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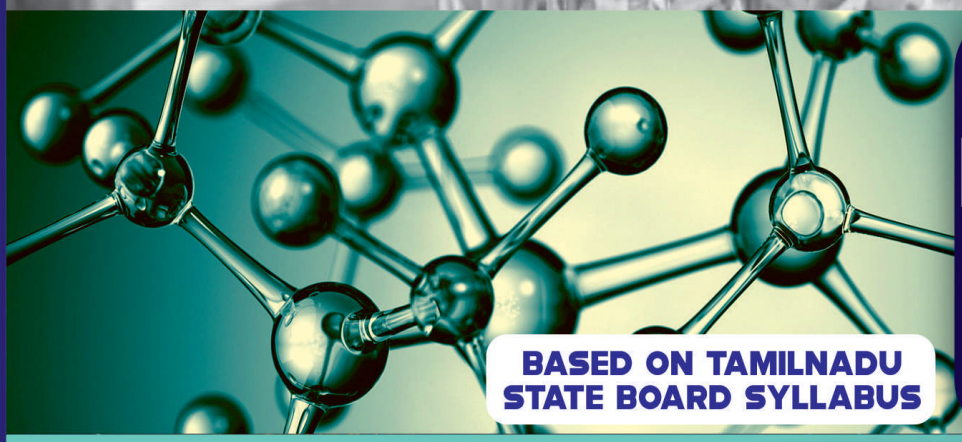

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10th Std

# SARAS SCIENCE

N.Arumugam
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# 10th Science - Line by Line Solved Questions

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First Edition : 2017; Second Edition: 2019; Third Edition: 2020.

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**ISBN : 9789386519566**

**Price : Rs.350/-**

**Pages : 520 + 2 Supplement Books**

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Published by
**SARAS PUBLICATION**
114/35G, A.R.P. Camp Road, Periavilai,
Kottar P.O., Nagercoil,
Kanyakumari Dist -629 002.
Telephone : 04652 265026
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# 3 Thermal Physics

## For Memory

1. Relation between Celsius and Kelvin scale= K= C+273
   Fahrenheit to Kelvin= K= (F+ 460) x 5/9
   0K= -273$^0$C

2. Coefficient of linear expansion= $\alpha_L = \frac{\Delta L}{L_o \Delta T}$
   $\alpha_L$=Alpha L=Coefficient of linear expansion
   $\Delta L$= Delta L=Change in length
   $L_o$ =Original length
   $\Delta T$= Delta T= Change in temperature

3. Coefficient of areal expansion= $\alpha_A = \frac{\Delta A}{A_o \Delta T}$
   $\alpha_A$=Alpha A=Coefficient of areal expansion
   $\Delta A$= Delta A=Change in area
   $A_o$ =Original area

4.Coefficient of cubical expansion= $\alpha_V = \frac{\Delta V}{V_o \Delta T}$
   $\alpha_V$=Alpha V=Coefficient of cubical expansion
   $\Delta V$= Delta V=Change in volume
   $V_o$ =Original volume

5. Boyle's law = $P \propto 1/V$ (or) PV= constant
   P=Pressure, V= volume

6. Charles's law= $V \propto T$ (or) V/T = constant
   T=Temperature

7. Avogadro's law= $V \propto n$ or V/n= constant n=number of atoms

8. Ideal gas equation = PV= RT
   R = universal gas constant

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# 3 Thermal Physics

## Book Back Solved Questions-1 Mark

### I. Choose the Correct Answer

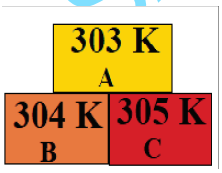
**1.** The value of universal gas constant
*a) 3.81 J mol$^{-1}$ K$^{-1}$ b) 8.03 J mol$^{-1}$ K$^{-1}$*
*c) 1.38 J mol$^{-1}$ K$^{-1}$ d) 8.31 J mol$^{-1}$ K$^{-1}$*

**2.** If a substance is heated or cooled, the change in mass of that substance is
*a) positive b) negative*
*c) zero d) none of the above*

**3.** If a substance is heated or cooled, the linear expansion occurs along the axis of
*a) X or –X b) Y or –Y*
*c) both (a) and (b) d) (a) or (b)*

**4.** Temperature is the average _____ of the molecules of a substance
*a) difference in K.E and P.E*
*b) sum of P.E and K.E*
*c) difference in T.E and P.E*
*d) difference in K.E and T.E*

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




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

### II. Fill in the Blanks

1. The value of Avogadro number _____
2. The temperature and heat are ..... quantities
3. One calorie is the amount of heat energy required to raise the temperature of___of water through _____ .
4. According to Boyle's law, the shape of the graph between pressure and reciprocal of volume is _____

### III. State whether the following statements are true or false, if false explain why?

**1.** For a given heat in liquid, the apparent expansion is more than that of real expansion.
***False***
***Correct statement:*** For a given heat in liquid, the ***real*** expansion is more than that of ***apparent*** expansion.

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

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

**I.** 1. (d) 2. (c) 3. (c) 4. (c) 5. (a)
**II.** 1. $6.023 \times 10^{23}$ /mol 2. Scalar 3. 1 gram ; 1°C 4. Straight line



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## IV. Match the items in Column-I to the items in Column-II

| Column-I | Column-II |
|---|---|
| 1. Linear expansion | - change in volume |
| 2. Superficial expansion | - hot body to cold body |
| 3. Cubical expansion | - 1.381 X $10^{-23}$ $JK^{-1}$ |
| 4. Heat transformation | - change in length |
| 5. Boltzmann constant | - change in area |

**Ans**

| Column-I | Column-II |
|---|---|
| 1. Linear expansion | - change in length |
| 2. Superficial expansion | - change in area |
| 3. Cubical expansion | - change in volume |
| 4. Heat transformation | - hot body to cold body |
| 5. Boltzmann constant | - 1.381 X $10^{-23}$ $JK^{-1}$ |

## V. Assertion and Reason Type Questions

a. Both the assertion and the reason are true and the reason is the correct explanation of the assertion.

b. Both the assertion and the reason are true but the reason is not the correct explanation of the assertion.

c. Assertion is true but the reason is false.

d. Assertion is false but the reason is true.

**1. Assertion:** There is no effect on other end when one end of the rod is only heated.

**Reason:** Heat always flows from a region of lower temperature to higher temperature of the rod.

***Ans: c. Assertion is true but the reason is false.***

**2.Assertion:** Gas is highly com-pressible than solid and liquid

**Reason:** Interatomic or intermolecular distance in the gas is comparably high.

***Ans: a. Both the assertion and the reason are true and the reason is the correct explanation of the assertion.***

## VI. Answer in Briefly-2 Marks

**1.** Define one calorie.

*Amount of heat required to rise the temperature of one gram of water through $1^oC$*

**2.** Distinguish between linear and areal or superficial expansion.

| Linear Expansion | Areal Expansion |
|---|---|
| 1. Longitudinal expansion | Superficial expansion |
| 2. Length of body increases | Area of body is increases |
| 3. $\alpha_L = \Delta L/L_o\Delta T$<br>$\Delta L$-Change in length<br>$L_o$- Original length<br>$\Delta T$- Change in temperature<br>$\alpha_L$-Coefficient of linear expansion | $\alpha_A = \Delta A/A_o\Delta T$<br>$\Delta A$- Change in area<br>$A_o$- Original area<br>$\Delta T$- Change in temperature<br>$\alpha_A$-Coefficient of superficial expansion |

**3.** What is co-efficient of cubical expansion?

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

Unit is $K^{-1}$.



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**4.** State Boyle's law.

*The volume of a fixed mass of gas is inversely proportional to its pressure. when the temperature of the gas is constant.*

$P \propto 1/V$ (or) $PV$=Constant

**5.** State-the law of volume.

*It is also known as Charles's law. The volume of a gas is directly proportional to the temperature of the gas. When the pressure of a gas is constant.*

$V \propto T$ (or) $\frac{V}{T}$ = Constant

**6.** Distinguish between ideal gas and real gas.

| *Ideal Gas* | *Real Gas* |
|---|---|
| 1. If the atoms or molecules of a gas ***do not interact*** with each other, then the gas is said to be an ***ideal gas*** or a ***perfect gas***. | If the molecules or atoms of a gas ***interact with each other***, then the gas is said to be a real gas |
| 2. There is ***no*** intermolecular force of ***attraction.*** | There is intermolecular force of ***attraction.*** |

**7.** What is co-efficient of real expansion?

- *The ratio of the **true** rise in the **volume of a liquid** per degree rise in **temperature** to its unit volume.*
- SI unit is $K^{-1}$

**8.** What is co-efficient of apparent expansion?

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

## VII. Numerical Problems-4 Marks

**1.** Find the final temperature of a copper rod, whose area of cross section changes from 10 $m^2$ to 11 $m^2$ due to heating. The copper rod is initially kept at 90 K. (Coefficient of superficial expansion is 0.0021 /K).

**Given Data**

Initial Area of Copper rod ($A_1$) = 10 $m^2$
Final Area after expansion ($A_2$) = 11 $m^2$
Initial Temperature ($T_1$) = 90 K
Coefficient of superficial expansion ($\alpha_A$) = 0.0021/K
**What is need to find?** = **$T_2$ = Final Temperature**
In this problem : Initial Area **($A_1$)** = Original Area **($A_o$)**




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Unit-Kelvin (K)

**2.** Define absolute temperature?

Measurement of ***temperature*** in relation to absolute ***zero*** using the ***Kelvin scale***. It is also known as ***thermodynamics*** temperature.

**3.** Define thermal equilibrium

In thermal equilibrium there is no net flow of ***thermal energy*** between the systems.

**4.** Define thermal energy

The flow of heat energy from a ***hot object*** to a ***cold object.***

**5.** What is heating?

The flow of ***heat energy*** flows from a body of ***higher temperature*** to another object of ***lower temperature.***

**6.** Write the names of the unit of heat energy other than joule.

*1. Calorie 2. Kilocalorie*

**7.** Define Kilocalorie?

Amount of ***heat energy*** required to raise the ***temperature*** of 1 ***kilogram of water*** through 1°C.

**8.** What is thermal expansion

The change in the ***dimension*** due to ***rise*** in ***temperature.***

**9.** What are the types of expansion of solids?

*1. Linear expansion-longitudinal expansion*

*2. Superficial expansion-areal expansion*

*3. Cubical expansion-volumetric expansion*

**10.** What is linear expansion ?

An ***increase*** in the ***length*** of a solid ***body*** due to ***heating.*** It is also called ***longitudinal expansion***.

**11.** What is superficial or areal expansion?

An ***increase*** in the area of a ***solid object*** due to ***heating.***

It is also called ***areal*** expansion.

**12.** What is cubical expansion?

An ***increase*** in the ***volume*** of a ***solid body*** due to ***heating.***

It is also called ***volumetric*** expansion.

**13.** Write the values of coefficient of cubical expansion of any two materials.

Aluminium = $7 \times 10^{-5} K^{-1}$

Brass = $6 \times 10^{-5} K^{-1}$

**14.** What is real expansion of the liquid?

The ***expansion*** observed when a ***liquid*** is heated directly without using any ***container.***

**15.** What is apparent expansion of the liquid?

The expansion of the liquid due to heating without considering the ***expansion of container***.

**16.** List out the name of three fundamental laws of gases

1. Boyle's law
2. Charles's law
3. Avogadro's law

**17.** What will happen when a substance is heated?

- Temperature of the substance ***rises***.
- The substance may ***change*** from ***solid*** to ***liquid*** or from ***liquid*** to gas.
- The substance will ***expand***.



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**18.** State Avogadro's law

At constant pressure and temperature, the volume of a gas is ***directly proportional*** to ***number of atoms*** or molecules present in it.

$V \alpha n$

**19.** Define real gas

In real gas, the molecules or atoms interact with each other.

**20.** Define ideal gases or perfect gas

In ideal gas, the atoms or molecules ***do not interact*** with each other.

**21.** When real gas behaves as an ideal gas?

At very ***high temperature*** or ***low pressure***.

**22.** Give the relation between the different types of scale of temperature

Celsius and Kelvin: K = C+273

Fahrenheit and Kelvin:

[K] = (F+460) x 5/9

0K = -273°C

**23.** Write the characteristic features of heat energy transfer

1. Heat flows from a system of ***higher temperature*** to a system of ***lower temperature.***

2. The ***mass of the system*** is not altered.

3. The heat ***gained*** by the cold system is equal to heat ***lost*** by the hot system.

Heat gained = Heat lost

**24.** Define coefficient of linear expansion.

The ratio of increase in length of the body per degree rise in temperature to its unit length.

SI unit -$K^{-1}$

**25.** Define coefficient of superficial expansion.

The ratio of increase in ***area of the body*** per degree rise in temperature to its unit area.

SI unit -$K^{-1}$

**26.** Write notes on ideal gas equation.

The ideal gas equation is an equation, which relates all the properties of an ideal gas.

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

According to ***Boyle's law,***

PV = constant

According to ***Charles's law,***

V/T = constant

According to ***Avogadro's law***,

V/n = constant

Ideal gas equation is also called as ***equation of state*** because it gives the relation between the state variables and it is used to describe the state of any gas.

On combining the above three laws, we get a ***combined law of gases***.

$PV = RT.$

Here, R is known as ***universal gas*** constant whose value is ***8.31 J $mol^{-1}K^{-1}$.***

## VI. Numerical Problems-4 Marks

**1.** A container whose capacity is 102 ml is filled with a liquid up to 72 ml. Then, the liquid in the container is heated. Initially, the level of the liquid falls from 72 ml to 70.5 ml. Then we heat more, the level of the liquid rises to 75.2 ml. Find the apparent and real expansion.



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***body*** due to heating.

* It is also called ***volumetric*** expansion.

* Coefficient of cubical expansion = $\alpha_V = \Delta V / V_0 \Delta T$

* SI unit of Coefficient of cubical expansion is $K^{-1}$

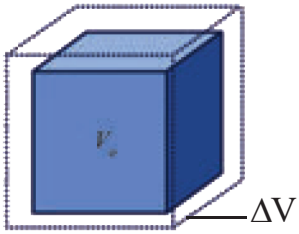


*Fig. Cubical expansion.*

**2.** Describe thermal expansion in liquids and gases.

♦ When heated, the ***atoms*** in a liquid and gas gain ***energy*** and are forced further ***apart***.

♦ For a given rise in temperature, a ***liquid*** will have ***more expansion*** than a ***solid.***

♦ For a given rise in temperature, a ***gas*** will have ***more expansion*** than a ***solid*** and a ***liquid.***

♦The coefficient of cubical expansion of liquid is ***independent of temperature.***

♦The coefficient of cubical expansion of gas depends on the ***temperature.***

**Real and Apparent expansion**

♦If a liquid is ***heated*** directly without using any ***container,*** then the ***expansion*** is called as ***real expansion.***

♦***Coefficient of real expansion*** is defined as the ratio of the true rise in the ***volume of the liquid*** per degree rise in temperature to its unit volume.

♦SI unit of coefficient of real expansion is $K^{-1}$

♦The expansion of a liquid apparently observed ***without*** considering the ***expansion*** of the ***container*** is called the ***apparent expansion*** of the liquid

♦***Coefficient of apparent expansion*** is defined as the ratio of the ***apparent*** rise in the ***volume of the liquid per degree*** rise in the volume of the liquid per degree rise in ***temperature*** to its unit volume.

♦SI unit of coefficient of apparent expansion is $K^{-1}$

## IX. Hot Questions

**1.** Why are gaps left in between rails?

Rails will lengthen due to ***thermal expansion.***

Thermal expansion is the tendency of matter to expand on heating.

**2.** Do you think that the rails bent because of thermal expansion?

Yes. A railway track is made up of a number of rails placed end to end. These rails are usually made up of ***steel***.

***Steel*** expands on ***heating*** and contracts on ***cooling***.

When the rails are joined to one another without leaving any space for expansion, the ***rails bend*** due to ***thermal expansion*** and the train goes off the railway track.

Each rail is connected to the other in such a way that a small ***gap*** is left in between them.

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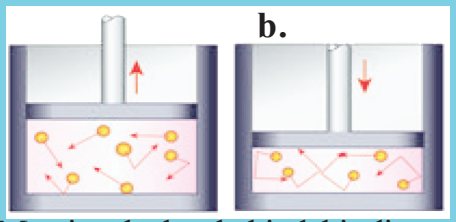
These ***small gaps*** provide space for easy ***expansion*** of the rails which happens during summer as well as due to continuous friction between the train wheels and the rails.

Hence, these small gaps prevent the rails from bending.

**3.** The given diagram explains variation of volume with pressure. Answer the following questions.

**a.** **b.**



**a.** Mention the law behind this diagram.
**b.** Explain the concept of diagram (a)------
**c.** State the concept of diagram (b)------

a. Boyle's law

b. Volume increases and pressure decreases when pulling up.

c. Volume decreases and pressure increases when pulling down.

**4.** Sun gives light and temperature to all the living beings on the earth. Among all the living beings, human beings are cooking and eating. During cooking, a cold vessel is placed onto a stovetop. When the stove is turned on, the vessel becomes very hot due to the heat transfer from the burner to the vessel. At hot summer, people are using air conditioner. On a hot summer day, air-conditioners are used constantly. The process of cooling air in air-conditioners employs heat transfer principle.

In the above statements how many types of heat transfer are involved? And write the name of those heat transfer principles and explain it with the help of above examples.

**Answer**

***Three*** types of heat transfer principles are mentioned.

**Names of heat transfer**

1. Conduction 3. Radiation
2. Convection

a) ***Conduction***: Vessel becomes very hot due to ***heat conduction*** from the burner to the vessel

b) ***Convection***: The process of cooling air in air-conditioners employs the principle of convection.

c) ***Radiation***: Thermal energy is radiated from sun

**5.** Assume two different solid materials A and B. Material A has high bond energy and high melting point. Material B has low bond energy and low melting point. Same amount of temperature is applied on both materials. Discuss thermal expansion based on the above condition.

- Thermal expansion generally ***decreases*** with ***increasing bond energy,*** which also has an effect on the melting point of solids.
- High melting point materials are more likely to have lower thermal expansion.
- Therefore Material A has low thermal expansion. Material B has high thermal expansion.



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# 11 Carbon and its Compounds

## Book Back Solved Questions-1 Mark

### I. Choose the Correct Answer

**1.** The molecular formula of an open chain organic compound is $C_3H_6$. The class of the compound is
*a. alkane* *b. alkene*
*c. alkyne* *d. alcohol*

**2.** The IUPAC name of an organic compound is 3-Methyl butan-1-ol. What type compound it is?
*a. Aldehyde* *b. Carboxylic acid*
*c. Ketone* *d. Alcohol*

**3.** The secondary suffix used in IUPAC nomenclature of an aldehyde is _
*a. - ol* *b. – oic acid*
*c. - al* *d. - one*

**4.** Which of the following pairs can be the successive members of a homologous series?
*a.* $C_3H_8$ *and* $C_4H_{10}$
*b.* $C_2H_2$ *and* $C_2H_4$
*c.* $CH_4$ *and* $C_3H_6$
*d.* $C_2H_5OH$ *and* $C_4H_8OH$

**5.** $C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O$ is a
*a. Reduction of ethanol*
*b. Combustion of ethanol*
*c. Oxidation of ethanoic acid*
*d. Oxidation of ethanal*

6. Rectified spirit is an aqueous solution which contains about___ of ethanol
*a. 95.5 %* *b. 75.5 %*
*c. 55.5 %* *d. 45.5 %*

**7.** Which of the following are used as anaesthetics?
*a. Carboxylic acids b. Ethers*
*c. Esters* *d. Aldehydes*

**8.** TFM in soaps represents ___ content in soap
*a. mineral* *b. vitamin*
*c. fatty acid* *d. carbohydrate*

**9.** Which of the following statement is wrong about detergents?
*a. It is a sodium salt of long chain fatty acids*
*b. It is sodium salts of sulphonic acids*
*c. The ionic part in a detergent is* $-SO_3^- Na^+$
d. It is effective even in hard water.

### II. Fill in the Blanks

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

1. (b) 2. (d) 3. (c) 4. (a) 5. (b) 6. (a) 7. (b) 8. (c)
9. (a) **II.** 1. functional group

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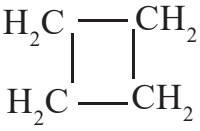
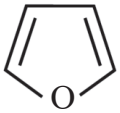
(ii) Benzene -
Cyclic Aromatic compound -

(iii) Cyclobutane -
Alicyclic compound



(iv) Furan-
Heterocyclic compound -



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

**Preparation Ethanoic Acid**

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

**Chemical Formula**

$$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow[2[O]]{KM_nO_4\ /\ OH^-} \underset{\text{Ethanoic acid}}{CH_3COOH} + H_2O$$

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

**Detergent Pollution**

♣ Detergents, having ***branched hydrocarbon*** chain, are not fully ***biodegradable*** by microorganisms present in water.

♣ They cause ***water pollution.***

**Remedial Measures**

♣ Use of detergents having ***straight hydrocarbon*** chains, can be clearly ***degraded*** by bacteria.

**5.** Differentiate soap and detergent.

| Soap | Detergent |
|---|---|
| 1. It is a sodium salt of ***long chain fatty acids***. | It is sodium salts of ***sulphonic acids***. |
| 2. The ionic part of a soap is $-COO^-Na^+$. | The ionic part in a detergent is $-SO_3^-Na^+$. |
| 3. It is prepared from ***animal fats*** or ***vegetable oils.*** | It is prepared from ***hydrocarbons*** obtained from crude oil. |
| 4. Its effectiveness is ***reduced*** when used in ***hard water.*** | It is ***effective*** even in hard water. |
| 5. It forms a ***scum*** in ***hard water***. | Does not form a ***scum*** in hard water. |
| 6. It has ***poor foaming*** capacity. | It has ***rich foaming*** capacity. |
| 7. Soaps are ***biodegradable***. | Most of the detergents are ***non-biodegradable***. |

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## VI. Long Questions-4 Marks

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

### Homologous Series

It is a group of organic compounds having

*1. Same general formula*

*2. Similar chemical properties*

*3. The successive members differ by a* ***$CH_2$*** *group.*

### Characteristics of Homologous Series

1. Each member of the series differs from the preceding or succeeding member by one ***methylene group*** ($-CH_2$) and hence by a molecular mass of ***14amu.***

2. All members of a homologous series contain the ***same elements*** and ***functional group.***

3.They are represented by a general molecular formula.

Eg. *Alkanes,* $C_nH_{2n+2}$

4. ***Regular gradation*** in their physical properties with respect to their increase in ***molecular mass.***

5. Chemical properties are ***similar***.

6. All the members can be ***prepared*** by a common method.

**2.** Arrive at, systematically, the IUPAC name of the compound: $CH_3$-$CH_2$-$CH_2$-OH.

### Compound

$CH_3$-$CH_2$-$CH_2$-OH.

### Systematical Naming by IUPAC

**Step-1:** The parent chain consists of ***3 carbon*** atoms.

So, the root word is ***'prop'.***

**Step-2:** There are ***single*** bonds between the carbon atoms of the chain.

The primary suffix is ***'ane'.***

**Step-3:** The compound contains ***-OH group.***

It is an ***alcohol.***

The carbon chain is numbered from the end which is closest to ***-OH*** group (Rule 3).

3 2 1

$CH_3$-$CH_2$-$CH_2$-OH.

**Step-4:** The locant number of -OH group is ***1.***

Thus the secondary ***suffix*** is '1-al'.

Name of the compound is

***Prop+ane+(1-01)=Propan-1-al***

Note: Terminal 'e' of 'ane' is ***removed*** as per 'Rule 5'.

**3.** How is ethanol manufactured from sugarcane?

Ethanol is manufactured by the ***fermentation*** of ***molasses.***

Molasses is the ***by-product*** obtained during the manufacture of sugar from sugarcane.

Molasses is a ***dark coloured*** syrup.

Molasses contains ***30%*** of sucrose.

Molasses is converted into ethanol by the following process:

*1. Dilution of molasses*

*2. Addition of nitrogen source*

*3. Addition of yeast*

*4. Distillation of wash*

### 1. Dilution of Molasses

Molasses is ***diluted*** with water.



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The ***concentration*** of sugar is brought down to 8 to 10 percent.

**2. Addition of Nitrogen Source**

Molasses contains enough ***nitrogenous*** matter.

This acts as ***food*** for yeast during ***fermentation process.***

If nitrogen content in molasses is poor, it is fortified by adding ***ammonium sulphate*** or ***ammonium phosphate.***

**3. Addition of Yeast**

1. The ***solution*** from the above step is collected in a large ***'fermentation tank'.***

2. ***Yeast*** is added.

3. The mixture is kept at ***303K*** for a few days.

4. During this period ***fermentation*** occurs.

The enzyme ***'invertase'*** present in yeast converts sugar into ***glucose*** and ***fructose.***

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

5. The enzyme ***zymase*** present in the yeast converts glucose and fructose into ***ethanol.***

$$\underset{\textbf{Glucose or Fructose}}{C_6H_{12}O_6} \xrightarrow{zymase} \underset{\textbf{Ethanol}}{2C_2H_5OH} + 2\ CO_2$$

The fermented liquid is called ***wash.***

**4. Distillation of Wash**

The fermented liquid contains ***15 to 18 percent*** alcohol.

It is now subjected to ***fractional distillation.***

The main fraction draw is an ***aqueous solution*** of ethanol.

The aqueous solution contains ***95.5%*** of ***ethanol*** and ***4.5%*** of ***water.***

This is called ***rectified spirit.***

Rectified spirit is ***refluxed*** over ***quicklime*** for about 5 to 6 hours.

It is allowed to stand for ***12 hours.***

On distillation, ***pure alcohol*** (100%) is obtained.

Pure alcohol is ***absolute alcohol.***

**4.** Give the balanced chemical equation of the following reactions:
(i) Neutralization of NaOH with ethanoic acid.
(ii) Evolution of carbon dioxide by the action of ethanoic acid with $NaHCO_3$.
(iii) Oxidation of ethanol by acidified potassium dichromate.





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**(iv) Combustion of ethanol.**

**1. Neutralization of NaOH with Ethanoic Acid**

$$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$$

**2. Evolution of Carbon dioxide by the reaction of Ethanoic acid with $NaHCO_3$**

$$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2\uparrow + H_2O$$

**3. Oxidation of ethanol by acidified potassium dichromate**

$$CH_3CH_2OH \xrightarrow[2[O]]{K_2Cr_2O_7 \,/\, H^+} \underset{\text{Ethanoic acid}}{CH_3COOH} + H_2O$$

**4. Combustion of ethanol**

$$\underset{\text{Ethanol}}{C_2H_5OH} + 3O_2 \rightarrow \underset{\text{Carbon dioxide}}{2CO_2} + 3H_2O$$

**5.** Explain the mechanism of cleansing action of soap.

1. A soap molecule has ***two*** distinct parts, namely
   1.***Polar end*** 2. ***Non-polar end.***
2. Polar end is a short ***head.***
3. It is a ***carboxylate group*** (-COONa)
4. Polar end is ***hydrophilic***-water loving.
5. Polar end is ***attracted*** towards ***water.***
6. Non polar end is a long ***tail.***
7. It is a ***hydrocarbon chain.***
8. Non polar end is ***hydrophobic***-water hating.
9. It is ***attracted*** towards ***dirt*** or ***oil*** on the cloth.
10. The two parts of soap molecules interact differently with water.
11. The ***hydrophilic*** part makes the entire molecule soluble in water.

The hydrophobic part of the soap molecules ***traps dirt.***

When detergent is dissolved in water, the soap molecules join together as ***clusters*** called ***micelles.***

12. Long hydrocarbon chains ***attach*** to the oil and dirt.

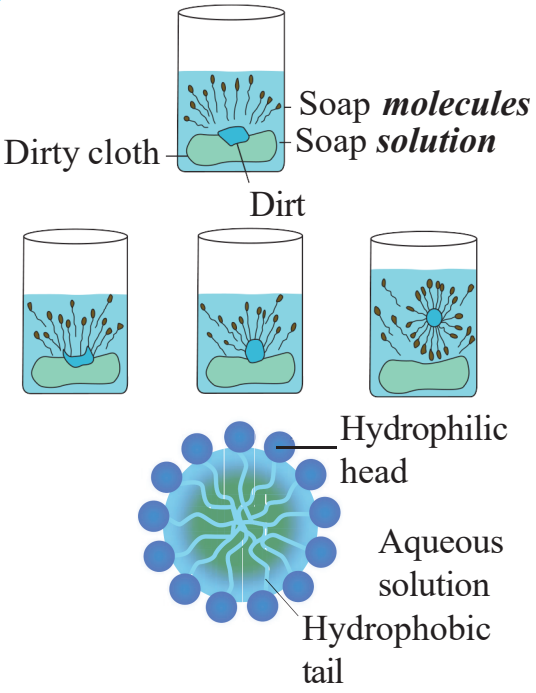


*Fig. Cleansing action of soap.*

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## V. Short Questions-2 Marks

**1.** What are organic compounds?

♣ A chemical compound containing ***carbon.***

♣ Carbon is ***covalently*** bonded to elements like hydrogen, oxygen, nitrogen, etc.

**2.** What are acyclic compounds?

♣ ***Open chain*** compounds.

♣ The organic compounds in which the carbon atoms are linked in a ***linear pattern*** to form the chain.

**3.** Acyclic or open chain compounds are
(i) Saturated, state the reason
(ii) Unsaturated, state the reason

**(i) Saturated**

All the carbon atoms in the chain are connected by ***single bonds.***

Eg. $CH_3$-$CH_2$-$CH_3$

**(ii) Unsaturated**

One or more ***double bonds*** or ***triple bond*** exists between the carbon atoms in a compound.

Eg. $CH_3$-CH=$CH_2$

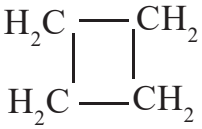
**4.** What are cyclic compounds?

Organic compounds in which the chain of carbon atoms is ***closed*** or ***cyclic.***

**5.** What are carbocyclic compound?

Cyclic compound containing carbon alone in its chain.

Example:

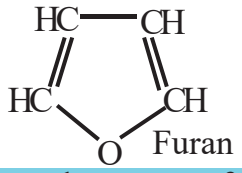


Cyclobutane

**6.** What are heterocycle compound?

Cyclic compound, containing ***carbon*** and ***other atoms*** like oxygen, nitrogen, sulphur, etc. in its chain.

Example: Furan



Furan

**7.** What are the types of carbocyclic compound? Explain.

**Types of Carbocyclic Compound**

*1. Alicyclic compound*
*2. Aromatic compound*

**1. Alicyclic Compound**

Organic compound containing one or more ***carbocyclic rings.*** It may be saturated or ***unsaturated.***

It is a ***carbocyclic compound.***

**2. Aromatic Compound**

Organic compound containing one or more ***benzene ring.***

Benzene ring contains ***alternate double bonds*** between carbon atoms.

It is a ***carbocyclic*** compound.

**8.** What are hydrocarbons?

Organic compounds composed of ***only carbon*** and ***hydrogen*** atoms.

**9.** List the types of hydrocarbons?

*1.Alkanes*
*2. Alkenes*
*3. Alkynes*

**10.** What is a functional group? Give examples.

*A functional group is an **atom** or **group of atoms** in a molecule which is more **reactive** and it determines the characteristic chemical properties of the compound.*

Example:

| | |
|---|---|
| 1.–OH | - Alcohol |
| 2.-CHO | - Aldehyde |





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4. To ***sterilize*** wounds (antiseptic).
5. Solvent for drugs, oils, fats etc.
6. In preparation of ***methylated spirit*** (95% ethanol and 5% methanol).
7. In preparation of ***rectified spirit*** (95.5% ethanol and 4.5% water).
8. In preparation of ***power alcohol*** (petrol + ethanol).
9. In preparation of ***denatured spirit*** (ethanol + pyridine).
10. To ***enhance*** flavour of food extract.

**17.** List out the uses of ethanoic acid.

- Food additive
- Flavouring agent.
- Preservative
- Manufacture of plastic
- Making dyes, pigments and paints.
- Printing fabrics
- Laboratory reagent
- Coagulating rubber from latex
- Production of pharmaceuticals.

**18.** Which prevents the precipitation of Ca and Mg ions on hard water? Mention its role.

**Surfactants**

- Compounds with molecules that line up around water to ***break*** the ***surface tension.***
- Surfactants donot bond with minerals present in hard water.
- They prevent the precipitation of Ca and Mg ions in hard water.

**19.** What are soaps?

Soaps are ***sodium*** or ***potassium salts*** of some long chain ***carboxylic acids.***

**20.** What are the major raw materials in soap?

*1. Fat 2. Alkali*

**21.** What are the two types of soaps? Explain.

*1. Hard soap*
*2. Soft soap*

**1. Hard Soap**

- Soaps which are prepared by the ***saponification*** of oils and fats with ***caustic soda.***
- Used for ***washing purpose.***

**2. Soft Soap**

- Prepared by the ***saponification*** of oils and fats with ***potassium salts.***
- Used for cleaning the ***body.***

**22.** What are the effects of hard water on soap?

1. Hard water contains calcium and magnesium ions.
2. With soap, the metal ions form a precipitate called ***scum.***
3. It is deposited on the cloth or skin as a ***sticky grey layer.***
4. It will ***ruin*** the cloth.
5. It ***limits*** the cleansing action of soap.

**23.** List out the disadvantages of detergents.

- Detergents having a ***branched hydrocarbon*** chain are not fully biodegradable by microorganisms.
- The ***cause*** water pollution.
- Relatively ***more expensive*** than soap.

**24.** What is TFM? Why is it important?

- TFM means ***Total Fatty Matter.***
- Higher the TFM, higher the ***quality*** of the soap.
- It protects the skin.




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**25.** What are soaps?

Soaps are sodium salts of ***long chain fatty acids.***

**26.** What are detergents?

Detergents are sodium salts of ***sulphonic acids.***

**27.** What are substituents?

***Atoms*** or ***group of atoms***, other than hydrogen, attached to carbon of the parent chain.

**28.** What is locant number?

Carbon atom beginning at the closest end of the ***substituent*** or ***functional group.***

**29.** Write notes on.

*1. Biodegradable detergents*

*2. Non-biodegradable detergents*

**1. Biodegradable Detergents**

- ***Straight hydrocarbon*** chains.
- Easily ***degraded by bacteria.***

**2. Non-biodegradable Detergents**

- Highly ***branched hydrocarbon*** chains.
- ***Cannot*** be degraded by bacteria.

**30.** List the unique characters of carbon.

*1. Catenation*

*2. Tetravalency*

*3. Multiple bonding*

**31.** What is the common bond in organic compounds?

*Covalent bond*

**32.** What are the classes of organic compounds based on functional groups.

1. –OH - Alcohol
2. –C(=O)–H - Aldehyde
3. –C(=O)– - Ketone
4. –C(=O)–OH - Carboxylic acid
5. –C(=O)–OR - Ester
6. –O–R - Ether

**33.** Name systematically the following hydrocarbon compound using IUPAC rules.

$CH_3$-$CH_2$-$CH_2$-$CH_2$-$CH_2$- $CH_3$

**Steps:**

1. It is a ***6-carbon chain***. Hence the root word is ***"Hexa".***

2. All the bonds between carbon atoms are ***single bonds***. Hence the suffix is ***"ane"***.

So the name of the compound is Hex + ane =***Hexane.***

**34.** Name systematically the following organic compound using IUPAC rules.

$CH_3CHO$

**Steps**

1. The parent chain consists of 2-carbon atoms. Hence the root word is ***"Eth".***

2. The bonds between carbon atoms is a ***single bond.*** Hence the primary suffix is ***"ane".***

3. The compound contains CHO group. It is an ***aldehyde*** group.

4. The name of the compound is Eth + ane + aldehyde = Ethaldehyde

**Note:** Terminal 'e' of 'ane'is removed as per rules.



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**35.** How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties?

| Ethanol | Ethanoic acid |
|---|---|
| **Physical Properties** | |
| 1. Ethanol has a ***pleasant*** odour ***(sweet smell)*** | Ethanoic acid has a ***pungent*** odour ***(vinegar-like smell)*** |
| 2. ***Boiling point*** is ***78°C*** | ***Boiling point*** is ***118.1 °C*** |
| 3. It is completely ***miscible*** with water in all properties. | On cooling, pure ***ethanoic acid*** is frozen to form ice like ***flakes.*** |
| **Chemical Properties** | |
| 1. It is ***less acidic*** than ethanoic acid. | It is ***more acidic*** than ethanol. |
| 2. ***No reaction*** with blue litmus paper. | It ***turns blue*** litmus to ***red.*** |
| 3. The functional group is ***OH.*** | The functional group is ***COOH.*** |
| 4. It ***does not*** react with ***sodium bicarbonate***. | It ***reacts*** with ***sodium bicarbonate*** producing sodium acetate, $H_2O$ and $CO_2$. |

**36.** What is the functional group of Butanone.

***Ketone***

**37.** Write the next homologue of $CH_3CH_2OH$ and HCOOH.

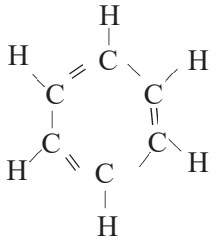
1. Next homologue of $CH_3CH_2OH$ is ***propanol-$CH_3$ - $CH_2$ -$CH_2$ - OH .***

2. Next homologue of HCOOH is acetic acid(Ethanoic acid) ***-$CH_3COOH$.***

**38.** Write the molecular formula and structure of benzene and state the number of double bonds in its structure.

♣ Molecular formula of benzene is ***$C_6H_6$***.

♣ Structure



♣ No of double bonds is ***3.***

**39.** State the name of functional group in citric acid.

***Functional group*** in citric acid is ***Carboxyl group - COOH.***

**40.** How do you differentiate between saturated and unsaturated hydrocarbons with the help of combustion reactions.

| Saturated Hydrocarbons | Unsaturated Hydrocarbons |
|---|---|
| 1. Saturated hydrocarbons undergo ***complete*** combustion. | 1. Unsaturated hydrocarbons undergo ***incomplete*** combustion. |
| 2. It gives ***clean flame*** on combustion. | 2. It produces ***smoky*** flame. |

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| | |
|---|---|
| 3. It produces ***blue flame.*** | 3. It produces ***yellow flame.*** |
| 4. It produces carbon dioxide and water. | 4. It produces carbon monoxide or carbon soot |

**41.** What is esterification?

✶ Esterification is the reaction in which, ***an alcohol*** combines with a ***carboxylic*** acid in the presence of an ***acid catalyst*** to form ***ester.***

✶ Esterification can take place ***only*** in the ***presence*** of an ***acid catalyst*** and heat.

$$\underset{\text{Ethanoic acid}}{CH_3\text{-}COOH} + \underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow{\text{Acid}} \underset{\text{Ester}}{CH_3COOC_2H_5}$$

**42.** Explain saponification?

***Oil*** and ***10% alkaline*** solutions are boiled by ***steam***. Oil gets ***hydrolysed.*** This process is called ***saponification.***

**43.** Write the name and formula of the second member of homo-logous series having general formula $C_nH_{2n}$.

1. Name of the second member = Propene
2. Formula of the second member = $C_3H_6$

**44.** Write the name and formula of the 2nd member of homologous series having general formula. $C_nH_{2n-2}$

Name of the compound is ***Propyne***.
Its formula is $C_3H_4$.

**45.** Write the name and molecular formula of the fourth member of alkane series.

Name of the compound is ***Butane***.
Its formula is $C_4H_{10}$.

## VI. Long Questions-4 Marks

**1.** Explain the general characteristics of organic compounds.

✪ Chemical compound containing carbon.
✪ ***High molecular weight***
✪ It has a ***complex*** structure.
✪ ***Insoluble*** in water.
✪ ***Soluble*** in ***organic*** solvents such as ether, carbon tetrachloride, toluene, etc.
✪ ***Highly*** inflammable.
✪ ***Less*** reactive.
✪ Forms ***covalent bonds.***
✪***Lower melting*** point.
✪They exhibit ***isomerism.***
✪They are ***volatile***
✪They can be prepared in the ***labo-ratory.***

**2.** What are hydrocarbons? How are hydrocarbons subdivided? Explain.

The organic compounds composed of only ***carbon*** and ***hydrogen atoms.***

**Classification of Hydrocarbons**

*1. Alkanes*
*2. Alkenes*
*3. Alkynes*



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# 12 Plant Anatomy and Plant Physiology

## Book Back Solved Questions-1 Mark

### I. Choose the Correct Answer

**1.** Casparian strips are present in the _____ of the root.
*a) cortex* *b) pith*
*c) pericycle* *d) endodermis*

**2.** The endarch condition is the characteristic feature of
*a) root* *b) stem*
*c) leaves* *d) flower*

**3.** The xylem and phloem arranged side by side on same radius is called _____
*a) radial* *b) amphivasal*
*c) conjoint* *d) None of these*

**4.** Which is formed during anaerobic respiration
*a) Carbohydrate b) Ethyl alcohol*
*c) Acetyl CoA* *d) Pyruvate*

**5.** Krebs' cycle takes place in
*a) chloroplast*
*b) mitochondrial matrix*
*c) stomata*
*d) inner mitochondrial membrane*

**6.** Oxygen is produced at what point during photosynthesis ?
*a) when ATP is converted to ADP*
*b) when $CO_2$ is fixed*
*c) when $H_2O$ is splitted*
*d) All of these*

### II. Fill in the Blanks

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

### III. State whether the statements are true or false. Correct the false statement

**1.** Phloem tissue is involved in the transport of water in plant.

***False***

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

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

***True***

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

***False***

***Correct Statement:*** In ***dicot*** stem cambium is present in between xylem and phloem.

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**I.** 1. (d) 2. (b) 3. (c) 4. (b) 5. (b) 6. (c) **II.**1. Epidermis and endodermis 2. Conjoint 3. Cytoplasm 4. Water 5. Mitochondria

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- It has ***spherical*** or ***oval*** shaped cells.
- The cells are ***irregularly*** arranged.
- They have ***intercellular spaces.***
- They help in ***gaseous exchange.***

**3.** Draw and label the structure of oxysome.

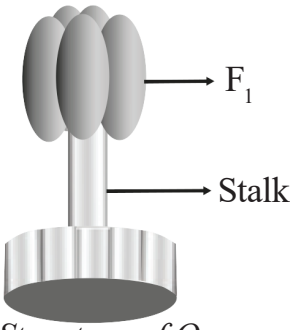


*Fig. Structure of Oxysomes.*

**4.** Name the three basic tissue systems in flowering plants.

1. Dermal or epidermal tissue system.
2. Ground tissue system.
3. Vascular tissue system.

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

**Photosynthesis**

1. Synthesis of ***carbohydrates*** by chlorophyll containing organisms using ***sunlight, $CO_2$*** and ***$H_2O$.***
2. *Photo* - Light
   *Synthesis* - to build
3. Photosynthetic organisms are:
   1. *Green plants*
   2. *Algae*
   3. *Some bacteria*

**Place of Photosynthesis**

*Chloroplast*

**6.** What is respiratory quotient?

*The ratio of volume of* ***carbon dioxide*** *liberated and the volume of* ***oxygen*** *consumed during respiration.*

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

**7.** Why should the light dependent reaction occur before the light independent reaction?

1. Light independent reaction needs ***ATP*** and ***$NADPH_2$*** to reduce $CO_2$.
2. These ATP and $NADPH_2$ are produced in ***light dependent*** reaction.
3. Hence, the light dependent reaction occurs before the light independent reaction.

**8.** Write the reaction for photosynthesis

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

Carbon dioxide + Water ⟶ ***Glucose + Water + Oxygen***

## VII. Long questions-4 Maks

**1.** Differentiate the following:
a) Monocot root and Dicot root
b) Aerobic and Anaerobic respiration



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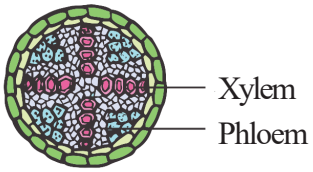
**2.** What is endarch condition?

1. Protoxylem lies towards the ***centre***.
2. Metaxylem lies towards the ***periphery***.

**3.** What is exarch condition?

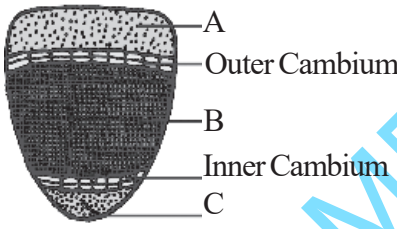
1. Protoxylem lies towards the ***periphery***.
2. Metaxylem lies towards the ***centre***.

**4.** Identify the given vascular bundle.




***Radial*** vascular bundle.

**5.** Label A,B,C from the following diagram




***Ans:*** A. Outer phloem
B. Xylem
C. Inner phloem

**6.** What is another name of epiblema?

Rhizodermis

**7.** What are casparian strips made of?

Suberin

**8.** What are casparian strips?

1. A band like ***thickening.***
2. Found on the walls of ***endodermis*** of root.

**9.** What is stele?

All the tissues ***inner to endodermis.***

**10.** Write the chemical composition of mitochondria?

| | | |
|---|---|---|
| Protein | - | 60-70% |
| Lipids | - | 25-30% |
| RNA | - | 5-7% |
| DNA | - | Small amount |

**11.** Who first discovered mitochondria?

***Kolliker*** in 1857

**12.** What are grana?

A ***stack*** of ***thylakoids*** present in stroma of chloroplast.

**13.** What are the vascular tissues? What is their function?

**Vascular Tissues**

1. ***Xylem***
2. ***Phloem***

**Functions**

1. Xylem - Transport of ***water*** and ***minerals***
2. Phloem - Transport of ***food.***

**14. What do you mean by pith?**

1. The large ***central parenchymatous zone.***
2. Found in ***monocot root*** and ***dicot stem.***

**15.** What are the types of plastids?

1. ***Chloroplast*** - green colour
2. ***Chromoplast*** - yellow, red and orange colour.
3. ***Leucoplast*** - colourless

**16.** Define plant anatomy

*The study of internal structure of plants.*

**17.** Where does the term anatomy come from?

The term anatomy comes from the Greek words

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* *Ana* - as under
* *Temnein* - to cut

**18.** Define tissues

*Group of cells that are similar or dissimilar in structure and origin, but perform similar function.*

**19.** Define vascular bundle

*Arrangement of xylem and phloem in the form of bundles.*

**20.** What do you mean by pith?

1. ***Central*** tissue
2. Made up of ***parenchyma*** cells with intercellular spaces.
3. Contains ***starch grains.***
4. Stores ***food.***
5. Found ***inside*** the stem and root.

## VI. Short Questions-4 Marks

**1.** Name the tissue systems as classified by Sachs and write their functions

### Tissue Systems

1. Dermal tissue system
2. Ground tissue system
3. Vascular tissue system

### Functions

| | |
|---|---|
| 1. **Dermal tissue-** | 1. Protection<br>2. Prevention of water loss |
| **2. Ground tissue-** | 1. Photosynthesis<br>2. Food storage<br>3. Regeneration<br>4. Support<br>5. Protection |
| 3. **Vascular tissue-** | 1. Transport of water<br>2. Transport of food |

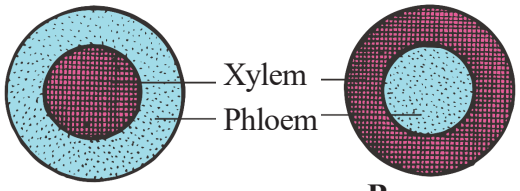
**2.** Give an account on epidermal tissue system

1. ***Outer most covering*** of plants.
2. Consists of the following;
   - *Epidermis*
   - *Stomata*
   - *Epidermal outgrowths*
3. Epidermis is the ***outermost layer.***
4. It is covered by ***cuticle.***
5. Stomata are ***minute pores*** found on epidermis.
6. Epidermal outgrowths are;
   1. *Trichomes*
   2. *Root hairs*

**3.** Write the functions of epidermal tissue system.

1. Epidermis ***protects*** the inner tissues.
2. Stomata help in ***transpiration.***
3. Root hairs help in ***absorption*** of water and minerals.

**4.** Identify the given diagrams A & B




A - Concentric and Amphi***cribal*** vascular bundle

B - Concentric and Amphi***vasal*** vascular bundle

**5.** Write the functions of chloroplast

1. ***Photosynthesis***
2. Storage of ***starch***
3. Synthesis of ***fatty acid***
4. Storage of ***lipids***
5. Formation of ***chlorophyll***

**6.** Write notes on photosynthetic pigments

1. Pigments involve in ***photosynthesis.***
2. They are of two classes namely,

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1. ***Primary pigment*** - Chlorophyll a
2. ***Accessory pigments*** - Chlorophyll b and carotenoids.
3. Primary pigment is called ***reaction centre.***
   - ☛ It traps ***solar energy.***
   - ☛ It converts the solar energy into ***electrical*** and ***chemical*** energy.
4. ***Accessory pigments*** are called ***harvesting centre.***
   - ☛ They pass on the absorbed energy to primary pigment molecule.
5. Reaction centre and the harvesting centre are together called ***photosystem.***

**7.** What are the factors affecting the photosynthesis?

**Internal Factors**

*1. Pigments*
*2. Leaf age*
*3. Accumulation of carbohydrates*
*4. Hormones*

**External Factors**

*1. Light*
*2. Carbon dioxide*
*3. Temperature*
*4. Water*
*5. Mineral elements*

**8.** What are the functions of mitochondria?

1. Act as the ***power house*** of cell.
2. ***Cell respiration***
3. Production of ***ATP*** molecules.
4. Maintain normal ***concentration of calcium ions.***
5. Regulate the ***metabolic activity*** of the cell.

**9.** Write notes on aerobic respiration.

1. ***Cellular respiration*** takes place in the presence of ***oxygen.***
2. Organic food is completely ***oxidised*** with the help of ***oxygen.***
3. Glucose is broken down into ***carbon dioxide, water*** and ***energy.***
4. It occurs in ***plants*** and ***animals.***
5. It includes the following stages:
   *1. Glycolysis*
   *2. Krebs cycle*
   *3. Electron transport chain*
6. The aerobic process is:

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + ATP$$

**10.** Write notes on anaerobic respiration.

1. ***Cellular respiration*** takes place in the ***absence of oxygen.***
2. Glucose is converted into ***ethanol*** (in plants) or ***lactate*** (in some bacteria).
3. It includes ***glycolysis.***
4. The anaerobic process is:

$$C_6H_{12}O_6 \longrightarrow 2CO_2 + 2C_2H_5OH + \text{Energy (ATP)}$$

**11.** What are oxysomes?

1. ***$F_1$ particles.***
2. Present on the inner ***mitochondrial membrane.***
3. Minute tennis racket shaped ***particles.***
4. It has a ***stalk.***
5. Involves in ***ATP synthesis.***



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*1. Epidermis 3. Vascular bundles*
*2. Mesophyll*

### Epidermis

1. Monocot leaf has ***two layer*** of epidermis
   *1. Upper epidermis*
   *2. Lower epidermis*
2. Made up of ***parenchyma*** cells.
3. Covered by ***cuticle.***
4. ***Stomata*** on the surface.
5. Upper epidermis has some large and thin walled cells called ***bulliform cells.***

### Mesophyll

1. Ground tissue.
2. Present between both epidermal layers.
3. Not differentiated into palisade and spongy parenchyma.
4. The cells are ***irregularly*** arranged.
5. They have ***intercellular spaces.***
6. They contain ***chloroplasts.***

### Vascular Bundles

1. ***Numerous***
2. Some are ***small.***
3. Some are ***large.***
4. Surrounded by parenchymatous ***bundle sheath.***
5. Conjoint
6. Collateral
7. Closed
8. Xylem is present towards the ***upper epidermis.***
9. Phloem is present towards the ***lower epidermis.***

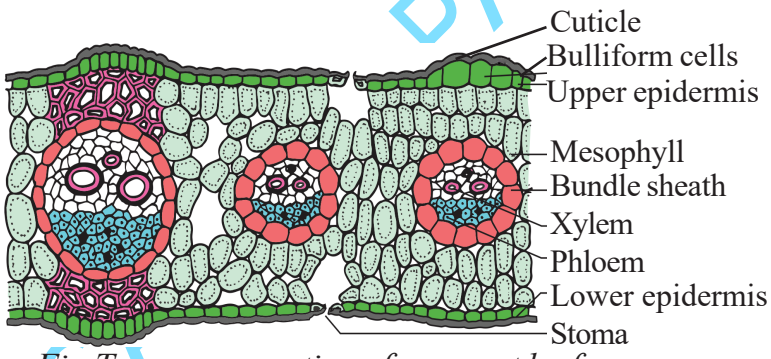


*Fig. Transverse section of monocot leaf.*

**2. Describe the structure of chloroplast.**

1. ***Green plastid***
2. Contains green pigment called ***chlorophyll.***
3. Cell organelle
4. ***Oval*** shape.
5. Diameter - ***2*** to ***10*** micrometer.
6. Thickness- ***1*** to ***2*** micrometer.
7. Has the following structures:
   *1. Envelope 3. Thylakoids*
   *2. Stroma 4. Grana*
8. Envelope has two membranes, the ***outer*** and ***inner*** membrane.
9. They are separated by ***intermembrane space.***
10. ***Stroma*** is the ***matrix.***
11. It is present inner to the membrane.
12. It contains the following:
    - *DNA*
    - *70S ribosomes*
    - *Some other molecules required for protein synthesis.*



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13. Thylakoid consists of ***thylakoid membrane.***

14. Thylakoid membrane encloses the ***thylakoid lumen.***

15. Stack of thylakoids are called ***grana*** (Sing-granum).

16. Grana are interconnected to each other by ***lamellae.***

17. The lamellae are called ***Fret channels.***

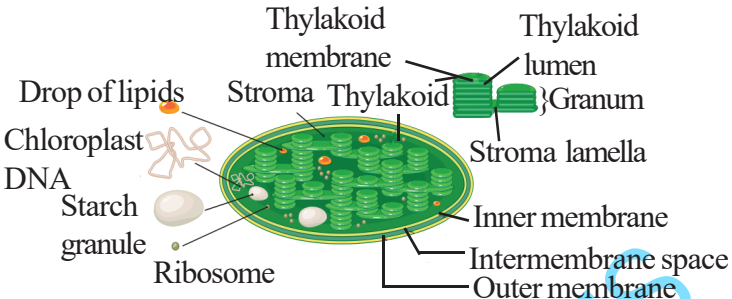


*Fig. Ultrastructure of chloroplast.*

## 3. Describe the structure of mitochondria

1. Filamentous or granular ***cytoplasmic organelles.***

2. ***Power house*** of the cell.

3. Present within ***eukaryotic cells.***

4. Produce ***ATP.***

5. ATP forms the ***energy currency*** of the cell.

6. Size : ***0.5µm*** to ***2.0µm.***

7. Has the following structures:

*1. Mitochondrial membranes*
*2. Cristae*
*3. Oxysomes*
*4. Matrix*

### Mitochondrial Membranes

1. Mitochondria contain two membranes, the ***outer*** and ***inner membrane.***

2. Each membrane is ***60-70A°*** thick.

3. ***Outer membrane*** is ***smooth.***

☛ It is ***permeable*** to small molecules.

☛ It contains the following:

*1. Enzymes 3. Lipids*
*2. Proteins 4. Porin molecules*

☛ Porin molecules form ***channels*** for passage of molecules.

4. ***Inner mitochondrial*** membrane is ***semipermeable.***

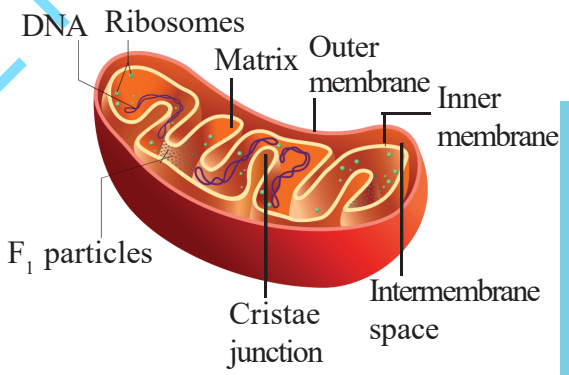


*Fig. Structure of mitochondria.*

☛ It ***regulates*** the passage of materials.

☛ It consists of the following:

*1. Proteins - 80% 3. Enzymes*
*2. Lipids*

### Cristae

1. Finger like ***projections.***

2. Formed from the ***inner mitochondrial membrane.***

3. They ***increase*** the ***inner surface area*** to hold variety of enzymes.

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**9.** Why is the teeth of rabbit called heterodont?

1. Heterodont means ***different types of teeth.***
2. The different types of teeth are:
   *1. Incisors 3. Molars*
   *2. Premolars*
3. Hence, it is called ***heterodont.***

**10.** How does leech suck blood from the host?

1. Leech makes a ***triradiate*** or **Y-*shaped*** incision in the skin of the host by the ***jaws.***
2. The blood is sucked by ***muscular pharynx.***
3. Salivary secretion, containing ***hirudin,*** prevents blood clotting.
4. An ***anaesthetic substance*** injected by leech prevents the host from feeling the bite.

## VI. Short Questions-4 Marks

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

1. To give ***support*** to the trachea.
2. For ***free passage*** of air.

**2.** List out the parasitic adaptations in leech.

1. Suckers - For attachment
2. Jaws - Cause painless wound
3. Muscular pharynx - Sucks the blood
4. Crop and caeca - To store blood
5. Hirudin - Prevents ***coagulation*** of blood.
6. Digestive glands are absent - The food-blood is in the liquid form.
7. Anaesthetic substance.
8. Slow digestion.
9. Parapodia and setae are completely absent.

## VII. Long Questions-7 Marks

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

Leech has a pair of ***lateral haemocoelic channels.*** They contain inner ***valves.*** So, they serve as ***heart*** in leech.

1. ***Haemocoelic circulatory system.***
2. ***Open*** circulatory system.
3. True blood vessels are absent.
4. The blood vessels are replaced by ***haemocoelic channels*** or ***canals.***
5. There are four longitudinal channels, they are
   *1. Dorsal channel - 1*
   *2. Ventral channel - 1*
   *3. Lateral channels - 2*
6. Dorsal channel lies ***above*** the alimentary canal.
7. Ventral channel lies ***below*** the alimentary canal.
8. Lateral channels lie on ***either side*** of the alimentary canal.
9. Lateral channels serve as ***heart.*** They have ***valves.***
10. All the four channels are connected together posteriorly in the 26$^{th}$ segment.
11. The channels are filled with blood like fluid called ***haemicoelic fluid.***
12. The fluid contains ***haemoglobin.***

**2.** How does locomotion take place in leech?

In leech, locomotion takes place by the following methods:

1. Looping or crawling movement
2. Swimming movement

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### 1. Looping or Crawling Movement

1. Looping movement is brought about by the ***contraction*** and ***relaxation*** of ***muscles.***

2. The anterior and posterior ***suckers*** serve for ***attachment*** during movement on a substratum.

### 2. Swimming Movement

1. Leeches swim very ***actively.***

2. They perform ***undulating movement*** in water.

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

1. The male rabbit has a pair of ***testes.***

2. ***Oval*** in shape.

3. They are enclosed by ***scrotal sacs*** in the abdominal cavity.

4. Each testis consists of numerous fine tubules called ***seminiferous tubules.***

5. They lead into a coiled tubule called ***epididymis.***

6. Epididymis leads into the sperm duct called ***vas deferens.***

7. The vas deferens joins in the ***urethra*** just below the ***urinary bladder.***

8. The urethra runs backward and passes into the ***penis.***

9. There are three accessory glands namely:

*1. Prostate gland*
*2. Cowper's gland*
*3. Perineal gland*

10. Their secretions are involved in ***reproduction.***

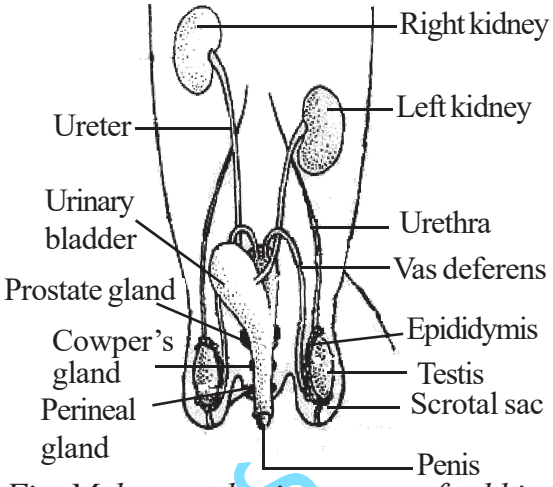


*Fig. Male reproductive system of rabbit.*

## VIII. Higher Order Thinking Skills (HOTS)

**1.** Arjun is studying in tenth standard. He was down with fever and went to meet the doctor. As he went to the clinic he saw a patient undergoing treatment for severe leech bite. Being curious, Arjun asked the doctor why leech bite was not felt as soon as it attaches to the skin ? What would have been the reply given by the doctor?

The reply given by the doctor is

1. Leech injects an ***anaesthetic substance*** that prevents the host from feeling the bite.

2. It's saliva contains a protein called ***hirudin.***

3. The hirudin prevents ***blood clotting.***

4. So, the leech bite was not felt.

**2.** Shylesh has some pet animals at his home. He has few rabbits too, one day while feeding them he observed something different with the teeth.



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2. Cuticle is the ***outermost*** layer.
3. Epidermis lies ***below*** the cuticle.
4. ***Dermis*** lies below the epidermis.
5. Muscular layer is formed of ***circular*** and ***longitudinal*** muscles.
6. ***Botryoidal tissue*** lies beneath the longitudinal muscles. It ***fills*** the ***entire coelom*** around the gut.

**3.** Which is the largest portion of alimentary in leech? Write a note about this.

- **Crop**

1. The ***largest portion*** of the alimentary canal.
2. It is divided into a series of ***10 chambers.***
3. The chambers communicate with one another through circular ***apertures.***
4. The circular apertures are surrounded by ***sphincters.***
5. Each chamber bears a pair of ***blind outgrowth*** called ***caeca*** or ***diverticula.*** They are ***lateral, backwardly*** directed.
6. The last chamber of crop opens into ***stomach.***
7. The pharynx opens into the first chamber.
8. Crop and diverticula store large amount of blood.

**4.** Write about the excretory system of leech.

1. Excretion takes place by ***nephridia.***
2. They are segmentally arranged.
3. They are ***paired tubules.***
4. There are ***17 pairs*** of nephridia.
5. They are arranged from $6^{th}$ to $22^{nd}$ segments.
6. They open out by ***nephridiopores.***

**5.** Give the name of an animal having mammary and liven in a burrow and taxonomic position.

Ans: **Rabbit**

- Phylum - *Chordata*
- Sub-phylum - *Vertebrata*
- Class - *Mammalia*
- Order - *Lagomorpha*
- Genus - *Oryctolagus*
- Species - *Cuniculus*

**6.** Write short notes on nervous system of rabbit.

1. Nervous system is formed of the following:
   - ✪ *Central Nervous System - CNS*
   - ✪ *Peripheral Nervous System- PNS*
   - ✪ *Autonomic Nervous System-ANS*
2. CNS consists of
   - ✪ *Brain* ✪ *Spinal cord*
3. PNS consists of
   - ✪ *Cranial nerves - 12 pairs*
   - ✪ *Spinal nerves - 37 pairs*
4. ANS consists of
   - ✪ *Sympathetic nerves*
   - ✪ *Parasympathetic nerves*

**7.** Write short notes on brain of rabbit.

1. Brain is situated in the ***cranial cavity.***
2. It is covered by the following three membranes:
   1. *Dura mater - Outer*
   2. *Arachnoid membrane-Middle*
   3. *Pia mater - Inner*
3. It is divided into
   1. *Forebrain - Prosencephalon*
   2. *Midbrain - Mesencephalon*
   3. *Hindbrain - Rhombencephalon*
4. Forebrain consists of the following



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