u^2 + 2as$$

$$\text{or } v^2 - u^2 = 2as.$$

13. Give three equations of motion of a body.

Equations of motion.

1)  $v = u + a t$

2)  $s = ut + \frac{1}{2} at^2$

3)  $v^2 - u^2 = 2as$

14. When a body dropped from 3 storied building ( $s = 15 \text{ M}$ ) How much time will it take to reach the ground? ( $g = 10 \text{ m sec}^{-2}$ )

Formula  $s = ut + \frac{1}{2} at^2$

$$s = ut + \frac{1}{2} gt^2 \quad (\because a = g)$$

$$u = 0 ; g = 10 \text{ m.sec}^{-2} \quad s = 15 \text{ m.}$$

substituting the above values in the formula

$$15 = 0 + \frac{1}{2} \times 10t^2$$

$$t = \sqrt{\frac{15}{5}} = \sqrt{3} = 1.7325 \text{ sec.}$$

$$t = 1.7325 \text{ sec.}$$

15. A body starts from rest accelerate in 5 sec and attains the velocity  $10 \text{ m sec}^{-1}$  What is its acceleration.

Formula : Acceleration (a) =  $\frac{v - u}{t}$

$$u = 0 : v = 10 \text{ m.sec}^{-1} \quad t = 5 \text{ sec.}$$

substituting the values in the formula

$$\text{acceleration (a)} = \frac{10-0}{5} = \frac{10}{5} = 2 \text{ sec}^{-2}.$$

$$\text{Acceleration (a)} = 2 \text{ m sec}^{-2}.$$

16. A body starts from rest travels 50 m in 10 sec. What is its average speed ?

Formula : speed =  $\frac{\text{distance travelled}}{\text{time taken}}$

$$\text{distance} = 50 \text{ m} \quad t = 10 \text{ sec}$$

substituting the values in the formula

$$\text{speed} = \frac{50 \text{ m}}{10 \text{ se}} = 5 \text{ m sec}^{-1}.$$

$$\text{average speed} = 5 \text{ m/sec}^{-1}.$$

**Answer the following questions**

**5 Marks**

**1. How can you say the body is in motion ? Give four examples for the bodies in motion in your daily life.**

A. When the position of the body changes with time the body is said to be in motion.

Examples of bodies in motion from daily life.

- (a) Cars moving on the road.
- (b) Aeroplanes flying in air.
- (c) Ships moving on the sea.
- (d) Flowing water in rivers.

**2. What is meant by rectilinear motion and circular motion ? Give 3 examples of each.**

A. When a body always moves in the same straight line path all the time is said to be in rectilinear motion. when a body moves in circular path the body is said to be is circular motion.

**Examples for linear motion.**

- (a) Car moving on a straight line path on a level road.
- (b) A ball rolling on a horizontal surface
- (c) A stone dropped from a building

**Examples for circular motion**

- (a) motion of the tip of hands of a clock
- (b) motion a body in merri go round
- (c) Motion of the blades of fan an electric

**3. What is meant by circular motion and oscillatory motion ? Give 3 examples of each.**

A. The motion is said to be circular if the body moves in a circular path. The to and fro motion of a body is known as oscillatory.

**Examples for circular motion**

- (a) Motion of the tip of hands in a clock
- (b) Motion of body in Merry - go round
- (c) Motion of the blades of an electric fan.

**Examples for oscillatory motion**

- (a) Motion of a swing
- (b) Motion of apendular
- (c) Motion of the branches of a tree in wind.
- (d) Motion of the needle of a swing machine.

**4. What are Scalar quantity and Vector quantity ? Give examples of each.**

A. Scalar quantity : - A quantity which has only magnitude but no direction is known as Scalar quantity.

Vector Quantity :- A quantity which has both magnitude and direction is known as Vector quantity.

Example for Scalar quantities : Distance, Speed, time, temperature, etc.

Examples for Vector quantities : Velocity, Acceleration, Displacement, momentum, force.

**5. What is meant by Distance and Displacement ? How can you say when a body has undergone Displacement ? Explain with figure.**

A. The total distance traveled by a body is known as Distance

The difference between the initial and final positions is known as Displacement.

We can show the displacement of the body through the following figure.

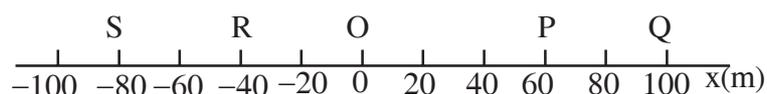


Fig : A body moves along x-axis

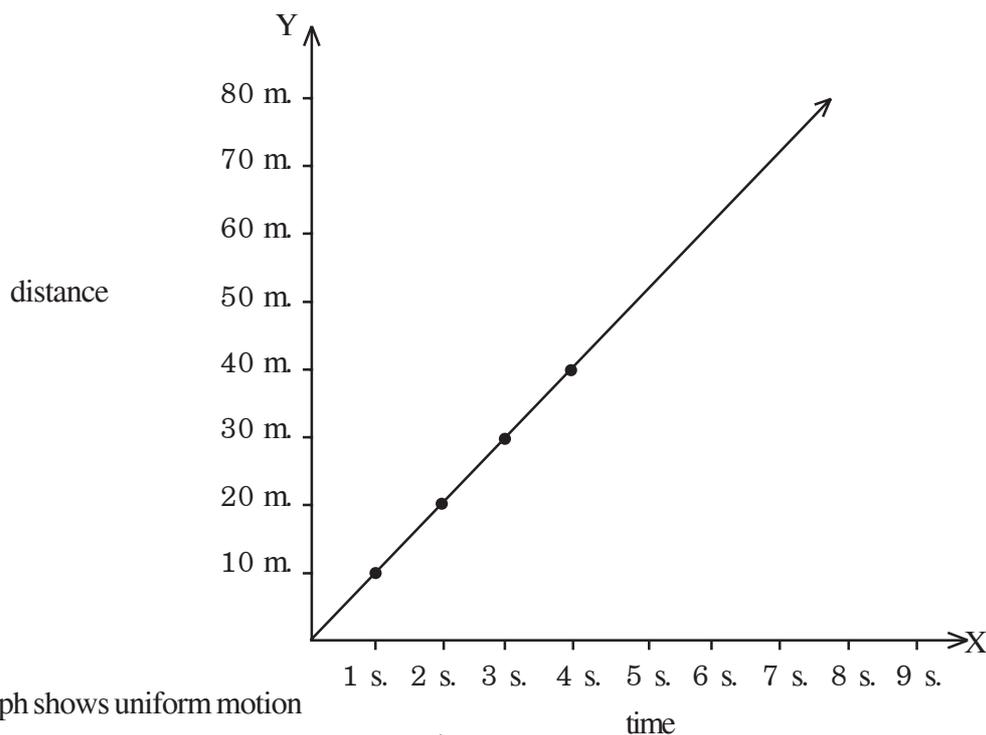
The position of the body is a point and is shown by zero. This point is called origin of the axis.

For example let the initial position of the car is at zero then at the end of the journey the car is at P.

The displacement in the position of the car is OP i.e. + 60 m.

The displacement of the body = Final position - initial position. That means car displaces 60 m and its direction may be right side or left side.

6. Which type of motion indicated by the graph shown in figure what is velocity shown by the slope of the graph at 2<sup>nd</sup> second, 4<sup>th</sup> second. What type of velocity it indicates ?



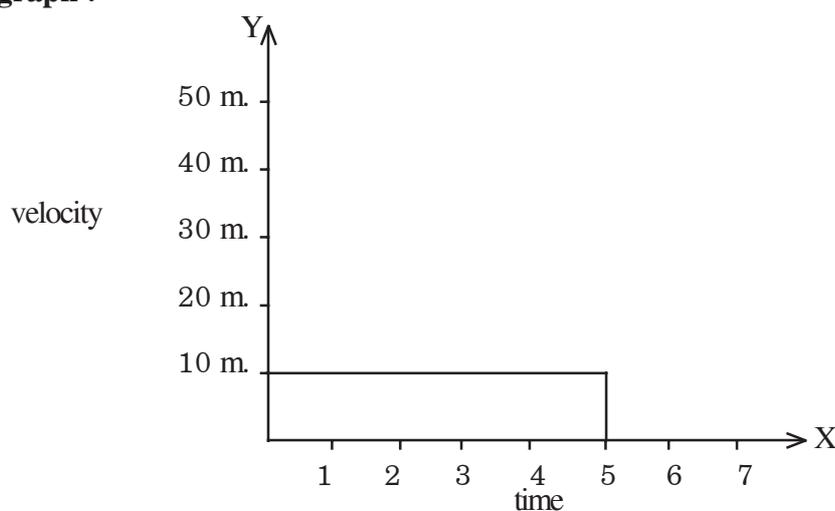
$$\text{velocity in 1}^{\text{st}} \text{ sec} = 10 \text{ m.sec}^{-1}$$

$$\text{velocity in 2}^{\text{nd}} \text{ sec} = 10 \text{ m.sec}^{-1}$$

$$\text{velocity in 3}^{\text{rd}} \text{ sec} = 10 \text{ m.sec}^{-1}$$

Thus velocity of the body is constant i.e., equal to 10 m/sec throughout the motion. The motion of a body in which its velocity is constant is known as uniform motion. For uniform motion the **position and time graph** a straight line. The slope of the graph is slope of the straight line gives the velocity.

7. Which type of motion is indicated by the following graph ? Which quantity indicates the area of the graph ?



Graph show the uniform motion of the body, Area of the graph indicates displacement.  
 area in graph = In the same interval the displacement of the body.

8. A body is thrown vertically upwards with an initial velocity + 19.6 m. sec<sup>-1</sup>. It was caught at the same height from where it was thrown up.

a) What is the maximum height it has reached.

b) how much time the body was in air (g = 9.8 m. sec<sup>2</sup>)

a) formula  $h = \frac{u^2}{2g}$

$$u = 19.6 \text{ m. sec}^{-1}, g = 9.8 \text{ m/s}^2$$

substituting these values in the above equation.

$$h = \frac{19.6 \times 19.6}{2 \times 9.8} \Rightarrow h = \frac{19.6 \times 19.6}{19.6}$$

$$h = 19.6 \text{ m.}$$

Maximum height reached by the ball ( $h$ ) = 19.6 m.

b) Formula  $t_1 = \frac{u}{g}$  ( $\because$  time of ascent =  $t_1$ )

substituting  $u = 19.6 \text{ m.s}^{-1}$   $g = 9.8 \text{ m/s}^2$  in the above equation.

$$\text{time of ascent } t_1 = \frac{19.6}{9.8} = 2 \text{ sec.}$$

$$\text{time of descent } t_2 = \frac{u}{g} = \frac{19.6}{9.8} = 2 \text{ sec.}$$

total time is called time of travel.

time of travel = time of ascent + time of descent.

$$= 2\text{sec} + 2 \text{ sec} = 4\text{sec}$$

total time of the ball in air = 4sec.

### Fill in the Blanks

1. When a body is at the same position with respect to time then the body is said to be in ..... (rest)
2. When the position of the body changes with time then the body is said to be in ..... (Motion)
3. When a body moves in the same straight line in all the times the motion of the body is called .....  
(rectilinear)
4. When a body moves in a circular path the body is said to be in ..... (circular motion)
5. The total path travelled by the body is known as ..... (distance)
6. Distance is a ..... quantity (Scalar)
7. Speed is a ..... quantity (Scalar)

8. Mass is a ..... quantity (Scalar)
9. time is a ..... quantity (Scalar)
10. Temperature is a ..... quantity (Scalar)
11. Displacement is a ..... quantity (Vector)
12. Velocity is a ..... quantity (Vector)
13. Acceleration is a ..... quantity (Vector)
14. Momentum is a ..... quantity (Vector)
15. Force is a ..... quantity (Vector)
16. Physical quantities are ..... types (two)
17. A quantity which has only magnitude but no direction is known as ..... (Scalar)
18. A quantity which has both magnitude and direction is known as ..... (Vector)
19. Distance travelled by a body in unit time is called ..... (speed)
20. The displacement of a body in unit time is called ..... (velocity)
21. The motion of a ball which is rolling on a horizontal surface is ..... (Linear)
22. The motion of a stone which is dropped from a building is ..... (Linear)
23. The motion of who is a man running in a 100 m running race ..... (linear)
24. Motion of the hands in a clock ..... (circular)
25. Motion of body in merrygoround ..... (circular)
26. Motion of the blades an electric fan ..... (circular)
27. Motion of a swing ..... (Oscillatory)
28. Motion of a pendulum ..... (Oscillatory)
29. Motion of the branches of a tree in wind ..... (Oscillatory )
30. Motion of the needle of a sewing machine ..... (Oscillatory)
31. Vector quantities are indicated by a letter with ..... mark (arrow)
32. Arrow mark indicates ..... of vector quantity (direction)
33. Position of a body is indicated on the basis of 0. This point of axis is called ..... (origin)
34. The value which is the right hand side of origin is taken as ..... (positive)

35. The value which is left hand side of origin is taken as ..... (negative)
36. SI unit of distance ..... (metre)
37. S.I unit of displacement ..... (metre)
38. Unit of speed ..... ( $\text{m/sec}^{-1}$ )
39. Speed = .....  $\left( \frac{\text{length of the path or distance travelled}}{\text{time interval}} \right)$
40. Velocity = .....  $\left( \frac{\text{displacement}}{\text{time interval}} \right)$
41. Acceleration = .....  $\left( \frac{\text{Change in velocity}}{\text{time interval}} \right)$
42. Units of acceleration ..... ( $\text{m/sec}^2$ )
43. An example for physical quantity which changes with time ..... (acceleration)
44. The uniform acceleration of a freely falling body is called ..... (acceleration due to gravity)
45. The average value of acceleration due to gravity on the earth's surface ..... ( $9.8 \text{ m. sec}^{-2}$ )
46. The relation between  $v, u, a$  and  $t$  ..... ( $v = u + at$ )
47. The relation between  $s, u, a$  and  $t$  ..... ( $s = ut + \frac{1}{2} at^2$ )
48. The relation between  $u, v$  and  $s$  ..... ( $v^2 = u^2 + 2as$ )
49. When the ..... of the body does not change with time, then the body is said to be in rest. (position)
50. If the average velocity of a body becomes zero within an interval of time then the displacement of the body in that interval of time is ..... (zero)

# 8

## Lesson

# Force And Motion

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### Objectives :

- Explain the cause of motion.
- Define the terms Inertia, Force, Mass and momentum.
- State three laws of motion and their significance.
- Establish the relation between force, mass and acceleration.
- Illustrate advantages and disadvantages of friction in our daily life.
- State and explain Newton's law of gravitation.
- Distinguish between mass and weight and express the relation between them.
- Distinguish between Thrust and Pressure.
- State Archimedes principle and apply it to solve problems.

### Important Points

- Force is something which when applied on a body changes (or) tends to change the state (or) rest (or) uniform motion of the body.
- A body continues to be in rest or of its uniform motion unless and until no external force acts on it. This is known as Newton's first law of motion.
- Newton's first law of motion

The acceleration of a body is directly proportional to the external force acting on it and inversely proportional to its mass. The direction of the acceleration is the same as that of the force.

- To every action there is always an equal reaction. This is Newton's third law of cooling.
- Friction : The force that resists the relative motion between two surfaces which are in contact with each other.
- Archimedes Principle : When a body is completely (or) partially immersed in a fluid it undergoes and apparent loss in its weight which is equal to the weight of the fluid displaced by the body.
- Buoyancy : The force exerted by a fluid on a body immersed in it in the upward direction / up-thrust or buoyant force is called buoyancy.
- Newton's universal law of gravitation : The force of attraction between two bodies is directly proportional to product of their masses and inversely proportional to the square of the distance between the two masses.

## 5 Marks

### 1. Define force and give unit in SI system ? Give three examples of different types of forces applied on a body.

- A. Force: Force is something which when applied on a body tends to change the state of rest or uniform motion of the body.

Unit of force in SI system is Newton.

Different types of forces applied on a body

- (a) Pulling the body
- (b) Pushing the body
- (c) Kicking the body

### 2. State Newton's first law of motion and define Inertia ? Give three examples.

- A. Every body continues to be in its state of rest or of uniform motion in a straight line unless an external force acts on it to change the state. This is known as Newton's first law of motion.

Inertia : The property of a body by virtue of which continues to be in its state of rest or of uniform motion in a straight line is known as inertia of the body.

#### Examples of Newton's first law of motion.

- (a) Passengers in a moving bus experience a forward jerk when the moving bus suddenly comes to rest.
- (b) When a moving trolley is stopped suddenly loaded goods fall off from it.
- (c) Ink coming from the fountain pen when it is given a jerk.

**3. State Newtons second law of motion and define momentum. Explain Newton second law of motion with example.**

**Newtons second law of motion.**

The acceleration of the body is directly proportional to the masses. It tells us that force and acceleration are in the same direction.

Momentum :

The product of mass ( $m$ ) of the body and velocity ( $v$ ) is known as momentum

$$\text{Momentum (P)} = m \times v$$

Examples of Newton second law of motion.

- (a) Cricketer pulls his hands backwards when he catches the ball. By doing so he increases the time duration in which the momentum of the ball becomes zero. Hence his hands do not get hurt.
- (b) In bundle tied with a string is lifted quickly by holding the string the string snaps. This is because a large force must be exerted on the string to quickly increase the momentum of the bundle.
- (c) When a person falls on a cemented floor, he gets hurt. This is because the persons unitial momentum ( $\mu$ ) becomes zero when he comes to halt. Since mass comes to rest with a very short time very large force comes into action inorder to produce a definite change in momentum (from  $\mu$  to zero) there by hurting the person.

**4. What force accelerater a 50 kg mass at 4m sec<sup>-2</sup>.**

A. **Formula:**  $F = m \times a$  (from Newton's second law)

substituting  $m = 50 \text{ kg}$  and  $a = 4 \text{ m/sec}^{-2}$  in the above formula

$$F = 50 \text{ kg} \times 4 \text{ m. sec}^{-2}$$

$$F = 200 \text{ kg m. sec}^{-2}$$

$$F = 200 \text{ N} \quad (\because 1 \text{ N} = 1 \text{ Kg. m/sec}^{-2})$$

**5. If a force of 50 N acts on a body of 10 kg then what is the acceleration produced in the body.**

**Formula :**  $F = m \times a$  (from Newtons 2<sup>nd</sup> law)

$$a = \frac{F}{m}$$

$$F = 50 \text{ N} = 50 \text{ Kg m. sec}^{-1}$$

$$m = 10 \text{ kg.}$$

$$a = \frac{50}{10} \text{ du. m. sec}^{-2}$$

$$a = 5 \text{ m. sec}^{-2}$$

**6. State Newtons third law of motion. Explain Newton's 3rd law of motion with examples ?**

A. Newton's 3rd law of motion

To every action there is always an equal and opposite reaction.

Examples for Newton's 3<sup>rd</sup> law of motion.

- (a) When a man jump out from a boat suddenly, the boat moves in the backward direction. This is because while jumping he exerts a backward force with his foot on the boat. This force is called **action**. At the same time a force is exerted by the boat on his foot which makes him move forward. This force is known as reaction.
- (b) When an air filled ballon is released the balloon moves opposite to the direction of the air coming out of it. This is because the air coming out of the ballon (action) exerts a force of reaction on the balloon and this force (reaction) pushes the balloon upwards
- (c) Working of jet plane and rocket. The force with which the burnt gases coming out from the tail of the jet plane in the action, the plane moves in the forward direction is reaction.

**7. What is meant by friction ? Give two advantages and disadvantages of friction.**

A. Friction : The force that resist the relative motion between two surfaces which are in contact with each other.

**Advantages of friction**

- (a) It helps vehicles to move on the road
- (b) It help the people to walk on the road.

**Disadvantages of friction**

- (a) Friction reduces the efficiency of the machines as considerable amount of energy is wasted in over coming the friction.
- (b) Due to friction wear and tear of surfaces and machines parts increases.

**8. State Archimeds principle and define buoyancy ? Give 3 of applications of Archimedes principle ?**

**Archimedes Principle :** When a body is immersed in a fluid it undergoes an apparent loss in its weight, which is equal to the weight of the fluid displaced by the body.

**buoyancy** : The force exerted by a fluid on a body which is immersed in it in the upward direction is called the up-thrust or buoyant force or buoyancy.

**Applications of Archimedes Principle :**

- (a) Suppose the weight of a body is  $W$  and weight of the liquid or fluid displaced is  $w$ . If the body is fully immersed  $W = w$ . If the body is partially immersed  $W < w$ .
- (b) The specific gravity a body can be determined.
- (c) Volume of a body can be determined.

**9. The mass of body in air is 1 kg. What will be its weight in the liquid of specific gravity 1.2 if it displaces 100 ml of this liquid (Take  $g = 10 \text{ m sec}^{-2}$ )**

A. Weight of the body in air =  $1 \text{ kg} \times 10 \text{ m. sec}^{-2} = 10\text{N}$

$$\text{Density of the liquid} = 1.2 \times 10^3 \text{ kg. m}^{-3}$$

$$\text{Volume of the liquid displaced} = 100 \text{ ml} = 100 \times 10^{-6} \text{ m}^3$$

$$\text{Buoyancy force} = (100 \times 10^{-6} \text{ m}^3) = (1.2 \times 10^3 \text{ kg. m}^3) \times 10 \text{ m sec}^{-2}$$

$$\text{loss in weight of the body} = 1.2\text{N}$$

$$\text{Weight of the body in the liquid} = 10 \text{ N} - 1.2\text{N} = 8.8\text{N}.$$

$$= 8.8 \text{ N}$$

**10. State Newton's law of gravitation and define acceleration due to gravity. Give the value of  $G$  and define mass and weight.**

- A. Newton's law of gravitation : Force of attraction between any two bodies is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. Mathematically.

$$F = G \frac{m_1 \times m_2}{r^2}$$

$$\text{Value of } G = 6.67 \times 10^{-11} \text{ N m}^2 \cdot \text{Kg.}^{-2}$$

Acceleration due to gravity : The acceleration of a freely falling body is called as acceleration due to gravity.

Mass : The mass of the body is defined as the ratio of the force of gravity acting on the body to the free

$$\text{fall acceleration} \left( m = \frac{F}{g} \right)$$

**Weight** : The weight of the body at a given place is the force with which the earth attracts the body towards it. ( $W = \text{mass} \times \text{acceliation}$ )

11. A body weighs 49N at a place where  $g = 9.8ms^{-2}$ . What will be its weight at the pole where  $g = 9.82 ms^{-2}$ .

**Solutin:**  $W = mg$

$$m = \frac{W}{g} = \frac{49 \text{ N}}{9.8ms^{-2}} = 5$$

$$\begin{aligned} \text{Weight at pole } W &= mg \ 5 \text{ kg} \times 9.8 \text{ ms}^{-2} \\ &= 49.10 \text{ N} \end{aligned}$$

12. A 1kg body falls from a height of 60m from rest on a planet where acceleration due to gravity is  $120 m.s^{-2}$ . Calculate the velocity of the body when it touches the planet's surface.

**Solution :** Initial velocity of the, body,  $u = 0$

$$\text{acceleration, } a = g = 120 \text{ ms}^{-2}$$

$$\text{height through which body falls} = h = 60m$$

Using the equation of motion

$$v^2 = u^2 + 2gh \text{ we have on substitution of values}$$

$$v^2 = 0^2 + 2 \times 120 \text{ ms}^{-2} \times 60m$$

$$= 14400 \text{ m}^2\text{s}^{-2}$$

$$v = 120 \text{ ms}^{-2}.$$

13. Two bodies A and B weighing, 2N and 6N are dropped from the roof of a 10m high building together. Which one of the two A or B will reach the Earth first?

**Solutin:** Since the two dodies have same initial velocity (i.e. zero) and have same acceleration (g) i.e. acceleration due to gravity acts on both A and B, hence, both will reach Earth together irrespective of their masses.

## Fill in the Blanks

1. The acceleration of a freely falling body is known as ..... (acceleration due to gravity)
2. When a body is immersed wholly or partially in a liquid it undergoes an apparent loss in its weight which is equal to ..... of the liquid displaced by a body (weight)
3. When a body is immersed in a liquid the upward thrust is called as ..... (buoyancy)
4. Something which changes the state of rest of a body is called ..... ( force )
5. The force that resists the relative motion between two surfaces which are in contact with each other is known as ..... (friction)
6. The property of body by virtue of which it is unable to change its state of rest or of uniform motion in a straight line is called..... (Inertia)
7. The unit of fluid pressure ..... (Pascal)
8. The thrust exerted by fluid at rest per unit area of the surface in contact with fluid is called..... (pressure)
9. The total force exerted normally by a fluid on any surface in contact with it is called ..... (thrust)
10. The force with which earth attracts the body towards it is called ..... (weight)
11. Force is a ..... quantity (vector)
12. Unit of force in SI system ..... (Newton)
13. Momentum = ..... (mass  $\times$  velocity)
14. Unit of Momentum =..... (kg. m / sec)
15. Boat moves ..... when a man suddenly jumps from a boat (backwards)
16. Frictional force is always ..... to the direction of motion (opposite)
17. The resistive force before the body starts moving on a surface is called ..... friction. (static)
18. Once a body starts moving on a surface the friction is called ..... (sliding or kinetic friction)
19. The friction between wheels and road is ..... friction. (sliding)
20. .... helps vehicles to move (friction)
21. decreases the friction between wheel and axle ..... (Grease)
22. Value of G ..... ( $6.67 \times 10^{-11} \text{ N.m}^2 \text{ kg}^{-2}$ )

23. In Newton's universal law of gravitation  $G$  is known as ..... (universal gravitation constant)
24. The value of  $g$  is maximum at..... (poles)
25. Mass is a ..... quantity (scalar)
26. Unit of mass ..... (kg)
27. Weight is a ..... quantity (vector)
28. Weight is measured by ..... balance. (spring)
29. Thrust is measured in ..... (Newton)
30. The astronauts and soldiers in places like siaehin, wear ..... to avoid bleeding (pressure suits)
31. 1 atmosphere = . ..... ( $1.014 \times 10^5 \text{ N.m}^{-2}$ )
32. S.I unit of pressure = ..... ( $\text{Nm}^{-2}$ )
33. 1 atmosphere = ..... (76 cm of Hg)
34. 1 atmosphere = ..... (760 torr)
35. Principle of buoyancy comes from ..... principle (Archimedes)
36. The relation between change in motion and force is established by Newton's ..... law of motion. (second)
37. Newton's ..... law explains that force always exists in pairs and they act on two different bodies (third)
38. .... exists between two surfaces of bodies which rub against each other. (Friction)
39. The mass of the body is directly proportional to the ..... force. (gravity)
40. More massive a body is ..... it will be (More weighty)
41. Time taken for action is equal to time taken for ..... (reaction)
42. Blood pressure becomes higher than ..... pressure at high altitudes pressure. (atmospheric)
43. When no other except gravity, acts on a falling body, it is called ..... (free fall)

## Module - 4

# 9

## Lesson

# WORK AND ENERGY

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### Objectives

1. Define the term energy and state its SI units and various forms and sources of energy.
2. Explain the work done by a body in terms of change in its energy.
3. Establish the relation between work done, force and displacement.
4. Explain the various forms of mechanical energy.
5. State the Law of conservation of energy and also explain the transformation of energy from one form to another.
6. Suggest various methods to save energy.

### Important Points

1. Energy can neither be created nor destroyed. But can be changed from one form to another.
2. The sum of all energy forms is always constant, which is known as law of conservation of energy.
3. The ability or power to do work is known as energy.
4. The mechanical energy possessed by a body by virtue of its motion is known as kinetic energy.
5. Potential energy is the energy acquired by a body by virtue of its position or configuration.
6. The rate of work is known as power.

### 3 Marks questions

1. Calculate the work done to move a box to a distance of 5 meters in the direction of force, when a constant force of 10 N is applied on it.

Ans: Applied force (F) = 10 N

Distance moved (S) in the direction of force = 5 m

$$\begin{aligned}\text{Work done } W &= F \cdot S \\ &= 10 \times 5 \\ &= 50 \text{ J}\end{aligned}$$

2. A person stands at a point by holding a weight. Is that person performing any work? Support your answer.

Ans: A person is holding a weight in his hand. He is standing at a fixed point, and his displacement is zero

$$\begin{aligned}\text{Work done} &= \text{force} \times \text{displacement} \\ &= \text{force} \times 0 \\ &= 0.\end{aligned}$$

As per the principles of classical Physics the work done is nil and hence that person is not performing any work.

3. Define renewable and non renewable energy sources and give one example each.

Ans: The energy sources which are available in limited quantities in the earth and exhausting due to the continuous extraction are called "Non - renewable sources". Ex. - Coal, Petroleum, Natural gas etc. (Any one example)

The energy sources which are available in abundant in and around the globe and which will never exhaust are called renewable sources. Ex. - Air, water, biomass, solar energy etc. (Any one example)

4. "Sun is the ultimate source of energy for all living beings". Justify your answer.

Ans: We are receiving energy and light from the Sun from billions of years. All plants are getting energy in presence of Sun. Animals are getting the required energy from plants and hence, sun is the prime source of energy for the animals also. The energy stored in eggs, butter, milk etc., also comes from the sun. With all these reasons we can say that sun is the chief source of energy for all living organisms.

5. Define kinetic energy and explain on what factors it depends.

Ans: The energy acquired by a body by virtue of its motion is called kinetic energy.  $KE = \frac{1}{2} mv^2$

The factors that influence the kinetic energy of a moving body are mass and velocity of that body so that

- i) KE is directly proportional to the mass of the body, and
- ii) directly proportional to the square of the velocity of that body.

**6. Define Potential Energy and explain on what factors it depends.**

**Ans:** Potential energy is the energy acquired by a body by virtue of its position or configuration.

The equation for Potential Energy is  $PE = mgh$ .

The factors that influence the Potential Energy of a body are mass and height at which that body is located.

When we assume that the acceleration due to gravity at that place is 'g',

- i) PE is directly proportional to mass of the body, and
- ii) Distance between the body to the surface of the ground (height).

**7. Which type of energy a moving body possesses? Give four examples of bodies having that type of energy.**

**Ans.:** A body in motion possesses Kinetic Energy.

- Ex., (i) A bullet fired from a gun,
- (ii) Flowing water,
- (iii) Moving ball
- (iv) Breezing wind.

**8. What is Potential Energy? Give four examples of such bodies having that type of energy.**

**Ans.:** Potential energy is the energy acquired by a body by virtue of its position or configuration.

- Ex. (i) Elongated rubber band
- (ii) Wound spring,
- (iii) Water stored in a reservoir,
- (iv) Balancing wheel of a watch which is pre wound.

**9. Write a short note about utilization of energy sources in our country.**

**Ans.:** The consumption of energy sources in our country is drastically increasing as population is exploring. At present the main thrust being on fossil fuel. The production of about 35 million tonnes of crude oil and 25 billion cubic meters of natural gas provides for only 60% of the consumption. For the remaining 40% we have to spend a big chunk of our national budget formports. Hence, a planned strategy for saving these reserves and utilizing alternative resources is a must.

**10. A person with 50 kgs of weight climbed a tower of 72 meters high. Calculate the work done. [g = 9.8 m / sec<sup>2</sup>]**

**Ans.:** Mass  $m = 50$  kg

Height  $h = 72$  m.

Acceleration due to gravity  $g = 9.8$  m / sec<sup>2</sup>

Work done = potential energy =  $mgh$

$$= 50 \text{ kg} \times 9.8 \text{ m / sec}^2 \times 72\text{m}$$

$$= 35280 \text{ J}$$

**11. Calculate the kinetic energy of a ball having a mass of 0.5 kg which is moving with a velocity 4 m / sec**

**Ans.:** Mass  $m = 0.5 \text{ kg}$

Velocity  $v = 4 \text{ m / sec}$

Kinetic energy  $KE = \frac{1}{2}mv^2$

$$= \frac{1}{2} \times 0.5 \times 4 \times 4$$

$$= 4 \text{ J}$$

**12. Calculate the velocity of a ball having a mass of 0.5 kg and 100 J of kinetic energy.**

**Ans.:** Mass  $m = 0.5 \text{ kg}$

$KE = \frac{1}{2}mv^2 = 100 \text{ J}$

Velocity of the ball = ?

$KE = \frac{1}{2}mv^2$

$$\text{i.e. } 100\text{J} = \frac{1}{2} \times 0.5 \times v^2$$

$$\Rightarrow v^2 = (100 \times 2) / 0.5 = 400$$

$$400 = 20 \text{ m/ sec.}$$

**13. Write the differences between renewable and non renewable energies.**

Renewable energy	Non renewable energy
i) Reserves never exhaust	i) Reserves exhaust when we use them
ii) can be used again and again	ii) can't be used again and again
iii) pollution does not arise when we use them	iii) Causes pollution when we use them
iv) Ex. Solar energy, hydro power, wind energy etc.	iv) Ex.Coal, petroleum, natural gas etc.

**14. Mass of an object 'A' is double to the mass of another object 'B'. Calculate the ratios of the kinetic energies of A and B while both of them moving with the same velocity.**

**Ans.:**            **Object (B)**

Mass =  $m$

Velocity =  $v$

Kinetic Energy =  $\frac{1}{2}mv^2$

**Object (A)**

Mass =  $2m$

velocity =  $v$

Kinetic Energy =  $\frac{1}{2}(2m)(v^2)$

The ratio of Kinetic Energies of A, B is =  $\frac{1}{2}(2m)(v^2) : \frac{1}{2}mv^2$

$$= 2 : 1$$

**15. Calculate the work done when an object of mass 100kg is lifted to a height of 10m.**

$$[g = 10 \text{ m / sec}^2]$$

**Ans.:** Mass  $m = 100 \text{ kg}$

Displacement or Height  $h = 10 \text{ m}$ .

Acceleration due to gravity  $g = 10 \text{ m/sec}^2$

Work done or Potential energy stored in that object =  $mgh$

$$= 100 \times 10 \times 10$$

$$= 1000 \text{ Joule}$$

**16. Two objects having the same mass are moving with velocities  $v$  and  $4v$  respectively. Find the ratio of their Kinetic Energies.**

**First object**

Mass =  $m$

Velocity =  $v$

Kinetic Energy =  $\frac{1}{2} mv^2$

**Second object**

Mass =  $m$

velocity =  $4v$

Kinetic Energy =  $\frac{1}{2} (m) (4v)^2$

The ratio of Kinetic Energies is =  $\frac{1}{2} mv^2 : \frac{1}{2} (m) (4v)^2$

$$= \frac{1}{2} mv^2 : \frac{1}{2} m (16v^2)$$

$$= \frac{1}{2} mv^2 : \frac{1}{2} m \times 16v^2$$

$$= 1 : 16$$

**17. How the Biomass help in overcoming the energy crisis?**

**Ans:** (i) A short fall in fossil fuels is known as energy crisis.

(ii) Biomass energy is an excellent solution for energy crisis.

(iii) Biomass energy a non extinct source of energy

(iv) This energy can be produced from wastes of living beings, household wastes, sewerage and drainage water etc.

(v) This energy can be used in our routine necessities.

**18. Suggest any three ways to save energy in day to day life.**

**Ans:** (i) use good quality appliances.

(ii) drive vehicles which give good mileage

(iii) put a lid on the vessels in which we cook rice, dal etc.

(iv) switch off the electrical devices like light fan etc., when we do not require them.

(v) use good quality of steel.

1. **What is energy crisis? Discuss about the utility of any two sources useful in overcoming the energy crisis.**

**Ans.** The short fall in the reserves of energy sources is called energy crisis. To overcome this crisis we have to use renewable energies widely. Solar energy, wind energy, hydro energy, biomass etc., are renewable energies.

**Hydro energy:** Water flows from upper level to lower level on its own. The energy gained by the water due to its flow will transport huge logs. This water flow will rotate the turbines in the hydro power stations to produce electricity.

**Biomass energy:** The wastes of living beings and dead parts of them are called biomass. This may include the household wastes, crop wastes, sewerage etc., also. Heat and then steam may be produced by burning the dried biomass. When it is dissociated in absence of Oxygen, Methane gas will be produced. This gas is used to light the lamps and to cook the food.

**Note:** Apart from the above two types of sources; one can attempt solar energy or wind energy etc.

2. **Prove that the kinetic energy of a moving object =  $\frac{1}{2}mv^2$**

(or)

**Derive an equation for the kinetic energy of a moving object.**

(or)

**Derive the equation  $KE = \frac{1}{2}mv^2$  for a moving body.**

Ans.

Fig

Consider that a ball of mass  $m$  come into motion from its state of rest and moving with a velocity of  $v$  by applying a force  $F$ . Let its acceleration be  $a$ . As the ball is in motion it possesses Kinetic Energy. When we ignore the resistance or friction due to air, the work done is equal to the KE of the ball.

**Observations:**

Initial velocity of the ball  $u = 0$

Acceleration =  $a$

Force applied =  $F$

Velocity acquired by the ball =  $v$

Distance travelled =  $S$

**Derivation:**

KE of the ball = work done against the ball

= F.S (since work done  $W = F \times S$ )

Kinetic energy =  $mas$  .... (1)

(as per Newton's 2<sup>nd</sup> Law of motion,  $F = ma$ )

From the equation of motion  $v^2 - u^2 = 2as$

$\Rightarrow v^2 - 0 = 2as$  (since ball started from rest position  $u = 0$ )

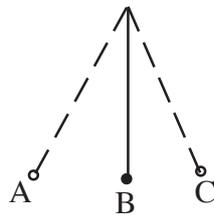
$\Rightarrow as = \frac{v^2}{2}$  ..... (2)

By substituting (2) in (1)

Kinetic energy =  $\frac{1}{2}mv^2$

**3. Explain about the energy changes that take place in the bob of a simple pendulum.**

**Ans.** When the bob of a simple pendulum is lifted to a small distance from its mean position, it starts to and fro motion. A, C are the end points and B is the mean position as shown in the fig.



When the position of the bob is at A :

While the bob is oscillating it comes to rest for a little span of time at A

At this position the bob possess potential energy as it is at height from mean position

As the bob comes to rest at this point the velocity becomes zero and hence,  $KE=0$

$\therefore$  the total energy at A =  $mgh + 0$  (as  $PE = mgh$ ,  $KE = \frac{1}{2} m v^2 = 0$ )

$$= mgh$$

When the position of the bob is at B:

While the bob moves towards the point B, the PE tends to 0 and the KE attains a maximum value.

$\therefore$  the total energy at B = diminished value of potential energy + Maximum value of KE.

$$= mgh + \frac{1}{2}mv^2 \text{ (as } PE = mgh, KE = \frac{1}{2} m v^2 \text{)}$$

$$= \frac{1}{2}mv^2 \quad \text{(as } h = 0, mgh = 0\text{)}$$

The total energy of the bob at the point B = least PE + Maximum KE

When the position of the bob is at C:

Again at C the bob comes to rest position for very short interval. Hence the KE becomes zero. As the bob stands at a height it gains PE.

The total energy of the bob at the point C = Potential Energy + Kinetic Energy

$$= mgh + 0 \text{ (since PE=mgh, and KE}=\frac{1}{2} m v^2 =\frac{1}{2} m \times v^2 = 0)$$
$$= mgh.$$

∴ the total energy of the bob continuously changes at every point and at every instant. And also the quantities of PE and KE change so that the total energy always constant for the pendulum bob.

After many oscillations the bob stops oscillating due to the resistance and frictional force of air surrounding it

**4. Derive an equation for the Potential energy of a body which is at a height.**

(or)

**Derive an equation for Potential energy “mgh”.**

(or)

**Derive an equation for the energy that is possessed by a body which is at a height ‘h’.**

**Ans:** Assume that a body with mass m is placed at a height h.

At that point the body can do a work equal to its gravitational pull, provided we ignore the resistance caused by air.

Observations:

Mass of the object = m

Gravitational force = g

Height = h

The downward force exerted by the body when it is lifted up = F

Work done against the object = W

**Derivation:**

The work done to lift the body W = force x distance moved

$$W = F \times h \quad [ \text{since } s = h ]$$

$$W = mgh \dots\dots\dots (1) \quad \text{As per the Newton's 2<sup>nd</sup> law of motion.}$$

But, the work done against the body is equal to potential energy.

$$W = \text{potential energy} \dots\dots\dots (2)$$

From the equations (1) and (2)

$$\text{potential energy} = mgh$$

**5. Explain the necessity to save the energy and write some other methods or ways which are in your purview to save the energy.**

**Ans:** the reserves of petroleum, natural gas available are limited and hence they are known as non renewable energies. But we are consuming them abundantly. Due to the rapid usage of these sources the reserves may diminish and cause the energy crisis. Even these fossil fuels may extinguish in future. Hence we should necessarily save these reserves.

Here are some ways and means I suggest to save energy.

- (i) Switch off the electrical devices like light, fan etc., when we do not require them.
- (ii) Put a lid on the vessels in which we cook rice, dal etc.
- (iii) Go by walk or use non fuel mode of transportation while traveling short distances,
- (iv) Use public transportation as far as possible.
- (v) Electric power can be saved by using good quality appliances.
- (vi) By using good quality of ovens, furnaces, stoves power can be saved.
- (vii) Check the engines of vehicles frequently so that they may be maintained in good condition.
- (viii) Drive vehicles which give optimum mileage.

#### **6. What is biomass? How do you expect that biomass is an alternate fuel?**

**Ans:** Biomass energy: The wastes of living beings and dead parts of them are called biomass. This may include the household wastes, Industrial carbon wastes, crop wastes, sewerage etc., also.

In the following two ways biomass can be used as energy source.

- i) Heat and then steam may be produced by the combustion of dried biomass.
- ii) When it is dissociated in absence of Oxygen, Methane gas will be produced. This gas is used to light the lamps and to cook the food.

Apart from these the wastes expelled from the biomass mass plants can be used as manure for crops.

#### **7. Define law of conservation of energy. Explain how the energy conversion takes place in thermal power stations.**

**Ans:** Law of conservation of energy- Energy neither be created nor destroyed. It can be changed from one form to the other. The total quantity of energy is always constant. This is called as law of conservation of energy.

Energy conversion in thermal power stations;

- (i) Chemical energy is stored in the coal which we use in thermal power stations.
- (ii) This chemical energy is converted into heat and then in the form of steam which can provide KE.
- (iii) The kinetic energy given by the steam rotates the turbine to give mechanical energy.
- (iv) This mechanical energy generates the electric power through the generator.
- (v) The electric power generated in the thermal power stations will be transmitted to cities, towns, houses and industries through conducting wires.
- (vi) This transmitted electric energy will be converted into various forms such as heat, light, sound, mechanical energies as per the needs in those places.
- (vii) Such a change from one form to the other is called energy conversion.
- (viii) During energy conversion there will be no change in the total quantity of the energy.

8. A body with 6 kg mass is travelling with a velocity of 5 m / sec. What is its Kinetic Energy? Find the change in KE, if the velocity is doubled.

Event – 1

Mass m = 6 kg

Velocity V = 5 m / sec

Kinetic Energy =  $\frac{1}{2} mv^2 = \frac{1}{2} \times 6 \times 5 \times 5$   
= 75 Joule

Event – 2

Mass m = 6 kg

Velocity V = 10 m / sec (as the velocity is doubled )

Kinetic Energy =  $\frac{1}{2} mv^2 = \frac{1}{2} \times 6 \times 10 \times 10$   
= 300 Joule

Hence the Kinetic Energy is raised by 4 times

Change in the Kinetic Energy = 300 – 75 = 225 Joule.

**Fill in the blanks:**

1. The ability to do work is ..... (energy)
2. The S.I unit for work is ..... (Joule)
3. If the force is measured in Newtons and displacement is measured in meters, then work is measured in ..... (Joule or Newton-meter)
4. The work done is .....,when one Newton force moves a body to distance of one meter in the direction of that force. (one Joule)
5. When the displacement happen in the direction of force, work done = Force X.....(displacement)
6. The amount of work done is ....., when a body moves perpendicular to force. (zero)
7. The rate of work is defined as ..... (power)
8. If the work done is W, in time t, the equation for power is P = ..... (W/t)
9. The food in plants is stored in the ..... form of energy. (chemical)
10. When the firewood is burnt, the chemical energy stored in it will convert into heat and ..... forms. (light)
11. The substances which are known as energy resources give ..... (energy)
12. The energy resources, which are available in small quantities and may exhaust are called as ..... energy resources. (non renewable)
13. Example for Non-renewable energy sources ..... (coal, petroleum, natural gas etc.)
14. The energy resources that never lost are called ..... energy sources. (Renewable)

15. Air, sun light, biomass etc are the examples for ..... energy sources. (Renewable)
16. We can say ..... is the prime source for all living beings. (sun)
17. .... energy is produced with the help kinetic energy in hydro power stations. (electricity)
18. ....gas is liberated when biomass is dissociated in the absence of oxygen. (Methane)
19. The change of energy from one form to other is called ..... (transformation of energy)
20. As per the law of conservation of energy, the quantity of ..... is constant. (total energy)
21. The energy acquired by a body by means of its motion is called.....energy. (kinetic)
22. The equation which denotes the kinetic energy of a moving object is .....  
(if mass is denoted by m, and velocity by v) (KE =  $\frac{1}{2} mv^2$ )
23. Kinetic energy of a body is directly proportional to the square of ..... (velocity)
24. If the velocity of an object is raised by 3 times, its kinetic energy will increase by.....times. (9)
25. When the mass is measured in Kgs, and velocity in m/sec., the units for the Kinetic energy Is.....  
(Joule)
26. A stone is kept at a height. The energy that possessed by the stone is called.....  
(Gravitational static energy)
27. The energy of a body by virtue of its state or of position is called..... (static energy)
28. When the mass of a body is m, acceleration due to gravity is g and the height from the surface of the ground is h, then the equation for the Potential Energy of that body is PE =..... (mgh)
29. Mass = m, and acceleration due to gravity = g for a ball shown in the figure. The upward thrust requires lifting the ball is =.....(mg)
30. The work done against the ball shown in the fig, to lift it to height h is equal to..... (mgh)
31. The energy stored in a wound spring is ..... (potential energy)
32. The energy in water flow is ..... (kinetic energy)
33. “The energy of an object is neither created nor destroyed”. This is called ..... principle.  
(Law of conservation of energy)
34. 1 Kilo Joule = ..... joules. (1,000)
35. 1 Mega Joule = ..... kilo joules. (1,000)
36. The deficit of energy sources is called..... (energy crisis)

### Multiple Choice type questions:

1. The power required to do work is called as [ b ]  
(a) momentum (b) energy (c) weight (d) force

2. The equation for the work done if the body moves in the direction of the force is [ c ]  
 (a) force/distance (b) force—distance (c) force X distance (d) force+distance
3. The amount of work done when object displaces perpendicular to the force [ c ]  
 (a) one Joule (b) two Joules (c) zero (d) three Joules
4. The work done when 1 Newton force is applied to displace an object to a distance of 1 meter [ a ]  
 (a) one Joule (b) two Joules (c) zero (d) three Joules
5.  $10^3$  Joules is equal to [ d ]  
 (a) one mega Joule (b) nano Joules (c) 1 giga Joule (d) 1 kilo Joule
6. 1 Mega Joule is equal to the following quantity of Joules. [ c ]  
 (a) 10 (b)  $10^3$  (c)  $10^6$  (d)  $10^9$
7. Joule /Sec. is the unit of the following [ d ]  
 (a) work (b) energy (c) momentum (d) power
8. The quantity of power when a joule of work is done in 1sec is [ a ]  
 (a) one watt (b) one Newton (c) two watts (d) two Newtons
9. Which of the following is true [ d ]  
 (a) unit for work is Newton (b) unit for energy is Newton  
 (c) unit for work is Pascal (d) unit for energy is joule
10. The energy that depend on the velocity of the moving object is [ b ]  
 (a) potential energy (b) kinetic energy (c) gravity (d) electric energy
11. “Energy crisis” means [ c ]  
 (a) increase in the reserves of renewable energy sources  
 (b) increase in the reserves of non renewable energy sources  
 (c) decrease in the reserves of renewable energy sources  
 (d) unaltered energy sources.
12. Which of the following is not a renewable energy source? [ a ]  
 (a) Natural gas (b) water (c) air (d) biomass
13. Biomass means [ c ]  
 (a) pollutant gases present in the atmosphere (b) body parts of live organisms  
 (c) Wastes of the living organisms (d) other name for cooking gas (natural gas)

14. Which of the following is true? [ d ]  
 (a) the bird sitting on the branch of a tree has kinetic energy.  
 (b) the wound spring has Kinetic energy.  
 (c) the water stored in the tank that built on a building has kinetic energy.  
 (d) the bullet moving with high speed has kinetic energy.
15. Which one of the following possesses the potential energy? [ a ]  
 (a) the compressed gas in a cylinder. (b) flowing water  
 (c) a thrown ball by a cricketer (d) a vehicle that moves on a road.
16. The change that takes place in the kinetic energy of an object when its velocity is reduced to half of its original [ b ]  
 (a) becomes half (b) reduced to one fourth.  
 (c) doubled (d) rises to four times.
17. The work done against a body when it is rotated in uniform circular motion is [ c ]  
 (a) positive (b) negative (c) zero (d) infinite
18. When a pendulum is making to and fro motion [ a ]  
 (a) potential and kinetic energies interchange  
 (b) potential and kinetic energies do not interchange  
 (c) potential and kinetic energies are negative  
 (d) the sum of potential and kinetic energies is zero
19. Which of the following is false, with respect to energy? [ c ]  
 (a) Kinetic energy depends on velocity (b) potential energy depends on height.  
 (c) potential energy is a scalar (d) energy can be transformed from one form to other.
20. This will be used to produce electricity in thermal power stations. [ b ]  
 (a) paper (b) coal (c) Uranium (d) Thorium
21. The following energy source has fewer reserves. [ d ]  
 (a) solar energy (b) wind energy (c) hydro energy (d) natural gas
22. Law of conservation energy means [ b ]  
 (a) form of energy can't be changed (b) form of energy can be changed  
 (c) the sum of energy is instable (d) the energy is spread over the entire universe.
23. This is true, with respect to potential energy. [ a ]  
 (a) potential energy do not depend on velocity (b) potential energy depends on velocity.  
 (c) potential energy depends on shape (d) potential energy do not depend on mass



# 10

Lesson

## HEAT ENERGY

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### Objectives

1. Differentiating the heat and temperature.
2. Construction of thermometer, calibration and use of thermometer.
3. To explain the thermal expansion due to temperature in solids, liquids and gases.
4. To explain how and why the food is cooked quickly in pressure cooker.

### Important Points

1. Heat is form of energy while temperature is the degree of hotness of the body.
2. The Kelvin scale is related to Celsius scale by the relation  $K = 273 + ^\circ C$
3. Linear coefficient of thermal expansion of a solid material is defined as the increase in length per unit length per degree Celsius rise in temperature. It is measured in  $^\circ C^{-1}$ .
4. Volume coefficient of thermal expansion of a solid material or a liquid or gaseous material is defined as the change in volume per unit volume per unit rise in temperature. It is measured in  $^\circ C^{-1}$ .
5. Melting point of a substance decreases while its boiling point increases with mixing of impurities.
6. Melting point and boiling point change with rise in pressure. The solids (like ice) which contract in volume on melting show a fall in their melting point with rise in pressure. The boiling point of all liquids increases with rise in pressure.

### 3 Marks questions

1. **Support your answer with relevant reasons that heat is the kinetic energy rendered by the moving molecules.**

**Ans:** (i) every material is made up of molecules, which are in a state of continuous random motion.

- (ii) This is due to the energy in them.
- (iii) When we heat up this material, the molecular motion increases.
- (iv) This suggests that heat appears as kinetic energy of molecular motion.

**2. Differentiate the terms heat and temperature? (or)**

**Does the two terms heat and temperature belong to the same concept?**

**Ans:** (i) Heat is a form of energy.

(ii) The term temperature denotes the degree of hotness of a body.

(iii) Heat flows from one body to another body in contact, due to the temperature difference between them.

(iv) Heat is measured in Joules.

(v) temperature is measured in °C (or) °F (or) K .

**3. Which numerical is a common in both the Celsius and Fahrenheit scales of temperature?**

**Ans:** The equation which shows the relation between Celsius and Fahrenheit scales of temperature is

$$\frac{F-32}{9} = \frac{C}{5}$$

as per the given sum  $C = F$

$$\Rightarrow \frac{C-32}{9} = \frac{C}{5}$$

$$\Rightarrow 5C - 160 = 9C$$

$$\Rightarrow 4C = -160$$

$$\text{i.e. } C = -40^0$$

$$\therefore -40^0 C = -40^0 F$$

4. The length of a steel rod is 20 cm. at 25<sup>0</sup>C. Calculate the length of that steel rod if the temperature is raised to 325<sup>0</sup>C. (Coefficient of linear expansion for steel = 0.000012<sup>0</sup>C<sup>-1</sup>)

**Ans:** Length of steel rod = 20 cm.

Initial temperature = 25<sup>0</sup>C

Final temperature = 325<sup>0</sup>C

Temperature difference = 325<sup>0</sup>C – 25<sup>0</sup>C = 300<sup>0</sup>C

Coefficient of linear expansion for steel  $\alpha = 0.000012^0C^{-1}$

Linear expansion due to the difference in temperature =  $\Delta L = \alpha L . \Delta t$

$$= 0.000012 \times 20 \times 300$$

$$\therefore \Delta L = 0.072 \text{ cm.}$$

$$\begin{aligned}
 \text{Length of the steel rod due to increase in temperature} &= L + \Delta L \\
 &= 20 + 0.072 \text{ cm.} \\
 &= 20.072 \text{ cm.}
 \end{aligned}$$

**5. Water pipes located at cold hilly areas usually burst. (Basing on the properties of water) explain the reasons for it.**

**Ans:** (i) All liquids will contract when they change into solid state.

(ii) But water expand when it solidify.

(iii) In cold regions the water present in pipes start solidifying due to low temperatures.

(iv) Hence it expands.

(v) Because of this reason it is common that the water pipes burst in such areas..

**6. Is it easy to cook food by using ordinary vessels at such places like Ooty, Nital? Give proper reasons.**

**Ans:** (i) The atmospheric pressure at high altitude will be comparatively low.

(ii) Hence water starts boiling at low temperature ( $< 100^\circ\text{C}$ )

(iii) In this situation it will take more time to cook food by using ordinary vessels.

(iv) Also the fuel consumption is more.

(v) Because of this reason the people staying at hill stations use pressure cooker instead of using ordinary vessels.

**7. Explain why Pressure cooker is named so ?**

**Ans:** (i) Always a certain weight is put on the nozzle of the pressure cooker.

(ii) If the force due to the pressure of the steam exceeds this weight, the weight gets lifted up.

(iii) Thus some of the steam leaks out and reduces pressure.

(iv) Because of the pressure and temperature inside the pressure cooker the food will be cooked soon.

(v) Thus this is called pressure cooker.

**8. Explain the concept “Latent heat”.**

**Ans:** (i) The states of materials (solids or liquids) change when their temperatures are raised

(ii) That means they change their state to liquid or gas.

(iii) When the heat is supplied the state of matter changes..

(iv) The temperature does not change during the change of state even though heat is continuously supplied to the material..

(v) It is used up wholly in changing the state of substance.

(vi) This is, therefore called latent heat (or hidden heat)

9. Derive the equation  $S = \frac{H}{M.t}$  and from that define specific heat.

Ans: The heat gained or lost by a substance is (H), is proportional to the mass of that substance (M), and temperature difference (t)

$$H \propto M$$

$$H \propto t$$

$$\Rightarrow H \propto M.t$$

$$\Rightarrow H = s. M.t$$

$$\Rightarrow S = \frac{H}{M.t}$$

Here s is called specific heat of the substance.

Definition for specific heat :

When it is assumed that, unit mass is M and temperature difference t is  $1^{\circ}\text{C}$ ;  $s = H$

“Specific heat of a material is the amount of heat required to raise the temperature of unit mass of that substance through  $1^{\circ}\text{C}$ .”

10. Define specific heat and calculate the heat required to raise the temperature of 10 kg of water to  $100^{\circ}\text{C}$  from  $25^{\circ}\text{C}$ . The specific heat of water is  $4200 \text{ J/kg}^{\circ}\text{C}$ .

Ans: Definition for specific heat - “Specific heat of a material is the amount of heat required to raise the temperature of unit mass of that substance through  $1^{\circ}\text{C}$  or 1 K.”

Mass  $m = 10 \text{ kg}$

Temperature difference,  $t = 100^{\circ}\text{C} - 25^{\circ}\text{C} = 75^{\circ}\text{C}$

specific heat of water,  $s = 4200 \text{ J/kg}^{\circ}\text{C}$

amount of heat,  $H = s . m. t$

$$= 10 \times 4200 \times 10 \times 75$$

$$= 31,50,000 \text{ joules}$$

11. Explain the reason why the water in the earthen pot gets cooled.

Ans: (i) Pots are made up of clay.

(ii) The earthen ware are porous.

(iii) The water coming out of these tiny holes absorbs heat from the water inside the pot.

(iv) The expelled water droplets evaporate by consuming that heat.

(v) Thus the temperature inside the pot decreases.

(vi) Hence the water gets cooled.

12. How the principle of expansion of solids is used in fixing the iron rim to the wheel of a bullock cart?

- Ans:** (i) The diameter of the wooden wheel of a bullock cart will be more than the diameter of the iron rim to be fixed.
- (ii) This iron rim is heated to red hot.
- (iii) Then the diameter of the rim increases.
- (iv) Hence the wooden frame is inserted easily in the iron rim.
- (v) By pouring cool water on the iron rim it contracts, to fit around the wooden frame.
- (vi) Thus the iron rim holds tightly on the wooden frame.
- (vii) In this way the principle of expansion of solids is used in fixing the iron rim to the wheel of a bullock cart.

**13. Find the value of the numerical in Fahrenheit scale that exactly double to the value of Celsius scale.**

**Ans:** The equation which shows the relation between Celsius and Fahrenheit scales of temperature is

$$\frac{F - 32}{9} = \frac{C}{5}$$

as per the given sum  $F = C$

$$\Rightarrow \frac{C}{5} = \frac{2C - 32}{9}$$

$$\Rightarrow 9C = 10C - 160$$

$$\Rightarrow C = 160^{\circ}\text{C}.$$

$$\therefore 320^{\circ}\text{F} = 160^{\circ}\text{C}$$

**14. Explain an activity to show the effect of impurities on melting point of ice.**

**Ans:** (i) Take two vessels A and B.

(ii) Take powdered ice into A and 2/3 powdered ice along with 1/3 common salt in B.

(iii) Now saturated salt solution will form in B.

(iv) Measure the temperatures in both the vessels.

(v) One can find the temperature in B will be less than that in A.

(vi) This confirms that the melting point decreases by adding salt (impurity) to ice.

**15. The length of the silver rod 50 cm. long is decreased by 1mm by cooling it. How much temperature is reduced in it? The coefficient of linear expansion=  $18 \times 10^{-6}/^{\circ}\text{C}$ .**

**Ans:** Linear expansion  $\Delta l = 1\text{mm} = \frac{1}{10}\text{cm} = 10^{-1}\text{cm}$

$$\text{Initial length } L = 50 \text{ cm} = 5 \times 10 \text{ cm}$$

$$\text{Coefficient of linear expansion} = 18 \times 10^{-6}/^{\circ}\text{C}.$$

$$\text{Difference in temperature } \Delta t = ?$$

$$\frac{\Delta L}{L} = \alpha \cdot \Delta t$$

$$\Rightarrow \Delta t = \frac{\Delta L}{L \cdot \alpha}$$

$$= \frac{10^{-1}}{5 \times 10 \times 18 \times 10^{-6}}$$

$$= \frac{1}{90} \times 10^4$$

$$= 111^{\circ}\text{C}$$

**16. Derive the equation  $\Delta L = \alpha \cdot L \Delta t$**

**Ans:** The coefficient of linear expansion of a substance ( $\Delta L$ ), is directly proportional to the length of the object and the temperature raise.

$$\Delta l \propto L$$

$$\Delta l \propto \Delta T$$

$$\Rightarrow \Delta l \propto L \cdot \Delta T$$

$$\Rightarrow \Delta l = \alpha \cdot L \cdot \Delta T$$

Where,  $\alpha$  is called the coefficient of linear expansion of a substance.

**17. Derive the equation  $\Delta v = \gamma \cdot V \cdot \Delta T$**

**Ans:** The volume coefficient of thermal expansion ( $\Delta v$ ), of a solid material or a liquid or gaseous material is directly proportional to the initial volume of the object and the temperature raise ( $\Delta T$ ).

$$\Delta v \propto V$$

$$\Delta v \propto \Delta T$$

$$\Rightarrow \Delta v \propto V \cdot \Delta T$$

$$\Rightarrow \Delta v = \gamma \cdot V \cdot \Delta T$$

Where, ( $\gamma$ ) is called the volume coefficient of thermal expansion of a liquid or gaseous substance.

**18. Mention any three applications of thermal expansion of solid substances.**

**Ans:** The applications of expansion of solid substances:

- (i) To fix the iron rim over the wooden wheel of a horse cart (jatka),

- (ii) Gaps are made at the joints in a railway track to allow the expansion of iron rail during summer. Otherwise the rail will get bent at the joints.
- (iii) To control the temperature in electrical appliances thermostats are in use.

**19. Give any three examples to prove that heat can perform the work.**

- Ans:** (i) When water boils in kettle, the steam comes out by moving the lid. The lid moves up and down.
- (ii) The steam engine in a train pulls the long array of coaches.
  - (iii) The steam liberated in thermal power station due to the boiling of water with help of coal as fuel. This steam rotates the huge turbines with high velocity.

**20. While using the thermometer to measure temperature, no error may occur due to mercury. Defend your answer.**

- Ans:** (i) The expansion or contraction in mercury level will be exactly equal for every degree raise or fall in temperature.
- (ii) Mercury does not stick to glass surface.
  - (iii) It will not form any patches on capillary bore.
  - (iv) Due to these reasons, no error will take place in measuring temperature with the help of mercury level.

**21. How you adopt the implication of expansion of solids to unthread the tightened cap of an ink bottle?**

- Ans:** (i) Keep the ink bottle in warm water, whose cap is tightened.
- (ii) As both the cap and bottle are solids, they expand.
  - (iii) But the cap expands more than the glass bottle.
  - (iv) Thus the cap can be unthreaded easily.

**22. Reason out that the water filled glass bottle will break down when it kept in a refrigerator for a long time.**

- Ans:** (i) The water in the bottle solidifies due to low temperature.
- (ii) Ice will have maximum volume at 0°C.
  - (iii) Hence water expands apparently when turns into ice.
  - (iv) Thus the bottle breaks up..

**23. Prove that the evaporation point of water will increase due to the presence of impurities.**

- Ans:** (i) Take two vessels A and B.
- (ii) Take powdered ice into A and saturated salt solution in B.
  - (iii) Now heat the two vessels till the contents boil.
  - (iv) Measure the temperatures in both the vessels with a Celsius thermometer, which give the boiling points of the contents.

(v) One can notice that the boiling point of salt water will be more than pure water.

(vi) This confirms that the boiling point increases by adding salt (impurity) to water.

### 5 Marks questions

1. Explain the construction of clinical mercury thermometer with the help of a neat diagram.

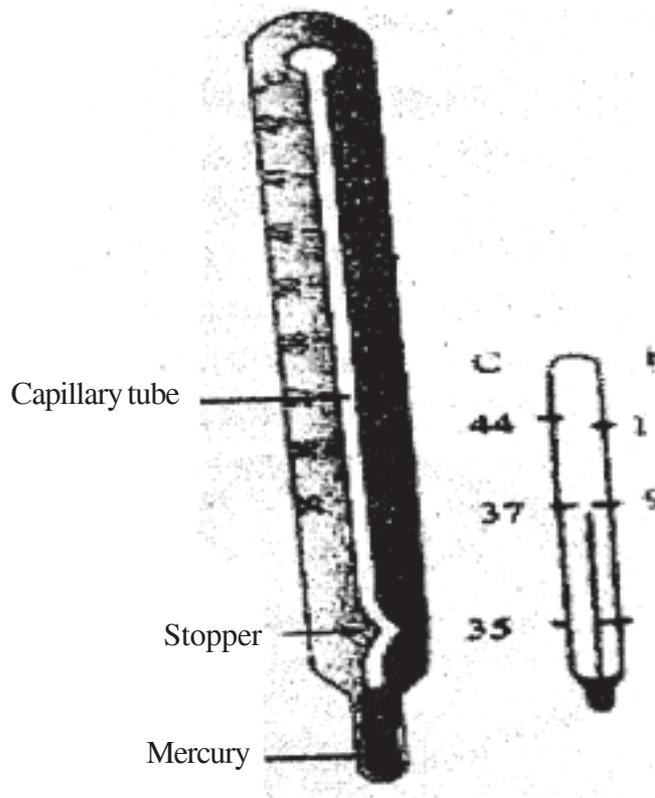


Fig. Capillary tube Constriction Mercury in bulb

Ans: (i) Thermometer consists of a thin walled glass bulb filled with mercury.

(ii) This bulb opens into a thin capillary tube.

(iii) The mercury in this capillary tube appears like a long and thin thread.

(iv) The other end of the capillary tube is closed by evacuating the air above the mercury level.

(v) For every degree raise in temperature the mercury level expands uniformly.

(vi) There is a constriction in between the bulb and capillary tube to restrict the back flow of mercury while reading the temperature.

(vii) Generally clinical thermometer is calibrated in  $^{\circ}\text{C}$  and  $^{\circ}\text{F}$ .

(viii) The coincidence of upper edge of the mercury level on the scale gives accurate reading after stabilizing its position during expansion.

**2. Explain the procedure for calibration of mercury column from 0°C to 100°C (or) 32°F to 212°F in a mercury thermometer.**

**Ans:** While calibrating a mercury thermometer, the melting point of ice and the boiling point of water are to be noted.

Identifying the melting point of ice :

- (i) Take small pieces of ice in a vessel.
- (ii) Keep the bulb of the thermometer immersed in the ice.
- (iii) Let the mercury level stabilize and make a note at the edge of the mercury level.
- (iv) This shows the melting point of the ice.
- (v) This can be read as either 0°C (or) 32°F.

Identifying the boiling point of water:–

- (i) Take water in a vessel and let it boil.
- (ii) Keep the bulb of the thermometer on which the melting point of ice is noted already, just above the boiling water.
- (iii) The mercury level raises and stabilizes at a point.
- (iv) Make a note at this point also which denotes the boiling point of water.
- (v) This point is read as 100°C (or) 212°F.

Calibrating the thermometer:–

- (i) Divide the space in between 0°C and 100°C into 100 equal parts. Each part denotes 1°C.
- (ii) Divide the space in between 32° F and 212°F into 180 equal parts. Each part denotes 1°F.

**3. What is thermostat? Explain its use in electrical appliances with a neat diagram.**

**Ans:** (i) The device which controls the temperature in electrical appliances is called thermostat.

- (ii) Thermostat consists of a bimetallic strip made up of two different metals.
- (iii) These two metals will have different values of coefficient of thermal expansion.
- (iv) When the temperature increases in the appliances, two metals in thermostat expand un evenly and make it to bend one side.
- (v) As the bimetallic strip bends one side, the circuit breaks down.
- (vi) Thus the temperature controls.

**4. On what principle does the pressure cooker works? It is easy to cook food with pressure cooker. Explain the theoretical reason for it.**

**Ans:** Working principle of pressure cooker: Boling point of water increases with the increase in pressure.

- (i) The food substances are kept in cooker, along with water.

- (ii) When the valve is open the water evaporates at  $100^{\circ}\text{C}$  and the steam comes out.
- (iii) Steam occupies more space than that of water.
- (iv) When the valve is closed, there will be no other way to steam to come out.
- (v) This steam creates pressure over the boiling water in the cooker and hence, the evaporation does not take place at  $100^{\circ}\text{C}$ .
- (vi) As heating process continues, the temperature of water increases further, but not boils.
- (vii) In this situation, the water and steam present in cooker experience more pressure and temperature.
- (viii) Thus the food is cooked soon.
- (ix) When the pressure further increases in the cooker, the weight (whistle) is pushed up and some steam will be released out to maintain the pressure inside the cooker.

**5. An iron ball of 1kg mass at  $60^{\circ}\text{C}$  is put in a container having 3kgs of water at  $25^{\circ}\text{C}$ . Find the final temperature when thermal equilibrium attained. Calculate the temperature of the container. (Specific heat of Iron is  $3000\text{ J/kg}\cdot^{\circ}\text{C}$ ; specific heat of water is  $4200\text{ J/kg}\cdot^{\circ}\text{C}$ .)**

Ans: <b>Iron ball</b>	<b>water</b>
Mass $m$ = 1 kg	Mass $m$ = 3 kg
Initial temperature = $60^{\circ}\text{C}$	Initial temperature = $60^{\circ}\text{C}$
specific heat $s$ = $3000\text{ J/kg}\cdot^{\circ}\text{C}$	specific heat     = $4200\text{ J/kg}\cdot^{\circ}\text{C}$
The temperature at thermal equilibrium = $\theta^{\circ}\text{C}$	
The temperature difference in iron ball = $60^{\circ} - \theta$	
The temperature difference in water     = $\theta - 25^{\circ}$	
The heat lost by the iron ball	= $m \cdot s \cdot t$
= $1 \times 3000 \times (60 - \theta)$	
= $3000 (60 - \theta)$ joule	
The heat gain by water	= $m \cdot s \cdot t$
= $3 \times 4200 \times (\theta - 25)$	
= $12600 (\theta - 25)$ joule	

At thermal equilibrium

The heat lost by the iron ball = The heat gain by water

$$3000 (60 - \theta) \text{ joule} = 12600 (\theta - 25) \text{ joule}$$

$$5(60 - \theta) = 21 (\theta - 25)$$

$$300 - 5\theta = 21\theta - 525$$

$$\therefore \theta = \frac{825}{26} = 31.7^{\circ}\text{C}$$

**6. Explain an activity to prove that, it is difficult to confirm the terms hotness and coolness by mere touch.**

**Ans:** (i) Take three vessels A, B, C.

(ii) Take ice cool water in A, normal water in B and warm water in C.

(iii) Keep left hand in C and right hand in A for two minutes.

(iv) Now take out both the hands from A,C and keep in B at once immediately.

(v) One can experience the water in B is cool for left hand and the same is hot for right hand.

(vi) Thus for skin by touch it is difficult to explain the concept of hotness and coolness.

**7. Explain an experiment to show that liquids expand on heating.**

**Ans:** (i) Take a small transparent glass bottle.

(ii) Fill it with water up to its brim.

(iii) Fix a single holed rubber cork to the bottle.

(iv) Take a straw and bend it.

(v) Fix this straw in the cork so that its one end immersed in water.

(vi) Now heat the bottle gradually.

(vii) Slowly water drops come out from the other end of the straw.

(viii) This is due to the expansion of water. Thus we can say liquids expand on heating.

**I. Fill in the blanks:**

1. By burning ....., Electricity is produced in thermal power plants. (coal)
2. Due to ....., heat is produced when two palms are rubbed one over other. (friction)
3. The device which converts heat energy into mechanical energy is called .....(heat engine)
4. The form of heat present in sun rays is called ..... heat. (radiation)
5. Velocity of light is ..... m/sec. ( $3 \times 10^8$  m/sec)
6. The degree of hotness of a body is called ..... (temperature)
7. The instrument used to measure temperature is ..... (thermometer)
8. Unit to measure the quantity of heat is ..... (joule)
9. The melting point of pure ice is ..... $^{\circ}$ C (0)
10. Ice point of pure water .....  $^{\circ}$ C (0)
11. Boiling point of pure water is ..... $^{\circ}$ C (100)
12. Steam point of pure water is ..... $^{\circ}$ C (100)
13. Melting point of ice on Fahrenheit scale is ..... $^{\circ}$ F (32)

14. Boiling point of water on Fahrenheit scale is .....°F (212)
15. Number of divisions on Celsius scale is..... (100)
16. Number of divisions on Fahrenheit scale is..... (180)
17. Absolute zero temperature is equal to .....°C (−273.15°C)
18. The reading starts from 95°F and end with .....in a clinical thermometer (110°F)
19. The equation used to inter convert the Celsius and Fahrenheit scales is.....
- $$\frac{F - 32}{180} = \frac{C}{100} \quad (\text{or}) \quad \frac{F - 32}{9} = \frac{C}{5} \quad (\text{or}) \quad C = \frac{5(F - 32)}{9}$$
20. The numerical which is a common in both the Celsius and Fahrenheit scales is.....(−40°)
21. The equivalent reading of 80°C on Kelvin scale is ..... (353 K)
22. An example for the heat controlling device is ..... (thermostat)
23. The increase in length of a solid substance per its unit length per 1°C raise in temperature is.....  
(Linear coefficient of thermal expansion (or) )
24. The increase in volume of a substance per its unit volume per 1°C rise in temperature is called  
.....  
(Volume coefficient of thermal expansion (or) )
25. Volume coefficient of thermal expansion is equal to .....times of its Linear coefficient of thermal expansion (3)
26. Melting point of pure ice is.....°C (0)
27. Boiling point of pure water is .....°C (100)
28. When a state of change is taking place in a substance it's ..... is constant. (Temperature)
29. Unit for latent heat is ..... (joule / kg)
30. The heat absorbed by a substance to change its solid state to liquid state without raising its temperature is called.....  
(Latent heat of liquefaction)
31. The heat absorbed by a substance to change its liquid state to gaseous state without raising its temperature is called.....  
(Latent heat of vaporization)
32. The process of changing of solid state a substance to gaseous state directly is called.....  
(Sublimation)
33. Example of a substance which undergoes sublimation is..... (Naphthalene ball, Iodine, camphor)
34. The heat required to raise the temperature of a substance by 1 °C is called..... (Specific heat)
35. The SI unit for specific heat is ..... (joule.kg<sup>-1</sup>.°C<sup>-1</sup>)
36. Units for Linear coefficient of thermal expansion is ..... (°C)
37. Units for volume coefficient of thermal expansion..... (°C.)
38. The state at which two substances have same temperature and no heat transformation is taking place

among them is called .....

(Thermal equilibrium)

39. Normal body temperature of human beings .....<sup>0</sup>F (98.6)

**Multiple Choice type questions:**

1. Velocity of light in vacuum is [ c ]  
(a)  $3 \times 10^8$  km/sec (b)  $3 \times 10^8$  cm/sec (c)  $3 \times 10^8$  m/sec (d)  $3 \times 10^8$  mm/sec
2. Heat engine means [ b ]  
(a) The device which converts the mechanical energy into heat energy  
(b) The device which converts the heat energy into mechanical energy  
(c) The device which converts the mechanical energy into magnetic energy  
(d) The device which converts the magnetic energy into mechanical energy
3. The melting point of pure ice is [ c ]  
(a) 100<sup>0</sup>C (b) 50<sup>0</sup>C (c) 0<sup>0</sup>C (d) 120<sup>0</sup>C
4. Boiling point of pure water is [ a ]  
(a) 100<sup>0</sup>C (b) 50<sup>0</sup>C (c) 0<sup>0</sup>C (d) 120<sup>0</sup>C
5. The true statement with reference to a clinical thermometer is [ a ]  
(a) 95<sup>0</sup>F to 110<sup>0</sup>F (b) 32<sup>0</sup>F to 212<sup>0</sup>F (c) 0<sup>0</sup>F to 100<sup>0</sup>F (d) 50<sup>0</sup>F to 150<sup>0</sup>F
6. Which of the following denotes the absolute zero temperature? [ c ]  
(a) 0<sup>0</sup>C (b) -100<sup>0</sup>C (c) -273.15<sup>0</sup>C (d) -40<sup>0</sup>C
7. The value of 80<sup>0</sup>C on Kelvin scale is [ b ]  
(a) 180K (b) 353K (c) 112K (d) 292K
8. Units for heat energy is [ c ]  
(a) Newton (b) watt (c) joule (d) coulomb
9. Unit for coefficient of linear expansion is [ a ]  
(a) <sup>0</sup>C<sup>-1</sup> (b)  $\frac{J}{kg.^0C}$  (c) <sup>0</sup>C (d) J/kg
10. Unit for coefficient of volume expansion is [ a ]  
(a) <sup>0</sup>C<sup>-1</sup> (b)  $\frac{J}{kg.^0C}$  (c) <sup>0</sup>C (d) J/kg
11. Coefficient of linear expansion is..... times to the coefficient of volume expansion [ b ]  
(a) 2 (b) 3 (c) 4 (d) 5
12. When the temperature of water is raised 0<sup>0</sup>C to 4<sup>0</sup>C, its volume [ d ]  
(a) increases (b) rises to 3 times (c) rises to 2 times (d) decreases

13. By increasing the pressure, the evaporation point of water [ b ]  
 (a) do not change (b) increases (c) decreases (d) becomes double
14. By increasing the pressure, the melting point of ice [ c ]  
 (a) do not change (b) increases (c) decreases (d) becomes double
15. Unit for latent heat is [ b ]  
 (a) Kg/J (b) J/Kg (c) J.Kg (d) J/Kg<sup>0</sup>C
16. The process of changing solid substances into gaseous state directly is called [ c ]  
 (a) melting point (b) evaporation (c) sublimation (d) latent heat
17. Example for a substance which sublimates [ a ]  
 (a) Iodine (b) potassium chloride (c) potassium sulphate (d) sodium chloride
18. Which of the following equation is false [ d ]  
 (a)  $H = smt$  (b)  $Q = mL$  (c)  $\frac{\Delta L}{L} = \alpha \cdot \Delta t$  (d)  $\frac{V}{\Delta V} = \gamma t$
19. Linear expansion of an object do not depend on [ d ]  
 (a) initial length (b) rise in temperature (c) nature of the substance (d) pressure
20. While change of state taking place in a substance, its temperature [ a ]  
 (a) do not change (b) increases (c) decreases (d) becomes double
21. The temperature of water during evaporation [ a ]  
 (a) do not change (b) increases (c) decreases (d) becomes double
22. The electrical appliance that consists of thermostat is [ b ]  
 (a) T.V (b) greaser (c) cell phone (d) electric bulb
23. The melting point of ice when salt is added to it [ b ]  
 (a) increases (b) decreases (c) do not change (d) becomes double
24. The numerical which is a common in both the Celsius and Fahrenheit scales is [ c ]  
 (a) 0<sup>0</sup> (b) 40<sup>0</sup> (c) -40<sup>0</sup> (d) 100<sup>0</sup>
25. The liquid which expands during its change of state into solid [ a ]  
 (a) water (b) alcohol (c) mercury (d) liquid wax
26. At this temperature water possess least volume [ d ]  
 (a) 0<sup>0</sup>C (b) 2<sup>0</sup>C (c) 3<sup>0</sup>C (d) 4<sup>0</sup>C
27. At this temperature water possess maximum density [ d ]  
 (a) 0<sup>0</sup>C (b) 2<sup>0</sup>C (c) 3<sup>0</sup>C (d) 4<sup>0</sup>C

28. The correct relation in between is [ b ]  
 (a)  $\alpha=3\gamma$       (b)  $3\gamma = \alpha$       (c)  $\gamma=\frac{3}{\alpha}$       (d)  $\alpha=\frac{3}{\gamma}$
29. Which of the following is true? [ a ]  
 (a) The melting point of ice decreases when pressure is increased  
 (b) The melting point of ice increases when pressure is increased  
 (c) The melting point of ice decreases when pressure is decreased  
 (d) The melting point of ice doesn't depend on pressure
30. The boiling point of water is less at this place [ b ]  
 (a) Hyderabad    (b) Ooty                      (c) Mumbai                      (d) Chennai
31. Which of the following is a heat calibrating substance? [ b ]  
 (a) water    (b) mercury      (c) Sodium chloride solution    (d) liquid Iodine
32. The correct relation between Kelvin and Celsius scales is [ a ]  
 (a)  $K = 273 + C$     (b)  $C = K + 273$       (c)  $C = 273 - K$       (d)  $K = 273 - C$
33. The substance which never changes to liquid state is [ b ]  
 ]  
 (a) Ice                      (b) Naphthalene                      (c) coconut oil    (d) wax

### III. Matching

<u>Group - A</u>	<u>Group - B</u>
1) Velocity of light in vacuum	– $3 \times 10^8$ m/sec
2) Heat	– Joule
3) Latent heat	– J/kg
4) Specific heat	– J/kg.°C
5) Coefficient of linear expansion	– °C <sup>-1</sup>
6) Coefficient of volume expansion	– °C <sup>-1</sup>
7) Temperature controlling device	– Thermostat
8) Temperature measuring device	– Thermometer
9) $\alpha$	– $\frac{\Delta L}{L.t}$
10) $\gamma$	– $\frac{\Delta V}{V.t}$

- 11) Evaporation point of pure water –  $100^{\circ}\text{C}$
- 12) Melting point of pure ice –  $0^{\circ}\text{C}$
- 13) Relation between Celsius and Fahrenheit scale is  $\frac{C}{5} = \frac{F-32}{9}$
- 14) Lowest volume of water –  $4^{\circ}\text{C}$
- 15) By increasing the pressure, the melting point of ice – decreases
- 16) By increasing the pressure, the evaporation point of water – increases
- 17) Latent heat –  $\frac{Q}{M}$
- 18) Heat absorbed by a body (H) is – mst
- 19) Relation between Kelvin and  $^{\circ}\text{C}$  –  $\text{K} = 273 + ^{\circ}\text{C}$
- 20) Change of state – temperature do not change

# 11

## Lesson

# LIGHT ENERGY

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### Objectives

1. To recognize the importance of light in day to day life, and to define the reflection of light, laws of reflection.
2. To describe the image formation by plane and curved mirrors with suitable ray diagrams.
3. To define refraction of light and state the laws of refraction.
4. To describe the types of lenses and explain the image formation by convex and concave lenses with the help of ray diagrams.
5. To use lense formula.
6. To describe briefly the construction and working of the instruments, like simple microscope, compound microscope and astronomical telescope.

### Important Points

1. Reflection of light: When the light ray (called incident ray) strikes a polished surface, it bounces back in the same medium (forming reflected ray), and the phenomenon is called reflection of light.
2. When a ray of light passes from one medium to another medium of different density, it bends and this phenomenon is called refraction of light.
3. The ability of any medium to bend light ray is called the refractive index of the medium.
4. Radius of curvature: The distance between the pole and centre of curvature of a mirror is called radius of curvature.
5. Centre of curvature: It is the centre of the hollow sphere of which the spherical mirror is a part.
6. Focal length: It is the distance between the pole and the principle focus of the mirror.

7. In order to see very minute objects, we use compound microscope.
8. Depending on the nature of the surface, the reflection of light can be of two types: 1) Regular reflection  
2) Diffused reflection.
9. A lens is a portion of a transparent refracting medium bounded by two spherical surfaces and they are mainly of two types namely: 1) Convex lens and 2) Concave lens.
10. The ratio of the image to that of the object is called as the magnification of the lens.
11. The device which produces a magnified erect image of an object is called a Simple Microscope.

### 3 Marks questions

#### 1. State and explain the laws of reflection.

**Ans:** Reflection of light: When the light ray (called incident ray) strikes a polished surface, it is bounced back in the same medium (forming reflected ray), and the phenomenon is called reflection of light.

#### Laws of reflection:

- (i) First law of reflection: The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.
- (ii) Second law of reflection: The angle of incidence is equal to the angle of reflection. i.e.  $i = r$

#### 2. Write the characteristic properties of an image formed by a plane mirror.

**Ans:** (i) The size of the object and the size of the image are equal. The image is always virtual.  
(ii) The distance between the mirror and object is equal to that of the distance between image and mirror.  
(iii) Due to the reflection in a plane mirror, the left portion of the object appears as right portion in the image and vice-versa. This property is known as lateral inversion.

#### 3. Write the applications of a concave mirror.

**Ans:** Concave mirror is used –

- (i) as a reflector in head lights of motor cars,
  - (ii) to diverge the light through flood lights,
  - (iii) for converging solar radiation in solar cookers,
  - (iv) as a focusing mirror for dentists, etc.
4. What are the technical points to be considered, while taking the measurements with reference to a concave mirror?

**Ans:** (i) All measurements are measured from the pole of the mirror.  
(ii) Distance measured in the direction of incident ray should be as positive value.  
(iii) Distance measured against the direction of incident ray should be taken as negative value.  
(iv) The distances above the principle axis are taken positive, whereas, below it is taken negative.

**5. Differentiate the convex lens and concave lens.**

<b>convex lens</b>	<b>concave lens</b>
1. Edges of the lens are thin.	1. Edges of the lens are thick.
2. The central part is thick.	2. The central part is thin.
3. It converges the light rays.	3. It diverges the light rays.
4. It is called as converging lens.	4. It is called as diverging lens.

**6. Write the reasons of using frosted glasses as window glass generally.**

**Ans:** (i) Frosted glass has rough surface.

(ii) The light falling on the rough surface gets diffused reflection.

(iii) Hence the frosted glass can't give clear image.

**7. Even though the light is reflected from the book you read, why is your image not visible in it?**

**Ans:** (i) The surface of the book is rough.

(ii) The rough surfaces will give diffused reflection.

(iii) Due to this reason image will not form on paper surface.

**8. Write any three uses of a plane mirror.**

**Ans:** (i) as a reflector during makeup,

(ii) in the construction of Kaleidoscope, Periscope etc.,

(iii) to observe the curved directions,

(iv) to focus the light in the required direction, etc.

**9. Define the refraction of light and write the laws of refraction.**

**Ans:** When a ray of light passes from one medium to another medium of different density, it bends and this phenomenon is called refraction of light.

**Laws of refraction:**

(i) First law of refraction: The incident ray, the refracted ray and the normal at the point of incidence, all lie in the same plane.

(ii) Second law of refraction: The ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant and it is equal to the refractive index of the medium.  $\mu = \frac{\sin i}{\sin r}$

This law is also called as the **Snell's law**.

**10. Write any three applications of refraction of light.**

- Ans: (i) the coin dropped in a vessel containing water will be seen at a little upper region to the bottom surface of the vessel.
- (ii) Sun light appears before the sun rise and even after sun set.
- (iii) Stars appear to twinkle in the night sky.
- (iv) A long linear object appears as bent at the surface of the water, when it kept in slanting position in water.

**11. Glass prism produces a spectrum of white light, but why don't a glass slab?**

- Ans: (i) When the white light passes through a glass prism, it gets dispersed.
- (ii) To produce dispersion, the emergent beam should be divergent.
- (iii) The emergent light beam refract in a glass slab.
- (iv) The refracted rays travel parallel to the emergent beam.
- (v) Hence, white light beam do not split up.
- (vi) This is the reason that the glass slab does not form the spectrum.

**12. Find the magnification power of a simple microscope in which a convex lens of 25 cms focal length is used.**

Ans: Focal length = 25 cm.

$$\begin{aligned}\text{Magnifying power of simple microscope} &= 1 + (25/f) \\ &= 1 + (25/25) \\ &= 1 + 1 \\ &= 2\end{aligned}$$

**13. Define the following terms with respect to a spherical mirror.**

- (a) Radius of curvature (b) center of curvature (c) focal length

**Ans:** (a) Radius of curvature R :- It is the distance between the pole and the centre of curvature of a spherical mirror.

(b) Center of curvature C :- It is the centre of the hollow sphere of which the spherical mirror is a part.

(c) Focal length :- It is the distance between the pole and the principal focus of the mirror.

**14. Differentiate the real and virtual images formed due to reflection.**

Real image	Virtual image
1. Real image is obtained by the actual intersection of reflected rays.	1. Virtual image is obtained when the rays appear to meet each other but actually do not intersect each other.
2. This can be cast on a screen.	2. This can't be cast on a screen.
3. In case of spherical mirrors real images are formed on the same side of the mirror as the object.	3. Virtual images are formed behind the mirror.

**15. Write the characteristic properties of the image formed through a concave lens.**

**Ans:** The image formed by a concave lens is always (i) smaller than the object,  
(ii) erect with respect to object,  
(iii) virtual,  
(iv) forms in between focus and optical centre and,  
(v) forms on the same side as the object.

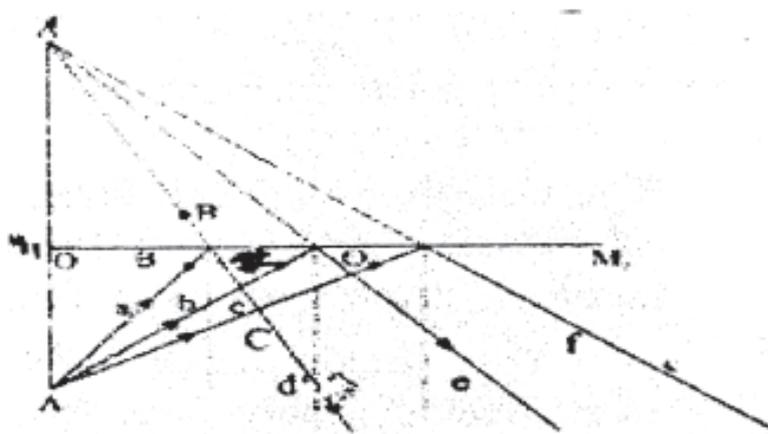
**16. Explain the reason, why the ice cubes appear sparkling when light falls on them.**

**Ans:** (i) When the light falls on a rough surface diffused reflection takes place.  
(ii) the surface of the ice cube acts as a diffused reflecting plane.  
(iii) Hence the light falling on ice surface reflects in all directions and appears to be sparkling.

**5 Marks questions:**

**1. Explain with a ray diagram, how a plane mirror forms an image.**

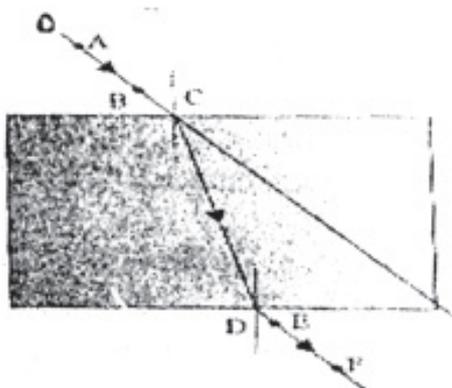
- (i) Spread a sheet of white paper over a soft, smooth wooden plank or a piece of card board.
- (ii) Put the mirror  $M_1M_2$  in a vertical position over the sheet as shown in figure.



- (iii) Put two pins, one at 'A' little far from the mirror and the other one very near to the mirror 'B' so that, the line AB makes an angle with the line  $M_1M_2$ .
- (iv) Look at the images A and B of the two pins through the mirrors put two other pins at C and D so that all four pins A, B, C and D are in the same straight line.
- (v) While identifying the images of A, B make sure that no parallax error exists.
- (vi) Join the positions of the pins by straight line.
- (vii) Keeping the first pin as it is, take out other three pins.
- (viii) Repeat the experiment described above by keeping the pins in new positions, so that we can take few more readings.
- (ix) a, b, c rays in the above figure are incident rays. They are reflected in d, e, f directions.
- (x) d, e, f rays appear to come from the point A'.
- (xi) A' is the image of the object A.

**2. Explain the refraction through a glass slab with the help of ray diagram ?**

**Ans.**



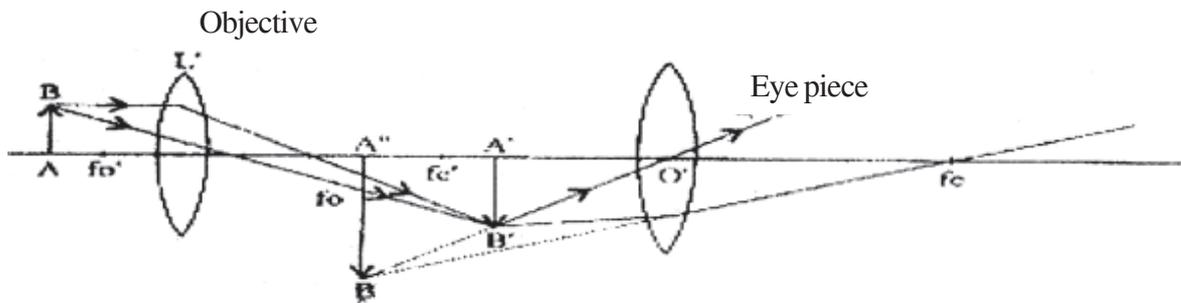
- (i) Place a glass slab on a drawing sheet fixed on a wooden drawing board.
- (ii) Sketch a pencil boundary of a glass slab. Draw a line OC meeting the boundary line obliquely as shown in fig.
- (iii) Fix the pins A and B on OC line.
- (iv) Now observe the images of A, B pins through the other side of the glass slab and Fix E and F pins such that they are in straight line with pins A, B.
- (v) Remove the slab and the pins.
- (vi) Draw a line joining the points F to E to meet the boundary at D.
- (vii) Join the C, D points by a dotted line.
- (viii) A, B, C gives the direction of incident ray and DEF gives the direction of emergent ray.

- (ix) The line CD gives the direction of refracted ray.
- (x) Draw normal  $N_1CN_2$  at C and  $N_3DN_4$  at D.

In this figure, the ray bends towards the normal when it goes from air to glass and bends away from the normal when it goes from glass to air.

**3. Explain the construction and working of a compound microscope with the help of ray diagram.**

Ans.



**Image formation by a compound microscope.**

A microscope is an instrument used to observe very small objects.

**Construction :**

- (i) It consists of two convex lenses
- (ii) The lens towards the object is known as objective.
- (iii) The lens towards the eye of the viewer is known as eyepiece.
- (iv) Focal length of the eyepiece is greater than the focal length of the objective.

**Working :**

- (i) Object is placed at a distance slightly greater than the focal length the objective.
- (ii) A real, inverted and magnified image is formed by the lens on its other side.
- (iii) The eye piece is so adjusted that this image is with in its focal length.
- (iv) This image acts as an object for the eyepiece.
- (v) Eyepiece produces a virtual, inverted and enlarged final image.

**4. Explain Regular and diffused reflections.**

Ans. Depending on the nature of surface the reflection of light can be of two types.

- (i) Regular reflection : When the reflecting surface is very smooth and the rays of light falling on it are reflected into the same medium, then it is called regular reflection. Ex: Light incident on a plane mirror undergoes regular reflection.

- (ii) Diffused reflection : When the reflection of light takes place from rough surface the light is reflected off in all directions. It depends on the angle of incidence on the part of the surface it hits. This is called diffused reflection.

Ex: Reflected light from the surface of the broken ice piece.

**5. Explain the formation of image in a simple microscope and magnifying power of it with the help of ray diagram.**

Ans.

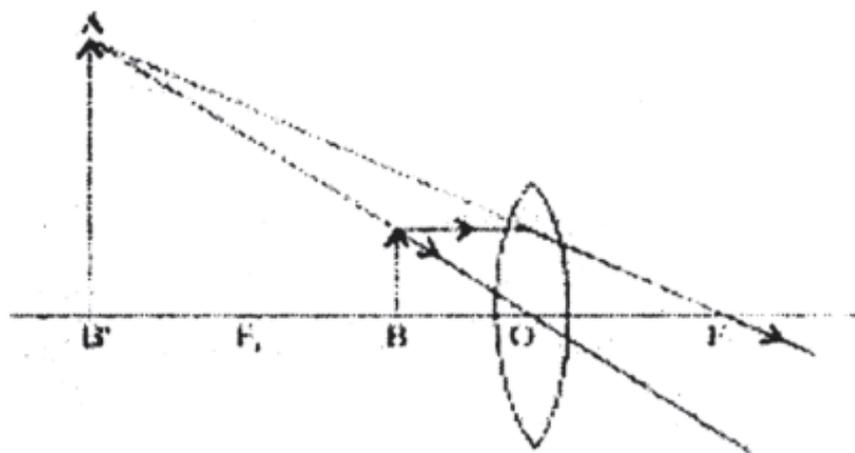


Image formation by simple microscope

- (i) A simple microscope consists of just a convex lens of small focal length.
- (ii) A convex lens produces an erect and magnified image when the object is placed at a distance less than its focal length.
- (iii) Magnification in the case of convex lens (fig) is given by  $m = 1 - \frac{v}{f}$
- where  $v$  is the image distance and  $f$  is the focal length of the lens.
- (iv) Magnification increases with the decrease in the focal length of the lens.
- (v) Since the least distance of distinct vision is 25 cm.

$$\text{Magnification } m = 1 - \frac{-25}{f}$$

$$m = 1 + \frac{25}{f}$$

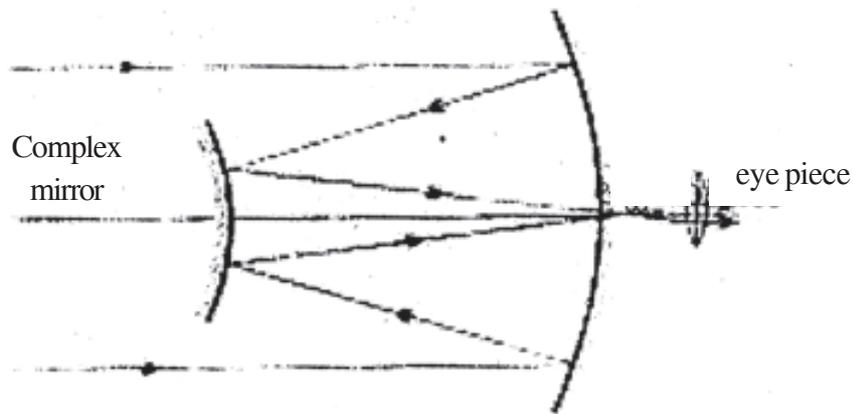
**6. With the help of a diagram, explain the construction and working of a refracting telescope.**

Ans.(i) Generally a refracting telescope is used to view the astronomical objects. Thus it is called as astronomical telescope.

- (ii) It consists of two convex lenses arranged in a tube.

- (iii) The lens towards object is known as objective.
- (iv) The lens towards the eye is called eye piece.
- (v) The objective is of larger focal length.
- (vi) The eyepiece is of short focal length.
- (vii) The objective forms an inverted and real image of the distant object. The eye lens acts like a magnifying glass taking the image formed by the objective as its object.

**7. With the help of a diagram, explain the working of reflecting telescope.**

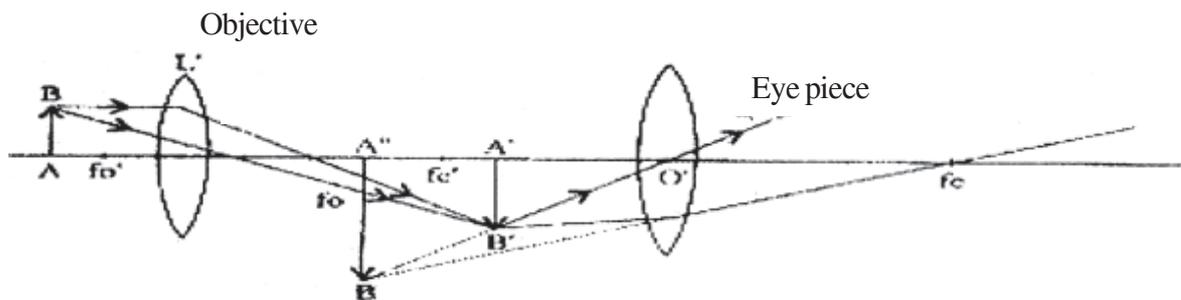


Reflecting telescope

- (i) The objective of a reflecting telescope is a spherical concave mirror of large focal length.
- (ii) The parallel rays from a distant object fall on the concave mirror.
- (iii) Before being focussed at the focus, the rays are intercepted by a small convex mirror,  $M_1M_2$  inclined at  $45^\circ$  with the axis of the objective mirror.
- (iv) Thus the image is shifted towards the eyepiece.
- (v) The eyepiece magnifies the image as usual.
- (vi) The mirror  $M_1M_2$  is so small that it does not obstruct much of the incident light.
- (vii) Hence the brightness of the image is not affected.
- (viii) Most of the telescopes used for important astronomical observations are reflecting telescopes.

**8. Derive an equation for the magnifying power of compound microscope.**

Ans.



Let  $u_1$  = distance of the object AB from objective.

$v_1$  = distance of the image from objective.

$u_2$  = distance of  $A_1B_1$  from eye piece.

$v_2$  or D = distance of final image from eye piece.

Now with the eye placed very close to the eyepiece, the magnifying power ( $m$ ) of the compound microscope is given as

$$m = m_0 \times m_e.$$

where  $m_e$  is the magnifying power of eyepiece and  $m_0$  is the magnifying power of objective. Since the eyepiece acts like a simple microscope, so its magnifying power is

$$m_e = \left( 1 + \frac{25}{f_e} \right)$$

where  $f_e$  is the focal length of the eyepiece. Magnifying power of objective  $m_0 = \frac{v_1}{u_1}$

$$\therefore m = \frac{v_1}{u_1} \left( 1 + \frac{25}{f_e} \right)$$

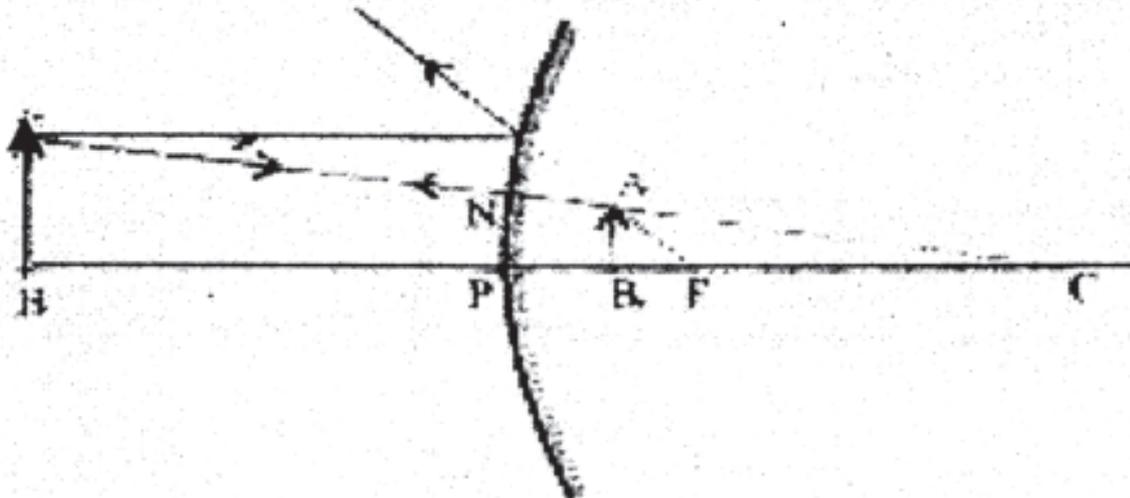
**9. What are the characteristics of the images formed by concave mirror for the following cases?**

- (i) When the object is in between mirror and principal focus.
- (ii) When the object is at centre of curvature.
- (iii) When the object is at Focus.

Position of the object	Characteristics of the image
1. When it is in between mirror and focus principal focus.	Real, inverted and enlarged image beyond C.
2. When the object is at centre of curvature	Real, inverted, diminished image between C and F
3. When the object is at the principal focus	real, inverted and highly enlarged image at infinity.

**10. Explain the formation of image in convex mirror with the help of ray diagram.**

Ans.



- (i) In fig, AQ is the incident ray and it is parallel to the principal axis.
- (ii) When the ray incidents on the mirror it reflects back.
- (iii) Reflected ray appears to come from the focus F.
- (iv) Another incident ray AN towards the centre of curvature is reflected back along the same parth.
- (v) These two reflected rays appear to come from the common point A.
- (vi) The image formed by the convex mirror is between pole P and focus F.
- (vii) The image formed is virtual, diminished and erect.

**11. What are the characteristics of the image formed by the convex lens for the following cases.**

- (a) When object is at optic centre and principal focus.
- (b) When object is at principal focus F.
- (c) When object is at  $2F_1$ .

Ans:	Position of the object	Characteristics of the image
	1. When the object is at optic centre and principal focus.	The image is formed on the same side of the lens and it is virtual, erect and magnified.
	2. When the object is at principal focus F.	The image is at infinity and it is real, inverted and much magnified.
	3. When object is at $2F_1$	The image is at $2F_2$ on the other side of the lens and its is real, inverted and is of the same size of the object.

## Fill in the Blanks

1. Some objects which emit light by their own are called as ..... (luminous objects)
2. Bouncing back of part of the incident light on surfaces is called .... (reflection of light)
3. The direction of propagation of light is known as ..... (ray)
4. Group of rays are known as ..... (beam of light)
5. The angle between incident ray and normal is called as ..... (angle of incidence)
6. Reflection on smooth surfaces is known as ..... (regular reflection)
7. Reflection on rough and unpolished surfaces is known as ..... (irregular reflection)
8. According to first law of reflection angle of incidence is equal to ..... (angle of reflection)
9. Images which can not cast on a screen are called as ..... (virtual images)
10. The images which are obtained by the actual intersection of reflected rays are called ..... (real images)
11. Due to reflection in a plane mirror, left handedness is changed into right handedness and vice-versa is known as ..... (lateral inversion)
12. A section of a hollow sphere whose inner or outer surface is polished is known as ..... (spherical mirror)
13. A mirror in which the reflection takes place from the outer or the bulging side is called as ..... (Convex mirror)
14. Mid point of the spherical mirror is known as ..... (pole)
15. Centre of the hollow sphere of which the spherical mirror is a part is known as ..... (centre of curvature)
16. Distance between the pole and the centre of curvature of a spherical mirror is called ..... (Radius of curvature)
17. The imaginary line joining the pole with the centre of curvature of spherical mirror is ..... (principal axis)
18. Distance between the pole and the principal focus of the mirror is ..... (focal length)
19. The mirrors which are used for converging solar rays in solar cookers are ..... (concave mirror)

20. The mirror which is used as rear view mirror in motor cars, buses and scooters is .....  
(convex mirror)
21. The mirror which is used in flood lights to obtain divergent beam of light is ..... (concave mirror)
22. The mirrors which are used in the construction of kaleidoscope, telescope, sextant and periscope are .....  
(plane mirrors)
23. The ratio between size of the image and size of the object is known as ..... (linear magnification)
24. When a ray of light passes from one medium to another, bends at the surface of separation is known as ..... (refraction)
25. The ratio between speed of light in vaccum and speed of light in medium is known as ..... of that medium.  
(refractive index)
26. The twinkling of stars is due to ..... of light. (refraction)
27. A lens which is thick in the middle and thin at the rim is known as ..... (convex lens)
28. A lens which is thin in the middle and thick at the rim is known as ..... (concave lens)
29. .... lens is diverging lens. (Concave lens)
30. To produce to image at infinity by using convex lens the object is placed at ..... (principal focus)
31. The process of separation of white light into its seven colours is known as .....  
(dispersion of light)
32. An instrument which is used to see magnified images of very small objects is ..... (microscope)
33. The minimum distance of an object from the eye upto which it is clearly visible is called .....  
(least distance of distinct vision)
34. An instrument which is used to see distant object is ..... (telescope)
35. Colour with minimum wavelength in VIBGYOR is ..... (Violet)
36. Colour with maximum wavelength in VIBGYOR is ..... (Red)
37. When part of a pencil is kept inside the water in a glass it appears to be bent. It is because of property of light .....  
(Refraction)
38. The ratio of  $\sin i$ ,  $\sin r$  gives ..... of the material. (refractive index)
39.  $\mu = \frac{\sin i}{\sin r}$  is ..... law (snells')

40. When a coin placed at the bottom of a container full of water appears to be raised because of ..... of light. (refraction)
41. Appearance of sun before sunrise and after sunset is due to ..... of light (refraction)
42. An optical instrument which is used to see bacteria is ..... (microscope)

### Multiple choice Question

1. Which of the following is self luminous ( c )  
 (a) Earth (b) moon (c) sun (d) mars
2. The phenomenon of bouncing back of light from surfaces is ( )  
 a )  
 (a) Reflection (b) Refraction (c) interference (d) dispersion
3. Which of the following reflects more light ( c )  
 (a) wall (b) wooden table (c) plane mirror (d) black board
4. According to reflection of light ( d )  
 (a)  $\angle i$  is grater than  $\angle r$  (b)  $\angle i$  is less than  $\angle r$   
 (c)  $\angle i$  is highly greater than  $\angle r$  (d)  $\angle i$  is equal to  $\angle r$
5. Which of the following is not the characteristic of the image formed by plane mirror. ( d )  
 (a) lateral inversion of image  
 (b) object distance is equal to image distance  
 (c) size of the object is equal to size of the image  
 (d) real image.
6. Which of the following is true in spherical mirrors. ( a )  
 (a)  $R = 2f$  (b)  $f = 2R$  (c)  $R = f/2$  (d)  $R = 2 + f$
7. Mirror fixed in front of the driver in a vehicle to have rear view ( c )  
 (a) convex lens (b) concave lens  
 (c) convex mirror (d) concave mirror
8. An optical instrument which is used in kalideoscope ( a )  
 (a) plane mirror (b) concave mirror  
 (c) convex lens (d) concave lens
9. An instrument used by doctors to observe the inner parts of an ear ( b )  
 (a) plane mirror (b) concave mirror  
 (c) concave lens (d) convex lens

10. linear magnification means ( a )  
 (a) ratio of size of the image and size of the object  
 (b) product of size of the image and size of the object  
 (c) sum of size of the image and size of the object  
 (d) difference of size of the image and size of the object
11. If linear magnification in spherical mirrors is positive ( b )  
 (a) inverted image (b) erect image  
 (c) diminished image (d) no image
12. If linear magnification in spherical mirrors is negative ( c )  
 (a) magnified image (b) no image  
 (c) inverted image (d) erect image
13. If speed of the light in vacuum is  $x$ , speed of the light in the medium is  $y$ , the refractive index ( d )  
 (a)  $xy$  (b)  $x+y$  (c)  $x - y$  (d)  $\frac{x}{y}$
14. Which of the following shows snell's law ( d )  
 (a)  $\sin i + \sin r$  (b)  $\sin i - \sin r$  (c)  $\sin i \cdot \sin r$  (d)  $\frac{\sin i}{\sin r}$
15. The property of convex lens ( a )  
 (a) thick in middle and thin at the rim  
 (b) thin in middle and thick at the rim  
 (c) thick at middle and at rim  
 (d) thin at middle and at rim
16. In any lens of minimum number of rays required to draw an image are ( b )  
 (a) one (b) two (c) three (d) four
17. When a ray of light incident on principal focus of the lens ( b )  
 (a) reflected (b) under goes refraction and propagates in the same direction  
 (c) undergoes refraction and change in the direction of propagation  
 (d) undergoes reflection and splits
18. When an object is placed at the principal focus of the convex lens, the image is formed at ( c )  
 (a) at F (b) nearer to the lens  
 (c) at infinity (d) at  $2F$
19. Which of the following is not the characteristic of the image formed when an object is placed at  $2F$  of the convex lens ( d )  
 (a) image formed at  $2F_2$  (b) real image  
 (c) size of the object is equal to size of the image  
 (d) erect image

20. Colour with least wave length ( a )  
 (a) violet (b) Red (c) green (d) blue
21. Which of the following is false in reflecting telescope ( b )  
 (a) focal length of the objective is high (b) concave lens is used  
 (c) inverted image (d) used to observe astronomical objects
22. If a person wants to see his full image in mirror the height of the mirror should be ( c )  
 (a) double (b) equal (c) half (d)  $1/4^{\text{th}}$
23. A man can see his full image in a mirror of 85 cm height. Then height of man ( c )  
 (a) 43 cm (b) 85 cm (c) 170 cm (d) 340 cm
24. Which of the following is false in refraction of light ( b )  
 (a) light rays bend while travel  
 (b) no change in the speed of light  
 (c) light travels from one medium to another medium  
 (d) when it travels through prism, splits into 7 colours
25. Size of the object is 10 cm. When a lens produces 20 cm height of an image, what is the magnification of the lens ( d )  
 (a)  $1/2$  (b) 30 (c) 10 (d) 2
26. Formula for magnification of a simple microscope ( a )  
 (a)  $M = 1 + 25/f$  (b)  $M = 1 + 25f$   
 (c)  $M = 25f - 1$  (d)  $M = 1 + \frac{f}{25}$
27. When sun light allowed to pass through prism, which colour is not present in the spectrum ( b )  
 (a) blue (b) black (c) violet (d) red
28. Unit of refractive index ( d )  
 (a) degree (b) m/sec (c)  $\text{m/sec}^2$  (d) no units
29. Depth of a coin in a liquid is 80 cm. apparent depth 60 cm, then refractive index of a liquid is ( a )  
 (a) 1.3 (b) 0.7 (c) 0.2 (d) 2.3
30. With convex lens the image is formed at infinity position of the object is ( d )  
 (a) between F and 2F (b) between optic centre and principal  
 (c) at C (d) at F

31. When a composite light passes through prism, it splits into its 7 constituent colours. It is called as

( d )

(a) reflection of light

(b) diffraction of light

(c) interference of light

(d) dispersion of light

### Match the following

- |  |   |                     |
|--|---|---------------------|
| 1. luminuous object                          | - | sun                 |
| 2. Non-luminuous                             | - | moon                |
| 3. reflection principle                      | - | $ i  =  r $         |
| 4. reflection on plane mirror                | - | regular reflection  |
| 5. reflection on broken ice pieces           | - | diffused reflection |
| 6. image that can cast on a screen           | - | real image          |
| 7. image that can not be cast on a screen    | - | virtual image       |
| 8. Kaledioscope                              | - | plane mirror        |
| 9. Mirror used by doctors                    | - | concave mirror      |
| 10. Rear view mirror used in vehicles        | - | convex mirror       |
| 11. A lens which is thin at the rim          | - | convex lens         |
| 12. A lens which is thick at the rim         | - | concave lens        |
| 13. $\frac{\sin i}{\sin r}$                  | - | refractive index    |
| 14. Image seen in a plane mirror             | - | reflection mirror   |
| 15. Twinkling of stars                       | - | refraction          |
| 16. Colour which undergoes maximum deviation | - | violet              |
| 17. Colour which undergoes minimum deviation | - | red                 |
| 18. Instrument used to see stars             | - | Telescope           |
| 19. Instrument used to see bacteria          | - | Microscope          |

# 12

Lesson

## Electrical Energy

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### Objectives

- Cite Examples of production of static electricity from every day life.
- To show experimentally the existence of two types of charges and state coulomb's law
- Define electro static potential energy, potential difference, electric current and electric resistance
- State ohm's law and describe its experimental verification.
- Define the commercial units of electric power and electric energy.
- Solve numerical problems based on Coulmb's law, ohm's law, combination of resistors and consumption of electric power and electric energy in our houses.

### Important Points

- (1) Charges are of two types. Charge acquired by a glass rod rubbed with silk is positive and that acquired by an ebonite rod rubbed with fur is negative.
- (2) Like charges repel each other as unlike charges attract each other.
- (3) The forece between two charges is given by Coulomb's law, according to which

$$F = \frac{Kq_1q_2}{r_2}$$

- (4) Force per Coulomb of charge at a point is called electric field

$$E = \frac{F}{q}$$

- (5) Ohm's law states that current flowing through a conductor is directly proportional to the potential difference applied between its ends, provided temperature and other physical conditions of the conductor remain unchanged.
- (6) Ratio of voltage applied across a conductor and the current flowing through is called resistance of the conductor. SI unit of resistance is Ohm.
- (7) In series, total resistance of the combination is equal to the sum of the individual resistances.
- (8) In parallel, reciprocal of the combined resistances is equal to the sum of the reciprocals of the individual resistances.

### 3 Marks

#### 1. What is frictional electricity ? Explain how it formed in different materials.

- A) The electricity (or charge) developed on a body, when it is rubbed in intimate contact with another body, is called frictional electricity.

Charles Dufay found that charge acquired by a glass rod on getting it rubbed with silk is different from the charge acquired by an ebonite rod rubbed with wool. Dufay called the charge acquired by glass - rod on rubbing it with silk as vitreous electricity and the charge acquired by ebonite rod on rubbing it with wool as resinuous electricity. Franklin called them as positive and negative charge.

Metals can't exhibit frictional electricity whereas non-metallic solids can be charged.

#### 2. Explain an experiment to identify two types of electric charges.

- A) Take two glass rods, two ebonite rods, a silk cloth, woollen cloth and an insulating stand. Hang the glass rod with silken thread.

Rub a glass - rod with a piece of silk and place it on the stirrup. Rub the second glass-rod with silk and bring it close to one end of the first glass-rod. We can observe that two charged glass rods repel each other

Rub an eborite - rod with a piece of wool and bring it close to the end of glass rod on stirrup as above. Two charged ebonite rods also repel each other. By repeating the experiment by placing an eborite rod on the stirrup instead of glass rod. We can see that charged glass rod attracts a charged ebonite rod.

This shows that there are two different charges i.e. +ve and -ve charges.

3. When the charge on the particles is doubled and distance is halved what happens to the force between them ?

- A) Force between two charges  $F = \frac{k q_1 q_2}{r^2}$

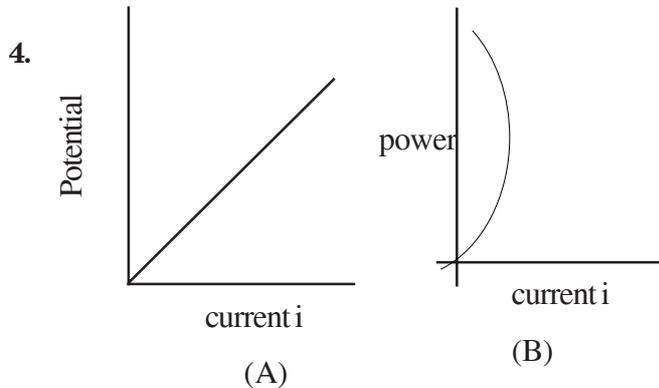
When force is doubled as distance is halved  $q_1 = 2 q_1, q_2 = 2 q_2$

$$r_2 = \frac{1}{2}r_1 \Rightarrow r_2^2 = \left(\frac{1}{2}r_1\right)^2$$

$$F' = \frac{K \cdot 2q_1 \cdot 2q_2}{\left(\frac{r_1}{2}\right)^2}$$

$$\begin{aligned} F : F' &= \frac{k \frac{q_1 q_2}{r_1^2}}{\left(\frac{r_1}{2}\right)^2} : \frac{k \cdot 2q_1 \cdot 2q_2}{\left(\frac{r_1}{2}\right)^2} \\ &= \frac{q_1 q_2}{r_1^2} : \frac{16 q_1 \cdot q_2}{r_1^2} \\ &= 1 : 16. \end{aligned}$$

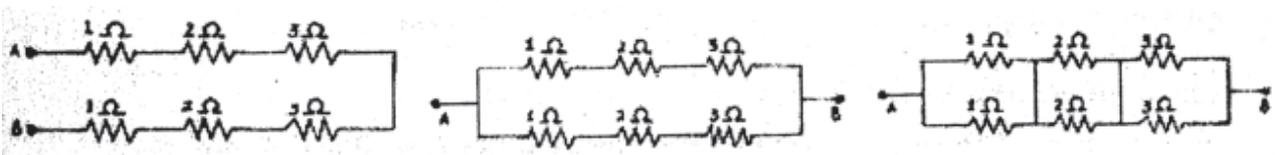
Therefore will be increased by 16.



write two sentences about above graphs.

- A. Graph A is between  $i$  and  $V$  is straight line hence it follows Ohm's law.  $V$  is proportional to  $i$ . Graph B is a curve and it will not follow Ohm's law. The graphs are drawn by using ammeter and voltmeter.

#### 5. Calculate effective resistance between points A as B



- A. Effective resistance for parallel resistances.

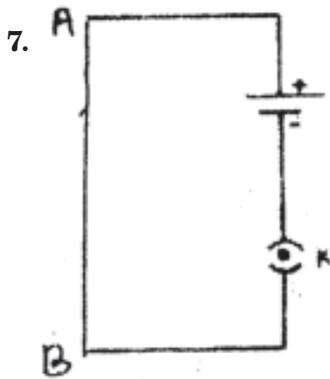
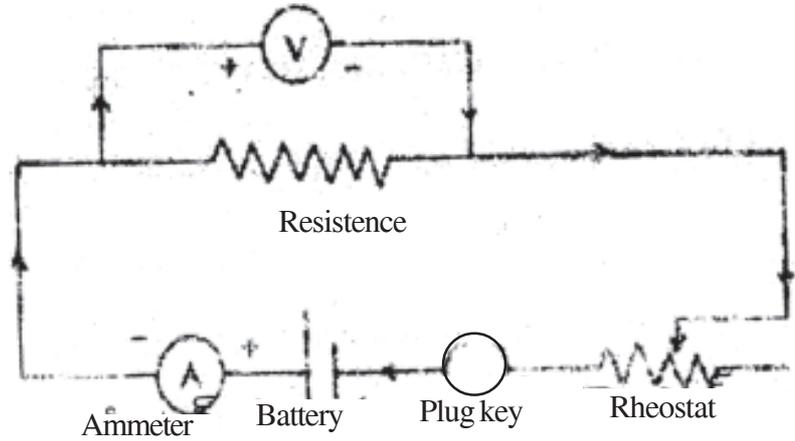
$$r = \frac{r_1 r_2}{r_1 + r_2} \Rightarrow r_1 = \frac{2 \times 2}{2 + 2} \Omega ; r_2 = \frac{4 \times 4}{4 + 4} \Omega ; r_3 = \frac{6 \times 6}{6 + 6} \Omega$$

$$r_1 = \frac{4}{4} = 1\Omega \quad r_2 = \frac{16}{8} = 2\Omega, \quad r_3 = \frac{36}{12} = 3\Omega$$

$$\text{effective resistance } R = r_1 + r_2 + r_3. \quad \therefore R = 1\Omega + 2\Omega + 3\Omega = 6\Omega.$$

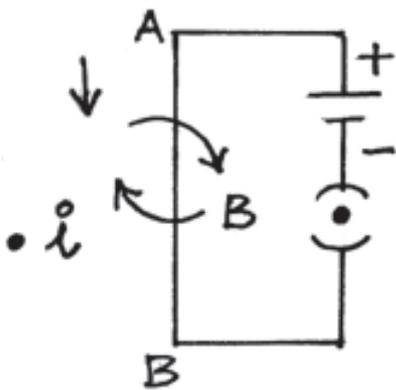
6. Draw the circuit diagram to prove ohms law and label the parts.

- A - Ammeter
- K - plug key
- R - Resistance
- V = Voltmeter
- Rh = Rheostat

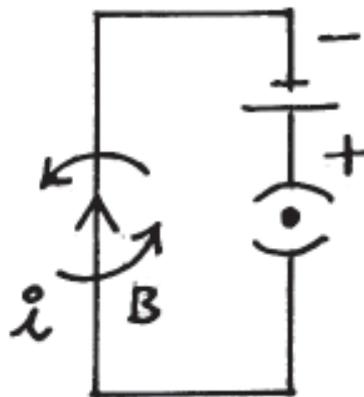


**Indicate the direction of magnetic field in the circuit shown. To change the field direction what changes we have to make ?**

A. According to Ampere right hand thumb rule when you hold the conductor in your right hand with thumb pointing in the direction of electric current then, the curling fingers point the direction of the magnetic field.



If you have to change direction of the magnetic field the battery terminals should be inter charged.



**8. 1500 Ω resistance is connected to 230 V battery. If the current is passed through it by 5 min, calculate the heat generated in the resistance.**

A. Heat generated  $Q = \frac{v^2 t}{R}$

$V = 230V, R = 1500 \Omega, t = 5 \text{ min} = 300 \text{ sec.}$

$\therefore Q = \frac{230 \times 230 \times 300}{1500} = 1058 \text{ joule}$

**9. What are the bad effects of using fossil fuels like coal in thermal power plants. How to avoid it.**

Fossil fuel is burnt to produce steam which runs a turbine to convert mechanical energy into electrical energy. When the fuel burns carbon dioxide, and dust is released into air which pollutes air and atmosphere. It increases Global warming. Over use of resources will result in unbalance of nature.

We need to use alternate sources for power production like bio mass, gobar gas solar power etc. Hydro power is also safe so we need to build more plants and projects.

**10. What are transmission losses ? How to avoid it.**

A. Current is transmitted through conductors. Even a good conductor also offers some resistance to conduction of current. Hence some current is converted into heat.

If R is resistance of the conductor 'i' is current 't' is time then

$Q = i^2 R t$  or  $Q = \frac{v^2 t}{R}$  Where V is voltage.

This heat is main reason for transmission losses.

We can't avoid transmission losses but we can reduce it by increasing the voltage and decreasing the current. We have to use step up transformers to increase the voltage while transmitting to longer distances.

**11. Why hydro electricity production is better than thermal electric production.**

A. In thermal electric production we use fossil fuels such as coal. Due to burning of coal air will get polluted and results in global warming. The fossil resources will get exhausted.

Hydro electric production uses water which is a natural resource and available for most part of the year. It is reusable. No pollution of air. Hence Hydro electricity is better than thermal electricity production.

**12. Bio Gobar plants are more better than thermal, Nuclear power plants ? Explain.**

A. In thermal plants fossil fuels are used. In nuclear power plants radio active substances are used. Both pollute air and cause environmental pollution.

Bio Mass and gobar gas causes little pollution to air but no harm to environment. The residues from Biomass are reused for other purposes. They are eco friendly substances. Hence it is advisable to use Bio fuel.

**13. When plenty of solar energy and wind energy is available in nature, why electric power plants use fossil fuels ?**

A. We have limitations in using solar or wind power. Solar energy can't be produced during nights and cloudy sky. Wind energy depends on weather conditions and location. The cost of production of these energies are very high compared to thermal electricity. Because fossil fuels are available with low cost we are using thermal electricity.

**14. Heat produced in a conductor depends on what factors ?**

A. The heat produced in conductor  $Q \propto Vit$  or  $Q = i^2 Rt$ . We see that  $Q$  is proportional to  $V, i, R$  and  $t$ . Hence  $Q$  increases when resistance, current, voltage as time of flow

## 5 Marks

**1. Define coulomb's law. derive SI units for it.**

A. The Magnitude of the force of attraction (or repulsion) between two point charges is directly proportional to the quantity of charge present on each of them and inversely proportional to the square of the distance separating them.

If a charge  $q_1$  is placed at a distance from a similar charge  $q_2$ , then the two charges will continue to repel each other with a force.

$$F = \frac{k q_1 q_2}{r^2} \text{ where } k \text{ is proportionality const.}$$

where Force is in Newtons  $q_1, q_2$  in coulombs, distance 'r' is in meters.

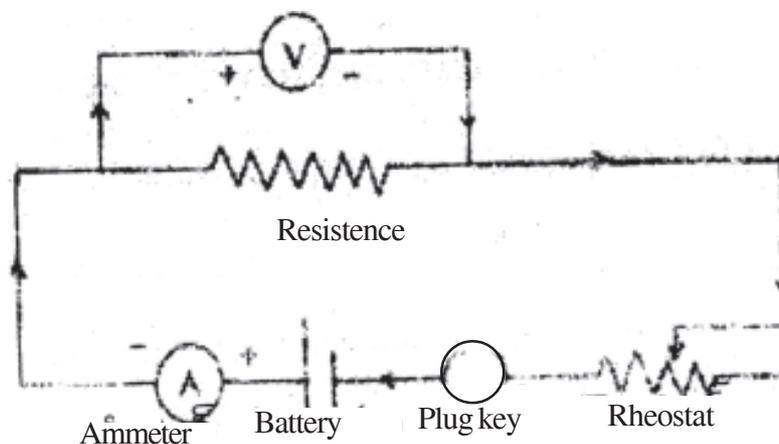
$$\text{Then } F(\text{N}) = \frac{K i \times 1\text{coul}^2}{1^2\text{m}^2}$$

$$F = 1\text{N} \times 1\text{m}^2 \times \text{coul}^2$$

The value of  $k$  is  $9 \times 10^9 \text{Nm}^2 / \text{coul}^2$

As coulomb is very big unit we use micro coulomb ( $10^{-6}\text{C}$ ) and millicoulomb ( $10^{-3}\text{C}$ ).

**2. Give an experiment to find the relation between the current flowing through a wire and the potential difference applied across it.**



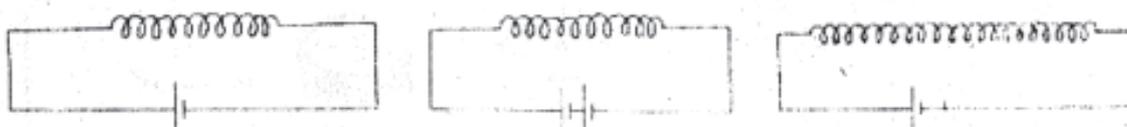
connect the fixed resistor (R), ammeter (A), dry cell B, plug key (K) and rheostat (Rh) in series and voltmeter (V) in parallel to R as shown in figure.

Insert the plug key and change the current by moving rheostat. Note down ammeter and voltmeter readings. By increasing the value of current take voltmeter readings. Then plot a graph between current I and voltage V.

We can see that as I increases V also increases and the graph is straight line. This proves the ohms law i.e.,  $V \propto I$  or  $V = RI$ . Where slope of the graph gives resistance R.

### U 3. Explain an experiment to study thermal effect of electric current.

- A. Take two heating coils of 10 turns and 20 turns each, two dry cells connecting wires, calorimeter and a thermometer.



Put the coils in calorimeter and fill the calorimeter with water. Connect one cell to 10 turns coils and another to 20 turn coil after 10 min measure the temperature of water in the calorimeter. We can see that heat is produced in 20 turn coil. Connect two cells to 10 turns coil and we can see that after 10 min more heat is generated. When reading is taken after 10 min the thermometer shows more temperature.

From the above we can observe that heat is produced when potential difference is applied across coil. When more voltage is applied i.e. more current is passed and more heat is generated. When current is flows for more time heat produced is more. Hence it is found that heat produced is proportional to V, R, t.

4. When a current of 5A is flowing through a 500 Ω resistance by a 500 V battery for 5 min, find the heat generated. If the same resistance has to produced 4 time of heat, how much current we should pass through it.

- A. Given  $V = 200\text{v}$   $i = 5\text{A}$   $R = 500\ \Omega$

$$t = 5\text{min} = 300\text{sec.}$$

$$Q = i^2 Rt$$

$$Q = 5 \times 5 \times 500 \times 300 = 3750000 \text{ Joule}$$

$$= 3750 \text{ K Joule}$$

To increase Q four times

Let  $Q_2 = 4Q$ , and R, t, V remains same

$$Q_1 = i_1^2 Rt$$

$$Q_2 = i_2^2 Rt$$

$$= 4Q_1$$

$$\therefore i_2^2 Rt = 4 (i_1^2 Rt)$$

$$i_2^2 = (2 i_1)^2$$

$$\Rightarrow i_2 = 2 i_1 = 2 \times 5A = 10A$$

Hence  $i_2$  should be 10A.

**5. Explain any two electric production methods used in India.**

A. There are three types of large scale electricity generating plants in India.

- a) Hydro electric power plants
- b) Thermal power plants
- c) Nuclear power plants

- a) Hydro electric power plants :- Dams are built on rivers and water is made to flow on turbines from height. The potential energy is converted into electricity. Bhakra - Nangal, Nagarjun Sagar plants are examples. 25% of India's electricity is produced by Hydro plants.
- b) Thermal power plants :- In thermal power stations coal is burnt to produce water vapour which rotates the turbines to produce electricity. 7% of India's electricity is produced by thermal plants. VTPs Kothagundam, Ramagundam are examples for thermal power plants.
- c) Atomic / Nuclear power plants :- Here nuclear energy obtained from a fissionable material like Uranium or Plutonium is used to run a turbine. Due to controlled fission heat is produced which is used to produce water vapour to rotate turbine.

**8. What are the limitations of Hydro electric production.**

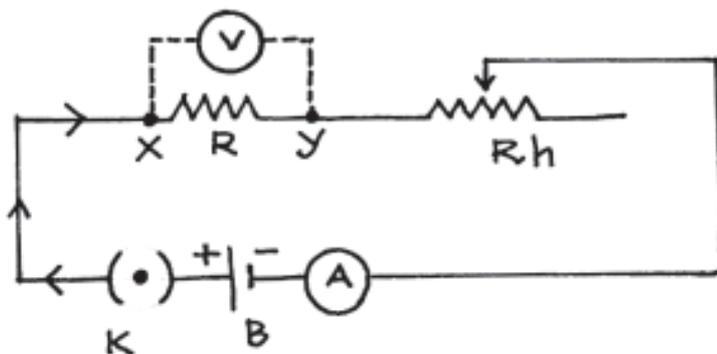
A. The limitations are

1. Water in rivers is not available throughout the year.
2. It depends on rain fall. If rain fall decreases electric production decreases.
3. Construction of dams is very costly and due to which many villages will be submerged. Rehabilitation will be a problem.
4. In summer electric consumption increases and production decreases due to shortage of water.

**9. Draw the diagram used to prove ohms law**

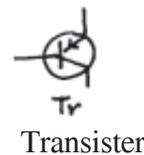
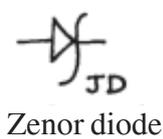
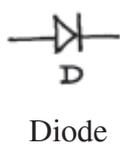
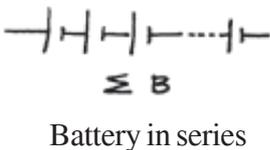
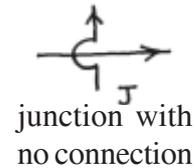
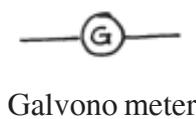
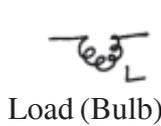
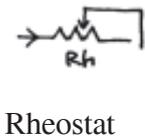
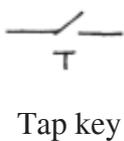
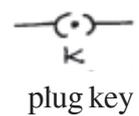
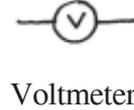
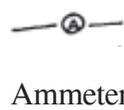
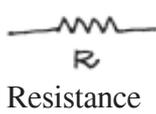
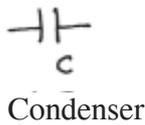
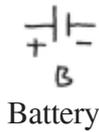
R = Resistance

V = volt meter



- Rh = Rheostat  
 K = plug key  
 B = Battery  
 A = Ammeter

**10. Write the symbols of any ten electric circuits with labels.**



**Fill in the Blanks**

- Charge of an electron ..... ( $1.6 \times 10^{-19}$  coul)
- One millicoulomb is equal to ..... ( $10^{-6}$  micro coul)
- Three resistors of  $3\Omega$  each connected in series are connected to another  $3\Omega$  resistance in parallel. Then the effective resistance is ..... ( $2.25\Omega$ )
- Electric appliances in our home are connected in ..... (parallel)
- Heat generated in R resistance due to V potential difference in time t is ..... ( $Q = v^2t/R$ )
- Heat generated by current I. in resistance R is ..... ( $Q = i^2 Rt$ )
- 2A current is flow in a  $10\Omega$  resistance for 100 sec. What is the heat generated ..... ( $4 \times 10 \times 100 = 4000J$ )
- 1 HP = ..... watt. (746)
- ..... is developed in a current carrying coil.. (Magnetic field)

# 13

## Lesson

# Electricity in our Homes

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### Objectives

- Explain the principle and working of an electric motor
- Explain the principle and working of an a.c. generator.
- Draw circuit diagram to indicate how wiring is done to supply electric power to various devices in our houses or in industry.
- Highlight the importance of fuse and earthing in electrical circuits.
- Identify different house hold electrical appliances and explain their construction and working.

### Important Points

- (1) Electric fuse :- It is a short piece of a thin wire made of a lead - tin alloy connected in series with a main supply on the line wire. It is used as a safty device.
- (2) Electric generator :- In converts mechanical mechanical energy into electrical energy.
- (3) Electric motor :- It converts electric energy into mechanical energy.
- (4) A current carrying solemoid with soft iron core is called an electromagnet.
- (5) A transformer which increases the level of voltage is called step - up transformer.
- (6) A transformer whcih decreases the level of voltage is called step down - transformer
- (7) A divice used to increase or decrease the voltage is called transformer.
- (8) Fleming's Right hend rule is used to find the direction of force acting in a current carrying conductor when it is placed in a magnetic field.

### 3 Marks

#### 1. Compare the properties and characteristics of a bar magnet and a electromagnet.

Bar magnet	Electromagnet
1. It is a permanent magnet	1. An electromagnet is a temporary magnet. It remains magnet only for the duration the current flows through it.
2. Iron or Nikel is used to make barmagnet	2. Soft iron core solenoid is used.
3. The strength of a bar magnet cannot be changed.	3. The strength of an electro magnet can be changed by changing the ammount of current flowing through it.
4. Bar magnet is a weak magnet	4. Electromagnet can produce stronger fields
5. The poles of a permanent magnet cannot be easily reversed	5. By reversing the direction of current flow, we can reverse the polarity of electromagnet.
6. The shape is a rectangular bar	6. We can have different shapes
7. Pole strngth is not constant and decreases with time.	7. Pole strength depends on current and is constant.

#### 2. What are the factors that effect the strength of electromagnet ?

A. The performance of electromagnet depends on three factors.

- i) Current flowing in solenoid i.e. magnetic field  $(B) \propto \text{Current}(i)$   
Hence more current will give more magnetic field and strength.
- ii) If number of turns increases the magnetic field also increases. The Magnetic field produced by individual turns in equal.
- iii) The core of the solenoid is made of a Ferro magnetic meterial. The properties of the material used like Fe, Co, Ni, Gd also influences the magnetic strength of an electromagnet.

#### 3. Explain how the length of the conductor and magnetic field effect the force exerting on the conductor when it is placed in magnetic field.

A. The factors that effect force are

- i) Magnetic field  $B$ . As  $B$  increases force on conductor increases  $F \propto B$ .
- ii) Current in the conductor  $i$ . As  $i$  increases Force increases.  $F \propto i$
- iii) The length of the conductor  $l$ . As  $l$  increases force increase  $F \propto l$  or  $F \propto i/B$

#### 4. Explain electromagnetic induction.

As the changing electric field gives magnetic field, changing magnetic field gives electric current.

The phenomenon of producing electric current in a coil, by changing magnetic field associated with it is called electro magnetic induction. Farady demonstrated an experiment to show this and gave the law, which is called Farady's law of electromagnetic Induction. Induced current always opposes the change in the magnetic field.

**5. What are the types of transformers.**

- A. Transformer is a device which increases or decreases voltage. Transformer which converts low voltage to high voltage is called step up transformer. Transformer which converts high voltage to low voltage is called step down transformer.

**6. Explain how fuse and earthing is used as safety devices in electrical circuit.**

- A. The damage caused due to short circuit is reduced by safety devices.

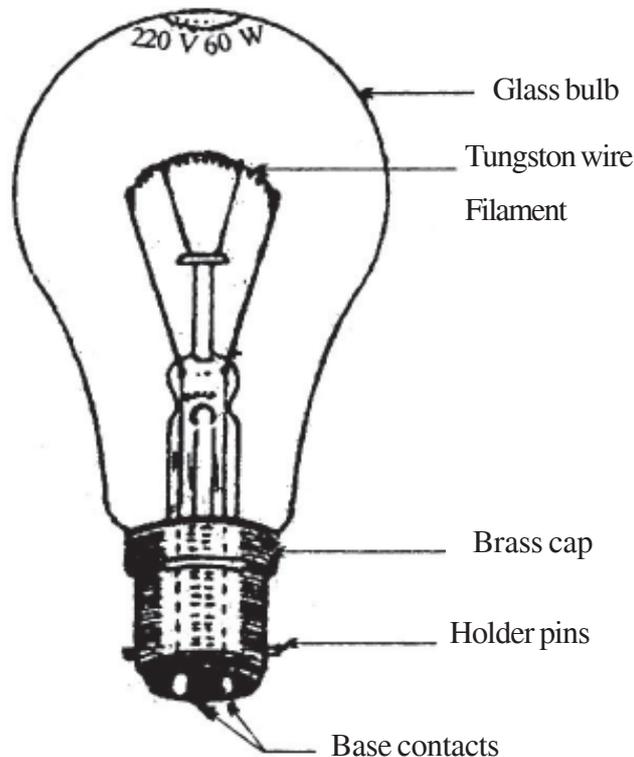
**Fuse :-** Fuse is a weak link in the electrical circuit. It is a short piece of a thin wire made of a lead-tin alloy. The material used for fuse has a low melting and high resistance compared to the live wire. When the current in the circuit increases beyond limit the fuse melts and circuit will be broken. Fuse is always connected in series with main supply.

- ii) **Earthing :-** To avoid shock due to current leakage in electrical appliances the metal body of the appliance is earthed i.e., connected to earth. Earth wire is connected to metal body and other end is attached to a copper wire buried deep in the ground. This makes the electrical appliance at the same potential (zero) as the earth. Hence when we touch the metal body we do not get shock.

**7. Explain the construction and working of Fluorescent lamp.**

- A) A fluorescent lamp has a filament sealed in one end of a glass tube and another electrode at the other end. Tube contains little amount of mercury that vaporizes when the filament gets hot. Electric current is set up through the mercury vapours which gives both visible and ultra violet light. UV light falls on the inside wall of the tube which is coated with a fluorescent material. The fluorescent material glows. The colour of the light depends on fluorescent material used. These lights give more light and less heat.

**8. Explain the construction of Incandescent lamp with diagram.**



- A. A filament made of material like tungsten whose melting point is 3300 K is used in the electric bulb. The filament is mounted on insulating supports inside the bulb. The bulb is filled with noble gases at low pressure and sealed. When current is passed through the filament it is heated and becomes incandescent to give light. Inert gas in the glass bulb prevents the filament from getting oxidised at the high temperature.

**9. Write the differences between Fluorescent lamp and Incandescent lamp.**

- |   |   |
|---|---|
| 1. Filament is mounted on insulating supports                                     | 1. Filament is arranged at one end of the tube  |
| 2. Current flows through two ends of the filament                                 | 2. Filament acts as electrode another electrode is at the other end of the tube.                            |
| 3. The bulb is filled with inert gases and sealed                                 | 3. The tube is filled with mercury vapour   |
| 4. light is emitted by incandescent filament                                      | 4. light is emitted when UV rays emitted by mercury vapours fall on fluorescent material which gives light. |
| 5. Gives same kind of light   | 5. Color of light depends on the fluorescent material used.   |
| 6. It gives light and heat.   | 6. It gives less heat and more light.   |
| 7. Electrical energy is changed into heat and light. Hence its efficiency is low. | 7. These are more efficient   |

**10. Explain how electric energy is transformed in electric fan and electric bell.**

- A. **Electric bell :-** Electric bell has a U-shaped electromagnet. The two ends of the windings of the electromagnet are connected to the power supply through a make and break arrangement as a push button like switch.

When the bell is pressed the electric current flows through the coils of the electromagnet and soft iron core of the electromagnet is magnetised. This magnetized core attracts the armature, consequently the hammer attached to the armature hits the gong and a long sound is produced.

But as soon as the armature is attracted by the electromagnet the circuit is broken at the contact screw. Electromagnet loses magnetic property. Armature returns to original position due to spring action. The process repeats to give sound.

- ii) **Electric Fan :-** Fans use a permanent capacitor type motor. Three blades are symmetrically attached to the rotor shaft of the motor. As soon as the switch is ON an electric current flowing through the motor rotates the blades which circulate air of the room.

**11. Mention any three parts of the Iron box and material used to make them.**

- A. Iron box has 4 important parts
1. Base plate - Non corrosive metal
  2. Heating element - Nichrome
  3. pressure plate - Cast iron
  4. upper cover with handle - insulating material like Bakelite

**12. Compare Fleming right hand as left hand rules.**

<b>Fleming Right hand Rule</b>	<b>Fleming left hand Rule</b>
1. When you stretch the thumb, the fore finger and the central finger of your right hand at right angles to each other and hold them in such a way that therefore finger points in the direction of magnetic field and thumb in the direction of motion of the conductor then the central finger will point in the direction of induced current.	1. If you hold the fore finger, the central finger and the thumb of your left hand at right angles to each other in such a way that the forefinger points in the direction of magnetic field and the central finger is in the direction of current, then the thumb will indicate the direction of the force experienced by the conductor.
2. It helps in understanding the working of electric motor.	2. It helps in understanding the working of dynamo and transformer.

**13. Electric current is converted into different forms of energy in different appliances. State due to which effect following electrical devices work and the transformed energy form.**

- (i) Immersion heater (ii) Ammeter (iii) washing Dryer (iv) Fluorescent lamp (v) Soldering gun (vi) Hair dryer.**

- A.(i) Immersion heater - Heat effect - Heat energy  
(ii) Ammeter - Magnetic effect - Kinetic energy  
(iii) Washing dryer - Magnetic effect - Centrifugal Force  
(iv) Soldering gun - Heat effect - Heat energy  
(v) Hair dryer - Magnetic effect - Heat & Mechanical energy

**14. Write the names of electrical appliances which uses magnetic effect of electricity.**

- A. 1) Fan 2) Grinder 3) Dryer 4) Hair dryer 5) Mixy 6) Ammeter 7) Electric bell 8) Electric lift  
9) Vacuum cleaner 10) Drilling Machine 11) Electric motor 12) Loud speaker.

**15. Write the names of electrical appliances which uses thermal effect of electricity.**

- A. 1) Room heater 2) Electric stove 3) Microwave oven 4) Roti maker 5) Water heater 6) Geceir  
7) Tea kettel 8) Soldering rod 9) hair dryer 10) iron box.

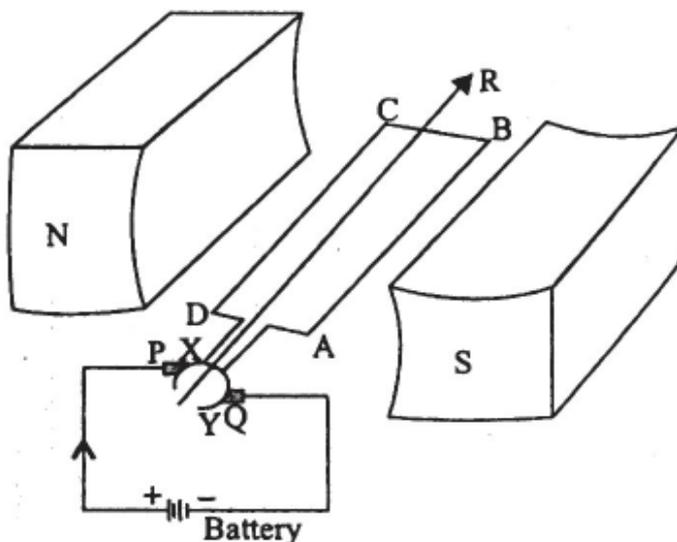
**16. Explain how electric current gives thermal effect. Give examples.**

- A.1) When battery or power supply is connected to a conductor free electrons will flow from lower potential to higher potential. During this process they will collide with lattice of the material and heat is generated. Examples are iron box, heater, soldering gun.

## 5 Marks

### 1. Explain the construction and working of electric motor.

- A. Faraday's discovery of force experienced by a current carrying conductor placed in a magnetic field was a great discovery, because it helped in the development of electric motor. An electric motor is a device that can convert electrical energy into mechanical energy. Electric motor, as you already know, is the main component of electric fans, mixer - juicer - grinders, electric churners, centrifuges, etc.



- i) Field magnet (N-S), which is a U-shaped permanent magnet with cylindrically curved pole pieces.
- ii) Rectangular coil (ABCD) with large number of turns of insulated copper wire mounted on a rotor shaft R and having a soft iron core (Core not shown in figure).
- iii) Split ring commutator (XY), which is a copper ring split in two parts. X and Y and mounted on the rotor shaft. One free end of the coil is welded with X and the other with Y.
- iv) Contact brushes (PQ) kept in contact with the half-rings of the commutator to provide for the convenience of supplying current to the coil through them.

### 2. Explain the construction of electric motor.

- A. When the contact brushes P and Q are connected to a battery, as shown, current flows through the coil. It can be seen applying Fleming's Left Hand Rule that on the side DC the force due to magnetic field acts in vertically downward direction where as on BA it acts in vertically upward direction. These two, unlike equal parallel forces acting on the coil, tend to rotate it. The coil makes a half rotation. Then the strands AB and CD interchange their positions and so do half-rings Q and P. Now the current in AB and CD again provides for a pair of equal, unlike parallel forces giving rotation to the coil in the same sense (anti-clockwise). Thus the coil and the shaft attached with it rotate continuously till the current is passed.

### 3. Explain the construction of Electric generator.

A) Electric generator is a device that converts mechanical energy into electrical energy.

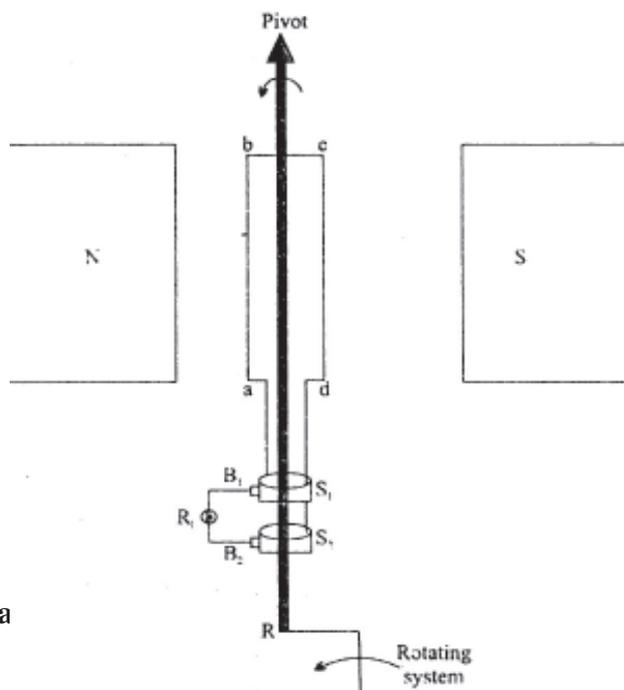
#### a) Principle of an electric generator.

If we rotate a rectangular coil of wire in a uniform magnetic field about an axis perpendicular to the field lines, the magnetic field associated with the coil will change continuously. This will induce a continuously changing current in the coil.

Depending on the way the energy is tapped out and the type of current we get in the output, generators are of two types :

- Direct current (d.c.) generators : These provide steady and unidirectional current output.
- Alternating current (a.c.) generators : These provide an output current, which varies continuously in magnitude and periodically in direction.

Most of the generators in use these days are a.c. generators. Let us study the construction and working of this generator.



#### b) Construction of an alternating current generator

The construction and working of an a.c. generator is shown in Fig.

An a.c. generator consists of the following parts :

- Rectangular coil ABCD made of very large number of turns of insulated copper wire, wound over an insulated frame and mounted on a rotor shaft.
- Rotor shaft R attached to a rotating system (viz. a turbine, not shown in the figure) with the help of which it can be rotated rapidly between the poles pieces of the field magnet.
- Field magnet N-S is a strong horse shoe type permanent magnet.
- A pair of slip rings  $S_1$  and  $S_2$ , which are metallic rings, mounted on the rotor shall insulated from each other and insulated from the shaft. One free end of the coil wire (say, a) is connected to  $S_1$  and the other (say, d) is connected to  $S_2$ .
- Contact brushes  $B_1$  and  $B_2$  are metallic (or carbon) brushes, kept in contact with  $S_1$  and  $S_2$ , through which current is taken out and passed in external circuits or appliances connected across them. The appliance connected across the generator is shown by  $R_L$  in Fig. 13.8 and is called load.

**4. Explain how transmission of current occurs.**

- A) Power generating stations are built at a place where resources are available eg. water source for hydro projects, coal mines for thermal projects etc.

11,000 V and 50 Hz current is produced at power stations. Voltage is increased through step up transformers and sent to sub stations. They are called distribution stations.

Current is supplied from generating stations to sub- stations and feeder stations with high voltage. Distribution system decreases the voltage through step down transformers as supplies to houses and factories.

**K5. What are the precautions one should take while using electricity.**

- A. While using electricity if we don't take proper precautions it will be harmful to human beings. Due to short circuit persons may lose their life. Hence one should take proper precautions such as

1. Use ISI mark appliances only
2. Use proper gauge wire for connections
3. Make sure that no loose contact is there
4. Use fuse and earth wires where ever required.

**6. Explain electrical hazards i) due to voltage leakage (bad insulation) ii) due to short circuit iii) over loading**

The dangers due to the above are

1. Current leakage :- Due to wear and tear or due to excessive heating, the insulation covering of connecting wires is removed and the live wire may touch the electrical appliance raising its voltage to the level of the main voltage. If proper earthing is maintained the current will flow to ground. Other wise body of the person acts like conductor and he gets shock. Due to shock person may get burns and die.
2. Short circuit :- Short - circuit takes place when a naked live wire touches a naked neutral wire. Normally sub- standard wires wear out soon and may cause short circuiting.
3. Overloading :- When the number of appliances operated on the circuit at the same time exceeds the limits the circuit wiring can withstand over loading occurs. Overloading may cause fire and damage the appliance.

**7. Explain the properties of bar magnet and electromagnet.**

**Bar magnet**

1. It is a permanent magnet
2. Iron and Nickel is used to make bar magnet
3. The strength of a bar magnet cannot be changed.
4. Bar magnet is a weak magnet

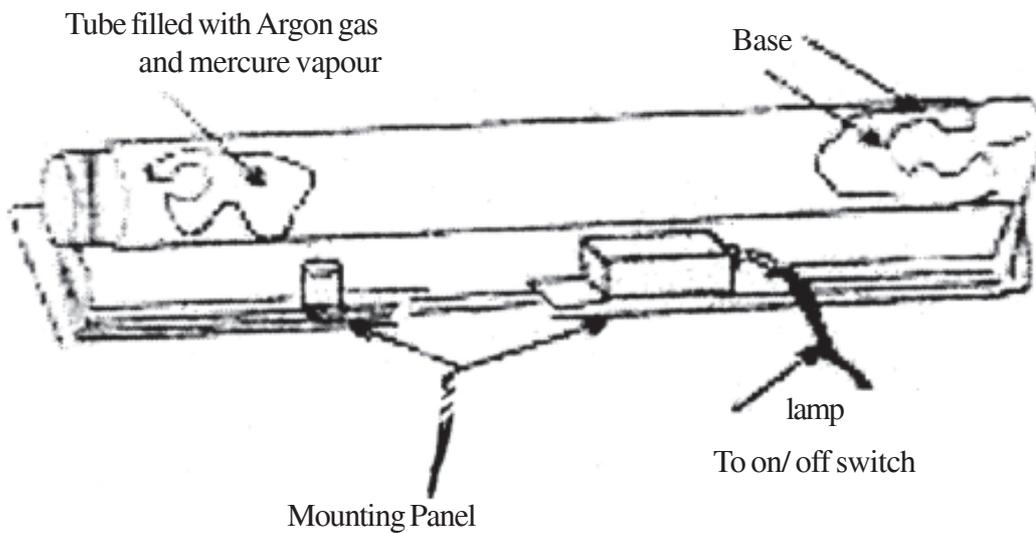
**Electromagnet**

1. An electro magnet is a temporary magnet. It remains magnet only for the duration the current flows through it.
2. Soft iron core solenoid is used.
3. The strength of an electro magnet can be changed by changing the amount of current flowing through it.
4. Electro magnet can produce stronger fields

- 5. The poles of a permanent magnet cannot be easily reversed
- 6. The shape is rectangular bar
- 7. Pole strength is not constant and decreases with time.
- 5. By reversing the direction of current flow, we can reverse the polarity of electromagnet.
- 6. We can have different shapes
- 7. Pole strength depends on current and is constant.

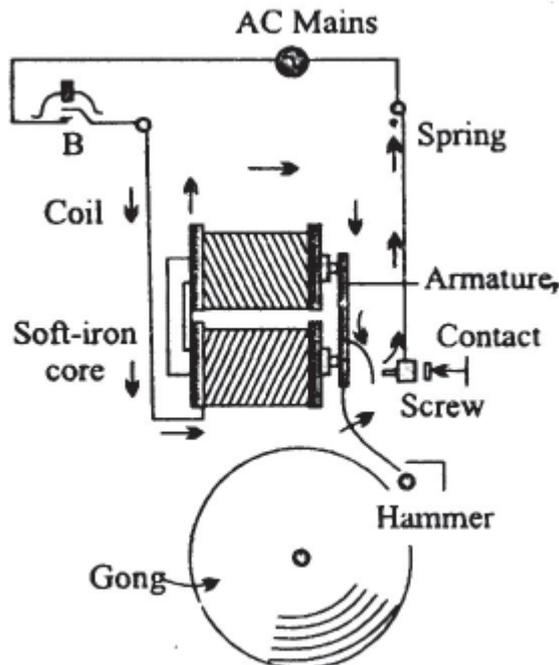
**8. Explain the construction and working of Fluorescent lamp.**

A) A fluorescent lamp has a filament sealed in one end of a glass tube and another electrode at the other end. Tube contains little amount of mercury that vaporizes when the filament gets hot. Electric current is set up through the mercury vapours which gives both visible and ultra violet light. UV light falls on the inside wall of the tube which is coated with a fluorescent material. The fluorescent material glows. The colour of the light depends on fluorescent material used. These lights give more light and less heat.



**Fig. Fluorescent Lamp**

**9. Explain the construction and working of Electric bell.**



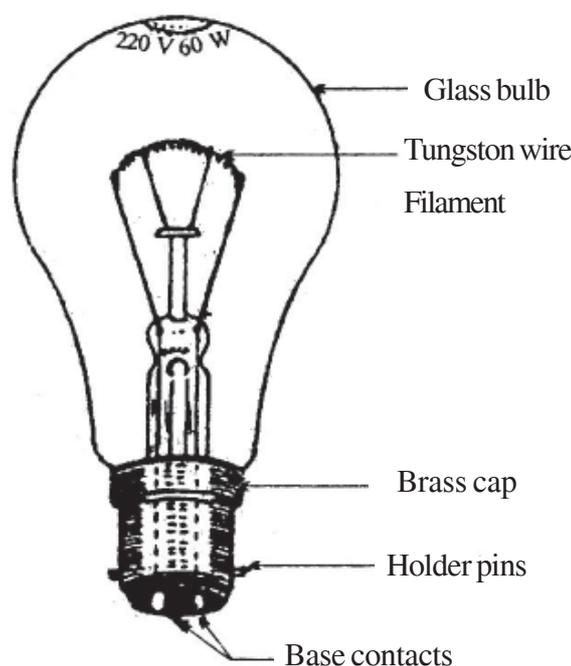
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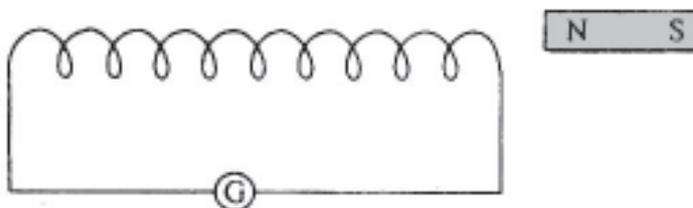
**U10. Explain the construction and working of incadesent lamp.**



**11. Explain an experiment to under stand magnetic induction.**

**A. Aim :** To induce current in a coil by changing the magnetic field associated with it. Take a strong magnet, a tightly wound cylindrical coil of insulated copper wire mounted on an insulating pipe, a galvanometer.

Hold the coil horizontally. Connect its free ends to a galvanometer. Hold the magnet at a distance from the coil. Move the magnet towards the coil. Move it away from the coil. Move the magnet towards and away from the coil at a faster rate.



**We see that**

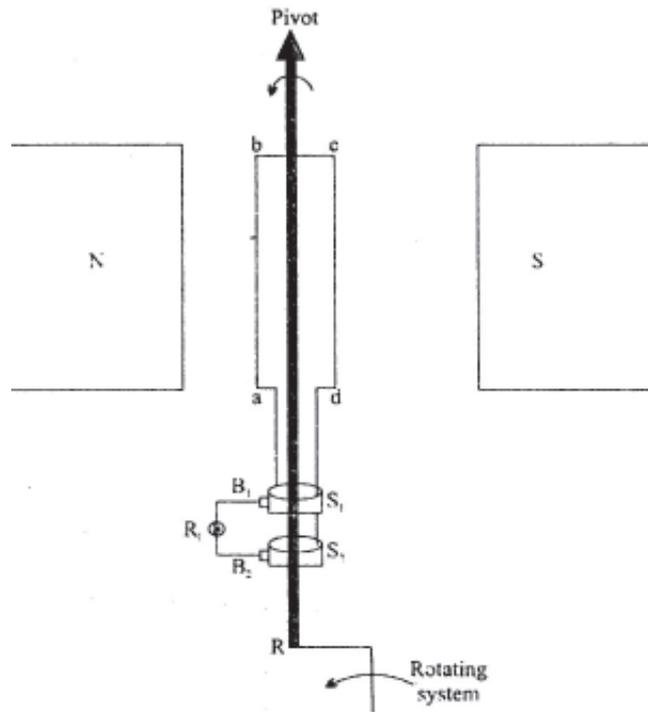
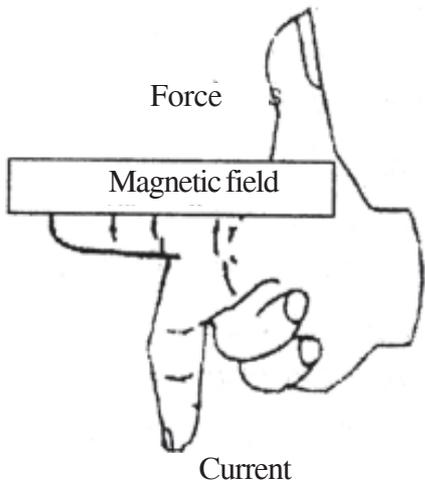
- i) The galvanometer shows a deflection whenever the magnet is moved relative to the coil.
- ii) The galvanometer pointer swings in one direction when the magnet moves towards the coil and in the opposite direction when the magnet moves away from the coil.

- iii) The galvanometer shows deflection only when the magnet is moving, the pointer of the galvanometer returns to zero position when the magnet is stopped at any position.
- iv) The deflection in the galvanometer is more when the magnet moves faster.

**We observe that**

An electric current is induced in a coil whenever the magnetic field associated with the coil is changed. When magnetic field threading the coil increases, the current flows in one direction but when the field associated with the coil decreases, it flows in opposite direction. More rapidly the field is changed greater is the magnitude of the induced current. This phenomenon of a changing magnetism into electricity is called electromagnetic induction and is the principle behind an electric generator.

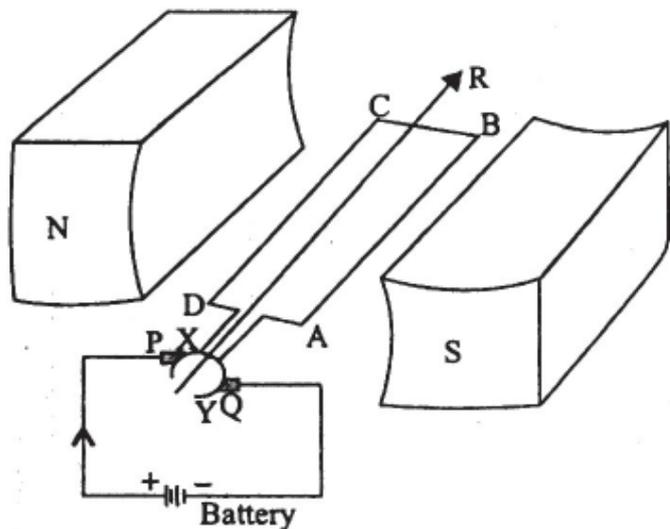
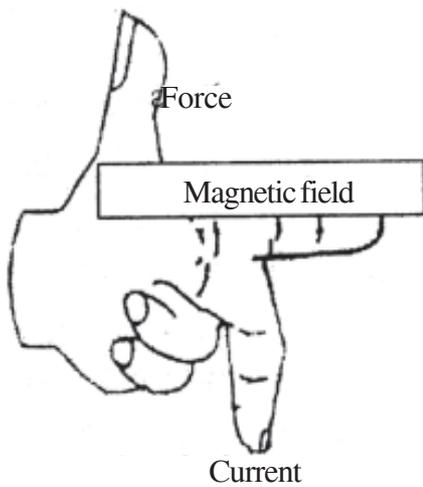
**12. Draw the diagram of electric motor and show the direction of fields using Fleming's left hand rule.**



**Fig. Diagram** to illustrate Fleming's left hand rule

**Fig. Construction** of an electric motor.

**13. Draw the diagram a) Fleming's right hand rule b) AC generator.**



## Fill in the Blanks

- 1) ..... material is used as fuse. (lead, tungsten)
- 2) The melting point of the fuse wire is .....than the melting point of the live wire (less)
- 3) Resistance of the live wire is ..... than fuse wire (less)
- 4) Electric workers should wear ..... gloves to hands (plastic)
- 5) In Fleming left hand rule middle finger shows ..... direction. (current)
- 6) In Fleming right hand rule middle finger shows ..... direction. (current)

## Choose the correct answer

1. Fuse is attached in the circuit [ 2 ]
  - (1) in series to nutral wire
  - (2) in series to live wire
  - (3) parallel to live wire
  - (4) parallel to earth wire
2. The colour used for nutral wire [ 4 ]
  - (1) Red or black
  - (2) Green or yellow
  - (3) Red or Green
  - (4) Blank or blue
3. The colour used for earth wire [ 3 ]
  - (1) Red
  - (2) black
  - (3) Green
  - (4) Any colour
4. The colour used for live [ 1 ]
  - (1) Red
  - (2) black
  - (3) Green
  - (4) yellow

## 1. Match the following

1. Electricity is converted to Mechanical energy ..... motor.
2. Mechanical energy converted to electrical energy ..... Dynamo
3. High voltage converted to low voltage ..... step down transformer.
4. Low voltage converted to high voltage .....step up transformer.
5. Electric energy to light energy ..... Blub
6. Current to magnetic energy..... Electric bell
7. Magnetic energy to mechemical energy .....lift
8. Sun light to electric energy ..... solar cell
9. Thermal energy to electric switch ..... Bi metal.
10. Electric energy to heat energy ..... Electric heater.

# 14

## Lesson

# Chemical and Nuclear Energy

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## Objectives

At the end of this chapter you will be able to

- differentiate between chemical and nuclear energy.
- define different fuels like fossil fuel char coal, petroleum, Biomass.
- tell about important compounds of petroleum and their uses.
- solve the problems related to combustion and calorific value of a fuel.
- know the working of fire extinguisher machine.
- know the working of voltcell and defects in that
- explain about radio activity, radio, isotopes, fission and fusion
- explain the working of nuclear energy reactor and production of electricity from that.

## Important points

- (1) char coal, petroleum and fossil fuels
- (2) Those reactions in which heat energy converts into chemical energy or chemical energy into heat energy are known as Thermochemical reactions.
- (3) In any chemical reaction if heat energy is released along with the products then it is known as exothermic reaction.
- (4) In any chemical reaction if reactant necessarily require some heat energy to form products, then it is known as endothermic reaction.
- (5) The chemical change in which both heat and light are produced simultaneously, that is known as combustion.

- (6) The minimum temperature required for any substance to start burning is known as ignition temperature.
- (7) The substances which burn readily are known as combustible substances and those which do not burn are known as non-combustible substances.
- (8) The instruments which are used for fire extinguishing are known as fire extinguishers.
- (9) The process in which the nucleus of atom undergoes spontaneous decay or fission by emitting energetic particles or rays is known as radio activity.
- (10) When heavy atomic nuclide is made to collide with the neutrons, two nearly equal masses and large amount of energy is released. This is known as fission.

### 3 Marks

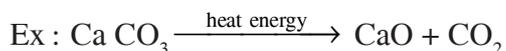
#### 1. How thermo chemical reactions can be classified. Explain with examples.

A. (i) All those reactions in which heat energy converts into chemical energy or chemical energy into heat energy are known as thermo chemical reactions. Depending on whether heat energy is released or absorbed, these can be classified into exothermic and endothermic reactions.

(ii) **Exothermic reactions :-** Chemical reactions in which heat energy is released along with products are known as exothermic reactions.



(iii) **Endothermic reactions :-** Chemical reactions which require some heat energy to form products are known as endothermic reactions.



#### 2. Explains how fuels can be classified depending on their utilization how these can be given preference.

A. Basing on the state of the fuel used we can classify these into 3 types.

1. **Solid fuels :-** Char coal, coke, coal, ..... etc are solid fuels. As these are cheap and easily available most of the people are dependent on these. But these fuels produce a large scale pollution. In some areas one type of fuel is easily available.
2. **Liquid fuels :-** Alcohol, some petroleum products are used as liquid fuels. These can be moved from one place to another place very easily with low cost. These are widely used in automobiles.
3. **Gaseous fuels :-** Like petrol gas. These fuels produce very less pollution and give high heat energy. Therefore these can be called as high capacitive fuels. These are costly and requires more precautions when they are used.

**3. Depending on the utilization of solid, liquid fuels tabulate their properties.**

A.	property	solid fuel	liquid fuel	Gaseous fuel
1.	Emission of heat (calorific value)	very low	very high	very high
2.	Cost, availability	cheap and easily available	Even though low cost, it is not easily available as fossil fuel.	highly expensive ; Except CNG all are artificially made ones
3.	using method	mainly as firewood	widely using in automobiles Kerosene is using for several purposes.	LPG, CNG were widely using as fire wood and industrial fuel.
4.	Pollution extent	produces high pollution and makes environment imbalance	This also makes high pollution by releasing highly poisonous gases	As only CO <sub>2</sub> is released, there is no much harm for environment.
5.	Transportation ability	highly expensive	By pipes very cheap.	By applying pressure, compressed gas can be transported very cheaply.

**4. Explain the process of destructive distillation. Mention any two products which releases in this process and their uses.**

A. By burning the coal without any air from 1273K to 1373 K and obtaining the products like coke, coaltar, coal gas at different temperatures is known as destructive distillation.

The following products are released in this process.

- (i) Coal gas : It is a best fuel with high calorific value.
- (ii) Coke : It is used as a reducing agent (reductant) in Blast furnace and as a fuel in the other furnaces.
- (iii) Ammonical liquor : It is used in the making of Ammonium sulphate. By which fertilizers are produced.
- (iv) Coaltar : For laying roads and for making Aromatic hydrocarbons.

**5. With respect to utilization analyse the properties of solid and liquid fuels.**

A.	<b>Solid fule</b>	<b>Liquid fuel</b>
1.	Very low	very high
2.	cheap and easily available	Even though low cost, it is not easily available as fossil fuel.
3.	mainly as firewood	Widely using in automobiles. Keresene is using for several purposes.
4.	produces high pollution and makes environment imbalance	This also makes high pollution by releasing highly poisonous gases
5.	highly expensive	By pipes very cheap.

**6. With respect to utilization analyse the properties of solid and gaseous fuels.**

A.	<b>Solid fule</b>	<b>gaseous fuel</b>
1.	Very low	very high
2.	cheap and easily available	highly expensive; Except CNG all are artificially made ones.
3.	mainly as firewood	LPG, CNG were widely using as fire wood and industrial fuel.
4.	produces high pollution and makes environment imbalance	As only CO <sub>2</sub> is released, there is no much harm for environment. highly poisonous gases
5.	highly expensive	By applying pressure, compressed gas can be transported very cheaply.

**7. What is meant by ignition temperature ? Explain how this is necessary for combustion of substances.**

- A. (1) The minimum temperature required for any substance to start burning is known as ignition temperature.
- (2) Merely heating a substance it doesn't burn. But when it is heated to a particular temperature then only it starts combustion process.
- (3) Match stick doesn't burn itself at room temperature or at 45<sup>0</sup>C. When it is rubbed on the side of a match box, by friction it gains ignition temperature and starts burning. Similarly ignition temperature of petrol is very less than that of Kerosene. Therefore petrol easily burns than Kerosene.

**8. Explain about combistible and non-combustible substances. Analyse the conditions necessary for the combistion.**

- A.1. The process in which any substance interacting with oxygen produces heat and light energies simultaneously without change in its composition is known as combustion.

2. Silk pores when they brought near to a fire which are immersed in Alcohol, petrol, kerosene they burn immediately. Match stick rubber, paper, cotton like substances will gain ignition temperature when they rubbed with rough surface or when sun light is made to fall on these surfaces by employing convex lens and they burn. These are called combustible substances.
3. Glass, ceramic, stone like objects even though they have heated to any extent of temperature they will not burn. These are called non-combustible substances.

**9. Mention the components which will form in the fractional distillation of petrol and also give number of carbon atoms in each component.**

A.	Component	Number of Carbon atoms	Component	Number of Carbon atoms
1.	gaseous hydrocarbons	$C_1 - C_4$	6. Fuel oil, gas oil, Diesel oil, Furnace oil.	$C_{13} - C_{18}$
2.	Naphtha, petroleum ether(rough)	$C_5 - C_7$	7. Grease oil, Medicinal oil Motor oil, Grease	$C_{15} - C_{18}$
3.	Petrol/gasoline	$C_7 - C_9$	8. paraffin wax, petroleum jelly, petroleum wax, petroleum coke	$C_{18} - C_{30}$
4.	Benzene	$C_9 - C_{11}$	9. Heavy oil, Bitumen	$> C_{30}$
5.	Kerosene oil	$C_{10} - C_{13}$		

**10. Mention the principles behind the working of fire extinguisher instruments (or) Basing on what principles fire extinguisher instruments will work.**

- A. Fire extinguisher instruments will work on any one principle mentioned below.
1. By cooling to a temperature lower than the ignition temperature of combustible substances.
  2. By stopping air flow.
  3. Cooling the combustible substance and at the same time stopping air flow.

**11. Establish the fact that whatever the food we are taking is a fuel.**

- A. (1) In the transportation of goods, for mechanical energy in the industries, for boiling the food and like in many cases we use several types of fuels. Fuel converts into different forms of energy.
- (2) When a living creature moves from one place to other place we call this as a transport. For different reactions to occur in the living creature energy is required. To maintain the body temperature same (in all seasons) energy is required.
- (3) This energy comes from the food what the living creature is consuming. Different food substances have different calorific values. (Ex. wheat = 6K. Joule/ gram) Depending on the nature and the quantity of food the energy will be released. As every substance which gives energy is a fuel, we can say that food also works as a fuel.

**12. Prove that why it is advantageous to use Biomass by converting into other forms than in its natural form.**

A.(1) Wood, animal dung, dry leaves, straw of plants, stubble of sugar cane etc are the examples for Biomass. When wood is converted into wood charcoal, coal acts as an efficient fuel and gives more energy.

Cow dung cakes and balls when placed in a fire-place, the amount of heat energy released in a fire-place, the amount of heat energy released is very small. But at the same time if the Biogas is prepared from the same cow dung and combusted, a large amount of heat energy is released.

**13. Whether the calorie and calorific value are the same physical quantities or different? Prove your answer.**

A.1) Calorie is a unit for energy. Generally heat quantity is expressed in Calories.  $Q = mst$

(2) The amount of heat energy absorbed by grams of mass having  $S$  specific heat when  $t^{\circ}\text{C}$  temperature change occurred is  $Q$  calories. (or)

(3) When  $t^{\circ}\text{C}$  temperature change occurred in the substance of mass  $m$ , the amount of heat energy absorbed by the substance is  $Q$  calories. Here  $S$  is the specific heat of the substance.

(4) Generally instead of calorie in some cases we use Joule as a unit for work.  $1 \text{ cal} = 4.18 \text{ J}$ . i.e., work done by 1 calorie heat quantity.

(5) Calorific is also a unit for energy.

(6) The amount of heat released when one gram substance completely combusts is expressed in terms of calorific value. i.e., calorific value means work done per gram or Joule/gram.

For example, Calorific value of petrol 50 kilojoules/gram means when one gram of petrol completely combusts it gives 50 kilojoules of heat energy.

**14. Mention any five uses of radio isotopes.**

A. The important uses of radio isotopes are

(i) For determining the age of fossils and archaeological stones.

(ii) For determining the solubility of partially soluble substances.

(iii) For determining the total element present in the sample

(iv) From isotope exchange reactions we can know how a chemical reaction takes place in some procedures.

(v) By using  $^{60}\text{Co}$  isotope in gamma radiography we can know the defects present in the casted materials.

(vi) In the medicinal field isotopes are very useful.  $^{135}\text{I}$  is used for identifying the tumours present in the brain and also defects present in the thyroid gland.  $^{24}\text{Na}$  is used for identifying the blood clotted parts.

(vii) Radio isotopes are also useful in biological and agricultural fields.  $^{32}\text{P}$  is used for identifying the deficiency of phosphate fertilizer.

**15. Mention the differences between the chemical and nuclear energies.**

A.	Chemical energy	Nuclear energy
1.	Basing on the binding energy present in the reactants and products chemical energy will be absorbed or released.	1. Basing on the change occurring in the components present in the atomic nucleus nuclear energy releases.
2.	Chemical energy is released when chemical reaction occurs.	2. When there is a change in nuclei nuclear energy is released.
3.	The amount of energy released is less	3. The amount of energy released is large.
4.	Dangerous radiations are not formed.	4. Dangerous radiations are released.

**16. Explain how radio isotopes are useful in agricultural, industrial and medicinal fields.**

- A. (i) In the industrial field  $^{60}\text{Co}$  is used in the Gamma radiography to know the defects present in the casted material.
- (ii) In the medicinal field  $^{135}\text{I}$  is used to identify the clots in the brain and also to know the functioning of Thyroid gland.  $^{24}\text{Na}$  is used to identify the blood clotted parts in the body.
- (iii) Radio isotopes are also useful in biological and agricultural fields. Radio phosphorous is used to know the deficiency of phosphate fertiliser which is essential for a plant.

**17. Explain the Daniel cell.**

- A. In this Zinc sulphate solution is placed in porous pot and this is placed in copper sulphate solution which is in the copper vessel. This gives the steady current. This cell gives a voltage of 1.1V.

**18. Explain how nuclear fusion occurs.**

- A.(1) When two lighter nuclei combine to form a heavier nuclide then large amount of energy is released. This is known as nuclear fusion.
- (2) With 4 million degree celsius temperature in sun and also in stars by this fusion process energy is releasing.
- (3) Till now nuclear fusion is not controlled to give fixed amount of energy.
- (4) In the fusion following reactions takes place
- (5)  ${}^1_1\text{H} + {}^1_1\text{H} \rightarrow {}^2_1\text{H} + {}^0_1\text{e} + \text{energy}$
- ${}^2_1\text{H} + {}^1_1\text{H} \rightarrow {}^3_2\text{H} + \gamma + \text{energy}$
- (6)  ${}^3_2\text{He} + {}^3_2\text{He} \rightarrow {}^4_2\text{He} + {}^1_1\text{H} + {}^1_1\text{H} + \text{energy}$

**19. Explain how nuclear energy is useful in nuclear reactor, submarines and in the military / war field.**

- A.(a) By using the heat generated in the nuclear reactor water is heated and the vapour thus formed is used to rotate the turbines by which current is generated with the electric generator.
- (b) Submarines and ships are now using nuclear energy as their fuel by which they can run for long time and can travel long distances.
- (c) Nuclear energy is used in the form of war bombs in war.

**20. Analyse the difference between Nuclear bomb and nuclear reactor.**

<b>A. Nuclear bomb</b>	<b>Nuclear reactor</b>
1. This is an uncontrolled nuclear reaction or explosion. 2. This is a destroyer. Large amount of energy is released at one time and destruction takes place. 3. Once explosion is started it is completed in few milli seconds. We cannot stop at any instant.	1. This works on the principle of controlled chain reaction. 2. Under some limitations this is useful for human society. 3. Eventhough it is very complex to start and to stop this, this will run under human control only.

**21. What are the functions of moderator and controlling rods ?**

- A. (i) Slow neutrons collide with U-235 effectively.
- (ii) As the fission reactions are exothermic, fast moving electrons are emitted. To increase the collision power, neutrons velocity is reduced.
- (iii) Which reduces the kinetic energy of neutrons is known as moderator.
- (iv) Graphite (C) or Heavy water (D<sub>2</sub>O) are the generally used moderators.
- (v) The chain reaction occurring in the reactor will be always under control. Number of Neutrons is responsible for this controlled reaction.
- (vi) By inserting Boron or Cadmium rods into the reactor we can control this.

**22. What should be the characteristics for moderator and controlling rods ?**

- A. **For moderator :** i) The atoms of moderator not to participate in the nuclear fission process ii) They should not be radioactive iii) Molecules of the moderator should reduce the velocity of neutrons and hence control their kinetic energy. iv) It should be non-toxic and should not be costly.

**For controlling rods :** i) It should control the neutrons in such a way that chain reaction has not to occur each time when the fission of an atom takes place. ii) It should control the excess neutrons in the reactor and not all the neutrons. iii) It should control only neutrons reaction and not to participate in any nuclear reactions.

**23. Whether we can heat the water in the paper vessel ? Analyse your answer.**

- A. (1) Basing on the ignition temperature of the paper vessel we can explain this.
- (2) When the paper vessel is heated, temperature immediately reaches the water from the vessel. paper vessel temperature does not reaches to its ignition temperature. Therefore it will not burn.
- (3) Even one condition is not satisfied among the three from combustion, combustion doesn't takes place.

**5 Marks**

**1. Depending on the utilization of solid, liquid gaseous fuels tabulate their properties.**

A.	property	solid fuel	liquid fuel	Gaseous fuel
1.	Emission of heat (calorific value)	very low	very high	very high
2.	Cost, availability	cheap and easily available	Even though low cost, it is not easily available as fossil fuel.	highly expensive ; Except CNG all are artificially made ones
3.	using method	mainly as firewood	widely using in automobiles Keresene is using for several purposes.	LPG, CNG were widely using as fire wood and industrial fuel.
4.	Pollution extent	produces high pollution and makes environment imbalance	This also makes high pollution by releasing highly poisonous gases	As only CO <sub>2</sub> is released, there is no much harm for environment.
5.	Transportation ability	highly expensive	By pipes very cheap.	By applying pressure, compressed gas can be transported very cheaply.

**2. Explain the process of destructive distillation. Mention any two products which releases in this process and their uses.**

A. By burning the coal without any air from 1273K to 1373 K and obtaining the products like coke, coaltar, coal gas at different temperatures is known as destructive distillation.

The following products are released in this process.

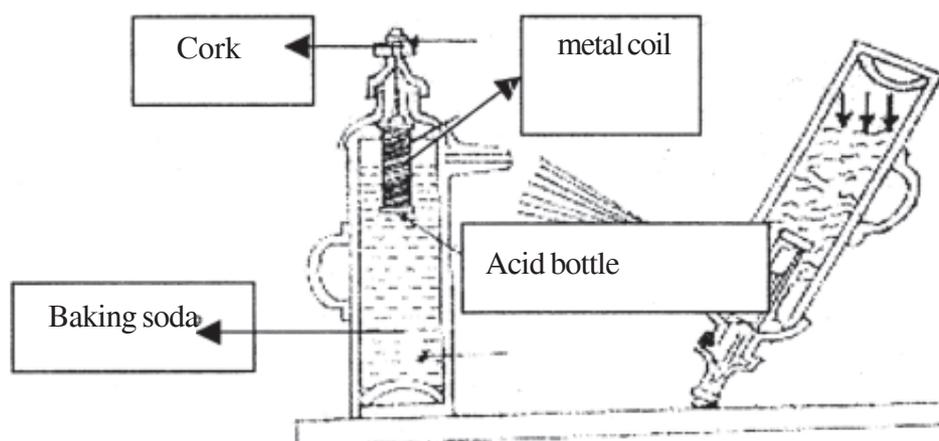
- (i) Coal gas : It is a best fuel with high calorific value.
- (ii) Coke : It is used as a reducing agent (reductant) in Blast furnace and as a fuel in the other furnaces.
- (iii) Ammonical liquor : It is used in the making of Ammonium sulphate. By which fertilizers are produced.
- (iv) Coaltar : For laying roads and for making Aromatic hydrocarbons.

**3. By explaining the process of manufacturing of coal gas, Ammonical liquor, coaltar mention their compositions and uses.**

A. By heating the coal under vacuum at high temperatures (1237K to 1373K) several changes will occur in that and different products are formed. By using fractional distillation method these products are separated at different temperatures.

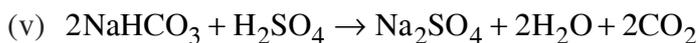
2. **Coal Gas :-** This is a mixture of hydrogen, methane and carbon monoxide. As all these gases burn, this will give heat energy. Therefore this is a best fuel having a high calorific value. This is used as a domestic gas.
3. **Coke :** This is used as carbon resource and fuel in the chemical industries. This is used as a reductant in the metal extraction from Iron metal in the blast furnace.
4. **Ammonical liquor :** When this is absorbed in dilute sulphuric acid, this changes to Ammonium sulphate which is used as a fertilizer.
5. **Coaltar :** Initially this is treated as complexive product. But not this is using in road laying, and in the production of Aromatic hydrocarbons.

**4. Explain the working of soda acid fire extinguisher instrument with neat diagram.**



- (i) When acid reacts with Baking soda, carbon dioxide releases.
- (ii) sulphuric acid is in the bottle which is surrounded by metal wire.
- (iii) Baking soda solution is there in the metallic container.

(iv) By inverting the cylinder and pressing the cork on the floor acid bottle breaks and it reacts with the Baking soda.



(vi) As a result carbon dioxide is released. Therefore carbondioxide percent increases in the air.

(vii) This stop the flow of air and hence fire extinguishes. This is used in theaters, multiplexed complexes for fire extinguishers and their working principle. What are the difference between these?

**5. Mention the important uses of radio isotopes.**

A. The important uses of radio isotopes are

- (i) For determining the age of fossils and archaeological stones.
- (ii) For determining the solubility of partially soluble substance.
- (iii) For determining the total element present in the sample
- (iv) From isotope exchange reactions we can know how a chemical reaction takes place in same procedures.
- (v) By using  $^{60}\text{Co}$  isotope in gamma radiography we can know the defects present in the casted materials.
- (vi) In medicinal field isotopes are very useful.  $^{135}\text{I}$  is used for identifying the tumours present in brain and also defects present in the thyroid gland.  $^{24}\text{Na}$  is used for identifying the blood clotted parts.
- (vii) Radio isotopes are also useful in biological and agricultural fields.  $^{32}\text{P}$  is used for identifying the deficiency of phosphate fertilizer.

**6. Mention the different fire extinguishers and their working principle. What are the differences between these ?**

Fire extinguisher	Working principle	Type of fire
By spraying powder Sand, Baking soda	stops the air flow	All types of fire
Baking soda, sulphuric acid fire extinguisher (soda acid)	„	All types of fire except due to electricity and liquids which burns easily.
Foam containing Fire extinguisher	stops the air flow	fire due to liquids which burns easily.
	By cooling the material to a temperature lower than its ignition temperature	All types of fire except due to electricity and oils.
Carbon tetrachloride extinguisher	stops the air flow	fire due to electricity.

**7. Mention the common properties for all radio active rays.**

A.(1) They effect the photographic plate.

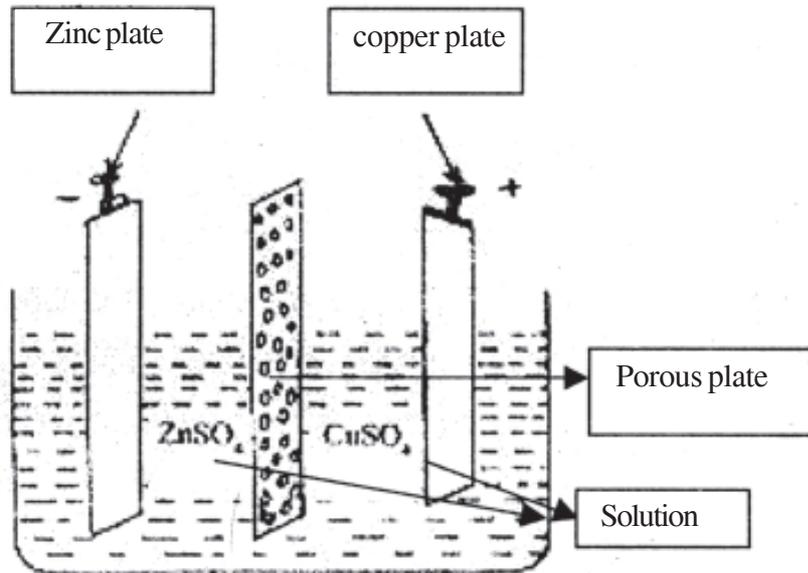
- (2) They form sparks on fluorescent screen ZnS
- (3) They effect human body also.
- (4) They destruct the plant seeds and human cell system.
- (5) They develop the cancer.
- (6) They destruct the bacteria.
- (7) Skin cancer and other diseases can be healed by using in limited amount.
- (8) These can pass through materials in which visibe light cannot passes (penetrating power changes from ray to ray)
- (9) These rays ionises the material or medium through which these rays passes  
(Ionisation Power changes from ray to ray)

**8. Mention the components which will form in the fractional distillation of petrol and also give number of carbon atoms and uses for each component.**

A. Component	Number of carbon atoms	uses
1. Gaseous hydro carbons	$C_1 - C_4$	Fuel gas after liquifaction, .....
2. Naphta (raw), petroleum ether	$C_5 - C_7$	As a solvent in warnish and rubber industries, in dry cleaning.
3. Petrol/Gasolene	$C_7 - C_9$	Machine fuel, Dry cleaning.
4. Benzene	$C_9 - C_{10}$	Dry cleaning
5. Kerosene oil	$C_{10} - C_{13}$	in stoves as a fuel, for making of oil gas, for lighting
6. Fuel oil, gasoil, Diesel oil Furnace oil	$C_{13} - C_{18}$	As a fuel for Diesel machines, tractors; for Gasolene roasting;
7. Grease oil, medicinal oil motor oil, Grease	$C_{15} - C_{18}$	Paint oil, transformer oil, Grease
8. Paraffin wax, petroleum jelly, petroleum wax, petroleum coke	$C_{18} - C_{30}$	In ointments, candles, match boxes, paints fore restructuring water As a fuel and for protection of paints.
9. Densy oil, Betumen	$> C_{30}$	Paints and surface of roads.

**9. Explain the construction and working of voltacell with neat diagram.**

A.



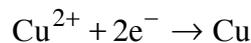
- (i) First electro chemical cell is constructed by the scientist volta in 1776. This is known as voltacell.
- (ii) In this cell, Zinc plate is placed in Zinc sulphate solution and copper plate is placed in copper sulphate solution.
- (iii) These two solutions are separated by diaphragm through which only ions can pass and the two solutions will not mix with each other.
- (iv) Zinc plate acts as anode, copper plate acts as cathode.

**Working of volta cell**

- (i) When two electrodes are connected by a wire, electrons will flow from zinc to copper terminals.
- (ii) As zinc is more reactive than copper, this will have tendency to lose electrons.



- (iii) These electrons will reach copper cathode through wire.  
At copper cathode the following reaction takes place.



**10. Justify your self that nuclear energy is more harmful for human society than accomplishing the needs of human society.**

- A. (1) Because nuclear energy is used in nuclear reactors, throughout the world electricity requirements are satisfying.
- (2) Those countries which possess nuclear bombs are very safe.
  - (3) Nuclear energy is useful in making radio isotopes which are used for several purposes.
  - (4) Even though nuclear energy is accomplishing large number of requirements of human society, it is making harm more than this.
  - (5) Harmful radiations are emitted when nuclear energy is released.

- (6) If any small defect happens in the reactor or any natural disaster occurs then more harmful radiations are released into the atmosphere and living creatures in the surrounding area get a permanent fear.
- (7) The waste materials which form in different phases of nuclear reactions are very harmful and because of these also some dangerous things happen.
- (8) Because of concentration of mines and minerals in different phases of nuclear cyclic processes also harmful and waste materials are formed which are also dangerous.
- (9) Till now no solution for waste materials has been known.
- (10) If atomic bombs are used in war, than entire world will distroy.

**11. Compare the Alpha and Beta particles with respect to their nature, change, penetrating power, ionising power and tabulate these.**

A. Character and property	Alpha rays $\alpha$	Beta rays $\beta$
Nature	These are doubly ionised Helium ions and each particle has 2 protons and 2 neutrons ${}^4_2\alpha$ (or) ${}^4_2\text{He}^{++}$	These are electrons ${}^0_{-1}e$ (or) ${}^0_{-1}\beta$
Charge	positive charge of 2 units	Negative charge of 1 unit
Penetrating power	Thick paper or skin can stop these rays	Aluminium sheet of few millimeters can stop these rays
Ionising power	high	Intermediate
Change in parent particle during emission	${}^A_Z\text{P} - \alpha \rightarrow {}^{A-4}_{Z-2}\text{D}$ ${}^{235}_{92}\text{U} - \alpha \rightarrow {}^{231}_{90}\text{Th}$	${}^A_Z\text{P} - \beta \rightarrow {}^A_{Z+1}\text{D}$ ${}^{231}_{90}\text{Th} - \beta \rightarrow {}^{231}_{91}\text{Pa}$

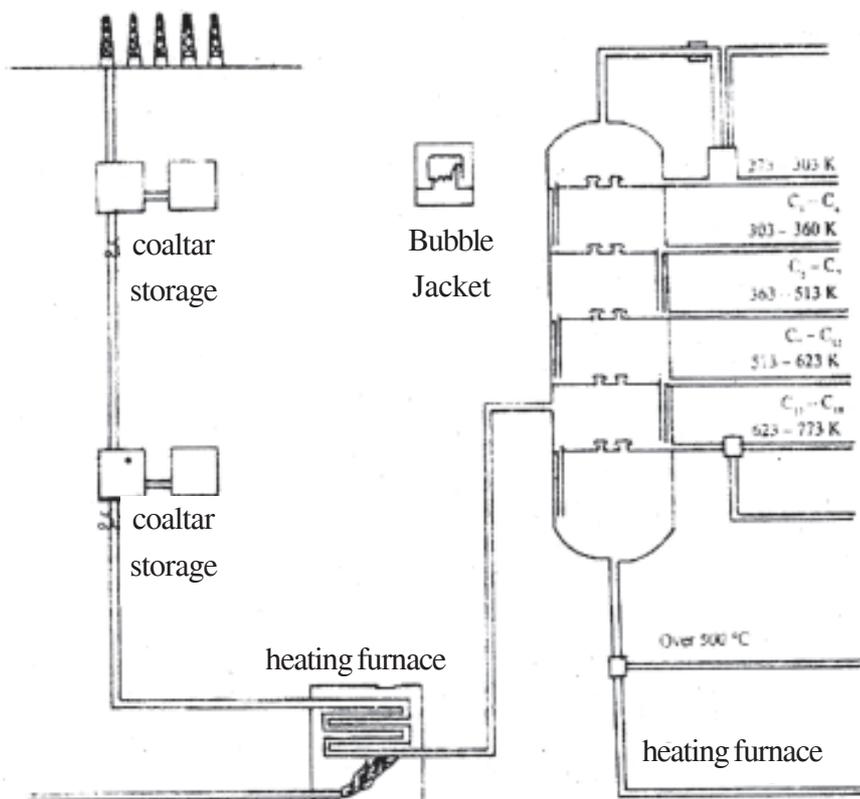
**12. Compare the Alpha and Gamma particles with respect to their nature, charge, penetrating power, ionising power and tabulate these.**

A. Character and property	Alpha rays $\alpha$	Gamma rays $\gamma$
Nature	These are double ionised Helium ions and each particle has 2 protons and 2 neutrons ${}^4_2\alpha$ (or) ${}^4_2\text{He}^{++}$	These are the electroma genetic waves equal to Gamma rays. ${}^0_0\gamma$ or ${}^0_0\nu$
change	Positive charge of 2 units	chargeless
Penetrating power	Thick paper and skin can stop these rays	we cannot stop these rays
Ionising power	high	low
change in parent particle during emission	${}^A_Z\text{P} - \alpha \rightarrow {}^{A-4}_{Z-2}\text{D}$ ${}^{235}_{92}\text{U} - \alpha \rightarrow {}^{231}_{90}\text{Th}$	${}^A_Z\text{P} - \gamma \rightarrow {}^A_Z\text{D} + \nu$ energy

13. Compare the Gamma and Beta particle with respect to their nature, charge, penetrating power, ionising power and tabulate these.

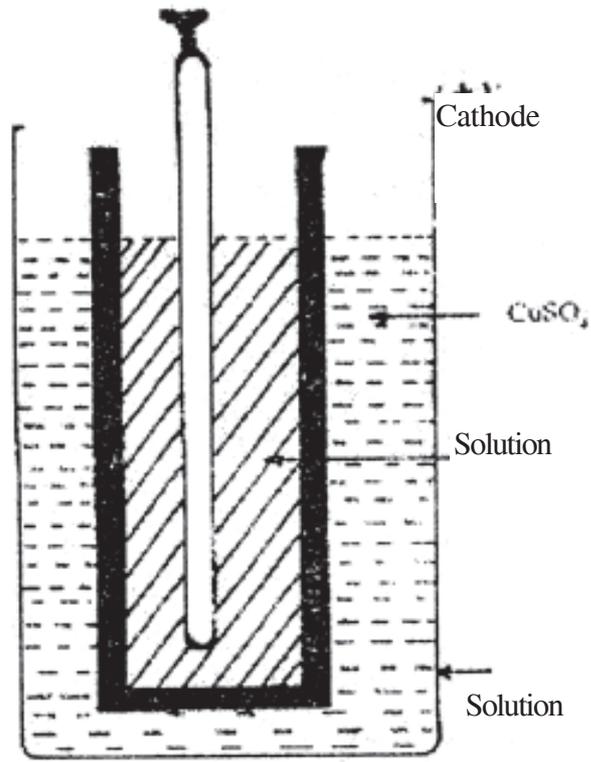
A. Character and property	Beta rays $\beta$	Gamma rays $\gamma$
Nature	These are electrons ${}^0_{-1}e$ or ${}^0_{-1}\beta$	These are electromagnetic waves equal to gamma rays ${}^0_0\gamma$ or ${}^0_0\nu$
Charge	Negative charge of 1 unit	chargeless
Penetrating power	Aluminium sheet of few millimeters can stop these rays	We cannot stop these rays
Ionising power	Intermediate	low
Change in parent particle during collision	${}^A_ZP - \alpha \rightarrow {}^{A-4}_{Z-2}D$ ${}^{235}_{92}U - \alpha \rightarrow {}^{231}_{90}Th$	${}^A_ZP - \gamma \rightarrow {}^A_ZD + \nu$ energy

14. Draw the diagram of petroleum fractiona distillation column and indicate different parts.



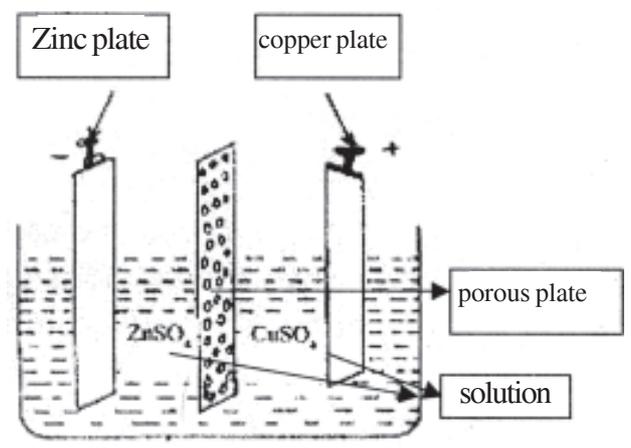
14.4 petroleum fractional distillation column

15. Draw the diagram of Daniel and volta cells and indicate the different parts.



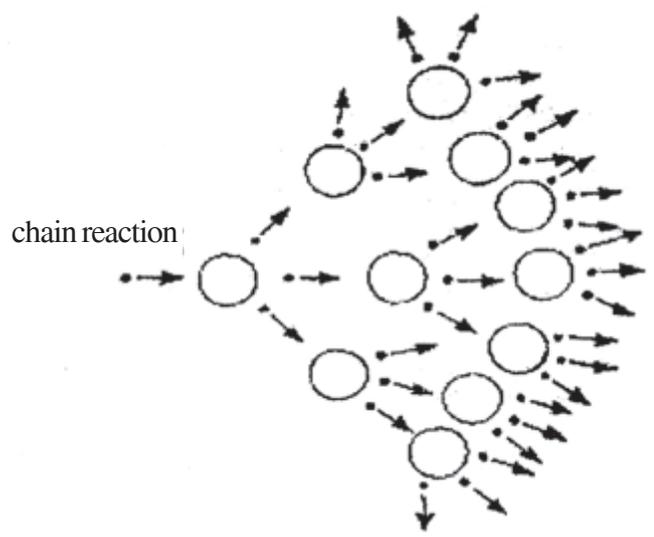
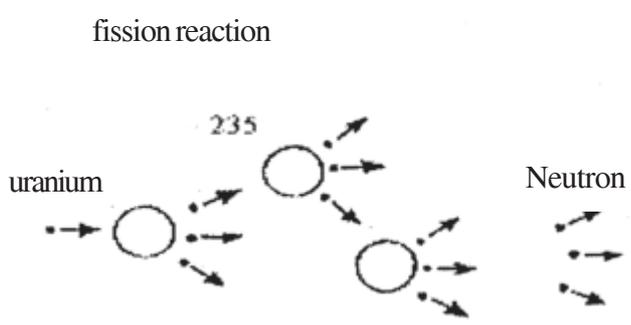
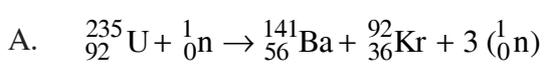
14.5 Daniel cell

copper vessel

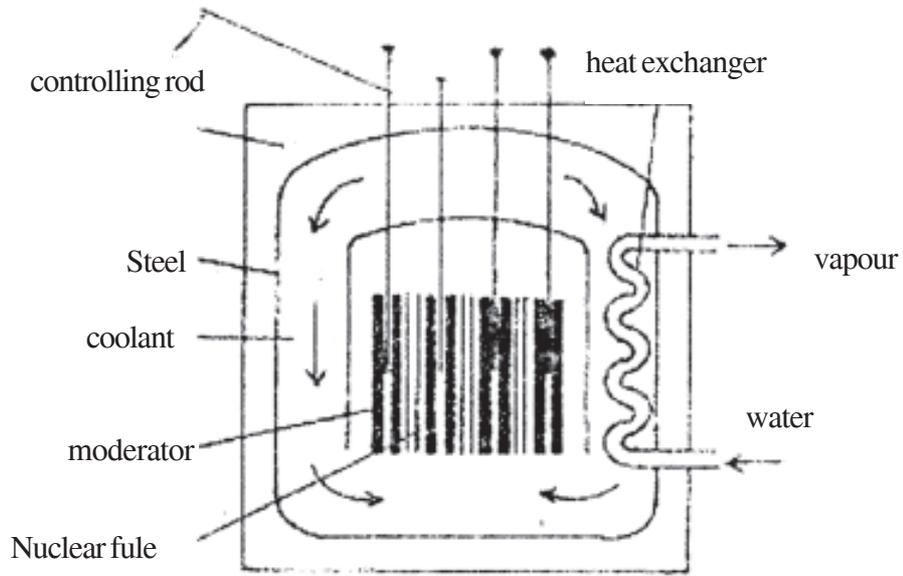


14.5 Volta cells

16. Write one equation for explaining the chain reaction and draw the figure showing that reaction.

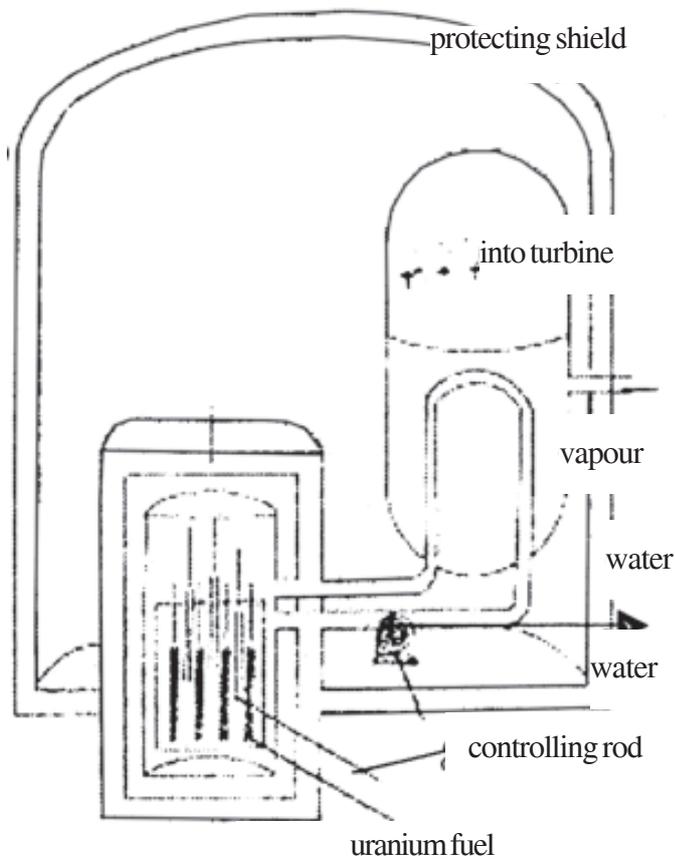


17. Draw the nuclear reactor figure and indicate different parts in that.



14.7 Nuclear Reactor

18. Draw the figure showing chain reaction, nuclear reactor core and indicate different parts.



14.8 Chain reaction, Nuclear Reactor core

## Fill in the Blanks

1. Endothermic, exothermic reactions are known as ..... (Thermo chemical reactions)
  2. In ..... reaction chemical energy is converted into heat energy (exoergic)
  3. Heat energy is converted into..... in endothermic. (chemical energy)
  4. Coal can be defined as combusting ..... rock. (precipitate)
  5. Chlorine radio isotope which is formed due to neutron bombardment will form  ${}_{17}^{38}\text{Cl}$  when bombarded with ..... (again  ${}^1_0\text{n}$ )
  6. When light weight nuclides are bombarded with alpha particle, in addition to other radio isotope ..... also released.  
(Neutron)
- 14.2.7 To get artificial radio isotope when light weight nuclei are bombarded with alpha or .....particle, neutron is released every time. (protons)
8. To test the iron pollors which are used in the polavaram project chief Engineer has to use ..... isotope. (Radio cobalt)
  9. Coal which has maximum amount of carbon is ..... (Anthracite)
  10. Coal gas has ..... gas in addition to ..... (H<sub>2</sub>, CH<sub>4</sub>) (CO)
  11. Combustion equation for CO .... (2CO + O<sub>2</sub> → 2CO<sub>2</sub>)
  12. When coal is made calcination the product which is used as fertilizers.....  
(Ammonium sulphate)
  13. For roasting of petrol, high temperature and ..... are required. (Catalyst)
  14. The reaction equation in soda acid fire extinguisher instrument .....  
(2Na HCO<sub>3</sub> + H<sub>2</sub>SO<sub>4</sub> → Na<sub>2</sub> SO<sub>4</sub> + 2CO<sub>2</sub> + 2H<sub>2</sub>O)

15. When ..... is bombarded with alpha particle, Neon radio isotope is formed. (  ${}_{9}^{17}\text{F}$  )
16. ADP means ..... (Adinocine diphosphate)
17. Coal which has only 60% carbon is called ..... (peet)
18. Fuels can be classified as ..... (solid, liquid, gaseous)
19. In combustion processes which forms only solid fuel and not liquid and gaseous fuels is ..... (ash)

### Multiple Choice Questions

1. Bombarding of Uranium-235 with neutron comes under ..... reaction ( 2 )  
 (1) Double decomposition (2) Exoergic (3) Endothermic (4) Displacement
2. Separation of big hydrocarbon beam of molecules into small hydrocarbon molecules in petroleum is the ..... process. ( 1 )  
 (1) Roasting (2) distillation (3) smelting (4) by water bath
3. The components which are in maximum and minimum amounts in natural gas are ..... ( 3 )  
 (1) Methane, propane (2) Ethane, Butane  
 (3) Methane, Butane (4) Butane, propane
4. Among the following which is not biofuel ( 1 )  
 (1) Bones powder (2) palm tree branch (3) cowdung (4) grass stuff
5. One family used 10 kg fuel of calorific value of 50 K.J/gram. Energy consumed by that family. ( 1 )  
 (1) 500 K.J (2) 500 J (3) 200 K.J (4) 200 J
6. The fuel used in the nuclear reactor is available in the form of ( 4 )  
 (1) Sulphate (2) Carbonate (3) sulphide (4) Oxide
7. The temperature required for fusion process in .....  $^{\circ}\text{C}$  ( 2 )  
 (1) 4 Tillions (2) 4 Millions (3) 3 Billions (4) 3 Trillions
8. Power of Narora nuclear energy reactor in million watts ( 3 )  
 (1) 160 (2) 100 (3) 220 (4) 120

9. Percentage of  $^{235}\text{U}$  isotopes in the natural uranium ( 3 )  
(1) 4 (2) 7 (3) 0.7 (4) 0.3
10. Uranium-235 concentration has to be increased to ..... percent so that controlled chain reaction can occur in the nuclear reactor. ( 4 )  
(1) 8 to 9 (2) 7 to 8 (3) 2 to 3 (4) 3 to 4
11. Graphite is used as ..... in the reactor ( 1 )  
(1) Moderator (2) Controlling rod (3) core shield (4) coolant
12. Ignition temperature of non-fissionable substance is ..... ( 3 )  
(1) high (2) low (3) infinite (4) very low

## Module - 5

# 15

Lesson

## Our Place in the Universe

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### Objectives

- List the constituents of the universe and describe them with examples.
- Recognise the vastness of the universe in terms of space and time and state the relative distances of important stars and galaxies with respect to earth.
- Differentiate between stars and planets, and between planets and satellites.

### Important Points

- Each star system in the universe is called galaxy.
- A light year is the distance travelled by light in space between stars (where it is vacuum) in one year. This is approximately 9.46 trillion km.
- The solar system consists of sun, nine planets, satellites of the planets, asteroids, comets and interplanetary gas and dust.
- A body revolving around a planet in a definite orbit is called satellite eg. moon.
- A bright object in extremely elongated elliptical orbit around sun is called comet.
- A momentary streak of light in the sky formed when a dust particle or rock enters the Earth's atmosphere at high speed are called Meteor.
- Meteoroid is a dust particle or rock which enters the atmosphere at high speed.

- Day and night is formed due to the rotation of earth around its axis.
- The universe contains many galaxies.
- light year is the unit to measure the distances between stars.
- The sun together with all the heavenly bodies bound to it by its force of gravitation is called solar system.

### 3 Marks

#### 1. Define star. Explain why the distances between stars are measured in light years.

A. A hot glowing gaseous heavenly body in the universe is called a star.

Light travels with a speed of about 3,00,000 km/sec. Light year is the distance traveled by light in one year i.e. about  $10^{13}$  km. The nearest star to our sun is about 4 light years away. The distances between stars is very large. Hence light year is used as the unit to measure the distance.

#### 2. What is the distance travelled by light in year

velocity of light =  $3 \times 10^5$  km

No. of sec in a year = 60 s x 60m x 24 h x 365 days

Distance travelled in one year =  $3 \times 10^5$  km x 60 s x 60m x 24 h x 365 days  
 =  $9.46 \times 10^{12}$  km/year.

#### 3. Write the differences between planets and satellites.

<b>Planets</b>	<b>Satellites</b>
A. 1. non-luminous objects	- Non-luminous objects
2. rotate around themselves	- rotate around them selves
3. revolve around sun in elliptical object	- revolve around a planet.
4. More gravitational force than satellite	- Have less gravitational force than planet.
5. Size is bigger than satellites	- Size and mass of satellite is less than planet.

#### 4. Write the difference between a star and a planet.

<b>Star</b>	<b>Planet</b>
A. 1. Luminous body	- Non luminous body
2. Very big in size and mass	- small in size and mass compared to star
3. More gravitational attraction	- very less gravitational attraction compared to planet
4. Fixed in the universe does not rotate	- Rotates around a star
5. Planets rotate around star	- Statellites rotate around planet.

**5. Define rotation and revolution of earth and mention its uses.**

- Rotation of earth around its own axis is called rotation of earth. Revolution of earth around sun in an elliptical orbit is called revolution.
- Day and night happen because of earth rotation. Seasons and monsoons occur due to revolution of earth around sun.

**6. How do eclipses of sun and moon occur?**

Lunar eclipse

Some times on a full - moon night, when moon is opposite to sun, moon passes through the shadow of earth. When this happens we do not see the moon until it comes out of the shadow. A total lunar eclipse occurs in this way. If the moon passes a little above or below the conical shadow of earth in space and only a part of the moon enters the shadow, then a partial lunar eclipse occurs.

**7. Define the following 1) planet 2) Satellite 3) Comet**

- A. 1) Planet - A heavenly body revolving around a star in a definite orbit is called a planet of that star.  
2) Satellite :- A heavenly body revolving around a planet in a definite orbit is called satellite of that planet.  
3) Comet - Bright heavenly objects, which revolve around the sun in extremely elliptical orbit are called comets.

**8. What are Asteroids ?**

- A. Smaller planets revolving around the sun are called asteroids. The size is about 1000 km to tens of metres. They may have spherical shape to irregular shape. All the asteroids revolve around the sun in the form of a belt between the orbits of mars and jupiter. Which is called asteroid belt.

**9. Write the properties of planet.**

- A. 1. All planets revolve around sun anticlockwise.  
2. They are non-luminous  
3. Planets wander about against the back ground of stars.  
4. Planets do not twinkle like stars.  
5. Planets are made up of different materials. The inner core is solid and outer is gaseous.  
6. Except few all planets rotate about their own axes in the same direction as they revolve around sun.

**10. Define the following : 1) Star 2) Constellation 3) Galaxy**

1. Star :- A star is a very hot and glowing gaseous object of very large mass.
2. Galaxy :- Each star system in the universe is called galaxy.
3. Constellation :- Group of stars forming a pattern in the sky which can be recognized is called a constellation.

**11. Define light year and Astronomical unit.**

Light year :- A light year is the distance travelled by light through space between stars (in vacuum) in one year. This is approximately 9.46 trillion km.

Astronomical unit (AU) :- The average distance of sun from earth is one astronomical unit.

$$1\text{AU} = 1.496 \times 10^8 \text{ km} = 499 \text{ light second}$$

## Fill in the Blanks

1. A star system is called ..... (Galaxy)
2. A large cloud of dust in the galaxy is called ..... (Nebula)
3. The star systems in the form of spiral, elliptical or spherical shape are called ..... (Galaxies)
4. The distance travelled by light in one year is called ..... (light year)
5. The name of our galaxy is ..... (Milkyway)
6. The distance between stars is measured by ..... (light year)
7. The shape of our galaxy, Milky way is ..... (spiral)
8. Sailors find their way in nights with the help of..... (pole star)
9. .... Pole of earth is indicated by pole star (North)
10. Nearest galaxy to our milky way is ..... (Andromeda)
11. Indian astronomers call milky way as..... (Akasa ganga)
12. Group of stars forming a pattern is called ..... (Constellation)
13. The average distance between earth as sun is called ..... (Astronomical unit)
14. The distances between the planets in a solar system are measured in ..... (Astronomical unit)
15. The fixed path in which planet revolve around sun is called ..... (orbit)
16. Planets revolve around sun in ..... orbits (elliptical)
17. One astronomical unit is ..... ( $1.496 \times 10^8$  km = 499 light secs.)
18. The orbit of comet is ..... (elongated ellipse)
19. The ..... part of the comet contains dust, gases and ice. (Tail)
20. Smaller planets revolving around the sun are called ..... (asteroids)
21. The asteroids between mars and jupiter orbits are called ..... (asteroid belt)
22. Small meteoroids and dust particles falling on earth due to gravity are called..... (meteor shower)
23. Earth is the ..... largest planet in the solar system ( $5^{\text{th}}$ )
24. Because of the rotation of ..... day and night is formed (Earth)

25. Because of the rotation of earth around sun ..... are formed. (seasons)
26. When earth, moon, sun comes into straight line ..... are formed. (eclipses)
27. .... forms on full moon day (lunar eclipse)
28. Solar eclipse forms on ..... (new moon day)
29. No. of times earth rotates in one year .... (365)
30. On ..... day time is less than night time (22 December)
31. Day time is more on ..... (21 June)
32. Time taken for earth to complete one rotation is ..... (24 hrs)

### Multiple choice questions

1. Nebula is [ 3 ]  
 (1) star constellations (2) gas cloud (3) dust cloud (4) solar systems
2. The shape of milky way Galaxi [ 3 ]  
 (1) spring (2) spherical (3) spiral (4) cylindrical
3. Sailors find the direction in night using [ 3 ]  
 (1) moon (2) star constellations (3) pole star (4) Air flow
4. Pole star is in which direction [ 2 ]  
 (1) East (2) North (3) south (4) Air flow
5. The astronomical unit is used to measure the distance between [ 4 ]  
 (1) stars (2) galaxies (3) star constellations (4) planets
6. The shape of the orbit of planets around sun [ 2 ]  
 (1) circular (2) ellipse (3) spiral (4) cylindrical
7. The order in which planets are mentioned depends on [ 3 ]  
 (1) Mass of the planets (2) Names  
 (3) Distance from sun (4) size of planets
8. Always same side of the moon's surface is visible from earth, because [ 1 ]  
 (1) Time period of rotation as revolution of moon are same  
 (2) Both revolves around sun  
 (3) moon revolve around earth  
 (4) No atmosphere on moon

9. The orbit of a comet is [ 3 ]  
 (1) circular (2) cylindrical  
 (3) elongated elliptical orbit (4) spiral
10. The part of the comet where dust, ice, solid gases lie [ 4 ]  
 (1) Head (2) centre of head  
 (3) at the middle (4) tail
11. Asteroid belt lies between [ 1 ]  
 (1) Mars and jupiter (2) Earth and mars  
 (3) Earth and venus (4) Mars and saturn
12. According to the size the place of earth in solar system [ 3 ]  
 (1) First (2) third (3) fifth (4) sixth
13. According to the size the planet in the 2<sup>nd</sup> place is [ 2 ]  
 (1) Earth (2) saturn (3) Mars (4) venus
14. According to the distance the place of earth is [ 2 ]  
 (1) second (2) Third (3) fourth (4) fifth
15. The biggest planet in solar system [ 4 ]  
 (1) saturn (2) Earth (3) Uranus (4) Jupiter
16. The planet nearest to sun is [ 3 ]  
 (1) Earth (2) Mars (3) Mercury (4) Venues
17. The planet near to earth [ 1 ]  
 (1) venus (2) mars (3) mercury (4) saturn
18. The planet with more number of satellites [ 2 ]  
 (1) Mercury (2) saturn (3) uranus (4) Earth
19. Lunar eclliple occurs when sun, earth as moon are placed in the following order [ 2 ]  
 (1) Sun-Moon-Earth (2) Sun-Earth-Moon  
 (3) Earth-sun-moon (4) Moon-sun-earth
20. Solar eclliple occurs when sun, moon and earth are in the following order [ 4 ]  
 (1) Earth - Sun - moon (2) Moon - Sun - Earth  
 (3) Moon - Sun - Moon (4) Earth - Moon - Sun

21. Planets with no satellites [ 4 ]
- |                   |                    |
|-------------------|--------------------|
| (1) Mercury, Mars | (2) Mars, pluto    |
| (3) Pluto - Venus | (4) Venus, Mercury |

22. Planet with only one satellite [ 3 ]
- |                    |                 |
|--------------------|-----------------|
| (1) Mercury, Earth | (2) Earth, Mars |
| (3) Earth, Pluto   | (4) Mars        |

**1. Match the following**

- |  |       |             |
|--|-------|-------------|
| 1. Biggest planet                          | ( 3 ) | (1) Earth   |
| 2. 5 <sup>th</sup> planet in terms of size | ( 1 ) | (2) Mercury |
| 3. 2 <sup>nd</sup> planet in terms of size | ( 5 ) | (3) jupiter |
| 4. Smallest planet                         | ( 6 ) | (4) Uranus  |
| 5. 3 <sup>rd</sup> planet in terms of size | ( 4 ) | (5) saturn  |
| 6. 8 <sup>th</sup> planet in terms of size | ( 2 ) | (6) Pluto   |

**2. Match the following**

- |   |       |             |
|---|-------|-------------|
| 1. Farthest planet from sun                         | ( 4 ) | (1) saturn  |
| 2. 3 <sup>rd</sup> planet from sun                  | ( 5 ) | (2) Uranius |
| 3. 5 <sup>th</sup> planet from sun                  | ( 6 ) | (3) Mercury |
| 4. Nearest planet from sun                          | ( 3 ) | (4) Pluto   |
| 5. The planet next to Jupiter<br>when seen from sun | ( 1 ) | (5) Earth   |
| 6. The planet after Saturn                          | ( 2 ) | (6) Jupiter |

**3. Match the following.**

- |  |       |                    |
|--|-------|--------------------|
| 1. When earth is in between sun and moon | ( 3 ) | (1) Full moon      |
| 2. Solar ecllipse happens on             | ( 4 ) | (2) Solar ecllipse |
| 3. When moon is in between sun and earth | ( 2 ) | (3) Lumar ecllipse |
| 4. lunar ecllipse happens on             | ( 1 ) | (4) no moon day    |
| 5. The length of night is shortest on    | ( 6 ) | (5) December 22    |
| 6. The length of night is longest on     | ( 5 ) | (6) June 21        |

# 16

## Lesson

# The Earth - A living planet

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### Objectives

- To explain the differentiation of Earth and evolution of atmosphere and hydrosphere in its present form.
- To describe the life supporting system on the earth i.e. biosphere comprising the lithosphere, the atmosphere and the hydrosphere.
- To explain how the solar energy is cycled in nature and utilised by living beings.

### Important points

- Only earth has life on its surface. Other planets don't have physical conditions necessary for life.
- Earth revolves around sun in nearly circular orbit and receive only required amount of solar energy.
- The earth has appropriate mass and radius so that it could provide graviteational field sufficient enough to hold atmosphere.
- The process of reorganisation of the earth in different layers of varying densities is called differentiation
- Life on earth is found in nearly 20 km thick spherical shell near its surface called biosphere.
- The parts of biosphere are 1. Lithosphere 2. Hydrosphase 3. Atmosphere.
- The space of 100 km around earth is called atmosphere.
- The main constituents of air are nitrogen and oxygen. It exists upto a height of 12 km from the earth's surface.

- It is because of the atmosphere that the radiation from the sun do not straight way reach the surface of the earth. Thus the atmosohere prevents the earth from getting too hot.
- Hot, molten rock formed beneath the earth's crust is called Magma
- The inner most portion of the earth is called core.
- The thin, rocky outer layer of the earth is called crust.
- The layer of the earth that lies between crust and core is called matle.
- Amount of force acting on unit area is Atmospheric pressure.
- An opening in Earth's crust through which magma erupts is called volcano.

### 3 Marks

#### 1. What are the uses of carbon dioxide.

- 0.033% of atmopshere is filled with carbondioxide. Green plants absorb carbon dioxide from atmo- sphere in preparing their food through photosynthesis. carbon dioxide being a green house gas traps infrared (heat) radiations and makes nights warmer and more comfortable.
- CO<sub>2</sub> is also called Green house gas.

#### 2. What is the differentiation of the earth. Earth is divided into how many layers due to diffrentiation ?

- 1) The process of reorganisation of the earth in different layers of varying densities is called differentia- tion. As earth melted it acquired a spherical shape. The heavier elements sank towards centre and formed central core. Other meterials remained on the surface of the earth as liquid, cooled and solidified to form crust. The gases and water vapour on the surface formed atmosphere. Hence the layers are core, mantle, crust and atmosphere.

#### 3. How oxygen free atmosphere helped in evolution of life on earth.

- A. When the blue green algae appeared in oceans, atmosphere had only nitrogen, hydrogen, water vapours and carbon dioxide. There was no oxygen in atmosphere. This was good, because the algae could have easily got oxidised in an oxygen rich environment. Then the prossibility of life on Earth would have been wipedout. Oxygen in air was added slowly and life forms could adjust with it.

#### 4. What is Lithosphere. Explain.

- A. The word lithosphere literally means layer of rocky materials. It consists of the earth's crust and the small upper solid part of mantle. Three fourth of surface of the lithosphere is water and one fourth is land. North America, South America, Antarctic, Australia, Asia, Africa as Europe. The entire land and water bodies of earth are divided into eight large and same smaller pieces called the lithospheric plates. These plates float on mantle is called magma. The study of lithorphere gives information about earth quckes, volcanos.

**5. Write the properties of core of the earth.**

A. Central part of the earth with heavier elements is called core. It contains Iron and some Nickel. The radius of the core is about 3400 km. It is very hot with temperatures about 4000°C. Pressure will be about 3.7 million atmosphere and density is about 18 g/cm<sup>3</sup>. The inner core is solid due to high pressure as outer core is liquid.

**6. Write the properties of Mantle.**

A. The middle part of earth is called mantle. It contains silicates of iron and magnesium. It lies between core and crust and spread over 2900 km. It is mostly solid only a thin outer layer of tar like viscous fluid of molten rocks. The pressure at mantle is about 4-6 g/cm<sup>3</sup>.

**7. Write the properties of crust.**

A. The outer most part of earth is called crust. It contains a mixture of large number of minerals like silica, alumina etc. It is a very thin layer with only around 10 km. under the oceans and 35-60 km below the land mass. Its density is about 3g/cm<sup>3</sup>. It is entirely solid.

**8. What made earth a special planet ?**

A. The following factors made earth a planet to live.

- i) Right distance from the sun :- The earth stays at the right distance from the sun in an almost circular orbit. Therefore it receives just appropriate amount of energy from the sun, so that the temperature range on its surface is suitable for the origin and evolution of life.
- ii) Appropriate mass and size :- The earth has appropriate mass and radius so that it could provide gravitational field sufficient enough to hold atmosphere.
- iii) Occurrence of some natural events on earth at right time and in desirable sequence so that a life supporting system (called Biosphere) could evolve on its surface.

**5 Marks**

**1. Explain the physical conditions required for formation of life on earth.**

A. The atmosphere contains nitrogen, oxygen, Hydrogen like gases. These are required for the formation of life cell. Because of atmosphere that the radiations from the sun do not straight way reach the surface of the earth. Thus it prevents earth from getting too hot so that life can survive. Existence of water in atmosphere and rains provide water for existence. Ozone (O<sub>3</sub>) layer above earth (10-50 km) protects earth from harmful ultra violet radiations of sun.

These physical conditions make earth a planet to live.

## 2. What are the uses of atmosphere on earth.

- A. (1) Atmosphere prevents earth from getting too hot because of sun rays.  
(2) Nitrogen and oxygen in the atmosphere are in correct proportion due to which living beings can breathe and controlled burning of fuels becomes possible.  
(3) Atmosphere prevents meteors from reaching earth.  
(4) The water vapours present in atmosphere provides for rains which is vital for agriculture.  
(5) Ozone layer protects us from UV rays.  
(6)  $\text{CO}_2$  present in the atmosphere helps photosynthesis and makes nights warmer.

## 3. Explain the different forms of solar energy.

- A. 1. Wind energy : Due to uneven heating of different regions of earth surface high and low pressure areas are created and wind blows. From this wind mills are run to produce electricity.  
2. Hydel power :- Water evaporates due to sun heat and comes down as rain and flows in rivers. From this hydro electricity is produced.  
3. Energy from food :- We get energy from food. Animals get food from plants. Photosynthesis happens due to sun light and plants grow.  
4. Energy from fossil fuels :- Fossil fuel like coal etc are biomass which have survived because of sun energy. From fossil fuels we get thermal energy.

## 4. What are the threats to the balance in nature by human activities ?

- A. The following features are affecting nature's balance.  
1. Due to industrialization fossil fuels are exhausting. The  $\text{CO}_2$  in atmosphere is rising. This is posing a threat of global warming.  
2. Mindless releasing of chloro fluoro carbons are damaging ozone layer.  
3. Due to deforestation environmental imbalance is occurring.  
4. Creation of non-biodegradable materials like polythene is making the earth barren and posing threats for various life forms.

## 5. Explain the origin of the earth.

- A. Initially under suitable circumstances more complex molecules like carbohydrates and amino acids were developed. Blue-green algae is the first living organisms that ever originated on earth. It has properties like self growth and self propagation. They prepared their food through photosynthesis using carbon dioxide and evolved oxygen. The early forms of life thus survived and developed into more advanced organisms.

## 6. What are the uses of oceans.

- A. The uses of oceans are  
1. They regulate the global temperature  
2. The primitive life form originated in the oceans  
3. They dissolve atmospheric carbon dioxide and thus help in keeping the biosphere in equilibrium.  
4. They provide good resources for fossil fuels, minerals salts and sea food.  
5. They act as a medium for transporting men and materials using ships boats etc.

### Fill in the Blanks

1. First organism originated is ..... (blue - green algae)
2. First organism originated in ..... (ocean)
3. .... in sun light cause cancer (UV rays)
4. .... layer protects earth from UV rays (Ozone)
5. When we move up from the surface of earth density of air ..... (decreases)
6. Due to differentiation mass of the earth is distributed in ..... different layers (four)
7. The age of fossils and rocks is determined by ..... (Uranium dating)
8. In the beginning the earth was a single piece of landmass called ..... (Pangaea)
9. Due to the release of ..... holes are created in ozone layer (chloro fluoro carbons)
10. Gases evolve while using AC and fridge are ..... (Chlor fluoro carbons)
11. The solar system and earth formed before .....  
(4.5 billion/ 450 crore years)
12. The reason for core of earth being solid even though the temperature are high is .....  
(high pressure / i.e. 3.7 million atmospheres)
13. The temperature at the core of earth is .....  $O_C$  (4000)
14. .... planet has ozone layer like earth. (venus)
15. Due to ..... energy is produced in sun (fission)
16. By ..... we can maintain environmental balance (growing trees)
17. Earth gets energy mainly from ..... (sun)
18. .... less atmosphere helped the evolution of life on earth (oxygen)

### Multiple choice questions

1. The planet with ozone layer other than earth [ 2 ]  
(1) saturn (2) Venus (3) Mercury (4) Mars
2. The reason for no life on jupiter is [ 3 ]  
(1) Big size (2) high gravitational force  
(3) low temperature (4) More satellites

3. The time taken to form fossil fuels [ 4 ]  
 (1) 5–10 thousand years (2) 10,000–1,00,000 thousand years  
 (3)  $10^5$ – $2.5 \times 10^5$  thousand years (4) 2.5 – 1 million years
4. Which part of the earth is near to us [ 4 ]  
 (1) core (2) mantle  
 (3) crust (4) atmosphere
5. The first organism originated in [ 2 ]  
 (1) ocean (2) atmosphere (3) Marshy land (4) crust
6. The thickness of earth crust [ 3 ]  
 (1) 1 km below surface (2) 10 km – 20 km below surface  
 (3) 35km – 60km below surface (4) 100km – 200km below surface
7. Ozone layer protects us from [ 1 ]  
 (1) UV rays (2) Infire red rays  
 (3) cosmic rays (4) meteoroid
8. Earth is divided into how many layers due to differentiation [ 3 ]  
 (1) 3 (2) 2 (3) 4 (4) 5
9. Time taken to evolve life on earth [ 3 ]  
 (1) 50,000 thousand years (2) 100 millian years  
 (3) 600 million years (4) 3.7 billion years
10. Which energy is not derived from sun [ 2 ]  
 (1) Hydro thermal enrgyer (2) Nuclear energy  
 (3) Fossil fuels (4) wind energy
11. The age of earth is [ 4 ]  
 (1) 6 billion (2) 6 million (3) 4.5 billion (4) 4.5 million
12. The layer of earth which is releated to us [ 3 ]  
 (1) core (2) mantle (3) crust (4) atmosphere

## Module - 6

# 18

Lesson

## Air And Water

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### Objectives

- Explaining the significance and importance of different gases ( $O_2$ ,  $N_2$ ,  $CO_2$ ).
- Describing different sources of water.
- Illustrating the general methods used for the preparation of drinking water.
- Explaining different properties of water.
- Recognising the use of water for different needs.
- Justifying the rain water storage.

### Important Points

- Air around the earth forms into a circle and applies pressure on the surface of the earth. This pressure is called Atmospheric pressure.
- The water vapour in the atmosphere is called humidity.
- The ratio between the water vapour in a specific volume of air and the water vapour required to saturate that volume of air is called relative humidity.
- Hardness in the water is due to the presence of calcium, magnesium salts.
- When capillary tubes are kept in water, water enters into them slowly. This property is known as capillary action.
- Chlorides and sulphates of calcium and Magnesium dissolved in water cause permanent hardness of water. This can be removed by adding sodium carbonate to the water or by Ion exchange method.

### 3 Marks Questions

**1. What are the components of air ?**

Answer

The components of air : Nitrogen, oxygen, Argon, carbon dioxide Neon, Helium, Krypton, Xenon and water vapour.

**2. Write any three uses of oxygen (or)**

**Write three contexts in which oxygen is very important for human life (or)**

**How the human life is linked with oxygen (or) oxygen is very essential for life why ? Give examples.**

- Oxygen is essential for breathing process.
- Oxygen helps burning
- liquid oxygen is used as fuel for Rockets
- Oxygen dissolved in water helps the breathing process for water plants and animals.
- Navy, Air, Fire forces, mountain treckers use oxygen for artificial breathing for some patients in emergency conditions.
- For Asthma patients, in water accidents, to enhance the natural breathing oxygen, carbogen mixture is used.
- In surgery, oxygen and Nitrous oxide mixture is used as anesthetic.
- To prepare pure Iron from its mineral oxygen is used because oxygen produce more heat than air.
- Oxy acetylene flame is used in welding processes.
- Oxygen is used to produce sulphuric acid.

**3. Write any three uses of Nitrogen (or)**

**How Nitrogen is essential for the mankind.**

- Nitrogen is the main part of protein. In the living beings the mixture of Nitrogen and many amino acids which is called protein is an important part.
- To reduce the reactivity of oxygen, Nitrogen is used in the atmosphere.
- If Nitrogen is absent in the atmosphere, rusting, burning etc reactions proceed in fast manner. So Nitrogen Controls these reactions.
- Nitrogen compounds are very important for plants. With Nitrogen plants prepare proteins. Animals use these proteins from plants.

**4. Nitrogen controls oxygen's distruction. Justify.**

- Nitrogen reduces the reactivity of oxygen in atmosphere.
- Nitrogen controls the combustion property of oxygen.
- Nitrogen controls the rusting process by oxygen.
- Nitrogen controls the combustion process of food & breathing.

Thus Nitrogen reduces the density of oxygen in atmosphere and controls the oxygen's distruction.

**5. Write any three uses of Carbon dioxide.**

- Carbon dioxide is used in the preparation of food for plants by photosynthesis.
- To store and protect the food grains from insects carbon dioxide is used.
- Carbon dioxide is a green house gas. It binds Infrared rays.
- Solid carbon dioxide is called dry ice. This is used in refrigerators
- Carbon dioxide is used in fire extinguishers.
- Since carbon dioxide dissolves in water, it is used in cool drinks preparation.
- $\text{CO}^{2+}$ ,  $\text{Mg}^{2+}$  ions which are useful for the growth of the plants are supplied in presence of carbon dioxide in the earth's crust.

**6. What is Atmospheric pressure. How do you measure it ? Write its types.**

- Air around the earth forms into a circle and applies pressure on the surface of the earth. This pressure is called atmospheric pressure.
- The instrument used to measure the atmospheric pressure is a barometer.
- The important types of barometers in use are
  1. Mercury barometer. (common barometer)
  2. Fortin barometer.
  3. Aneroid barometer.

**7. Explain the Mercury barometer structure with the help of a figure.**

- In a common barometer, there is a glass tube sealed on one side.
- It is filled with mercury and is kept in a reverse or inverted position.
- There will be some space above the mercury in this tube.
- Depending upon the pressure which is caused by the atmosphere, the level of mercury will be changing.

**8. Write three instruments which operate based upon the Atmospheric pressure.**

- Straw, we use to drink cool drinks.
- Ink filler, we use to fill ink in the pen.
- Kerosene pump, we use to take out kerosene from the tin
- Dropper used to put drops of medicine for children.
- Air filling pumps to fill air in the cycle wheel and in balloons.
- Syringe, used to inject medicine.

**9. Into How many layers the atmosphere is divided based upon the temperature, pressure difference and basic substances. what are they ?**

Atmosphere is divided into four layers.

- they are
1. Troposphere
  2. Stratosphere
  3. Mesosphere
  4. Thermosphere.

**10. On what basis the atmosphere is divided into 4 layers.**

The following factors are the basis for the division of atmosphere.

1. Temperature
2. Pressure difference
3. Basic substances present in atmosphere

**11. How the clouds are formed Explain.**

- Oceans and other water sources vapourise with sunlight and form water vapour (vaporisation).
- When this water vapour reaches heights in atmosphere it cools down and changes into water drops.
- These water drops mix with dust particles and form clouds.

**12. Define Humidity and relative humidity and mention the instrument used to measure them.**

Humidity : The water vapour present in atmosphere.

Relative Humidity :- The ratio between the water vapour in specific volume of air and the water vapour required to saturate the whole amount of air of that specific volume.

- Hygrometer is the instrument used to measure the relative humidity.

**13. Why the drinking water must be purified. Mention any two methods to purify water.**

- Water is available from oceans, rivers, wells, tanks etc.
- In these water sources, different solid substances, minerals, other compounds, virus, bacteria, eggs of insects, Algae, protozoa and other water plants are present.
- So, If we drink that water, or use for other needs, it shows adverse effects. Hence drinking water must be purified. Even for other needs, pure water should be used.

## Purifying methods

1. Filtration
2. Decantation
3. Boiling
4. Chlorination

**14. Why water is called as universal solvent ? Write any two uses of water with that property.**

- common salt, sugar, oxygen,  $\text{CO}_2$  and mineral salts dissolve in water. Hence it is called universal solvent.
- With this property, plants, are able to absorb mineral salts from earth.
- Due to the food we ate is in liquid form. After digestion it is useful for the absorption by the body.
- Many chemical reactions proceed in water solutions only.

**15. How Hardness is formed in water ? Depending upon the formation of froth with soaps how water can be classified.**

- Water gets hardness by the dissolution of calcium, Magnesium salts in water.
- Depending upon the formation of froth with soap water is divided into two types.
  - (1) If the water forms froth with soap then that water is called softwater.
  - (2) If the water will not give froth with soap then that water is called Hard water.

**16. What is capillary action ? Mention two processes which depend upon capillary action ?**

When capillary tube is dipped in water, water enters into the capillary tube. This is called capillary action.

- Water reaches leaves and branches due to this capillary action in plants.
- When a cloth is put on water on the floor, it absorbs water due to the capillary action.
- Kerosene in the Kerosene lamp reaches the cotton wick with the capillary action.

**17. When water is heated from  $0^\circ\text{C}$  how it behaves ?**

- Normally all substances expand when they are heated.
- On heating water at  $0^\circ\text{C}$  (ice) till the temperature reaches  $4^\circ\text{C}$ , it contracts.

- After the temperature  $4^{\circ}\text{C}$ , like all liquids water also expands. It means at  $4^{\circ}\text{C}$  water has less volume and high density.

**18. Mention two examples showing that air contains water vapour.**

- We see water droplets on the leaves of plants in winter. Those droplets are due to the vapourisation of water vapour in the air.
- When cold water or ice pieces are kept in a steel vessel water droplets are formed on the out side walls of the vessel. This is also due to the water vapour in the air.
- Rusting of Iron is due to the oxygen and water vapour in the air.
- Formation of smog in winter indicates humidity in air.
- When salt, sugar kept in vessels without lid they absorb water vapour from air and become watery.

**19. Mention any three uses of water.**

- Water is essential for life in plants & Animals.
- Cooking food, cleaning vessels, Laundry, bathing etc involve water.
- Water is essential for Agriculture.
- To cool the machines in industries water is used.
- Industries involving water vapour like thermal electrical plants require water.
- Water is used in the preparation of chemicals.
- In Hydral electric plants, water is poured down with high speed on turbines which produce electricity.

**20. What is the need of protecting the rain water?**

- As the population is increasing, industries, Agriculture is expanding and the need for water is also increasing.
- To meet this necessity the water wells, tanks, rivers are not able to fulfill the need.
- Ocean or sea water can not be used for many needs.
- Water storage in the earth layers is decreasing.
- Hence there is a need to store rain water, protect rain- water, building dams, projects to prevent rain water going into oceans, to controll the water storage in the layers of earth.

**21. What will you do to protect water in this situation where water storage in the earth layers is decreasing ?**

- Using water carefully for the domestic works, personal cleanliness, I will save water.
- I will make an arrangement to use the used water or waste water for the gardening purpose
- I will collect the rain water from the terrace through the pipes into drums.
- I will make water storage pits in my house premises and store water in the layers of the earth.
- I will counsel my neighbours and others about the need for protection of rain water and for saving water for the betterment of the living beings.

**22. Draw a picture of Mercury barometer and mention two precautions to be followed.**

- During filling Mercury in the glass tube care must be taken so that no bubbles are formed in the tube.
- While inserting the glass tube in the tank care should be taken so that no mercury is fell down.
- The glass tube must be thick so that it must withstand the wieght of mercury.

**5 Marks Questions.**

**1. Draw the figure for the experiment showing  $1/5$  th part of air is oxygen and explain.**

It can be determined by an experiment to show that  $1/5$  th part of the air is oxygen.

Apparatus : Measuring Jar, beaker, water, stand, cotton, phosphorous, Graph sheet.

**Procedure:-**

- Phosphorous piece is kept on cotton and it is arranged in a test tube having measurements.
- This test tube is kept inverted in the beaker.
- Water is poured in the beaker till the test tube shows 5 cm.
- With the help of a stand the test tube is kept straight for one hour.

**Observation**

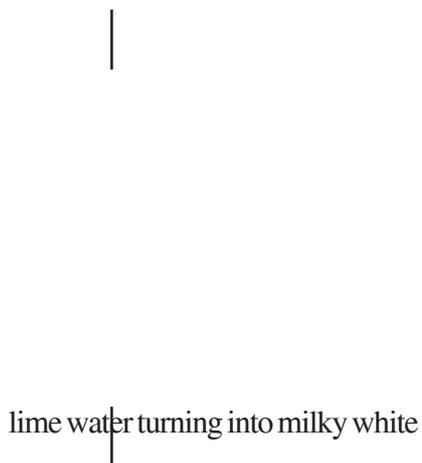
- The water level increases showing  $1/5$ th part of air in the test tube contains oxygen.

Reason : Oxygen in the air in test tube reacts with phosphorous and then react with water forming phosphoric acid.

Explanation : Oxygen is utilised in the testtube by this reaction. In the space created thus, water is occupied. Water occupied the oxygen volume which is  $\frac{1}{5}$  th part in the Air. Thus it is inferred that  $\frac{1}{5}$  th part of air is oxygen.

**2. Explain that air contains carbon dioxide with the help of a figure.**

**Apparatus :** Testtube, lime water, Rubber cork with two holes. L shape glass tubes.



**Procedure :**

- Take lime water upto half of the test tube.
- Arrange the rubber cork having two holes.
- Insert L shape glass tubes in the cork
- One glass tube must be dipped in lime water.
- Second tube is used to pipette out air from the testtube.
- Outside air enters into the lime water through the first L shape tube.
- The lime water turns to milky white.
- $\text{CO}_2$  can turn the lime water to milky white. Hence it is proved that air contains  $\text{CO}_2$ .

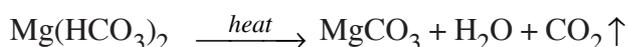
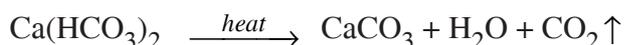
**3. What are the types of Hardness in water. How the hardness is removed. Explain briefly.**

Hardness of water is two types (1) Temporary Hardness

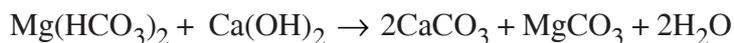
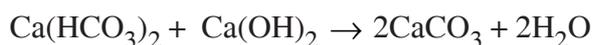
(2) Permanent Hardness

**1. Temporary Hardness :** When calcium, Magnesium, bicarbonates are dissolved in water it forms temporary Hardness. By boiling water, or adding wet calcium hydroxide to the water removes the temporary hardness.

**Boiling :** On boiling water the bicarbonates present in water convert into their carbonates and settle down at the bottom. By filtration these can be removed.

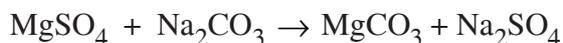
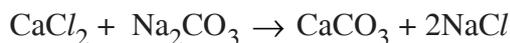


By adding wet calcium hydroxide:- By adding calcium hydroxide to the water, it converts bicarbonates into carbonates.



**2. Permanent Hardness :** The presence of calcium, Magnesium chlorides, sulphates cause permanent hardness to the water. By adding washing soda or by Ion exchange method this permanent hardness can be removed.

Addition of washing soda :- Calcium and Magnesium chlorides, sulphates react with washing soda and get converted into carbonates and settles in the form of precipitates. These can be removed by decantation.



Ion exchange method :- In this method zeolite is added to the water. Calcium, Magnesium salts precipitate out as their zeolites. By decantation they can be removed.

**4. Explain the significance and need to protect water for the benefit of human life.**

**Significance of water :-**

- Water is essential for all living beings.
- Water is very much needed, for the domestic works, like cooking, washing clothes, cleaning vessels, bathing etc.
- Water is the important base for Agriculture.
- Water is essential for plants to prepare food by photo synthesis. All living beings depend upon the food prepared by the plants.
- To cool the machinery parts in industries water is needed.
- Hydral, Thermal electrical plants require water.

**Reason for protecting water.**

- Existing water sources like tanks, wells, rivers are not sufficient due to the increased population, extensive Agriculture.
- Water storage in earth layers is also decreasing day by day.
- Sea water is not useful for many purposes.
- Hence Rain water must be protected by constructing dams, by building water pits etc.

**Fill in the blanks with the correct answer.**

1. Nitrogen's percentage of volume in air is..... (78.03)
2. Oxygen's percentage of volume in air is ..... (20.09)
3. Among the gases present in air most active gas is ..... (oxygen)
4. The gas which helps burning is ..... (oxygen)
5. For rusting Iron along with water ..... gas is resoinsible. (oxygen)
6. Solid carbon dioxide is called..... (dry ice)
7. 95% oxygen and 5% carbon mixture is called..... (Carbogen)

8. The gas present in protein is ..... (Nitrogen)
9. To reduce the reactivity of oxygen ..... gas in the Atmosphere is used (Nitrogen)
10. For photosynthesis plants take water vapour along with ..... from air. (Carbon dioxide)
11. The gas which binds Infrared rays is ..... (carbon dioxide)
12. The gas used in Fire Extinguishers is ..... (Carbon dioxide)
13. The gas used in the preparation of cooldrinks is ..... (Carbon dioxide)
14. The instrument used for measuring the Atmospheric pressure is ..... (Barometer)
15. The gas zone around the earth is ..... (Atmosphere)
16. The thin layer among the Atmospheric layers is ..... (Troposphere)
17. The temperature at which water vapour is converted into water drops is called .....  
(Dew point)
18. The instrument used to measure rain fall is called ..... (Rain gauge)
19. The water vapour in atmosphere is called ..... (Humidity)
20. The instrument used to measure the relative humidity is called ..... (Hygrometer)
21. The flow of water in circular way on the globe is called ..... (Water cycle)
22. Many substances dissolve in water and hence it is called ..... (universal solvent)
23. The sodium stearate formed with sodium salt is called ..... (Soap)
24. The presence of calcium, Magnesium bicarbonates cause ..... hardness to water.  
(Temporary hardness)
25.  $\text{Ca}(\text{HCO}_3)_2 + \text{Ca}(\text{OH})_2 \rightarrow \dots\dots\dots + 2\text{H}_2\text{O}$  (2Ca CO<sub>3</sub>)
26. The presence of calcium, Magnesium chlorides and sulphates cause ..... hardness to water.  
(permanent hardness)
27. The Tension formed by the water molecules on the surface is called ..... (surface Tension)
28. Water will have highest density at ..... temperature (4<sup>0</sup>C)
29. When a capillary tube is dipped in water, water enters into the Capillary tube slowly. This is called .....  
(capillary action)
30. The ratio between the density of the substance and the density of water at 4<sup>0</sup>C is called .....  
(relative density)

31. Density of water is .....kg / m<sup>3</sup> (or) kgm<sup>-3</sup> (1000)
32. Density of water is ..... g/cm<sup>3</sup> (or) gcm<sup>-3</sup> (1)
33. Air around the earth forming like a cycle and apply pressure on the earth surface is called .....  
(Atmospheric pressure)
34. The weight of a substance of specific volume is ..... (density)
35. To convert calcium, Megnesium bicarbonates in water into carbonates .....is added to the water.  
(Ca(OH)<sub>2</sub>)
36. Clouds, rain, ice, smog, Fog like substances are formed from..... (water vapour)
37. The main constituents in air are ..... (N<sub>2</sub>, O<sub>2</sub>)
38. The essential gas for the living beings in air is.....(O<sub>2</sub>)
39. The gas which is used for the preparation of proteins is .....(N<sub>2</sub>)
40. The gas which is essential for plants in the air for the photo synthesis is ..... (CO<sub>2</sub>)
41. The part of air which form Fog is ..... (water vapour)
42. The instrument used to measure Atmospheric perssure is ..... (barometer)
43. The instrument used to measure relative humidity is .....(Hydrometer)
44. Instruement used to measure rain fall ..... (Rain guage)
45. To remove temparoray hardness ..... is added to water. (Ca(OH)<sub>2</sub>)
46. To remove peramanent hardness .....is added to water. (Na<sub>2</sub>CO<sub>3</sub>)

### Multiple choice Questions

1. Two constituents of Air ( 2 )  
(1) CO<sub>2</sub> + H<sub>2</sub>O (2)N<sub>2</sub> + O<sub>2</sub> (3)CO<sub>2</sub>+ He (4) H<sub>2</sub>O + Xe
2. The precentage volume of Nitrogen in air ( 3 )  
(1) 68% (2) 73% (3) 78% (4) 88%
3. The percentage volume of oxygen in air ( 1 )  
(1) 20% (2) 16% (3) 28% (4) 30%
4. The gas used for cumbustion ( 4 )  
(1) CO<sub>2</sub> (2)N<sub>2</sub> (3)H<sub>2</sub> (4) O<sub>2</sub>
5. The gas responsibe for rusting of Iron ( 3 )  
(1)CO<sub>2</sub> (2) N<sub>2</sub> (3)O<sub>2</sub> (4)H<sub>2</sub>

6. The gas present in protein ( 2 )  
 (1)CO<sub>2</sub> (2)N<sub>2</sub> (3)O<sub>2</sub> (4)H<sub>2</sub>
7. For photosynthesis, plants absorb the gas ( 1 )  
 (1)CO<sub>2</sub> (2)N<sub>2</sub> (3)O<sub>2</sub> (4)H<sub>2</sub>
8. The gas used in Fire extinguisher ( 3 )  
 (1) N<sub>2</sub> (2)O<sub>2</sub> (3)CO<sub>2</sub> (4)H<sub>2</sub>
9. Dry ice means ( 4 )  
 (1) liquid oxygen (2) liquid Nitrogen  
 (3) Solid Ammonia (4) Solid carbondioxide
10. The gas used in the preparation of cool drinks pepsy, thumbs up ( 2 )  
 (1) O<sub>2</sub> (2)CO<sub>2</sub> (3)N<sub>2</sub> (4)H<sub>2</sub>
11. The Mercury level in barometer ( 3 )  
 (1) 66 cm (2) 70 cm (3) 76 cm (4) 80 cm
12. The instrument used to measure Atmospheric pressure ( 1 )  
 (1) Barometer (2) Hygro meter (3) Mesosphere (4) Thermosphere
13. The thin layer among Atmospheric layers ( 1 )  
 (1) Troposphere (2) stratosphere (3) Mesosphere (4) Thermosphere
14. Universal solvent ( 3 )  
 (1) Kerosene (2) Oil (3) water (4) Petrol
15. Instrument used to measure relative humidity ( 1 )  
 (1) Hygrometer (2) Hydrometer (3) Lactometer (4) Barometer
16. The temperature at which water has maximum density ( 2 )  
 (1) 0<sup>0</sup> (2) 4<sup>0</sup> (3) 100<sup>0</sup> (4) 27<sup>0</sup>
17. The mass for 1 m<sup>3</sup> water ( 4 )  
 (1) 100 kg (2) 10 kg (3) 10000 kg (4) 1000 kg
18. Carbogen has the gases ( 2 )  
 (1) O<sub>2</sub> + N<sub>2</sub> (2) O<sub>2</sub> +CO<sub>2</sub> (3)O<sub>2</sub> +H<sub>2</sub> (4)O<sub>2</sub> + CO

19. The volume ratio of  $N_2$  and  $O_2$  in air ( 2 )  
(1) 1:4 (2) 4:1 (3) 1:5 (4) 4:5
20. The height of Mercury level for 1 atmosphere pressure ( 4 )  
(1) 760 cm (2) 76 cm (3) 76 meters (4) 760 m.m
21. At 25 km height from earth belongs to the Atmospheric layer ( 2 )  
(1) Troposphere (2) strato sphere (3) Mesosphere (4) Thermosphere
22. The Atmospheric layer which is nearer to the surface of earth ( 1 )  
(1) Troposphere (2) strato sphere (3) Mesosphere (4) Thermosphere

# 19

## Lesson

# Mineral sources, Metals and non Metals

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### Objectives

- Stating the difference between metals and non metals based upon their characteristics.
- Identifying the difference between Ore and mineral.
- Identifying the Extraction processes of metallurgy for the metals Fe and Cu.
- Mentioning the uses of metals and Alloys.
- Describing the preparation methods, properties and uses of non metals H, Si and P.

### Important Points

- Oxygen (O), Silicon (Si), Aluminium (Al) and Iron (Fe) are the four most abundant elements which are more than 87%, of the earth's Crust.
- The mineral used for the extraction process of a metal is called its ore.
- The science of extraction of metals from their ores is called metallurgy.
- Main ores of Aluminium are bauxite ( $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ ) corandum ( $\text{Al}_2\text{O}_3$ ), Cryolite ( $\text{Na}_3\text{AlF}_6$ ) and Orthoclase Feldspar,  $\text{KAlSi}_3\text{O}_8$ .
- Aluminium is extracted by Hall's method from bauxite.

- Main ores of Copper are chalcopyrites ( $\text{CuFeS}_2$ ), Copper glance ( $\text{Cu}_2\text{S}$ ) and Malakite ( $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$ )
- The slow Decay of metals due to the atmospheric Conditions (mainly water and air) is called corrosion.
- Coating Iron with Zinc is called galvanising.
- Hydrogen has three allotropic forms. They are general Hydrogen Duterium and Tritium
- Phosphorous is found in nature in chlorapatite, Fluorapatite, and phosphorite  $\text{Ca}_3(\text{PO}_4)_2$ , forms.
- The allotropic forms of phosphorous are white, Red and black phosphorous types.

### 3 Marks Questions

#### 1. Define mineral ore. write the ores for Iron and Aluminium.

- A. The mineral used for extraction is called ore. So the mineral which is profitable in the extraction process is called its ore.
- i) Ores of Iron : Hematite, Magnetite.
  - ii) Ores of Aluminium : Bauxite, Carundum, Cryolite.

#### 2. Write any three physical properties of metals.

##### A. Physical properties of metals

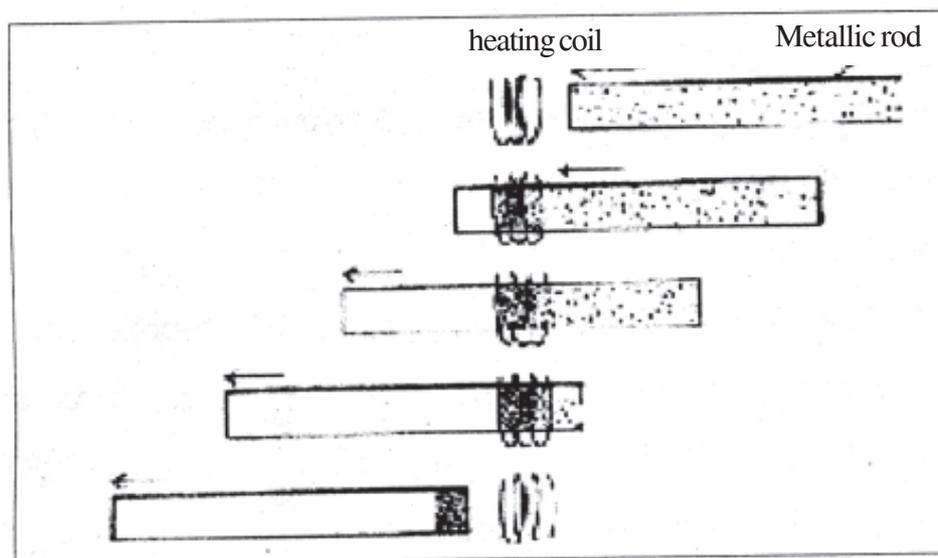
- 1) They do not vapourise at normal temperatures
- 2) Generally they have more density.
- 3) They have metallic lustre. They shine more.
- 4) They can be made into sheets and wires
- 5) They form alloys with other metals and non metals.
- 6) They are good conductors of heat and electricity.

#### 3. The development of a country depends upon the production of metals and their uses of that Country. Justify

- A. We notice many machines around us. A man can not live without machines. Out of them some machines do some normal things. Bulldozers, diggers, machinery instruments and agricultural instruments are used in the place of man's muscle power. These instruments do some sensitive things which man cannot do. Machines can prepare computers which are the substitutes of man's brain power. The development in Agriculture, Industry, transport fields are dependent upon the usage of the machines. All these machines are made up of metals. Hence the development of a country depends upon the production of metals and their uses in that country.

**4. What is Zone refining ? Write its uses.**

- A. This method is used to prepare purest metals. A pure metallic rod or silicon is arranged in a Quartz tube which is filled with a noble gas. When this rod is moved slowly with the hot wire bundle around the rod a small part of that rod will be dissolved. Metallic crystals will be formed from that molten metal. Impurities dissolve more in the liquid metal and they reach at the end of that metallic rod. This process is performed many times and the impurities will be extracted from the end of the metallic rod.



The end of the metallic rod will be cut and discarded. The remaining metal will remain pure.

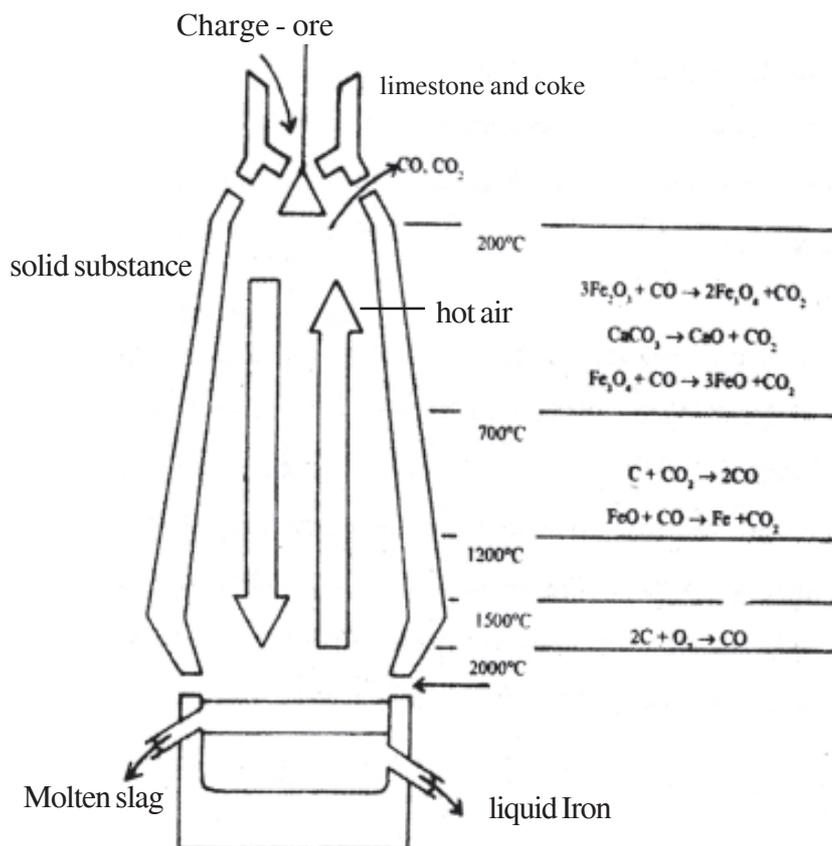
**5. Write about refining of metals with electricity.**

- A. Electrolytic refining :-

This is a general method used in refining metals. Pure-metals can be obtained by this method. Impure metal is used as anode and pure metal piece is used as cathode. These electrodes are dipped in the metallic salt solution. The metal from the impure metal slowly precipitate on the pure metallic cathode. So from the impure anode pure metal reach cathode. Impurities reach at the bottom of the anode or they will dissolve in solution. Metals like copper, Aluminium are refined by this method.

6. Draw the Figure of blast furnace and labell it he parts.

A.



7. In how many types Iron is available commercially. write the properties of them briefly.

A. Commercially Iron is three types. They are wrought Iron, Cast Iron and Steel. They differ with the composition of carbon in them.

1. **Cast Iron** :- In this 2.5- 4.5% Carbon and to small extent sulphur, phosphorous, Manganese and silicon are present. This is hard and brittle in nature. In can not get jointed. It will have low metlting point. It can be expanded when this is crystallised and it can be moulded. This type of Iron will not be rusted and hence the instruments which are exposed to the atmosphere can be preoared with this. This is used to prepare the spare parts of the mobiles.
2. **Wrought Iron** :- This can be considered as pure Iron. When cast Iron is mixed and heated with ferricoxide in a furnance wrought Iron is obtained. Its melting point is more than the cast Iron. This can be made into sheets and it can be moulded into different forms and it can be Jointed.
3. **Steel** :- It has 0.05 - 1.5% carbon init. This can be prepared from the cast Iron. This is used to prepare railway tracks wheels and building materials.

**8. Write the substances present in steel alloys and their properties.**

**A.** By mixing other metals with steel, useful properties can be created. The alloys of steel and their properties.

**1) Stain less steel :** This can be prepared by mixing 11.5% chromium with steel. This is a non rusting steel and hence it is called as stainless steel. This is used to prepare utensils, bicycles and spare parts of automobiles.

**2) Nickel steel :-** It contains 3.5% Nickel along with steel. It is hard in nature. This is used to prepare automobiles, rods, and parts of aeroplanes.

**3) Chrome steel :-** It contains 1.5-2.0% chromium. It is a hard steel. It is used to prepare Knifes and pounding machines.

**9. Write three uses of Aluminium.**

**A. Uses of Aluminium :-**

1. Since this is very light and good conductors of electricity, Aluminium is used to preapre electrical wires.
2. Along with Avise oil aluminium powder is used in silver paints.
3. This is used as a reductant in thermit welding.
4. This is used in the extractions of chromium and manganese.
5. This is used to prepare utensils; To pack the food materials Aluminium foils are used.

**10. Write any three uses of copper ?**

**A. 1.** To prepare Electric instruments and wires.

2) for copper coating

3) To prepare coins.

4) To prepare alloys

5) To prepare copper salts, and to prepare insecticides like copper sulphate.

**11. Write the copper alloys in usage since the olden days and mention the composition in them.**

A. Since the olden days copper alloys are in usage. Some important copper alloys.

1. **Brass** :- It has copper and Zinc in different proportion. This is used to make wires and sheets. This is used to prepare utensils, Idols and artistic pieces.
2. **Bronze** :- Copper and tin are in 9:1 ratio in this alloy. This is a hard and unbreakable alloy. This is used to prepare utensils, Idols and coins.
3. **German Silver** :- It has copper, Zinc and Nickel in 2:1:1 ratio. It is shining, hard white colour elastic metal alloy. It is used to prepare utensils, ornaments and electric resistant wires.
4. **Bell metal** :- It has 4:1 copper and tin ratio. It produces sound when it is hit by any object. This is used to prepare bells.

**12. How many isotopes are there for hydrogen ? Write briefly about them.**

A. There are three isotopes for hydrogen. They are protium or normal hydrogen, deuterium and tritium. Hydrogen atom has zero, one and two neutrons respectively in these isotopes.

Out of the three isotopes of hydrogen, Hydrogen and deuterium are stable isotopes. In the atmosphere, Hydrogen is present to the extent of 99.985% and deuterium to 0.015%. Tritium has radioactive property.

**13. Write any three uses of Hydrogen.**

- A. 1) Since hydrogen is a light gas, it is used in Rubber balloons and in air boats. As it has easily combustible property it is used in the place of Helium.
- 2) It is used for the production of Ammonia which is used in the preparation of fertilizers.
  - 3) Vegetable oils are made into solids by hydrogenation in the presence of Nickel catalyst.
  - 4) Used in the industrial gases, water gas ( $\text{CO} + \text{H}_2$ ) and coal gas ( $\text{H}_2 + \text{CH}_4$ ).

**14. Write any three uses of Silicon.**

- A. 1) The major part of Silicon produced is used in the reduction of steel in the steel industry. Non rusting steel can be produced with the help of Silicon.
- 2) Alloys like Ferro silicon and silico bronze can be prepared.
  - 3) Ferrosilicon is an acid resistant. Hence this is used to prepare the instruments used in chemical industries. Silicobronze is used in preparing Telephone and telegraph wires.
  - 4) Silicon is used to prepare radios, Computer chips and voltaic cells.

**15. Write any three uses of phosphorous and its compounds.**

A. Phosphorous and its compounds uses.

1. 85% phosphorous is used to prepare pure phosphoric acid. This is used to prepare phosphate fertilizers.
2. Phosphorous is changed to  $P_4S_3$  and is used in match box industry.
3. Phosphorous, copper and tin are used to prepare phosphobronz alloy.
4. Phosphate is used in detergents which remove dirt on the clothes.

**16. Write three uses of Sulphur.**

A. Uses of Sulphur.

1. Sulphur is used as disinfectant in agriculture and in medicines. Sulphur powder is sprayed on the grape gardens and on cotton crops.
2. Gum powder is prepared with the mixture of sulphur, coal powder and potassium nitrite. This is used to prepare crackers.
3. Sulphur is used in vulcanisation of Rubber.
4. Most part of the sulphur produced is used to prepare  $SO_2$ , then  $SO_3$  finally to change them into sulphuric acid.

**5 Marks Questions**

**1. Write any five physical property differences of metals and non metals.**

A.	Property	Metals	non metals
1.	State	Solids at room temperature and they do not vapourise at that temperature.	These exist in solid or liquid or gaseous state at room temperature. At low temperatures these exist in gaseous or liquid states.
2.	Density	Generally have high densities	Generally have low densities.
3.	Metallic Lustre	Have metallic lustre.	Have no metallic lustre (except graphite and Iodine)
4.	Malleability and ductility	These can be made into sheets and wires.	These can not be made into wires & sheets
5.	Alloy formation	These form alloys with other metals and non metals.	These don't form alloys. (Except carbon, Silicon and phosphorus).
6.	Thermal and Electrical conductance.	These are good electrical and thermal conductors.	These are not good conductors of heat and electricity.

**2. Write any five chemical property differences between metals and non metals.**

A. property	Metals	non metals
1. Nature of oxides	These form basic oxides. These dissolve in water and form bases. Example: $4\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{Na}_2\text{O} + 2\text{H}_2$ sodium                      sodium oxide $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{NaOH}$ sodium hydroxide	These form acidic oxides.
2. Hydrides	These do not form any stable compounds with hydrogen	These form stable compounds with Hydrogen which are called Hydrides.
3. Electro chemical Nature	These form electro positive ions or cations.	These form electro negative ions or anions.
4. Action with acids.	These dissolve in acids and form salts.	These do not dissolve in acids.
5. Solubility	They dissolve due to chemical reaction.	They dissolve without any chemical reaction. Example chlorine, bromine, Iodine, dissolve in water.

**3. How many stages are involved in Extraction of metals from ores.**

A. Metal can be Extracted from its ore in three stages. They are

- 1) Concentration of the ore
- 2) production of the metal
- 3) purification of the metal.

**1) Concentration of the ore :** Generally ore contains sand and mud as impurities . This mixture is called gangue. Concentration method depends upon the nature of the gangue.

**Different methods used for concentration.**

- (a) Separation with Electromagnet.
- (b) Washing with the flow of water.
- (c) Froath floatation process.
- (d) Combustion
- (e) Roasting.

**2. Production of the metal :-** After concentrating the ore, it will be converted into pure metal. Metals are in their cationic state in their compounds. So pure metal production is a reduction method. This method depends upon the reactivity of the method. Liquid metallic chlorides or oxides can be reduced by electrolysis.

**3. Purification of metals :-** After extracting the metal using above methods to remove the impurities other methods are needed. Impurities can be removed by purification. Generally the following methods are used to purify the metals.

a) Vapourisation then cooling, combustion.

b) Liquification.

c) Electrolytic purification.

d) Oxidation.

e) polling.

**4. Using blast furnace how Iron will be extracted ? Explain with a Figure.**

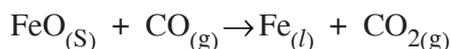
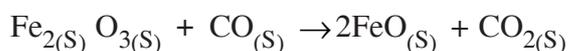
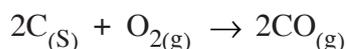
A. Important ores of Iron are Hematite and Magnetite. Extraction of Iron from its ore includes two procedures. They are

a) Concentration of ore.

b) Reduction of Iron using blast furnace.

**a) Concentration of the ore :-** First the ore is made into small pieces and treated with water. Generally ore has more concentration. So there is no need to increase the concentration. When carbonate or sulphide ores are used they are converted into oxides.

**b) Reduction of Iron :-** By burning oxide ore in blast furnace with carbon, ore is reduced with the evolved carbon monoxide. The charge of Iron, lime stone and coke is filled in the furnace.



**Blast furnace :-** Blast furnace has chimney like structure. In this, outer lining will be with steel plates, inner lining will be with furnace bricks. The mixture of Iron ore, lime stone and coke is called charge. This is introduced into the furnace from the top. Hot air is sent into the furnace from the bottom. Oxygen in the hot air react with coke and release carbon monoxide and to a small extent carbon dioxide. These chemical reactions have exothermic nature.

The Iron produced by blast furnace is called wrought Iron. This is also called as old Iron. This will have 95% Iron and nearly 5% carbon. To a very little extent Silica, phosphorous Manganese and sulphur like impurities are present in this.

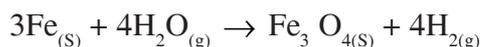
## 5. Mention the physical and chemical properties of Iron.

### A. a) physical properties of Iron

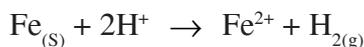
- (1) Pure Iron will be having white colour like silver metal.
- (2) Gets attracted by the magnet.

### b) Chemical properties.

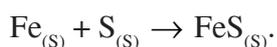
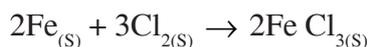
- 1) When Iron kept in open atmosphere it gets rusted. Hydrated ferric oxide is called rust. The composition of water will be varying. Hence it is indicated as  $\text{Fe}_2\text{O}_3 \times \text{H}_2\text{O}$ . For the formation of rust, oxygen and water are needed. Common salt and other salts enhances the rusting. Acids like  $\text{CO}_2$ ,  $\text{SO}_2$  and other bases fastens rusting process. Purified Iron does not undergo rusting.
- 2) When water vapour is passed through red hot Iron hydrogen gas is evolved.



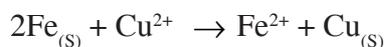
- 3) Iron reacts with dilute hydrochloric acid and sulphuric acid and replaces hydrogen.



- 4) Iron reacts with base. When it is hot, it reacts with halogens and sulphur to form halides and sulphides.



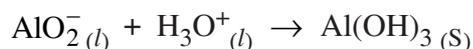
- 5) When less reactive metallic salt is in solution form, Iron replaces it.



### 6) Explain the separation process of Aluminium from bauxite with the help of a diagram.

- A. Aluminium is extracted by the electrolysis of bauxite. This ore contains the oxides of silicon, Iron and titanium as impurities. On reacting with concentrated sodium hydroxide, this ore bauxite (Aluminium oxide  $\text{Al}_2\text{O}_3$ ) converts into sodium meta Aluminate.

Other impurities Iron and Titanium oxides are filtered off. This solution is treated with an acid and Aluminium hydroxide is formed. When this solution is heated pure Aluminium oxide is formed.



Anhydrous Aluminium oxide or Alumina is reduced by Hall's process. On heating  $\text{Al(OH)}_3$ , Aluminium oxide is produced and its melting point is too high ( $2045^\circ\text{C}$ ). We can not Electrolyse this but  $\text{Al}_2\text{O}_3$  is soluble to some extent in cryolite ( $\text{Na}_3\text{AlF}_6$ ). This battery works at  $950^\circ\text{C}$  liquid Cryolite has high electrical conductance than  $\text{Al}_2\text{O}_3$ . Electrolytic cell in Hall's process is given in the following Figure.

Carbon Anode

Carbon cathode

Molten Aluminium

Molten Aluminium in tryolite

There is an Iron tank in this cell. The inner carbon lining acts as cathode. Carbon rods acts as Anode. By the electrolysis of the liquid mixture forms Aluminium and oxygen.



At cathod (Reduction)



liquid Aluminium (Melting point  $660.2^\circ\text{C}$ ) settles down in the bottom of the cell. This is removed often. The metal obtained by this method will have 99.6 - 99.8% purity.

(Figure - 2 marks, Explanation - 3 Marks)

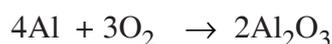
## 7. Write the physical and chemical properties of Aluminium.

A. Physical properties :-

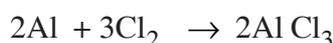
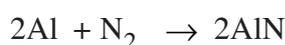
- 1) Aluminium is a shining whitish blue clouded metal.
- 2) It has less density ( $2.7 \text{ g/cm}^3$ ) and has high malleability. So this metal can be made into wires and sheets.
- 3) It is a good electrical conductor. Compared to copper, Aluminium has 65% electrical conductance. In conductance it occupies a position after copper and gold. Since it is having light weight and less cost it is used in electrical wiring in houses, and used in the preparation of wires which conduct high electrical energy.

### Chemical properties :

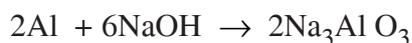
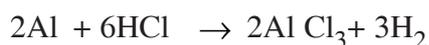
- 1) This is an element which carries three positive charges.  $Al^{+3}$ .
- 2) When kept in air, it forms Aluminium oxide coat. This protects Aluminium from rusting. It leads to inertness. This metal has its own protection.
- 3) When this is burnt to red hot, it burns with white light and produce more heat.



This is a highly active metal but it will not react with water like sodium and Megnesium. It reacts with Nitrogen and halogens to form nitrides and halides.

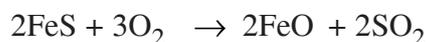
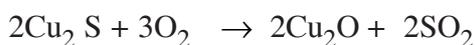
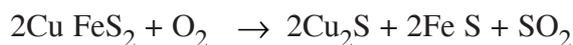


- 4) It reacts with hydrochloric acid and strong bases like sodium or potassium hydroxides.



### 8. Explain the separation of copper using reverboratory furnace with the help of a diagram.

- A. Usually copper is extracted from its sulphide ore chalco pyrite ( $CuFeS_2$ ). The ore is roasted in presence of more air in reverboratory furnace. Here Arsenic and Antimony impurities are removed in the form of vapour. Pyrite partially oxidises and give cuprous and ferrous sulphide mixture.



Roasted ore combines with coke and sand in blast furnace. Ferrous oxide reacts with sand and form metallic gangue.



Cuprous oxide reacts with ferrous sulphide and give ferrousoxide. This resultant liquid is called matte. This is removed from the bottom and is sent into the bessemer converter. The inner lining is with calcium oxide or megnesium oxide. Hot air is sent into this. Iron impurity will be removed while cuprous oxide and cuprous sulphide react to give copper.



This liquid is cooled in sand Sulphur oxide impurity will be formed in the form of blisters on copper and hence this is called as blister copper.

In this impure blister copper, Iron, Zinc, Nickel and silver impurities are present to the extent of 2%. Pure copper is prepared finally by electrolysis method.

## 9. Write the physical and chemical properties of copper.

### (A) Physical properties of copper :-

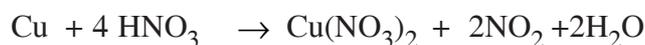
- A. (1) It is a Red colour metal. Density is  $8.94 \text{ gm.cm}^{-3}$ . It is a heavy metal.
- (2) It has malleable and ductile nature so it can be made into wires and sheets.
- (3) It is a good conductor of electricity. It is also a good thermal conductor.
- (4) Copper is an Electro positive metal and is not so reactive. +1 and +2 oxidation states are most common. +1 state is unstable and it oxidises to +2. Except Hg, Ag, Au and Pt all other metallic solutions replaces copper from its solution.

### B) Chemical properties of copper :-

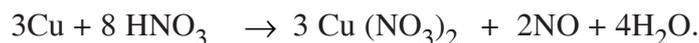
- 1) Copper does not react with dry air. In wet air copper forms  $\text{CuCO}_3$  a green coloured compound in presence of carbondioxide. In [resence of air and humidity it forms  $\text{Cu}(\text{OH})_2$ .
- 2) Copper does not react with water.
- 3) Copper does not replace hydrogen from dilute sulphuric and Hydrochloric acids. It reacts with hot concentrated sulphuric acid and Nitric acid. It reacts with dilute Nitric acid also.



Conc. sulphuric acid.

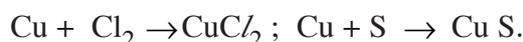


conc. Nitric acid.



dil. Nitric acid

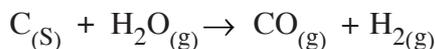
- 4) It reacts with sulphur and chlorine at high temperature and form cupric sulphide and cupric chloride.



**10. How the Hydrogen is prepared industrially. Explain with a Figure.**

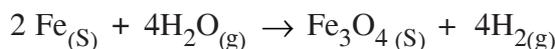
A. Industrial preparation methods of Hydrogen :-

- 1) Hydrogen gas and carbonmonoxide are evolved when water vapour is sent through the coke at high temperature. This mixture of gases is called water gas.

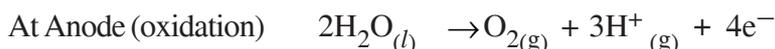


It is used as Fuel in industry. CO in the water gas is a poisonous gas and hence Natural gas is used in its place.

- 2) By passing water vapour on Iron at high temperature, Hydrogen gas in evolved.

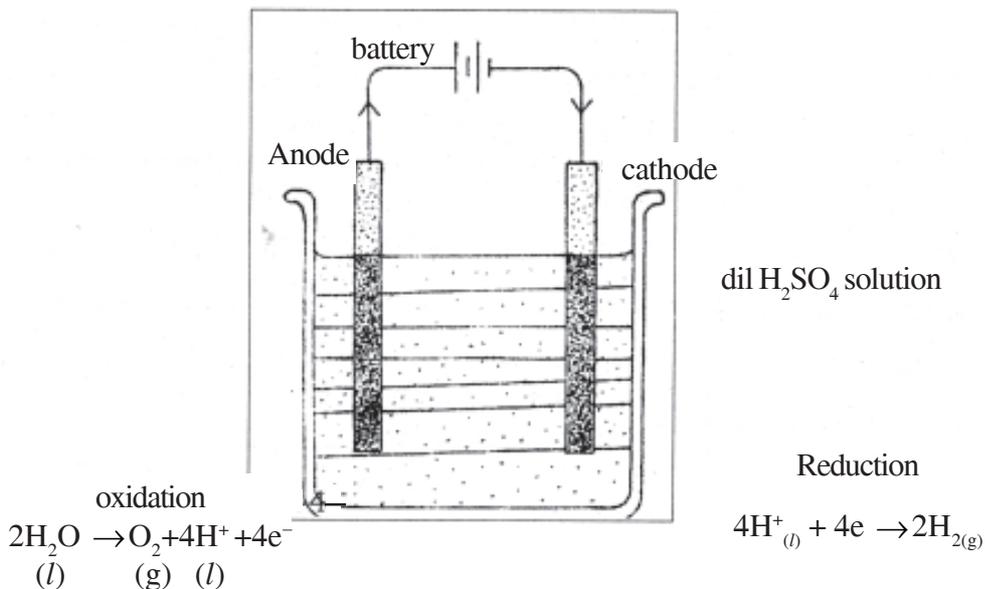


- 3) Hydrogen is prepared by electrolysis dilute sulphuric acid water solution. The chemical reactions are given below.



The figure of Electrolytic cell used for this method is given below

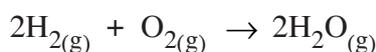
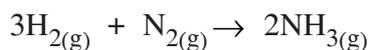
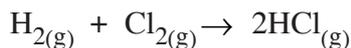
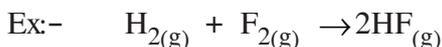
(Figure 2 marks Explanation 3 marks)



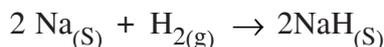
## 11. Write the physical and chemical properties of Hydrogen.

**A. Physical properties of Hydrogen :-** Hydrogen is a light gas. It occupies 10<sup>th</sup> place among the elements present on earth. It is the most abundant element. Since the gravitational force of earth is weak it weakly attracts the lightest element Hydrogen gas.

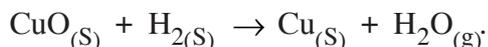
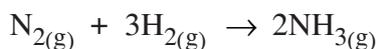
**B) Chemical properties of Hydrogen :-** With non metals Hydrogen form covalent bonds.



**2) Hydrogen reacts** with reactive metals and form salts called Hydrides.



**3) Hydrogen in its elemental :-** state reacts with non metals or less reactive metallic oxides and reduce them



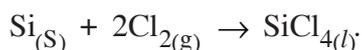
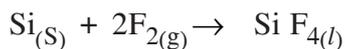
## 12. Write the physical and chemical properties of Silicon.

**A. A. Physical properties:-**

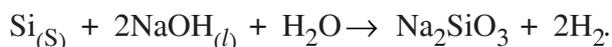
Pure Silicon has tetrahedral structure like diamond. Each silicon atom will have covalent bonds with the other four silicon atoms. It has hard crystal structure and they are used to cut glass.

**b) Chemical properties :-**

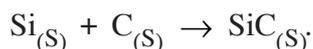
1) Even in hot condition, silica crystals donot react with air. Flourine and chlorine react with silicon and form silicon flouride and silicon chloride.



2) It reacts with sodium hydroxide solution to give sodium silicate



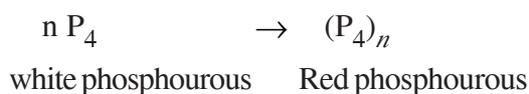
- 3) At high temperature, it reacts with carbon to give silicon carbide.



**13. What are the types of phosphorous. Explain their properties.**

A. Phosphorous Exists in three Allotropic forms. white, Red and black phosphorous

- 1) White phosphorous :- This is also called yellow phosphorous. Normally phosphorous exists in this form. In this  $\text{P}_4$  atoms are arranged in tetrahedral structure. It will have covalent bonds with other four atoms. There will be a weak force between these atoms to bind them together white phosphorous is a wax like compound. It has a low melting point ( $44.2^\circ\text{C}$ ). It is not soluble in water but soluble in carbond disulphide and other carbon solvents like chloroform. It reacts with wet air and produce light. It is a poisonous substance. As it burns in air, it is stored in water. Its high reactivity is due to the friction between the atoms in  $\text{P}_4$  atoms.
- 2) Red phosphorous :- This is the second form of phosphorous. This can be produced by heating the white phosphorous at  $250^\circ\text{C}$  in the presence of sun light in absence of air. This is a very slow process.

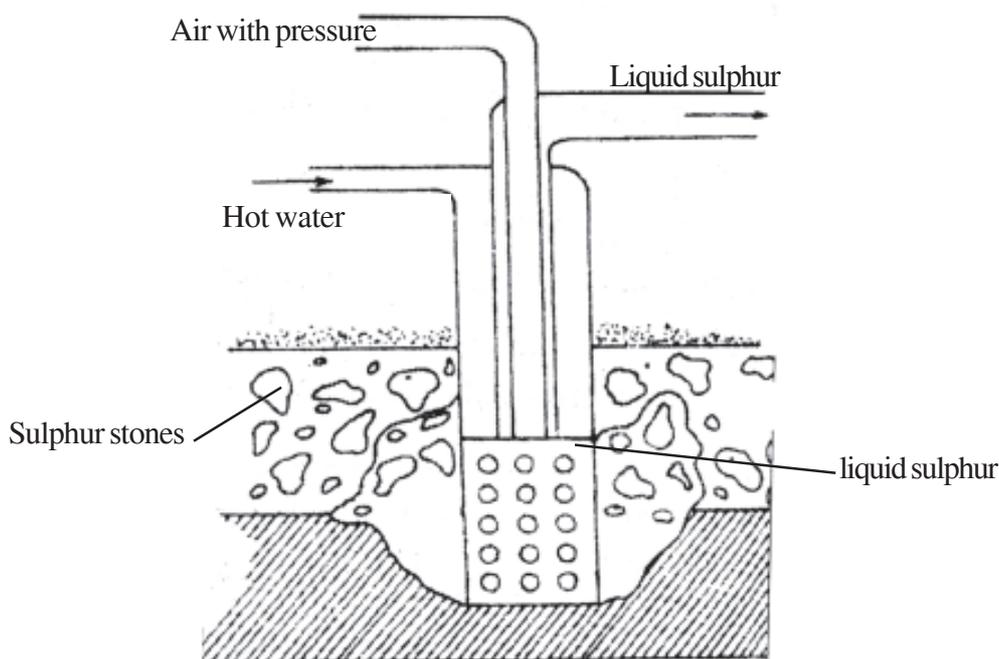


Red phosphorous will have poly hedral structure in which  $\text{P}_4$  atoms are attached with each other. It is more reactive than white phosphorous. It is stable in air. This will not burn till  $400^\circ\text{C}$ . So there is no need to store this in water. It is not soluble in carbon solvents.

- 3) Black phosphorous :- This can be produced by applying high pressure on white phosphorous. This is most stable among all types of phosphorous. It has layer structure. These layers are attached with the covalent bonds.

**14. Explain the extraction process of sulphur.**

A. Sulphur is prepared by Frosh's method from the earths crust, In this method, three tubes are arranged in one an other and inserted into earths crust. Into the outer tube hot water at  $160^\circ - 170^\circ\text{C}$  with high pressure is introduced. Then into the inner tube high pressure air is introduced. This air combines with sulphur and water. This mixture comes up through the inner tube. This mixture is taken in woden troughs. Sulphur prepared by this method will have 99.5% purity. So there is no need to purify sulphur again. For specific purposes where highest purity sulphur is required can be preapred by distillation process.



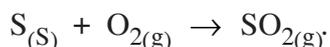
**15. Write the physical and chemical properties of sulphur.**

**A. Physical properties**

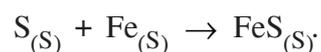
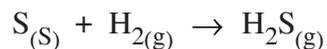
- 1) Sulphur is light yellow crystalline solid.
- 2) It has a characteristic smell.
- 3) It is insoluble in water. Sparingly soluble in alcohol. Completely soluble in carbon disulphide.
- 4) It has low thermal and electrical conductance.
- 5) It has no effect on the biological reactions in a human body. But for lower state living beings it is a poisonous substance.

**B) Chemical properties**

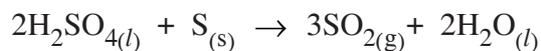
- 1) **With air :-** Sulphur burns in air to give sulphur dioxide.



- 2) **With other elements :-** With metals and hydrogen it forms their sulphides



- 3) **With acids :-** With hot concentrated sulphuric acid and Nitric acid it gets oxidised.



## I. Fill in the Blanks

1. The number of elements in nature is ..... (83)
2. The most abundant element in nature is ..... (oxygen)
3. The mineral used for extraction process is ..... (Ore)
4. The process of removing the impurities from the ore is called ..... (concentration)
5. The Ore along with mud and sand is called ..... (gangue)
6. In reduction process the substance used to convert the insoluble impurities into soluble impurities is called ..... (liquifier)
7. Most abundant ore of Iron is ..... (Hematite)
8. The furnace used for the extraction of Iron ..... (Blast furnace)
9. The important and most abundant ore of Aluminium in india is ..... (Bauxite)
10. When compared with copper, Aluminium's electrical conductance is ..... (65%)
11. The lining which resist the rusting for Aluminium is ..... (Alluminium oxide)
12. The alloy with 9.5% - 11.5% Aluminium, 88-90% copper and 0.5% tin is .....  
(Aluminium bronze)
13. Copper's symbol is Cu. It's name is after the latin name ..... (cuprum)
14. The heavy metal with density  $8.94 \text{ gm / cm}^3$  and has Red colour is ..... (copper)
15. When copper is heated with sulphur ..... is formed (cupric sulphide)
16. The copper alloy having the copper and tin in ratio as 9:1 is ..... (Bronze)
17. The copper alloy having copper and tin ratio as 4:1 is ..... (Bell metals)
18. The Radio active Isotope of hydrogen is ..... (Tritium)
19. Phosphorous has three allotropic forms. They are white , Red and ..... (black)
20. Thetype of phosphorus which burns in air is ..... (white phosphorus)
21. When white phosphrus burns in air ..... is formed. (Phosphorous pentoxide)

22. Burning stone is the name of the non metal ..... (sulphur)
23. Less quantity of ..... is present in ginger, onions, mustard, eggs and proteins. (Sulphur)

**II. Choose the correct answer and write the alphabet in the bracket.**

1. The element which exists in its isolated form [ d ]  
(a) Al (b) Cl (c) Co (d) Cu
2. The process of removal of water content from the ore is [ c ]  
(a) Electrolysis (b) Froath Floatation  
(c) smelting (d) Electro magnetic separation
3. Aluminium is..... Coloured white metal and it has shining property [ b ]  
(a) yellow (b) blue (c) white (d) light green
4. The alloy of aluminium having 95% Aluminium, 4% copper, 0.5% Megnesium, 0.5% Manganese [ a ]  
(a) Duraluminium (b) Magnalium  
(c) Aluminium bronze (d) Aluminium
5. The alloy of alluminium having 85-95%. Aluminium and 2-15%. Magensium is [ b ]  
(a) Duraluminium (b) Magnalium  
(c) Aluminium bronze (d) Aluminium
6. The alloy having copper, zinc and Nickel in 2:1:1 ratio is [ c ]  
(a) Brass (b) Bronze (c) German silver (d) Bell metal

# 20

## Lesson

# Carbon and its Compounds

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### Objectives

- Allotropy of carbon and comparison of their properties
- Preparation of inorganic, carbon compounds CO & CO<sub>2</sub>.
- Classification of Hydro carbons
- Identification of various functional groups.
- Uses of organic compounds.

### Important Points

- Carbon exhibits tetrahedron shape, and it has catination property,
- Carbon exhibits allotropy. Diamond, graphite fullerene, (C<sub>60</sub>) are some important allotropic form's of carbon.
- Diamond has three dimensional shape. It exists with covalent bonds, it is too hard and colour less.
- Diamond shows high, boiling and melting points.
- Diamond is a poor electric and thermal conductor.
- fullerene is a football like structure, containing pentagon and hexagon, rings.
- cooking coal, coke and carbon black are the carbon's micro crystalline solids.

- Graphite is soft black coloured compound having layery structure.
- Graphite is good conductor of electricity
- Carbon compounds are divided into organic and inorganic compounds
- CO & CO<sub>2</sub> are two important inorganic, carbon compounds.
- Hydro carbon's and their derivatives are organic carbon compounds.
- Saturated Hydro carbons are bonded with single bond between two carbons, but unsaturated Hydro carbons contain more than one bonds between carbon atoms.

### 3 Marks

#### 1. Write any 3 reasons for diamond's hardness ?

- A.
1. It has strong covalant bonds.
  2. In diamond, carbon atoms are in tetrahedrd arrangement. Each carbon atom is bonded to four other carbon atoms by covalent bonds.
  3. Three dimensional tetrahedral structure gives hardness to the Diamond. This structure is very hard to break and is very compact.

#### 2. What are natural allotropic forms of carbon ? Write their properties ?

- A.
1. Diamond, graphite, Buckminster fullerene are the three natural allotropes of carbon.
  2. Diamond is the naturally occuring crystalline solid Allotropic form of carbon.
  3. Graphite is greyish black soft crystalline solid and soapy to touch.

#### 3. What are the uses of graphite ?

- A.
1. It is used as lubricant in machinery which work at high temperatures.
  2. Used as electrodes in dry cells and electric discharge tubes.
  3. Used to prepare pencils and vessels for melting metals.

#### 4. How does carbon monoxide enters into atmosphere ? Write two harmful effects of CO.

- A.
1. Carbon Monoxide enters into atmosphere through automobiles.
  2. It is a poisinous gas and causes air pollution.
  3. If atmosphere Low quntity of CO causes migrain, and un consious ness. Excess Quantity of CO causes death.

**5. Mention three uses of CO.**

- A.
1. In metal extractions CO is used as reducing agent
  2. CO and Hydrogen mixture in presence of a catalyst is used in the preparation of Methanol.
  3. CO is used in purification of Ni Metal.
  4. CO is used in the preparation of carbonyl compounds. (  $\text{>C=O}$  )
  5. CO is used as fuel and in the preparation of bio organic compounds.

**6. Mention 3 differences between organic and inorganic compounds.**

- | <b>A. Organic</b>                                       | <b>In organic</b>   |
|---|---|
| 1. These exist in solid and liquid states.              | 1. Generally these are solids.                                |
| 2. Organic compounds have low boiling & melting points. | 2. These compounds will have high boiling and melting points. |
| 3. These dissolve in organic solvents.                  | 3. Insoluble in organic solvents.                             |
| 4. These are insoluble in water.                        | 4. Dissolve in water.   |

**7. Mention three uses of CO<sub>2</sub> ?**

- A.
1. CO<sub>2</sub> is used to prepare the food for plants and trees.
  2. Solid CO<sub>2</sub> is used as coolant.
  3. CO<sub>2</sub> is used in the preparation of cool drinks and soda.
  4. CO<sub>2</sub> is used in the preparation of baking soda and washing soda.
  5. It is used in fire extinguisher.

**8. What are saturated and unsaturated, Hydro carbons ? give examples.**

- A.
1. The valency of carbon is 4, if all the valencies of carbon are satisfied by single bonds the resultant Hydro carbons are named to as saturated Hydro carbons.
  2. The Hydro carbons containing double or triple bonds between two carbon atoms are called unsaturated Hydro carbons.
  3. Saturated Hydro carbons are called Alkanes

Ex: CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>H<sub>8</sub>, C<sub>4</sub>H<sub>10</sub> ..... etc.

4. Unsaturated Hydro carbon are called, Alkenes, or Alkynes.

Ex: C<sub>2</sub>H<sub>4</sub>, C<sub>3</sub>H<sub>6</sub>, C<sub>4</sub>H<sub>8</sub> .....are Alkenes

C<sub>2</sub>H<sub>2</sub>, C<sub>3</sub>H<sub>4</sub> ..... are Alkynes.

**9. How the natural diamonds are formed ? Write the names of the places of diamond sources.**

- A. 1. In cores of earth, at High temp (1500°C) and High pressures ( ~70000 Atm) carbon converts into diamond.
2. Diamonds are located at panna in Madhya pradesh .  
and also at vajra karoor, Anantapur (Dist) A.P.

**10. What is isomesim ? give Example.**

- A. 1. The compounds having same formula and different structures are called isomers.



2 -Pentene



1 - Pentene

**11. Write the similarities between alkanes and alkenes.**

**Alkanes**

1. These compounds have carbon and Hydrogen.
2. General formula is  $\text{C}_n\text{H}_{2n+2}$
3. Alkanes have only single bonds between carbon atoms.
4. These are called saturated Hydrocarbons

**Alkenes**

1. These compounds also have carbon and Hydrogen.
2. General formula  $\text{C}_n\text{H}_{2n}$ .
3. Alkenes have single and double bonds between carbon atoms.
4. These are called unsaturated Hydrocarbons.

**12. Mention the differences between Alkanes and Alkenes**

**Alkanes**

1. These contain single bonds.
2. These compounds contain two Hydrogens more than Alkenes.
3. have low reactivity.
4. These compounds show less isomerism than Alkenes

**Alkenes**

1. These contain single and double bonds.
2. These have two Hydrogens less than Alkanes.
3. have high reactivity
4. These compounds show more isomerism than Alkanes.

**13. Mention the similarities between Alkenes and Alkynes.**

**Alkenes**

1. These compounds contain C and H
2. General formula  $C_nH_{2n}$
3. have less reactivity than Alkynes.
4. These contain single and double bonds
5. These are unsaturated Hydro carbons.

**Alkynes**

1. These compounds also contain C and H.
2. General formula  $C_nH_{2n-2}$
3. These compounds are highly reactives than Alkenes.
4. These contain single and triple bonds.
5. These are also unsaturated Hydrocarbons.

**14. Write 3 differences between Alkenes and Alkynes**

**Alkenes**

1. These contains double bonds between carbon Atoms.
2. These compounds contain two hydrogen's more than Alkynes.
3. Less reactive then Alkynes

**Alkynes**

1. These contain triple bonds between banded carbon Atoms.
2. Contain two Hydrogens less than Alkenes.
3. more reactive than Alkenes.

**15. Mention 3 similarities between Alkanes and alkynes.**

**Alkanes**

1. These are Hydro carbons.
2. General formula for Alkanes  $C_nH_{2n}$
3. Less reactive them Alkynes
4. Alkanes have only single bonds
5. Alkanes are saturated Hydrocarbons

**Alkynes**

1. These are also Hydro carbons.
2. General formula for Alkynes  $C_nH_{2n-2}$
3. more reactive than Alkanes.
4. Alkynes have single and triple bonds
5. Alkynes are Unsaturated Hydrocarbons.

**16. Write the three differences between Alkanes and Alkynes**

**Alkanes**

1. These are saturated Hydro carbons.
2. Less reactive.
3. Single bonds exists between carbon atoms.
4. Alkanes show less iso merizum.
5. These contains four Hydrozons more than Alkynes

**Alkynes**

1. These are unsaturated Hydro carbons.
2. More reactive.
3. Single and triple bonds exists between carbon atoms.
4. Show high iso merizeum.
5. These contain four Hydrozons less than Alkanes.

**17. Mention three functional groups which react with Hydro carbons, give examples.**

1) Halogens containing functional groups

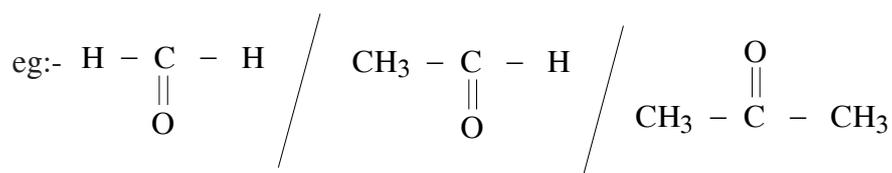
-F, -Cl, -Br, -I etc.

eg:-  $\text{CH}_3\text{Cl}$ ,  $\text{C}_2\text{H}_5\text{Cl}$  ...etc.

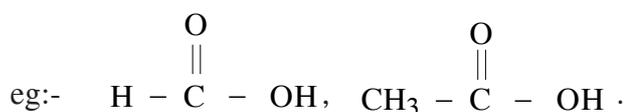
2) Hydroxyl(-OH) containing functional group

eg:-  $\text{CH}_3\text{OH}$ ,  $\text{C}_2\text{H}_5\text{OH}$

3) Carbonyl functional group

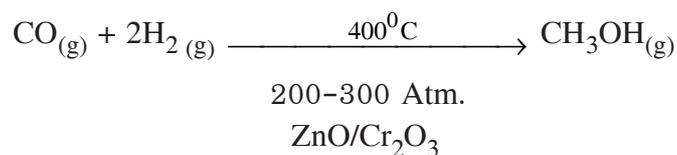


4) Carboxyl functional group  $\left[ \overset{\text{O}}{\parallel} - \text{C} - \text{OH} \right]$



**18. Write the preparation and use of Methanol.**

A. At low pressure, in presence of a catalyst, on heating CO, with  $\text{H}_2$  methanol is produced.

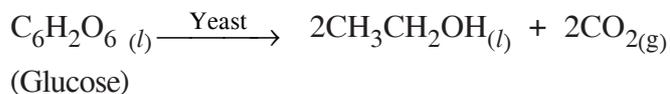


Methanol is used

- To prepare Acetic acid.
- To prepare adhesives.
- to prepare plastic products.
- mixture of methanol and petrol is used as fuel.

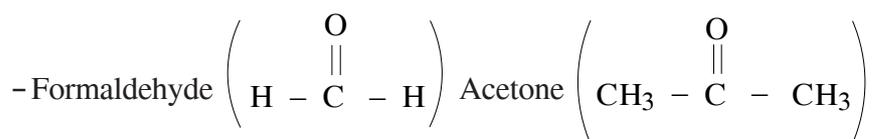
**19. Write the preparation method of Ethanol and write its uses.**

- Ethanol is prepared from starch, Barley by Fermentation (Kinwa process)
- Enzymes present in yeast act as catalyst and produce Ethanol.



- Ethanol is used to prepare beer, wine, drugs and cosmetics.

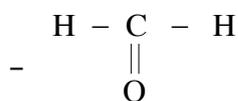
**20. Write the difference between Aldehyde and ketone with an example.**



- carbonyl, group bonded with Hydrogens in Aldehyde
- Carbonyl group, bonded with Alkyl groups in ketone.

**21. Write three similarities between formaldehyde and Acetone with the formulae.**

**Formaldehyde**

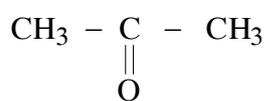


- Central carbon atom is bonded with oxygen with a double bond.

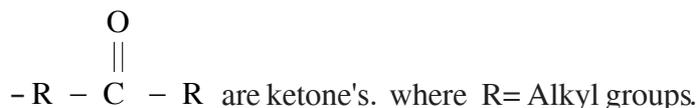


- Carbonyl group is bonded with H on both sides.

**Acetone**

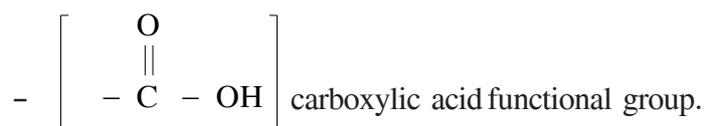


- Central carbon atom is bonded with oxygen with a double bond.



- carbonyl group is bonded with Hydro carbons on both sides.

**22. Write the General formula for carboxylic acid, function group.**



- General formula is R - COOH



**23. How are artificial diamonds are prepared, write two uses.**

A. - In laboratories at 50,000 to 65,000 Atm, in presence of Fe, Ni at 1500<sup>0</sup>C temp. Graphite gets converted, into diamond.

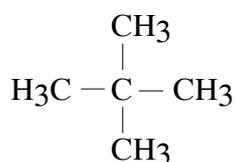
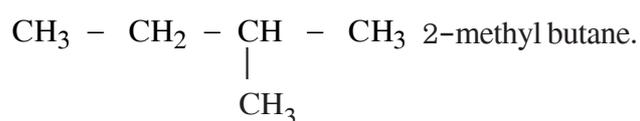
- Artificial diamonds are used for friction.

- Used as a coating on drilling tools.

**24. Write isomers of Hydro carbon containing 5 carbon Atoms.**

- Formula of Hydro carbon containing 5 carbon atoms is C<sub>5</sub>H<sub>12</sub>.

structure is CH<sub>3</sub> - CH<sub>2</sub> - CH<sub>2</sub> - CH<sub>2</sub> - CH<sub>3</sub> (pentane)



2, 2 dimethyl propane

**25. Write the shortest Alkyne's name formula and its uses ?**

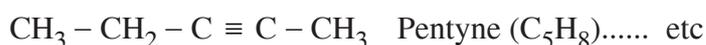
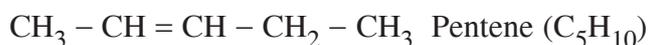
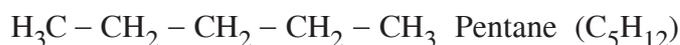
A. - Among Alkynes ethyne is the shortest. Its name is acetylene. Its structure is H - C  $\equiv$  C - H

- It is used for ripening the fruits.

- Acetylene is used with oxygen for welding, in oxy acetylene torch.

**26. Write the structures and Names of non isomer's of Hydro carbons containing 5 carbons.**

Formulae of Hydro carbon compounds containing 5 carbons.



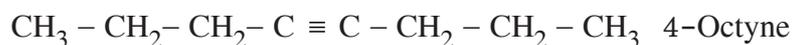
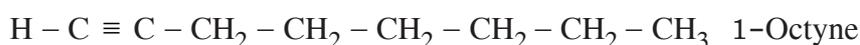
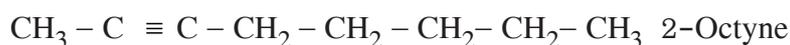
∴ In the above Hydro carbons the number of carbon Atoms are same but the number of H, atoms are different, so these are not isomers.

**27. Write the General formulae and names of functional groups which combines with Hydrocarbons.**

functional Group	Name	Formula
- X (X=F, Br, Cl, I ...)	Halo Alkanes	R - X
- OH	Alcohols	R - OH
- $\begin{array}{c} C \\    \\ O \end{array}$ - H	Aldehydes	$\begin{array}{c} O \\    \\ H - C - H \end{array}$
- $\begin{array}{c} C \\    \\ O \end{array}$ -	Ketones	$\begin{array}{c} O \\    \\ R - C - R \end{array}$
$\begin{array}{c} O \\    \\ - C - O - H \end{array}$	carboxylic acids	$\begin{array}{c} O \\    \\ R - C - O - H \end{array}$
$\begin{array}{c} O \\    \\ - C - O - \end{array}$	Esters	$\begin{array}{c} O \\    \\ R - C - O - R \end{array}$

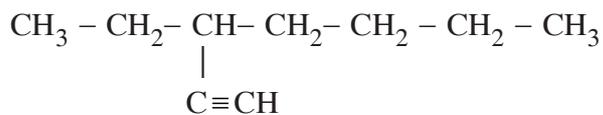
**28. Write molecular isomers of octyne.**

Octyne's formula is  $C_8H_{14}$

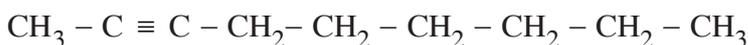


**29. Show 3- Ethyl 1-Heptyne's structure, and its isomer?**

Structural isomer of 3- Ethyl 1-Heptyne.



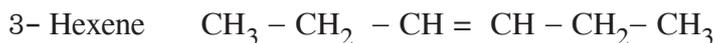
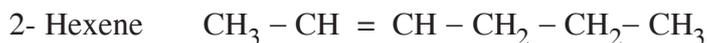
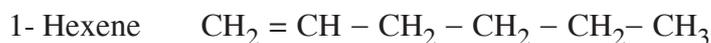
$\text{C}_9\text{H}_{16}$  Its isomer.



**30. Write 3 three isomers of Hexene, and their names.**

- General formula for, Hexene is  $\text{C}_6\text{H}_{12}$ .

- structure :



**31. What are Aliphatic Hydro carbons ? and How many types are they?**

- Aliphatic word is derived from Greek word Aliphar. Aliphar means fat.
- Aliphatic Hydro carbons are the products of fats and oils
- Aliphatic Hydro carbon are two types (1) cyclic, compounds (2) Acyclic compounds
- When carbon atoms are in branched or unbranched chain structures in Aliphatic hydro carbons, they are called as Acyclic compounds.
- When carbon atoms are in cyclic structures in aliphatic hydrocarbons they are called as cyclic compounds.

**32. How does the Aromatic hydrocarbons got their name ? Write the speciality of them.**

- Aroma means fragrance.
- Hydro carbons having fragrant smell are called Aromatic compounds.
- Benzene and its derivatives are Aromatic compounds.
- Due to their fragrance these are used in the perfume industry.

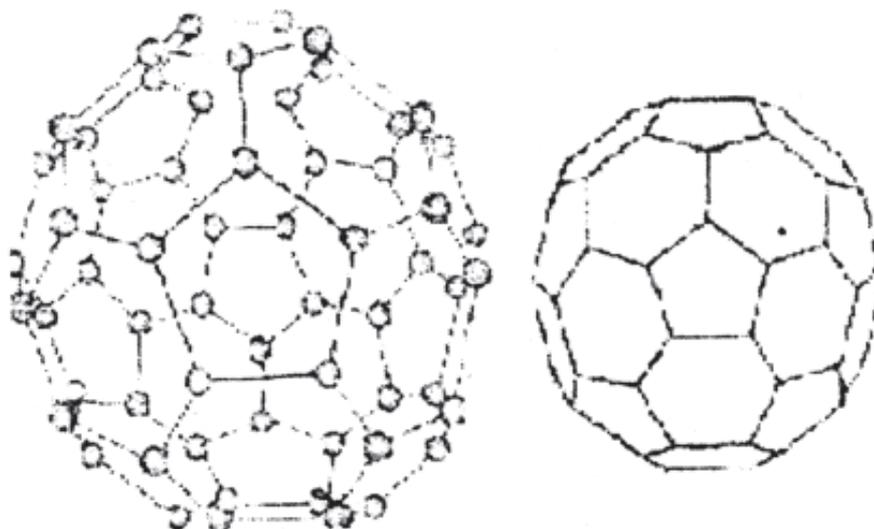
**33. Draw the structure of diamond and explain the arrangement of carbon atoms in it and mention its speciality.**

- Diamond has Tetrahedral structure in which each carbon atom is connected with the other four carbon atoms three dimensionally. Due to this structure this compound is the hardest among the compounds.

**34. Draw the structure of graphite and explain.**

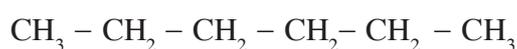
- Carbon atoms in Graphite are arranged in layers in which each carbon atom is connected with other three carbon atoms trigonally having  $120^\circ$  bond angle.

**35. Draw the structure of one minister fullarene  $C_{60}$  and show the arrangement of carbon atoms.**

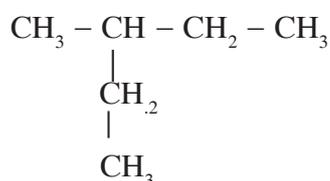


**36. Write three molecular isomers of  $C_6H_{14}$  and write their names.**

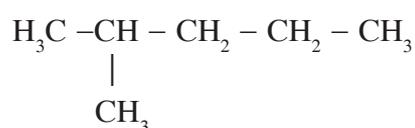
-  $C_6H_{14}$  is called hexane.



Its IUPAC name is n-hexane.



Its IUPAC name is 3-methyl pentane.



Its IUPAC name is 2-methyl pentane.

## Fill in the Blanks

1. The Electronic configuration of 'C' atoms ..... ( **$1s^2 2s^2 2p^2$** )
2. The Number of valence electrons in 'C' is ..... (4)
3. The maximum number of covalent bonds exists in carbon atom is ..... (Four)
4. The chemistry of carbon compounds is .....  
(**Organic chemistry**)
5. To attain the octet configuration, carbon needs ..... electrons.. (Four)
6. A property in which carbon atoms join together to form chains is called .....  
(**Catination**)
7. The number of Allotropic forms of carbon is ..... (3)
8. Carbon's recently discovered third allotropic form is ..... (fullerene)
9. The place where the diamonds found in AP..... (Vazra karur)
10. The density of diamond is ..... ( **$3.51 \text{ grms}^3/\text{cm}^3$** )
11. Melting point of a diamond in vacume is ..... ( **$3500 \text{ }^\circ\text{C}$** )
12. Thermal conductivity of diamond is ..... times more than copper. (5)
13. The Hardest substance in nature is ..... (Diamond)
14. Diamond is a bad conductor of ..... (Electricity)
15. Graphite is a soft crystalline solid because it has ..... (layers)
16. Graphite is used as lubricant in machinery parts which work at High temperature ..... (Graphite)
17. Graphite rods are used as ..... in dry cells. (electrodes)
18. Fullerene has ..... like structure. (Foot ball)
19. Fullerene contains ..... carbon Atoms (60)
20. Fullerene is also known as ..... (minister)
21. Carbon compounds are classified into ..... types (2)
22. Number of organic carbon compounds are ..... than inorganic carbon compounds (more)
23. Formula for carbon dioxide is..... ( **$\text{CO}_2$** )
24. Dangerous oxide of carbon atom is ..... (**CO**)
25. In extraction of metals CO is used in ..... of metallic oxides (Reduction)
26. Which carbon's oxide is used as fuel ..... (CO)

26. Which carbon's oxide causes Green house effect ..... (carbon dioxide)
27. CO<sub>2</sub> is used in the ..... which are used by the human beings. (Cooldrinks and sodas)
28. .... is obtained as a byproduct in the manufacture (CO<sub>2</sub>)
29. .... is used in the preparation of sodium carbonates and bicarbonates (CO<sub>2</sub>)
30. The solid ..... is called dry ice. (CO<sub>2</sub>)
31. By heating carbon in presence of limited oxygen ..... is formed. (Carbon black)
32. .... is used as colorant in black ink and in the preparation of Rubber tyres. (Carbon black)
33. Saturated Hydrocarbons are called ..... (Alkanes)
34. The smallest Alkane is ..... (methane)
35. The formula for methane is ..... (CH<sub>4</sub>)
36. The general formula for Alkanes ..... (C<sub>n</sub> H<sub>2n+2</sub>)
37. The formula for pentane is ..... (C<sub>5</sub>H<sub>12</sub>)
38. The number of Hydrogen's in isobutane is ..... (10)
39. The general formula of Alkenes is ..... (C<sub>n</sub> H<sub>2n</sub>)
40. In alkenes general formula C<sub>n</sub> H<sub>2n</sub> n indicates ..... (number of carbon atoms)
41. C<sub>8</sub>H<sub>16</sub> is called as ..... (octene)
42. Carbon gives rise to a class of compounds containing carbon and Hydrogen which are called ..... (Hydro carbons)
43. The Hydro carbons which are prepared from oil and fats are called ..... Hydrocarbons (Aliphatic)
44. Every compound having a standard difference with its earlier one is called ..... (Homologous)
45. IUPAC name of Glycerine is ..... (1, 2, 3 propanetriol)
46. Formula of Formaldehyde is ..... 
$$\begin{array}{c} \text{O} \\ || \\ \text{H}_2\text{C} / \text{H}-\text{C}-\text{H} \end{array}$$
47. Which acid is known as vinegar ..... (Acetic acid)
48. Which is known as wood alcohol ..... (methanol)

49. Acetic, formic, ascorbic acids are ..... acids (carboxilic)
50. Which oxide of carbon is poisonous ..... (carbon monoxide)
51. The acid which is present in vitamin C ..... (Ascarbic acid)

### Multiple Questions

1. Electronic configuration of carbon [ B ]  
(a)  $1s^2 2s^2 2p^1$  (b)  $1s^2 2s^2 2p^2$  (c)  $1s^2 2s^2 2sp^3$  (d)  $1s^2 2s^2 2p^4$
2. Number of Electron's in second orbital of carbon.... [ C ]  
(a) 2 (b) 3 (c) 4 (d) 6
3. The maximum number of covalent bonds exists in carbon [ D ]  
(a) 1 (b) 2 (c) 3 (d) 4
4. Number of electrons needed for carbon atoms to set octet configuration [ B ]  
(a) 6 (b) 4 (c) 3 (d) 2
5. Which of the following is not an allotropic form of carbon [ C ]  
(a) diamond (b) graphite (c) coal (d) fullarene
6. The hardest substance in nature is [ C ]  
(a) graphite (b) fullerence (c) diamond (d) coal
7. Thermal conductivity of diamond compared to copper is [ C ]  
(a) equal (b) two times (c) five times (d) half
8. Electrical conductivity of a diamond is [ B ]  
(a) Good electric conductor (b) Bad conductor  
(c) semi conductor (d) insulator
9. M.P. of diamond in vaccume is [ C ]  
(a)  $2500\text{ }^\circ\text{C}$  (b)  $3000\text{ }^\circ\text{C}$  (c)  $3500\text{ }^\circ\text{C}$  (d)  $4000\text{ }^\circ\text{C}$
10. Bond angle between carbon atoms in graphite [ B ]  
(a)  $135^\circ$  (b)  $120^\circ$  (c)  $105^\circ$  (d)  $90^\circ$

11. Foot ball like structure is [ D ]  
(a) Diamond (b) Grapate (c) Benzene (d) Fullerene
12. Used for Black colour in ink is [ A ]  
(a) carbon black (b) cltar (c) coke (d) charcol
13. Carbon compounds are classified into ..... types [ A ]  
(a) 2 (b) 3 (c) 4 (d) 5
14. Which is used as lubricant for mechines work at high temperature [ A ]  
(a) graphite (b) dimand (c) lubricant (d) coltar
15. Which of the following is a bioorganic carbon compound [ B ]  
(a) benzene (b) sugar  
(c) carbon dioxide (d) calcium chloride
16. In extraction of metals, carbon monoxide is used as [ C ]  
(a) catalyst (b) oxidising agent  
(c) Reducing agent (d) Neutral
17. Which is used to prepare washing soda ( $\text{Na}_2\text{CO}_3$ ), and cooking soda ( $\text{NaHCO}_3$ ) [ A ]  
(a) carbon dioxide ( $\text{CO}_2$ ) (b) carbon monoxide (CO)  
(c) methonal( $\text{CH}_3\text{OH}$ ) (d) Ethanol ( $\text{C}_2\text{H}_5\text{OH}$ )
18. Which is the green house gas ? [ D ]  
(a) oxygen (b) Nitrogen  
(c) carbon monoxide (d) carbon dioxide
19. Which of the following is a saturated Hydrocarbon [ B ]  
(a)  $\text{C}_6\text{H}_{12}$  (b)  $\text{C}_5\text{H}_{12}$  (c)  $\text{C}_5\text{H}_{10}$  (d)  $\text{C}_5\text{H}_8$
20. Number of Hydrogen Atoms exists in octene [ C ]  
(a) 8 (b) 18 (c) 16 (d) 14
21. Number of Hydrogen Atoms exist in Hexyme [ C ]  
(a) 14 (b) 12 (c) 10 (d) 6

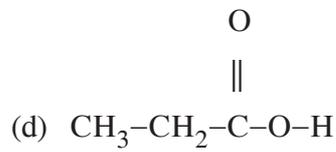
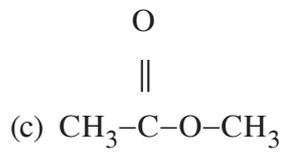
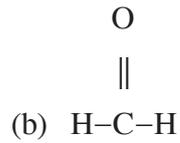
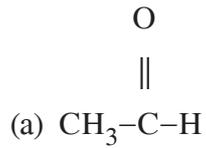
22. The general formula difference in Alkanes, Alkenes and Alkynes is [ A ]  
 (a)  $H_2$  (b) C (c) CH (d)  $CH_2$
23. IUPAC Name of  $CH_3 - CH_2 - CH = CH - CH_2 - CH_2 - CH_3$  [ D ]  
 (a) 3-Heptane (b) 3-Heptyne (c) 3-Hexyne (d) 3-Heptene
24. Which of the following is not a functional group [ C ]  

$$\begin{array}{c} O \\ || \\ -C- \end{array}$$
 (a)  $-C-$  (b)  $-OH$  (c)  $-CH_3$  (d)  $-COOH$
25. Which of the following is used as fuel when mixed with petrol. [ A ]  
 (a)  $CH_3OH$  (b)  $C_2H_5OH$  (c)  $CH_3COH$  (d)  $HCOOH$
26.  $CH_3-CH_2-CH-CH_2-CH_3$  is IUPAC Name [ D ]  

$$\begin{array}{c} | \\ CH_2 \\ | \\ CH_3 \end{array}$$
 (a) 3-methyl pentane (b) 3methyl butane  
 (c) 3-Ethyl hexane (d) 3-Ethyl pentane
27. The functional group which is recognised as alcohols is [ A ]  
 (a)  $-OH$  (b)  $-CHO$  (c)  $-CO$  (d)  $COOH$
28. Which is called as wood Alcohol [ D ]  
 (a) butanol (b) propanol (c) Ehtanol (d) Methanol
29. Which is used is cosmetics [ C ]  
 (a) Farmaldehyde (b) Acetone (c) Ehanol (d) Methanol
30. Acid which is produced during exercise in mucle is [ B ]  
 (a) Farmic acid (b) lactic acid (c) buteric acid (d) citric acid
31. Which is not a carboxylic acid from the following [ D ]  
 (a) Farmic acid (b) lactic acid (c) citric acid (d) Nitric acid
32. The Acid contains vitamin C is [ B ]  
 (a) Acetic acid (b) ascarbic acid (c) citric acid (d) Lictic acid

33. Carboxylic acid from the following

[ D ]



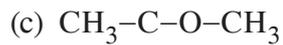
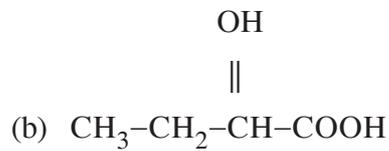
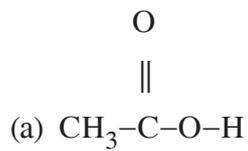
34. Which one is used as floavour from the following

[ B ]

- (a) Glycerene      (b) Veniline      (c) Venegar      (d) Formalene

35. The formula of lactic acid from the following

[ D ]



## Module - 7

# 21

Lesson

## Chemistry in day to day life

### The things we use in our day to day life

#### Objectives

- To know the difference between natural and man made substances.
- To know the principles involved in the preparation of man made substances and their properties.
- To tabulate some common diseases and their medicinal drugs.
- To know the adverse effects of man made substances on environment.

#### Important Points

- Candle wicks are prepared with the mixture of wax and stircic acid.
- Ink is the coloured substance used for writing and printing.
- Long chains of sodium or potassium salts of fatty acid is called soap.
- Purifiers contain sodium or potassium salts of sulphuric acid chain.
- The mixture of potassium chlorate and Antimony tri sulphide is applied to the tip of a match stick in the match boxes.
- The important building material cement is prepared with calcium hydroxide, mud and zypsum.
- Concrete is a very hard substance which is formed by the mixture of cement, sand and stones.
- Glass is prepared by mixing washing soda, calcium hydroxide and sand and heating in a furanace.
- soda glass is used to prepare bottles, home appliances, laboratory equipment etc.
- Hard glass is prepared with potassium carbonate, calcium hydroxide and sand. It with stands high temperatures.

- Flute glass is used to prepare lenses, prisms, mirrors, spectacles etc.
- Coloured glass is prepared by adding different metallic oxides in limited quantities.
- Fibre glass is the thread like structure of glass. This is used to resist electricity and sounds. To strength the plastics and Rubbers Fibre glass is used.
- Washing soda is prepared by solvey process. This is used in the preparation of glass, caustic soda, Borox and soap powder.
- Baking powder is the mixture of baking soda and tartaric acid.
- Bleaching powder is prepared with chlorine and calcium hydroxide.
- Plaster of paris is formed when zypsum is heated.
- Polymers are the macro molecules. These are formed when small molecules connect together. Wool, cotton, Terelene etc are the examples for polymers.
- Drug is the substance used to cure deseases or ill health. Anesthetics, Anti biotics, Analgesics, Antacids, Anti pyretics are the drugs we use commonly.

### 3 Marks Questions

**(1) What are natural and artificial substances ? Give two examples for each.**

A. Substances obtained from nature are called natural compounds.

Example :- wood, silk, cotton, skin, coal etc.

Some substances are man made. These are called artificial compounds

Example :- Clothes, cement, glass, colours, soaps, detergents etc.

**(2) How the candle wick is prepared ? Which compound is responsible for giving light in the candle wick ? Explain the light giving process.**

A. Candle wicks are prepared with the mixture of paraffine and steric acid.

Candles are made into cylindrical shape keeping the wick in the centre. When it is burned with match stick the wick burns due to that heat and wax dissolves.

The liquid wax changes into its vapour on burning and hence it gives light.

**(3) What is ink ? How will you prepare it ?**

- A. – Ink is a coloured compound which is useful to write or print.
- Amorphous carbon powder is mixed with oil.
  - A small amount of gum is added to this so that it will adhere to the paper.

**(4) Detergents form froath in hard water but soaps do not why ?**

- A. Hard water contains calcium and megnesium salts.

The sodium or potassium salts of detergent combine with calcium and megnesium salts of water and form soluble salts. No precipitate is formed.

Hence soaps do not give froath with hard water.

**(5) When you scratch the match stick on the sides of the match box it burns why ?**

On the top of the match stick potassium chlorate and Antimony tri-sulphides mixture is applied.

On the sides of the match box, Red phosphours and glass powder mixture is applied.

When the match stick is scratched on this coating heat is produced due to the chemical reaction. Due to this heat, it burns.

**(6) Mention the crude material for the preparation of Cement.**

- A. Calcium stone means  $\text{CaCO}_3$ .

Mud is the mixture of Alumina ( $\text{Al}_2\text{O}_3$ ), Silica ( $\text{SiO}_2$ ) and Aluminium silicates.

Zypsum is calcium sulphate mineral  $\text{Ca SO}_4 \cdot 2\text{H}_2\text{O}$ .

**(7) Write briefly about the preparation method of cement.**

- A.  $\text{CaCO}_3$  and mud are taken in required ratio dried and powdered. This powder is heated in a furnace.

$\text{CaCO}_3$  and mud react chemically and form calcium silicate and calcium Aluminates.

This is called clinker. It is cooled and powdered. To this powder 2-3% zypsum is added. Ash coloured substance which is formed is called cement.

- (8) During the preparation of cement why zypsum is added to the clinker. What are the uses of cement.**

**(or)**

**Mention the method for reducing the time of cement to get hardened and give the uses of cement.**

To reduce the time of cement to get hardend, zypsum is added.

Cement is packed in to the bags. Which are air tight and non humid.

**Cement uses.**

Cement is useful in Building roads, bridges, Dams etc.

- (9) Why the pebbel like stones are added to cement while Lyeing roads? What is the name of this mixture ? and mention where this mixture is very much used.**

**(or)**

**What is concrete ? For what this is used? Where it is used more ?**

- A. Cement, sand, small pieces of stones mixture with water is called concrete.

Concrete is a hard substance with steel rods its hardness increases.

Concerete is used to construct roads, roofs, bridges and Dams.

- (10) What are the raw materials used to prepare glass. Why the broken glass pieces are added in the preparation of glass.**

- A. Washing soda is sodium carbonate  $\text{Na}_2\text{CO}_3$ .

Lime stone means calcium carbonate  $\text{CaCO}_3$ .

Sand is  $\text{SiO}_2$

In the preparation of glass, broken pieces of glass is added because it recycles.

and its melting point decreases.

- (11) How glass is prepared**

**(or)**

**How soda, lime glass is prepared.**

Washing soda, lime stone, sand are mixed in the required ratio.

This mixture is powdered and heated in a furnace.

**(12) What are the substances used for the preparation of hard glass what is its speciality and what is the use of hard glass.**

In Hard glass preparation potassium carbonate is used.

It can withstand high temperatures.

Test tubes, beakers, conical flasks are prepared with this.

**(13) Which glass is unbreakable in hot and cold conditions. What are the substances used for this preparation. What are the instruments prepared with this type glass.**

**(or)**

**What is the raw material used to prepare borosilicate. What is its speciality. What are the uses of this type glass.**

A. Borosilicate is present in this glass which can withstand hot as well as cold conditions.

In the preparation sodium, Aluminium borosilicates are used

With this, domestic appliances, laboratory equipment are prepared.

**(14) What chemicals should be added to get Red, green and blue glasses.**

A. For blue glass, cobalt or copper oxide is added.

For green glass, chromium, ferrous oxide are used.

For Red colour glass selenium oxide is used.

**(15) Where the hard glass, borosilicate glass and Fibre glass are used ?**

A. With Hard glass, test tubes, beakers, conical flasks are prepared.

Borosilicate glass is used to prepare home appliances and Laboratory equipment.

Fibre glass is used to prepare electric ovens, geysers, Refrigerators.

**(16) Where the Lime-soda glass, Flint glass, Fibre glasses are used ?**

A. 1. Soda-lime glass is used to prepare home appliances and laboratory apparatus.

2. Flint glass is used to prepare mirror, Lenses, prisms and spectacles.

3. Fibre glass is used to prepare electric ovens, geysers, Refrigerations.

**(17) Write any three uses of baking soda.**

Baking soda is used mostly in Bakeries.

To prepare medicines which reduce indigestion.

Used in Fire extinguishers.

**(18) In the preparation of cakes in place of sodium bicarbonate (baking soda) baking powder is used. why ?**

A. When sodium carbonate is heated, it gives bitter taste.

Baking powder contains baking soda and tartaric acid.

Tartaric acid neutralises sodium carbonate and remove the bitter taste.

**(19) Write the uses of washing soda.**

A. Glass solution, caustic soda, borax and soap powders are prepared with washing soda.

To convert the hardwater into soft water this is used as laboratory reagent.

To prepare sodium compounds

**(20) Write the uses of bleaching powder. (or) Which compound is used to remove colour from the clothes, write its uses.**

A. Cotton, asbestos, paper industries use bleaching powder to bleach the things.

Used to purify water bleaching powder is used as a disinfectant.

To reduce the shrinking of wool, in the preparation of chloroform, bleaching powder is used

In chemical industries it is used as an oxidising agent.

**(21) How do you prepare bleaching powder.**

It is prepared in a wrought Iron furnace.

There are two openings in the bottom of the furnace for chlorine and for hot gases.

Wet lime is filled from the top. This will react with the chlorine gas and bleaching powder is formed and precipitated at the bottom.

**(22) Write the preparation of plaster of paris.**

It is prepared from hydrated calcium sulphate or zypsum.

Zypsum at 365k loses crystal lattice water and changes into plaster of paris.

With water it forms hard substance. It expands during the hardening process.

**(23) Write the uses of plaster of paris.**

A. To prepare Idols toys models, decorative pieces.

To joint the broken bones (fractures)

To prepare chalk pieces, to coat the walls, pillors.

**(24) What are the natural and artificial Fibres.**

A. The Fibres obtained from nature are called natural Fibres.

Example : wool, cotton, silk.

Man made Fibres are called Artifical, Fibres.

Example : Nylon, polyester, Terylene, Liacra.

**(25) Write any three uses of polyester.**

A. It will not wrinkle and long lasting. It is not affected by insects, mildue like fungi.

By preparing clothes with this the required wrinkles and fleets remain permament.

Used to repair blood vessels.

Thin layers of this can be made into cellotapes and Tape recorder tapes.

**(26) What is vulcanisation. Why natural rubber is vulcanised.**

A. Sulphur is added to the rubber in limited amount so that rubber becomes elastic. This process is called vulcanisation.

Natural rubber will not have elasticity.

For elasticity Natural rubber is vulcanised.

**(27) For fever, Acidity which medicine is used ? Write two examples.**

A. To control fever, high temperature, the medicines used are called as antipyretics.

Example : Aspirin, paracetamol, Analgin and Fenacetine.

Antacids are used to treat the Acidity.

Example: Digene, Ranitidine and omifrezole.

**(28) How the lorry tires are maintained to stand straight and strong. What is the principle involved in this.**

A. Chalk piece powder is used in the manufacture of Rubber tires.

Carbon powder is used to maintain the Rubber strong.

limited quantity of sulphur is mixed and heated for the elasticity. This is called vulcanisation.

**(29) What are the monomer units of polythene and polyvinylchloride ? Write any three uses.**

Polyethene unit is  $(CH_2 = CH_2)$ .

Uses : It is used to prepare bottles, buckets, pipes, electrical wires, cables and bags.

polyvinyl chloride (PVC) unit is  $(CH_2 = CH_2Cl)$

Rain coats, hand bags, electric wire tubes are prepared with polyvinyl chloride.

**(30) What are Analgesics and antibiotics. Write two examples.**

A. Drugs used to destroy bacteria, fungi are called anti biotics.

Example :- Streptomycine, Tetracyclin, chloronfenicol.

Analgesics are used to reduce pain.

Example:- Aspirin, paracetamol, morphine.

## 5 Marks Questions

**(1) What is the difference between soaps and detergents. With Hard water, purifiers give froath where as soaps do not. why ?**

A.

**Soaps**

**detergents**

(1) To wash hands, for bathing soaps are used

(1) To wash and clean clothes detergents are used.

(2) Soaps form froath only with soft water

(2) Detergents form froath both with soft as well as hard water

detergents form froath with hard water because the sodium or potassium salts present in the detergents combine with calcium and megnesium salts and form soluble salts and hence there will be no precipitate formation so they give froath.

Soaps do not give froath with hardwater. They form insoluble salts precipitates.

**(2) What are the raw materials used for the preparation of cement write briefly about the preparation method.**

Raw materials used for the preparation of cement are

1) lime stone ( $\text{CaCO}_3$ ) 2) mud 3) Alumina ( $\text{Al}_2\text{O}_3$ ) 4) Silica ( $\text{SiO}_2$ ) Zypsum ( $\text{Ca SO}_4 \cdot 2\text{H}_2\text{O}$ )

Lime stone and mud are taken in a required ratio dried and powdered.

This powder is heated in a furnace. Lime stone and mud react chemically in a furnace.

Calcium silicate and calcium Aluminates are formed.

This is called clincker. This is cooled and made into powder. 2-3% zypsum is added to this. An ash coloured substance is formed. This is called cement.

**3) Explain briefly the preparation of soda - lime glass. which chemicals are used to get red, green colours to the glass.**

A. Washing soda, lime stone, sand are mixed in the required ratio.

This mixture is powdered and heated in a furnace.

For blue glass, cobalt or copper oxide is added.

For green glass, chromium, ferrous oxide are used.

For Red colour glass selenium oxide is used.

**4) What are the types of Hard glass. Write its uses.**

A. 1. With Hard glass, test tubes, beakers, conical flasks are prepared.

2. Boro silicate glass is used to prepare home appliances and Laboratory equipment.

3. Fibre glass is used to prepare electric ovens, geasers, Refregerators.

4. Soda-lime glass is used to prepare home appliances and laboratory apparatus.

5. Flint glass is used to prepare mirror, Lenses, prisms and spectacles.

6. Fibre glass is used to prepare electric ovens, geasers, Refregirations.

**(5) Why baking powder is used in place of baking soda in the preparation of cakes. Write the uses of baking soda.**

A. When sodium carbonate is heated, it gives bitter taste.

Baking powder contains baking soda and tartaric acid.

Tartaric acid neutralises sodium carbonate and remove the bitter taste.

Baking soda is used mostly in Bakeries.

To prepare medicines which reduce indigestion.

Used in Fire extinguishers.

**(6) What are the raw materials used to prepare washing soda. Write four uses.**

raw materials used to prepare washing soda.

Lime stone is calcium carbonate  $\text{CaCO}_3$

Sodium chloride is  $\text{NaCl}$

Ammonia  $\text{NH}_3$

**Uses :-**

used to prepare glass, caustic soda, borax.

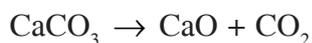
used to convert hard water to soft water.

used to prepare sodium salts.

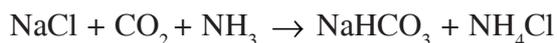
used to clean the clothes in the form of soap powders.

**(7) Write the chemical reactions involved in the preparation of washing soda.**

A. First lime stone is heated. Carbondioxide is evolved.



This is saturated with Ammonia gas and sent into  $\text{NaCl}$ .



$\text{NaHCO}_3$  has very low solubility.

$\text{NaHCO}_3$  on heating sodium carbonate is formed.



**(8) What are the raw materials used to prepare bleaching powder ? write the preparation process.**

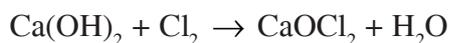
A. The raw materials are

(1) wet lime  $\text{Ca(OH)}_2$  (2) chlorine gas ( $\text{Cl}_2$ )

It is prepared in a wrought Iron furnace.

There are two ways at the bottom of the furnace to send chlorine gas and to release hot gases produced.

Wet calcium hydroxide is filled in the furnace from the top. This reacts with chlorine gas while coming down and form bleaching powder precipitate.



**(9) What is bleaching ? Write its uses.**

bleaching is a process in which the colouration in the clothes is removed and made into white.

**uses :-**

used in cotton and paper industries.

To purify water

To prepare chloroform, to reduce shrinking in wool.

used as an oxidising reagent in chemical industries.

**(10) How the plaster of paris is prepared ? Write its uses.**

prepared from zypsum.

At 365 k. zypsom loses water of crystallisation and plaster of paris is formed.

with water it becomes hard and gets expanded.

**uses :**

used in the preparation of model, Idols, decorative pieces.

to set the fractured bones.

to prepare chalk pieces.

to coat walls and pillars.

**(11) What is a polymer. Write their uses.**

Polymer is a macro molecule formed by the monomers which are inter connected with each other.

**uses:-**

1. These are long lasting materials. They do not get affected by insects.
2. Clothes formed with this material give required permanent folds and wrinkles.
3. To cure the blood vessels.
4. Thin layers of these are useful in the form of cello tape and tapes in Tape recorders.

**(12) Which type of drug is given while the removal of a tooth. What are the drugs used for this.**

While tooth is removed, local Anesthetic is given. These drugs show their effect on the limited local area.

Novocain and xylocain drugs are used for this.

During surgery the drug used for unconsciousness are called as anesthetics.

Example. Diethyl ether, cyclo propane.

**I. Fill in the blanks**

1. To slow down the fast burning of the cotton wicks in candle ..... is added to the wax. (Stearic acid)
2. Candle wicks are mostly prepared in ..... state. (Uttaranchal)
3. In uttaranchal candle wicks are prepared in ..... region (Ninetal)
4. Chemical formula for lime stone is ..... (CaCO<sub>3</sub>)
5. Mineral form of calcium sulphate is called ..... (zypsum)
6. At the tip of matchstick, ..... and Antimony tri sulphide mixture is applied (Potassium chlorate)
7. On the side of the match box ..... and glass powder mixture is applied. (phosphorous)
8. High quality optical glass is prepared with ..... (cerium oxide)
9. Glass used in the preparation of beaker, conical flasks ..... (Hard glass)
10. The other name for borosilicate is ..... (pyrex)

11. The other name for optical glass or Flint glass is ..... (crook's glass)
12. Glass which can with stand heat and electricity is ..... (Fibre glass)
13. Chemical name for dry lime is ..... (Calcium oxide)
14. Chemical name for wet lime is ..... (calcium hydroxide)
15. For cooking Dal fast, the chemical used is ..... (baking soda)
16. Baking soda means..... (sodium hydrogen carbonate or sodium bicarbonate)
17. The chemical formula for baking soda ..... ( $\text{NaHCO}_3$ )
18. The chemical used in the Fire extinguisher ..... (sodium bicarbonate)
19. The chemical formula for bleaching powder..... ( $\text{CaOCl}_2$ )
20. The chemical name of  $\text{NaHCO}_3$  .....  
(Sodium hydrogen carbonate or sodium bicarbonate)
21. The chemical formula of washing soda ..... ( $\text{Na}_2\text{CO}_3$ (or)  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ )
22. The chemical formula of plaster of paris ..... ( $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ )
23. The other name for polyamide..... (Nylon)
24. Soft toys are prepared from ..... (polyethene)
25. Rain coats are made up of ..... (Poly vinyl chloride)
26. PVC means ..... (poly vinyl chloride)
27. Electric switches, combs are madeup of ..... (bekelite)
28. The compound used to cure a disease is called a ..... (drug)
29. In kelvin's scale  $80^\circ\text{C}$  is ..... ( $80 + 273 = 353 \text{ K}$ )
30. The instrument which controls the temperature is ..... (Thermostat)
31. When  $1^\circ\text{C}$  temperature is increased for an object having standard length, the increase in its length is called..... (Coefficient of linear Expansion(or) $\alpha$ )
32. If an object's temperature is creased by  $1^\circ\text{C}$  having standard volume the increase in its volume is called ..... (Coefficient of Volume Expansion (or)  $\gamma$ )

33. Coefficient of volume expansion  $\gamma$  is ..... times of  $\alpha$  coefficient of Linear expansion (3)
34. Melting point of pure ice is ..... $^{\circ}\text{C}$  (0)
35. Boiling point of pure water ..... $^{\circ}\text{C}$  (100)
36. When there is no change in the state of the substance, ..... of that substance remains constant. (temperature)
37. The units for latent heat is ..... (joule /k.g)
38. If there is no change in the temperature of a substance when it is changing from liquid state to gaseous state the required quantity of heat is called ..... (Latent heat of fusion)
39. Without any change in temperature of a substance when it is changing from liquid state to gaseous state the required quantity of heat is called ..... (Latent heat of vapourisation)
40. Substances reaching directly gaseous state from solid state is called ..... (sublimation)
41. Example for the substance which undergo sublimation..... (Naphthalene, Iodine, camphor)
42. The heat required to increase  $1^{\circ}\text{C}$  temperature in object having standard mass is..... (specific heat)
43. SI units for specific heat ..... (joule  $\text{kg}^{-1} \cdot ^{\circ}\text{C}^{-1}$ )
44. Length Expansion coefficient units ..... ( $/^{\circ}\text{C}$  )
45. Volume Expansion coefficient units ..... ( $/^{\circ}\text{C}$  )
46. When two objects having same temperature, and there is no thermal flow between them, then this state is called ..... (Thermal equilibrium state)
47. Normal temperature of human body is ..... $^{\circ}\text{F}$  (98.6)

## II Multiple choice Questions

1. Glass which can withstand high temperatures [ d ]  
 (a) soda-lime glass (b) Flint glass (c) Fibre glass (d) Hard glass
2. The glass which is unbreakable on heating is [ a ]  
 (a) Boro silicate glass (b) Flint glass (c) Fibre glass (d) soda-lime glass

3. To get red colour for the glass which compound is added [ d ]  
 (a) cobalt (b) copperoxide  
 (c) chromium Ferrous oxide (d) cerium oxide
4. Optical lenses are prepared with this glass [ c ]  
 (a) hard glass (b) boro silicate glass  
 (c) Flint glass (d) Fibre glass
5. The glass which reduce the effect of ultra violet rays. [ a ]  
 (a) Filnt glass (b) Borosilicate glass  
 (c) Hard glass (d) Fibre glass
6. The glass which is used in electric oven to reduce heat and electric sounds [ b ]  
 (a) coloured glass (b) Fibre glass (c) optical glass (d) Borosilicate glass
7. The glass used in the gaeser of the electric oven [ a ]  
 (a) Fibre glass (b) coloured glass (c) Flint glass (d) soda lime glass
8. The medicine used to control fever (high temperature 120<sup>0</sup> F) [ a ]  
 (a) Analgin (b) Digene (c) Aspirin (d) Ranitidine
9. The medicine used to reduce acidity [ a ]  
 (a) digene (b) Analgin (c) Paracetamol (d) Fenacitin
10. The medicine used to pnenmonia fever [ d ]  
 (a) Analgesics (b) Antibiotics  
 (c) Antacids (d) Antipyretics
11. To remove a tooth the following local Anasthetic drug is used [ b ]  
 (a) Cyclopropane (b) Novocoin (c) Paracetamol (d) Analgin
12. For a complicated surgery, to make the patient unconscious the following medicine is used [ a ]  
 (a) Divenylether (b) Analgir (c) Paracetamol (d) Asprin
13. Novocoin is [ c ]  
 (a) Anti pyretic (b) Analgesic (c) Anasthetic (d) Antibiotic

14. Among the following which is not used in the preparation of washing soda [ b ]  
(a) lime stone (b) Ammonia (c) wet lime (d) Sodium chloride
15. Which one is not man mad [ c ]  
(a) glass (b) wooden chair (c) skin (d) book
16. Which one is not a man made thing [ d ]  
(a) glass (b) comb (c) clothes (d) wool
17. Which is an artificial Fibre [ c ]  
(a) wool (b) silk (c) Nylon (d) cotton
18. Which one of the following is not made up of a polymer [ c ]  
(a) Rain coats (b) hand bags (c) bottles (d) combs
19. Which one is made up of bekelite polymer [ a ]  
(a) combs (b) glass (c) buckets (d) pipes

# Module - 11

# 33

Lesson

## Space Exploration

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### Objectives

- Explain the meaning of space exploration and state its need and importance.
- differentiate between natural and artificial satellites.
- give an elementary idea of how a satellite is launched.
- examine the applications of artificial satellites in the field of communication, remote sensing and weather forecasting.
- mention the aim and objective of Indian space programme and identify the Indian achievements in the field of space science.

### Important Points

1. The path of the satellite revolving around earth is called orbit.
2. **Apogee** : It is a point on the orbit where vertical distance of the satellite from the Earth's surface is maximum.
3. **Communication satellite** : It is Geo-stationary satellite used to send information / data to long distances.
4. **Inclination** : The angle between the plane of orbit of the satellite and plane of the equator of Earth is called inclination of the orbit.

5. **Orbit of the satellite** : Path of the satellite revolving around the planet.
6. **Perigee** : It is a point on the orbit where vertical distance of the satellite from the Earth's surface is smallest.
7. **Remote sensing satellite** : A satellite in sun synchronous orbit being used for study for world resources by cameras and other sensors placed in it.
8. **Satellite** : A natural or man - made object revolving around earth or any planet.
9. **Space exploration** : Study of earth's atmosphere or surface or heavenly bodies by man - made space vehicles.
10. **Time period of orbit** : The time in which satellite in the orbit makes one complete revolution.

### 3 Marks

#### K1. What do you mean by space and space exploration?

- A. **Space** : Vast limit less and continuous region beyond earth's atmosphere.

**Space Exploration** : Study of earth's atmosphere or surface or heavenly bodies like planets and stars using satellites orbiting the earth or Space Probes is called space exploration.

#### 2. What are natural and artificial satellite ?

- A. Natural satellite for earth is moon. Jupiter has 16 satellites. Man has no role in the existence of these satellites. These are called natural satellites.

Satellites launched by man around any planet for our own purpose is called an artificial satellite or man-made satellite.

**Example** : Sputmic - 1, INSAT-1A etc.

#### K3. Define the following 1. Apogee, 2. Perigee, 3. Inclination.

- A 1. **Apogee** : The highest point of the orbit or height of that point above earth's surface.
2. **Perigee** : The lowest point of the orbit or height of that point above earth's surface.
3. **Inclination** : Angle between the planes of equator and of the orbit.

**K4. Define polar orbit, polar satellite and mention two polar satellites.**

- A. **Polar orbit** : If the inclination of the orbit of a satellite is  $90^\circ$ , then during one revolution around the earth, the satellite passes once vertically above the north pole of the earth and once above the south pole of the earth. Such an orbit is called a polar orbit. It is perpendicular to equator.

**Polar satellite** : The satellite moving in a polar orbit is called polar satellite.

**Examples** : IRS-1A, IRS-1B etc.

**K5. Define Geo-stationary orbit and Geo-stationary satellite. Give two examples.**

- A. **Geo-stationary orbit** : If the orbit is in the plane of equator with inclination of  $0^\circ$  and located at constant height 36000 km from earth and above the equator it is called Geo-stationary orbit. It has a circular orbit and time period is equal to the time period of earth. Hence, relative to any location on earth, the position of the satellite is stationary.

**Geo-stationary satellite** : A satellite revolving in this orbit is called Geo-stationary satellite.

**Examples** : GSAT-1 ; MATSAT etc.

**U6. Explain the meaning of the following statements.**

(i) **Apogee of the satellite orbit is 900 km**

(ii) **Perigee of the satellite orbit is 450 km**

(iii) **Inclination of satellite orbit is  $90^\circ$**

- A. The meaning of above statements

- (i) Maximum distance between earth's surface and satellite is 900 km  
(ii) Minimum distance between earth's surface and satellite is 450 km.  
(iii) The angle between planes of equator and orbit of the satellite is  $90^\circ$  .

**U7. The time taken for the earth to complete one revolution is same as the time taken for an artificial satellite to complete one rotation around earth. What is the name of this orbit. Write the two characteristics of this orbit.**

- A. This type of orbits are known as Geo-stationary orbits.

**Characteristics of Geo-stationary satellites.**

1. It lies in the plane of equator its inclination is zero.
2. It revolves at a height of 36,000 km .

**K8. Define polar satellites. What is orbit of polar satellite.**

- A. Satellites revolving in polar orbits is called polar satellites.

They revolve around earth through north and south poles with  $90^\circ$  inclination. Different polar satellites have different apogee and perigee.

**K9. Write two properties of Sun-synchronous orbit. What are their measurements?**

- A. An orbit in which satellite makes accurately an integral number of revolutions in 24 hours. Due to this satellite revolutioning in this orbit will be able to look at the same place on earth and photograph it on consecutive days in identical illuminations, sun being in the same position relative to that place.

The position of sun synchronous satellite is not precisely above that place after 24 hours but to the west of that place through angle  $\theta$  in longitude.

**K10. Mention three applications where satellite communication is being used.**

- A.1. Telephonic conversations and conferencing.
2. Television broad cast
  3. Fax and Computer network.

**A11. A satellite is placed perpendicular to equator and time taken to make one full rotation around earth is 1.6 hours. Write two uses of this satellite.**

- A. It is perpendicular to equator hence it is polar satellite. It rotates 15 times around earth with in 24 hours. Polar satellites are used for weather forecasting, to locate under ground water, minarals, find fish in sea and to photograph forests.

**K12. Write there uses of remote sensing satellite.**

- A.1. To examine forests and its degradation.
2. To find water and minaral resources under ground.
  3. To detect fishing zones.

**U13. A Dog has been sent into the space before man. What are the reasons for it.**

- A. A Dog has been sent into space through Sputnik - II by USSR (Now Russia). Through this they have examined the health of the dog and used it to send man later.

**K14. Who is the first Indian went into space? How long he stayed in space? In which launch vehicle he went into space.**

A.1. Rakesh Sharma

2. He stayed for 9 days
3. He went in USSR launch vehicle.

**K15. Which is the first country to venture into space? When it happend? Who is the first person to travel into space.**

A.1. USSR (Russia)

2. On 1957 Oct 4th Sputnik - I is launched.
3. Uri gagarin.

**K16. Who is the first person to step on Moon. When and in which launch vehicle he went.**

- A. Neil Armstrong of USA on 1969 Feb 20th went in US Launch vehicle "Apollo XI".

**K17. Expand the following terms.**

**IRS, INSAT, SROSS, ASLV, PSLV, GSLV**

A. IRS - Indian Remote Sensing Satellite

INSAT - Indian National Satellite System

SROSS - Streched Rohini Satellite Series

ASLV - Augmented Satellite Launch Vehicle

PSLV - Polar Satellite Launch Vehicle

GSLV - Geostationary Satellite Launch Vehicle.

## 5 Marks

1. An orbit of 900 km, Apogee, 300 km perigee and  $90^\circ$  inclination is shown in figure. Identify the parts in figure.

Perigee

A

Apogee

- For Figure- 3 M.
- For identifying parts - 1M.
- For showing Apogee and Perigee - 1M.

2. Explain the importance of space exploration with examples from three fields.

- A. Manufacturing and sending the satellites into orbit is very expensive. Only few rich countries can afforded. But by the improvement in the technology cost has come down and no. of applications are increased. Every body recognized the importance of space research and other countries also started to send satellites.

### Uses of space research in different fields

- (a) **Communications** : Using Geo-stationary satellites we can send data / information to long distances. This is called satellite communication. We use this for telephonic conversations and conferencing, for TV broad cast and FAX and computer Networks facilities.

(b) **Remote sensing** : Sun synchronous satellites are used for this purpose. It is equipped with cameras and other sensors, by which data about Earth's resources can be obtained. By using UV and infrared rays we can photograph the surface of earth at regular intervals. By observing these photographs we can get information about forestry, waste lands, ground water etc.

(c) **Study about heavenly bodies** : By using unmanned space crafts (Space probes) we can get information about planets like Mars, Venus etc. We can place a telescope in space so that we can observe changes in space.

**3. What is remote sensing satellite? Why it will be placed in sun synchronous orbit?**

A. A satellite in sun synchronous orbit used to photograph the Earth's surface illuminated by sun light, using UV and infrared light is called remote sensing satellite.

**4. Write the uses of remote sensing satellite?**

- A.
1. It takes the photographs of the earth once in a day at the same time of the day.
  2. Used to estimate forest cover, and waste lands by photographs. We can estimate deforestation.
  3. We can find ground water and menarals.
  4. Estimate yield of various crops and detect crop diseases.
  5. Identify potential fishing zones.

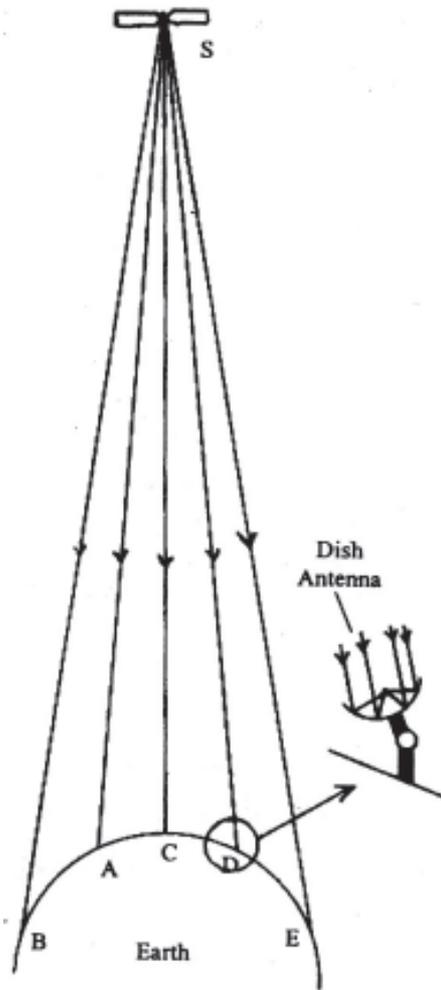
**5. What is the orbit of weather satellite? How these satellites observe cloud moment.**

A. The orbit of weather satellite is in the plane of equator i.e. its inclination is  $0^\circ$ . It is stationed at a constant height of about 36000 km above equator. It has a circular orbit.

The satellite being stationary relative to any place on earth, it can monitor the movement of clouds accurately by taking photographs using cameras fixed to it.

**6. Expand INSAT. Explain how TV programmes are transmitted to remote places with help diagrams.**

A. INSAT - Indian National Satellite



Satellite's placed at a height of 36000 km receives signals from an earth station A and transmits them to earth in different directions. Because its direction and distance relative to any ground station A or B or C or D etc. remains fixed, any ground station can send signals to it or receive signals from it with the help of a dish antenna whose direction is adjusted once for all.

Dish antenna is of parabolic shape. It focuses the microwaves coming from the satellite to its focus F. They can travel even through clouds and atmosphere. They can cover half the earth.

**7. Expand IRS and explain its working. How it is used to find the forest area and deforestation in India.**

**A. IRS - Indian Remote Sensing Satellite.**

IRS is a remote sensing satellite placed in sun synchronous orbit equipped with cameras and sensors. It can take photograph of earth in sun light. We can see the areas with greenary and dry lands clearly. By observing and comparing photos taken at different times we can estimate the decrease or increase in forest cover.

**8. Write a note on Indian space Exploration.**

- A.1. In 1961 Department of atomic energy was asked by Govt. to develop space research programme.
- 2. On 19th March 1975 first Indian satellite Aryabhata was launched.
- 3. On 18th July 1980 Satellite Rohini was launched by an indigenously developed launch vehicle SLV-3.
- 4. 2nd generation launch vehicle ASLV-D3 is launched on 20-5-1992.
- 5. Rakesh Sharma is first Indian to step into space on 3 April 1984 through USSR satellite.
- 6. First successful launch of polar satellite launch vehicle PSLV - D was launched on 15-10-1994.
- 7. First Geo-stationary satellite vehicle was GSLV - D1 launched on April 2001.

**Fill in the blanks**

- 1. Vast limit less and continuous expanse beyond earths atmosphere is called ..... (space)
- 2. The path of a satellite revolving around the Earth is called is ..... (orbit)
- 3. Geo-stationary satellite revolves in the plane of ..... (equator)
- 4. Time taken by a satellite to complete one revolution is called ..... (time period)
- 5. Sending messages to long distances using a Geo-stationary satellite is called .....  
(satellite communication)
- 6. To keep a satellite in a orbit near to earth a velocity of ..... km/sec. is required (8 km)
- 7. To find the earths atmosphere ..... satellites are used (Geo-stationary)
- 8. On ..... Sputnik - I is launched by USSR (4-10-1957)
- 9. First man to travel in space is ..... (Yuri Gagarin)
- 10. First Indian to enter in to space is ..... (Rakesh Sharma)
- 11. First Telescope in space is ..... (Hubble)
- 12. First satellite launched by India ..... (Aryabhata)
- 13. Expand SLV ..... (Satellite Launch Vechicle)
- 14. Expand ASLV ..... ( Augumented Satellite Launch Vehicle)
- 15. First successfully launched Indian polar satellite launch vehicle ..... (PSLV-D2)
- 16. Expand INSAT ..... (Indian National Satellite System)
- 17. .... is satellite launched by Indian to monitor weather (METSAT)
- 18. .... is Indias first Geo-stationary satellite. (GSAT-1)

## Multiple Choice Questions

- No of satellites revolving around Mars ( c )  
(a) 15 (b) 14 (c) 16 (d) 17.
- Geo-stationary satellites revolve on equator at a height of ( b )  
(a) 38,000km (b) 36,000 km (c) 35,000 km (d) 34,000 km
- Time period of Geo-stationary satellite ( a )  
(a) One day (b) 2 days (c) half day (d) one month
- To study world resources we use the following satellite ( c )  
(a) Geo-stationary satellite (b) Weather satellite  
(c) remote sensing satellite (d) None of the above
- Golden era for Astronary or Astrophysics ( d )  
(a) After 2000 (b) After 2005 (c) After 1990 (d) After 1970
- Space vehicle work on following principles ( c )  
(a) Newtons First law (b) Newtons second law  
(c) Newtons third law (d) Newtons Gravitational law
- The date on which Neil Armstrong landed on moon by Apollo satellite ( b )  
(a) 20th Feb 1979 (b) 20th Feb 1969  
(c) 22nd Feb 1979 (d) 22nd Feb 1969

## Match the following

### Part A

- Importance of 20th Feb 1969
- First man to enter space
- First satellite in space
- First man to step on moon
- Space telescope
- First Indian satellite
- Apple was launched from
- First Indian in space
- Indian communication satellite series
- Satellite used to find earth resources

### Part B

- Man landed on moon
- Yuri Gagarin
- Sputnik - I
- Neil Armstrong
- Hubble
- Aryabatta
- French Guyana
- Rakesh Sharma
- INSAT
- IRS

# 34

Lesson

## Communication Technology

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### Objectives

- Explain the meaning of communication and justify its need.
- State different steps in the process of communication.
- Differentiate between sound wave communication and electromagnetic wave communication.
- Identify different types of devices, like fax, internet, modem etc.
- Explain the working of radio and television communication system and its importance.
- Construct a model of satellite communication.

### Important Points:

1. Communication is the process of sharing facts, ideas, reasoning, opinion and feeling between two or more persons through a common system of gestures, sounds, symbols, language etc.
2. The arrangement of em waves according to their wave length or frequency is called electromagnetic spectrum.
3. Orbit located at a height of 36,000 km on equator is called Geo-stationary orbit. The satellite orbiting in this orbit is called Geo-stationary satellite.

4. **Frequency** : It is defined as the number of waves passing through any point in space in one second.
5. **Wave length** : It is defined as the distance between two nearest point in the same state of oscillation. It is denoted by  $\lambda$ .
6. **Wave - velocity** : It is the distance traveled by wave in one second (m/s).
7. Modulation is the process modifying one of the characteristic of carrier wave (Radio frequency wave) by superimposing ando frequency wave (signal wave).
8. Demodulation is the process of recovering original audio frequency wave from modulated carrier wave.
9. Receiver : The person who receives the message.
10. Sender : the person who sends the information or message.

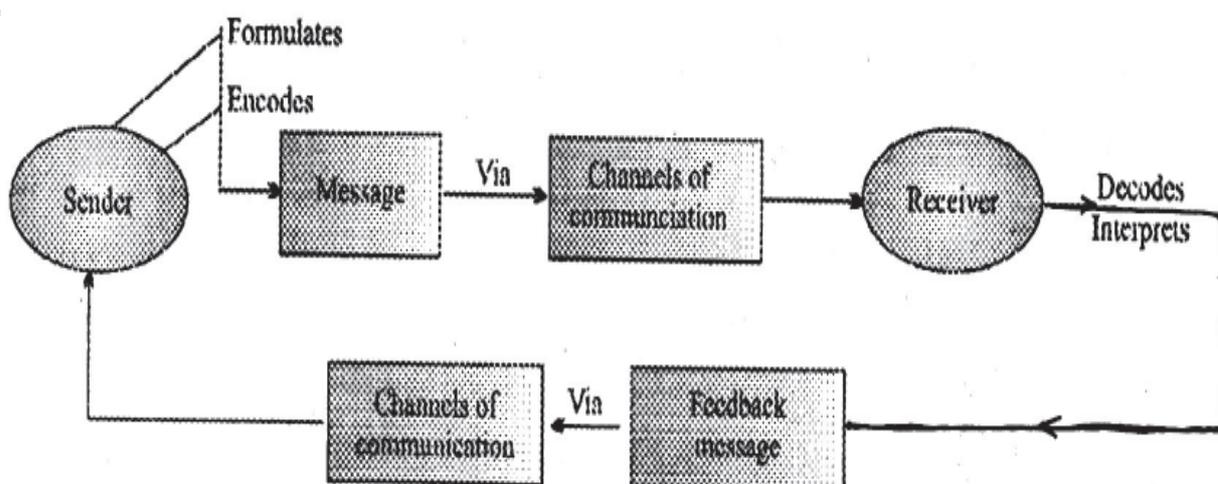
### 3 Marks

#### 1. What is communication? What is the need for it?

- A. Communication is the process of sharing facts, ideas, reasoning, opinion and feelings between two or more persons through a common system of gestures, sounds, symbols, languages etc. communication is a basic human activity as there is always a need to pass on information and ideas from one person to another. Ability to communicate with each other is an essential feature of a society.

#### 2. Draw the block diagram of communication cycle.

A.



**3. What are the differences between transverse and longitudinal waves. Give two examples for each.**

A.	Transverse wave	Longitudinal wave
	1. Particles of the medium oscillate about their mean position  2. Crests and troughs are formed in the propagation.  3. The distance between two consecutive crests or consecutive troughs is called wave length ( $\lambda$ ).  4. Example : (a) Waves on water surface. (b) Waves on the rope fixed at one end.	1. Particles of the medium oscillate to and from about their equilibrium position in the same direction as the motion of wave  2. Compressions and rare factrions are formed.  3. The distance between two consecutive compressions or rare factrions is called wave length ( $\lambda$ ).  4. Example : (a) Sound waves (b) Wave in a spring.

**4. Derive the relation between wave velocity (V), frequency ( $\gamma$ ) and wave length ( $\lambda$ )**

**A.** Let V be the wave velocity,  $\gamma$  be the frequency,  $\lambda$  be the wave length of a wave in a medium.

Distance travelled by the wave in time T is  $\lambda$ .

Distance travelled by the wave in one second  $\frac{\lambda}{T}$ .

Since the distance travelled by the wave in one second is wave velocity (V).

$$\text{Wave velocity (V)} = \frac{\lambda}{T} \text{ or } V = \frac{\lambda}{T}$$

$$\text{or } V = \gamma\lambda \text{ (because } \gamma = \frac{\lambda}{T} \text{)}$$

**5. What is electro magnetic spectrum? Mention any two types of em waves with their wave length and source.**

**A.** The arrangement of em waves (radiations) according to their wave length or frequency is called electro magnetic spectrum

em wave	Wave length (in metres)	Source
1. Radio Waves	600 to 1.5Hz	Electric circuits TV aerials.
2. Micro Waves	03 to $7 \times 10^{-7}$ Hz	Electric fire, sun rays any hot object

**6. What is Geo-stationary satellite? Write two uses.**

**A.** A satellite orbiting at a height of 36,000 km in the plane of equator is called Geo-stationary satellite. It's time period is equal to the time period of earth i.e. 24 hours.

These satellite are used for TV transmission weather forecasting.

**7. Which types satellites are used for weather forecasting. Write four uses of satellites.**

**A.** Geo-stationary satellites are used for weather monitoring.

(i) For communication and TV transmission.

(ii) For finding natural resources like water, minerals.

(iii) To find fishing areas in sea.

(iv) For defence and to find the secretes of enemy nations.

**8. TV towers are built on heigh places. Why?**

**A.** A you want to send TV signals to long distances we need large. TV antennas with about 300 m height. Vedio and sound is converted into electro magnetic signals. This signal is super imposed on a carrier wave of suitable frequency. An antenna sends these modulated carrier waves in space in the form of strong electro magnetic waves.

**9. Define the following terms (i) Frequency, (ii) Wave length, (iii) Wave velocity.**

**A.(i) Frequency :** Number of oscillations (or vibrations) made by any particle of the medium in one second when the wave travels in the medium.

(ii) **Wave length :** Distance travelled by a wave in the time taken by particles of the medium to complete one oscillation (or vibration).

(iii) **Wave velocity :** It is the distance travelled by wave in one second.

**10. (A) Define (i) (a) Time period (b) Amplitude.**

**(ii) What is the relation between wave velocity, time period, wave length.**

**A. Time period :** It is the time in which one complete wave passes through a point in space (T), (or) Time taken to complete one oscillation.

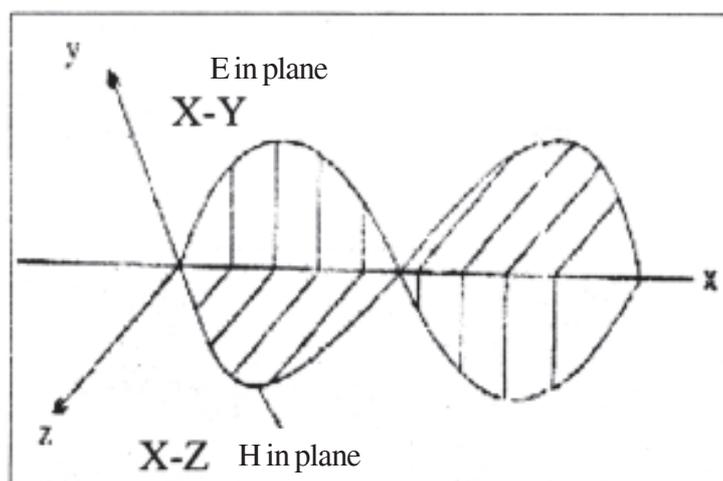
**Amplitude :** Maximum displacement of the particle from its mean positions when it is oscillating.

Relation between V, T and  $\lambda$

$$V = \frac{\lambda}{T}$$

**11. Write a brief note on Electro magnetic waves with the help of diagram.**

**A.** Electromagnetic waves (em waves) consist of a disturbance in the form of varying electric and magnetic field. Example : Light.



em wave is represented in the diagram. The direction of vibrating electric field (E) is perpendicular to magnetic field (H). Both the fields are at right angles to the direction of propagation of em wave, which is along X-axis. All em waves are transverse waves.

**12. What is the role of electro magnetic waves in mass communication.**

**A.** Signals are transmitted in open space. We call it as broad cast. One trasmitter and many receivers will be there. First radio transmission is made by Marconi in 1901. Then onwards mass communication is developed.

**13. Write the difference between modulation and demodulation.**

**A.** The process of modifying one of the characteristics of carrier wave (Radio frequency wave) by super imposing audio frequency wave (signal wave) is called modulation.

The process of recovering original audio frequency wave from modulated carrier wave is called demodulation.

Demodulation is reverse process of modulation.

## 5 Marks

### 1. Explain the communication process.

A. Information transmission consists of five parts.

- (a) **Sender** : The person who sends the information or message.
- (b) **Message** : The subject matter, which is communicated by the sender.
- (c) **Channels of communication** : The medium through which encoded message is sent is called channels of communication.
- (d) **Receiver** : The person who receives the message.
- (e) **Feed back** : Reaction or response of the receiver on receiving the message.

### 2. Define the following wave characteristics : (a) Frequency, (b) Wave length, (c) Wave velocity, (d) Time period, (e) Amplitude .

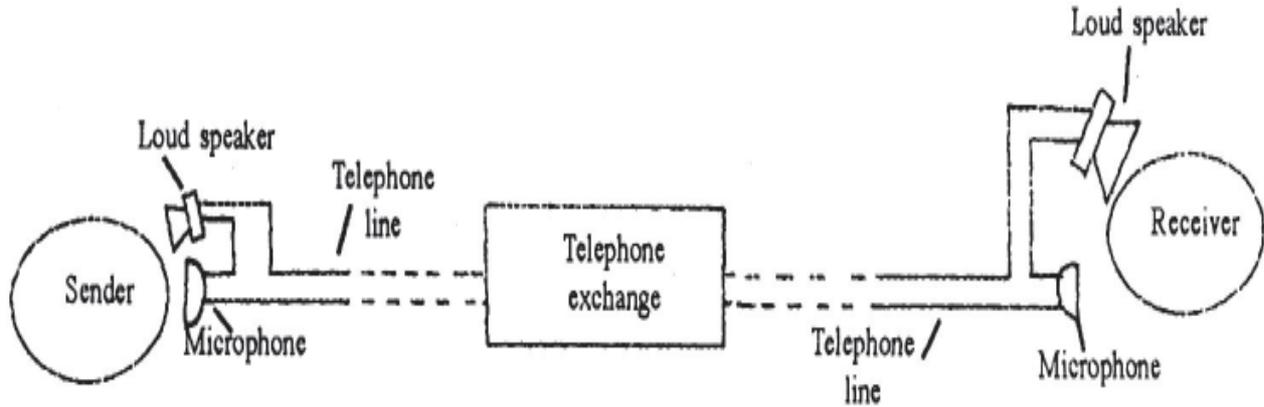
- A.(a) **Frequency** : Number of oscillations (or vibrations) made by any particle of the medium in one second when the wave travels in the medium.
- (b) **Wave length** : Distance travelled by a wave in the time taken by particles of the medium to complete one oscillation (or vibration).
- (c) **Wave velocity** : It is the distance travelled by wave in one second.
- (d) **Time period** : It is the time in which one complete wave passes through a point in space (T), (or) Time taken to complete one oscillation.
- (e) **Amplitude** : Maximum displacement of the partical from its mean positions when it is oscillating.

Relation between V, T and  $\lambda$

$$V = \frac{\lambda}{T}$$

### 3. Explain the working of telephone.

- A. The most popular communication means is telephone. It enables to send or receive voice signals from long distances. Telephone exchange is a switching system to make electrical connection between any two individuals with the help of a telephone number allotted to each.



**The telephone line between two persons**

The microphone (in the mouth piece) covers sender's voice (sound waves) into electrical signal of the same frequency. These electrical signals are transmitted without modification over telephone line to telephone exchange. Here the signal is amplified to make up the energy loss due to resistance of telephone line.

At the receiving end electrical signal is reconverted by a small loud speaker in ear piece into sound waves which are identical to original voice of the sender.

In the telephone instrument, loud speaker and microphone are in series. Hence any of the two individuals can become the sender at any instant of time.

### 4. When and where first radio transmission happened? Explain the details of radio transmission with diagram.

- A. Marconi is the first person to transmit radio signals in 1901. Initially a series of pulses were sent by switching on and off radio wave generator using morse-code.

Our voice frequency is below 8000 Hz. Which are less than e.m waves. At transmitter, a microphone converts sound waves into electrical signals. This signal is super imposed on a carrier wave of suitable frequency by a modulator. An amplifier makes the modulated carrier wave powerful enough. An antenna sends these modulated carrier wave in space in form of strong electro magnetic waves from transmitter. A tunable amplifier is tuned to the frequency of carrier waves of desired transmitter (radio station) so that em waves of particular radio station are received.

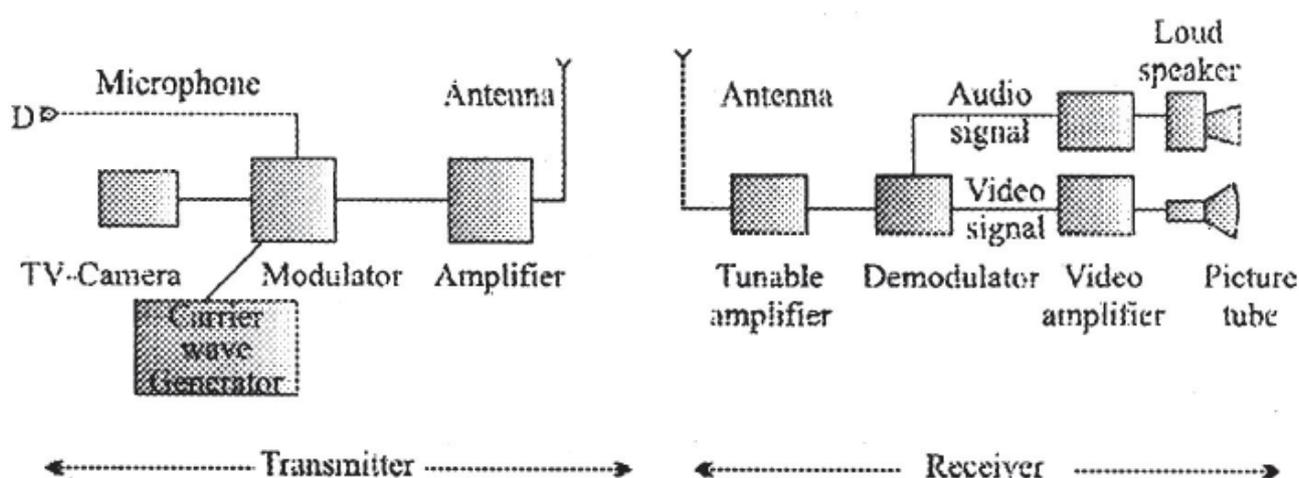
## Radio

The demodulator reproduces original audio wave from modulated carrier wave. An audio amplifier makes these electrical waves sufficiently powerful and then loudspeaker converts them into the sound waves, which is received by the microphone.

### 5. Explain How TV transmission occurs.

A. TV transmission is similar to radio transmission with some changes we can transmit pictures.

The picture received in the TV camera is divided into  $625 \times 625$  dots. The entire picture is scanned dot-by-dot 25 times per second. Carrier wave of TV transmitter carries large information due to this transmitter frequency should be high and in the band of VHF or UHF. Reception of these waves at a place depends upon the height of transmitter antenna. Greater the height longer the transmission distance.



The waves travel in straight lines. Now the transmission is through satellite communication.

## I. Fill in the blanks

1. Encoded message is transmitted by sender through a medium, known as .....  
(Channel of communication)
2. Viewers, Readers, listeners are called ..... (Receiver)
3. The person who developed telegraph is ..... (Samuel Morse)
4. Morse signals are in the form of ..... (Dots and dashes)
5. Speed of light ..... ( $3 \times 10^8$  m/sec)
6. In 1876 Alexander Graham Bell invented ..... (Telephone)
7. In the process of sending human voice through wires, sound waves become ..... waves in telephone  
(Electric)
8. In 1895 ..... invented wireless telegraph . (Marconi)
9. In Radio transmission sound waves are changed into ..... (Electromagnetic waves)
10. In 1950 first TV transmission is started by .....  
(British Broadcasting Corporation (BBC))
11. A disturbance that moves through a medium composed of matter is called .....  
(Mechanical wave)
12. When particles of the medium oscillate about their mean position at right angles to the direction of motion the wave is called ..... (Transverse wave)
13. When a rope is vibrating the points with maximum amplitude are called .....  
(Crests)
14. When a rope is vibrating the points with minimum amplitude are called ..... (troughs)
15. The distance between two consecutive crests or consecutive troughs in a transverse wave is called .....  
(Wave length)
16. When the particles of the medium vibrate parallel to the direction of propagation, then the wave is called .....  
(Longitudinal wave)

17. Sound waves travelling in air are example for ..... (Transverse wave)
18. For a particle time taken to complete one vibration is called ..... (Time period (T))
19. The maximum displacement of the particle from the mean position is called ..... (Amplitude)
20. Number of vibrations made by a particle in one second is called ..... (Frequency)
21. Distance travelled by a wave in one second is called ..... (Wave velocity)
22. Time taken to complete one vibration is called ..... (Time period)
23. Range of frequencies heard by man ..... (20 Hz to 20,000Hz)
24. Sound waves with more than 20,000 Hz frequency is called ..... (Ultra sound waves)
25. The sound waves having frequency below 20Hz are called ..... (Intrasonic waves)
26. Velocity of electromagnetic wave ..... ( $3 \times 10^8$  m/s)
27. Radio waves are produced by ..... (Electric circuits)
28. In 1901 ..... sent radio waves over at Atlantic using morse code (Marconi)
29. The range of frequencies used for local tranmission are ..... (300 to 3000Hz)
30. The range of frequencies used for long distance AM transmission are ..... (3 to 30 MHz)
31. Frequency range used for FM radio transmission is ..... (88 to 108MHz)
32. F.M. means ..... (Frequency modulated)
33. Micro phone changes sound waves into signals ..... (Electric)
34. Satellites that transmit information to distant places ..... (Information Satelites)
35. Communication satellites revolve in circular orbit at height of ..... km from the equator (36,000 km)
36. .... animals can hear infrasonic sounds (Dog and owl)

## II. Choose the correct answer

1. Medium required for light to travel [ d ]  
(a) air (b) liquid (c) solid (d) no medium required
2. Inventor of electric telegraph [ c ]  
(a) Marconi (b) Graham Bell (c) Morse (d) non of the above
3. In radio transmission sound waves are changed into [ a ]  
(a) Electric (b) Infrared (c)  $\gamma$  (d) Ultra violet
4. Telephone is invented by [ b ]  
(a) Marconi (b) Graham Bell (c) Morse (d) Newton
5. In transverse wave point with maximum amplitude [ d ]  
(a) Crest (b) Compression (c) Rarefaction (d) Trough
6. Distance between two crests in a transverse wave [ a ]  
(a) Wavelength (b) Amplitude (c) Compression (d) Rarefaction
7. Audible range for human [ b ]  
(a) 200 Hz – 20,000 Hz (b) 20 Hz – 20,000 Hz  
(c) 2 Hz – 20,000 Hz (d) 20 Hz – 2,000 Hz
8. Waves with more frequency than 20,000 Hz [ d ]  
(a) Electric waves (b) Infrasonic waves  
(c) Electromagnetic waves (d) Ultrasound waves
9. Waves with less frequency than 20 Hz [ b ]  
(a) Electric waves (b) Infrasonic waves  
(c) Electromagnetic waves (d) Infrasonic waves
10. You can send the copy of certificate by following instrument. [ b ]  
(a) Telegraph (b) Fax (c) Radio (d) T.V.

**Match the following.**

A	B
1. Person who speaks	a) Transmitter
2. Person who listens	b) receiver
3. transmitted data	c) Message
4. Inventor of telegraph	d) Samuel Mores
5. Inventor of telephone	e) Grahambel
6. First T.V. transmission is by	f) BBC
7. Waves in a thread	g) Transverse waves
8. Sound waves	h) longitudinal waves
9. Time taken for one oscillation	i) Time period
10. Maximum displacement by a particle	j) Amplitude
11. No.of oscillations made by a particle in one second	k) frequency
12. Distance between two successive crests	l) wave length
13. Audiable frequency of man	m) 20 Hz to 20,000 Hz
14. waves with, frequency less than 20,000 Hz	n) ultra sound waves
15. Waves with frequency less than 20 Hz	o) intrasonic waves
16. Wave which travels in vaccum	p) Electromagnetic waves
17. Intrument used for modulation and demodulation	q) Modom
18. These waves are used as carrier waves	r) Electromagnetic waves
19. Satillites used for TV transmission	s) Geo stationany satillites
20. At what distance geo stationary satilles are placed from earth.	t) 36,000 km

**OBJECTIVES**

1. Able to define Biosphere and Ecosystems. Understands the importance of the classification in Ecology
2. Compare the food chain, food web and trophic levels
3. Identifies the reasons for different types of pollution and remedies for control of pollution.

**IMPORTANT POINTS**

1. Environment consists of biotic and abiotic components
2. Biotic and abiotic components depend upon each other
3. The habitats provide food, shelter, environment for the organisms
4. All the abiotic and biotic components of the world, or all the ecosystems collectively called Biosphere
5. The community of the biosphere consists of different trophic levels like plants, animals and microorganisms
6. Through food chains, we can understand the trophic levels and food relations between living organisms
7. The energy of plants is transferred to different trophic levels by the processes of repeated eatings and being eaten
8. Loss of energy takes place, during the transfer of energy. In a food chain, the initial trophic levels receives more energy
9. In nature, the equilibrium of the different gases is maintained or protected by different cycles like carbon cycle and nitrogen cycle

**DEFINITIONS**

1. **Habitat** : A place or set of environmental conditions in which a particular organism lives
2. **Adaptations** : The adjustment made by an organism that lives in a specific habitat by acquiring certain important characteristics that helps it to adjust and live successfully .
3. **Biocoenosis** : All the living organisms in a community is constitute Biocoenosis.
4. **Ecosystem**: A functionally independent unit where living organisms interact among themselves as well as with their physical environment.
5. **Biosphere** : A thin layer on and around the earth which sustains life is called Biosphere.
6. **Food chain** : The relationship of eating and and being eaten up at different levels in an ecosystem represented in the form of a chain.
7. **Food web** : A network of species relationship formed by interconnected food chains.

### THREE MARKS QUESTIONS

#### 1. What are biotic and abiotic components ?

- Ans : 1. All the living organisms including man constitute the biotic components  
e.g., Butterfly, man, cow
2. All the non living things, present around the living organisms together constitute the abiotic components.  
e.g., Air, temperature, soil

#### 2. What is meant by adaptation ? What are the advantages of adaptations to the organisms ?

- Ans : The adjustment made by an organism that lives in a specific habitat by acquiring certain important characteristics that helps it to adjust and live successfully is called an **adaptation**. Due to these adaptations, the organisms
- Strive hard to protect themselves from enemies.
  - Obtain favourable conditions for reproduction and company for reproduction.
  - They compete well for food.

#### 3. Mention the adaptations of the hydrophytes.

Plants which live in water shows the following characters

- Ans : 1. Poorly developed roots. They easily absorb water and salts
2. Long and needle like leaves (*e.g., Hydrilla*) or flat and ribbon shaped (*e.g., Vallisnaria*). They withstand the force of water currents.
3. In *Nymphaea*, the leaves are large, have thick cuticle and float on the surface of water.

#### 4. Write the characters of aquatic vertebrates.

- Ans : 1. As the body of fish is spindle shaped, it offers less resistance to water and helps in rapid movement.
2. Gills are useful in respiration.
3. In fishes fins are useful in swimming and also maintains equilibrium.
4. These animals have eye is with large pupil. It allows more light into the eye. So they can see clearly in water.
5. Some fishes have air bladder. It helps the fish to float in water.

#### 5. Write the adaptations of xerophytic plants.

- Ans : 1. Roots are well developed and are useful to absorb the water from the soil.
2. Stem is green, fleshy and flattened stores water and helpful to discharge the duties of leaf.
3. Leaves are modified into spines. Stomata are few in number to reduce the loss of water through transpiration.

#### 6. Describe flight adaptations in organisms.

- Ans : 1. Body in spindle shaped for rapid movement.
2. Fore limbs are modified into wings, which are helpful in flight.
3. There are strong flight muscles.
4. Body is covered by feathers. They keep the body warm and also help in flight.
5. Bones are pneumatic and hence the skeleton is light and also contains less number of bones.

## 7. What is Biosphere ?

- Ans : 1. The soil, water and air on the earth are essential for the existence of organisms.  
All the water bodies on earth form the hydrosphere.
2. The rocks on the earth and in the oceans form the lithosphere.
  3. The air on earth forms the atmosphere.
  4. The Biosphere is formed by the thin strata of hydrosphere, lithosphere and atmosphere.

## 8. Define food chain, producers and consumers.

- Ans : 1. Transfer of food from the plants (producers) through a series of organisms with repeated eating and being eaten in an ecosystem is called **food chain**.
2. Green plants take raw materials from soil and sun and prepare food materials by the process known as photosynthesis. Hence green plants are called **producers**.
  3. All animals directly or indirectly utilize the food materials produced by the green plants. These are called **consumers**.

## 9. What is meant by food web ?

- Ans : 1. Biological community consists of many food chains. Organisms of same species of different food chains have interrelationships with each other.
2. Grass land consists of a number of food chains.
  3. Network of food chains which are interconnections which are inseparable is called food web.

## 10. Why the flow of energy in an ecosystem is unidirectional? Explain.

- Ans : 1. After receiving the energy from the plants, energy is transferred to the animals of the next trophic level in the form of food.
2. Some energy is wasted during this transfer. At every trophic level of food chain the energy received by an organism use it for its own metabolism and maintenance.
  3. While the energy flow is taking place from one trophic level to another trophic level, the required energy for trophic levels decreases. Energy flow to successive trophic levels takes place only in one direction. That means, the animals nearer to the plants obtain more energy.

## 11. What is the difference between Biosphere and Ecosystem ? Give examples.

- Ans : 1. The complex structure of a habitat with living organisms along with physical and chemical matter is called Ecosystem.  
e.g., Pond, lake, forest
2. Biological communities of larger areas with definite tropical conditions is collectively called Biosphere.  
e.g., Lakes, ponds, grass lands of forest community.

**12. Define food chain and food web.**

Ans : 1. **Food chain** : The relationship of eating and and being eaten up at different levels in an ecosystem represented in the form of a chain.

2. **Food web** : A network of species relationship formed by interconnected food chains form the food web.

**13. Define the biotic and abiotic components with examples.**

Ans : 1. All living organisms, including man constitute biotic components.  
e.g., Butterfly, man

2. All the non living components surrounding the organisms are called abiotic components.  
e.g., Air, temperature

**14. Compare the adaptations of mesophytic plants with that of xerophytic plants.**

Ans :

Mesophytes	Xerophytes
1. Roots are well developed and absorb more water from the soil	1. Roots are well developed and are useful to absorb water from the soil
2. Stem is strongly developed and has branches	2. Stem is fleshy and flattened and store water
3. Leaves are large, more in number and have many stomata	3. Leaves are modified into spines. Stomata are few in number to the water loss

**15. Compare the adaptations of xerophytes with that of hydrophytes.**

Ans :

Xerophytes	Hydrophytes
1. Roots are extensively developed and are helpful for the absorption of water from soil.	1. These plants easily absorb water, and salts. So the roots are poorly developed.
2. Leaves are modified into spines.	2. Leaves are covered with thick cuticle. Leaves are linear, flat or ribbon shaped

**16. Compare the adaptations of hydrophytes with that of mesophytes.**

Ans :

Adaptations of Hydrophytes	Adaptations of Mesophytes
1. These plants absorb water and salts easily. So roots are poorly developed.	1. Roots are well developed and absorb the water mostly.
2. Leaves are covered by cuticle. Leaves are linear, thin, flattened or ribbon shaped	2. Leaves are large, more in number and consists of numerous stomata.

**17. What are xerophytes ? Give two examples.**

Ans : Some plants live in dry conditions and in areas where the temperature is high. Such plants are called xerophytes.  
e.g., *Opuntia*, *Acacia*.

**18. What are mesophytes ? Give two examples.**

Ans : Some plants live on land. They require water, temperature to a limited extent. These plants are called mesophytes.  
e.g., Neem, mango.

**19. What are hydrophytes ? Give two examples.**

Ans : Plants which live in water are called hydrophytes.  
e.g., *Vallisneria*, *Nelumbium*

**20. Define the following terms, giving two examples for each:**

**a. Biotic factors                      b. Abiotic factors**

Ans : a. All the living organisms including man constitute the biotic components  
e.g., Monkey, man, cow

b. All the non living things, present around the living organisms together constitute the abiotic components.  
e.g., Air, temperature, water

**21. Define Habitat and Adaptation.**

Ans : 1. **Habitat** : A place or set of environmental conditions in which a particular organism lives

2. **Adaptation** : The adjustment made by an organism that lives in a specific habitat by acquiring certain important characteristics that helps it to adjust and live successfully .

**22. Define Community and Ecosystem**

Ans : 1. A group of organisms living together with mutual interaction in a natural area is known as **community**.

2. Ecosystem is a community of organisms and their abiotic environment interactive as a ecological unit.

**23. Name any three human activities that destroy the natural habitats.**

Ans : 1. Deforestation  
2. Excessive use of pesticides and chemicals  
3. Industrialisation and lack of control on industrial wastes.

**24. Define population and community.**

Ans : 1. A group of organisms belonging to the same species living in an area is called a **population**.

2. A group of organisms living together with natural interaction in a natural area is known as **community**.

**25. What is meant by photosynthesis ?**

Ans : The green pigment of the plant takes energy from sunlight, and with the help of water and CO<sub>2</sub>, prepare food materials. This process is called photosynthesis.

**26. Define producers and consumers.**

Ans : 1. Green plants take raw materials from soil, energy from sun, prepare their food materials by the process of photosynthesis. These are called producers.

2. All animals directly or indirectly utilise the food materials produced by the green plants. All the animals are called consumers.

**27. What is pyramid of numbers ?**

- Ans : 1. The graphical representation of the number of organisms of different trophic levels of a food chain is called pyramid of numbers.  
2. In pyramid of numbers, producers are at the base and consumers occupy the top position.

**28. What is ammonification ?**

- Ans : Proteins of the body broken and converted into urea and ammonia. These are eliminated by urine. In dead bodies also, the proteins are converted into ammonia occurs. This process is called Ammonification.

**29. What is nitrification ?**

- Ans : The bacteria of soil convert ammonia into nitrates. This process of conversion of ammonia into nitrates is called nitrification.

**30. What is denitrification ?**

- Ans : 1. The nitrates present in wet soil and pond soil are converted into nitrogen by denitrifying bacteria.  
2. This nitrogen again enters into atmosphere. This is called denitrification.

**31. Define Hydrosphere, Lithosphere and Atmosphere.**

- Ans : 1. **Hydrosphere** : Water containing regions or areas on the earth is called Hydrosphere.  
2. **Lithosphere** : The soil and rocks on the earth and on the bottom of the sea form the Lithosphere.  
3. **Atmosphere**: It is the gaseous envelope surrounding the earth surface.

**32. Define Biosphere and Ecosystem.**

- Ans : 1. A thin layer on and around the earth with definite tropical conditions which sustains life is called Biosphere.  
2. A biological community along with its physical, chemical complex structure is called Ecosystem.

**33. What are the advantages of the adaptations in organisms ?**

- Ans : 1. They compete well for food.  
2. They fight well to protect themselves from the enemies.  
3. Obtain favourable conditions for reproduction and company for reproduction.  
4. Respond well accordingly to the atmospheric changes.

**FIVE MARKS QUESTIONS**

**1. What are biotic and abiotic components? Give one example to say that biotic components depend on abiotic components ?**

- Ans : 1. All the living organisms including man constitute biotic components.  
2. All the non living components present around the living organisms constitute abiotic components.  
3. These two components effect on one another. Desert areas are covered on all sides by sand. Due to less rain fall in deserts, water scarcity arises.

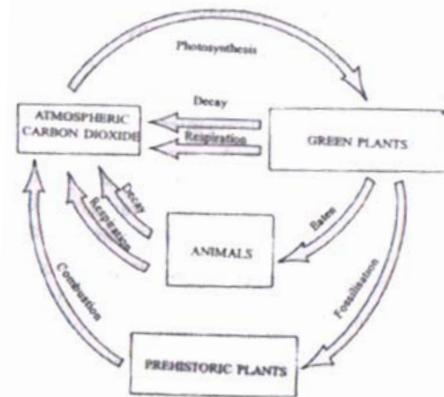
4. In desert areas, during day time, the temperature is very high, and during night time, cold conditions exist.
5. Due to these unfavourable abiotic components, few plants and some animals only live in deserts. e.g., Camel.

**2. Using food chain, explain with examples, the energy flow in an ecosystem ?**

Ans: 1. In food chain, the energy flows from produces to consumers in one direction only.

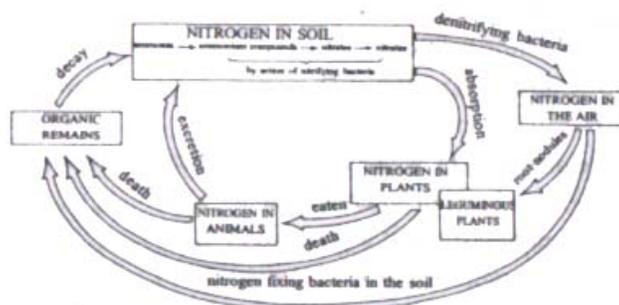
2. If we consider the food chain in a grass land, locust eats grass.
3. Birds eat the locust.
4. By eating or being eaten processes the energy flow takes place from one trophic level to another.
5. In this food chain, grass is the producer and the locust is a herbivore.
6. The bird which eats the locust is a carnivore.
7. The animals which eat both plants and animals are called omnivore.
8. Herbivores, carnivores and omnivores are consumers.

**3. With the help of diagram, explain Carbon cycle.**



1. Green plants prepare food materials by photosynthesis.
2. Atmospheric CO<sub>2</sub> taken up by plants enters into animals in the form of food.
3. After the death of plants and animals, their dead bodies become food for the decomposers.
4. By burning of fuels and through the respiration of plants and animals, the CO<sub>2</sub> reenters into atmosphere.

**4. Sketch the nitrogen cycle.**



**5. Describe the human activities like deforestation, industrial effluents which destroy the natural habitats ?**

Ans : **I. Deforestation :** The area required for the growth of wild plants and animals is becoming insufficient, several animals are becoming extinct.

1. Rainfall is decreases.
2. Due to soil erosion, the fertility of the soil decreases.
3. Ground water level decreases after level decreases.
4. Due to the deficiency of greenary, deserts are formed and CO<sub>2</sub> in atmosphere increases.

**II. Waste materials emitted from the industries.**

1. Sulphur compounds emitted from the electric industries cause respiratory problems in human beings.
2. Hydrocarbons emitted from the petroleum industries cause respiratory problems and the cancer..
3. Due to textile and carpet industries, cause lung diseases.

**FILL IN THE BLANKS**

1. Plants trap sun light and transfer the energy to the next trophic levels in the form of .....
2. In a food chain, the tertiary trophic level consists of .....
3. In a food chain, the energy flow takes place from ..... to consumers only in one direction.
4. The habitat we live is called .....
5. Due to the presence of ....., fish float in water
6. In xerophytic plants, the leaves are modified into .....
7. In deserts, ..... during day time
8. In deserts, .....during night time
9. In an area, having more plants, the air contains more .....
10. In an area having more plants, ..... are few in air
11. In *Nymphaea*, the leaves contain thick .....
12. .... help the animals to respire in water
13. Whale swim with the help of .....
14. Some plants grow in the areas having high temperatures and xeric conditions. Such plants are called .....
15. Snakes are the examples for the .....
16. All terrestrial vertebrates respire with .....
17. Birds and insects use .....as a medium for transport

18. The body of birds is .....for fast movement in air
19. In birds the fore limbs are modified into .....
20. Group of organisms of the same species living in a particular place and in particular time is called .....
21. There are different steps in a food chain and energy transfers from one step to the other. each of these steps in a food chain is called.....
22. If you compare the number of organisms living at each trophic level in a food chain, then you can represent the chain by a .....
23. The base of the pyramid occupied by .....and the top by .....
24. .... bacteria convert nitrates into nitrogen
25. Conversion of Ammonia into nitrates is called .....

### MULTIPLE CHOICE QUESTIONS

1. Which one of the following is helpful for burning ? ( A )
 

A. Oxygen	B. Nitrogen
C. Water vapour	D. O <sub>2</sub>
2. The mechanism of conversion of atmospheric nitrogen into nitrates ( A )
 

A. Nitrification	B. Denitrification
C. Nitrogen nutrition	D. Nitrogen loss
3. The methods by which the CO<sub>2</sub> recycles back into air ( A )
 

A. Burning and respiration	B. Photosynthesis and respiration
C. Decomposers	D. Photosynthesis
4. The climax stage in an ecosystem ( A )
 

A. Population	B. Phosphates
C. Biosphere	D. Herbivores
5. In pyramid of numbers, the top position is occupied by ( C )
 

A. Producers	B. Small carnivores
C. Larger carnivores	D. Herbivores
6. In which of the following habitats, the root system is extensively developed( C )
 

A. Water	B. Terrestrial
C. Desert	D. Amphibians
7. Special features in bones of birds ( D )
 

A. Small and flexible joints	B. Circulation of materials through small pores
C. Possessing hard substances for strength	D. Less number of hollow bones to make the body light

**Match the following :**

- |                          |  |
|--------------------------|--|
| 1. Aquatic organisms     | A. Depends on other living organisms for food                        |
| 2. Terrestrial organisms | B. Complete a part of life cycle in water and the other part on land |
| 3. Aerial organisms      | C. Organisms choose air as medium to move from one place to another  |
| 4. Amphibians            | D. Live on land  |
| 5. Parasites             | E. Live in water   |

**ANSWERS**

**Fill in the Blanks**

- |                             |                            |
|-----------------------------|----------------------------|
| 1. Chemical energy          | 2. Carnivores              |
| 3. Producers                | 4. Environment             |
| 5. Air bladder              | 6. Spines                  |
| 7. Temperature is very high | 8. Temperature is very low |
| 9. Moisture                 | 10. Dust particles         |
| 11. Cuticle                 | 12. Gills or branchiae     |
| 13. Flippers                | 14. xerophytes             |
| 15. Fossorial animals       | 16. Lungs                  |
| 17. Air                     | 18. Spindle shaped         |
| 19. Wings                   | 20. Population             |
| 21. Trophic level           | 22. Pyramid of numbers     |
| 23. Producers; consumers    | 24. Denitrifying           |
| 25. Nitrification           |                            |

**Multiple choice questions**

1. A 2. A 3. A 4. A 5. C 7. C 8. D

**Match the following**

1. E 2. D 3. C 4. B 5. A



**ENVIRONMENTAL PROBLEMS**

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**OBJECTIVES**

1. Understands the effect of growing human population on Environment.
2. To know the reasons for global warming and depletion of ozone layer.
3. Able to give examples for natural and man made environmental problems.

**IMPORTANT POINTS**

1. Balance between the living organisms and physical surroundings is called Environmental Equilibrium.
2. The method of reforestation is called **selviculture**. Replantation or growing of new plants in the deforested areas is called **reforestation**.
3. The addition of unwanted substances into the environment is called **pollution**. Pollution shows its effect on the purity of air, water, land etc.
4. Water pollution is due to domestic, agricultural and industrial activities. The polluted water is not useful for drinking and for industrial use.
5. Addition of substances that change the quality of soil by making it less fertile and unable to support life is called soil pollution. The waste materials are classified into
  - a. Biodegradable wastes:  
e.g., Dung, Paper, wood, vegetable peelings etc.
  - b. Non biodegradable wastes:  
e.g., Aluminium bores, glass bottles, plastic, D.D.T. etc.
6. The ozen layer of the atmosphere prevents the entry of harmful ultraviolet radiations (UV) of the sun reaching the earth surface. Industrial use of chemicals called chlorofluoro carbons (CFCs) in refrigeration, air conditioning, cleaning solvents damage the ozone layer, reduce in its thickness.
7. Due to high concentration of CO<sub>2</sub>, global warming (green house effect) takes place and increases the temperature of the earth.

**DEFINITIONS**

1. **Green House Effect** : Increase in average global temperature due to high concentration of carbon dioxide, methane etc., that trap heat from solar radiations.
2. **Eutrophication** : The enrichment of water bodies with nutrients such as nitrates and phosphates that triggers the growth of blue green algae is called eutrophication. As a result, aquatic animals die due to depetion of oxygen.
3. **Biomagnification**: Entry of harmful, non biodegradable chemical in a low concentration and its accumulation in higher concentration at various levels of food chain



**6. What are the effects of global warming ?**

- Ans : 1. Due to increase in temperature, the melting of ice and melting of ice in tundra regions increases sea level.  
2. Unimaginable atmospheric changes takes place.  
3. The coastal region of Maldives is sinking in Indian Ocean.  
4. Due to quick maturity of crops, the size of the seed decreases, which leads to reduction in the yield.  
5. Shows the effect on the eggs of some fish.

**7. Explain the human activities in your surrounding areas that cause soil pollution.**

- Ans : Addition of substances that change the quality of soil by making it infertile and unable to support life is called soil pollution. Sources of soil pollution are...  
1. Domestic sources : Plastic bags, kitchen wastes, glass bottles and paper.  
2. Industrial sources : Chemical residue, flyash, metallic wastes.  
3. Agricultural residues : Chemical fertilizers and pesticides.

**8. Explain process of conversion of waste materials into a useful products ?**

- Ans : 1. The process of conversion of waste materials into useful products is called **recycling**.  
2. The first type of waste materials are called biodegradable wastes e.g., Agricultural and animal wastes like leaves, twigs, dung etc.  
3. All these are changed into manure and increase the crop yield and also produce biogas and protect the environment.

**9. Give reasons for noise pollution.**

- Ans : 1. Transport vehicles like automobiles, railways and air crafts.  
2. Use of loud speakers, loud music systems and televisions at public places.  
3. Heavy machines in industries and fireworks.

**10. Explain Radio activity.**

- Ans : 1. Explosion nucleus of the atomic molecules like radium, thorium and uranium is called radiation.  
2. Alpha, beta and gamma rays are ionizing radiations. Due to the explosion, they are released into atmosphere and cause ionization in living cells. They cause genetic disorders, leukaemia (blood cancer).

**11. How do you classify the domestic wastes ? What are differences among them? How do you treat these wastes to minimise the pollution ?**

- Ans : 1. The waste products of the domestic sources are the factors for soil pollution.  
3. These waste products from the domestic sources can be recycled into useful products, which minimizes pollution and protects environment.  
2. Another type of wastes like industrial sources and agricultural residues cannot be recycled.

**12. Indicate the measures you suggest to help the people of flood affected areas.**

- Ans : 1. Move the people to the rehabilitation centers safely from flood affected areas.  
2. During floods, control of spreading of the diseases is important.  
3. During flood times, one should use boiled and cooled water, and thoroughly cooked food.

4. During floods, one must be away from the walls which are high and also from electric poles.
5. Divert the water from flooded canal to other canals.
6. Removal of clay and mud from the canals and reservoirs and cleaning should be done.

**13. What is earth quake ? What are its consequences?**

Ans : 1. An earth quake is the shaking, rolling or sudden shock of earth's surface.

Earth quakes are a common phenomenon. Most of the earth quakes paa unnoticed.

Effects:

1. Due to earth quakes, the buildings collapse, roof gets damaged, all the articles fall down and results in property damages.
2. Falling walls may injure people.
3. Roads, bridges and dams are damaged.

**14. What are natural disasters ? Explain their adverse effects.**

Ans : 1. Some environmental problems are not man made but are caused by natural processes. Floods, cyclones, earth quakes, volcanic eruptions, hurricanes, storms and forest fires etc., are some examples for natural disasters.

2. Due to these disasters floods and monsoons are resulted.

**FIVE MARKS QUESTIONS**

**1. In your village, to start new industry, major part of forest area is destroyed. Explain the consequences faced by the people of that area.**

Ans : Destruction of natural forests is called deforestation. Forests are useful in many ways such as yielding timber, protection of wild life, soil conservation and rain fall.

The adverse effects on atmosphere due to deforestation are :

1. Habitat is destroyed. Due to the shortage of living area, the wild plants and animals become extinct.
2. Rainfall decreases in that area.
3. Water level decreases. Ground water level go down
4. Soil erosion occurs. Soil fertility decreases. Due to the deficit of greenary, the area is deserted.
5. CO<sub>2</sub> increases in atmosphere, results in global warming.

(Write any five points - 5 marks)

**2. Explain the problems met by mankind due to the effect of environmental imbalance.**

Ans : The balance between the living organisms and their physical surroundings is called environmental equilibrium. Due to its deficiency, the following problems are resulted.

1. Wild organisms lose their natural habitat. For example, due to deforestation, chetas disappeared.
2. Near Bombay, due to release of chemical effluents of the industries into kalu river, the fish Bombay duck became extinct.
3. Indiscriminate hunting of lions, their number is greatly reduced and the number of herbivores is increased.

4. Due to this, grass is extensively used, soils are eroded and areas are deserted.
5. Due to the changes in the food chain, one type of organisms increase in number causing danger to the others.

(Write any five points - 5 marks)

**3. What are natural disasters ? What are the actions to be taken to prevent the loss ? Explain.**

Ans : Some environmental problems occur naturally.e.g., Cyclones, floods, earth quakes, volcanic eruptions, hurricanes, forest fires etc., These are called natural disasters.

Measures to be taken :

1. By interlinking of rivers, to divert the flood water to another river, can loss can be minimised.
2. To prevent the loss due to cyclones, houses are to be constructed in such a way to withstand cyclones by following scientific methods.
3. One should not go to the places where water level is high during rain and to coastal regions and river sides.
4. Use only pure drinking water. Store rice and pulses grains in large quantities. One must know weather forecast from time to time. Men and animals may die. Hence one must be cautious.
5. If rehabilitation centres are established, in the flood effected areas, people may get shelter in them in emergency.
6. If electric wires touch each other, sparks may be formed.
7. Some times, diseases spreads and causes epidemic.

**4. What are the measures to be taken to protect forests from fires ?**

Ans : 1. In summer, the dry leaves, branches etc., must be removed.

2. By digging of soil in a circle around the fires and spraying of water, fires may be controlled.

3. Information is to be given to fire protection authorities.

4. Animals used in agricultural operations, movable articles are to be shifted to safe places.

5. Do not throw beedi or cigarette or wood with fire into the forests.

**5. Mention any three effects in human beings due to sound which coming from different sources. What are the steps you take to control Noise Pollution ?**

Ans : Effects due to noise pollution

1. Temporary loss of hearing, ear ache, sometimes leads to permanent deafness.

2. Inability to concentrate, head ache.

3. Increased blood pressure, irregular heart beats.

4. Inability to sleep, slow recovery from sickness.
5. Ringing of ears (a feeling, sound coming from within the ear in a very quiet environment).

Prevention and control of noise pollution :

1. Regulate the noise emanating from radio and television.
2. Use automobile horn only in case of emergency.
3. Do not fire crackers.
4. Get all machinery and engines properly tuned and serviced at regular intervals and by the use of silencers.
5. A green belt of vegetation is efficient in absorbing noise.

**6. Explain the role of recycling in environmental protection.**

Ans : The process of conversion of waste materials into useful products is called recycling.

1. Recycling helps in waste material management. Reduces the pressure on natural resources.
2. Recycling of plastic and paper, conversion of urban waste materials into fertilizers, wooden plates.
3. The biodegradable waste materials like leaves, twigs, gram etc., are converted into fertilizers by recycling and increases crop yield.
4. By using cow dung in biogas production, by recycling of waste materials, energy is produced. By all these we can protect our environment.
5. The waste materials (cow dung etc.) from animals of the same group, are used for energy production.

**7. What are the different types of environmental problems ? Explain.**

Ans : Environmental problems are of two types. They are a. Natural and b. Man made

1. Due to increase in population, man is using the natural resources extensively to meet the necessities like food, shelter and energy.
2. Due to excessive utilization of resources and human activities, environmental problems are arising. Those problems include-
  - a. Deforestation and destruction of wild life.
  - b. Air, water and soil pollution.
  - c. Diminishing fossil fuels
  - d. Depletion of ozone layer and global warming.

**8. Explain how you can prevent and control air pollution.**

Ans : 1. At domestic level burning of wood and dung cakes can be replaced by cleaner fuel and use of biogas (formed by the decomposition of animal and plant wastes in a biogas plant).

2. Pooling of transport or use of public transport.
3. Use of unleaded petrol and compressed natural gas - CNG.
4. Regular tuning and servicing of the engines and switching off the engine at red lights or when not in use.
5. By installing tall chimneys, we can reduce industrial pollution.

**9. Name the instrument used to measure the intensity of earth quakes ? How can you protect yourself from the areas favourable for earth quakes?**

Ans : The intensity of earth quakes is measured with **Richter scale**.

1. Keep away from old and tall buildings, electrical poles and walls and wires that liable to collapse.
2. Move out in open.
3. Do not rush to doors or exits,keep calm, never use lift and keep away from windows, mirrors and furniture.
4. Immediately come out of the house, if your if it is badly damaged.
5. While moving out of the house, collect the emergency requisites like food, water, first aid box, medicines, torch light, candles, match box, clothes etc.,

**10. What is global warming ? Name the gas responsible for it. Explain the environmental problems we face due to global warming.**

Ans : Due to deforestation and industrialisation, gases like  $\text{CO}_2$ ,  $\text{CH}_4$ , and  $\text{N}_2\text{O}$  concentration increases in the atmosphere. These gases trap the heating radiations of the sun , which leads to increase in temperature of the earth, leading to global warming. This phenomenon is called green house effect.  $\text{CO}_2$ ,  $\text{CH}_4$ , and  $\text{N}_2\text{O}$  are responsible for this it.

1. Due to global warming, melting of ice caps/glaciers occur which leads to the rise of sea level.
  2. Unpredictable environmental changes takes place.
  3. The coastal areas of Maldeeves will ssubmerge into the Indian ocean.
  4. Early maturity of crops leads to reduced grain size and low yields.
- Hence, I identified green house effect as environmental problem.

### **FILL IN THE BLANKS**

1. The balance between the living organisms and physical environment is called \_\_\_\_\_
2. Due to the absence of \_\_\_\_\_ deserts are formed.
3. The planting of trees in the area of forest where the plants are cut off is called \_\_\_\_\_
4. \_\_\_\_\_ dependent on the medicinal properties of the plants and plant products.
5. The addition of unwanted substances in abnormal concentration that has an adverse effect on organisms and environment. It is called \_\_\_\_\_
6. Ozone layer prevents the of harmful \_\_\_\_\_ radiations of the Sun to reach the earth surface.
7. The enrichment of water with nutrients such as nitrates and phosphates that triggers the growth of blue green algae is known as \_\_\_\_\_
8. The process of conversion of waste materials into useful products is called \_\_\_\_\_

9. \_\_\_\_\_ is the unit measure intensity of sound.
10. The intensity of earth quake is measured with \_\_\_\_\_
11. The decrease in purity of air is called \_\_\_\_\_
12. Addition of substances that change the quality of soil by making it less fertile and unable to support life is called \_\_\_\_\_
13. The chemical \_\_\_\_\_ used in industries damages ozone layer.
14. Plastic bags and waste materials of the surroundings leads to \_\_\_\_\_
15. Unwanted sound leads to \_\_\_\_\_ pollution.
16. Sound pollution is caused by speakers and \_\_\_\_\_
17. Vegetable peelings and paper are examples for \_\_\_\_\_ type of waste materials.
18. The pollutants in the emissions of automobiles are \_\_\_\_\_ and carbondioxide.
19. Accumulation of high concentration of carbondioxide in the atmosphere leads to \_\_\_\_\_
20. To prevent air pollution in industries filters and \_\_\_\_\_ are to be arranged.
21. Water pollution is caused due to natural and \_\_\_\_\_ activities.
22. \_\_\_\_\_ dies when heat is released into rivers.
23. Presence of bacteria and \_\_\_\_\_ in water, leads the communicable diseases.
24. Entry of harmful non biodegradable waste materials into food chain leads to \_\_\_\_\_
25. Growing of forest trees is called \_\_\_\_\_
26. Betterment of ponds and lakes with the nutrients released from the fields is called \_\_\_\_\_
27. Due to deforestation, the number of \_\_\_\_\_ drastically decreased.
28. Due to the growth of population \_\_\_\_\_ problem arises.
29. If the forests are less, the \_\_\_\_\_ in atmosphere is more.
30. To prevent air pollution, use \_\_\_\_\_ instead of burning dung cakes and wood.

### **MULTIPLE CHOICE QUESTIONS**

1. Which one of the following causes air pollution ? (     )
  - A. Carbondioxide
  - B. Cooking Oil
  - C. Lead particles
  - D. Carbon monoxide

2. Growing of forests is called ( )  
 A. Monoculture                      B. Horticulture  
 C. Silviculture                      D. Agriculture
3. One of the following chemicals cause damage to ozone layer ( )  
 A. Chloroflouro carbons              B. Carbondioxide  
 C. Nitrogen                              D. Water vapour
4. Which one of the following is present in high concentration in tertiary consumers? ( )  
 A. Nitrates                              B. Phosphates  
 C. D.D.T                                D. Vitamins
5. Soil erosion is due to ( )  
 A. Pesticides                            B. Cutting down of forests  
 C. Growing forests                    D. Excessive use of manures
6. Biodegradable waste products are ( )  
 A. Plastic                                B. Glass  
 C. Grass                                 D. Aluminium tins
7. Radiation which cause genetic disorders ( )  
 A) Acids and bases                      B) Uranium, Thorium and Iodine  
 C) Bacteria, Viruses                      D) Pesticides
8. Which one of the following is not radiating substance? ( )  
 A. Radium                                B. Thorium  
 C. Uranium                                D. Calcium

**Match the following :**

- I.**
- |                                 |     |                            |
|---------------------------------|-----|----------------------------|
| 1. Communicable disease factors | ( ) | A. Bacteria and viruses    |
| 2. Carbon chemicals             | ( ) | B. Acids and bases         |
| 3. Non carbon chemicals         | ( ) | C. Pesticides and oil      |
| 4. Eutrophication               | ( ) | D. Uranium and Thorium     |
| 5. Radiating substances         | ( ) | E. Nitrates and Phosphates |
- II.**
- |                       |     |                            |
|-----------------------|-----|----------------------------|
| 1. Carbon compounds   | ( ) | A. Factors causing cancer  |
| 2. Sulphur compounds  | ( ) | B. Decrease in plant yield |
| 3. Nitrogen compounds | ( ) | C. Acid rain               |
| 4. Hydrocarbons       | ( ) | D. Green house effect      |

- |             |                    |     |                           |
|-------------|--------------------|-----|---------------------------|
| <b>III.</b> | 1. Cyclones        | ( ) | A. Factors causing cancer |
|             | 2. Floods          | ( ) | B. Pesticides             |
|             | 3. Earth quake     | ( ) | C. Depression             |
|             | 4. Sound pollution | ( ) | D. Rictor scale           |
|             | 5. Soil pollution  | ( ) | E) Loss of hearing        |

### ANSWERS

#### Fill in the Blanks :

- |                              |                      |
|------------------------------|----------------------|
| 1. Environmental equilibrium | 2. Greenary          |
| 3. Reforestation             | 4. Ayurvedam         |
| 5. Pollution                 | 6. Ultra violet      |
| 7. Utrophication             | 8. Recycling         |
| 9. Decidbel or db            | 10. Rictor scale     |
| 11. Air pollution            | 12. Soil pollution   |
| 13. Chloroflouro carbons     | 14. Soil pollution   |
| 15. Sound                    | 16. Vehicles         |
| 17. Biodegradable            | 18. Carbon monoxide  |
| 19. Green house effect       | 20. Tall chimneys    |
| 21. Man made                 | 22. Fish             |
| 23. Virus                    | 24. Biomagnification |
| 25. Selviculture             | 26. Eutrophication   |
| 27. Cheetas                  | 28. Environmental    |
| 29. Carbondioxide            | 30. Biogas           |

#### Multiple Choice Questions :

- |      |      |      |      |
|------|------|------|------|
| 1. B | 2. C | 3. A | 4. C |
| 5. B | 6. C | 7. B | 8. D |

#### Match the following :

- |             |      |      |      |      |      |
|-------------|------|------|------|------|------|
| <b>I.</b>   | 1. A | 2. C | 3. B | 4. E | 5. D |
| <b>II.</b>  | 1. D | 2. C | 3. B | 4. A |      |
| <b>III.</b> | 1. C | 2. A | 3. D | 4. E | 5. B |



**OBJECTIVES**

1. To study the classification of plants and animals with examples
2. To understand the importance of vertebrates
3. To develop skills in drawing diagrams

**IMPORTANT POINTS**

1. Living organisms show great variation in their size. They include microscopic organisms to huge bodied animals like whales.
2. Classification is useful in understanding the inter relations among organisms.
3. In classification, species is the smallest unit and kingdom is the highest unit. In between these two, there are family, order, class, phylum etc.,
4. Every organism has a scientific name with two words (namely, genus and species) - Binominal nomenclature.

**DEFINITIONS**

1. **Classification** : Arranging the organisms into groups or phyla based on similarities and differences.
2. **Species** : A group of similar organisms sharing a common gene pool and inter breeding freely producing fertile offspring.
3. **Family** : A group containing two or more related genera and can be distinguished from the other such groups by important differences.
- 4.
5. **Animalia** : It is the highest taxonomic category. All types of animals are included in it. It is divided into nine phyla.

**THREE MARKS QUESTIONS****1. Define the following :**

- a. Species    b. Classification**

Ans :a. **Species** : A group of similar organisms sharing a common gene pool and inter breeding freely producing fertile offspring.

b. **Classification** : Arrangement of organisms into different taxonomic groups based on their inter relationships.

**2. Define the word family in Animal classification. Give an example.**

Ans :A group containing two or more related genera and can be distinguished from the other such groups by important differences.

*e.g.*, Lion and Tiger appears to have similar characters. But they belong to different genera. Both of them are included in the Family Felidae.

**3. Write the meanings of the following words in Animal Kingdom :**

**a. Domesticus      b. Esculenta      c. Religimosa**

Ans : a. *Domesticus*      -      House  
b. *Esculenta*      -      Eating  
c. *Religimosa*      -      Holiness

**4. How many types of crows are there in India ? Write their scientific names and common names**

Ans : a. *Carvus spendens*      -      Domestic crow  
b. *Carvus macrorhyncus*      -      Wild crow

**5. Who proposed five kingdom classification ? Name those kingdoms.**

Ans : R.H. Whittaker (1969) proposed the five kingdom classification.

The five kingdoms are :

1. Monera
2. Protista
3. Fungi
4. Plantae
5. Animalia

**6. In which Kingdom Bacteria are included ? In which shapes the bacteria occur ?**

Ans : 1. Bacteria belong to the Kingdom Monera

2. The shapes of bacteria are :

- a. Round      :      Cocci
- b. Rod like      :      Bacilli
- c. Spirally coiled      :      Spirilli

**7. What are the divisions of Kingdom Plantae? Name them**

Ans : Kingdom Plantae contains four divisions. The are -

- a. Algae
- b. Bryophyta
- c. Pterydophyta
- d. Spermatophyta

**8. Write characters of Aschelminths**

Ans : 1. Elongated, cylindrical and unsegmented body  
2. Long alimimentary canal with mouth and anus  
3. Mostly parasites. Some live in soil

**9. Write characters of Mollusca**

Ans : 1. Soft and unsegmented body  
2. Have a shell mainly made by calcium carbonate  
3. Have a muscular foot, which helps in locomotion, creeping etc.

**10. Describe characters of echinoderms and give two examples**

Ans : 1. Echinoderms are characterised by spiny skin  
2. All body parts are arranged around oro aboral axis  
3. Examples - Star fish, Brittle star, Sea Urchin

**11. How many Subphyla are there in Chordata ? Name them. Give examples.**

Ans : Chordata contains three Subphyla. They are -

1. Urochordata - e.g., *Herdmania*
2. Cephalochordata - e.g., *Amphioxus* (Marine)
3. Vertebrata - e.g., Fish, Frog, Snake, Bird

**12. Enumerate the characters of Pisces**

Ans : 1. Body is covered by scales

2. Limbs are absent. But possess fins

3. Respire with gills. Lungs are absent

4. Heart is two chambered

5. In bony fishes, gills are covered by an operculum

6. In cartilagenous fishes, gills are not covered by operculum

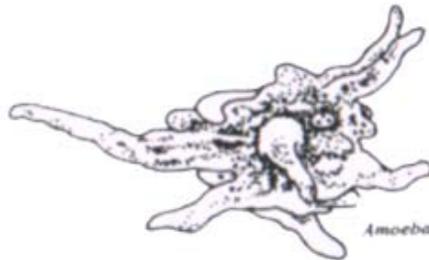
**13. Basically how many types of fishes are there ? Name them. Write their characters.**

Ans : 1. Fishes are basically two types, namely, **Cartilagenous fishes** and **Bony fishes**

2. In Cartilagenous fishes, skeleton is cartilagenous and in these fishes, gills are not covered by operculum.

3. In bony fishes, skeleton is formed by bones. In these fishes, gills are covered by an operculum.

**14. Draw diagram of *Amoeba***



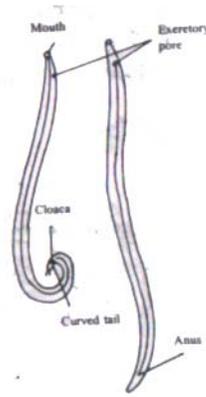
**15. Draw diagram of *Paramecium***



**16. Draw diagram of *Hydra***



## 17. Draw diagrams of male and female *Ascaris*



### FIVE MARKS QUESTIONS

#### 1. What is meant by classification ? Describe its importance in organisms

Ans : 1. Based on the resemblances and differences, grouping organisms into various taxa (Divisions, Phyla etc.,) is known as **classification**.

#### 2. Importance of classification :

- There are different types of organisms on earth
- Some organisms are closely related to each other
- In organisms, some are related and some are quite different
- All organisms possess the features of living things and differ from that of non living things
- Due to similarities or differences, organisms are divided into groups or Phyla, we can study the organisms, which we can not see.

#### 2. What are the uses of classification ?

- Ans :
- We can understand innumerable organisms by their classification
  - Great variations among organisms can be briefly explained
  - It helps to know the relations among different organisms
  - One can understand the size of animals
  - It acts as base for the other sciences that are related to Biology

#### 3. In two Kingdom classification, there are some problems. What are they ?

Ans : Formerly, the organisms are classified into two main Kingdoms. They are Kingdom Plantae and Kingdom Animalia. There are some problems in this classification.

- Mushrooms and bread moulds are included in plants. But there are no leaves or chlorophyll. Hence, their inclusion is not proper.
- Unicellular organisms like *Euglena* and Bacteria are not adjusted in animals or plants. Bacteria have cell wall. But chlorophyll is absent. In *Euglena*, cell membrane is present but cell wall is absent and has chlorophyll.

#### 4. Based on which factors, five Kingdom classification was prepared ?

Ans : In five Kingdom classification, organisms are placed in five Kingdoms, namely, Monera, Protista, Fungi, Plantae and Animalia.

This classification was based on three factors :

- Unicellular or multicellular nature of organisms

2. Genetic material (chromosomes) lie in nucleus or freely floating in cytoplasm
3. Third one is mode of nutrition - preparation of food materials by photosynthesis or depends on others or absorption of decomposing organic food materials.

**5. For organisms, we must prefer scientific names rather than common names. Justify this statement.**

Ans : Common names of an organism are different in different areas. Hence, common names cause ambiguity in identifying a particular organism.

For example -

- a. Custard apple has different names such as Seetaphal, Kasiphal, Patha, Kaddu etc.,
- b. In India there are many regional languages. It is very difficult to learn the regional terms by all people.
- c. Similarly, it is much difficult to know these terms by the people of different countries.
- d. Hence, there is a need for providing a scientific name.
- e. Due to the use of scientific name, there will be no ambiguity in different areas and countries.

**6. Explain the characters of Bacteria.**

Ans : **1. Size** : Bacteria of microscopic organisms. Rarely they reach 0.01 mm in length.

**2. Cell membrane** : It is not formed by cellulose. Chromosomal material is not enveloped by a nuclear membrane.

**3. Shape** : Spherical, rod like or spiral

**4. Nutrition** : Release enzymes on food materials and then absorb

**5. Reproduction** : By binary fission

**7. Describe characters of Algae.**

Ans : 1. Algae grown in all types of water bodies

2. Specific roots, stem, leaves are absent

3. Absorb mineral salts from the surrounding water

4. Some algae, such as, sea weeds are very long

5. Some marine algae and weeds are useful to man and animals as food

**8. Write characters of Angiosperms**

Ans : 1. In Greek, the word angiosperms means - angio : cover and sperm : seed

2. These are flowering plants. In these plants seeds are present inside the fruit

3. One seed contains embryo and the materials required for its early development

4. Flower is the important part. It contains male and female reproductive organs

5. Angiosperms are of two types - If seed contains two cotyledons, they are called **Dicots** ; if seed contains one cotyledon, they are called **Monocots**.

**9. Describe important characters of Pteridophyta**

Ans : 1. Pteridophytes are called **snakes of plant science**

2. Pteridophytes have roots, stem and leaves

3. Leaves have spores for reproduction

4. Pteridophytes will not produce flowers or seeds

**10. Explain characters of Bryophyta**

Ans : 1. Bryophytes have chlorophyll. They are small and grow on damp soil or on damp walls

2. They have root like structures. But true roots are absent
3. They have small, green leaves
4. Some mosses have long and slender stalks
5. The terminal part of each stalk bears a capsule and containing spores
6. Spores are released from the capsule and which germinate in favourable conditions

**11. Enumerate the characters of Gymnosperms**

Ans : 1. In Greek *gymno* means naked / without cover and sperm means seed

2. They are fruit less seed plants
3. Reproduction organs are formed in cones
4. In Himalayas and on other hills many species will grow. All of them are called **conifers**.
5. These are used in the manufacture of plywood.

**12. What are the differences between Gymnosperms and Angiosperms ?**

Gymnosperms	Angiosperms
1. These plants produce seeds without a fruit cover	1. In these plants seeds lie inside the fruits
2. True flowers are absent	2. True flowers are present
3. Pine cones have hard scales, which provide support for the seeds formed on them	3. The seed contains cotyledons which provide nutrition for the embryo and its early development
4. Reproduction organs are formed in cones	4. Reproduction organs are present in flowers
5. In gymnosperms the important plant in <i>Pinus</i>	5. Angiosperms can be divided into monocots ( <i>e.g.</i> , Corn) and dicots ( <i>e.g.</i> , Mango)

**13. Mention different Phyla in Animalia and give an example for each**

- Ans :
- |                    |   |                                       |
|--------------------|---|---------------------------------------|
| a. Porifera        | - | <i>e.g.</i> , Sponges                 |
| b. Cnidaria        | - | <i>e.g.</i> , Jelly fishes, corals    |
| c. Platyhelminthes | - | <i>e.g.</i> , Tapeworm                |
| d. Achelminthes    | - | <i>e.g.</i> , Roundworm               |
| e. Annelida        | - | <i>e.g.</i> , Earthworm               |
| f. Arthropoda      | - | <i>e.g.</i> , Insects, spiders, crabs |
| g. Mollusca        | - | <i>e.g.</i> , Snail, oyster           |
| h. Echinodermata   | - | <i>e.g.</i> , Star fish, sea urchin   |
| i. Chordata        | - | <i>e.g.</i> , All vertebrates         |

**14. Write the characters of the animals included in Phylum Porifera**

- Ans :
1. Most of the poriferans are marine. Very few forms live in fresh water
  2. These are found attached to other objects in water. Body contains a cavity
  3. There are numerous pores on the body, through which, water along with micro organisms (= food) enter the body
  4. At the free end of the body, there is a large opening, through which, water goes out
  5. There are microscopic spicules and / or special fibres, which act as skeleton and supports the body

**15. Describe characters of cnidarians**

- Ans : 1. These are cylindrical or umbrella shaped organisms. They have a cavity in the body which opens at one end
2. Mouth is surrounded by tentacles. They contain stinging cells, which are useful in food collection
  3. Food enters the body through mouth and the undigested matter pass out through mouth itself
  4. Some animals like corals secrete rigid calcareous skeleton
  5. They reproduce asexually (by budding) and sexually

**16. Explain important features of Platyhelminthes**

- Ans : 1. Platyhelminths are small, soft and flat worms
2. Mostly of these animals have alimentary canal with mouth only
  3. Most of them are parasites
  4. Liver fluke and tapeworm are examples for endoparasites
  5. Very few forms are free living ( live in sea / fresh water).

**17. Enumerate the characters of annelids**

- Ans : 1. These animals have long and cylindrical body formed by ring like segments.
2. Well developed digestive system is present.
  3. Alimentary canal has mouth and anus
  4. Earthworms live in damp soil
  5. Leeches live in water. They attach the bodies of cattle and man and suck their blood.

**18. Write the characters of Arthropoda**

- Ans : 1. These are animals with jointed legs
2. Most of the arthropods have a pair of appendages in each segment.
  3. Body is covered by exoskeleton, formed by chitinous plates.
  4. During growth, the old skeleton is shed off and new skeleton will develop.
  5. Insects have three pairs of legs and two pairs of wings.

**19. Enumerate the characters of the animals of Phylum Chordata**

- Ans : 1. In all chordates (including man), in embryonic stage, there is a slightly flexible rod along the mid dorsal line of the body, called notochord.
2. Gradually, notochord is replaced by the vertebral column.
  3. Chordates have gill slits. In some forms, they may exist throughout life and in others they are confined to embryonic stages only.
  4. There is a post and tail.
  5. But in man tail disappears before birth.

**20. Five kingdom classification is better than the two kingdom classification. Explain it with two examples.**

- Ans : 1. Previously the organisms are divided into two kingdoms, namely, Plantae and Animalia. There are some problems in this classification. They are -
- a. Mushrooms and bread molds are included in plantae. But they lack leaves and chlorophyll. Hence, their inclusion in plantae is incorrect.
  - b. Unicellular organisms like *Euglena*, bacteria also does not exactly fit in

Plantae or in Animalia. In bacteria, cell wall is present but chlorophyll is absent. In *Euglena* cell membrane is present but not cell wall. It has chlorophyll.

2. Hence five kingdom classification is better than the two kingdom classification.

**21. Write characters of amphibians.**

Ans : 1. Amphibians live in water as well as on land.

2. Skin is smooth and scale less.

3. They respire with skin in water and with lungs on land. Larvae respire with gills. Few adults also have gills.

4. They have three chambered heart.

5. Amphibians are poikilothermic animals. Their body temperature is altered according to that of surroundings.

6. Tympanum and tympanic cavity are present (In some, they are absent).

**22. Name the sub phyla of Chordata. Explain them briefly.**

Ans : Chordata is divided into three sub phyla

**1. Urochordata** : Notochord lies in the tail of larvae only.

**2. Cephalochordata** : Notochord extends upto the anterior tip of the body beyond nerve cord.

**3. Vertebrata** : In these animals, notochord is replaced by vertebral column. Head is distinct.

**23. Mention the characters of Plantae and divide it upto sub phyla.**

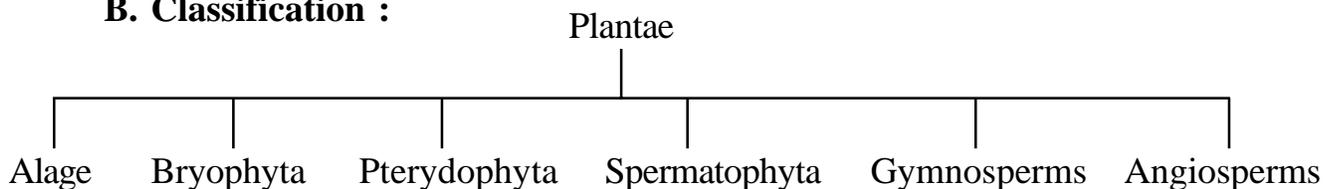
Ans : **A. Characters :**

1. These are multicellular organisms

2. Most of the cells of the body contain chlorophyll, which helps in photosynthesis

3. Cells are covered by a cell wall formed by cellulose

**B. Classification :**



**24. Describe the characters of mammals**

Ans : 1. Most of the mammals give birth to young ones. They were nourished by the milk secreted by mammary glands

2. Skin contains hair

3. There are pinnae (ear lobes) on the head

4. In males, testes lies in scrotal sacs outside the body

5. Heart is four chambered

6. These are homeothermic animals

7. Mature red blood cells lack nucleus

**25. Explain the characters of class Aves (birds)**

Ans : 1. Body is covered by feathers

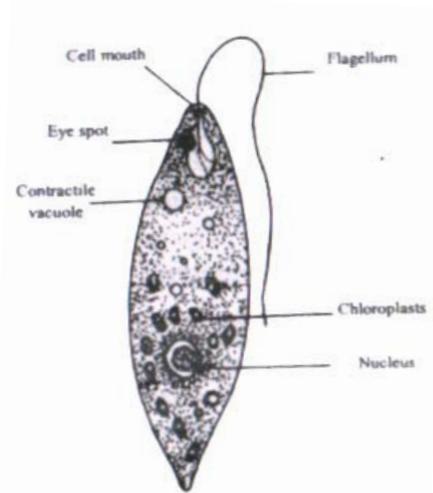
2. Fore limbs are modified into wings. Hind limbs are present and are helpful in walking, running, perching etc.,

3. Lower parts of the legs are covered by horny skin with scales
4. Heart is four chambered
5. Bones are pneumatic (contain air cavities). Hence, the weight of the skeleton is reduced. It is one of the flight adaptations.
6. These are homeothermic animals
7. Eggs are large and are covered by calcareous shell.

**26. Describe characters of class Reptilia**

- Ans :
1. These are adapted to live on land. But few live in water also.
  2. These are poikilothermic animals. Most of the reptiles are found in arid regions.
  3. They respire with lungs
  4. Skin is covered by horny scales, scutes etc.,
  5. Eggs are covered by thin shell.

**27. Draw labelled diagram of Euglena**



**FILL IN THE BLANKS**

1. \_\_\_\_\_ is heavier than thirty elephants
2. Number of chambers in the heart of frog is \_\_\_\_\_
3. Binominal nomenclature was introduced by \_\_\_\_\_
4. *Homo sapiens* is the zoological name of \_\_\_\_\_
5. In classification, sapiens means \_\_\_\_\_
6. Five kingdom classification was introduced by \_\_\_\_\_
7. \_\_\_\_\_ produce seeds without fruits
8. In \_\_\_\_\_, seeds are enveloped by the fruit
9. Plants with one cotyledon are \_\_\_\_\_
10. Plants with two cotyledons are \_\_\_\_\_
11. Animals with jointed legs belong the phylum \_\_\_\_\_
12. Star fish belongs to the phylum \_\_\_\_\_
13. Basic unit of classification is \_\_\_\_\_

14. The largest taxon in classification is \_\_\_\_\_
15. \_\_\_\_\_ proposed two names for each organism
16. Flat worms in which alimentary canal has a single opening are included in the phylum \_\_\_\_\_
17. Minute spicules are found in the animals of phylum \_\_\_\_\_
18. Even though the animals of phylum \_\_\_\_\_ appears to be segmented, they are unsegmented animals
19. In the animals of sub phylum \_\_\_\_\_ notochord is replaced by vertebral column
20. Notochord is confined to tail of larvae in \_\_\_\_\_
21. Shell of snails is mainly formed by \_\_\_\_\_
22. In bony fishes, gills are covered by \_\_\_\_\_
23. Ventricle is incompletely divided in \_\_\_\_\_
24. In cartilagenous fishes, gills are not covered by \_\_\_\_\_
25. Shell of bird egg is formed by \_\_\_\_\_
26. In warm blooded animals, the body temperature is constant between \_\_\_\_\_
27. If body temperature is constant, the animals is called \_\_\_\_\_
28. Animals with milk glands belong to \_\_\_\_\_
29. The hybrid produced by crossing a male ass and female horse is \_\_\_\_\_
30. The organisms with filamentous body belong to the kingdom \_\_\_\_\_
31. The fungi used in the preparation of bread and wine is \_\_\_\_\_
32. In Greek, the word *angio* means \_\_\_\_\_
33. Zoological name of common earthworm is \_\_\_\_\_
34. The exoskeleton of arthropods is formed by \_\_\_\_\_
35. Unicellular, eukaryotic organisms belong to \_\_\_\_\_
36. First discovered antibiotic is \_\_\_\_\_
37. Sea weeds belong to the class \_\_\_\_\_
38. In bony fishes, skeleton is formed by \_\_\_\_\_
39. Viviparous vertebrates belong to \_\_\_\_\_
40. Number of chambers in the heart of fish is \_\_\_\_\_
41. Number of chambers in the heart of amphibians is \_\_\_\_\_
42. Number of chambers in the heart of birds is \_\_\_\_\_
43. Number of chambers in the heart of mammals is \_\_\_\_\_
44. Partially divided ventricle is found in \_\_\_\_\_





24. In Greek, *angio* means ( )  
 A. Covered B. Seed  
 C. Heart D. Pinus
25. Example for a dicot ( )  
 A. Pine B. Coconut  
 C. Maize D. Mango
26. Example for a monocot ( )  
 A. Pea B.  
 C. Maize D. Mango
27. Mushrooms belong to this kingdom ( )  
 A. Monera B. Protista  
 C. Fungi D. Plantae
28. These animals belong to Porifera ( )  
 A. Sponges B. Corals  
 C. Oysters D. Sea urchins
29. Jelly fishes belong to ( )  
 A. Porifera B. Cnidaria  
 C. Annelida D. Arthropoda
30. Roundworms belong to ( )  
 A. Cnidaria B. Platyhelminthes  
 C. Aschelminthes D. Annelida
31. Earthworm belongs to the phylum ( )  
 A. Chordata B. Mollusca  
 C. Arthropoda D. Annelida
32. Insects are included in ( )  
 A. Mollusca B. Echinodermata  
 C. Arthropoda D. Cnidaria
33. Animals with a back bone are included in ( )  
 A. Chordata B. Annelida  
 C. Cnidaria D. Aschelminthes
34. The animals with a skeleton formed by minute spicules are included in ( )  
 A. Annelida B. Porifera  
 C. Echinodermata D. Mollusca
35. In this animals, mouth is surrounded by tentacles ( )  
 A. Earthworm B. Tapeworm  
 C. *Hydra* D. Jelly fish

36. This animal lives in the bile duct of liver of sheep ( )  
 A. Liver fluke B. Earthworm  
 C. Leech D. Roundworm
37. Eventhough appears to be segmented, these are unsegmented animals( )  
 A. Earthworm B. Leech  
 C. Tapeworm D. Star fish
38. *Hirudinaria medicinalis* is the zoological name of ( )  
 A. Earthworm B. Leech  
 C. *Ascaris* D. Crab
39. Animals with jointed appendages belong to this phylum ( )  
 A. Annelida B. Aschelminthes  
 C. Arthropoda D. Mollusca
40. Shell of snail is mainly formed by ( )  
 A. Calcium carbonate B. Calcium silicate  
 C. Hydrochloric acid D. Chitin
41. This animal belong to Echinodermata ( )  
 A. Mussel B. Snail  
 C. Spider D. Star fish
42. Number of sub phyla in chordata is ( )  
 A. 1 B. 2  
 C. 3 D. 4
43. Special classes in vertebrate ( )  
 A. 5 B. 4  
 C. 2 D. 10
44. Number of chambers in the heart of fish is ( )  
 A. 1 B. 2  
 C. 3 D. 4
45. Example for cartilagenous fish ( )  
 A. Rohu B. *Catla*  
 C. Trout D. Shark
46. Ambibians are ( )  
 A. Live in water only B. Fly in air  
 C. Live on land D. Live on land and in water
47. Cold blooded animal is ( )  
 A. Man B. Monkey  
 C. Frog D. Pigeon

48. Animal with three chambered heart is ( )  
 A. Toad B. Fish  
 C. Sparrow D. Bat
49. Ventricle is incompletely divided in ( )  
 A. Frog B. Owl  
 C. Penguin D. Lizard
50. Bones are with air cavities in ( )  
 A. Pigeon B. Crocodile  
 C. Toad D. Cat
51. Animals with milk glands belong to ( )  
 A. Reptilia B. Aves  
 C. Mammalia D. Amphibia
52. RBC are nucleated in ( )  
 A. Cat B. Camel  
 C. Rat D. Monkey
53. Mule is not considered as a species, because ( )  
 A. It is not animal B. It will not produce fertile offspring  
 C. It is born to female horse D. It is born to ass

### MATCH THE FOLLOWING

- |           | <b>Animal</b> |     | <b>Phylum</b>      |
|-----------|---------------|-----|--------------------|
| <b>I.</b> | 1. Earthworm  | ( ) | A. Cnidaria        |
|           | 2. Star fish  | ( ) | B. Mollusca        |
|           | 3. Snail      | ( ) | C. Platyhelminthes |
|           | 4. Jelly fish | ( ) | D. Annelida        |
|           | 5. Tapeworm   | ( ) | E. Echinodermata   |

- |            | <b>Animal</b> |     | <b>Phylum</b>    |
|------------|---------------|-----|------------------|
| <b>II.</b> | 1. Roundworm  | ( ) | A. Porifera      |
|            | 2. Spider     | ( ) | B. Arthropoda    |
|            | 3. Sponges    | ( ) | C. Cnidaria      |
|            | 4. Oysters    | ( ) | D. Mollusca      |
|            | 5. Corals     | ( ) | E. Aschelminthes |

- |             | <b>Classes</b> |     | <b>Animals</b> |
|-------------|----------------|-----|----------------|
| <b>III.</b> | 1. Pisces      | ( ) | A. Bat         |
|             | 2. Amphibia    | ( ) | B. Sparrow     |
|             | 3. Reptilia    | ( ) | C. Snake       |
|             | 4. Aves        | ( ) | D. Frog        |
|             | 5. Mammalia    | ( ) | E. Rohu        |

	<b>Common name</b>		<b>Zoological name</b>
IV.	1. Man	( )	A. <i>Felis domesticus</i>
	2. Cat	( )	B. <i>Felis tigris</i>
	3. Tiger	( )	C. <i>Musca domstica</i>
	4. Honey bee	( )	D. <i>Homo sapiens</i>
	5. Housefly	( )	E. <i>Apis indica</i>

	<b>Common name</b>		<b>Botanical name</b>
V.	1.	( )	A. <i>Hibiscus esculenta</i>
	2. Banyon tree	( )	B. <i>Mangifera indica</i>
	3. Rubber plant	( )	C. <i>Ficus bengalensis</i>
	4. Mango	( )	D. <i>Ficus elastica</i>
	5. Ladies fingers	( )	E. <i>Ficus religiosa</i>

	<b>List - A</b>		<b>List - B</b>
IV.	1. Class	( )	A. Some related classes
	2. Family	( )	B. Some related families
	3. Kingdom	( )	C. Group of organisms which are distantly related
	4. Order	( )	D. Two or more related species
	5. Phylum	( )	E. Some related orders

## ANSWERS

### Fill in the Blanks :

- |                       |                      |
|-----------------------|----------------------|
| 1. Whale              | 2. Three             |
| 3. Linnaeus           | 4. Man               |
| 5. Wise               | 6. Whittaker         |
| 7. Gymnosperms        | 8. Angiosperms       |
| 9. Monocots           | 10. Dicots           |
| 11. Arthropoda        | 12. Echinodumata     |
| 13. Species           | 14. Kingdom          |
| 15. Linnaeus          | 16. Platy helminthes |
| 17. Porifera          | 18. Platy helminthes |
| 19. Vertebrata        | 20. Urochordata      |
| 21. Calcium carbonate | 22. Operculum        |
| 23. Reptiles          | 24. Operculum        |
| 25. Calcium carbonate | 26. 38° C and 41° C  |

- |                               |               |
|-------------------------------|---------------|
| 27. Warm blooded animals      | 28. Mammalia  |
| 29. Mule                      | 30. Fungi     |
| 31. Yeast                     | 32. Cover     |
| 33. <i>Pheretima posthuma</i> | 34. Chitin    |
| 35. Protista                  | 36. Pencillin |
| 37. Algae                     | 38. Bone      |
| 39. Mammalia                  | 40. Two       |
| 41. Three                     | 42. Four      |
| 43. Four                      | 44. Reptiles  |

**Multiple Choice Questions :**

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1. C  | 2. A  | 3. D  | 4. A  | 5. D  |
| 6. A  | 7. D  | 8. C  | 9. C  | 10. B |
| 11. B | 12. C | 13. A | 14. C | 15. D |
| 16. D | 17. A | 18. B | 19. A | 20. C |
| 21. B | 22. D | 23. B | 24. A | 25. D |
| 26. C | 27. C | 28. A | 29. B | 30. C |
| 31. D | 32. C | 33. A | 34. B | 35. C |
| 36. A | 37. C | 38. B | 39. C | 40. A |
| 41. D | 42. C | 43. A | 44. B | 45. D |
| 46. D | 47. C | 48. A | 49. D | 50. A |
| 51. C | 52. B | 53. B |       |       |

**Match the following :**

- |             |      |      |      |      |      |
|-------------|------|------|------|------|------|
| <b>I.</b>   | 1. D | 2. E | 3. B | 4. A | 5. C |
| <b>II.</b>  | 1. E | 2. B | 3. A | 4. D | 5. C |
| <b>III.</b> | 1. E | 2. D | 3. C | 4. B | 5. A |
| <b>IV.</b>  | 1. D | 2. A | 3. B | 4. E | 5. C |
| <b>V.</b>   | 1. E | 2. C | 3. D | 4. B | 5. A |
| <b>VI.</b>  | 1. E | 2. D | 3. C | 4. B | 5. A |



**CELLS, TISSUES AND ORGANS -  
THE BUILDING BLOCKS OF THE BODY****OBJECTIVES**

1. Able to describe the structural details of the cell in plants and animals with the help of diagram.
2. Able to understand necessity of cell division in growth, development and reproduction.

**IMPORTANT POINTS**

1. Cell is the basic structural and functional unit of an organism.
2. Each cell basically consists of cell membrane, cytoplasm and nucleus.
3. A **tissue** is a group of cells which are essentially of the same kind and of same origin and performing same function.
4. An **organ** is a group of different tissues performing similar function.
5. The animal tissues are epithelial, connective, muscular and nervous tissues.
6. Plant tissues are meristamatic and permanent
7. The complex structures of the cell which perform different metabolic activities are called **cell organelles**.
8. **Mitochondria** : Mitochondria are minute cell organelles present in the cytoplasm. Cellular respiration takes place in mitochondria in which glucose is oxidised and thus energy is released.
9. **Lysosomes** : These are small sac like cell organelles and contain digestive enzymes. They help in cleaning the cell by digesting damaged or non functional components of the cell and bacteria.
10. **Plastids** : Plastids are in different shapes such as oval, round or discoid. Of these the most common are chloroplasts containing chlorophyll.
11. **Mitosis** : Cell division that takes place for growth and replacement.
12. **Meiosis** : Cell division that takes place in gonads to produce gametes. In meiosis, the number of chromosomes of the daughter cells is reduced to half of the parent cell.
13. **Meristamatic tissues** : Meristamatic tissue is present in the growing regions of the plant like root tip and shoot tip. These cells divide rapidly and add new cells to the plant.
14. **Conducting tissue** : This tissue helps in upward and downward movement of liquids in the plant body. They are of two types, namely, xylem and phloem.
15. **Xylem** : Xylem is a conducting tissue which conducts water and salts absorbed from the soil to the terminal portion of the plant.

16. **Phloem** : Phloem conducts food synthesized in the leaves to different parts of the plant.
17. **Heridity** : The transmission of characters from one generation to the other, that is from parents to offsprings is called heridity.
18. **Conjunctive tissue** : Tissue which supports or connects different tissues and organs is called conjunctive tissue.

### THREE MARKS QUESTIONS

#### 1. What are the differences between plant cell and animal cell?

Plant cell	Animal cell
1. Cell wall is present	1. Cell membrane present
2. Chloroplasts are present	2. Chloroplasts are absent
3. Plant cell consists of one or two large vacuoles.	3. Animal cell consists of many small vacuoles.

#### 2. Is it justifiable to call cell as structural and functional unit of organisms? Explain.

- Ans : 1. Every individual begin its life with a single cell called **zygote**.  
 2. Each cell basically consists of cell membrane, cytoplasm and nucleus.  
 3. Any function of the body is dependent on the functioning of the cells.  
 4. Cell helps in the growth of the body of organisms.  
 5. Reproduction takes place with the help of cells.  
 By observing the above facts, we can say that cell is the structural and functional unit of an organism.

#### 3. Describe the function of cell in plants.

- Ans : 1. New cells are formed as a result of cell division.  
 2. The absorption of water and minerals from the soil takes place through cell.  
 3. The pigments that are present in the cell are responsible for the colour of the flower.

#### 4. Why lysosomes are called the suicidal bags of the cell?

- Ans : 1. Lysosomes are small, sac like cell organelles that occur in different shapes.  
 2. Lysosomes contain digestive enzymes.  
 3. They destroy the own components of the cell which are non functional and other components like bacteria that enter the cell. When cells are old, diseased or injured, lysosomes burst and digest that cell. Hence they are called suicidal bags of the cell.

#### 5. State the reasons for the occurrence of plastids only in plant cell.

- Ans : 1. Due to the presence of plastids in plants, they prepare food materials by photosynthesis.  
 2. Due to the presence of chlorophyll, nutrition in plants is autotrophic.  
 3. Due to the presence of plastids in plants, the plants are in different colours.

**6. Explain the drastic changes that occur in offsprings of the reduction division does not take place in organisms.**

- Ans : 1. Due to reduction division, the chromosome number is reduced to half of the parent cell. In this division, four daughter cells are formed from every parent cell.  
2. If the reduction division does not take place, the chromosome number is doubled in every generation, and thus there is possibility for the production of new organisms.  
3. To remain the constant number of chromosomes for generations together, the reduction division is a must in sexually reproducing organisms

**7. Blood is called fluid connective tissue. Why ?**

- Ans : 1. Blood consists of cells and liquid  
2. Blood cells include white blood cells, red blood cells, blood platelets. Lymph and plasma forms the fluid part.  
3. As the blood is containing liquid and cells, it is called fluid connective tissue.

**8. What are the differences between striated and unstriated muscles ?**

Ans :

Striated muscle	Unstriated muscle
1. These are voluntary muscles 2. Muscle fibres are present in the groups. 3. Contractions and relaxations of these muscles are under our control. Ex :- Hands and legs	1. These are involuntary muscles 2. The cells are elongated with tapering ends 3. Contractions and relaxations of muscles are not under our control. Ex :- Blood vessels, ovary

**9. Define meristamatic tissue. Mention its uses.**

- Ans : 1. Any cell which is capable of undergoing cell division is called meristamatic cell.  
2. These cells are small with larger nuclei.  
3. The cells actively divide and form new cells. Meristamatic tissue is present in the region of stem tip and root tip.

**10. Why the xylem and phloem are called conducting tissues ?**

- Ans : 1. Xylem conducts water and minerals from roots to the different parts of the plant.  
2. Phloem participates in the transport of food materials.  
3. The food materials synthesized in the leaf are transported by phloem to the downward, upward and to the rest of the plant parts.

**11. Write the differences between the following organelles.**

Ans :

A.	Nucleus	Nucleolus
	Present in the centre of the cell. contains the chromosomes having genetic material. Controls all the activities of the cell.	Nucleus consists of one or two rounded nucleoli.

<p><b>B. Cell</b> Cell is the structural and functional unit of organism.</p> <p><b>C. Conducting tissue</b> Tissue helps in the conduction of water and food materials.</p>	<p><b>Tissue</b> Group of cells which perform the same function is called tissue.</p> <p style="text-align: center;"><b>Protective tissue</b></p> <p>This tissue is present on the plant parts like leaves, roots. Have thick walls.</p>
--	--

**12. What are the functions of cell membrane ?**

- Ans : 1. The membrane which is present below the cell wall is called plasma membrane or cell membrane.
2. It is flexible and can fold in or fold out.
3. It allows transport of certain substances into and out of the cell, but not all substances, so it is termed **selectively permeable**.

**13. What is heredity ?**

- Ans : 1. The transmission of characters from one generation to the other, that is, from parents to offsprings is called heredity.
2. The transmission of these hereditary characters from one generation to another or generations together constitute the science of **Genetics**.
3. The factors which carry the hereditary characters are called **genes**.

**14. Is it justifiable to say that the first meiotic division in meiosis is the actual reduction division ? If this division does't takes place, explain the drastic changes that takes place.**

- Ans : 1. Reduction division is divisible into two parts, *viz.*, reduction division - I and reduction division - II.
2. In reduction division - I, the chromosome number is reduced to half of the parent cell. So, the reduction division - I is the actual reduction division.
3. If the reduction division does not take place, the chromosome number becomes doubled in the off spring in each generation. Hence, there is scope for the formation of quite new sps.

**15. If bone tissue and cartilage tissue are absent in human beings, What changes will take place ? Explain.**

- Ans : 1. Bone tissue gives strength and support to the body. The movements of the body takes place by bone tissue. If this tissue is absent, we cannot move the body from one place to another place.
2. Nose, ear, wall of trachae are made up of cartilage tissue. If this tissue is absent, support and tenduness does not occur in these parts.

**16. Describe the structure of ribosomes.**

- Ans : 1. Ribosomes present either as free particles in cytoplasm or attached to endoplasmic reticulum.
2. Protein synthesis takes place in ribosomes.

**17. What are permanent tissues ? What are its types?**

- Ans : 1. Permanent tissue is a plant tissue. The cells in this tissue are incapable of producing new cells.
2. Depending on the function, they permanent tissue is classified into three types, *viz.*,

- a. Protective tissue
- b. Supporting tissue
- c. Conducting tissue

**18. What is supporting connective tissue ? What are its types ?**

- Ans : 1. Supporting tissue connects different types of tissues and organs or gives support, and arranges them in suitable positions.
2. It is of four types, viz.,
- a. Fibrous tissue
  - b. Cartilage tissue
  - c. Bone and
  - d. Fluid connective tissue

**19. Describe the different types of muscles.**

- Ans : 1. muscles are responsible for all types of movements in the body.
2. Muscular tissue is divided into three types. They are :
- a. Striated (voluntary) muscles
  - b. Unstriated (involuntary) muscles and
  - c. Cardiac muscles.

**20. What is meristematic tissue ? In which parts it is present?**

- Ans : 1. If the plant tissues, the tissue which divides actively, giving new cells to the plant body is called meristematic tissue.
2. This tissue is present in the growing parts of the plant body such as root tip, branch tips and shoot tips.

**21. What are cell and tissue ?**

- Ans : 1. The structural and functional unit of an organism is called cell.
2. Group of structurally similar cells performing the same function is called tissue.

**22. Write the different cell organelles of the cell.**

- Ans : 1. Normally cell consists of three important parts.
2. They are cell membrane, cytoplasm and nucleus.
3. Cytoplasm consists of different components
4. Endoplasmic reticulum, ribosomes, mitochondria, Golgi apparatus, lysosomes, centrosomes and plastids.

**23. What is heredity ?**

- Ans : 1. The similarities between the members of the family are transmitted due to Heredity.
2. The transfer of characters of parents to their offsprings is called inheritance.

**FIVE MARKS QUESTIONS**

**1. Describe the five cell organelles of plant cell and their functions.**

- Ans : Plant cell consists of many cell organelles. Some of the important organelles are :

**1. Mitochondria :** These are the important organelles in plant cell.

i) Participates in respiration.

ii) In mitochondria, the oxidation of glucose takes place and energy is released.

This energy is stored in the form of ATP. Hence mitochondria are called the power houses of the cell.

2. **Chloroplasts** : These are present in the green parts of the plant body.

i) This is the important plant organelle which participates in photosynthesis.

ii) In chloroplast, the light energy is converted into chemical energy.

3. **Lysosomes** :

i) Lysosomes are small vesicles of different shapes and contain digestive enzymes.

ii) Destroys the non functional cell organelles and also help in digesting the food reserves of the cell, when the cell is starved

iii.) Lysosomes are called **suicidal bags of the cell** because the enzymes contained in them can digest the cell's own material when damaged or dead.

4. **Golgi apparatus** :

i) Very small vesicles like structures which are of various shapes, present near the nucleus. In plant cells, they are called dictyosomes.

ii) It produce secretions of the cell such as hormones and enzymes etc.

5. **Ribosomes** : These are in the form of particles, freely in the cytoplasm or attached to the endoplasmic reticulum. Ribosomes synthesise proteins.

2. **Explain the structure of the tissue that transmits the information from the surroundings to the brain.**

Ans : 1. The tissue which transmits the impulses or information of the surroundings to the brain is called nervous tissue.

2. The cells of nervous tissue are called nerve cells or **neurons**.

3. Each nerve cell has a cell body and it is called pericarian

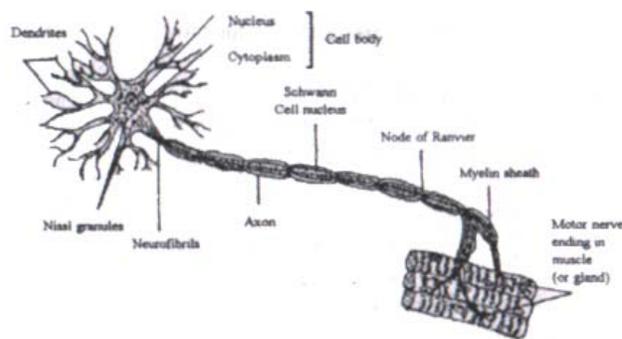
4. Each nerve cell consists of nucleus and hair like structures which are called dendrites.

5. The long fibre, which projects from main cell body is called **axon**. It is covered by a substance called myelin. The myelin sheath is not continuous and is broken at intervals called nodes of Ranvier.

6. The bundle of axons is called nerve. Dendrites carry the impulses towards cell body. But axon carries these impulses away from the cell body.

3. **Draw the labelled diagram of Nerve cell.**

Ans :



4. **Discribe the structure of animal cell.**

Basically all the types cells of plants and animals show same structure.

Ans : 1. Generally, the animal cell consists of three main parts, viz.,

**a. Plasma membrane** or cell membrane.

It is the outermost part of the cell. It covers the cell and protects the cell.

**b. Cytoplasm :** Except the nucleus, the living substance of the cell, covered by plasma membrane is called cytoplasm. Floating in cytoplasm, there are many cell organelles, such as Golgi complex, endoplasmic reticulum, ribosomes, mitochondria, lysosomes etc.

**c. Nucleus :**

1. It is present in the centre of the cytoplasm and is round or oval. Nucleus is covered by a thin nuclear membrane and the fluid inside the nucleus is called nucleoplasm.
2. The dark coloured, filaments that form a net called chromatic network or chromatic reticulum is floating in the nucleoplasm.
3. Nucleus consists of one or two nucleoli.

**5. Which type of cell division is helpful for the growth ? Explain**

Ans : The type of cell division which is helpful for growth and repair is mitosis or somatic cell division. It takes place in all body cells. Various events in mitosis are:

1. Chromosomal material in the nucleus becomes thick, short and forms chromosomes.
2. Centrosome divides and forms two centrioles and reach opposite poles. Spindle fibers are formed between them.
3. Due to the duplication of chromosomes, chromatids are formed. Nuclear membrane disappears.
4. Chromatids of the chromosomes separate and move towards the opposite poles. After reaching the poles, again they become as chromatin network.
5. Nuclear membrane is formed around the chromatin network at each pole.
6. In the centre of the cell a furrow appears, grows deep and divides the cell into two daughter cells.

**6. What are the differences between bone and cartilage ?**

Bone	Cartilage tissue
1. Strong and consists of small pores	1. Cartilage is without pores and it is a smooth tissue
2. Consists of living cells and dead salts	2. Partially transparent and homogeneous
3. Gives support and strength	3. Gives support and strength
4. Ribs, vertebrae etc.,	4. Nose, ears, wall of tracheal tube and terminal portion of long bones

**7. Describe the tissue which gives support to plants.**

- Ans :
1. The tissue which gives strength and support to the plant is called supporting tissue
  2. These tissues are collenchyma and sclerenchyma.
  3. The medulla of stem and root of plant gives temporary support
  4. The thick cells present in the corners and long part of the petiole of leaf gives support
  5. The long, narrow, thick walled dead cells of stem give strength and support to the plant.

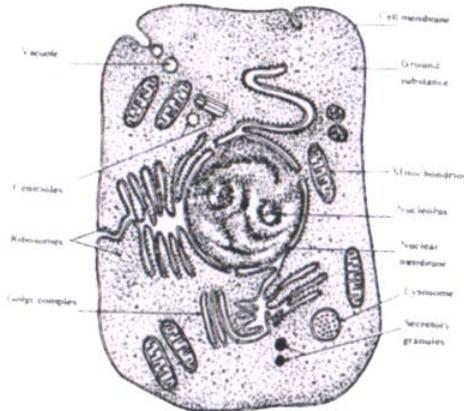
**8. Describe the epithelial tissue.**

- Ans : 1. The thin protective membrane of the cells that covers the free surfaces of the body.

2. The epithelial tissues are of three types
- Squamous epithelium : The cells are flattend with centrally placed nucleus and have irregular margins. Protects the inner parts of the body from injuries, heat, harmful substances etc.
  - Cuboidal epithelium : Cube like cells, polygonal in out line. Present in the lining of salivary and pancreatic ducts.
  - Columnar epithelium : Tall and cylindrical cells. Free surfaces of these cells in some areas like lining of stomach, intestine and trachea have cilia.

**9. Draw the diagram of animal cell and label the parts.**

Ans :



**10. Describe the structure of cell organelles that are helpful in autotrophic nutrition and different colours in plants.**

- Ans :
- Presence of plastids is the important feature of a plant cell.
  - Plastids are classified into chromoplasts, leucoplasts and chloroplasts. Out of them, chloroplasts are very important.
  - Chloroplasts converts light energy into chemical energy.
  - Due to the presence of chloroplasts only, the green plants live as autotrophs.
  - Due to the absence of chloroplasts, the animals live as heterotrophs.
  - Due to chromoplasts, flowers and certain parts of plant has characteristic colours

**FILL IN THE BLANKS**

- In a plant cell, the cell wall is made up of \_\_\_\_\_
- Lysosomes are also called \_\_\_\_\_
- Selectively permeable membrane is \_\_\_\_\_
- In mitochondria, energy is stored in the form of \_\_\_\_\_
- Plastids are present only in \_\_\_\_\_ cells.
- For every minute \_\_\_\_\_ millions of red blood cells are destroyed.
- Number of chromosomes in human cell \_\_\_\_\_
- \_\_\_\_\_ division takes place in body cells.

9. \_\_\_\_\_ division takes place in sexual cells.
10. In \_\_\_\_\_ cells, cell plate is formed in the centre of the cytoplasm of cell.
11. Number of cells formed from parent cell at the end of reduction division is \_\_\_\_\_
12. \_\_\_\_\_ cells, centrioles are absent.
13. Xylem and phloem are called \_\_\_\_\_ tissues.
14. Within the cell, the transport of materials takes place through \_\_\_\_\_
15. The spongy, smooth tissue present in the centre of the stem is called \_\_\_\_\_

### MULTIPLE CHOICE QUESTIONS

1. The tissue capable of cell division is present in this part ( )  
 A. Lower part of the flower      B. Root tip  
 C. Old part of stem                D. Middle part of root
2. This cell organelle is called suicidal bag of the cell ( )  
 A. Ribosomes                        B. Glyoxysomes  
 C. Sphaerosomes                  D. Lysosomes
3. One of the following is fluid connective tissue ( )  
 A. Fibrous tissue                  B. Bone  
 C. Blood                                D. None of the above
4. This membrane is selectively permeable ( )  
 A. Cell membrane                B. Nuclear membrane  
 C. Cell wall                            D. Nucleus
5. Number of chromosomes in Man ( )  
 A. 40                                    B. 42  
 C. 44                                    D. 46
6. One of the following muscle is rest less ( )  
 A. Unstriated                        B. Cardiac  
 C. Striated                            D. None of the above
7. The body of Nerve cell is called ( )  
 A. Aericarian                        B. Cyton  
 C. Dendrite                            D. Axon
8. One of the following is conducting tissue ( )  
 A. Parenchyma                      B. Xylem  
 C. Phloem                              D. Xylem and phloem



**Multiple Choice Questions :**

- |       |       |      |      |       |
|-------|-------|------|------|-------|
| 1. B  | 2. D  | 3. C | 4. A | 5. D  |
| 6. B  | 7. B  | 8. D | 9. C | 10. C |
| 11. D | 12. D |      |      |       |

**Match the following :**

- |    |      |      |      |      |      |
|----|------|------|------|------|------|
| 1. | 1. E | 2. B | 3. A | 4. D | 5. C |
| 2. | 1. C | 2. E | 3. A | 4. B | 5. D |



**FOOD AND NUTRITION**

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**OBJECTIVES**

1. Able to explain the importance of photosynthesis as the source of food to all living organisms on the globe
2. Able to identify the deficiency symptoms due to lack of balanced diet.
3. Develop skills to identify the adulterants in the food materials.

**IMPORTANT POINTS**

1. **Food** : The raw material required for the growth and development of living organisms.
2. **Nutrition** : The process by which organisms obtain and utilize food for their growth, development and maintenance.
3. **Parasites** : Some organisms which depend on other organisms for food and shelter are called parasites.
4. **Absorption** : Diffusion of digested food from the gut into the blood to reach the body tissues.
5. **Assimilation** : Utilisation of digested food by the body tissues.
6. **Excretion** : Elimination of undigested food is called egestion and separation and elimination of all harmful, unwanted products (specially nitrogenous wastes) from the body is called excretion.
7. **Enzymes** : Chemicals that act as catalysts complete the chemical reactions that take place in the cells/gut are called enzymes.
8. **Balanced diet** : Balanced diet is a mixture of all essential nutrients in required proportions to provide necessary energy and keep the body in a healthy state. The amount of carbohydrates, fats, proteins, vitamins, minerals and water in a balanced diet depends on many factors like age, sex, the nature of work of the individual.
9. **Digestion** : The breakdown of complex food constituents into simple substances, for the easy absorption is called digestion.
10. **Vitamins** : The complex organic compounds which are necessary in very little amounts for the healthy survival of the organism are called vitamins.
11. Excess glucose, sucrose, fructose, cellulose, carbohydrates in our body are converted into fats, oils and proteins.
12. The process of digestion consists of different stages namely ingestion, digestion, absorption, assimilation and egestion
13. Hormones are the chemical substances that control the functioning of body.

14. The salivary glands, liver and pancreas help in the digestion of food. They secrete enzymes necessary for digestion.
15. After digestion of fats and oils, fatty acids and glycerol are formed. The digestion starts from mouth and is continued up to the large intestine.
16. Deficiency of proteins (Kwashiorkor, Marasmus), minerals (Goiter, Anemia) vitamins (beriberi, pellagra, rickets) causes a number of diseases due to malnutrition.

### THREE MARKS QUESTIONS

#### 1. What is nutrition ? What are different types of nutrition?

Ans : The process by which organisms obtain and utilise food for their growth, development and maintenance is called nutrition. It is of two types :

- a. Autotrophic nutrition
- b. Heterotrophic nutrition.

#### 2. What is heterotrophic nutrition ? Describe various types in it with examples.

Ans : The organisms which depend on other organisms for food are called heterotrophs and the mode of nutrition is called heterotrophic nutrition.

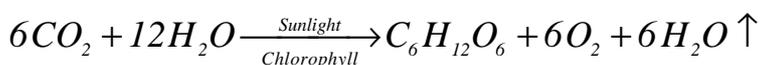
**1. Saprophytic nutrition :** Organisms which take food from the dead organic material by secreting enzymes is called saprophytic nutrition. Bacteria, yeast, fungi and mushrooms take food from the dead and decayed organic matter.

**2. Parasitic nutrition :** Derive food from other living organisms residing on or inside their body.

*e.g.*, Roundworm, tapeworm, cuscuta leech, bug, lice etc.

#### 3. Define photosynthesis and write its equation.

Ans : The method by which green plants absorb carbon dioxide, water and sunlight and prepare the food material is called photosynthesis.



#### 4. What reactions take place in photosynthesis ?

Ans : i. Two reactions take place in photosynthesis.

- a. Light reaction
- b. Dark reaction

ii. Light reaction takes place only in the presence of light. The energy required for carbon fixation is released in this reaction.

iii. Light is not required for dark reaction. The energy produced in the light reaction  $CO_2$  and water molecules combine. Thus the carbon hydrate, the energy rich molecule is produced.

**5. What are the factors that influence photosynthesis ?**

Ans : The factors which influence photosynthesis are divided into two types.

- a. External factors : Light, CO<sub>2</sub>, H<sub>2</sub>O and Temperature
- b. Internal factors : Chlorophyll

**6. What are nutrients ? Name them.**

Ans : 1. The chemical substances required for the nutrition of body are called nutrients.

2. They are....

- |                   |             |             |
|-------------------|-------------|-------------|
| a) Carbonhydrates | b) Fats     | c) Proteins |
| d) Vitamins       | e) Minerals | f) Water    |

**7. Write about the different types of vitamins.**

Ans : 1. Vitamins are of two types, namely,

- i) Water soluble vitamins
- ii) Fat soluble vitamins

2. Water soluble vitamins are B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, B<sub>12</sub> and C

3. Fat soluble vitamins are A, D, E and K.

**8. Explain the uses of fats to our body.**

Ans : 1. Fats are the richest source of energy and keeps our body warm.

2. Subcutaneous fats serve as insulators, thus protecting body from cold weather and pressure.

3. Stored fat provides padding to protect the vital organs of the body from shocks.

**9. Which Vitamin is helpful for the formation of strong bones and teeth ? Explain its importance.**

Ans : 1. Vitamin D plays important role in the formation of bones and teeth.

2. Deficiency of vitamin D leads to rickets in children. In rickets, bones are effected. shows its effect on bones. Bones became soft and are not properly formed.

**10. How cellulose is useful to us ?**

Ans : 1. Cellulose helps in the movement of food in the digestive tract.

2. For the complete digestion of food and absorption, such type of movements are required.

3. If cellulose is absent, the food is not digested completely and leads to constipation.

**11. Write the chemical name of Vitamin A. Mention the deficiency diseases.**

Ans : 1. The chemical name of Vitamin A is retinol.

2. Its deficiency causes the diseases like

- a) Night blindness
- b) Xerophthalmia
- c) Permanent blindness
- d) Dry skin
- e) Stunted growth

**12. How can you identify the disease pellagra .**

- Ans : 1. Due to the deficiency of Vitamin B<sub>4</sub>, (niacin) the skin becomes dry, with red patches.  
2. Swelling of tongue and checks.  
3. Diarrhoea and mental disorders.

**13. What are the effects, if rice is thoroughly washed and consume the rice with germs?**

- Ans : 1. If a person consumes polished rice, he is likely to suffer from the disease beri beri.  
2. The symptoms of beri beri are .. swelling of tissues due to accumulation of water, head ache, paralysis, oedema etc.

**14. Explain the importance of iodine in our food.**

- Ans : 1. Iodine an important mineral.  
2. Iodine is required for the production of the hormone thyroxine.  
3. Deficiency of iodine leads to the enlargement of thyroid gland, and it is called **Goitre**.

**15. Write notes on Kwashiorkar.**

- Ans : 1. Due to the deficiency of proteins, the disease Kwashiorkar is caused in the children of age group of 1 - 5 years.  
2. The symptoms of this disease are.. enlargement of liver due to accumulation of water. Skin becomes dry and black. Hair becomes reddish. Physical and mental disorders.

**16. What are the symptoms of Anaemia ?**

- Ans : 1. Body becomes pale  
2. Decrease of appetite  
3. Loss of weight  
4. Stunted growth

**17. Which Vitamin is helpful for the formation of strong bones and teeth ? Explain its importance.**

- Ans : 1. Vitamin D helps for the formation of bones and teeth.  
2. Its deficiency causes the disease rickets in children. It affects the bones leads to softening of bones and bones are not formed properly.

**18. In what way, cellulose is useful to us?**

- Ans : 1. Cellulose helps in the movement of food in the digestive system.  
2. For the complete digestion of food and absorption, such type of movements are required.  
3. If cellulose is absent, the food is not digested properly and leads to constipation.

**19. Write an account of balanced diet ?**

- Ans : 1. A balanced diet is one that contains all essential nutrients in required proportions to provide necessary energy and keep the body in a healthy state.  
2. It must contain carbohydrates, proteins, vitamins, fats, minerals and water in required proportions.

3. A balanced diet varies with age, occupation, sex and state of health.

**20. What is the role of stomach in the digestion of food ?**

- Ans : 1. The gastric juices produced by the gastric glands present in the lining of stomach helps to digest the food.
2. Gastric juice consists of HCl, enzymes - pepsin and lipase.
3. HCl activates the inactive enzymes and kills the bacteria entering along with food.
4. These enzymes convert the proteins into peptones
5. In stomach, food is thoroughly churned

**21. What are the adulterants in cooking oils?**

- Ans : 1. Mineral oil
2. Arsenic oil
3. Artificial colours

**22. What are Vitamins ? Which of them are fat soluble.**

- Ans : 1. Vitamins are complex organic compounds necessary for healthy survival of animals.
2. A, D, E and K are the fat soluble vitamins.

**22. What are parasites and saprophytes ?**

- Ans : **1. Parasites** : Organisms which live on and inside the body of another living organisms for food and shelter.
- 2. Saprophytes** : Organisms which derive food from the dead and decomposed organic matter.

**23. Define autotrophs and heterotrophs.**

- Ans : 1. Green plants and some types of bacteria prepare their food themselves. Hence, they are called autotrophs.
2. All the animals including man depend on plants for their food. If the organisms depend on other organisms for food, they are called heterotrophs.

**24. Mention the common adulterants of food.**

- Ans : 1. Milk - Carbohydrates, water, milk of other animals.
2. Honey - Sugar syrup, jaggary
3. Black pepper - Dried papayya seeds
4. Chilly powder - Saw dust, colour powder
5. Coriander - Dried and powdered cow dung or horse dung.
6. Pulses - Straw, kesari dal, low quality grains.

**25. Define Enzymes and Vitamins.**

- Ans : 1. Organic substances required to catalyse the chemical reactions that occur in all cells / gut are called enzymes.
2. Vitamins are complex organic compounds essential for healthy survival of organisms.

## FIVE MARKS QUESTIONS

### 1. What is nutrition ? Explain different types of nutrition.

Ans : 1. The process by which organisms obtain and utilize food for their growth, development and maintenance is called nutrition.

2. Nutrition can be divided into two types, viz., autotrophic nutrition and heterotrophic nutrition.

**a. Autotrophic nutrition :** Green plants and certain bacteria can prepare their own food within themselves and their mode of nutrition is called autotrophic nutrition.

**b. Heterotrophic nutrition :** Organisms which depend on other organisms for their food are called heterotrophs and their mode of nutrition is called heterotrophic nutrition.

3. On the basis of feeding habits, the heterotrophs are divided into two types. They are...

a. Saprophytic nutrition : e.g., Bacteria, mushrooms

b. Parasitic nutrition : e.g., Bug, lice etc.

### 2. Describe the factors that influence the process of photosynthesis.

Ans : 1. **External factors -**

**Light :** The rate of photosynthesis depends on the intensity of light. Food materials are not formed without light.

**Carbon dioxide :** With the increase in the concentration of carbon dioxide, the rate of photosynthesis also increases. In the absence of CO<sub>2</sub>, glucose is not formed.

**Water :** Water is the essential raw material for photosynthesis. When water is available in low quantities, the rate of photosynthesis decreases. Whereas excess water is eliminated by transpiration.

**Temperature :** Most of the plants work best at an optimum temperature of about 25°C. Plants that grow in tropics can efficiently produce starch even in high temperatures.

#### 2. **Internal factors -**

These include chlorophyll content, number of stomata and shape, structure and age of the leaf. The rate of photosynthesis decreases with the increase of age.

### 3. Explain in detail the reactions of photosynthesis.

Ans : 1. Reactions of photosynthesis are two types

i. Light reaction and ii. Dark reaction

#### 2. **Light reaction :**

i. It is the first phase of photosynthesis and it takes place only in the presence of light.

ii. In this reaction, the plant cells chlorophyll trap the radiant or light energy from the sun.

iii. This energy is converted into chemical energy. This energy is transferred to the dark reaction.

#### 3. **Dark reaction :**

i. This is the second phase of the photosynthesis. It does not require light. Hence it is called dark reaction.

- ii. This reaction may take place in the presence of light also.
- iii. In this reaction, the energy produced in the light reaction combines CO<sub>2</sub> and H<sub>2</sub>O molecules, and as a result the energy rich compounds carbohydrates such as starch is produced. In this reaction O<sub>2</sub> is also released.

**4. What are nutrients ? Write the different types of nutrients in detail.**

Ans : 1. The chemical substances of the food which are necessary for nourishment of our body are called nutrients.

2. Various nutrients of the food are .. a. Carbohydrates b. Fats c. Proteins d. Vitamins e. Minerals and f. Water

**3. Carbohydrates :** These are the substances formed by carbon, hydrogen and oxygen in 1:2:1 ratio. These are in the form of sugars, carbohydrates or cellulose.

**4. Fats :** Fats are made up of carbon, hydrogen and oxygen. One molecule of fat consists of glycerol and fatty acids.

*e.g.*, Cooking oils, ghee, cream and ground nut seeds contain fats in high quantities.

**5. Proteins :** Proteins consist of carbon, hydrogen, oxygen and sometimes sulphur.

*e.g.*, Pulses, soyabean, peas, lentil and pulse grains.

**6. Vitamins :** Vitamins are the complex organic substances required for healthy survival of the organism. Based on the solubility, vitamins are classified into two types, *viz.*, water soluble vitamins and fat soluble vitamins.

i. Water soluble vitamins - B-Complex ( B<sub>1</sub>, B<sub>2</sub>, B<sub>4</sub>, B<sub>6</sub>, B<sub>12</sub> etc) and C

ii. Fat soluble vitamins - Vitamins A, D, E and K

**7. Minerals :** Minerals are required in varying quantities for plant body.

*e.g.*, Iron, calcium, phosphorus, iodine, sodium and potassium

**8. Water :** Water is the important part in food. It controls the body temperature, useful as a medium for the excretion of waste materials.

**5. Write notes on carbohydrates.**

Ans : 1. Carbohydrates are the compounds of carbon, hydrogen and oxygen.

2. One gram of carbohydrates give 4 k. cal. of energy.

3. Carbohydrates are in the form of glucose, fructose, sucrose, lactose etc. Glucose provides almost instant energy.

4. Carbohydrates are available as starch in potato, wheat, rice and sweet potato. In our body they are easily digested.

5. In fruits, vegetable peelings, carbohydrates are present in high percentage in the form of cellulose. It helps in the movement of food materials in alimentary canal and prevents constipation.

**6. Write notes on different types of proteins and their functions.**

Ans : **1. Constructive proteins :** *e.g.*, Collagen and elastin. This type of proteins are required for building and maintaining body tissues.

**2. Enzymes :** *e.g.*, Pepsin and trypsin. These are proteins that regulate the chemical reactions going on inside of our body such as digestion, respiration etc.

3. **Protective proteins** : *e.g.*, Gama globulins. These proteins provide protection against infections with the help of anti bodies.
5. **Contractile proteins** : *e.g.*, Actin and myosin. These proteins help in movements and locomotion
6. **Transport proteins** : *e.g.*, Blood. These proteins carries different substances in the blood to body tissues.
7. **Hormone** : *e.g.*, Insulin and thyroxine. These proteins acts as chemical messenger which regulates the body functions.

**7. Write notes on Fats.**

- Ans :
1. Fats are composed of carbon, hydrogen and oxygen.
  2. A fat molecule consists of glycerol and fatty acids.
  3. On complete oxidation, one gram of fat provides 9 K. Cal. of energy.
  4. Fats provide more energy and keeps the body warm.
  5. The fats deposited under the skin prevents the outgoing of temperature from the body.
  6. Stored fats acts as packing material to protect the vital organs of the body from shocks.
  7. Fats are essential for the transport of fat soluble vitamins.

**8. Write an account of Marasmus.**

- Ans :
1. Marasmus affects the children up to one year age due to the deficiency of mother' milk.
  2. the symptoms of Marasmus are..
    - a. Body develops loose folds of skin
    - b. Loss or wasting of muscles.
    - c. Digestion becomes weak.
    - d. Ribs become prominent
    - e. Body growth and development slows down

**9. What are the effects of Kwashiorkor in children ?**

- Ans :
1. Kwashiorkor is caused in children of age group 1-5 years due to the deficiency of proteins.
  2. The symptoms of this disease are as follows:
    - a. Retardation of physical and mental growth
    - b. Skin becomes dark, dry and scaly.
    - c. Due to the accumulation of water, liver enlarges.
    - d. Hair becomes reddish brown
    - e. Legs become thin

**10. Write briefly about Vitamin E.**

- Ans :
1. It is a fat soluble vitamin.
  2. It is available in germinating seeds, milk, vegetables, vegetable oils, cream.
  3. Chemically it is called tocophorol.
  4. Plays an important role in the protecting of cell membrane.
  5. This vitamin is necessary for the functioning of reproductive organs.
  6. The deficiency of this vitamin to some extent shows its effect on fertilization.

**11. In what way the vitamin available from the citrus fruits is helpful to the body ? Or Explain the sources and functions of vitamin C.**

- Ans :
1. Chemical vitamin C is ascorbic acid.
  2. Vitamin C play an important role in general growth, repairing of tissues, maintenance of lining of blood capillaries.
  3. Main sources of vitamin C are citrus fruits, tomato, green leafy vegetables, nuts and amla.

**12. Write an account of riboflavin.**

- Ans :
1. Riboflavin is one of the B - Complex vitamins and is also called B2. It is a water soluble vitamin.
  2. Its main sources are milk, eggs, wheat, pea and leafy vegetables.
  3. Riboflavin helps in growth and development of healthy skin.
  4. Due to the deficiency, the craking of corners of mouth and skin results.

**13. Write the different types of vitamins and their chemical names.**

Ans : **1. Water soluble vitamins** : B - Complex - B1, B2, B4, B12 and C

- B1 - Thiamine
- B2 - Riboflavin
- B4 - Niacin
- B12 - Cyanacobalamine
- C - Ascorbic acid

**2. Fat soluble vitamins** : A, D, E and K

- A - Retinol
- D - Calciferol
- E - Tocoferol
- K - Philloquinone

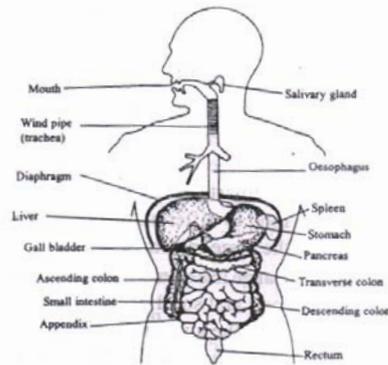
**14. Describe the digestion of food in stomach.**

- Ans :
1. Due to the contraction of the muscles in the wall of stomach, the food is thoroughly churned in the stomach
  2. The gastric juice secreted by gastric glands helps to digest the food.
  3. The gastric juices contains HCl and enzymes like pepsin.
  4. Pepsin digests the proteins into peptones.
  5. HCl activates the enzymes and helps to kill the bacteria.
  6. In stomach, the food is partly digested and then reaches duodenum.

**15. Explain the mechanism of digestion in small intestine.**

- Ans :
1. Partially digested food from the stomach reaches the small intestine where it is completely digested by various digestive juices.
  2. The bile juice secreted by liver helps in the emulsification of fats.
  2. Enzymes like trypsin, amylase and lipase secreted by the pancreas are released into the duodenum.
    - a. Trypsin - Converts peptones into amino acids
    - b. Amylase - Converts maltose into glucose.
    - c. Lipase - Converts fats into fatty acids and glycerol.
  3. The villi present on the ileum absorb the end products of the digestion and transfers to blood.
  7. Then it is supplied to different parts of the body.

**16. Draw the diagram of alimentary canal and label the parts.**



**FILL IN THE BLANKS**

1. The raw material necessary for the development of healthy body is \_\_\_\_\_
2. The method by which the possession of food takes place for the growth and development of organisms is called \_\_\_\_\_
3. The organisms which depend on the other organisms for food are called \_\_\_\_\_
4. Bacteria and mushrooms are examples for \_\_\_\_\_
5.  $CO_2 + H_2O \rightarrow H_2O + O_2 +$  \_\_\_\_\_
6. The process by which the green plants prepare food material utilising  $CO_2$ , water and sunlight is called \_\_\_\_\_
7. In \_\_\_\_\_ organelles of cells of the leaf, photosynthesis takes place.
8. In \_\_\_\_\_ reaction of the photosynthesis, carbohydrates are prepared.
9. \_\_\_\_\_ gas is released in photosynthesis.
10. The substances that are present in food for (nutrition) are called \_\_\_\_\_
11. The compound formed by carbon, hydrogen and oxygen is \_\_\_\_\_
12. The sugar present in milk is called \_\_\_\_\_
13. This helps in the movement of food in the gut and prevents constipation \_\_\_\_\_
14. For the synthesis of carbohydrates, along with water,  $CO_2$  and light \_\_\_\_\_ is necessary.
15. The substance formed with glycerol and fatty acids is called \_\_\_\_\_
16. Due to the deficiency of \_\_\_\_\_, the child suffer from Kwashiorkar.
17. Due to the deficiency of \_\_\_\_\_ vitamin, children suffer from Rickets.
18. \_\_\_\_\_ vitamin promotes the coagulation of blood.
19. Retinol is the chemical name of \_\_\_\_\_
20. \_\_\_\_\_ mineral is essential for the development of strong bones and teeth.
21. Scurvy is due to the deficiency of \_\_\_\_\_

22. The water soluble vitamins are \_\_\_\_\_
23. The taking in take of food into the mouth is called \_\_\_\_\_
24. The finger like projections present in the small intestine are called \_\_\_\_\_
25. Enzymes are helpful for the \_\_\_\_\_ reaction of the cell.
26. The release of unwanted and undigested food from the body is called \_\_\_\_\_
27. The disease appears due to the deficiency of niacin is called \_\_\_\_\_
28. By eating highly polished rice \_\_\_\_\_ disease results.
29. Chemical name of vitamin D is \_\_\_\_\_
30. Xirafthalmia develops due to the deficiency of \_\_\_\_\_ vitamin.
31. \_\_\_\_\_ enzyme converts proteins into peptones.
32. \_\_\_\_\_ type of movements are helpful for the downward movement of food in oesophagus.
33. To prevent goitre \_\_\_\_\_ salt is to be taken.
34. The adultrant of the cooking oil is \_\_\_\_\_
35. The disease beri beri results due to the deficiency of \_\_\_\_\_
36. Amino acids are the forms of \_\_\_\_\_
37. Deficiency of iron leads to \_\_\_\_\_
38. The disease pellagra is due to the deficiency of \_\_\_\_\_
39. In leafy vegetables, pennisietum, grains \_\_\_\_\_ mineral is present in high percentage.
40. \_\_\_\_\_ is necessary for the production of hormone thyroxine.
41. The food having all the nutrients in required quantities for the growth of body is called \_\_\_\_\_
42. Our body consists of \_\_\_\_\_ % of water.
43. The examples for fat soluble vitamins \_\_\_\_\_
44. \_\_\_\_\_ vitamin is rich in citrus fruits.
45. \_\_\_\_\_ vitamin shows more effect on the process of photosynthesis.

### MULTIPLE CHOICE QUESTIONS

1. One of the following is important for the development of bones and teeth (     )
 

A. Sodium	B. Potassium
C. Magnesium	D. Calcium
2. This is important part of haemoglobin (     )
 

A. Calcium	B. Iron
C. Iodine	D. Potassium



14. These are water soluble vitamins ( )  
 A. Retinol, Calciferol, Pyridoxin  
 B. Tocoferol, Niacin, Cyanocobalamin  
 C. Calciferol, Tocoferol, Niacin  
 D. Thiamin, Ascorbic acid and Pyridoxin
15. This vitamin is required for the coagulation of blood ( )  
 A. B<sub>6</sub> B. C  
 C. K D. B<sub>1</sub>
16. Glands which secrete tears ( )  
 A. Lacrymal glands B. Salivary glands  
 C. Mammary glands D. Digestive glands
17. One of the following causes beri beri ( )  
 A. Eggs B. Polished rice  
 C. Ground nut D. Unpolished rice
18. The chemical name of vitamin B<sub>12</sub> ( )  
 A. Retinol B. Riboflavin  
 C. Cyanocobalamin D. Thiamine
19. The chemical name of vitamin K ( )  
 A. Calciferol B. Ascorbic acid  
 C. Retinol D. Phylloquinone

### MATCH THE FOLLOWING

- 1. A** **B**
- |                    |     |                  |
|--------------------|-----|------------------|
| 1. Autotrophs      | ( ) | A. Doddar plant  |
| 2. Heterotrophs    | ( ) | B. Disease germs |
| 3. Saprophytes     | ( ) | C. Fungi         |
| 4. Parasites       | ( ) | D. Man           |
| 5. Parasitic plant | ( ) | E. Plants        |
- 2. A** **B**
- |                           |     |                    |
|---------------------------|-----|--------------------|
| 1. Vitamin B <sub>1</sub> | ( ) | A) Pellagra        |
| 2. Vitamin B <sub>4</sub> | ( ) | B) Beri beri       |
| 3. Vitamin D              | ( ) | C) Night blindness |
| 4. Vitamin A              | ( ) | D) Scurvy          |
| 5. Vitamin C              | ( ) | E) Rickets         |
- 3. A** **B**
- |            |     |                   |
|------------|-----|-------------------|
| 1. Calcium | ( ) | A) Nervous system |
| 2. Iron    | ( ) | B) Growth         |

- |              |     |                             |
|--------------|-----|-----------------------------|
| 3. Iodine    | ( ) | C) Strong bones and teeth   |
| 4. Potassium | ( ) | D) Formation of haemoglobin |
| 5. Sodium    | ( ) | E) Brain development        |

4.

**A**

1. Starch
2. Proteins
3. Fats
4. Sucrose
5. Fructose

- ( )
- ( )
- ( )
- ( )
- ( )

**B**

- A) Pulses
- B) Groundnut, Coconut, Mustard
- C) Cereals, Potato
- D) Sweet fruits
- E) Sugarcane, Beetroot,  
Common sugar

5.

**A**

1. Riboflavin
2. Niacin
3. Tocoferol
4. Ascorbic acid
5. Philoquinone

- ( )
- ( )
- ( )
- ( )
- ( )

**B**

- A) E vitamin
- B) K vitamin
- C) B2 vitamin
- D) B4 vitamin
- E) C vitamin

## ANSWERS

### Fill in the Blanks :

1. Food
3. Heterotrophs
5.  $C_6H_{12}O_6$
7. Chloroplasts
9. Oxygen
11. Carbohydrates
13. Cellulose
15. Fats
17. Vitamin D
19. A - Vitamin
21. Vitamin - C
23. Ingestion
25. Chemical
27. Pellagra
29. Calciferol
31. Pepsin
33. Iodized
35. Vitamin B1

2. Nutrition
4. Saprophytes
6. Photosynthesis
8. Dark reaction
10. Nutrients
12. Glucose
14. Chlorophyll
16. Protein
18. K - Vitamin
20. Calcium
22. Vitamin B and Vitamin C
24. Villi
26. Excretion
28. Beri beri
30. A - Vitamin
32. Peristaltic
34. Mineral oil
36. Proteins

- 37. Anaemia
- 39. Phosphorus
- 41. Balanced diet
- 43. A, D, E, K
- 45. Vitamin - C

- 38. Vitamin B3
- 40. Iodine
- 42. 65 - 70%
- 44. Vitamin - C

**Multiple Choice Questions :**

- |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| 1. D  | 2. B  | 3. B  | 4. D  | 5. B  | 6. A  |
| 7. C  | 8. C  | 9. C  | 10. D | 11. C | 12. A |
| 13. C | 14. D | 15. C | 16. A | 17. B | 18. C |
| 19. D |       |       |       |       |       |

**Match the following :**

- |           |      |      |      |      |      |
|-----------|------|------|------|------|------|
| <b>1.</b> | 1. E | 2. D | 3. C | 4. B | 5. A |
| <b>2.</b> | 1. B | 2. A | 3. E | 4. C | 5. D |
| <b>3.</b> | 1. C | 2. D | 3. E | 4. B | 5. A |
| <b>4.</b> | 1. C | 2. A | 3. B | 4. E | 5. D |
| <b>5.</b> | 1. C | 2. D | 3. A | 4. E | 5. B |



**TRANSPORT OF MATERIALS IN  
PLANTS AND ANIMALS**

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**OBJECTIVES**

1. Recognise the importance of blood as a medium of transport
2. Explain the structure and function of heart
3. List the major blood groups and state the matching groups for blood transfusion.

**IMPORTANT POINTS**

1. Flowing blood in the body transports food, nutrients, oxygen, hormones, metabolic wastes, carbondioxide etc.,
2. Human heart is four chambered - Anterior two chambers are atria and posterior two chambers are **ventricles**.
3. **Arteries** transport blood from heart to different parts and veins transport blood to the heart.
4. Blood contains plasma ; red blood cells, white blood cells and blood platelets.
5. Blood transfusion occurs between matched groups. O - group persons are universal donars and AB - group persons are universal receiptents.
6. Colour less lymph ; lymph vessels etc., from the lymphatic system.

**DEFINITIONS**

1. **Selectively permeable** : Membrane that allows some molecules but not all molecules.
2. **Diffusion** : Process of spreading of molecules from a higher concentration to a lower concentration. For this process, energy is not necessary.
3. **Osmosis** : Flow of water from a region having more water molecules to a region having less water molecules.
4. **Universal donor** : Persons with the blood group - O. They can donate blood to the persons of any blood group.
5. **Universal receiptent** : Persons with blood group - AB. They can accept blood from the persons of any blood group.
6. **Active transport** : Flow of molecules against concentration gradient using energy.

### THREE MARKS QUESTIONS

1. Define the following :

a. Diffusion

b. Selectively permeable

Ans : a. **Diffusion** : Process of spreading of molecules from a higher concentration to a lower concentration. For this process, energy is not necessary.

b. **Selectively permeable** : Membrane that allows some molecules but not all molecules.

2. What is meant by osmosis and selectively permeable membrane ?

Ans : a. **Osmosis** : Flow of water from a region having more water molecules to a region having less water molecules.

b. **Selectively permeable** : Membrane that allows some molecules but not all molecules.

3. What is the difference between diffusion and active transport ?

Ans : a. **Diffusion** : Process of spreading of molecules from a higher concentration to a lower concentration. For this process, energy is not necessary.

b. **Active transport** : Flow of molecules against concentration gradient using energy.

4. What are the functions of xylum and phloem ?

Ans : a. **Xylum** : It transports the water absorbed by the root hairs to the leaves and other parts of the plant.

b. **Phloem** : It transports the sugars and other food materials formed in leaves to the other parts of plant.

5. How transport of food materials takes place in plants ?

Ans : 1. The sugars and other food materials formed in leaves are transported to the other parts of the plant by phloem.

2. The living sieve tubes of phloem transport the food materials.

3. Transport of materials from leaves to the other parts is called **translocation**.

6. Why blood is called circulating tissue ? Which materials are supplied by the blood ?

Ans : 1. In most of the animals, materials are transported from one part to the other by blood. Hence, it is called circulating tissue.

2. Organs of circulatory system keep the blood to flow through all parts of the body.

3. Blood transports nutrients, respiratory gases, hormones, waste materials etc., from one part of the other.

**7. Describe structure of human heart.**

- Ans : 1. In the body of man, heart lies between the two lungs in the thoracic cavity.  
Heart is a muscular organ.
2. Heart is four chambered. They is a pair of atria and a pair of ventricles.
  3. Heart is formed by some special muscle fibres and cardiac muscles.

**8. Describe human blood.**

- Ans : 1. Blood is the circulating fluid connective tissue.
2. It is formed by the fluid medium called plasma
  3. Floating in the plasma, there are red blood cells, white blood cells and blood platelets.

**9. Write about white blood cells.**

- Ans : 1. In the circulating blood about 5000 - 7000 WBC are present per cubic millimeter ( $\text{mm}^3$ )
2. They are colourless because of the absence of pigments.
  3. They have no definite shape
  4. They produce antibodies against disease causing microbes and protect the body from diseases.

**10. Explain universal donor and universal recipient.**

- Ans : **a. Universal donor** : Persons with the blood group - O. They can donate blood to the persons of any blood group.
- b. Universal recipient** : Persons with blood group - AB. They can accept blood from the persons of any blood group.

**11. A person with blood group A needs blood. Blood from the persons of which blood groups can be transfused to him ? If your blood group is O, can it was given to him ? Why ?**

- Ans : 1. To the person with the blood group A can be given blood from A - group and O - group persons, because agglutination of RBC does not occur.
2. If my blood group is O, I can donate blood to him. O - group can be given to any person.

**12. Write about anaemia.**

- Ans : 1. Deficiency of haemoglobin than normal level is called anaemia.
2. Due to anaemia the person appears to be pale, weak and sluggish.
  3. Anaemia can be prevented by taking food containing iron.

**13. Why high blood pressure is caused ? What are its features ? Explain its cure.**

Ans : 1. High blood pressure is caused due to tensions.

2. Due to high blood pressure - head ache, nausea and fatigue are caused.

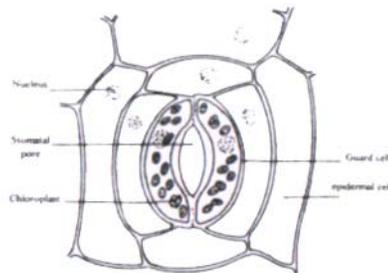
3. Balanced diet, exercise, medicines and peace of mind prevents high blood pressure.

**14. Write about pulmonary artery and pulmonary vein.**

Ans : 1. **Pulmonary artery** : It transports deoxygenated blood from heart to lungs.

2. **Pulmonary vein** : It transports oxygenated blood from lungs to heart.

**15. Draw a labelled diagram of stomata.**



**16. Write functions of blood.**

Ans : 1. Blood transports oxygen, carbondioxide, hormones, waste materials to respective body parts.

2. Blood produces antibodies against disease causing microbes and protect the body.

3. Blood constituents help in blood clotting.

**17. What are the different types of blood cells ?**

Ans : Blood contains three types of cells :

1. **Red blood cells** : Contains a red pigment called haemoglobin. It carries oxygen to tissues.

2. **White blood cells** : Lacks definite shape and colour. They produce anitbodies and protect the body from diseases.

3. **Blood platelets** : Help in blood clotting.

## **FIVE MARKS QUESTIONS**

**1. Name the main parts of human circulatory system. Describe briefly.**

Ans : 1. Between the two lungs, a muscular pumpling organ called heart is present in the thoracic cavity.

2. Some tubes are connected to the heart are called blood vessels. They are of

three types, namely, arteries, veins and blood capillaries.

3. Arteries transport blood from heart to different parts.
4. Veins transport blood from different parts to heart.
5. Arteries and veins are connected by minute tubes. Through these capillaries exchange of materials between blood and tissues takes place.

## **2. Describe functioning of heart.**

- Ans : 1. Three major veins (vena cavae) transport deoxygenated blood from different parts to right atrium.
2. Pulmonary veins transport oxygenated blood from lungs to left atrium.
  3. When atria contract, deoxygenated blood from right atrium flows into right ventricle and oxygenated blood flows from left atrium to left ventricle.
  4. Valves in the heart prevent backward flow of blood.
  5. When ventricles contract, deoxygenated blood from right ventricle reaches the lungs through pulmonary arteries for oxygenation.
  6. Oxygenated blood from left ventricle flows into the aorta. It transports oxygenated blood to all parts of the body.

## **3. Write notes on red blood cells / erythrocytes.**

- Ans : 1. These are circular in out line.
2. They contain a red pigment called haemoglobin.
  3. RBC of man lack a nucleus.
  4. They transport oxygen and little amount of carbondioxide.
  5. The circulating blood contains about 5 millions of RBC per cubic millimeter ( $\text{mm}^3$ )

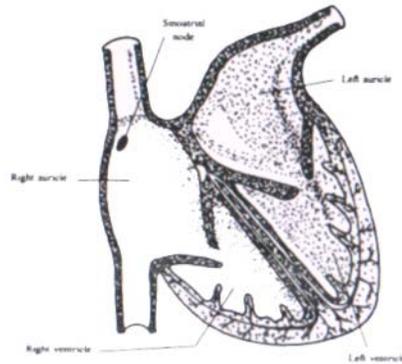
## **4. Describe lymphatic system.**

- Ans : 1. Lymph is a circulating fluid. It flows through lymph vessels.
2. Lymph is a faint yellow fluid.
  3. Lymph flow is unidirectional, that is towards heart.
  4. Lymphocytes of lymph eat the harmful microbes and protect the body from diseases.
  5. Lymph transports digested fats from intestine.
  6. Lymph supplies proteins etc., from blood to tissues.

## **5. Write about blood transfusion.**

- Ans : 1. During surgery or accidents, a person may lose blood.
2. In such cases, to protect the person blood transfusion will be done.

3. Injecting blood into the body from outside is called blood transfusion.
4. Blood transfusion is successful only when the blood of donor (who gives blood) and of the recipient (who received blood) matches.
5. Unmatched blood transfusion causes agglutination of red blood cells due to which the recipient may die.
6. **Draw a labelled diagram of internal structure of heart.**



### FILL IN THE BLANKS

1. Molecules enter and exit the cell through \_\_\_\_\_
2. Cell membrane is \_\_\_\_\_ to materials
3. Spreading of molecules from a higher concentration to a lower concentration is known as \_\_\_\_\_
4. Cell membrane allows some molecules but not all molecules. It is called \_\_\_\_\_
5. Flow water from a region having more water molecules to a region having less water molecules through semi permeable membrane is known as \_\_\_\_\_
6. Transport of molecules against concentration gradient is known as \_\_\_\_\_
7. Upward movement of water and minerals against gravity is called \_\_\_\_\_
8. Transport of food materials from leaves to other parts of plant is called \_\_\_\_\_
9. Xylem and phloem tissues of plant are called \_\_\_\_\_
10. Water from soil is absorbed by \_\_\_\_\_ of plant.
11. Tracheids and vessels are \_\_\_\_\_ of xylem.
12. Non living cells of xylem transport water to \_\_\_\_\_
13. Muscular pump in the body of man is \_\_\_\_\_
14. Blood vessels are of \_\_\_\_\_ types.
15. Blood vessels that transport blood from heart to different parts of body are \_\_\_\_\_
16. Blood vessels that transport blood from different parts of body to heart are \_\_\_\_\_
17. Arteries and veins are connected by minute \_\_\_\_\_
18. Number of atria in human heart is \_\_\_\_\_
19. Number of ventricles in human heart is \_\_\_\_\_

20. Rhythmical contraction and relaxation of heart are called \_\_\_\_\_
21. In a healthy man, number of heart beats per minute is \_\_\_\_\_
22. Defects in heart beat are known with the help of \_\_\_\_\_
23. Expand ECG \_\_\_\_\_
24. Major blood vessels that transport deoxygenated blood to right atrium of heart are \_\_\_\_\_
25. Blood does not flow from ventricles to atria due to \_\_\_\_\_
26. \_\_\_\_\_ transports deoxygenated blood from heart to lungs.
27. Blood in pulmonary artery is \_\_\_\_\_
28. Blood in pulmonray vein is \_\_\_\_\_
29. Connective tissue that circulates through out the body is \_\_\_\_\_
30. Blood cells are manufactured in \_\_\_\_\_
31. Blood cells floating in plasma are of \_\_\_\_\_ types
32. Erythrocyte is the other name for \_\_\_\_\_
33. Full form of RBC is \_\_\_\_\_
34. Blood cells that contain haemoglobin are \_\_\_\_\_
35. Haemoglobin is a \_\_\_\_\_ coloured pigment.
36. Blood is red because of \_\_\_\_\_
37. Oxygen and carbondioxide are transported by \_\_\_\_\_
38. Number of erythrocytes in circulating blood is \_\_\_\_\_
39. Shape of the red blood cells is \_\_\_\_\_
40. Leucocytes are the \_\_\_\_\_
41. Full form of WBC is \_\_\_\_\_
42. Number of white blood cells in circulating blood is \_\_\_\_\_
43. \_\_\_\_\_ produce antibodies against diseases causing microbes.
44. \_\_\_\_\_ protects the body from contageous diseases.
45. \_\_\_\_\_ play an important role in blood clotting.
46. Injection of blood into the body from outside is known as \_\_\_\_\_
47. Agglutination of RBC occur due to transfusion of \_\_\_\_\_
48. Result of agglunation is \_\_\_\_\_
49. Person with \_\_\_\_\_ group blood is called universal donar.
50. Person with \_\_\_\_\_ group blood is called universal receiptent.
51. \_\_\_\_\_ group blood can be given to any group.
52. \_\_\_\_\_ group persons can take blood from all other groups.
53. A - group blood can be given to persons with \_\_\_\_\_ group(s).
54. B - group blood can be given to persons with \_\_\_\_\_ group(s).

55. O - group blood can be given to persons with \_\_\_\_\_ group(s).
56. Persons with blood group - A can take blood from \_\_\_\_\_ group(s).
57. Persons with blood group - B can take blood from \_\_\_\_\_ group(s).
58. Persons with blood group - AB can take blood from \_\_\_\_\_ group(s).
59. Persons with blood group - O can take blood from \_\_\_\_\_ group(s).
60. Lymph flows through \_\_\_\_\_
61. \_\_\_\_\_ cell(s) of lymph protect the body from diseases.
62. When haemoglobin level falls below the normal level, the condition is called \_\_\_\_\_
63. To avoid anaemia, food containing \_\_\_\_\_ is to be taken
64. Leukemia is a type of \_\_\_\_\_
65. Over production of white blood celss is called \_\_\_\_\_
66. Normal blood pressure of man is \_\_\_\_\_
67. Fluid part of blood is \_\_\_\_\_
68. High blood pressure is called \_\_\_\_\_
69. Due to abnormalities in ECG \_\_\_\_\_ can be identified.
70. \_\_\_\_\_ of root absord water from the soil.
71. Blood is fluid \_\_\_\_\_ tissue.

### **MULTIPLE CHOICE QUESTIONS**

1. Molecules enter and exit the cell through ( )
 

A. Nucleus	B. Mitochondria
C. Cell membrane	D. Cytoplasm
2. Cell membrane allows certain molecules only but not all. This character is known as ( )
 

A. Osmosis	B. Selectively permeable
C. Active transport	D. Diffusion
3. Movement of molecules from a higher concentration to a lower concentration is known as ( )
 

A. Diffusion	B. Translocation
C. Active transport	D. Transpiration
4. Flow of water from a region having more water molecules to a region having less water molecules through semipermeable membrane is known as ( )
 

A. Active transport	B. Active absorption
C. Selectively permeability	D. Osmosis

5. Factor not necessary for diffusion and osmosis, but is required for active transport is ( )  
A. Energy  
B. Vitamins  
C. Food  
D. Cell membrane
6. Transport of molecules against concentration gradient is known as ( )  
A. Osmosis  
B. Diffusion  
C. Active transport  
D. Transport of water
7. Function of xylem ( )  
A. Absorption of water from soil  
B. Supply of water to leaves  
C. Conversion of water into food  
D. Transport of food from leaves to roots
8. Tissue with sieve tubes ( )  
A. Xylem  
B. Cardiac muscles  
C. Nervous tissue  
D. Phloem
9. Process of transport of food materials from leaves to the other parts of plant is known as ( )  
A. Translocation  
B. Transpiration  
C. Diffusion  
D. Osmosis
10. Upward movement of water and mineral salts against gravity is called ( )  
A. Undulating movement  
B. Membrane movement  
C. Translocation  
D. Ascent of sap
11. Circulating tissue is ( )  
A. RBC  
B. WBC  
C. Blood  
D. Blood platelets
12. Muscular pump present in thoracic cavity is ( )  
A. Lung  
B. Heart  
C. Liver  
D. Pancreas
13. Vessels transport blood from heart to other parts are ( )  
A. Arteries  
B. Veins  
C. Pulmonary veins  
D. Xylem
14. Vessels that transport blood from various body parts to heart are ( )  
A. Arteries  
B. Pulmonary veins  
C. Veins  
D. Xylem

15. Minute vessels that connect arteries and veins are ( )  
 A. Pulmonary arteries                      B. Blood capillaries  
 C. Pulmonary vein                            D. Cardiacartery
16. Anterior two chambers of heart of man are ( )  
 A. Ventricles                                    B. Pulmonary arteries  
 C. Pulmonary veins                            D. Atria
17. Posterior two chambers of heart of man are ( )  
 A. Pulmonary arteries                      B. Ventricles  
 C. Atria    D. Pulmonary veins
18. Rhythmical contractions and relaxations of heart are ( )  
 A. Heartbeat                                    B. Blood circulation  
 C. Inspiration                                    D. Expiration
19. In man, number of times the heartbeat per minute ( )  
 A. 16    B. 100  
 C. 72    D. 90
20. ECG reveals the ( )  
 A. Digested food                                B. Functioning of brain  
 C. Structure of bones                            D. Defects in heart beating
21. Blood vessels that collect deoxygenated blood from different parts and convey it to right atrium are ( )  
 A. Vena cavae                                    B. Aorta  
 C. Pulmonary vein                                D. Pulmonary artery
22. Blood flows into the ventricles from atria due to ( )  
 A. Contraction of ventricles                    B. Relaxation of ventricles  
 C. Contraction of atria                            D. Relaxation of atria and ventricles
23. Blood clotting is facilitated by ( )  
 A. Ateries                                        B. Red blood cells  
 C. White blood cells                                D. Blood platelets
24. Colour of haemoglobin ( )  
 A. White    B. Yellow  
 C. Red    D. Green
25. Shape of RBC ( )  
 A. Square                                         B. Spherical  
 C. Circular                                         D. Irregular
26. Number of RBC in man is ( )  
 A. 5 millions / mm<sup>3</sup>                                B. 6 millions / mm<sup>3</sup>  
 C. 7 millions / mm<sup>3</sup>                                D. 8 millions / mm<sup>3</sup>

27. Blood cells are produced in ( )  
 A. Bone marrow                      B. Brain  
 C. Stomach                              D. Kidneys
28. Main function of RBC ( )  
 A. Provide colour for blood      B. Transport of oxygenated and carbondioxide  
 C. Transport of oxygen only      D. Transport of carbondioxide only
29. Shape of white blood cells in ( )  
 A. Square                                B. Spherical  
 C. Circular                                D. Irregular
30. Number of white blood cells in a healthy man ( )  
 A. 5000 - 7000 / mm<sup>3</sup>              B. 3000 - 4000 / mm<sup>3</sup>  
 C. 500 - 700 / mm<sup>3</sup>                  D. 1000 - 2000 / mm<sup>3</sup>
31. Blood cells that produce antibodies against disease causing agents are ( )  
 A. RBC                                      B. Blood platelets  
 C. WBC                                      D. Erythrocytes
32. These cells prevent the contageous diseases ( )  
 A. RBC                                      B. WBC  
 C. Blood platelets                      D. Nerve cells
33. Main objective of blood transfusion is ( )  
 A. Why the patient lost the blood  
 B. Knowing how much blood is lost by the patient  
 C. Injecting the blood that is lost by the patient  
 D. Whether the patient can donate blood or not
34. Injecting blood into the body from outside is called ( )  
 A. Blood transfusion                  B. Blood donation  
 C. Blood collection                      D. Blood loss
35. Result of agglutination is ( )  
 A. Patient live forever                  B. Death of the patient  
 C. Relaxation of the patient          D. None
36. Universal donars belong to this blood group ( )  
 A. A    B. B  
 C. AB                                        D. O
37. Universal receipients belong to this blood group ( )  
 A. A    B. B  
 C. AB                                        D. O

38. These cells of lymph eat the disease causing microbes ( )  
 A. Red blood cells                      B. Lymphocytes  
 C. Blood platelets                      D. Erythrocytes
39. Abnormal ECG reveals ( )  
 A. Heart attack                      B. Head ache  
 C. Water in lungs                      D. Structure of liver
40. Leukemia means ( )  
 A. White blood cells                      B. Blood cancer  
 C. Anaemia                      D. Heart attack
41. Decrease of haemoglobin than normal level ( )  
 A. Blood cancer                      B. Hypertension  
 C. Anaemia                      D. Heart attack
42. High blood pressure is described as ( )  
 A. Hypertension                      B. Anaemia  
 C. Haemophilia                      D. Heart attack
43. Normal blood pressure of man is ( )  
 A. 80 / 120 mm Hg                      B. 128 / 80 mm Hg  
 C. 120 / 80 mm Hg                      D. 100 / 120 mm Hg
44. Lymph is ( )  
 A. Fluid flows in one direction    B) Fluid transports materials from heart  
 C. Other name for blood              D) Fluid with red cells
45. Pulmonary artery transports deoxygenated blood. Other arteries transport oxygenated blood. Still it is called artery because ( )  
 A. Structure is similar to artery  
 B. It transports blood from heart  
 C. It transports blood to the heart  
 D. It transports blood from lungs to heart

### MATCH THE FOLLOWING

#### I. List - A

1. Arteries ( )
2. Veins ( )
3. Blood capillaries ( )

#### List - B

- A) Transports oxygenated blood to heart
- B) Transport deoxygenated blood to lungs
- C) Transport blood from body parts to heart

4. Pulmonary artery ( ) D) Minute vessels connecting arteries and veins
5. Pulmonary vein ( ) E) Transport blood from heart to body parts

## ANSWERS

### Fill in the Blanks :

- |                         |                                     |
|-------------------------|-------------------------------------|
| 1. Plasma membrane      | 2. Selectively permeable            |
| 3. Diffusion            | 4. Selectively permeable            |
| 5. Osmosis              | 6. Active transport                 |
| 7. Ascent of sap        | 8. Translocation                    |
| 9. Conducting tissues   | 10. Root hairs                      |
| 11. Non living          | 12. Leaves                          |
| 13. Heart               | 14. Three                           |
| 15. Arteries            | 16. Veins                           |
| 17. Blood capillaries   | 18. Two                             |
| 19. Two                 | 20. Heart beat                      |
| 21. Seventy two         | 22. Electro Cardio Graphy (ECG)     |
| 23. Electro Cardio Gram | 24. Vena cavae                      |
| 25. Heart valves        | 26. Pulmonary artery                |
| 27. Impure              | 28. Pure                            |
| 29. Blood               | 30. Bone marrow                     |
| 31. Three               | 32. Red blood cells                 |
| 33. Red blood cells     | 34. Red blood cells                 |
| 35. Red                 | 36. Haemoglobin                     |
| 37. Red blood cells     | 38. 5 millions / mm <sup>3</sup>    |
| 39. Circular            | 40. White blood cells               |
| 41. White blood cells   | 42. 5,000 - 7,000 / mm <sup>3</sup> |
| 43. White blood cells   | 44. White blood cells               |
| 45. Blood platelets     | 46. Blood transfusion               |
| 47. Unmatched blood     | 48. Death                           |
| 49. O                   | 50. AB                              |
| 51. O                   | 52. AB                              |
| 53. A, AB               | 54. B, AB                           |
| 55. A, B, AB and O      | 56. A, O                            |
| 57. B, O                | 58. A, B, AB and O                  |

59. O

61. Lymphocytes

63. Iron

65. Leukemia

67. Plasma

69. Heart attack

71. Connective

60. Lymph vessels

62. Anaemia

64. Blood cancer

66. 120 / 80 mm Hg

68. Hypertension

70. Root hairs

**Multiple Choice Questions :**

1. C

2. B

3. A

4. D

5. A

6. C

7. B

8. D

9. A

10. D

11. C

12. B

13. A

14. C

15. B

16. D

17. B

18. A

19. C

20. D

21. A

22. C

23. D

24. C

25. C

26. A

27. A

28. B

29. C

30. A

31. C

32. B

33. C

34. A

35. B

36. D

37. C

38. B

39. A

40. B

41. C

42. A

43. C

44. A

45. B

**Match the following :**

1. 1. E

2. C

3. D

4. B

5. A



**RESPIRATION GASEOUS EXCHANGE  
AND ELIMINATION OF BODY WASTES**

---

**OBJECTIVES**

1. Explain the need of respiratory gaseous exchange
2. Sketch the respiratory and excretory organs of man
3. Identify the importance of dialysis.

**IMPORTANT POINTS**

1. Every cell of our body needs energy to carry out its regular function. Energy is released by the oxidation of food materials.
2. Roots take up oxygen through root hairs by diffusion
3. Animals have specialised organs for respiration. Most of the aquatic animals have gills.
4. Air enters into the lungs by the expansion of thoracic cavity.
5. If any victim drowns, got electric shock or inhale poisonous gas will suffer from **asphyxia** (condition lack of oxygen)
6. Two bean shaped kidneys located below the diaphragm in the abdomen towards back.

**DEFINITIONS**

1. **Excretion** : Process of separation and elimination of nitrogenous wastes from the body.
2. **Breathing** : In take of oxygen into lungs from the surroundings and elimination of carbondioxide from lungs.
3. **Cellular respiration** : Process of oxidation of glucose in the mitochondria of cells.
4. **Inhalation** : In take of air with oxygen into lungs during respiration.
5. **Exhalation** : Elimination of carbondioxide from lungs during respiration.
6. **Nephrons** : Structural and functional unit of a kidney.
7. **Respiration** : In take and utilisation of oxygen for the oxidation of glucose in cells for the release of energy.
8. **Dialysis** : Process of cleaning of blood outside the body using dialysis machine.

### THREE MARKS QUESTIONS

**1. Define breathing and respiration.**

Ans : **a. Breathing :** In take of oxygen into lungs from the surroundings and elimination of carbondioxide from lungs.

**b. Respiration :** In take and utilisation of oxygen for the oxidation of glucose in cells for the release of energy.

**2. Name the parts of respiratory system in man.**

Ans : 1. External nostrils

2. Nasal cavities in the nose

3. Internal nostrils opening into pharynx

4. Pharynx leads into the wind pipe / trachea

5. Trachea divides into two bronchi which leads into lungs

6. Alveoli in lungs

**3. Describe exhalation in man.**

Ans : 1. Muscles of diaphragm relax and hence it becomes dome shaped

2. Ribs move downward and inward

3. The thoracic cavity is compressed and the pressure on lungs is increased

4. Hence, air is pushed out through trachea and nose

**4. Describe inhalation in man.**

Ans : 1. Diaphragm move downward and becomes flat

2. Ribs are raised upward and outward and volume of chest cavity increases

3. The air drawn in brings in oxygen which diffuses into the blood supplied to walls of alveoli.

**5. Explain exchange of gases between blood and alveoli in man.**

Ans : 1. Alveoli of lungs are filled with air rich in oxygen

2. Oxygen from alveoli diffuses into the blood capillaris that are present in the walls of alveoli.

3. Carbondioxide from the blood diffuses into the alveoli.

**6. What is meant by cellular respiration ?**

Ans : 1. The digested food (glucose) reaches the cells of tissues, where it is oxidised.

2. As a result of oxydation of glucose, energy is released.

3. As this process takes place in mitochondria of cells, it is called cellular respiration.

**7. People living in higher altitudes have more RBC and large thoracic cavity. Why ?**

Ans : 1. As we go higher and higher altitudes, the pressure of air reduces. Hence lungs receives less air.

- To overcome this problem, those people have large thoracic cavity to receive more air into lungs.
- RBC absorb oxygen and transport it to cell. Due to low pressure of air less oxygen is diffused. Hence, more RBC are present to carry more oxygen.

**8. Write briefly about pneumonia.**

- Ans :
- Pneumonia is a respiratory disease
  - It is caused by *Pneumococci* bacteria
  - Infection to trachea and bronchi and then to terminal bronchi
  - Symptoms of pneumonia are shivering, vomiting and continuous fever
  - Antibiotics are used to cure pneumonia

**9. When asphyxia occurs ? What are symptoms of it ? What do you do to overcome it ?**

- Ans :
- Accidental drowning, electric shock or inhalation of poisonous gas results in asphyxia.
  - The symptoms of asphyxia are blueing of lips, finger nails, tongue etc.,
  - In such cases, mouth to mouth respiration is given.

**10. Mention three plants that produce alkaloids. Where they store alkaloids in the body ?**

Ans :

S.No.	Name of the plant	Name of the alkaloid	Part of plant, where it stored
1	<i>Cinchona</i>	Quinine	Bark
2	Poppy	Morphine	Fruit
3	Coffee	Caffeine	Seeds

**11. Write about non nitrogenous wastes of plants.**

- Ans :
- Tannins found in tea leaves.
  - Essential oils in leaves of tulsi, lemon and eucalyptus.
  - Resins in the bark of pine trees.
  - Crystals of silica in certain grasses.

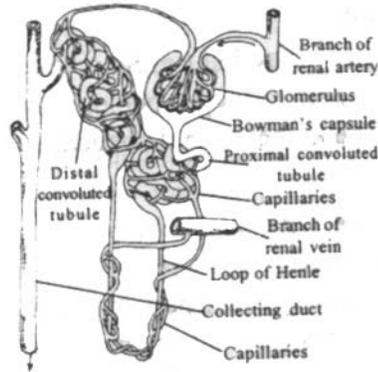
**12. Describe various parts in human excretory system.**

- Ans :
- Two bean shaped **kidneys** located below the diaphragm in the abdomen towards back.
  - Two excretory tubes (**Ureters**)
  - One **urinary** bladder, into which ureters open
  - A muscular tube arising from the urinary bladder called **urethra**, which opens out.

**13. Describe functions of kidneys.**

- Ans :
1. Elimination of nitrogenous wastes.
  2. Regulating the water content of the body (Osmoregulation)
  3. Keeping normal mineral balance in blood.

**14. Draw labelled diagram of Nephron**



**FIVE MARKS QUESTIONS**

**1. Describe stomata.**

- Ans :
1. Tiny apertures found on the surface of the leaf are called **stomata**
  2. They have mechanism for opening and closing
  3. They open to let in oxygen and release carbondioxide
  4. When a plant is short of water, the guard cells become flaccid closing the stoma.
  5. When the plant has plenty of water, the guard cells become turgid. As the cell wall of guard cells along the inner surface is thick, it can not stretch much. Hence the stoma opens.

**2. Describe inhalation in man.**

- Ans :
1. Diaphragm move downward and becomes flat
  2. Ribs are raised upward and outward and volume of chest cavity increases
  3. The air drawn in brings in oxygen which diffuses into the blood supplied to walls of alveoli

**3. Explain bronchitis.**

- Ans :
1. In bronchitis, the bronchi and bronchioles get inflamed and their cavities become narrow - so that air can not pass in and out of lungs easily.
  2. The pathway gets constricted due to accumulation of mucus on the walls of bronchi and bronchioles.
  3. This happens due to excessive smoking.
  4. Due to infection of accumulated mucus, inflammation of lungs and bronchi.
  5. Hence the air ways become narrow causing difficulty in breathing.

#### 4. Describe the structure of a nephron.

- Ans :
1. The cup shaped upper end of nephron is called **Bowman's capsule**.
  2. It contains a net of capillaries called **glomerulus**. Glomerulus is formed by the capillaries of artery.
  3. This artery transports blood rich in wastes and water to the kidneys.
  4. Bowman's capsule leads into a tubular structure. It is divisible into a proximal convoluted tubule (PCT), a loop of Henle and a distal convoluted tubule (DCT).
  5. These three parts are surrounded by blood capillaries.

#### 5. Describe mechanism of excretion.

- Ans :
1. Blood leading into the glomerulus is filtered in the Bowman's capsule. The filtrate is called nephric filtration. Resultant fluid is nephric filtrate.
  2. Proteins, red blood cells etc., are not filtered.
  3. Nephric filtrate enters the renal tubule. It contains waste materials as well as useful substances.
  4. The useful substances are reabsorbed into the blood capillaries present around the renal tubule. Excess water, sodium chloride etc., are reabsorbed. The remaining fluid in the urine.
  5. The wastes, in the form of urea reaches the collecting tubule and then ureters. Through ureters, urine reaches the urinary bladder and then sent out at intervals.

#### 6. How dialysis will be done ?

- Ans :
1. A tube is inserted in an artery in the arm of the patient. It is connected to the dialysis machine.
  2. The plastic tube is formed by two membranes - tube in tube.
  3. In the inner tube blood of patient flows. In the outer tube dialysis fluid is present.
  4. Wastes of the blood flows into the dialysis fluid.
  5. The purified blood enters the vein from the dialysis machine.

#### FILL IN THE BLANKS

1. Due to \_\_\_\_\_ of food, energy is liberated.
2. For oxidation of glucose in cell, \_\_\_\_\_ is required.
3. Utilisation of oxygen for oxidation of glucose to release energy is called \_\_\_\_\_
4. In take of oxygen by animals from surroundings and release of carbon dioxide is known as \_\_\_\_\_
5. Tiny pores present on the upper surface of the leaf are called \_\_\_\_\_
6. When plant is short of water, \_\_\_\_\_ cells become flaccid. Hence, the stoma is closed.

7. For respiration, fishes have \_\_\_\_\_
8. Chief respiratory organs in terrestrial animals are \_\_\_\_\_
9. In man, internal nostrils open into \_\_\_\_\_
10. In respiratory systems of man, pharynx opens into the \_\_\_\_\_
11. In man trachea is divided into two branches and they open into \_\_\_\_\_
12. In man, pharynx opens into the trachea through \_\_\_\_\_
13. Walls of trachea are supported by \_\_\_\_\_
14. Branches of bronchi are called \_\_\_\_\_
15. Bronchioles are covered by \_\_\_\_\_
16. Branches of bronchioles enter into \_\_\_\_\_
17. Muscular partition between thoracic cavity and abdominal cavity is known as \_\_\_\_\_
18. Breathing is also called \_\_\_\_\_
19. In take of air into lungs is called \_\_\_\_\_
20. Elimination of air from lungs is called \_\_\_\_\_
21. A person at rest respire \_\_\_\_\_ times.
22. \_\_\_\_\_ acts on digested food after reaching the cells.
23. In cells, energy is liberated by \_\_\_\_\_
24. Respiration inside the cell is called \_\_\_\_\_
25. At higher and higher altitudes, \_\_\_\_\_ reduces.
26. People living in \_\_\_\_\_ regions have more red blood cells.
27. Inhaling of poisonous gases lead to \_\_\_\_\_
28. For the patients suffering from respiratory problems, doctors arrange \_\_\_\_\_
29. Bronchitis and pneumonia are diseases of \_\_\_\_\_
30. Bacteria that cause pneumonia \_\_\_\_\_
31. \_\_\_\_\_ have no special organs for excretion.
32. Carbondioxide released in respiration is utilised by the plants in \_\_\_\_\_
33. Alkaloid in the bark of *Cinchona* is \_\_\_\_\_
34. Person suffering from malaria is given the \_\_\_\_\_ as medicine.
35. Morphine is extracted from the fruit of \_\_\_\_\_
36. Plant product used as anaesthetic is \_\_\_\_\_
37. Alkaloid in the seeds of coffee \_\_\_\_\_
38. Bark of pine trees contain \_\_\_\_\_
39. \_\_\_\_\_ are used to prepare varnish and polish.
40. Human kidneys are \_\_\_\_\_ shaped.
41. Tube like structure formed from urinary bladder is \_\_\_\_\_

42. Urethra opens out through \_\_\_\_\_
43. Structural and functional unit of kidney is \_\_\_\_\_
44. Minute tubular structures in the kidney are \_\_\_\_\_
45. Capillary net in the Bowman's capsule is \_\_\_\_\_
46. Glomerulus is formed by the capillaries of \_\_\_\_\_
47. In kidney, blood is filtered in \_\_\_\_\_
48. Filtration of blood in Bowmans capsule is \_\_\_\_\_
49. Chief excretory product in the nephric filtrate is \_\_\_\_\_
50. Urine reaches the urinary bladder from kidneys through \_\_\_\_\_
51. Wastes are excreted through skin as \_\_\_\_\_
52. Carbondioxide from the body is eliminated through \_\_\_\_\_
53. Maintenance of water and mineral ions in optimum levels is called \_\_\_\_\_
54. Maintenance of the body at a constant level is called \_\_\_\_\_
55. Each kidney is formed by about \_\_\_\_\_ nephrons.
56. When kidneys are failed, wastes from blood are eliminated artificially by \_\_\_\_\_
57. To eliminate wastes from blood, a tube is inserted into the \_\_\_\_\_ and is connected to the dialysis machine.
58. After purification in dialysis machine, blood is sent to \_\_\_\_\_
59. Excretion means \_\_\_\_\_ of waste materials.

### **MULTIPLE CHOICE QUESTIONS**

1. One of the following is not related to respiration ( )
  - A. Breathing
  - B. Diffusion of oxygen from blood to tissues
  - C. Diffusion of oxygen from tissues to blood
  - D. Energy production
2. From this part of respiratory system, oxygen diffuses into blood ( )
 

A. Trachea	B. Alveolus
C. Bronchus	D. Nostril
3. It is not related to the nephron ( )
 

A. Loop of Henle	B. Proximal convoluted tubule
C. Distal convoluted tubule	D. Seminiferous tubules
4. Process involved in the functioning of artificial kidney ( )
 

A. Dialysis	B. Ventilation
C. Failure of kidney	D. Catalysis
5. The following are the parts of excretory system ( )
 

1. Kidney	2. Ureters
3. Urethra	4. Urinary bladder

Arrange them in correct sequence -

- A. 2 - 1 - 3 - 4                      B. 4 - 3 - 2 - 1  
C. 1 - 2 - 3 - 4                      D. 1 - 2 - 4 - 3
6. Energy releasing activity (     )  
A. Digestion                              B. Respiration  
C. Excretion                              D. Transport
7. Utilisation of oxygen for the release of energy from glucose (     )  
A. Breathing                              B. Digestion  
C. Respiration                              D. Digestion
8. In take of oxygen into lungs from surroundings and liberation of carbondioxide is called (     )  
A. Breathing                              B. Digestion  
C. Respiration                              D. Digestion
9. Oxidation of glucose in the mitochondria of cell is called (     )  
A. Digestion                              B. Excretion  
C. Cellular respiration                      D. Photosynthesis
10. The pores on the leaves for exchange of gases are called (     )  
A. Stigmata                              B. Respiratory pores  
C. Spiracles                              D. Stomata
11. Bronchitis is a (     )  
A. Part of body                              B. Respiratory diseases  
C. Division of trachea                      D. Alveolus
12. In mammals, the muscular partition between thoracic cavity and abdominal cavity is (     )  
A. Diaphragm                              B. Tympanum  
C. Retina                              D. Dialysis
13. Elimination of carbondioxide from lungs during breathing is (     )  
A. Inhalation                              B. Exhalation  
C. Respiration                              D. Dialysis
14. In take of air with oxygen into the lungs during breathing is (     )  
A. Inhalation                              B. Digestion  
C. Excretion                              D. Dialysis
15. By this process, nitrogenous wastes are eliminated from the body (     )  
A. Respiration                              B. Digestion  
C. Excretion                              D. Diffusion

16. Filtration of wastes from the blood by using artificial machine ( )  
 A. Capillary action                      B. Curing  
 C. Wetting                                  D. Dialysis
17. In the older parts of roots or bark of woody plants, tiny openings called ( )  
 A. Stigmata                                  B. Stomata  
 C. Lenticles                                 D. Spiracles
18. Structural and functional unit of kidney ( )  
 A. Nephron                                  B. Ureter  
 C. Xylem                                      D. Urethra
19. Glomerulus is present in ( )  
 A. Right atrium                              B. Left atrium  
 C. Blood capillaries                        D. Bowman's capsule
20. Number of nephrons in a kidney ( )  
 A. One lakh                                  B. Ten lakhs  
 C. One crore                                  D. Ten crores

### MATCH THE FOLLOWING

<b>I. Product</b>		<b>Plant</b>
1. Quinine	( )	A) Grass
2. Morphine	( )	B) Tea leaves
3. Caffeine	( )	C) Poppy
4. Tannins	( )	D) Coffee seeds
5. Silica crystals	( )	E) <i>Cinchona</i>

### ANSWERS

#### Fill in the Blanks :

- |                     |                 |
|---------------------|-----------------|
| 1. Oxidation        | 2. Oxygen       |
| 3. Respiration      | 4. Breathing    |
| 5. Stomata          | 6. Guard cells  |
| 7. Gills            | 8. Lungs        |
| 9. Pharynx          | 10. Trachea     |
| 11. Lungs           | 12. Glottis     |
| 13. Cartilage rings | 14. Bronchides  |
| 15. Lungs           | 16. Alveoli     |
| 17. Diaphragm       | 18. Ventilation |
| 19. Inhalation      | 20. Exhalation  |
| 21. 16 - 18         | 22. Oxygen      |

- |                      |                          |
|----------------------|--------------------------|
| 23. Mitochondria     | 24. Cellular respiration |
| 25. Air pressure     | 26. Hilly                |
| 27. Asphyxiation     | 28. Ventilator           |
| 29. Lungs            | 30. <i>Pneumococci</i>   |
| 31. Plants           | 32. Photosynthesis       |
| 33. Quinine          | 34. Quinine              |
| 35. Poppy            | 36. Morphine             |
| 37. Caffeine         | 38. Resins               |
| 39. Resins           | 40. Bean                 |
| 41. Urethra          | 42. Urinary aperture     |
| 43. Nephron          | 44. Nephrons             |
| 45. Glomerulus       | 46. Artery               |
| 47. Bowman's capsule | 48. Nephric filtration   |
| 49. Urea             | 50. Ureters              |
| 51. Sweat            | 52. Lungs                |
| 53. Osmoregulation   | 54. Equilibrium          |
| 55. A million        | 56. Dialysis             |
| 57. Artery           | 58. Vein                 |
| 59. Elimination      |                          |

**Multiple Choice Questions :**

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1. C  | 2. B  | 3. D  | 4. A  | 5. D  |
| 6. B  | 7. C  | 8. A  | 9. C  | 10. D |
| 11. B | 12. A | 13. B | 14. A | 15. C |
| 16. D | 17. C | 18. A | 19. D | 20. B |

**Match the following :**

- |    |      |      |      |      |      |
|----|------|------|------|------|------|
| 1. | 1. E | 2. C | 3. D | 4. B | 5. A |
|----|------|------|------|------|------|



**CONTROL AND COORDINATION**

---

**OBJECTIVES**

1. Relate nervous system and endocrine system with the function of control and coordination.
2. Explain parts of eye ; difference between myopia and hypermetropia
3. Sketch the nerve cell, brain and sense organs.

**IMPORTANT POINTS**

1. Nervous system and endocrine system work in a coordinated manner to convey the information to various organs and systems in the body.
2. Human nervous system mainly consists of two parts, namely, central nervous system and peripheral nervous system.
3. Central nervous system is formed by **brain** and **spinal cord**. Peripheral nervous system is formed by the **nerves** connecting central nervous system and sense organs, muscles, glands etc.,
4. Brain consists of cerebrum, cerebellum and medulla oblongata.
5. Cerebrum is the largest part in the brain. It regulates intelligence and voluntary actions.
6. Cerebellum is maintains equilibrium of the body.
7. Medulla oblongata is continued as spinal cord. It is a cylindrical structure found in vertebral column.

**DEFINITIONS**

1. **Nerves** : Thread like structures formed from brain or spinal cord. Nerves are a bunch of axons covered by a membrane.
2. **Synapse** : Narrow gap present between the terminal branches of axon of a nerve cell and the dendrites of cell body of next nerve cell.
3. **Nodes of Ranvier** : Axon of most of the nerve cells is covered by a type of fatty material called **myelin**. It is missing at intervals. These parts of axon without myelin are called **nodes of Ranvier**.
4. **Reflex action** : Fast and spontaneous actions without processing of brain are called reflex actions.
5. **Hypermetropia** : It is a defect of eye, which is also called long sightedness. In this defect, distant objects can be focussed properly, but the point of focus for an object near to the eye is behind retina.

6. **Myopia** : It is a defect of eye, which is also called short sightedness. In this defect, objects close to the eye are can be focussed properly, but the point of focuss for distant objects is in front of retina.
7. **Hormone** : A chemical substance secreted by an endocrine gland and carried by the blood or lymph to a target organ to stimulate a specific activity.

### THREE MARKS QUESTIONS

#### 1. What are the differences between cerebrum and cerebellum ?

Ans :

Cerebrum	Cerebellum
1. It is the largest and the most prominent part of brain	1. It is a small area of brain lying below the mid brain.
2. It is divided into left and right hemispheres by a deep median longitudinal groove	2. It is present under the large cerebrum
3. Each hemisphere contains two regions - outer gray matter and inner white matter	3. Like cerebrum, it has outer grey matter and inner white matter
4. It governs thinking, learning, reasoning, anger and pain	4. It maintains equilibrium of the body
5. It controls voluntary actions	5. It controls the posture of the body

#### 2. Define sensory nerves and motor nerves.

- Ans : a. **Sensory nerves** : Nerves that transmit information from sensory receptors to central nervous system are called sensory nerves. They contain sensory neurons.
- b. **Motor nerves** : Nerves that transmit information from the central nervous system to that effector organs are called motor nerves. They contain motor neurons.

#### 3. Describe the functions of cerebrum and cerebellum.

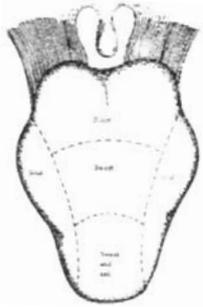
##### Ans : 1. Functions of cerebrum :

- It governs the mental abilities like thinking, reasoning, learning, memorising and intelligence.
- It controls our will, emotions and speech.
- It controls voluntary functions.

##### 2. Functions of cerebellum :

- It maintains equilibrium of the body
- It controls the posture of the body
- It coordinates the muscular coordination

4. Draw a diagram of tongue showing the parts that detect tastes like sour, bitter, sweet and salt.



5. Write the difference between hypermetropia and myopia.

Ans :	Hypermetropia	Myopia
	1. It results when the eye ball is shorter than normal	1. It occurs when the eye ball is longer than normal
	2. In this defect, distant objects can be focussed properly	2. In this defect, objects close to the eye can be focussed properly
	3. The point of focus for an object close to the eye is behind the retina	3. The point of focus for distant objects is in front of retina

6. What are hormones ? How they reach other parts of the body?

Ans : a. The chemical substances secreted by the endocrine glands are called hormones.  
 b. They are transported by the blood or lymph to a target organ to stimulate a specific activity.

7. Name the hormone secreted by thyroid gland and mention its functions.

Ans : 1. Thyroid gland secretes thyroxine  
 2. Thyroxine stimulates cellular metabolism and oxidation  
 3. In general thyroxine controls metabolism and growth

8. What is Cushing's disease ? Which endocrine gland is responsible for it ?

Ans : 1. Hyperactive of cells of pituitary gland causes Cushing's disease.  
 2. In this disease, excessive growth of hair occurs in males. In some, atrophy of testes leading to impotency is observed.  
 3. In females, this disease causes sterility, masculinisation, growth of beard and moustaches etc.,

9. What is a reflex action ? Name some common reflex actions.

Ans : 1. Fast and spontaneous actions without processing of brain are called reflex actions.  
 2. Blinking of our eyes in response to high beam of light that falls on our eyes ; withdrawl of our hand immediately if our finger touch a hot object.

**10. What does a synapse do?**

- Ans : 1. Synapse permits the transmission of information from one nerve to next nerve.  
2. It ensures the transmission of nerve impulse in one direction only.  
3. It helps in processing of information.  
4. It filters out low - level stimuli.

**11. What are the functions of cerebellum ?**

- Ans : Functions of cerebellum :
- It maintains equilibrium of the body
  - It controls the posture of the body
  - It coordinates the muscular coordination

**12. What are the functions of medulla oblongata ?**

- Ans : 1. Medulla oblongata is the lower most part of the brain located at the base of skull.  
2. It controls the internal organs like movement of lungs, heart etc., by regulating breathing, heart beat.  
3. It controls vital reflex centres such as cardiac centre, respiratory centre and centres for swallowing, sneezing and vomiting.

**13. Describe the structure of nerve cell.**

- Ans : 1. A neuron has a central area call the cell body or **cyton**.  
2. Several short, thread like branches arise from the cyton called **dendrites**.  
3. One of the dendrites is long and is called **axon** or nerve fibre.  
4. In most of the neurons, axon is covered by a fatty material called **myelin**. It is missing at intervals called **nodes of Ranvier**.

**14. What are the different types of nerves and mention their function ?**

- Ans : 1. Nerves are of three types, viz., sensory nerves, motar nerves and mixed nerves.  
2. **Sensory nerves** transmit information from sense organs to the central nervous system.  
3. **Motar nerves** transmit information from the central nervous system to the effector organs.  
4. **Mixed nerves** contain both sensory and motar neurons. They perform both sensory and motar functions.

**15. When a person is sleeping, if a feather is moved on his check, he move his head and kept it in same place. In this reflex action which events taken place ?**

- Ans : 1. This action takes place by the coordination of nervous system.

2. The stimulus reach the brain through skin and sensory nerves.
3. Brain transmit impulses into the parts of head. They constitute reflex action.
4. Hence, head is moves to a side.

**16. A person withdrawn his hand immediately after touching a hot object. Explain the role of nervous system in this event.**

- Ans :
1. When a hot object is touched, sensory nerves transmit the information from the hand to the spinal cord.
  2. A relay or intermediate neuron of spinal cord transmits the information to motar nerve.
  3. The motar nerve transmit the information about withdrawl of hand to the muscles from spinal cord.
  4. Hence the person withdraw his hand.

**17. Will any person can identify an object without seing it ? How ?**

- Ans :
1. Yes, we can identify certain objects in nature without seing them.
  2. Our skin is a receptor of touch and pressure.
  3. By holding an object with our hands, we can identify it.
  4. By observing the sound also we can detect it.
  5. If the substance is tastable, we can identify it with tongue.
  6. If the object releases smell, it can be known with nose.

**18. While going to school, you or your friend can say the curries in the neighbours house. How it is possible.**

- Ans :
1. Nose has can detect the sense of smell.
  2. While cooking, the chemicals of that curry reaches our nose as vapour and dissolve in the moisture of the layer in nose.
  3. The sensory nerves of nose transmit the sense of smell to the brain. Hence, we can identify the curries without seing them.

**19. Microbes are present in air, water, soil. Why they are not enter into our body ?**

- Ans :
1. Our entire body is covered by skin.
  2. It prevents the entry of microbes into the body.
  3. If they enter, the resistance of skin will destroy them.

**20. Describe common skin diseases, causative organisms, their symptoms and prevention.**

Ans :

S.No.	Disease	Causative organisms	Symptoms	Prevention
1	Ring worm	Fungus	Itching, rashes burning sensation	Personal hygiene
2	Eczema, dermatitis	Allergic	Itching, scaly skin	Most of the allergies can be prevented by avoiding offending substances
3	Scabies	Parasites	Itching	Personal hygiene and domestic hygiene

**21. Write about eye.**

- Ans :
1. Eye is the most important sense organ in the body.
  2. Eyelids protect our eye from external discomfort.
  3. Different parts of eye are cornea, iris, pupil, retina etc.

**22. How accommodation occur in the eye when we see the nearer objects and to see distant objects ?**

- Ans :
1. When we see nearer or distant objects, muscles of eye adjust accordingly.
  2. When we see a near object, due to the contraction of ciliary muscles, lens become thick and more convex. Thus the image is formed on retina.
  3. When we see a distant object, due to relaxation of ciliary muscles, lens become less convex and thus the image is formed on retina.

**23. What are the precautions to be taken to protect our eyes ?**

- Ans :
1. Do not read in the dark or when the light is too bright.
  2. You must keep your book at a proper distance from the eyes.
  3. While reading, maintain correct posture.
  4. Do not rub the eyes with unclean hands.
  5. Wash the eyes with cool and pure water daily.
  6. In case of an injury consult the doctor immediately.

**24. State the reasons for deafness.**

- Ans :
1. Ear contains a tube called eustachian tube.
  2. Unfortunately, it may become a channel for infections. If neglected, the

infection reaches the middle ear.

3. Then tympanum may become thickened and little bones may have their articulations affected. This may cause deafness.

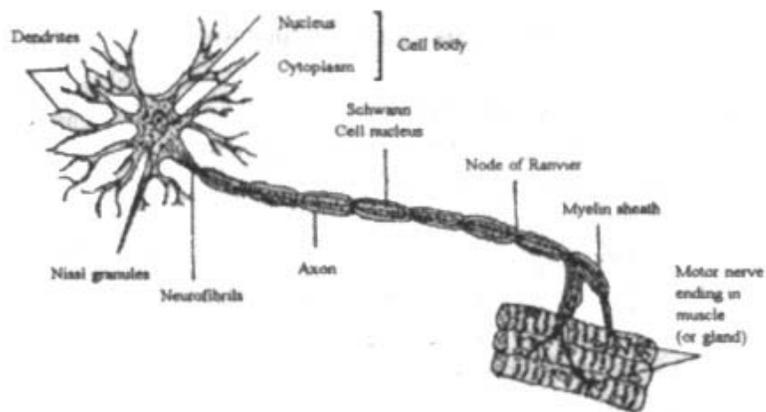
**25. Explain the secretions and effects of thyroid secretions.**

- Ans :
1. Thyroid gland is situated in the neck region on the ventral side.
  2. It secretes a hormone called thyroxine.
  3. It stimulates the cellular metabolism.
  4. In general, thyroxine controls the growth and metabolism of the body.

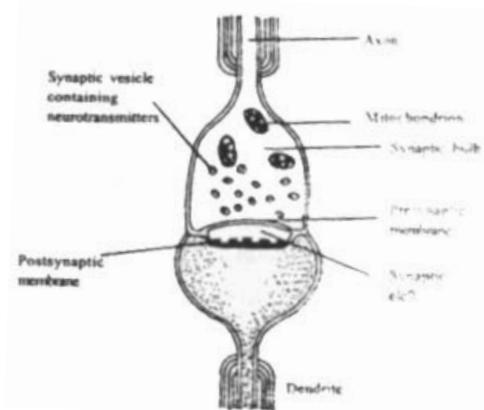
**26. Explain pancreas, its secretions and their actions.**

- Ans :
1. Pancreas is situated in the abdominal region.
  2. Pancreas secretes two hormones, viz., insulin and glucagon.
  3. Insulin promotes the conversion of glucose into glycogen.
  4. Glucagon promotes the conversion of glycogen and some other carbohydrates into glucose.

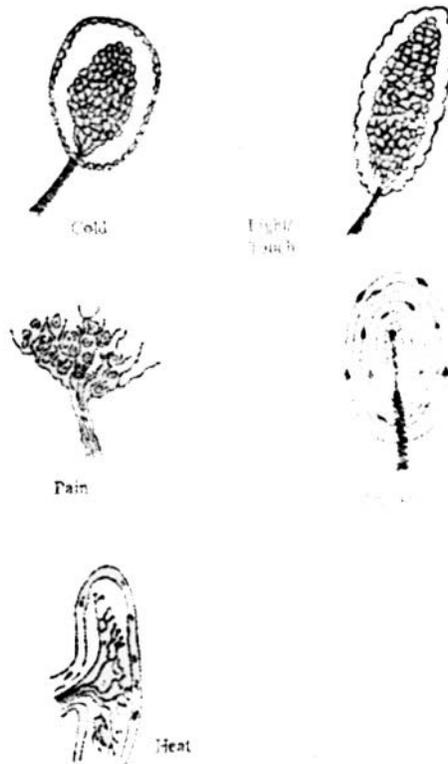
**27. Draw labelled diagram of neuron.**



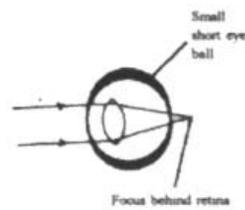
**28. Draw labelled diagram of synapse.**



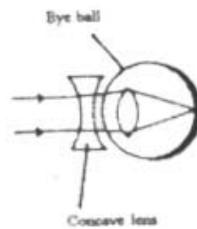
29. Draw different types of sensory cells in the skin that detect different senses.



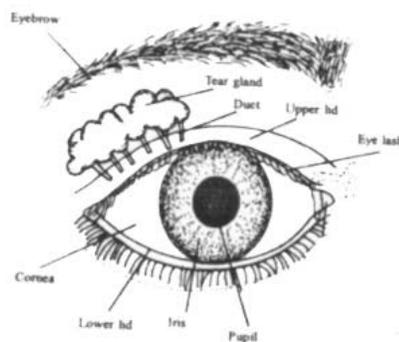
30. Draw labelled diagram showing corrected hypermetropia.



31. Draw labelled diagram showing corrected diagram of myopia



32. Draw labelled diagram of human eye.



## FIVE MARKS QUESTIONS

1. Where pituitary gland is located ? Mention any three hormones secreted by it and their effects.

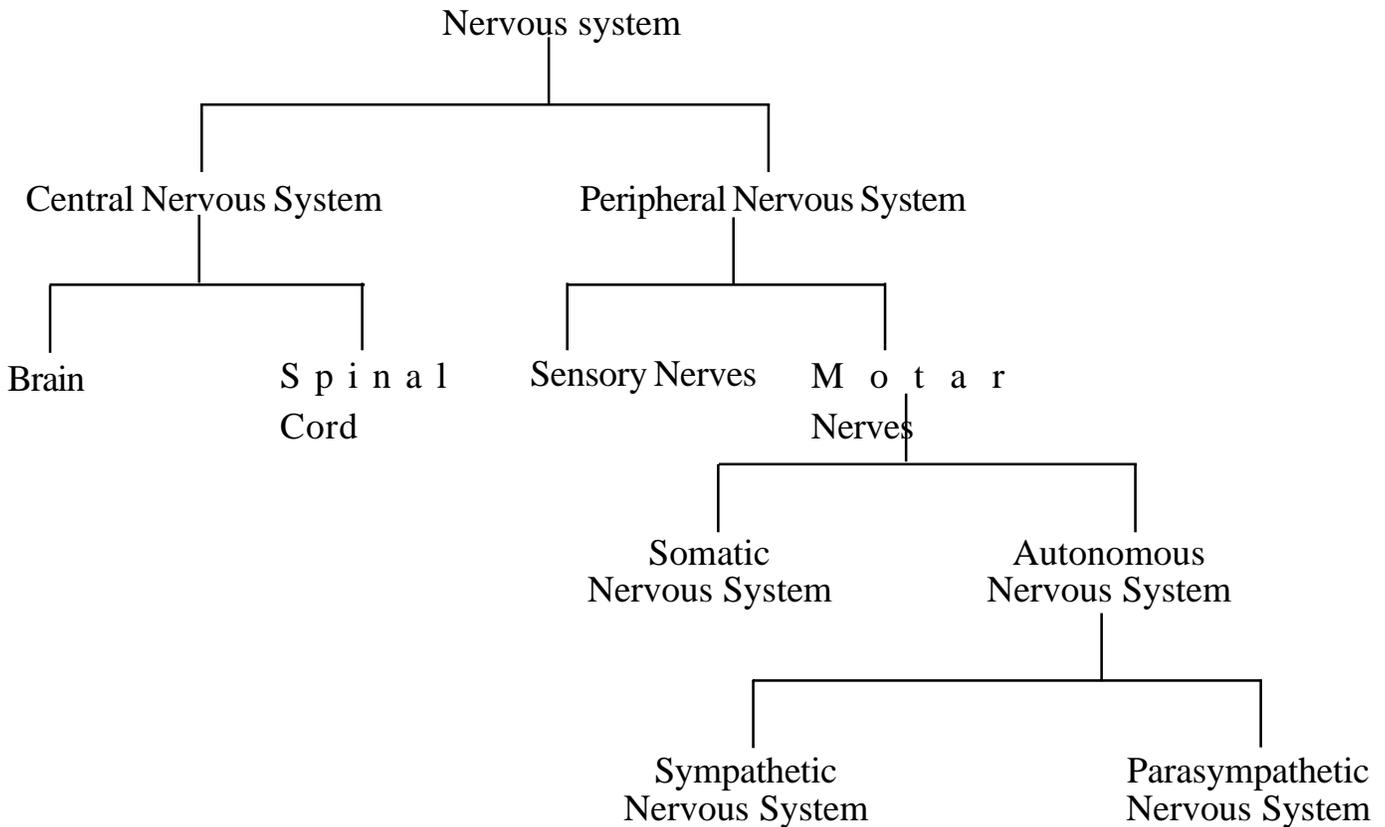
Ans : 1. Pituitary gland is located on the lower surface of the brain.

2. Hormones secreted by the pituitary and their effects are given in the following table :

S.No.	Hormones	Effects
1	Growth hormone or somato tropic hormone	Controls overall growth of the body, muscles and bones
2	Adreno cortico tropic hormone	Controls growth and functioning of adrenal cortex - stimulates adrenal cortex to produce steroid hormones.
3	Thyroid stimulating hormone	Controls growth and functioning of thyroid gland. Stimulates thyroid to secrete thyroxine
4	Follicle stimulation hormone	Stimulates the maturity of ovarian follicles and secretion of oestrogen by ovary in females ; and in males stimulates the process of spermatogenesis
5	Luteinising hormone	In females, it stimulates ovulation and secretion of progesterone and helps in preparation and maintenance of pregnancy. In males stimulate the secretion of testosterone.
6	Prolactin	Enhances the development of mammary glands and milk production in females
7	Melanocyte stimulation hormone	Controls the production of melanin pigment in skin
8	Oxytocin	Controls the uterine muscle contractions at the time of child birth
9	Anti diuretic hormone	Controls reabsorption of water in kidney tubules

**2. Draw a chart showing divisions of nervous system.**

Ans :



**3. Describe the functions of cerebrum.**

Ans : 1. Cerebrum is the largest part of brain. It is well developed and prominent part in man.

2. Cerebrum is divided into left and right cerebral hemispheres. They are formed by outer grey matter (contains cell bodies) and inner white matter (contains axons of neurons)

3a. It governs our mental abilities like thinking, reasoning, learning, memorising and intelligence.

b. It controls our will, emotions and speech.

c. It controls feeling of love, admiration and hatred.

d. It controls voluntary activities.

**4. Describe structure and functions of spinal cord.**

Ans : **I. Structure :**

1. Spinal cord is long and cylindrical. It is the continuation of medulla oblongata and extends upto the end of trunk in the vertebral column.

2. In the middle of spinal cord is a longitudinal narrow tube in which, cerebro spinal fluid is present.

3. Spinal cord is formed by inner grey matter and outer white matter.

## II. Functions :

1. Spinal cord controls the reflexes below the region of neck.
2. It conducts sensory impulses from the skin and muscles to the brain.
3. It conducts motor response from brain to the muscles of trunk and limbs.

### 5. Which organ helps in maintaining equilibrium in our body ? How it functions ?

Ans : 1. Internal ear maintains the equilibrium of the body.

2. Our internal ear has three semicircular canals and are filled with fluid.
3. Whenever we move, the fluid also moves. These movements are detected by the sensory cells.
4. They send the impulses to the brain.
5. Our brain detects the loss of our balance and sends impulses to the muscles to keep us upright.

### 6. Describe functions of skin.

Ans : 1. Skin protects the body from mechanical injuries, bacterial infections, heat and cold.

2. Skin is sensory to touch, pain and temperature.
3. Skin regulates our body temperature. Excessive heat is lost through evaporation of sweat, otherwise it is conserved by fat and hair.
4. Skin easily absorbs oily substances.
5. Skin synthesises the vitamin - D in sunlight.
6. Skin eliminates excess water, salts and wastes through sweat.

### 7. Explain peripheral nervous system.

Ans : 1. Peripheral nervous system is formed by the nerves that conduct impulses towards or away from the central nervous system.

- a. **Sensory nerves** transmit information from sense organs to central nervous system.
- b. **Motor nerves** transmit information from central nervous system to the effector organs.

2. Peripheral nervous system consists of a somatic nervous system and autonomous nervous system.

### 8. Explain the components of reflex arc.

Ans : 1. A **receptor** or sensory neuron perceives the stimulus

2. A **sensory nerve** carries the message from the receptor to spinal cord.
3. A relay or intermediate neuron of spinal cord transmits the impulse to a motor nerve
4. Motor nerve carries the message from spinal cord to effector organ - muscle or gland.

### 9. How taste of food materials is detected ?

Ans : 1. Tongue is a sense organ that distinguishes different tastes.

2. Our tongue contains taste buds.

3. Taste buds are the group of sensory cells.

4. These are sensitive to chemicals, which most dissolve in saliva, before we can taste them.

5. Taste buds send messages to brain by taste nerves for analysis, resulting in the sensations.

6. This is why dry food has no taste until we chew it with saliva.

7. Tongue detects different tastes in different regions.

### 10. Write three sentences about endocrine system.

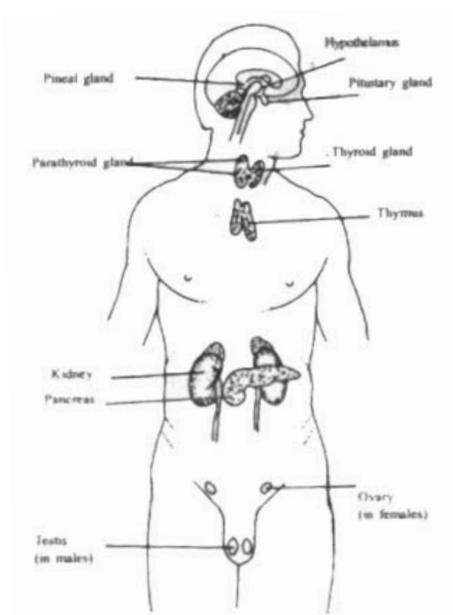
Ans : 1. Our body contains endocrine glands. They secrete chemical substances called **hormones**.

2. Hormones control and coordinate tissues or organs in the body.

3. As the endocrine glands have no ducts, they are also called ductless glands. Different glands secrete hormones.

4. Over secretion and under secretion of hormones result in various abnormalities / diseases.

### 11. Draw a labelled diagram showing endocrine glands in human body.



### FILL IN THE BLANKS

1. Sensory and motor nerves constitute \_\_\_\_\_

2. Functional units of nervous tissue are \_\_\_\_\_

3. Number of nerve cells in our nervous system is about \_\_\_\_\_

4. Each neuron has a central area called \_\_\_\_\_

5. Thread like processes formed from the cyton of neuron are \_\_\_\_\_

6. The longest branches of fibres formed from cyton is called \_\_\_\_\_
7. Non myelinated parts of axon are called \_\_\_\_\_
8. Thread like structures attached to brain and spinal cord are called \_\_\_\_\_
9. The narrow gap between the terminal fibres of axon of a neuron and dendrites of next neuron is called \_\_\_\_\_
10. Weight of brain of man is about \_\_\_\_\_ gms.
11. The largest part of brain is \_\_\_\_\_
12. Love and anger are regulated by \_\_\_\_\_
13. Equilibrium of body is maintained by \_\_\_\_\_
14. Swallowing, coughing, vomiting etc., are regulated by the respective centres that lie in \_\_\_\_\_
15. Fluid present in the narrow tube of spinal cord is \_\_\_\_\_
16. Brain and spinal cord are parts of \_\_\_\_\_
17. \_\_\_\_\_ nerves transmit impulses from brain / spinal cord to the effector organs.
18. The narrow gap at synapse is called \_\_\_\_\_
19. \_\_\_\_\_ nerves transmit information from sense organs to central nervous system.
20. Whenever, impulse reaches synapse \_\_\_\_\_ is released into the synaptic cleft.
21. Hair, nails etc., are in \_\_\_\_\_
22. Skin regulates our \_\_\_\_\_
23. Skin can synthesise \_\_\_\_\_
24. Excessive water, salts etc., are sent out by skin in the form of \_\_\_\_\_
25. The image formed on retina is real and \_\_\_\_\_
26. In hypermetropia, objects close to the eye can be focussed behind the \_\_\_\_\_
27. Ears convert the vibrations in the air into \_\_\_\_\_
28. Taste buds are groups of \_\_\_\_\_
29. Hyperactivity of cells of pituitary gland causes \_\_\_\_\_
30. Due to deficiency of growth hormone in children results in \_\_\_\_\_
31. Hyper secretion of growth hormone in children results in \_\_\_\_\_
32. Secretions of endocrine glands are called \_\_\_\_\_
33. Thyroid gland secretes \_\_\_\_\_
34. Conversion of glucose into glycogen is regulated by \_\_\_\_\_
35. Conversion of glycogen into glucose is regulated by \_\_\_\_\_
36. Hyperactivity of thyroid gland also causes abnormal swelling of thyroid gland called \_\_\_\_\_

## MULTIPLE CHOICE QUESTIONS

1. Nerves that carry impulses from brain to effector organs ( )  
A. Sensory nerves                      B. Motor nerves  
C. Intermediate neurons              D. Mixed nerves
2. Find thread like structures formed from nerve cell body ( )  
A. Dendrites                              B. Synapse  
C. Nodes of Ranvier                    D. Neuron
3. Neuro transmitters are relased from the terminal part of ( )  
A. Axon                                      B. Synapse  
C. Nodes of Ranvier                    D. Neuron
4. Pituitary gland is present ( )  
A. In the neck                              B. Below the brain  
C. Below the stomach                   D. Near the kidneys
5. Transparent window in the fornt part of eye is ( )  
A. Cornea                                    B. Aqueous humour  
C. Cone                                        D. Retina
6. Hormones are circulated by ( )  
A. Blood                                      B. Nerves  
C. Lymph                                      D. Blood and lymph
7. Thyroxine is secreted by ( )  
A. Pituitary                                  B. Thyroid  
C. Brain                                        D. Pancreas
8. Pancreas secretes ( )  
A. Growth hormone                      B. Thyroxine  
C. Insulin                                     D. Prolactin
9. Disease caused due to deficiency of insulin ( )  
A. Goitre                                      B. Cretinism  
C. Diabetes incipidus                    D. Diabetes mellitus
10. Cretinism is due to ( )  
A. Inactivity of pituitary                B. Overactivity of pituitary  
C. Inactivity of thyroid                 D. Overactivity of thyroid
11. Ringworm disease is caused by ( )  
A. Fungus                                    B. Alga  
C. Parasites                                 D. Bacteria

## MATCH THE FOLLOWING

- 1.**
- | <b>A</b>           |     | <b>B</b>  |
|--------------------|-----|-----------|
| 1. Eustachian tube | ( ) | A. Tongue |
| 2. Cornea          | ( ) | B. Ear    |
| 3. Nerve endings   | ( ) | C. Eye    |
| 4. Olfactory organ | ( ) | D. Skin   |
| 5. Taste buds      | ( ) | E. Nose   |
- 2.**
- | <b>A</b>                 |     | <b>B</b>                               |
|--------------------------|-----|--|
| 1. Somatotrophic hormone | ( ) | A. Growth of mammary glands in female  |
| 2. Lactinizing hormone   | ( ) | B. Ovulation in females                |
| 3. Thyroxine             | ( ) | C. Conversion of glucose into glycogen |
| 4. Insulin               | ( ) | D. Growth of bones and muscles         |
| 5. Prolactin             | ( ) | E. Growth of body                      |
- 3.**
- | <b>A</b>           |     | <b>B</b>                            |
|--------------------|-----|-------------------------------------|
| 1. Pituitary gland | ( ) | A. Maintains equilibrium            |
| 2. Thyroid gland   | ( ) | B. Controls love, anger, pain etc., |
| 3. Pancreas        | ( ) | C. Thyroxine                        |
| 4. Cerebrum        | ( ) | D. Insulin                          |
| 5. Cerebellum      | ( ) | E. Growth hormone                   |
- 4.**
- | <b>A</b>          |     | <b>B</b>   |
|-------------------|-----|--|
| 1. Sensory nerves | ( ) | A. Junction of two neurons                         |
| 2. Motor nerves   | ( ) | B. Transmit impulses from sense organs to brain    |
| 3. Mixed nerves   | ( ) | C. Nodes of Ranvier                                |
| 4. Synapse        | ( ) | D. Contains sensory and motor neurons              |
| 5. Axon           | ( ) | E. Transmit impulses from brain to effector organs |
- 5.**
- | <b>A</b>  |     | <b>B</b>              |
|-----------|-----|-----------------------|
| 1. Skin   | ( ) | A. Light              |
| 2. Tongue | ( ) | B. Chemicals in air   |
| 3. Nose   | ( ) | C. Chemicals in food  |
| 4. Ears   | ( ) | D. Heat and pressure  |
| 5. Eyes   | ( ) | E. Sound and movement |

## ANSWERS

### Fill in the Blanks :

- |                              |                            |
|------------------------------|----------------------------|
| 1. Peripheral nervous system | 2. Nerve cells             |
| 3. Ten billions              | 4. Cyton                   |
| 5. Dendrites                 | 6. Axon                    |
| 7. Nodes of Ranvier          | 8. Nerves                  |
| 9. Synapse                   | 10. 1200 - 1400            |
| 11. Cerebrum                 | 12. Cerebrum               |
| 13. Cerebellum               | 14. Medulla oblongata      |
| 15. Cerebro spinal fluid     | 16. Central nervous system |
| 17. Motor                    | 18. Synaptic cleft         |
| 19. Sensory                  | 20. Neuro transmitter      |
| 21. Epidermis                | 22. Body temperature       |
| 23. Vitamin - D              | 24. Sweat                  |
| 25. Inverted                 | 26. Retina                 |
| 27. Nerve impulses           | 28. Sensory cells          |
| 29. Cushing's disease        | 30. Dwarfism               |
| 31. Gigantism                | 32. Hormones               |
| 33. Thyroxine                | 34. Insulin                |
| 35. Glucagon                 | 36. Goitre                 |

### Multiple Choice Questions :

- |       |      |      |      |       |
|-------|------|------|------|-------|
| 1. B  | 2. A | 3. A | 4. B | 5. A  |
| 6. D  | 7. B | 8. C | 9. D | 10. C |
| 11. A |      |      |      |       |

### Match the following :

- |    |      |      |      |      |      |
|----|------|------|------|------|------|
| 1. | 1. B | 2. C | 3. D | 4. E | 5. A |
| 2. | 1. D | 2. B | 3. E | 4. C | 5. A |
| 3. | 1. E | 2. C | 3. D | 4. B | 5. A |
| 4. | 1. B | 2. E | 3. D | 4. A | 5. C |
| 5. | 1. D | 2. C | 3. B | 4. E | 5. A |



**REPRODUCTION****OBJECTIVES**

After completing this lesson you will be able to :

1. Illustrate male and female reproductive systems in humans and state functions of each part.
2. Describe the main events in the process of reproduction in humans starting from the production of gametes to pregnancy and parturition.
3. Reason out the importance of contraception and suggest methods for control of population growth.

**IMPORTANT POINTS**

1. In asexual reproduction, only one animal is involved. Male and female animals are not involved. Reproduction occurs by cell division.
2. A typical flower has four whorls, viz., calyx, corolla, androecium and gynaecium.
3. All stamens together form androecium, gynaecium contains ova.
4. In human beings, males attain puberty at 13 - 14 years and females attain puberty at 11 - 12 years.
5. The developing young one is attached to the uterine wall by placenta.
6. By using contraceptives, unwanted pregnancy can be prevented.

**DEFINITIONS**

1. **Sexual reproduction** : Production of an offspring by the fusion of egg and sperm which are sex cells or gametes.
2. **Self pollination (Autogamy)** : Pollen grains from the anther of a flower are transferred to the stigma of same flower.
3. **Cross pollination (Allogamy)** : The process of formation of sperms in the testes of an organism.
4. **Identical twins** : When two embryos are formed from the same egg due to division of the fertilised egg into two sets of cells.
5. **Non identical or fraternal twins** : When two embryos are formed from two different eggs produced at the same time and fertilised by two different sperms.

**THREE MARKS QUESTIONS**

1. **Describe main events in asexual reproduction.**

Ans : 1. In asexual reproduction, only one animal is involved

2. Reproduction occurs by cell division

3. New individuals produced are genetically identical to the parent

4. It is a fast mode of multiplication

## 2. Describe sexual reproduction

Ans : 1. In sexual reproduction, two animals - male and female are involved. This type of reproduction occurs both in plants and animals.

2. This type of reproduction occurs by the fusion of sperm and ovum.

3. After fertilisation of sperm and ovum, a zygote is formed. It develops into a complete organism.

4. In this reproduction combination of genetic material of both parents occurs.

## 3. What are binary fission and multiple fission ?

Ans : 1. **Binary fission** : In this process parent animal is divided into two individuals are formed. This type of reproduction occurs in bacteria, yeast, *amoeba* etc.,

2. **Multiple fission** : In this type, parent individual is divided into many individuals. Generally it occurs during unfavourable conditions. It is observed in many algal, *amoeba* and some other protozoans.

## 4. Describe medical termination of pregnancy (MTP).

Ans : MTP methods are also known as it these are conceptive methods. These are applied if conception has taken place. Abortion and aspiration are two corrective methods in which pregnancy can be terminated by either mechanical method or by using hormones.

## 5. Describe sexually transmitted diseases.

Ans : 1. Diseases which spread through sexual contact are called sexually transmitted diseases (STD)

2. Sometimes microorganisms may infect areas around reproductive parts. During the act of sexual intercourse, they may be easily transmitted from one person to the other.

3. Syphilis, gonorrhoea, AIDS etc., are some of the STD.

## 6. Explain the modes of transmission of AIDS.

Ans : 1. Sexual contact with the affected person *i.e.*, through semen or vaginal fluid

2. Use of infected syringes to other people and transfusion of infected blood

3. Organ transplantation of an infected person to a healthy person

4. During pregnancy, from an infected mother to her baby.

## 7. Describe budding in *Hydra*

Ans : 1. Budding is a type of asexual reproduction in *Hydra*. In this process, a bulb like projection arises on the parent body known as **bud**.

2. Body cavity projects into the bud. Tentacles and mouth are formed at the free end.

3. Now the bud is detached from the parent and leads independent life.

**8. Describe vegetative propagation or vegetative propagation.**

Ans : 1. Vegetative propagation is a type of asexual reproduction in plants.

2. In this reproduction, new plants are formed from leaves, stems or roots but not from flowers.

3. Vegetative propagation is of two types, viz., natural or artificial.

**9. Name the natural methods of vegetative reproduction.**

Ans : Natural methods of vegetative reproduction takes place through stem, roots and leaves.

- a. Stem - e.g., Runners of grass  
Suckers of *chrysanthimum*  
Bulbs of onion  
Rhizomes of ginger  
Tubers of potato
- b. Roots - e.g., Roots of sweet potato  
Adventitious buds of mint
- c. Leaves - e.g., *Bryophyllum*, *Bigonia*

**10. A farmer is growing plants with leaves (without seeds). How it is possible ?**

Ans : 1. In vegetative reproduction, new plants can be grown with the help of leaves.

2. Adventitious buds are developed from the margins of the leaves of *Bryophyllum* and *Bigonia*.

3. When such leaf falls on moist soil, these buds develop into plantlets, which can be separated and grown into independent plants.

**11. Which crops are cultivated without seeds ? How ?**

Ans : By vegetative propagation, crops can be grown without seeds.

- e.g., 1 a. Stem - e.g., *Chrysanthimum*, onion, ginger, potato.
- b. Roots - e.g., Sweet potato, mint
- c. Leaves - e.g., *Bryophyllum*, *Bigonia*
- 2 a. Grafting - e.g., Mango, apple, rose, rubber, citrus
- b. Cutting - e.g., Sugarcane, *Bougainvillea*
- c. Layering - e.g., Raspberries, Jasmine, *Magnolia*
- d. Tissue culture - e.g., Orchids, Asparagus, *Chrysanthimum*

**12. What is puberty ? Explain it in human beings.**

- Ans :
1. Human reproductive organs become functional at the age of 13 - 14 years in males and 12 - 13 years in females. This age is known as *puberty*.
  2. During sexual maturity, hormonal changes take place in males and females.
  3. Secondary sexual characters in males are : deepening of voice, widening of shoulders, appearance of beard and moustaches and growth of axillary and public hair.
  4. Secondary sexual characters in females are : growth of axillary and public hair, widening of pelvis and hip, enlargement of breasts and initiation of menstrual cycle.

**13. What happens when ovum receives a sperm ?**

- Ans :
1. If ovum receives sperm in the fallopian tube, both of them are united to form a **zygote**
  2. Then the zygote begins to divide and forms a mass of cells called **morula**.
  3. Morula reaches the **uterus** and fixes itself to the wall of uterus. This process is called **implantation**.
  4. Then it undergoes further development.

**14. Explain how twins are born ?**

- Ans :
1. In every reproductive cycle, usually an ovary releases only one ovum.
  2. Sometimes more than one ovum may be released and are fertilised by the sperms.
  3. In some cases after fertilisation, the egg divides and the resultant cells separate and develop as different individuals.
  4. This is how times, rarely triplets and quadruplets are produced.

**15. Describe mechanical methods of contraception.**

- Ans :
1. Condoms, diaphragms and loop are mechanical contraceptives.
  2. **Condoms** : It is a thin rubber tube worn over the penis before sexual intercourse. The ejaculate gets collected in this tube and is not discharged into the vagina.
  3. **Diaphragm** : It is fitted over the cervix in a woman's body by a doctor to prevent the entrance of sperms into the cervical canal.
  4. **Loop** : It is made up of plastic or stainless steel. It is inserted in the uterus, which releases certain secretions that prevent the implantation of embryo in the uterine wall.

**16. Describe chemical methods of contraception.**

- Ans :
1. **Spermicides** : Strong spermicidal creams, jellies et., are applied in the vagina

before copulation, which kill the sperms and prevent fertilisation.

2. **Oral contraceptives / pills** : These are taken daily, which prevent ovulation in females. They prevent ovulation but allow monthly menstrual bleeding.

17. **You know about the twins. But some twins look alike but some appears different. Explain the reason(s).**

Ans : 1. The twins which looks alike are called identical twins. When fertilised egg divides into two independent sets of cells, both of which continue to divide and produce identical twins.

2. When two eggs are produced at a time and a different sperm fertilises each egg, non identical twins are produced.

18. **Describe population control methods.**

Ans : 1. The population control methods are mainly two types, namely, vasectomy and tubectomy.

2. **Vasectomy** : This is a method of sterilisation in males. In this method, each vas deferens is cut and tied at cut ends by a thread.

3. **Tubectomy** : This is a method of sterilisation in females. In this method, the fallopian tube of each side cut and the two ends are tied to prevent passage of ova. Thus eggs will not reach the uterus.

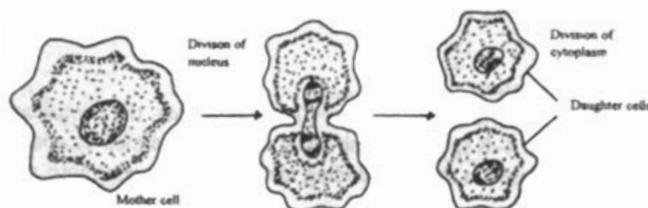
19. **What are natural methods of contraception ?**

Ans : There are two natural methods of contraception, namely, rhythm method of contraception and coitus interruptus.

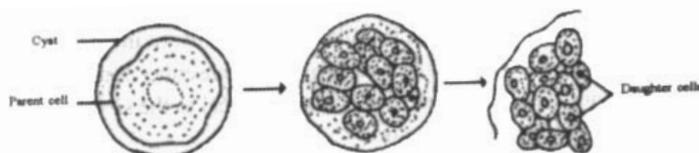
1. **Rhythm method of contraception** : In this method copulation is avoided for those days when the ovum is available for fertilisation.

2. **Coitus interruptus** : In this method, the penis is withdrawn from the vagina prior to ejaculation.

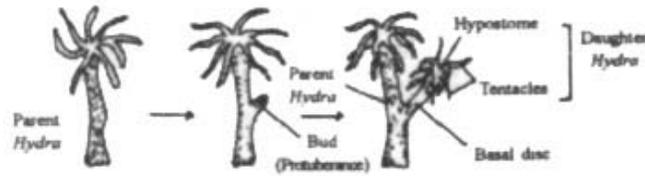
20. **Draw labelled diagram of binary fission of *Amoeba***



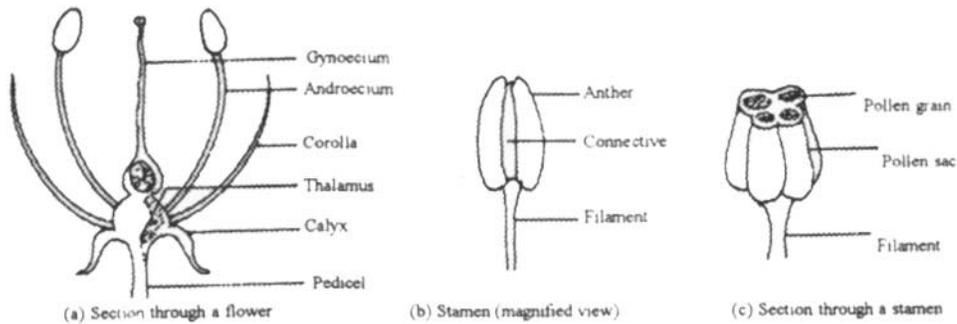
21. **Draw labelled diagram of multiple fission of *Plasmodium***



22. Draw labelled diagram of budding in *Hydra*



23. Draw labelled diagram of sexual parts of a flower



**FIVE MARKS QUESTIONS**

1. Describe grafting

- Ans : 1. In this method, a superior quality plant is formed from two different plants, taking root system of one plant and shoot system of another plant.
2. The plant whose root system is taken is called **stock**.
  3. The plant whose shoot system is taken is called **scion**.
  4. The ends to be grafted, of the stock and scion, are cut obliquely and placed face to face and are bound firmly with tape. The stock supplies all the desired nutrients to the scion.
  5. This technique has been used in raising superior quality plants of mango, apples, roses, rubber and citrus.

2. What is tissue culture ? Explain it.

- Ans : 1. Culture of cells, tissues or organs in a nutrient medium under aseptic conditions is called tissue culture.
2. This tissue utilises the nutrients from the medium, divides and redivideds and forms a **callus**.
  3. Small portion of this callus are transfered to another medium which induces differentiation and plantlets are formed.
  4. These plantlets are transplanted in soil to form an adult plant.
  5. *Chrysanthimum*, orchids, *asparagus* and in many plants are now being grown by using tissue culture technique.

### 3. Describe sexual reproduction in plants.

- Ans :
1. In flowering plants, flower is the reproductive part of the plant.
  2. Most of the flowers have both male and female reproductive organs.
  3. A typical flower has four whorls, viz., calyx, corolla, androecium and gynoecium.
  4. Androecium and gynoecium are directly concerned with sexual reproduction.
  5. **Androecium** is the male part of a flower. It consists of stamens. Each stamen has **anther** and a filament. Each anther possesses many **pollen grains**. They are the male gametes.
  6. **Gynoecium** is the female part of a flower. The female part is called **pistil**. Each pistil has three parts, viz., a lower swollen **ovary** ; middle, long and cylindrical **style** ; and a terminal flat **stigma**.
  7. Stigma receives pollen grains during pollination.
  8. After fertilisation, ova develop into **seeds**.

### 4. Describe male reproductive system in man.

- Ans :
1. Male reproductive system of man consists of a pair of testes, a pair of epididymes, a pair of vasa deferentia, an ejaculatory system, a urethra, penis and accessory glands.
  2. Testes produce the male gametes - the sperms
  3. Each testis consists of coiled tubes called seminiferous tubules, which produce the sperms.
  4. Sperms are stored in epididymes until mating.
  5. At the time of mating, the sperms are passed from the epididymis through vas deferens to the ejaculatory duct. It opens into the urethra. Urethra passes through the penis and opens at its tip.
  6. During the passage from the epididymis to the urethra, the sperms are mixed with the secretions of accessory glands and thus semen is formed.
  7. Penis releases the semen in the vagina of female during sexual intercourse.

### 5. Describe female reproductive system in human beings.

- Ans :
1. The female reproductive system of human beings consists of a pair of ovaries, a pair of oviducts (fallopian tubes), uterus and vagina.
  2. Ovaries produce ova and secrete female sex hormones, viz., oestrogen and progesterone.
  3. There is a pair of fallopian tubes. The free ends of the fallopian tubes are funnel like. They collect ova released from the ovaries.
  4. Fallopian tubes of both sides open into a pear shaped, muscular, thick walled uterus.

5. Uterus opens into the vagina, which opens out through a genital opening.
6. Vagina is the organ where penis is inserted during coitus for discharge of semen. It also act as a birth canal during child birth.

**6. Explain sexual cycle (menstrual cycle) in human beings.**

Ans : 1. The regular monthly sequence of events that takes place in female reproductive organs from puberty to menopause (45 - 50 years) constitute the sexual cycles. Sexual cycle in human females is called menstrual cycle.

2. During menstrual cycle, an ovum matures and is released once every 28 days.
3. The menstrual cycle starts with menstrual flow, during which cellular lining of the uterus is shed off along with blood flow. This process continues for 3 - 4 days.
4. From the 5th day to 13th day of the onset of menstrual cycle, growth and maturation of the graafian follicle take place. Graafian follicle contains of an ovum.
5. Graafian follicles secrete the female sex hormone oestrogen.
6. The cells of inner lining of uterus grow rapidly and develop a dense net of blood capillaries.
7. The process of release of ovum from graafian follicle is called ovulation. It occurs 12 - 13 days after menstruation.
8. Graafian follicle ruptures and release the ovum.
9. The empty graafian follicle is filled with **corpus luteum**. It secretes **progesterone**.
10. The ovum reach the fallopian tube on 13th or 14th day and remains there upto the 16th day (48 - 72 hours)
11. If ovum is not fertilised, it disintegrates. At the end of 28th day, the uterine lining is rejected in the form of menstrual flow.
12. Again another menstrual cycle starts.

**7. Write the symptoms prevention and cure of syphilis and gonorrhoea.**

Ans : 1. Syphilis and gonorrhoea are **bacterial** diseases syphilis is caused by **Treponema pallidum** and gonorrhoea is caused by **Neisseria gonorrhoeae**.

2. These diseases are infected due to sexual contact with infected partner.
3. Symptoms of syphilis occur in about 10 - 90 days and that of gonorrhoea in about 2 - 5 days.
4. **Symptoms** of these diseases are :
  - a. Fever and sores on the skin, in throat and in vagina, penis, rectum and mouth.
  - b. Break out of rashes on hands, feet and palms
  - c. White patches in mouth.
  - d. Acne like warts in the groin area.

**5. Prevention and cure :**

- a. Having sexual intimacy with only one person.
- b. Avoiding prostitution and homosexuality.
- c. Taking appropriate medical treatment.

**8. What are the symptoms of AIDS ?**

Ans : 1. The person suffering from AIDS feels fatigued, suffer from weight loss, fever and profuse sweating.

2. Persistent dry cough, oral rash and shortness of breath may be observed.

3. Head ache, visual disturbance, vomitings and fits occur.

4. Skin blotches, eczema, fungal infection, sometimes skin cancer may be observed.

5. Brain may be badly affected leading to loss of memory.

**9. Describe prevention and control of AIDS.**

Ans : 1. Avoiding multiple sex partners

2. Using condoms

3. Avoiding prostitution and homosexuality

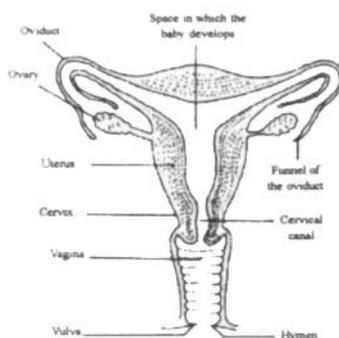
4. Screening of blood before transfusion

5. Avoiding sharing of injection needles

6. Avoiding pregnancy, if mother is HIV positive

7. Educating people.

**10. Draw a labelled diagram of female reproductive system of human beings.**



**FILL IN THE BLANKS**

1. \_\_\_\_\_ is the process by which a living organism is able to produce more of its own kind.

2. Development of a new individual without the fusion of gametes is known as \_\_\_\_\_ reproduction.

3. Asexual reproduction is common in \_\_\_\_\_ animals.

4. In plants fission, budding, fragmentation and regeneration are \_\_\_\_\_ methods of reproduction.

5. In flowering plants reproduction occurs by the union of \_\_\_\_\_ gametes.

6. In multiple fission, the unicellular organism develops a \_\_\_\_\_ around itself.
7. In animals, budding is common in \_\_\_\_\_
8. In spirogyra and planaria reproduction occurs by \_\_\_\_\_
9. In lower forms like \_\_\_\_\_ the photoplast of the cell divides to form spores.
10. Sweet potato and mint asexually reproduce by \_\_\_\_\_
11. In potato asexual reproduction takes place through \_\_\_\_\_
12. In *Bryophyllum*, reproduction occurs by busa on \_\_\_\_\_
13. By adventitious buds on leaf margins, \_\_\_\_\_ reproduces asexually.
14. In grafting, whose root system is taken is called \_\_\_\_\_
15. In grafting, whose shoot system is taken is called \_\_\_\_\_
16. Stock supplies water and required minerals to \_\_\_\_\_
17. By grafting, we obtain \_\_\_\_\_ plants
18. The modern technique of vegetative propagation is \_\_\_\_\_
19. In flowering plants, \_\_\_\_\_ is the reproductive part
20. In sexual reproduction of plants, \_\_\_\_\_ and \_\_\_\_\_ play an important role
21. Anther contains \_\_\_\_\_
22. In a flower, the female reproductive part is called \_\_\_\_\_
23. Long, tube like part arising from the gynoecium is known as \_\_\_\_\_
24. The tip of the style is called \_\_\_\_\_
25. The \_\_\_\_\_ receives pollen grains during pollination.
26. In ovary, the ovules are attached to \_\_\_\_\_
27. The management of ovules in ovary is called \_\_\_\_\_
28. The process of transfer of pollen grains from anther to the stigma of flower is called \_\_\_\_\_
29. If the pollen grains from the anther of a flower are transferred to the stigma of same flower, it is termed as \_\_\_\_\_
30. If the pollen grains from anther of one plant reaches the stigma of another plant of same species, it is called \_\_\_\_\_
31. The fusion of male and female gamets to form a zygote is called \_\_\_\_\_
32. The second male nucleus fuses with diploid secondary nucleus and form the \_\_\_\_\_

33. The ovary wall ripens and form the \_\_\_\_\_ of the fruit.
34. Each ovaule after fertilisation develops into a \_\_\_\_\_
35. In custurd apple, the seeds are the \_\_\_\_\_ of flower.
36. Testes produce the male gametes \_\_\_\_\_
37. Sperms are stored in \_\_\_\_\_
38. Ovaries release \_\_\_\_\_
39. Ovaries secrete the hormones \_\_\_\_\_ and \_\_\_\_\_
40. Process of formation of ova by ovary is called \_\_\_\_\_
41. In human beings, puberty starts at \_\_\_\_\_ in males.
42. In human beings, puberty starts at \_\_\_\_\_ in females.
43. Deeping of voice in males is a \_\_\_\_\_
44. Onset of menstruation is the \_\_\_\_\_ of females.
45. Menstrual cycle is completed in \_\_\_\_\_
46. After ovulation, the empty follicle is filled with \_\_\_\_\_
47. Corpus luteum secretes \_\_\_\_\_
48. In human beings, in females, the reproductive capacity is upto the age of \_\_\_\_\_
49. Sperm fuses with the ovum and form a \_\_\_\_\_
50. Ovum becomes a zygote after \_\_\_\_\_
51. In human beings, fertilisation takes place in \_\_\_\_\_
52. Fixation of the embryo in the uterine wall of human beings is called \_\_\_\_\_
53. Developing embryo (foetus) is attached to the uterus by \_\_\_\_\_
54. \_\_\_\_\_ is a tough structure that serves as the blood vascular connection between the foetus and uterine wall.
55. The human embryo is enclosed in a sac called \_\_\_\_\_
56. The space between the embryo and amnion is filled with \_\_\_\_\_
57. Amniotic fludi \_\_\_\_\_ the embryo from mechanical shocks.
58. Fertilisation of an ovum by a sperm outside the body of female is called \_\_\_\_\_
59. The process of fertilisation of ovum and sperm will be done in a test tube and then the embryo is implanted in the uterus is called \_\_\_\_\_
60. When a fertilised egg divides into two sets of cells, both of which develops and thus \_\_\_\_\_ are produced.



8. In males sperms are stored in ( )  
 A. Epididymis B. Penis  
 C. Vasa deferentia D. Testis
9. It reproduces by budding ( )  
 A. *Plasmodium* B. *Amoeba*  
 C. Bacteria D. *Hydra*
10. Implantation takes place in ( )  
 A. Fallopian tube B. Ovary  
 C. Uterus D. Cervix

### MATCH THE FOLLOWING

- 1. A** **B**
1. Sexual reproduction ( ) A. Grass  
 2. Binary fission ( ) B. Potato  
 3. Budding ( ) C. *Hydra*  
 4. Eyes ( ) D. Asexual reproduction in  
*Hydra*  
 5. Runner ( ) E. Ovum and sperm
- 2. A** **B**
1. Stock ( ) A. Formation of caulus  
 2. Ginger ( ) B. Grafting  
 3. Sucker ( ) C. Stem modification  
 4. Cutting ( ) D. Vegetative production in  
 mint  
 5. Tissue culture ( ) E. Rose
- 3. A** **B**
1. Anther ( ) A. Implantation  
 2. Sperms ( ) B. Formation of ovum  
 3. Oviduct ( ) C. Pollen tube  
 4. Uterus ( ) D. Epididymis  
 5. Ovary ( ) E. Fertilisation
- 4. A** **B**
1. Vasectomy ( ) A. Artificial pregnancy  
 2. Tubectomy ( ) B. For men  
 3. From same egg ( ) C. For women  
 4. From different eggs ( ) D. Identical twins  
 5. Test tube baby ( ) E. Fraternal twins

5.	A		B
	1. Syphilis	( )	A. For females
	2. Gonorrhoea	( )	B. For males
	3. AIDS	( )	C. <i>Treponema</i>
	4. IUD	( )	D. <i>Neisseria</i>
	5. Condoms	( )	E. HIV

### ANSWERS

#### Fill in the Blanks :

- |                                   |                                |
|-----------------------------------|--------------------------------|
| 1. Reproduction                   | 2. Asexual                     |
| 3. Lower                          | 4. Asexual                     |
| 5. Male and female                | 6. Cyst                        |
| 7. <i>Hydra</i>                   | 8. Regeneration                |
| 9. Alage and <i>chlamydomonas</i> | 10. Roots                      |
| 11. Stem                          | 12. Leaves                     |
| 13. <i>Bryophyllum</i>            | 14. Stock                      |
| 15. Scion                         | 16. Superior quality           |
| 17. Tissue culture                | 18. Scion                      |
| 19. Flower                        | 20. Androecium ; gynoecium     |
| 21. Pollen grains                 | 22. Gynoecium                  |
| 23. Sytle                         | 24. Stigma                     |
| 25. Stigma                        | 26. Placenta                   |
| 27. Ovulation                     | 28. Pollination                |
| 29. Autogamy / self pollination   | 30. Cross pollination          |
| 31. Fertilisation                 | 32. Endosperm nucleus          |
| 33. Pericarp                      | 34. Seed                       |
| 35. Ova                           | 36. Sperms                     |
| 37. Epididymus                    | 38. Ova                        |
| 39. Oestrogen ; progesterone      | 40. OoGenesis                  |
| 41. 13 - 14 years`                | 42. 12 - 13 years              |
| 43. Secondary sexual character    | 44. Secondary sexual character |
| 45. 28 days                       | 46. Corpus luteum              |
| 47. Progestrone                   | 48. 45 - 50 years              |
| 49. Zygote                        | 50. Fertilisation              |
| 51. Fallopiian tube               | 52. Implantation               |
| 53. Placenta                      | 54. Umbelical cord             |
| 55. Amnion                        | 56. Amniotic fluid             |
| 57. Protects                      | 58. Invitro fertilisation      |
| 59. Test tube baby                | 60. Identical twins            |

- 61. Fraternal twins
- 63. Tubectomy
- 65. Sexually transmitted diseases
- 67. *Neisseria gonorrhoea*
- 69. Incubation period

- 62. Vasectomy
- 64. Rhythm method of contraception
- 66. *Treponema pallidum*
- 68. Acquired Immuno Deficiency Syndrome
- 70. Human Immunodeficiency Virus (HIV)

**Multiple Choice Questions :**

- |      |      |      |      |       |
|------|------|------|------|-------|
| 1. B | 2. A | 3. A | 4. B | 5. A  |
| 6. C | 7. A | 8. A | 9. D | 10. C |

**Match the following :**

- |    |      |      |      |      |      |
|----|------|------|------|------|------|
| 1. | 1. E | 2. D | 3. C | 4. B | 5. A |
| 2. | 1. B | 2. C | 3. D | 4. E | 5. A |
| 3. | 1. C | 2. D | 3. E | 4. A | 5. B |
| 4. | 1. B | 2. C | 3. D | 4. E | 5. A |
| 5. | 1. C | 2. D | 3. E | 4. A | 5. B |



**FROM PARENTS TO CHILDREN-  
ELEMENTS OF GENETICS**

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**OBJECTIVES**

1. Appreciates the greatest achievements of scientists.
2. Understands how we can determine the sex of human beings by chromosome theory.
3. Develops knowledge about hereditary diseases.

**IMPORTANT POINTS**

1. The transmission of characters from parents to offspring is called **inheritance**.
2. The laws of inheritance was first proposed by Mendel. He explained that the inheritance was due to factors.
3. The diploid number of chromosomes in human beings is 46, of these 22 pairs are autosomes and one pair is sex chromosomes (X and Y)
4. The genes are formed of deoxyrobo nucleic acid (DNA). Genes are the fragments of DNA.
5. The sex determination in human beings depends on the union of sex chromosomes. Female has two X chromosomes, while male has one X chromosome and one Y chromosome.

**DEFINITIONS**

1. **Autosomes** : The chromosomes containing genes for characters other than those for sex determination.
2. **Colour blindness** : It is a genetic disorder in which a person cannot distinguish between blue and green colours due to defective genes.
3. **Genetics** : The study of science of heridity and variation.
4. **Haemophilia** : It is a genetic disorder in which blood does not clot because of the defective genes.
5. **Thalassemia** : This is a genetic disorder which haemoglobin is not formed in red blood cells due to defective genes.
6. **Heredity** : The transmission of characters from parents to offsprings.
7. **Variation** : Genetic differences between individuals

### THREE MARKS QUESTIONS

1. Define the following :

a. Heredity b. Variation c. Genetics

Ans : a. **Heredity** : The transmission of characters from parents to offsprings.

b. **Variation** : Genetic differences between individuals

c. **Genetics** : The study of Heredity and variation.

2. Explain the experiments of Mendel in Genetics.

Ans : 1. For his experiments, Mendel selected garden pea plants and identified seven pairs of contrasting traits like tall and short, green seeds and yellow seeds etc.

2. He conducted number of cross pollination experiments in garden pea plants for a number of generations, and observed the plants of each generation and proposed the basic laws of inheritance.

3. These laws of inheritance are the foundation for Genetics. Hence Mendel was called the **Father of Genetics**.

3. What are the Mendel's factors? Explain them.

Ans : 1. Mendel stated that each trait in an organism is controlled by two **factors**.

2. These factors are now called **genes**.

2. Genes are linearly arranged in chromosomes.

3. Chemically, genes are formed by deoxyribo nucleic acid.

4. The transmission of characters from parents to offspring occurs through the genes.

4. Why DNA finger printing is identified as reliable test to identify the criminals ?

Ans : 1. The nucliec acid tests conducted for the identification of criminals is called **DNA finger printing**.

2. Like finger printing, the DNA is unique for every individual.

3.The DNA of the each cell of an individual is alike.The hair, semen, blood traces etc., found at the site of crime are used for the identification of the actual criminal.

### FIVE MARKS QUESTIONS

1. In an individual, percentage of haemoglobin is less. He is undergoing frequent blood transfusion. Name disease he is suffering from ? Mention th reasons and describe the method of treatment.

Ans : 1. The symptoms stated above indicates a geneticdisorder thalassemia.

2. In the individuals with this disorder, haemoglobin is not synthesised.

3. Hence in these individuals, the genes which are responsible for to the synthesis of haemoglobin are defective.

4. To save the life of such individuals, frequent blood transfusion is necessary.

5. To cure this disorder, the defective genes can be replaced by normal genes by gene transfer treatment.

**2. Describe any two genetical disorders. Give their symptoms and method of treatment.**

Ans : Thalassemia, haemophilia and colour blindness are some of the the hereditary disorders. Hence they are called genetic diseases.

1. In **thalassemia**, the gene related to the synthesis of haemoglobin is defective. Hence the haemoglobin in their blood is less and they need regular blood transfusion.
2. In **haemophilia**, the gene related to the synthesis of the substances required for blood coagulation is defective. So, whenever such person gets an injury, the bleeding of blood does not stop.
3. Persons suffering from **colour blindness**, due to defective genes, they are unable to identify different colours, especially red and green.
4. By the replacement of defective genes by normal genes by the gene transfer method, these disorders can be rectified.

**3. Arun is unable to identify blue and green colours. Name the disorder.**

**Explain the nature of his parents and explain how this disease is transmitted to him.**

- Ans :
1. By the above symptoms, it is clear that Arun is suffering from colour blindness.
  2. Number of chromosomes in Arun is 44 autosomes and two sex chromosomes (X and Y).
  3. Of these, 22 autosomes and Y chromosome are inherited from his father and the remaining 22 autosomes and X chromosome are inherited from his mother.
  4. Colour blindness is due to the defective genes of the X chromosome.
  5. It may be concluded that the X chromosome with defective gene is inherited from his mother.

**4. Is blaming the women that she is not giving birth to male children is correct? Explain.**

- Ans :
1. Blaming of women that they are not giving birth to male children is wrong.
  2. In human beings, male has 44 autosomes and the sex chromosomes X and Y. and female has 44 autosomes and the sex chromosomes X and X.
  3. Male produces two types of sperms, half with 22 autosomes and one X chromosome and the other half with 22 autosomes and one Y chromosome.
  4. Female produces ova with 22 autosomes and one X chromosome.
  5. If the sperm with X chromosome fertilises the ovum, the

new born will be a female.

7. If the sperm having Y chromosome fertilises the ovum, the new born will be a male.
8. Hence, it is wrong to blame that women is not giving birth to male child because sex of an individual is purely due to chance and neither the mother nor the father can be blamed.

**5. Explain the chromosomes in human beings.**

- Ans: 1. In human beings, every cell of the body consists of 46 (23 pairs) chromosomes. They are clearly visible during cell division.
2. Chromosomes occur in pairs. In each pair, one chromosome is inherited from the father and the other from mother.
  3. These chromosomes transmit the characters from one generation to another.
  4. Out of the 23 pairs of chromosomes, the two chromosomes (X and Y) determine the sex of the individual. They are called **sex chromosomes**.
  5. The remaining 22 pairs of chromosomes are called **autosomes**.

**FILL IN THE BLANKS**

1. Mendel selected \_\_\_\_\_ plants for his experiments.
2. Geneticist who conducted experiments on locust is \_\_\_\_\_
3. \_\_\_\_\_ scientist discovered artificial genes.
4. The laws of inheritance proposed by Mendel are base to the science of \_\_\_\_\_
5. According to Mendel, the number of factors for each character is \_\_\_\_\_
6. \_\_\_\_\_ was called the Father of Genetics.
7. The factors of Mendel are now called \_\_\_\_\_
8. The factors of Genetics are \_\_\_\_\_
9. The number of chromosomes in human beings is \_\_\_\_\_
10. In an organism, if the number of chromosomes in a cell is of 10 pairs, the number of chromosomes in gamete is \_\_\_\_\_
11. The number of autosomes in human cell is \_\_\_\_\_
12. The number of sex chromosomes in human beings is \_\_\_\_\_
13. The genetic disease caused due to the deficiency of autosomes is \_\_\_\_\_
14. The genetic disorders like haemophilia and colour blindness results due to the defective genes in \_\_\_\_\_ chromosomes.
15. In an individual, the blood group as a result of the union of I<sup>A</sup> and I<sup>B</sup> genes is \_\_\_\_\_
16. If the male gamete having Y chromosome combines with female gamete, the new born baby is \_\_\_\_\_

17. If the male gamete with X chromosomes unites with female gamete, the new born baby is \_\_\_\_\_
18. The method of exchange of defective genes with normal genes is called \_\_\_\_\_
19. The individuals with the disease thalassemia do not have the capacity to produce \_\_\_\_\_
20. In the disorder \_\_\_\_\_ the blood does not coagulate when the person gets injured.
21. The process of transmission of characters from parents to offspring is called \_\_\_\_\_
22. The study of science of Heredity is called \_\_\_\_\_

### **MULTIPLE CHOICE QUESTIONS**

1. Of the following sentences, which one is true regarding Genetics ( )
  - A. Genes are the factors above imagination
  - B. Genes are the fragments of deoxyribo nucleic acid
  - C. Ribosomes of the cell contains genes
  - D. Genes are not inherited
2. In which one of the following genetically inherited disorder, the production of haemoglobiun does not occur ( )
 

A. Haemophilia	B. Thalassemia
C. Tuberculosis	D. Jaundice
3. The sex chromosomes in female are ( )
 

A. XX	B. One X and one Y
C. XY	D. One Y and one X
4. The number of chromosomes in the male gamete of man is ( )
 

A. 46	B. 44
C. 23	D. 22
5. Who is called the Father of Genetics ( )
 

A. Sutton	B. Mendel
C. Khorana	D. Morgan
6. Scientist who prepared artificial gene in the laboratory and got Nobel Prize was ( )
 

A. Darwin	B. Mendel
C. Khorana	D. Sutton
7. The number of contrasting characters Mendel selected to conduct experiments in garden pea plants is ( )
 

A. 3 pairs	B. 5 pairs
C. 7 pairs	D. 9 pairs

8. Two X chromosomes are present in ( )  
 A. Men B. Women  
 C. Boys D. All the above
9. Y' chromosomes is present in ( )  
 A. Women B. Men  
 C. None D. A & B
10. Due to the defect in this chromosome, the disease haemophilia is expressed ( )  
 A. X chromosome B. Y chromosome  
 C. Autosome D. All the above
11. The blood group formed by the union of genes  $I^A$  and  $I^B$  ( )  
 A. A B. B  
 C. AB D. O
12. The blood group formed by the union of genes  $I^A$  and  $I^A$  is ( )  
 A. AB B. A  
 C. B D. O
13. Due to defect in which chromosome, colour blindness is expressed( )  
 A) Y B) X  
 C) Z D) All the above
14. The deficiency in the sex chromosome results the disease ( )  
 A. Thalassaemia B. Haemophilia  
 C. Colour blindness D. B & C
15. The disease caused due to the deficiency of autosomes is ( )  
 A. Thalassaemia B. Haemophilia  
 C. Colour blindness D. B & C
16. Sex chromosomes of male ( )  
 A. XX B. YY  
 C. XY D. ZY
17. Number of chromosomes in man ( )  
 A. 20 pairs B. 22 pairs  
 C. 23 pairs D. 25 pairs
18. In an injured part, the bleeding of blood without coagulation is the symptom of this disease ( )  
 A. Thalassaemia B. Haemophilia  
 C. Colour blindness D. All the above

19. By medicines, can we cure the genetically related diseases? ( )  
 A. Yes B. No  
 C. Can not say D. None of the above
20. If the male gamete with Y chromosome combines with female gamete, the newly born baby is ( )  
 A. Female B. Male  
 C. Both A & B D. None
21. The reason for the birth of female baby is ( )  
 A. Union of male gamete with X chromosome and female gamete  
 B. Union of male gamete with Y chromosome and female gamete  
 C. Cannot say anything  
 D. None of the above
22. The genes of the blood group A are ( )  
 A)  $I^A I^A$  B)  $I^A$   
 C) Both A & B D)  $I^A I^B$
23. The genes for the blood group B are ( )  
 A)  $I^B I^B$  B)  $I^B i$   
 C) Both A & B D)  $I^A I^B$
24. The reason for the birth of male child is ( )  
 A. Male gamete having X chromosome combines with female gamete  
 B. Male gamete having Y chromosome combines with female gamete  
 C. Cannot say anything  
 D. None of the above

### MATCH THE FOLLOWING

- |           |                                 |     |                       |
|-----------|---------------------------------|-----|-----------------------|
| <b>1.</b> | <b>A</b>                        |     | <b>B</b>              |
|           | 1. Number of chromosomes in Man | ( ) | A. One pair           |
|           | 2. Number of Autosomes          | ( ) | B. 24                 |
|           | 3. Number of sex chromosomes    | ( ) | C. 23 pairs           |
|           | 4. XY chromosomes               | ( ) | D. 22 pairs           |
|           | 5. Diploid condition            | ( ) | E. Sex chromosomes    |
| <b>2.</b> | <b>A</b>                        |     | <b>B</b>              |
|           | 1. Experiments on locust        | ( ) | A. Sutton             |
|           | 2. Gene creator                 | ( ) | B. Gregor Mendel      |
|           | 3. Pea plant experiment         | ( ) | C. Haragobind Khorana |
|           | 4. Sex determination in man     | ( ) | D. Genes              |
|           | 5. Mendel's factors             | ( ) | E. Y chromosome       |

3.	A		B
	1. A blood group	(     )	A. $Rh^+, Rh^-$
	2. B blood group	(     )	B. $I^A I^A$
	3. AB blood group	(     )	C. $I^A I^B$
	4. O blood group	(     )	D. $I^B I$
	5. $Rh^+$ factor	(     )	E. $Ii$

### ANSWERS

#### Fill in the Blanks :

- |                       |                             |
|-----------------------|-----------------------------|
| 1. Pea                | 2. Sutton                   |
| 3. Haragobind Khorana | 4. Genetics                 |
| 5. 2                  | 6. Gregor Johann Mendel     |
| 7. Genes              | 8. Genes                    |
| 9. 23 pairs           | 10. 10                      |
| 11. 44                | 12. 1 pair or 2             |
| 13. Thalassaemia      | 14. Sex                     |
| 15. AB                | 16. Male                    |
| 17. Female            | 18. Gene exchange treatment |
| 19. Haemoglobin       | 20. Haemophilia             |
| 21. Heredity          | 22. Genetics                |

#### Multiple Choice Questions :

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1. B  | 2. B  | 3. A  | 4. C  | 5. B  |
| 6. C  | 7. C  | 8. B  | 9. B  | 10. A |
| 11. C | 12. A | 13. B | 14. D | 15. A |
| 16. C | 17. C | 18. B | 19. B | 20. B |
| 21. A | 22. C | 23. C | 24. B |       |

#### Match the following :

- |    |      |      |      |      |      |
|----|------|------|------|------|------|
| 1. | 1. C | 2. D | 3. A | 4. E | 5. B |
| 2. | 1. A | 2. C | 3. B | 4. E | 5. D |
| 3. | 1. B | 2. D | 3. C | 4. E | 5. A |



## HEALTH, HYGIENE AND DISEASES

## OBJECTIVES

1. Able to recognise proper food, adopt healthy habits, knows the importance of physical exercise to maintain a high standards of health.
2. Development skills to tabulate the National Immunization Programmes.
3. Participates in the programmes conducted by community health centres.

## IMPORTANT POINTS

1. The main objects of personal hygiene is to maintain a high standards of health which include proper nutrition, personal, hygiene, healthy food, water, air, exercise and rest.
2. To maintain community health, the surroundings must be maintained clean and neat and care should be taken to avoid the spreading of the disease causing germs.
3. Communicable diseases spread from infected person by air, water, food and fother substances to other persons. The diseases spred by means of viruses, bacteria, fungi and pathogenic protozoa.
4. Vaccines protect us from communicable diseases.
5. Government hospitals, medical centres and pulse polio, malaria eradication, leprosy, T.B controlling programmes mainly aim for the health of society.

## DEFINITIONS

1. **First aid** : The activity to be taken, to prevent deterioration of health conditions, of the victim until he gets prope medicaal aid is called first aid.
2. **Immunity** : Body's ability to fight and protect against diseases.
3. **Vaccination** : Introduction of weakened germs into the body to develop body's resistance against communicable diseases.
4. **Antibiotics** : Chemicals secreted by bacteria and some fungi for their self protection, also used to cure certain infectuous diseases.

## THREE MARKS QUESTIONS

1. A person is suffering from aute diarrhoea, loss of water etc. Name the disese, causes and controlling measures of the disease.

Ans : 1. Acute diarrhoea, vomtings, dehydration are the symptoms of cholera.  
2. Contamined food and water, and germs in the stools of patients cause this disease.

3. Vaccination; using clean, treated water; prevention of contamination etc. are control measures of this disease.

**2. Boy is playing with dog. Accidentally he was bitten by it. Mention the disease, the boy will get and mention the methods for the prevention of that disease.**

Ans : 1. Any person bitten by an infected dog gets the disease rabies.

2. The dog is to be observed whether it has hydrophobia.

3. The bitten area is to be washed with soap and water.

4. Consult the doctor immediately for anti rabies treatment

**3. Describe five measures to control the diseases.**

Ans : **1. Balanced diet :** The food with carbohydrates, proteins, fats, vitamins, minerals and roughage in required quantities is necessary.

**2. Neatness of house :** Care should be taken that the house should be neat and clean without dust, flies and germs.

**3. Careful cooking :** While preparing food, if we use high temperature, the germs will be destroyed. We have to consume it immediately after cooking.

**4. Personal hygiene :** Habit of regular evacuation of bowels, washing hands before taking food, regular bath and neat dressing, brushing the teeth everyday are important to maintain personal hygiene.

**5. Exercises :** Regular walking, games, physical exercises have good effect on health.

**4. A man suddenly met with an accident. What are the measures to be taken as first aid ?**

Ans : 1. If bleeding is severe, blood pressure decreases and the person may die.

2. Press and hold the injured part with thumb firmly.

3. Tightly tie that part with neat cloth or hand kerchief.

4. Lie down the injured person and care should be taken to see that the bleeding part of the body should be at the above level of the remaining body.

**5. Name the causative organism of filariasis? How to prevent it?**

Ans : 1. The disease filariasis is caused by filarial worm *Wuchereria bancrofti*, and the disease is spread by female *Culex* (mosquito).

2. Eradication of mosquitoes by spraying kerosine on sewage canals and spraying insecticides in areas where mosquitoes develop.

3. Using medicines under medical supervision.

**6. Mention any two diseases caused by consumption of infected water and Describe the symptoms of the diseases.**

Ans : 1. By drinking contaminated water, persons may suffer from cholera and dysentery.

2. Acute diarrhoea, dehydration, vomitings, muscle cramps, etc., are the symptoms of cholera.

3. Abdominal pain, acute diarrhoea, mucus and blood in stools, irregular motions etc., are symptoms of dysentery

**7. What are first aid measures to be taken when bleeding occurs through nose and losing consciousness?**

- Ans : 1. When bleeding is occurs, the victim is made to sit and lean forward to minimise bleeding.
2. Press the nostrils for short while.
  3. Place an ice cold cloth on the face of the victim.
  4. If bleeding does not stop consult the doctor.

**8. In a laboratory, a person got third degree (deep) burns and extensive burns due to acid. Describe the first aid measures to be taken for that person.**

- Ans : 1. First aid is depending on the intensity of burns.
2. Third degree burns or injuries destroys the inner membranes of the skin. Hence, injuries are not to be washed with water.
  3. Do not remove burning clothing and apply no medicines. Cover the whole area, including burned clothing, with a sterile and bandage it in same position. By covering the burns, we keep out air containing germs and pain is reduced.
  4. As the burns are due to chemicals like acids, pour the water for ten minutes.
  5. Take the victim for the medical treatment immediately.

**9. Assume that malaria is spreading in your residential area. Name the organism that causes malaria, explain the symptoms of malaria and control measures .**

- Ans : 1. Malaria is an infectious disease transmitted by female *Anopheles* (mosquitoes). The causative organism is *Plasmodium* (malarial ).
2. Main symptoms of malaria are shivering, chill and rigors. Malaria patient also suffer from head ache and body pains. Chill and shivering are followed by hot flushes. After few hours fever subsides, along with profuse sweating and feeling of exhaustion. If the infection persists, anaemia results and is followed by the enlargement of liver and spleen.
  3. For the treatment of malaria, antimalarial drugs like quinine, chloroquine along with vitamin B complex are used. To control malaria mosquito nets, mosquito proof cloths are to be used. Avoiding water stagnation in the surrounding areas to prevent the growth of mosquitoes, will regulate the spread of this disease.

**10. What type of first aid do you provide for a person, suffering from bone fracture when he is away from the hospital ?**

- Ans : 1. If a person suffering from bone fracture, who is away from a hospital, do not move the patient until expert help arrives. Improper handling may cause more damage.
2. Apply a splint (support given to the injured area) in that area, if the victim has to be taken for further treatment. Piece of wood or walking stick etc., can be padded and tied to remain in place.
  4. Do not tie it very tight, as it interfere with blood circulation.
  5. Do not move the patient when his neck or vertebral column get damaged.

**11. Your friend is suffering from abdominal pain, acute diarrhoea with blood and mucus in stools. Name the disease. How it spreads and control measures**

- Ans : 1. The above symptoms indicate the amoebic dysentery.  
 2. This disease is caused by a protozoan parasite (*Entamoeba histolytica*).  
 3. This disease spreads by contaminated food, water, house flies and use of vegetables without washing.  
 4. Use of fresh and clean water and uncontaminated food, clean vegetables prevent this disease.

**12. What is immunity ? What are different types of immunity? Explain the role of vaccines to acquire immunity.**

- Ans : 1. Ability of the body to defend against diseases is called immunity.  
 2. Immunity can be divided into two types, viz., Innate immunity and Acquired immunity.  
 a. Innate immunity is the immunity present by birth  
 b. Acquired immunity is immunity achieved during one's life time.  
 3. Vaccines increase the capacity of disease resistance. Some vaccines provide life time immunity. e.g., Vaccines of polio and small pox.  
 5. Acquired Immunity may be brought about by infection. As a result antibodies are produced against the pathogen and by deliberate artificial immunization. This is termed actively acquired immunity.

**13. Ravi fell down accidentally while cycling. Then he is suffering from severe pain and swelling and leg is unable to move. What type of first aid do you suggest ?**

- Ans : 1. Ravi might be suffering from fracture of bone.  
 2. The injured portion is tied with a splint, so that the injured part remains in original position.  
 3. Splint should not be tied tightly. If it is so, it affects the blood circulation.  
 4. Then he has to be taken to a hospital for further treatment.

**14. Describe filariasis.**

- Ans : 1. Filariasis is caused by a helminth parasite called *Wuchereria*.  
 2. Female *Culex* (mosquito) spreads this disease  
 3. Fever, accumulation of endothelial cells and metabolites in the walls of lymph vessels, swelling takes place in the affected parts like legs, breasts, scrotum etc.  
 4. Swelling of legs gives the appearance of legs of elephant and hence, this disease is called elephantiasis.  
 5. Preventing mosquito bites, by spraying of kerosene in ditches and drug administration prevents this disease.

**15. Write the differences between communicable and non - communicable diseases.**

Communicable diseases	Non - communicable diseases
1. Spread from one person to another.	1. Do not spread from one person to another by contact.
2. Caused by some biological agents such as virus, bacteria, fungi, protozoans and worms	2. The biological agents do not involve.

3. e.g., malaria, typhoid, cold, T.B., small pox, measles

3. Rickets, scurvy, Kwashiorkar and genitic defects.

**16. In an area, a disease was spread to a large number of people in a short period. Name the disease. Explain it with an example.**

Ans : 1. If a disease spreads in short period to a large number of people, in an area, the disease is called **epidemic disease**

e.g., cholera

2. Cholera is caused by bacteria

3. Diarrohoea and vomitings leads to dehydration, and some times leads to death in cholera.

**17. Your friend is suffering from vomitings and dysentery. What type of first aid do you suggest to your friend ?**

Ans : 1. Vomitings, dysentery, low blood pressure are the symptoms of dehydration.

2. The body cells lose water, and severe dehydration may leads to death.

3. Mix one spoon sugar and a pinch of salt in a glass of water (about 200ml) to prepare oral rehydration solution (ORS). For immediate rehydration, the vivtim is to be given this ORS.

**18. What measures do you suggest to prevent the diseases ?**

Ans : 1. Personal and community hygeine.

2. Taking balanced diet.

3. Removal of waste materials in a systematic way.

4. Vaccination to control communicable diseases.

**19. Write notes on any two bacterial diseases.**

Ans : **Tubercluosis :**

1. Tuberculosis is caused by bacteria (*Mycobacterium*).

2. Peristant fever and coughing, chest pain, blood in sputum, sweating during night time are the symptoms of this disease.

3. B.C.G vaccination to children helps to protect children fom this disease.

**Cholera :**

1. Cholera is caused by bacteria (*Vibrio*).

2. Acute dysentery, vomitings, muscle pain are the symptoms of this disease.

3. Taking purified water, healthy food prevents the spreading of this disease.

**20. Describe malaria.**

Ans : 1. malaria is caused by a protozoan, *Plasmodium*.

2. This is a contagious disease, spreads through the female *Anapheles* (mosquito).

3. The onset of fever is accompanied by shivering, chill and rigors. There are head ache and body pains. This is followed by hot flushing of the body. After sometime, fever subsides and is followed by profuse sweating and feeling of exhaustion. If the infection persists, gradually anaemia develops and the enlargement of liver and spleen occurs.

4. By preventing water stagnation in the surroundings helps to prevent mosquito growth. Use of antimalarial drugs like quinine, meparine, camaquine and antibiotics like tetracycline can be given to the patient.

**21. Your friend is suffering from an injury and bleeding while playing games. What type of help do you extend to your friend ?**

Ans : When bleeding takes place excessively.

1. Press and hold the injured part with thumb.
2. Tie it with neat cloth or kerchief.
3. Lie down him and make the arrangement in such a way that the injured part lies upward or higher, than the remaining body.

**22. What is meant by community health ? Explain the programmes, that the Government is performing to maintain community health.**

Ans : 1. For the improvement of health of the society, health awareness programmes should be conducted by the Government and local societies.

2. Some of the programmes conducted by Government.
  - a. Government hospitals and dispensaries.
  - b. National Malaria Eradication Programme.
  - c. T.B control programme.
  - d. National Disease Resistant Programme.
  - e. National Pulse Polio Programme.

**23. What are the diseases caused by the biological agents ? Explain how the disease spreads.**

Ans : 1. The diseases which spread from one infected person to another through biological agents are called communicable diseases.

2. Mode of infection of communicable diseases is of two types:
  - a. Direct transmission
  - b. Indirect transmission

3. **Direct transmission** : The pathogen of diseases infects a healthy person directly without an intermediate agent.

4. **Indirect transmission** : The pathogens of certain diseases reach the human body through some intermediate agents, contaminated food or sharing things with infected person and touching the person.

### **FIVE MARKS QUESTIONS**

**1. During pregnancy, the mother is given vaccination. Why?**

Ans : 1. During pregnancy, tetanus toxoid vaccine is given in two stages.

2. During child birth, to protect from the surgical equipments and tetanus the vaccines are given to mother.
3. Vaccine means weakened germs. When these are injected into the body, they make the body develop resistance to fight against disease but do not by themselves cause this disease.

**2. A person is suffering from swelling of foot and leg, which appears as leg of an elephant. Name the disease with which that man suffers from and the causative organism and control measures of the disease.**

Ans : 1. Fever, accumulation of endothelial cells and metabolites in the wall of lymph vessels, swelling taking place in the affected parts of the body like legs, breast, scrotum, legs appears like elephant leg and hence the disease is called elephantiasis.

2. These symptoms are present in the above person, the person is suffering from the disease filariasis.
3. This disease is caused by a helminth worm, *Wuchereria*.
4. Prevention of mosquito bite, mesh doors and windows to check the entry of mosquitoes, proper covering of water tanks or other articles, sprinkling of kerosene, drug administration are the methods by which the disease may be controlled.

**3. Why vaccines are given ? Describe the diseases which are controlled by vaccines.**

- Ans :
1. By administration of vaccines, we acquire protection from the communicable diseases.
  2. Vaccines provide immunity *i.e.*, acquired immunity to fight against disease causing germs.
  3. Vaccines help to develop antibodies which fight against the disease causing microbes present in the body.
  4. Vaccines provide resistance to diseases like T.B., polio, jaundice etc.

**4. In a village people are using water from the ditches ; and eating leafy vegetables of the fields. What types of diseases that may infect them? Name the micro organisms that cause the diseases ?**

- Ans :
1. By the consumption of contaminated and polluted water, vegetables without washing and fly infected eatbles, people may suffer from dysentery.
  2. Polluted food, drinks and food may cause cholera.
  3. As the people of that village are drinking water from the ditches and eating leafy vegetables from the field, they may suffer from dysentery and cholera.
  4. These are caused by bacteria and certain protozoans.

**5. As you have awarness about the diseases, write in 5 sentences, about how you are maintaining personal hygiene.**

- Ans :
1. The waste materials produced in our body may be eliminated by the regular evacuation of bowels.
  2. Washing hands before taking food.
  3. Taking of bath regularly and wearing neat dress.
  4. Brushing the teeth regularly.
  5. Head bath, cleaning ears, cleaning nails, keeping the hair throughly clean and combed and dressed. If care is not taken about hair diseases like ringworm and dandruff may be caused

**6. How can you detect the communicable diseases. What are the measures you take for protection against the disease infection ?**

- Ans :
1. Malaria, Typhoid and cold etc., are identified as communicable diseases.

2. Should not use the items used by the infected persons, *i.e.*, not using the handkerchieves, cloths and materials etc.
3. Avoiding consumption of contaminated food, water and drinks.
4. Cockroaches and flies carries disease causing germs from one place to another. Hence care should be taken to eradicate them.
5. The diseases also spreads from the infected persons through cough and sneeze. Hence, others must be away from them.

**7. Eyes of a person yellow. What is the reason for it ? Name the disease. Which organ is affected by this disease? state the preventive measures to be taken**

Ans : 1. Yellowness of eyes indicates the disease jaundice.

2. Weakness, fever, poor appetite and yellowness of urine, eyes, nails etc. are symptoms of jaundice.
3. Jaundice mainly affects the liver.
5. To control jaundice, one should take purified water, proper vaccination are useful. Healthy persons must be away from the infected persons and his belongings and clothes.

**8. Why the children are given B.C.G vaccination? Write the features of the disease against which the vaccination is given.**

Ans : 1. After child birth, the B.C.G vaccination is given in 2 - 6 weeks time.

2. It is given for the prevention of tuberculosis.
3. Chest pain, difficulty in respiration, mild fever for long period during night time, loss of weight, blood in sputum, sweating in night time are the symptoms of this disease.

**9. A person's hygiene is within his hands. Justify.**

Ans : 1. Health and neatness are inter related with each other. To have good health and to be away from the diseases, we have to maintain neatness or cleanliness.

2. We have to take balanced diet *i.e.*, having carbohydrates, proteins, vitamins and minerals in required quantities.
3. Smoking, taking gutka, drinking alcohol are to be avoided. These habits leads to liver and kidney diseases.
4. Regular walking, games, physical exercises shows effect on health. By all these activities, the blood circulation will be in good condition.
5. Regular sleep, rest are essential for maintainance of mental health.

**10. What is the first aid you practice when a person is injured with burns ?**

Ans : 1. The first aid depends upon the intensity of the injuries.

**a. First degree burns :**

In first degree burns, the surface layer of the skin consisting of epithelial cells is midly damaged. The skin reddens and swells and is painful. All these

symptoms disappear in two or three days without treatment and the burns leaves no traces apart from mild itching and peeling of skin.

**b. Second degree burns :**

In Second degree of burns, blisters are filled with yellow fluid. These blisters are either immediately formed or a bit later when they give way to painful wound with a bright red floor which is exposed. If the burn is not infected, the blisters burst and dry up. The skin regenerates without scarring.

2. For the first degree burns, immediately immerse the part in clean and cold water to cool it. If the part cannot be immersed, apply cold compresses. Keep the part cool for about 15 minutes.

For second degree burns, do not break blisters. Cover the burn with a dry dressing with cotton wool and a bandage. Support and protect the part from further injury. At the subcentre, continue applying dry dressing, but if blisters are broken, wash gently, with soap and boiled and cooled water and paint with gentian violet, cover with sterile vaseline, spread on sterile gauze and dress it. It is very important to protect the burn from dust and flies.

3. **The third degree of burns** cause deeper damage and more marked necrosis of the tissues and formation of burn scab.

Keep the victim quiet and lying down. Remove quickly any rings, bangles, belt, shoes etc., before the burning part swells. Do not remove burning clothing and does not apply any medicines. Cover the whole area, including burned clothing with a sterile or clean cloth and bandage it in position. By covering the burns, we keep out air containing germs and pain is reduced. Raise and support burned arms, legs and head.

**11. Explain in detail the programmes taken up by community health centres.**

- Ans :
1. To maintain cleanliness, the dirty polluted water from the colonies is to be diverted to far away places.
  2. Supplying fresh, germ free potable water
  3. Conducting programmes to explain the damage happened due to spread of the diseases.
  4. Educating the people by explaining about the importance of health, principles, diseases, their effects, control and eradicating methods.
  5. Spraying of insecticides to kill harmful insects.
  6. To control mosquito breeding, covering the dirty polluted water and spraying of kerosene on stagnant water.
  7. Regular checking of food storage godowns, milk and meat selling centres to maintain health parameters.

**12. To maintain personal hygiene, what are the measures to be taken?**

Ans : To maintain good health, we have to follow the following guidelines.

1. **Balanced diet** : Food containing carbohydrates, proteins, fats, vitamins, minerals in required quantities in the food we are taking makes the balanced diet.
2. **Personal hygiene** : Regular habit of evacuation of bowels, cleaning of hands after evacuation of bowels and urine, taking bath regularly, cleaning the teeth everyday and wearing clean and neat dress.
3. **Cleanliness of home** : Make the home clean and neat, take care, to see that the home without dust, flies, worms and cockroaches.
4. **Clean food and water** : Before cooking, wash the vegetables and fruits with the clean water, so that germs and other chemical substances can be removed.
5. **Safe cooking** : Prepare the food in a clean kitchen. Take the food immediately after cooking.
6. Drinking alcohol, nut, gutka and chewing tobacco are to be avoided.
7. **Exercise** : Regular walking, physical exercises show good effect on health.
8. **Regular sleep and rest** : These are very important. Sleeping at specific time and awakening at specific time in each day, minimises the work stress.

**13. By which symptoms, we can recognize jaundice ?**

Ans : 1. The symptoms of jaundice are yellow colour of urine, eyes, nails etc.

2. Loss of appetite, vomiting are also symptoms of this disease.
3. Jaundice is transmitted through drinking of polluted water.
4. To prevent this disease, we have to take purified water. proper vaccination is also useful.
5. By keeping the belongings of the infected persons away from the others are control measures of jaundice.

**14. Explain some of the programmes conducted by community health centers ?**

Ans : 1. To maintain cleanliness, the dirty polluted water from the colonies is to be diverted to far away places.

2. Supplying fresh, germ free potable water
3. Conducting programmes to explain the damage happened due to spread of the diseases.
4. Educating the people by explaining about the importance of health, principles, diseases, their effects, control and eradicating methods.
5. Spraying of insecticides to kill harmful insects.
6. To control mosquito breeding, covering the dirty polluted water and spraying of kerosene on stagnant water.
7. Regular checking of food storage godowns, milk and meat selling centres to maintain health parameters.

## FILL IN THE BLANKS

1. A state of complete physical , mental and social well being is called \_\_\_\_\_
2. The methods followed to have good health are called \_\_\_\_\_
3. Regular sleep and rest gives \_\_\_\_\_ health to us.
4. The programmes conducted by Government and local organisations to improve the health of people are called \_\_\_\_\_
5. By taking alcohol, narcotics, kidneys, heart and \_\_\_\_\_ will be destroyed.
6. Before eating, fruits and vegetables should be \_\_\_\_\_ to eradicate or remove the worms and insecticides and fungicides etc.
7. Disturbances in health and inconvenience to the body is called \_\_\_\_\_
8. The disease transmitted from one person to another is called \_\_\_\_\_
9. The communicable diseases are transmitted by \_\_\_\_\_
10. Malaria and typhoid are examples of \_\_\_\_\_ type of diseases.
11. The diseases which does not transmit from one person to another are called \_\_\_\_\_
12. The disease which spreads to many people in short period is called \_\_\_\_\_
13. The organisms which carry worms from one place to another place are called \_\_\_\_\_
14. An organism which harbours a pathogen and may pass it on to another person to cause a disease is called \_\_\_\_\_
15. The disease spreads through the instruments like \_\_\_\_\_ used to the infected persons.
16. The filariasis is caused by the worm \_\_\_\_\_
17. The disease hepatitis is caused by \_\_\_\_\_
18. Titanus, T.B., cholera are caused by \_\_\_\_\_
19. \_\_\_\_\_ transmits ring worm.
20. Dysentery spreads through \_\_\_\_\_
21. Having capacity to protect from diseases is called \_\_\_\_\_
22. \_\_\_\_\_ gives energy for new born children to fight against diseases.
23. To the diseases like polio, T.B., and jaundice resistance is developed by \_\_\_\_\_
24. B.C.G. vaccines prevent \_\_\_\_\_ disease in babies.
25. Diphtheria is prevented by \_\_\_\_\_ vaccine.
26. Jaundice shows its effects on \_\_\_\_\_
27. The disease malaria is transmitted by \_\_\_\_\_



13. In which of the following no biological agent participates ( )  
 A. Cold B. Malaria  
 C. Filaria D. Rickets
14. In which of the following lymph nodes swell ( )  
 A. Cold B. Polio  
 C. Malaria D. Filariasis
15. During pregnancy, the mothers are given this vaccine ( )  
 A. B.C.G. B. Polio  
 C. Tetanous taxoid D. D.P.T.
16. By which one of the following vaccine we can controll the disease diptheria ( )  
 A. B.C.G. B. D.P.T.  
 C. Polio D. Tetanous taxoid
17. To which of the following diseases, the female *Culex* acts as carrier ( )  
 A. Cough B. Cold  
 C. Filariasis D. T.B.

### ANSWERS

#### Fill in the Blanks :

- |   |                          |
|---|--------------------------|
| 1. Health                               | 2. Neatness              |
| 3. Mental                               | 4. Community health      |
| 5. Liver                                | 6. Washing               |
| 7. Disease                              | 8. Communicable diseases |
| 9. Biological agents                    | 10. Commnicable          |
| 11. Non communicable                    | 12. Epidemic             |
| 13. Carriers                            | 14. Vectors              |
| 15. Needles                             | 16. Helmenths            |
| 17. Virus                               | 18. Bacteria             |
| 19. Fungus                              | 20. Protozoa             |
| 21. Immunity                            | 22. Mother's milk        |
| 23. Vaccines                            | 24. T.B.                 |
| 25. D.P.T.                              | 26. Liver                |
| 27. Female <i>Anophelous</i> (mosquito) |                          |

#### Multiple Choice Questions :

- |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|
| 1. C  | 2. D  | 3. C  | 4. D  | 5. B  | 6. C  |
| 7. C  | 8. D  | 9. C  | 10. D | 11. D | 12. D |
| 13. D | 14. D | 15. C | 16. B | 17. C |       |



**AGRICULTURAL PRACTISES AND ANIMAL HUSBANDARY**

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**OBJECTIVES**

1. Understand the methods by which the agricultural products can be preserved.
2. Identifies the advantage of crop rotation and implement it in practice.
3. To develop skills in drawing diagrams

**IMPORTANT POINTS**

1. To increase the food products
  - proper preparation of the soil
  - Selection of the right variety and quality seeds
  - Preparation of seedling beds
  - Planting of seedlings
  - Use of fertilizers and control of weed plants
  - Control of plant diseases, crop rotation and multiple crop methods are to be practiced.
2. In animal husbandary, good food, animal houses, vaccination and plant breeding are important.
3. For the production of high yielding animals artificial insemination is one of the methods.

**DEFINITIONS**

1. **Animal husbandary** : The branch of science dealing with the study of various breeds of domesticated animals and their management for obtaining better products and services from them.
2. **Biological control** : Killing insect pests by predators
3. **Fungicides** : The chemical used to destroy the fungi are called fungicides.
4. **Horticulture** : The branch of science which deals with the production of vegetable, fruit yielding plants and ornamental plants.
5. **Multiple cropping** : Growing of 2 - 4 crops in the same field one after the other.
6. **Planting of seedlings** : Planting of seedlings from seedling bed into main field.
7. **Weed** : The undesirable plants growing in the same field as the main crop and competing for nutrients, water and sunshine with the main crop.
8. **Herbicides** : The chemical used to destroy the weed plants.

### THREE MARKS QUESTIONS

**1. What are the necessary requisites for Indian agriculture for spectacular increase in modern days ?**

- Ans : 1. Production of agricultural implements, pumpsets, fertilizers and pesticides from the factories.  
2. Irrigation and power projects to supply water and electricity in time are needed.  
3. Research stations are required for the production of new crop varieties and plants with high yield and more resistant varieties for pests.

**2. What are the similarities and differences between compost fertilizer and vermicompost ?**

- Ans : 1. Keeping the waste products like grass, weed plants, excreta of animals, vegetables remains of the house in the in a deep pit and make them to decompose, results in the formation of a compost.  
2. The compost which is broken down by earthworms is called vermicompost.  
3. Compost and vermicompost are examples for natural fertilizers.

**3. What are weed plants? Give five examples.**

Ans : The plants which compete with main crop plants for sunlight, water and nutrients etc., are called weed plants.

*e.g., Amaranthus, Chenopodium, doob grass and wild oat, Canvalula*

**4. Explain the advantages of gober gas plant.**

- Ans : 1. In our country we are not using animal dung properly.  
2. Gobar gas plant is very useful for the proper utilization of animal dung.  
3. By the installation of gober gas plant, the animal dung can be used as fuel as well as manure.

**5. Explain the diseases caused by bacteria and viruses in animals.**

Ans : **1. Viral diseases:** Pox in cattle, goats, sheeps and fowls; foot and mouth disease in cattle etc.

**2. Bacterial diseases:** Tuberculosis in cattle and poultry birds, cholera in fowls, diphtheria in calves, diarrhoea in fowls, foot rot in sheep etc.

**6. What are the different types of domesticated animals ?**

- Ans : 1. Milk yielding animals - *e.g., cattle, buffalo, goat, sheep*  
2. Meat and egg yielding animals - *e.g., fowl, duck, goat and buffalo, pig etc.*  
3. Draught (working) animals - *e.g., bullock, horse, donkey, mule, camel, elephant etc.*

**7. What is artificial insemination ? What are its advantages ?**

Ans : 1. Artificial insemination involves collection of semen from a healthy bull of the desired breed and storage at very low temperature and introduction of it into the female cattle during heat period with sterilised equipment.  
2. It is helpful in increasing the milk production and improved variety of animals.

**8. Write the full form of N.D.R.I and the varieties of cows it produced.**

Ans : 1. Full form of N.D.R.I is National Dairy Research Institute.  
2. It is located in Karnal of Haryana state.  
3. Here improved breeds of cows are produced.  
*e.g.*, Karan swiss (a cross between brown swiss and sahiwall)

**9. Explain with examples the type of feed supplied to animals.**

Ans : 1. The feed supplied to the animals is categorised into types. They are :  
a. Concentrates                      b. Roughage  
**2. Concentrates** : Contain all nutrients. *e.g.*, : cotton seeds, oil cakes, mineral salts and vitamins.  
**3. Roughage** : Contain more fibres and less nutrients. *e.g.*, grass, straw, stems of leguminous plants

**10. Write the feed supplied to goat, pigs and fowls in a tabular form.**

Ans :	Animal	Feed
	1. Goat, Sheep	Grass of farm yard and herbs
	2. Pigs	Cereals and their products
	3. Fowl	Cereals, bone powder, minerals and vitamins

**FIVE MARKS QUESTIONS**

**1. Explain with examples the different types of crops and the type of food products.**

Ans :	Crop	Product
	a. Millets	- Sorgham, ragi
	b. Pulses	- Black gram, green gram, bengal gram
	c. Beans	- Peas, soya bean
	d. Oil seeds	- Groundnut, sun flower, mustard, soya bean
	e. Root crops	- Carrot, turnip, sweet potato
	f. Sugar crops	- Sugarcane, beet root
	g. Tuber crops	- Potato, ginger, turmeric

**2. Differentiate between Agriculture and Horticulture.**

Ans :	Agriculture	Horticulture
	1. The branch of science dealing with	1. The branch of science dealing with

with the methods for the production of food is called agriculture	the production of vegetables, fruit, ornamental plants and orchids etc., is called horticulture
2. You will know the new methods in the food production and cultivation of new crops with better qualities.	2. You will know the new methods in the production of new varieties of fruit, vegetable plants with better qualities.

**3. Explain in brief, the agricultural practices to be followed to get more yield.**

- Ans : 1. Preparation of soil : Ploughing of soil added with manure, loosening of the soil, with agricultural instruments like spade, plough etc.
2. Seed treatment : Before planting the seeds are treated with pesticides. Due to this process, the fungus present on the seeds is destroyed and healthy plants will grow.
3. Preparation of seed bed : Rice, tomato and capsicum seeds are not directly sown in the field. Instead, before planting directly in the field, seed beds are prepared.
4. Planting and seedlings : healthys eedlings are selected and planted in the field supplied with manure. They are irrigatedand then irrigated with manure.
5. Supply of fertilisers : The nutrients required for the healthy growth of the crop are supplied in the form of fertilisers in the prescribed time. These are available as natural manures and chemical fertilisers.
6. Water irrigation : Depending on the nature of the soil, crop type, water is supplied to the field. In rice crop, water must be always stagnated in the field.
7. Harvesting: Using sickle and scythe, the required parts of the matured crop are collected.

(For any 5 points, 5 marks)

**4. Write notes on crop rotation and its advantages.**

- Ans : 1. Growing of pulses especially leguminous plants in between two cereal crops to enrich the soil to get a better yield of main crop is called crop rotation method.
2. All leguminous plants have root nodules in their root system and they contain nitrogen fixing bacteria.
3. These bacteria fix the atmospheric nitrogen into nitrates and nitrites, which will be utilised by the plant. Hence, the soil becomes fertile.
4. As a result, after growing the pulses, the fertility of the soil increases and the other crops produces more yield.
5. Due to crop rotation, we can minimise the use of chemical manures.

## 5. Describe natural manures and chemical fertilisers.

Ans : 1. Chemical fertilisers are produced in factories. Nitrogen fertilisers, complex fertilisers like N.P.K. are examples of chemical fertilisers.

3. Compost, vermicompost, garden compost are examples for natural manures.

4. Compost fertilisers : Organic wastes materials of the houses, grass, excreta of animals etc., are placed in deep pits, make them to decompose. By this process compost is formed.

5. Vermicompost : The compost which is broken down by earthworms is called vermicompost.

## 6. Explain the damage caused by weed plants to the main crop and their control methods.

Ans : 1. The unwanted plants which compete with the main crop for sunlight, water, nutrients etc., are called weed plants.

2. These plants utilise nutrients from the soil and thus they are not available to the main crop in sufficient amounts.

3. Due to the growth of weed plants, main crop does not get sufficient light and water. Hence the crop yield decreases.

4. Before sowing the seeds or before planting the saplings or seedlings, the weed plants are to be removed by hand or with the help of plough, crowbar, spade etc.

5. By spraying the herbicides like 2-4 - D, D.M.C.P., cimagin the weed plants can be destroyed.

## 7. Explain the methods to control pests and diseases in plants.

Ans : 1. In plants fungi, bacteria and viruses cause diseases.

2. They spread through seeds, air or soil.

3. Some insects live on plants and destroy their stems, leaves, flowers and fruits.

4. By spraying fungicides and pesticides, the pests and diseases of the plants can be controlled.

5. Besides chemical control, biologically control methods are also available. *e.g.*, to control some insects, their natural enemies are used.

## 8. Explain the methods to prevent the loss of agricultural products.

Ans : Methods to prevent or control the damage and loss of agricultural products.

**1. Drying :** Grains are dried by sunlight or by blowing hot air over them.

**2. Maintenance of storage containers :** The godowns or gunny bags which are used for storage should be free of any cracks, holes and should be clean.

**3. Chemical treatment :** Before storage, spraying of fungicides and pesticides, fuming is to be practised.

4. By spraying neem grain powder, pepper powder or mineral oil, the laying of eggs by the insects can be controlled.

5. By using better storage structures, exposure to air, moisture can be prevented and also protected from rats.

By observing these management methods, spoilage of agricultural products can be minimised.

**9. Describe green revolution.**

Ans : 1. Spectacular increase in the yield of crops, particularly cereals, through the application of modern techniques in agriculture is called **green revolution**.

2. In India, the crop yield has increased enormously between 1960 and 1980.

3. As a result, we became self sufficient in food. In fact we are able to have surplus crop to stock and use in natural calamities like draught and floods.

4. The credit of green revolution credit goes to the great agricultural scientist of our country, Dr.M.S.Swaminathan.

**10. What is the necessity of animal husbandary?**

Ans : 1. Even though the animal population is more in our country, we do not get as much food from these animals as we possibly can and need for our large population.

2. Besides food, we need them to do a lot of work

3. Animal dung, urine etc., are natural manure which enrich our soil

4. By establishing gobar gas plants, the animal dung can be used as fuel and manure.

5. Animal husbandary plays a prominent role in the betterment of cattle and other useful animals and their utilisation to a maximum extent.

**11. Write an account on the methods of animal husbandary.**

Ans : **1. Feeding of animals :** Animals must be fed properly. The food must contain carbohydrates, proteins, fats, minerals, water, vitamins etc.

**2. Housing of animals:** Animals are to be protected from too much heat, rain, cold etc.. The houses should have proper sanitation and ventilation.

**3. Water and its supply:** Adequate quantity of fresh water is to be supplied to drink. Besides this, we must bathe the cattle with clean water and animals are to be washed with fresh water.

**4. Prevention of diseases :** The animals may be affected by various diseases and the diseases are to be prevented by maintaining hygiene, regular feeding, vaccination etc.

**5. Animal breeding :** Crossing of better variety of (which yield more milk, eggs and meat) animals, results in the production of hybrids with required characters. This is called animal breeding.

**12. Describe the common diseases of animals and the controlling measures.**

Ans : Domestic animals often suffer from various diseases caused by bacteria, viruses, fungi, protozoa etc.

**1. Viral diseases:** Pox in cattle, goats, sheeps and fowls; foot and mouth disease in cattle etc.

**2. Bacterial diseases:** Tuberculosis in cattle and poultry birds, cholera in fowls, diphtheria in calves, diarrhoea in fowls, foot rot in sheep etc.

**13. Explain the prominence of Dr Kurian in the improvement of milk production that our country.**

Ans : 1. Milk is the best balanced diet that is available to us.  
2. The credit of improvement of milk production in our country goes to Dr. Kurian.  
3. He was the first president of National Dairy Development Board.  
4. He introduced the **operation flood** programme in our country.  
5. As a result, **white revolution** has taken place in our country and get self sufficiency in milk production.

**14. Write the better yielding varieties of the following crops.**

Ans : 1. Rice 2. Wheat 3. Maize 4. Lady's finger 5. Brinjal

**1. Rice :** I.R - 8, Jaya, Padma, Bala.

**2. Wheat :** Sarbathi, Sonara, Sonalika, Kalyansona, Heramoti.

**3. Maize :** Ganga 101, Rankit, Deccan hybrid.

**4. Lady's finger :** Pusa Savani.

**5. Brinjal :** Pusa purple, Pusa kranthi, Mukthabeshi.

#### **FILL IN THE BLANKS**

1. The scientists who produces new variety of seeds are called \_\_\_\_\_
2. In rice crop the herbicide used for the prevention of weed plants is \_\_\_\_\_
3. By using cimagin we can destroy \_\_\_\_\_
4. In carrot and raddish the root swell and store \_\_\_\_\_
5. A cow consumes \_\_\_\_\_ litres of water per day.
6. By using agrosan, we can destroy the diseases caused by \_\_\_\_\_ of plants.
7. If animals are not vaccinated in time, we cannot protect them from \_\_\_\_\_
8. I.R - 8, Padma, Jaya are the high yielding varieties of the crop \_\_\_\_\_
9. \_\_\_\_\_ is called the king of fruits.
10. Black gram is an example of \_\_\_\_\_
11. Carrot is an example of \_\_\_\_\_.
12. Sunflower is an example of \_\_\_\_\_ seeds.
13. Horticulture is the name formed by the union of two latin words \_\_\_\_\_
14. \_\_\_\_\_ scientists perform experiments to produce fruits and vegetables of better quality on large scale.
15. The chemical substances which are used to control the growth of plants are called \_\_\_\_\_

16. The nitrogen fixing bacteria are present in the root nodules of the species of \_\_\_\_\_ palnts.
17. *Amaranthus* is an example for \_\_\_\_\_
18. The scientist who achieved green revolution in India \_\_\_\_\_
19. Number of times the nitrogen fertilisers are supplied to the crop is \_\_\_\_\_
20. The better quality disease resistant quality gives \_\_\_\_\_ yield.
21. In hilly regions, the soliders carry the materials from one place to another with the help of \_\_\_\_\_
22. In roughages, the fibrous materials is more and the nutrients are in \_\_\_\_\_ percentage.
23. Cows, buffaloes and goat give \_\_\_\_\_ \_\_\_\_\_ to us.
24. The crop to be grown to increase the fertility of soil \_\_\_\_\_
25. In animals the important thing to be done, not be effected by diseases is \_\_\_\_\_
26. Crop plants and weed plants compete for \_\_\_\_\_
27. The smut disease in wheat is caused by \_\_\_\_\_
28. In rice \_\_\_\_\_ disease is caused by fungus.

### MULTIPLE CHOICE QUESTIONS

1. Example for weedicide ( )
 

A. 2 - 4 D	B. M.C.P.A
C. Cimagin	D. All the above
2. In which of the following the stem is consumed as food ( )
 

A. Tomato	B. Chilly
C. Potato	D. Brinjal
3. The chemical used for treatment of of the seed is ( )
 

A. Perathian	B. Agrason
C. Cimagin	D. A and B
4. For plantation the following number of seedlings are selected ( )
 

A. 1	B. 2 or 3
C. 4 or 5	D. 10
5. In wheat, the better quality variety developed for more yield is ( )
 

A. Sonalica	B. Sonamasuri
C. Pusa savani	D. Ganga 101
6. Varieties in mango are ( )
 

A. Alphons	B. Chusa
C. Himasagar	D. All the above

7. This variety of buffalo yields more milk ( )  
 A. Murra B. Muktabheshi  
 C. Pusa purple D. Jaya
8. In India, green revolution was achieved by ( )  
 A. Aryabhatta B. Dr. V. Kurian  
 C. Dr. M. Swaminathan D. Khorana
9. Examples for plant growth regulators ( )  
 A. Gibberellins B. Cytokinins  
 C. Absciscic acid D. All the above
10. Examples for the working animals ( )  
 A. Goat B. Sheep  
 C. Buffalo D. Pig

### MATCH THE FOLLOWING

- 1.**
- | A             |     | B            |
|---------------|-----|--------------|
| 1. Pulses     | ( ) | A. Rice      |
| 2. Oil seeds  | ( ) | B. Radish    |
| 3. Grains     | ( ) | C. Groundnut |
| 4. Root crops | ( ) | D. Sorghum   |
| 5. Cereals    | ( ) | E. Red gram  |
- 2.**
- | A                |     | B              |
|------------------|-----|----------------|
| 1. Rice          | ( ) | A. Ganga 101   |
| 2. Wheat         | ( ) | B. Pusa cranti |
| 3. Maize         | ( ) | C. Pusa gavani |
| 4. Lady's finger | ( ) | D. I. R - 8    |
| 5. Brinjal       | ( ) | E. Sonalika    |
- 3.**
- | A                           |     | B              |
|-----------------------------|-----|----------------|
| 1. Insecticide              | ( ) | A. 2 - 4 D     |
| 2. Treatment of seeds       | ( ) | B. FMT         |
| 3. Fungicide                | ( ) | C. Gibberllins |
| 4. Growth regulator         | ( ) | D. Agrason     |
| 5. Viral disease in animals | ( ) | E. Perathian   |

4.	<b>A</b>		<b>B</b>
	1. Green revolution	( )	A. Flowering plants
	2. White revolution	( )	B. Taemed animals
	3. Horticulture	( )	C. Crop plants
	4. Agriculture	( )	D. Dr. M.S. Swaminathan
5. Animal husbandary	( )	E. Dr. Kurian	

### ANSWERS

#### Fill in the Blanks :

- |                           |                          |
|---------------------------|--------------------------|
| 1. Plant breeders         | 2. 2 - 4 D               |
| 3. Weed                   | 4. Food                  |
| 5. 27 - 36 litres         | 6. Fungi                 |
| 7. Diseases               | 8. Rice                  |
| 9. Mango                  | 10. Pulses               |
| 11. Root                  | 12. Oil                  |
| 13. Harpas, culture       | 14. Plant breeders       |
| 15. Growth regulators     | 16. Leguminous           |
| 17. Weed                  | 18. Dr. M.S. Swaminathan |
| 19. 2 or 3                | 20. Yield                |
| 21. Mules                 | 22. Virus                |
| 23. Less                  | 24. Milk, meat           |
| 25. Leguminous crop       | 26. Vaccination          |
| 27. Sunlight, water, soil | 28. Fungi                |

#### Multiple Choice Questions :

- |      |      |      |      |       |
|------|------|------|------|-------|
| 1. D | 2. C | 3. B | 4. C | 5. A  |
| 6. D | 7. A | 8. C | 9. D | 10. C |

#### Match the following :

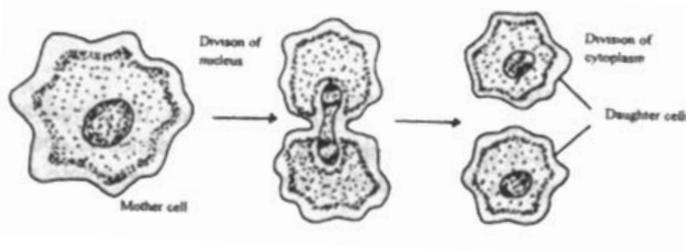
- |    |      |      |      |      |      |
|----|------|------|------|------|------|
| 1. | 1. E | 2. C | 3. D | 4. B | 5. A |
| 2. | 1. D | 2. E | 3. A | 4. C | 5. B |
| 3. | 1. E | 2. D | 3. A | 4. C | 5. B |
| 4. | 1. D | 2. E | 3. A | 4. C | 5. B |



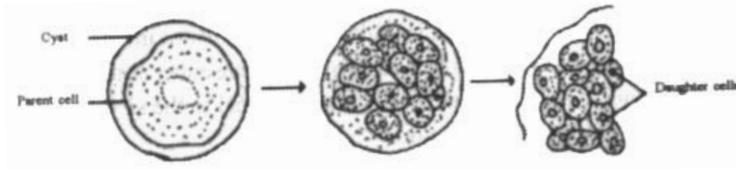
**DIAGRAMS**

**FOR 3 MARKS**

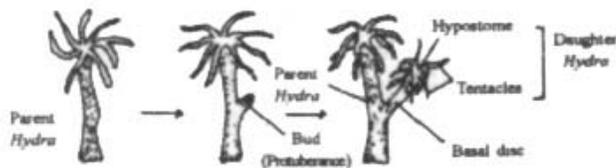
1. Draw labelled diagram of binary fission of *Amoeba*



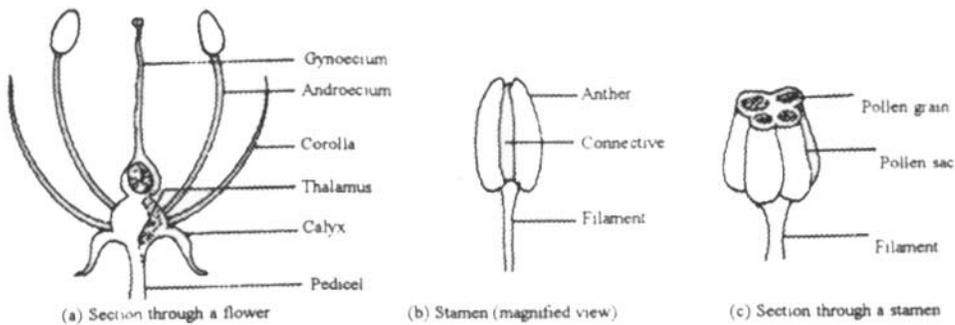
2. Draw labelled diagram of multiple fission of *Amoeba*



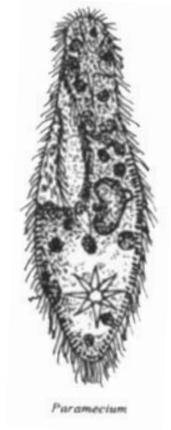
3. Draw labelled diagram of budding of *Hydra*



4. Draw labelled diagram of reproductive organs of a flower



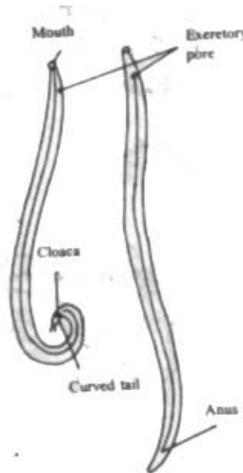
5. Draw labelled diagram of *Paramecium*



6. Draw labelled diagram of *Amoeba*



7. Draw labelled diagram of *Ascaris*



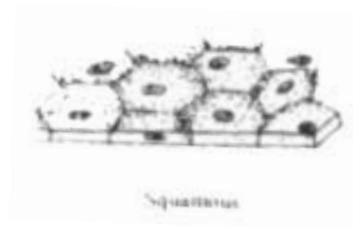
8. Draw labelled diagram of a fern



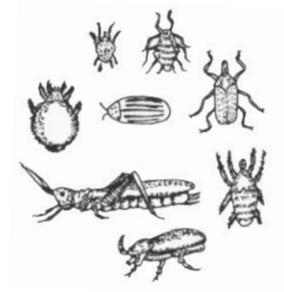
9. Draw labelled diagram of *Hydra*



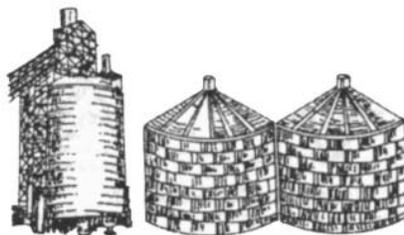
10. Draw labelled diagram of squamous epithelium



11. Draw labelled diagram of insect pests



12. Draw labelled diagram of silos



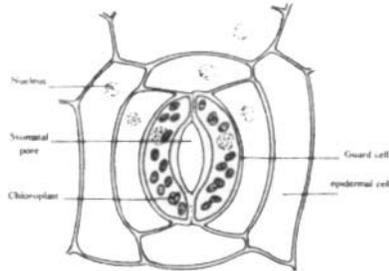
13. Draw labelled diagram of liver wort



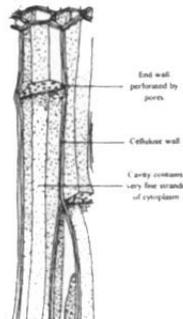
14. Draw labelled diagram of *Sycon*



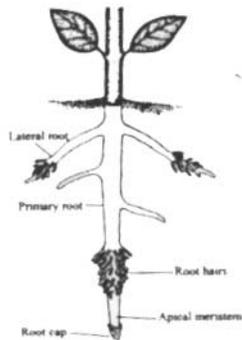
15. Draw labelled diagram of stomata



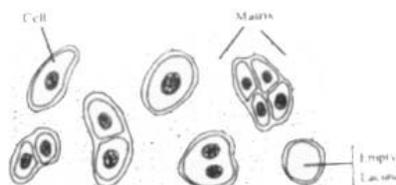
16. Draw labelled diagram of sieve tube



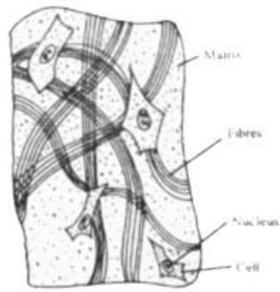
17. Draw labelled diagram of root with root hairs



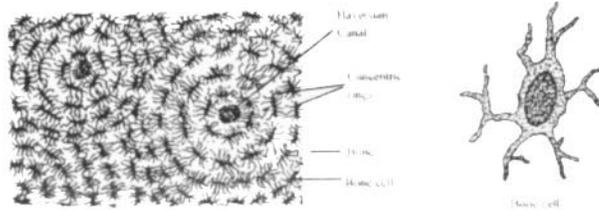
18. Draw labelled diagram of cartilage



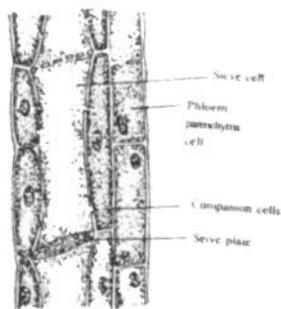
19. Draw labelled diagram of fibrous tissue



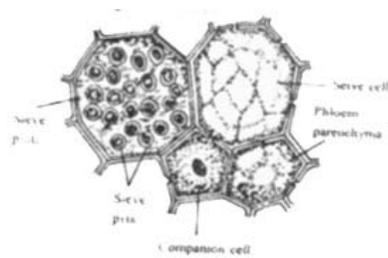
20. Draw labelled diagram of bone



21. Draw labelled diagram of sieve tube of phloem



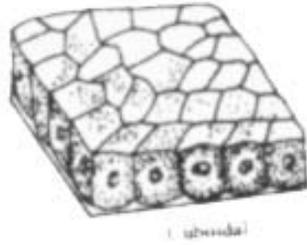
22. Draw labelled diagram of T.S. of sieve tube



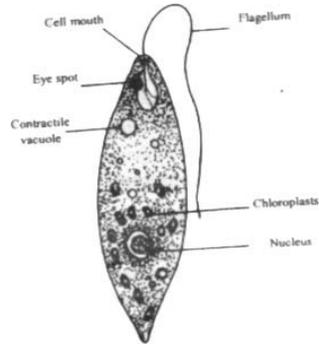
23. Draw labelled diagram of ciliated epithelium



24. Draw labelled diagram of cuboidal epithelium

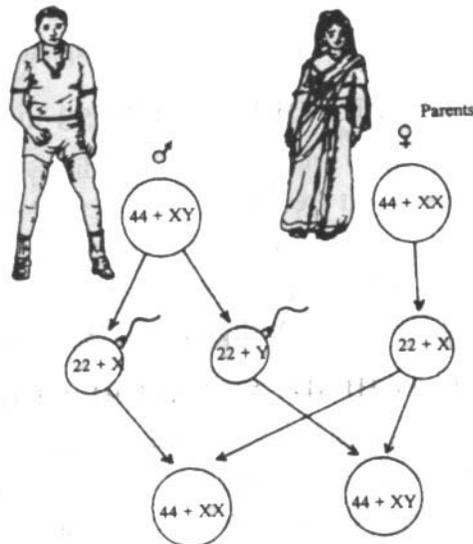


25. Draw labelled diagram of *Euglena*

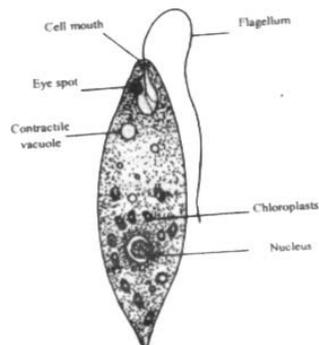


**FOR 5 MARKS**

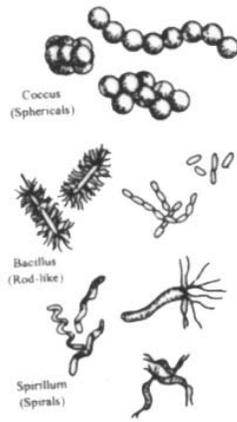
1. Draw labelled diagram of sex determination of man



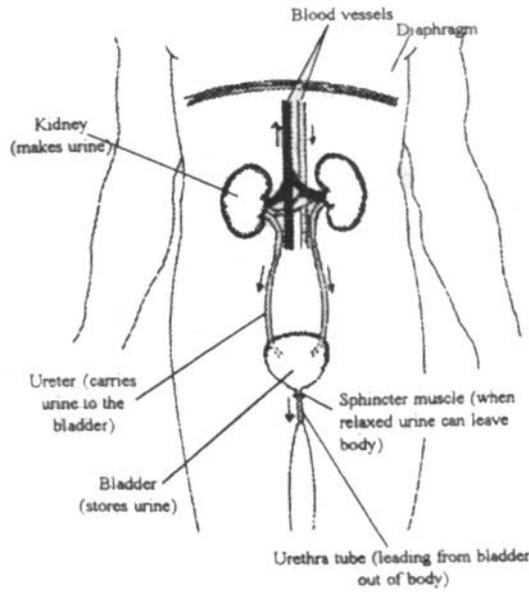
2. Draw labelled diagram of *Euglena*



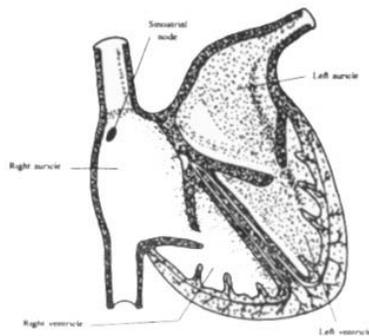
3. Draw labelled diagram of types of bacteria



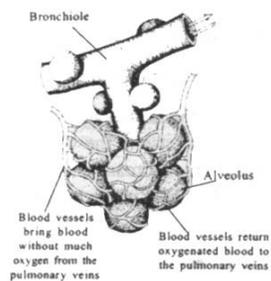
4. Draw labelled diagram of excretory system of man



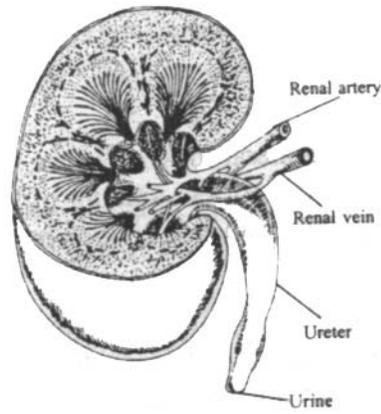
5. Draw labelled diagram of internal structure of heart of man



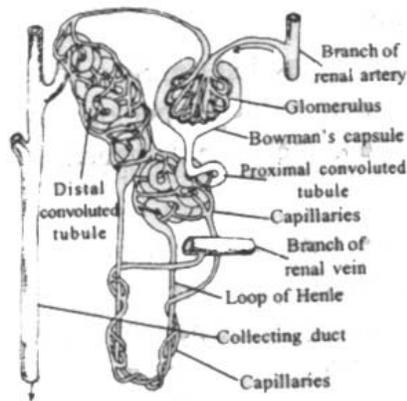
6. Draw labelled diagram of alveoli of man



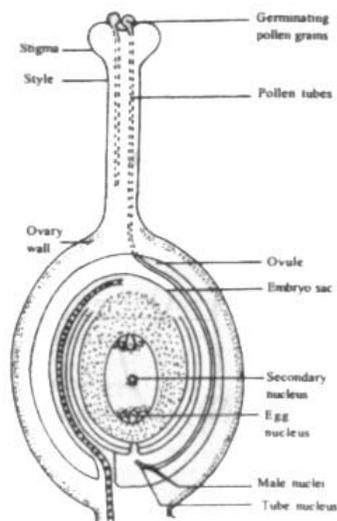
7. Draw labelled diagram of internal structure of kidney



8. Draw labelled diagram of nephron



9. Draw labelled diagram of zygote formation in plants





# Model Question Paper

212 – E (TS)

SSC (TOSS)

Reg. No. : .....

(A)

## SCIENCE AND TECHNOLOGY (Physical Science)

### Part – A and B

Time : 3 Hours

Maximum : 100 Marks

#### PART – A

Time : 2½ Hours

Maximum : 80 Marks

- Instructions :**
- 1) Write the answers for questions under Part – A in your answer book.
  - 2) Write the **correct** numbers of the questions you answer.
  - 3) Write **neatly and legibly**.

#### SECTION – 1

- Instructions :**
- 1) Answer **all** the following questions in **3 or 4** sentences.
  - 2) **3** marks will be given for **each** right answer. (10×3=30 Marks)

1. Give 3 cases for measuring area in daily life.
2. Hydro electricity production is better than thermal electric production. Support this argument.
3. Why is it advantageous to use Biomass by converting into other forms than in its natural form ?
4. Define the following :  
1) Planet            2) Satellite            3) Comet
5. Match stick burns when we scratch it on the sides of match box. Why ?
6. What are the differences between transverse and longitudinal waves ?
7. What is food chain ? Show how energy flows in a food chain using flow chart.
8. What are the symptoms of AIDS ?
9. Arun is unable to identify blue and green colours. Name the disorder. Explain how this disease is transmitted to him.
10. Draw a labelled diagram of root with root hairs.

P.T.O.



II. Choose from the given words A, B, C, D and indicate the correct answer in the bracket. (10× $\frac{1}{2}$  = 5 Marks)

- 11) Which of the following is not S.I. unit ? ( )  
A) Metre B) Pound  
C) Kilogram D) Second
- 12) Valency of Inert gases is ( )  
A) 0 B) 8  
C) 7 D) 1
- 13) 1 litre of volume is expressed in cubic centimeters. ( )  
A) 1 B) 10  
C) 100 D) 1000
- 14) Universal solvent ( )  
A) Kerosene B) Oil  
C) Water D) Petrol
- 15) General formula of Alkenes ( )  
A)  $C_nH_{2n}$  B)  $C_nH_{2n+2}$   
C)  $C_nH_{2n-2}$  D)  $C_nH_n$
- 16) Distance between two consecutive crests in a transverse wave ( )  
A) amplitude B) frequency  
C) wave length D) oscillation
- 17) You can send the copy of certificate by the following ( )  
A) Telegraph B) Fax  
C) Radio D) T.V.
- 18) The structural and functional unit of the living being is ( )  
A) Lungs B) Cell  
C) Stomach D) Tissue



212 – E (TS)

SSC (TOSS)  
May 2015

Reg. No. : .....

(B)

**SCIENCE AND TECHNOLOGY**  
**(Physical Science)**

PART – B

Time : 30 Minutes

Maximum : 20 Marks

- Instructions:** 1) Answer **all** the questions under Part – **B** on the question paper itself.  
2) Attach Part – **B** sheet to the answer sheet.

I. Fill in the blanks :

(10×1=10 Marks)

1) The liquid in adjacent figure indicates \_\_\_\_\_ meniscus.



- 2) Atoms attaining 8 electrons in outer most orbit is \_\_\_\_\_ rule.  
3) Motion of the needle of sewing machine is \_\_\_\_\_  
4) The relation between v, u, a and t is \_\_\_\_\_  
5) Due to \_\_\_\_\_ energy is produced in sun.  
6) Expansion of F.M. \_\_\_\_\_.  
7) Having capacity to protect from diseases is called \_\_\_\_\_  
8) We should use \_\_\_\_\_ bags instead of plastic bags to protect environment.  
9) Animals with jointed legs belong to the phylum \_\_\_\_\_.  
10) In hilly regions, the soldiers carry the materials from one place to another with the help of \_\_\_\_\_ animal.

P.T.O.



## SECTION – 2

**Instructions:** 1) Answer **all** the following questions in **5 or 6** sentences.

2) **Each** question carries **5** marks.

**(8×5=40 Marks)**

11. Define Atomic radius, Ionisation energy and explain the trend of Atomic radius in period and group.
12. Balance the following equations :
  - i)  $\text{H}_3\text{PO}_3 \rightarrow \text{H}_3\text{PO}_4 + \text{PH}_3$
  - ii)  $\text{Ca} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$
  - iii)  $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
  - iv)  $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
  - v)  $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$ .
13. Define and give Units of following :
  - 1) Speed
  - 2) Velocity
  - 3) Acceleration.
14. Explain the construction of clinical mercury thermometer with the help of a neat diagram.
15. Mention the uses of radio isotopes.
16. Explain in brief, the agricultural practices to be followed to get more yield.
17. Describe the structure of nephron.
18. You identified that some people in your area are suffering from headache, high fever with periodical shivering. Identify the disease, disease causing organism and mode of transmission. Mention the controlling measures you take to control the disease.

## SECTION – 3

**Instructions:** Draw a **neat** labelled diagrams and **each** question carries

**5** marks.

**(2×5=10Marks)**

19. Draw the experimental set-up to show that air contains Oxygen and Nitrogen.
  20. Draw a neat labelled diagram of Nerve cell or Neuron.
-



- 19) There is decrease in rainfall year by year in your area. Which natural activity do you suggest to solve this problem ? ( )
- A) planting more number of trees    B) deforestation  
C) reducing air pollution            D) cloud seeding
- 20) Spraying of more of insecticides and pesticides in the fields leads to ( )
- A) land pollution                        B) air pollution  
C) both A and B                         D) none

III. Match the following :

(10x $\frac{1}{2}$ =5 Marks)

- | A                          |     | B                         |
|----------------------------|-----|---------------------------|
| 21) Inert gas              | ( ) | A) Thorium                |
| 22) Halogen                | ( ) | B) Argon                  |
| 23) Ionic substance        | ( ) | C) Hydrogen chloride      |
| 24) Covalent substance     | ( ) | D) Chlorine               |
| 25) Actinide               | ( ) | E) Sodium chloride        |
| <b>Vitamins</b>            |     | <b>Deficiency disease</b> |
| 26) Vitamin B <sub>1</sub> | ( ) | A) Pellagra               |
| 27) Vitamin B <sub>3</sub> | ( ) | B) Beri Beri              |
| 28) Vitamin D              | ( ) | C) Night Blindness        |
| 29) Vitamin A              | ( ) | D) Scurvy                 |
| 30) Vitamin C              | ( ) | E) Rickets                |
-