

SET - B

<p>GSEB Batch : 10<sup>th</sup> Std. Eng. Medium</p>	<p><b>MAHESH TUTORIALS</b> <b>SUBJECT : Science &amp; Technology(011)</b> <b>Second Preliminary Exam</b> <b>Model Answer Paper</b></p>	<p>Date: Marks : 100 Time: 3 Hrs.</p>
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PART - A

1. (d) 50,000nm
2. (c) 100
3. (b)  $3 \times 10^5$
4. (d) Inverted
5. (c) red, blue, green
6. (d) Retina
7. (c) refraction and total internal reflection
8. (d) Coulomb
9. (b) Copper plate, Zinc plate
10. (a) Electroplating
11. (b)  $10^3$
12. (c) 220V, 50Hz
13. (a) Faraday
14. (d) It protects the electrical appliances from damage
15. (d) 30,000 light years
16. (b) Ceres
17. (b) 1986
18. (c) Phobos
19. (b) Blue litmus paper red
20. (a) 4.5 to 5.5
21. (b) 1 and 3
22. (a) aqueous solution
23. (c) Mostly nonmetallic gases
24. (b) 2
25. (c) Lead + tin
26. (c) Iodine
27. (d) Nickel
28. (a) Different arrangement of atoms
29. (b) Kachh
30. (a) 1350
31. (a) Tar
32. (a) Catenation
33. (b) Ethanol
34. (a) Methanal
35. (b) Teflon; polyvinylchloride
36. (d) 6.5 m
37. (c) lungs
38. (d) Contractile Vacuole
39. (b) veins
40. (d) Water
41. (b) 31
42. (c) Testosterone
43. (b) Entry of ovum is prevented in the oviduct.
44. (a) National AIDS Control Organization.
45. (a) All plants obtained were tall
46. (c) Heredity
47. (c) Sunlight
48. (b) Converts organic compound in inorganic elements
49. (b) 18999
50. (c) Carbon

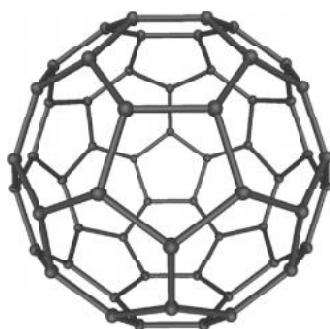


**SECTION - A**

**Answer the following questions : [2 marks]**

**10**

1.



½

- ⇒ Bucky ball/ Fullerenes is a special form of carbon molecule. Bucky ball is also known as Buckminsterfullerene.
- ⇒ Bucky ball comprises of 60 carbon atoms in the architectural configuration of a soccer ball (sphere).
- ⇒ Here, each carbon atom is bonded to three adjacent carbon atoms forming a sphere, which is around 1.0 nm in diameter.
- ⇒ The bonds between 60 carbon atoms form a pattern of joined hexagons and pentagons that is similar to the panels on a soccer ball.

½

½

½

**OR**

1. Carbon is a fundamental element in nanotechnology because of the following reasons:

½

- ⇒ A carbon atom can bond with many different types of atoms by forming covalent bonds.
- ⇒ Each carbon atom can extend itself to form such covalent bonds with four other atoms at a time. This helps to form chain of atoms.
- ⇒ There is no other element except carbon which bonds as strongly to other carbon atoms and in as many ways as the carbon atom.
- ⇒ Eg., When carbon atoms bond together in short chains, they have properties of a gas.
- ⇒ Their bonding together in longer chains results in solid, e.g., plastic.
- ⇒ When they bond together in 2 or 3 dimensional lattices they form extremely hard materials such as diamond.

½

½

½

2. “Electric power means the rate of electric energy.” That means the electrical energy consumed (or heat generated) in unit time is defined as an electric power. It is denoted by symbol P.

½

⇒ 
$$P = \frac{\text{Electrical energy consumed}}{\text{Time}}$$

½

$$= \frac{W}{t}$$

$$= \frac{I^2 R t}{t}$$

$$P = I^2 R$$

$$\text{or } P = IV \quad (\because IR = V)$$

$$\text{or } P = \frac{V^2}{R} \quad (\because I = \frac{V}{R})$$

½

- ⇒ The SI unit of power is joule/second or watt (W).
- ⇒ If 1A current flows through the circuit from 1V battery, then the power consumed is said to be 1W.
- ⇒ From the above equation  
1 watt = 1 volt × 1 ampere  
= 1 VA

½



⇒	$\text{Li}_2\text{O} + \text{H}_2\text{O} \longrightarrow 2 \text{LiOH}$ <p style="text-align: center;"> <span style="margin-right: 100px;"><b>Lithium Oxide</b></span> <span><b>Lithium Hydroxide</b></span> </p>	½
<b>SECTION - B</b>		
<b>Answer the following questions : [2 marks]</b>		<b>10</b>
6.	There are three types of blood vessels, (1) Arteries, (2) Veins and (3) Capillaries.	
(i)	<b>Arteries :</b>	
⇒	The blood vessels which carry blood from the heart to different organs are called arteries.	½
⇒	Their walls are thick and elastic.	
⇒	They enter into the organs and branch into small vessels called arterioles.	½
(ii)	<b>Veins :</b>	
⇒	The blood vessels which carry blood from the different organs to the heart are called veins.	½
⇒	Their walls are thin and non-elastic.	
⇒	They contain valves. Different veins join to form the vena cava.	
(iii)	<b>Blood Capillaries :</b>	
⇒	Around the tissue, the arterioles break up into fine vessels, called capillaries.	
⇒	The capillaries are thin-walled and narrow.	½
⇒	Capillaries unite to form very small blood vessels called venules. Venules unite to form veins.	
7.	The system which is responsible for the intervention of the organs located in the body cavity without the awareness of the brain is called autonomous nervous system.	½
⇒	Heart, blood vessels, glands, uterus and coelomic organs are under the control of this system.	
⇒	Autonomous nervous system is of two types (i) Sympathetic (ii) Parasympathetic.	½
⇒	By the coordination of these two systems, the involuntary action of the body are controlled and regulated.	
⇒	The effects of sympathetic and parasympathetic nervous systems are complimentary and contradictory.	½
⇒	If sympathetic system increases heart beat than normal, parasympathetic system decreases it and brings it back to normal.	½
8.	Biotic components can be of two types-	
⇒	Producers-Organisms are autotrophic.	1
⇒	Consumers-Organisms are heterotrophic.	1
9.	Heredity is transmission of characters from parents to the offsprings.	½
→	This involves the tendency of every individual to resemble their parents.	1
→	Hereditary information is present in the fertilized egg or zygote.	½
<b>OR</b>		
9.	When plant or animals die, the micro organism in the presence of moisture and oxygen decompose their bodies.	½
→	Sometimes due to environmental condition their bodies do not decompose completely.	
→	Such body parts of plants or animals become fossils and are available on digging the earth.	½
→	If dead leaf gets caught in the mud, leaf will not decompose completely.	½
→	The mud around leaf will harden to form rock and retain the impression of the leaf.	
→	Thus, fossil of leaf is formed.	½
10.	The importance of wild life are as follows-	
→	Wild life is economically beneficial.	½
→	It is an important component of the food web of ecosystem.	½
→	It helps in maintaining the balance of the ecosystem.	
→	The important of wild life is success of the gene bank.	½

→ Men use them for developing varieties of plants & animals in agriculture, animal husbandary etc.

½

**SECTION - C**

**Answer the following questions : [3 marks]**

**15**

11. Mirage is an optical illusion usually seen in desert. It is also seen on coal tar road during summer.

½

⇒ In summer the air near the surface of the earth is hotter than the air above it.

⇒ Therefore, the air near the earth is rarer than that above it. So as we move up above the surface of the earth the refractive index increases continuously.

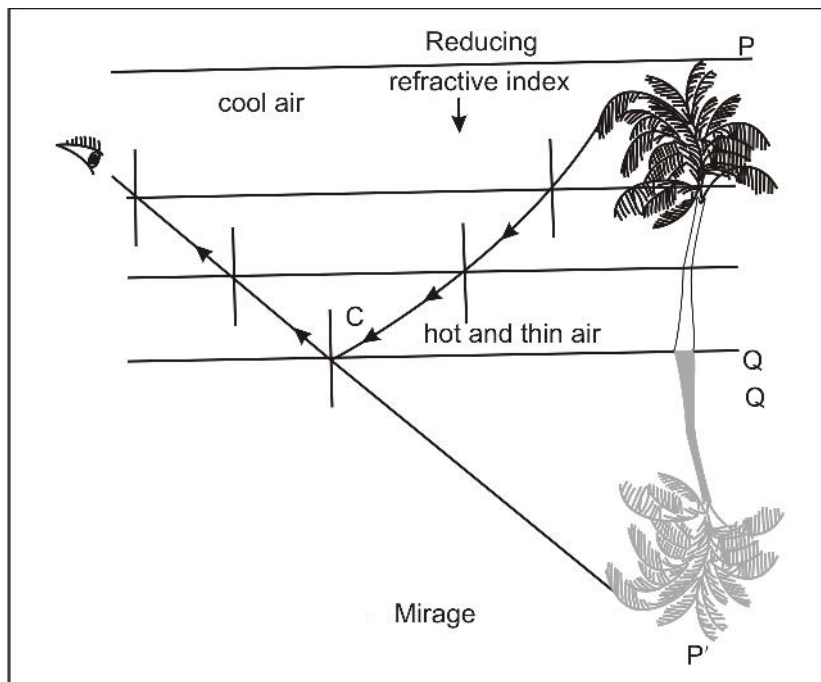
½

⇒ As shown in the figure the light rays coming from a point of a tall object like a tree pass through the air of gradually decreasing refractive index towards the ground. The light rays bend gradually more and more away from normal and their angle of refraction increases gradually. So they enter the observer's eye after the total internal reflection occurs.

½

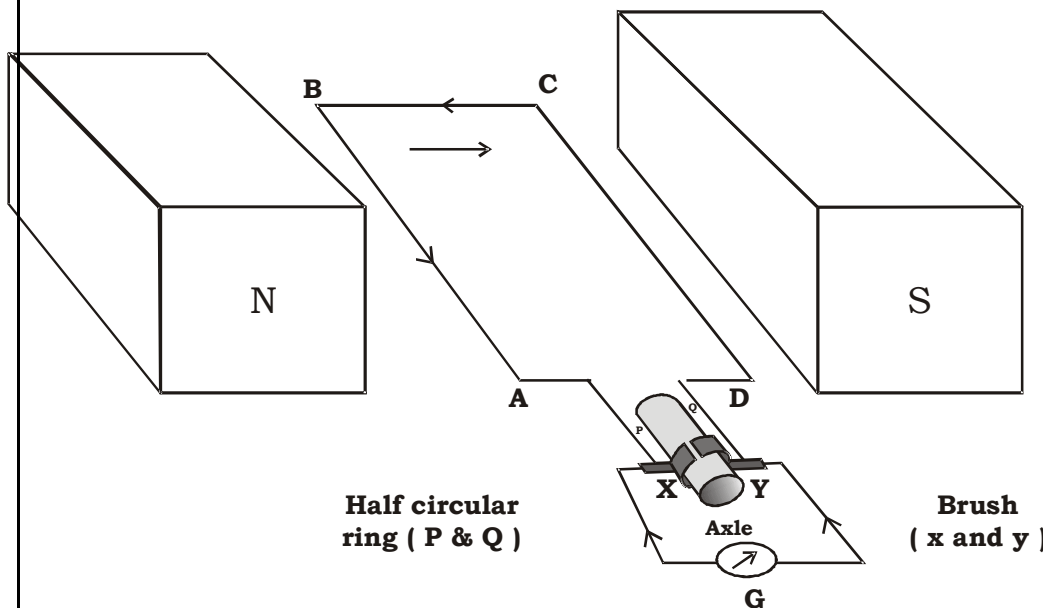
⇒ Thus a virtual and inverted image of an object appears as it is reflected from the water surface.

½



1

12.



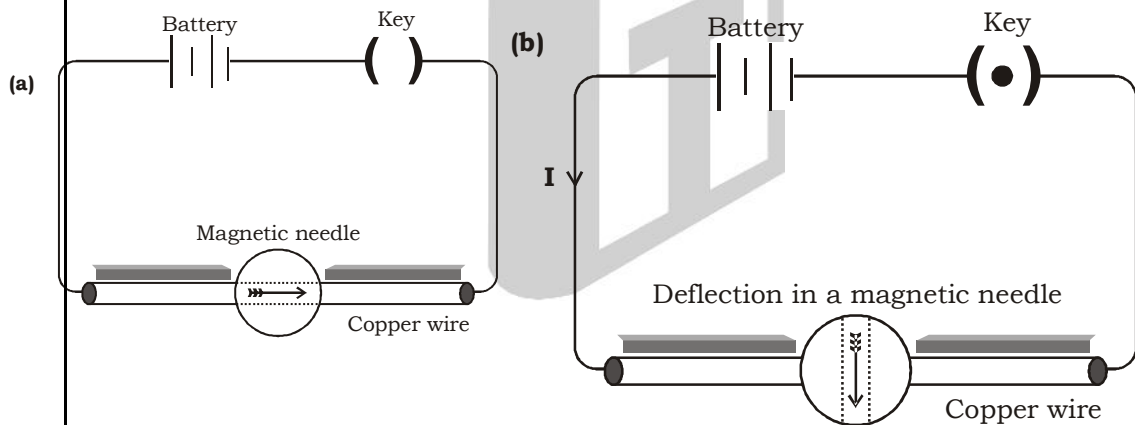
1

**Construction of electric generator**

- ⇒ Electric generator converts mechanical energy into electrical energy. It works on the principle of an electromagnetic induction. ½
- ⇒ The construction of an electric generator is like the construction of an electric motor which is shown in Figure.
- ⇒ The two ends of a loop ABCD are placed in a magnetic field and are connected with two semi-circular rings P and Q.
- ⇒ These two rings are insulated from each other. These rings can slide while remaining in contact with the brushes X and Y.
- ⇒ A galvanometer is connected between the two ends of brush. By applying mechanical rotation to the loop ABCD in the magnetic field, the number of magnets field lines associated with it changes so that an electric current is induced which is observed from the deflection of galvanometer. ½
- ⇒ Thus, the mechanical energy is converted into electrical energy.
- ⇒ By rotating the loop in a magnetic field, the side AB moves upward and the side CD move downwards. The direction of an induced electric current in wire AB and CD can be known by Fleming's right hand rule. As shown in the Figure, induced electric current flows in a path B-A-G-D-C. ½
- ⇒ After the half rotation of a loop, the ring P comes in the contact with brush Y and the ring Q with the brush X. Here, the brush X is always in contact with the side moving upwards while the brush Y is always with the side moving downwards as a result of which the current flows only in one direction.
- ⇒ This current is called direct or DC current. This type of generator is called DC generator. Similarly instead of half ring if full ring is used then A.C. current can be generated and such generator is called A.C. generator. ½

OR

12.



#### Magnetic field produced by conducting wire

- ⇒ In 1819, a science teacher H.C. Oersted at a school in Denmark investigated that when an electric current is passed through the conducting wire, a magnetic field is produced in a region around it. ½
- ⇒ As shown in Figure, connect a straight conducting copper wire in series with a battery and a key.
- ⇒ Arrange a magnetic needle on a copper wire and arrange the wire such that it remains parallel to the magnetic needle. [Figure A]
- ⇒ Now make the electric current to flow through the wire by closing a key in the circuit and observe the magnetic needle. ½
- ⇒ You will see the deflection in a magnetic needle. [Figure B]
- ⇒ On reversing the polarity of a battery in the circuit, the current will flow through the wire in a reverse direction, magnetic needle will also move in the opposite direction.
- ⇒ From this activity, we can say that, on passing the electric current through the wire it acts as a magnet and it possesses its own magnetic field so that the magnetic needle gets deflected. ½
- ⇒ On reversing the direction of electric current, the direction of magnetic field is also reserved. ½

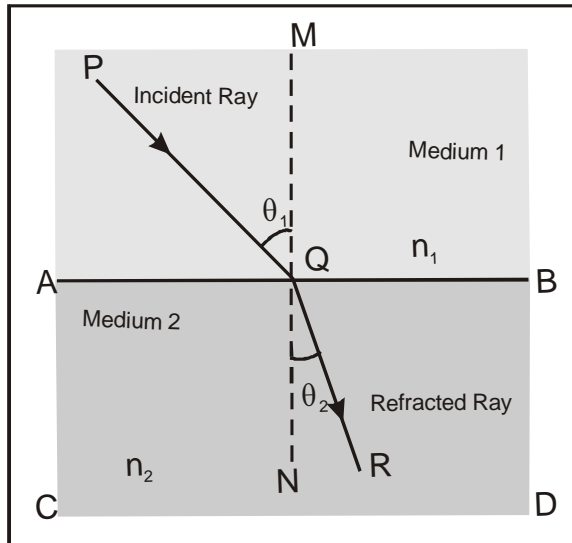
13.	As one of the reactant in the production of ammonia gas by Haber's process.	½
⇨	In hydrogenation reaction of preparation of vegetable ghee from vegetable oil in presence of nickel catalyst.	½
⇨	In welding of metals and in oxy-hydrogen flame for cutting metals.	½
⇨	In industrial production of methanol and hydrochloric acid, as fuel in rockets and fuel cells for production of electricity.	½
⇨	Dihydrogen gas gets adsorbed on solid alloy and can be released whenever required and can be stored to use it again.	½
⇨	The calorific value of dihydrogen gas is the highest of all other fuels. By combustion of dihydrogen gas, water is produced and so there is no question of pollution.	½
⇨	Thus, there is a possibility of hydrogen being an important source of energy in future.	½
14.	The common name of ethanoic acid is acetic acid. Its formula is CH <sub>3</sub> COOH.	½
	<b>Preparation of Ethanoic Acid :</b>	
⇨	Ethanoic acid (vinegar) is formed by oxidation of ethanol in air by fermentation in presence of acetobacter enzyme.	½
	$C_2H_5OH + O_2 \xrightarrow[\text{Enzyme}]{\text{Acetobacter}} CH_3COOH + H_2O$	½
	Ethanoic acid	
⇨	The proportion of ethanoic acid obtained by this method is very less.	½
⇨	In the modern industrial production of ethanoic acid, methanol is reacted with carbon monoxide in presence of catalyst Iodine - Rhodium (I <sub>2</sub> - Rh)	½
	$CH_3OH + CO \xrightarrow{[K_2-Rh]} CH_3COOH$	½
	Methanol                      Carbon monoxide                      Ethanoic acid or Acetic acid	
	<b>OR</b>	
14.	Polyamide is a polymer containing amide group. it can be prepared by condensation of amine and carboxylic acid. Which is known as nylon.	1
	$H_2N-\boxed{\phantom{R}}-NH_2 + n HOOC-\boxed{\phantom{R}}-COOH \xrightarrow[\Delta]{\text{Polymerisation}}$	
	Diamine                                      Dicarboxylic acid	
	$H_2N \left[ \boxed{\phantom{R}}-NHCO-\boxed{\phantom{R}} \right]_n COOH + n H_2O$	
	Nylon	2
	where $\boxed{\phantom{R}}$ shows hydrocarbon part.	
15.	Fission is of two types -	
	A) Binary fission	½
	B) Multiple fission	½
	<b>Binary Fission</b> - the nucleus lengthens and divides into two parts.	½
⇨	Cytoplasm then divides into two parts, one part around each nucleus.	½
⇨	This results into 2 daughter cells.	½
⇨	Each one grows into an adult.	½
⇨	Eg - Amoeba, Paramecium.	
	<b>Multiple Fission</b> - The parent organism divides to form many new organisms at the same time.	½
⇨	During unfavourable condition, a cyst is formed around single cell organism.	½
⇨	The nucleus divides to form many smaller daughter nuclei.	½
⇨	Small amount of cytoplasm collects around each daughter nuclei and membrane is formed.	½
⇨	Under favourable condition cyst breaks and many daughter cells are release each forming a new organism.	½
⇨	Eg - Plasmodium, Amoeba .	

**SECTION - D**

**Answer the following questions : [5 marks]**

16.

15



$\angle PQM =$  Angle of incidence ( $\theta_1$ ) and  
 $\angle RQN =$  Angle of refraction ( $\theta_2$ )

According to Snell's Law

$$\frac{\sin \theta_1}{\sin \theta_2} = \text{Constant}$$

Snell's law: The ratio of sine angle of incidence to the sine of the angle of refraction is constant.

⇒ This constant is known as refractive index of medium 2 with respect to medium 1 and is denoted by  $\eta_{21}$ .

$$\text{Now, } \eta_{21} = \frac{\sin \theta_1}{\sin \theta_2} \dots\dots (1)$$

Suppose,

$c =$  velocity of light in vacuum

$v_1 =$  velocity of light in medium 1

$v_2 =$  velocity of light in medium 2

⇒ Refractive index of medium 2 with respect to medium 1 can also be expressed as

$$\eta_{21} = \frac{v_1}{v_2} \dots\dots (2)$$

⇒ Hence, the absolute refractive index of medium 1

$$\eta_1 = \frac{c}{v_1} \dots\dots (3)$$

⇒ Absolute refractive index of medium 2

$$\eta_2 = \frac{c}{v_2} \dots\dots (4)$$

⇒ Dividing (4) by (3)

$$\therefore \frac{\eta_2}{\eta_1} = \frac{c/v_2}{c/v_1} = \frac{v_1}{v_2}$$

$$\therefore \frac{\eta_2}{\eta_1} = \frac{v_1}{v_2}$$

But  $\eta_{21} = \frac{v_1}{v_2}$  [from equation (2)]

1

1/2

1/2

1/2

1/2

1/2

1/2



$$\therefore \frac{\eta_2}{\eta_1} = \eta_{21}$$

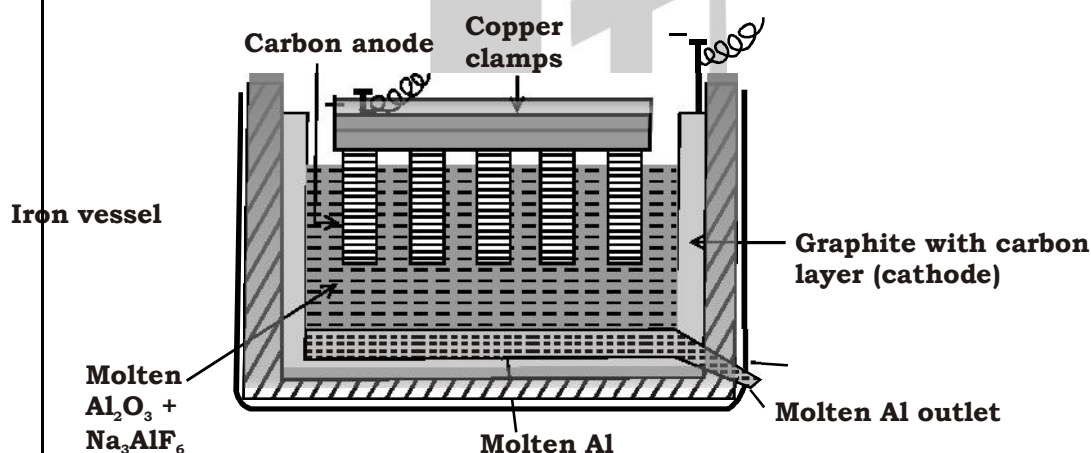
$$\frac{\eta_2}{\eta_1} = \frac{\sin\theta_1}{\sin\theta_2} \quad \text{[from equation (1)]}$$

$$\therefore \eta_1 \sin \theta_1 = \eta_2 \sin \theta_2 \quad \dots\dots (5)$$

Equation (5) is known as generalized form of Snell's law.

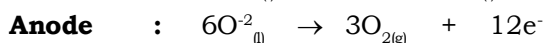
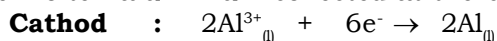
17. The method to obtain aluminium from alumina by electrochemical method was invented by American chemist Charles Martin Hall and French scientist Paul Heroult in 1886.

- ⇒ Hence, this method is also known as Hall-Heroult method.
- ⇒ Electric current cannot pass through solid form of alumina.
- ⇒ Also, melting point of alumina is very high 2348 K.
- ⇒ Electrolysis at such a high temperature is very expensive.
- ⇒ Hence, cryolite ( $\text{Na}_3\text{AlF}_6$ ) is added so that electrolysis can be carried out easily.
- ⇒ This mixture works as better electric conductor than melted alumina.
- ⇒ The melting point can be brought still lower by addition of feldspar ( $\text{CaF}_2$ ).
- ⇒ As shown in Figure, the mixture of alumina, cryolite and feldspar is electrolysed in a vessel of iron having inner surface layered with carbon.
- ⇒ In this cell, the rods of carbon are joined by copper clamp as anode and carbon layered graphite is taken as cathode.
- ⇒ On passing the electric current molten aluminium is deposited on cathode and dioxygen gas is produced at the anode.



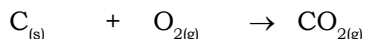
**Electrolysis cell for the extraction of aluminium**

- ⇒ The molten aluminium collected at the bottom of the cell is taken out.



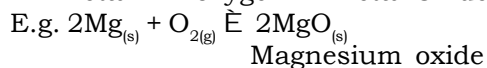
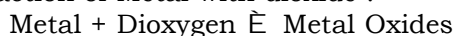
- ⇒ The dioxygen gas produced at the anode reacts with rod of carbon and forms carbon dioxide.

- ⇒ As a result anode is corroded. Hence, then are frequently replaced.

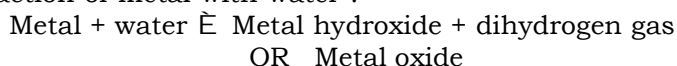


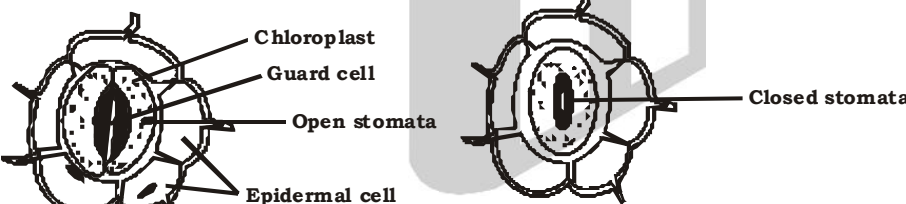
**OR**

17. Reaction of Metal with dioxide :



- ⇒ Reaction of metal with water :



	$2K_{(s)} + 2H_2O_{(l)} \rightarrow 2KOH_{(aq)} + H_{2(g)}$ $Zn_{(s)} + H_2O_{(g)} \rightarrow ZnO_{(s)} + H_{2(g)}$ <p>⇒ Reaction of metal with Acid :</p> <p>Metal + dilute Acid → Salt corresponding + Dihydrogen gas to metal</p> $2Al_{(s)} + 6HCl_{(aq)} \rightarrow 2AlCl_{3(aq)} + 3H_{2(g)}$ $Mg_{(s)} + H_2SO_{4(aq)} \rightarrow MgSO_{4(aq)} + H_{2(g)}$ <p>⇒ Reaction of metal with Dichlorine :</p> <p>Metal + Dichlorine gas → Metal chloride</p> $Ca_{(s)} + Cl_{2(g)} \rightarrow CaCl_{2(s)}$ <p>Calcium chloride</p> <p>⇒ Reaction of metal with Dihydrogen :</p> <p>Active metal + Dihydrogen → Metal hydride</p> $2Na_{(s)} + H_{2(g)} \rightarrow 2NaH_{(s)}$ <p>Sodium hydride</p>	<p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p>
18.	<p>(i) The respiration taking place in the absence of oxygen is referred to as anaerobic respiration.</p> <p>(ii) It is seen in microorganisms like yeast, fungi, endoparasites and muscle cells.</p> <p>(iii) CO<sub>2</sub> and ethanol are formed as end products in plants while in animals the end product is lactic acid.</p> <p>(iv) The energy released is less compared to the aerobic respiration.</p> <p>(v) The equations for the respiration in plants and animals are as follows.</p> <p>Glucose <math>\xrightarrow[\text{In cytoplasm}]{\text{Glycolysis}}</math> 2Pyruvic acid <math>\xrightarrow[\text{yeast}]{\text{In absence of oxygen}}</math> 2Ethanol + 2CO<sub>2</sub> + 2ATP</p> <p>Glucose <math>\xrightarrow[\text{In cytoplasm}]{\text{Glycolysis}}</math> 2Pyruvic acid <math>\xrightarrow[\text{In muscles of animals}]{\text{In absence of oxygen}}</math> 2 Lactic Acid + 2 ATP</p> <p style="text-align: center;"><b>OR</b></p>	<p>1</p> <p>1</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p>
18.	 <p style="text-align: center;"><b>Open and closed stomata</b></p> <p>(i) The leaf surface has many tiny apertures called stomata.</p> <p>(ii) During exchange of gases Oxygen from the atmosphere diffuses into the leaves through the stomata and reaches all the cells of stamp for respiration.</p> <p>(iii) When carbon dioxide concentration increases in the cells during respiration, the stomata opens and it is released back in the atmosphere.</p> <p>(iv) The opening and closing of the stomata depends upon various factors.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>~~~~~ <b>All the Best</b> ~~~~~</p>		