

# MT

2014 \_\_\_ \_\_\_ 1100

Seat No. 

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**MT - SCIENCE & TECHNOLOGY (72) - PRELIM II - PAPER - 6**

**Time : 3 Hours**

**(Pages 5)**

**Max. Marks : 80**

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**Note :**

- (i) All questions are compulsory.
- (ii) All questions carry equal marks.
- (iii) Draw neat and labelled diagrams wherever necessary.

**SECTION - A**

**Q.1. (A) Answer the following sub-questions : 5**

(1) **Find the odd man out :**

Cornea, Iris, Pupil, Cerebrum.

(2) **Fill in the blanks :**

(i) 10% NaCl is known as .....

(ii) ..... harm the respiratory system of fish.

(3) **State whether the following statements are true or false.**

(i) Helium is the only element in octet state.

(ii) The unit of potential difference is ampere.

**Q.1. (B) Rewrite the following statements by selecting the correct options :** **5**

- (1) Which of the following represents the mirror formula ?  
(a)  $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$   
(b)  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$   
(c)  $\frac{1}{v} + \frac{1}{u} = \frac{1}{R}$   
(d)  $\frac{1}{u} - \frac{1}{v} = \frac{1}{f}$
- (2) Which instrument is used to measure electric current ?  
(a) potentiometer  
(b) variable resistor  
(c) ammeter  
(d) voltmeter
- (3) What will be the equivalent resistance of two resistances of 5 and 10 ohms connected in parallel ?  
(a) 15 ohms  
(b) 10/3 ohms  
(c) 3/10 ohms  
(d) 5 ohms
- (4) ..... is the natural indicator.  
(a) Phenolphthalein  
(b) Methyl orange  
(c) Litmus  
(d) Methyl red
- (5) ..... is a decomposition reaction.  
(a)  $\text{CaCO}_3 \xrightarrow{\Delta} \text{CaO} + \text{CO}_2$   
(b)  $\text{H}_2\text{O} + \text{CO}_2 \longrightarrow \text{H}_2\text{CO}_3$   
(c)  $\text{CaS} + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{S}$   
(d)  $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$

**Q.2. Attempt any FIVE of the following :** **10**

- (1) Draw a ray diagram for object position between  $2F_1$  and  $F_1$  for a convex lens.
- (2) Distinguish between : Convex mirror and Concave mirror.

- (3) Resistors of  $10\Omega$  and  $2.5\Omega$  are connected in parallel combination and a  $3\Omega$  resistance is connected in series combination with them. Find the combined resistance.
- (4) The sun appears reddish early in morning. Why?
- (5) Distinguish between : Periods and Groups.
- (6) Explain the following chemical reaction with the help of balanced equation : Barium sulphide reacts with zinc sulphate solution.

**Q.3. Attempt any FIVE of the subquestions : 15**

- (1) Explain Green House Effect.
- (2) Explain the sign conventions for reflection by spherical mirrors.
- (3) (a) State any two applications of magnetic effect of current.  
(b) We should not use many electrical appliances simultaneously. Why?
- (4) Write a note on refraction observed in the atmosphere.
- (5) Explain the zig-zag line in the periodic table.
- (6) Explain the pH scale.

**Q.4. Attempt any ONE of the following : 5**

- (1) Define magnetic field and state the characteristics of magnetic lines of force.
- (2) Explain the four blocks of periodic table

**SECTION - B**

**Q.5. (A) Answer the following sub-questions : 5**

- (1) **Fill in the blank :**  
The exit of the food from the stomach is regulated by the .....
- (2) **State whether the following statement is true or false :**  
Most metal oxides are insoluble in water.

- (3) **Define** : Saturated hydrocarbon.
- (4) What is covalent bond?
- (5) **Name the following** :  
Maintenance of steady state by different systems in an organism.

**Q.5. (B) Rewrite the following statements by selecting the correct options :**

5

- (1) Guard cells lose turgidity in ..... .
  - (a) light
  - (b) day time
  - (c) sunshine
  - (d) darkness
  
- (2) The utilized sugar is stored in the form of ..... in plants.
  - (a) glucose
  - (b) glycogen
  - (c) starch
  - (d) iodine
  
- (3) A student soaked 5 g of raisins in beaker A containing 25 ml of ice cold water and another 5 g of raisins in beaker B containing 25 ml of tap water at room temperature. After one hour the student observed that ..... .
  - (a) the water absorbed by raisins in beaker A is more than the water absorbed by raisins in beaker B.
  - (b) the water absorbed by raisins in beaker B is more than the water absorbed by raisins in beaker A.
  - (c) amount of water absorbed by raisins in both beakers is the same.
  - (d) no water was absorbed by raisins in any beaker.
  
- (4) To observe stomata in a dicot leaf, we must prepare a slide by taking ..... .
  - (a) the crushed leaf
  - (b) the upper epidermis of the leaf
  - (c) the lower epidermis of the leaf
  - (d) the central part of the leaf

(5) ..... is liberated when acetic acid reacts with sodium metal.

- (a) H<sub>2</sub> (b) O<sub>2</sub>  
(c) CO<sub>2</sub> (d) NH<sub>3</sub>

**Q.6. Attempt any FIVE of the following :** **10**

- (1) Write balanced chemical reaction : Zinc sulphide is heated in excess of air.
- (2) What is meiosis ? Represent it diagrammatically.
- (3) Phenotypic and genotypic ratios are different. Why?
- (4) State two functions of MPCB for prevention of water pollution.
- (5) Distinguish between : Diamond and Graphite.
- (6) The graphite (carbon) anodes are periodically replaced during the electrolysis of fused alumina. Why?

**Q.7. Attempt any FIVE of the following :** **15**

- (1) How will you obtain alternative fuel?
- (2) Distinguish between : Voluntary movements and Involuntary movements.
- (3) Write short note on homologous series.
- (4) Describe the mechanism of breathing in human beings.
- (5) An element X on reacting with oxygen forms an oxide X<sub>2</sub>O which dissolves in water and turns red litmus blue. State the element is a metal or non-metal, explain with proper example.
- (6) Describe spore formation in mucor with a diagram.

**Q.8. Attempt any ONE of the following :** **5**

- (1) Describe the double circulation of blood.
- (2) Describe Darwin's theory of evolution.

*Best Of Luck* 🍀

# MT

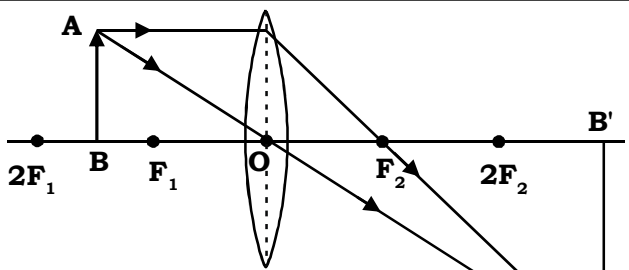
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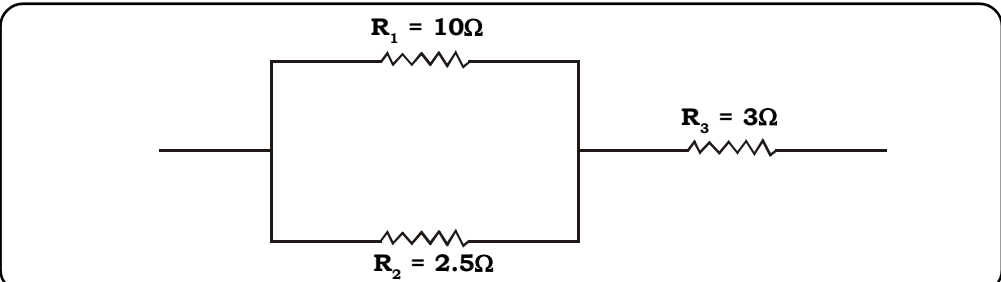
**MT** - SCIENCE & TECHNOLOGY (72) - PRELIM II - PAPER - 6

**Time : 3 Hours**

**Prelim II Model Answer Paper**

**Max. Marks : 80**

<b>SECTION - A</b>		
<b>Q.1. (A) Answer the following sub-questions :</b>		
(1) <b>Cerebrum.</b> Cerebrum is the part of brain. The others are parts of human-eye.		<b>1</b>
(2) (i) 10% NaCl is known as <b>brine</b> .		<b>1</b>
(ii) <b>Detergents</b> harm the respiratory system of fish.		<b>1</b>
(3) (i) <b>False.</b> Helium is the only element in duplet state.		<b>1</b>
(ii) <b>False.</b> The unit of potential difference is volt.		<b>1</b>
<b>Q.1. (B) Rewrite the following statements by selecting the correct options :</b>		
(1) Which of the following represents the mirror formula ? $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$		<b>1</b>
(2) Which instrument is used to measure electric current ? <b>Ammeter.</b>		<b>1</b>
(3) What will be the equivalent resistance of two resistances of 5 and 10 ohms connected in parallel ? <b>10/3 ohms</b>		<b>1</b>
(4) <b>Litmus</b> is the natural indicator.		<b>1</b>
(5) $\text{CaCO}_3 \xrightarrow{\Delta} \text{CaO} + \text{CO}_2$ is a decomposition reaction.		<b>1</b>
<b>Q.2. Attempt any FIVE of the following :</b>		
(1)	 <p><b>Image position :</b> Beyond <math>2F_2</math>. <b>Nature :</b> Real, inverted and magnified.</p>	<b>2</b>

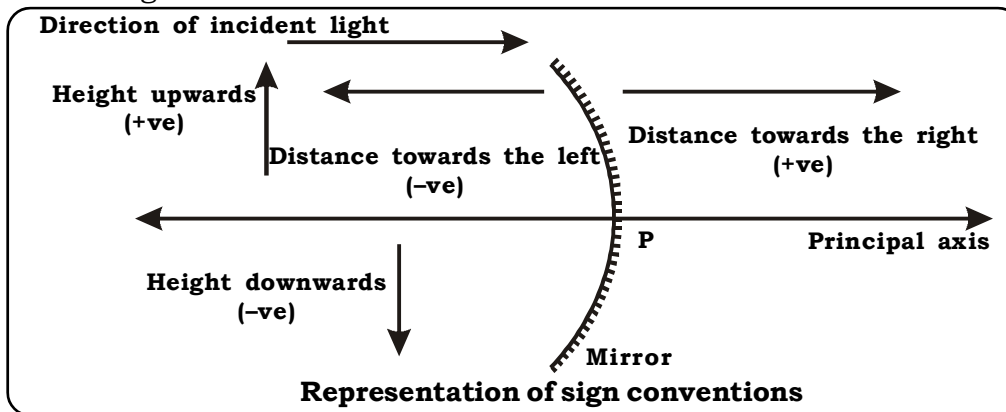
(2)	<p style="text-align: center;"><b>Convex mirror</b></p>	<p style="text-align: center;"><b>Concave mirror</b></p>	2
	<ol style="list-style-type: none"> <li>1. In a convex mirror, the reflecting surface is on the outer side.</li> <li>2. It is called as diverging mirror.</li> <li>3. The focus of a convex mirror is virtual.</li> <li>4. It can form only a virtual image</li> <li>5. It can form only a diminished image.</li> </ol>	<ol style="list-style-type: none"> <li>1. In a concave mirror, the reflecting surface is on the inner side.</li> <li>2. It is called as converging mirror.</li> <li>3. The focus of a concave mirror is real.</li> <li>4. It can form a real as well as a virtual image.</li> <li>5. It can form an enlarged, diminished as well as the same size image.</li> </ol>	
(3)	 <p style="text-align: center;"> <math>R_1 = 10\Omega</math>  <math>R_2 = 2.5\Omega</math>  <math>R_3 = 3\Omega</math> </p>		2
	<p><b>To find :</b> Equivalent Resistance (R) = ?</p>		
	<p><b>Solution :</b></p>		
	<p>1. Resistance <math>R_1</math> and <math>R_2</math> are in parallel combination.</p>		
	$\therefore \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$		
	$\therefore \frac{1}{R_p} = \frac{1}{10} + \frac{1}{2.5}$		
	$\therefore \frac{1}{R_p} = \frac{1+4}{10}$		
	$\therefore \frac{1}{R_p} = \frac{5}{10}$		
	$\therefore R_p = \frac{10}{5}$		
	$\therefore R_p = 2\Omega$		
	<p>2. Resistance <math>R_p</math> and <math>R_3</math> are in series combination.</p>		
	$\therefore R = R_p + R_3$		
	$\therefore R = 2 + 3$		
	$\therefore R = 5\Omega$		
	<p style="text-align: center;"><b>The effective resistance of the arrangement is 5Ω.</b></p>		

(4)	<p>1. At the time of sunrise or sunset, the sun is very close to horizon.</p> <p>2. Sunlight has to travel a longer path through the atmosphere to reach the observer.</p> <p>3. The blue and violet colours are scattered in a greater amount than red colour.</p> <p>4. The light that reaches to the observer is mostly red and yellow. Hence the sun appears reddish early in the morning.</p>	2				
(5)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Periods</th> <th style="width: 50%; text-align: center;">Groups</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <p>1. Modern periodic table has 7 horizontal rows called as periods.</p> <p>2. The number of shells present in the atom of an element determines the period number.</p> <p>3. Elements show gradual variation in chemical properties along a period.</p> </td> <td style="vertical-align: top;"> <p>1. Modern periodic table has 18 vertical columns of elements called groups.</p> <p>2. The number of electrons present in the outermost shell of an atom of the element determines the group number.</p> <p>3. Elements belonging to a particular group show strong resemblance in their chemical properties like valency, formulae of compounds and chemical reactions.</p> </td> </tr> </tbody> </table>	Periods	Groups	<p>1. Modern periodic table has 7 horizontal rows called as periods.</p> <p>2. The number of shells present in the atom of an element determines the period number.</p> <p>3. Elements show gradual variation in chemical properties along a period.</p>	<p>1. Modern periodic table has 18 vertical columns of elements called groups.</p> <p>2. The number of electrons present in the outermost shell of an atom of the element determines the group number.</p> <p>3. Elements belonging to a particular group show strong resemblance in their chemical properties like valency, formulae of compounds and chemical reactions.</p>	2
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(6)	<p>When barium sulphide reacts with zinc sulphate solution, it gives a white precipitate of barium sulphate and zinc sulphide. This reaction is a double displacement reaction.</p> $\text{BaS}_{(aq)} + \text{ZnSO}_{4(aq)} \rightarrow \text{BaSO}_4 \downarrow + \text{ZnS}_{(aq)}$ <p style="text-align: center;">Barium sulphide      Zinc sulphate      Barium sulphate      Zinc sulphide</p>	2				
<b>Q.3.</b>	<p><b>Attempt any FIVE of the subquestions :</b></p>					
(1)	<p>(i) Greenhouse effect is a phenomenon. The impact of greenhouse effect is global warming and climate change.</p> <p>(ii) Our earth receives energy from the sun. The earth's surface absorbs the solar energy and releases it back to the atmosphere as infrared radiation, some of which goes right back into space.</p> <p>(iii) But some of the infrared radiation emitted by the earth is absorbed by CO<sub>2</sub>, CH<sub>4</sub> and water vapour in the atmosphere and sent back towards the earth surface as heat energy causing a warming known as green house effect.</p> <p>(iv) The gases that contribute to the greenhouse effect are called as green house gases which are carbon dioxide, methane, nitrous oxide and CFC-12.</p> <p>(v) The warming due to greenhouse gases is expected to increase as humans add more greenhouse gases to the atmosphere leading to global warming.</p>	3				



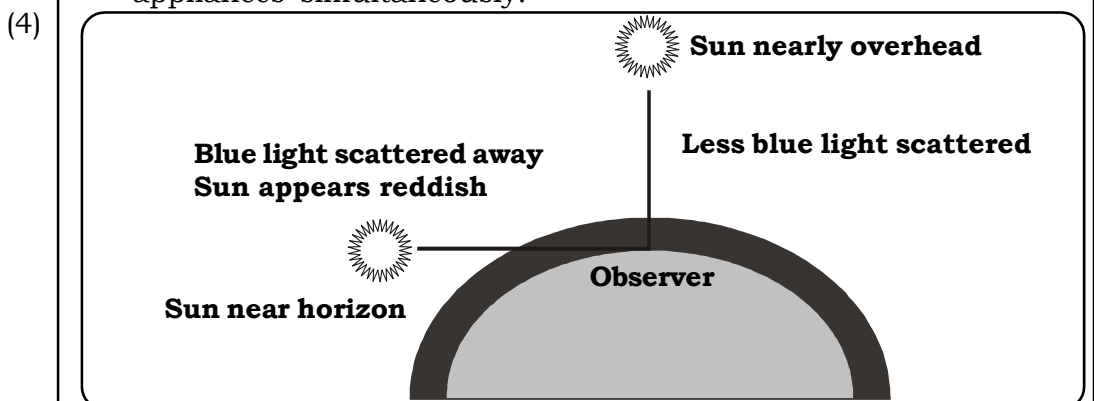
- (2) According to the new cartesian sign convention, the pole (P) of the mirror is taken as origin. The principal axis is taken as X-axis of the co-ordinate system. The sign conventions are as follows :
1. The object is always placed on the left of the mirror.
  2. All distances parallel to principal axis are measured from the pole of the mirror.
  3. All the distances measured to the right of the origin are taken as positive, while distances measured to the left of the origin are taken as negative.
  4. Distances measured perpendicular to and above the principal axis are taken as positive.
  5. Distances measured perpendicular to and below the principal axis are taken as negative.
  6. Focal length of convex mirror is positive while that of concave mirror is negative.

3



- (3)
- (a)
1. Electric bell
  2. Telephone earpiece
  3. Galvanometer
  4. Ammeter.
- (b)
1. If many electrical appliances of high power rating such as geyser, heater, motor, oven are switched on simultaneously, overloading occurs.
  2. This may result in switching off of the fuse resulting in lose of power supply.
  3. It may also cause fire. Hence we should not use many electrical appliances simultaneously.

3



3

	<ol style="list-style-type: none"> <li>1. In the atmosphere, there are different layers of air with different refractive indices which keep on changing as the physical conditions of air are not stationary.</li> <li>2. When we observe any object through this air, the light coming from them refract randomly due to which the apparent position of the object fluctuates.</li> <li>3. The large scale effect of this phenomenon is the twinkling of stars, advanced sunrise and delayed sunset.</li> <li>4. Due to change in the refractive index of atmosphere, the intensity of light that reaches our eyes from the stars varies and hence the stars appear twinkling at night.</li> <li>5. Advanced sunrise occurs as a ray of light from the sun enters the earth's atmosphere, it follows a curved path due to refraction before reaching to the observer.</li> <li>6. It appears to the observer as if the rays are coming from the position. Where the sun is seen by the observer, hence the sun is seen earlier before it reaches the horizon.</li> </ol> <p>(5)</p> <ol style="list-style-type: none"> <li>1. On the basis of electronic configuration of elements, the periodic table is divided into four blocks namely, s-block, p-block, d-block and f-block.</li> <li>2. The elements of s-block (except hydrogen), d-block and f-block are all metals.</li> <li>3. In the p-block, all the three types of elements, i.e. metals, non-metals and metalloids are present.</li> <li>4. A zig-zag line separates the metals on the left side from the non-metals on the right side of the periodic table.</li> <li>5. The bordering elements along the zig-zag line are the metalloids. These are Antimony (Sb), Germanium (Ge), Boron (B), Silicon (Si), Arsenic (As), Tellurium (Te), Polonium (Po), Astatine (At). They show intermediate properties and are called as metalloids or semi-metals.</li> </ol> <p>(6)</p> <ol style="list-style-type: none"> <li>1. The strength of an acid or base is measured on a scale of numbers called pH scale that has values from 0 to 14. pH scale helps in measuring hydrogen ion concentration in solutions. In pH, p stands for "potenz" (means "strength" in German). The scale reads from 0 (zero) (most acidic) to 14 (most basic). The value of pH indicates acidic or basic nature of a solution. The strength of base is represented by pOH.</li> <li>2. When the pH value is in between 0 to 7, the solution is acidic in nature.</li> <li>3. At value 7, the solution is neutral and between 7 to 14 the nature of the solution becomes alkaline/basic.</li> <li>4. The pH of a solution is inversely proportional to the concentration of hydrogen ions in it. i.e. a solution having a high concentration of hydrogen ions has a low pH value.</li> </ol> <p style="text-align: center;">             Acidic      Neutral      Basic              0                      7                      14              _____              Most acidic    Most basic         </p>	<p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>3</b></p>
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<b>Q.4.</b>	<b>Attempt any ONE of the following :</b>				<b>5</b>
(1)	<b>Magnetic field :</b> The area adjoining the magnet comprising of magnetic lines of force is called magnetic field. <b>Characteristics of magnetic lines of force :</b> 1. Magnetic lines of force are closed continuous curves. They start from north pole and ends on south pole. 2. The tangent at any point on the magnetic lines of force gives the direction of the magnetic field at that point. 3. No two magnetic lines of force can intersect each other. 4. Magnetic lines of force are crowded where the magnetic field is strong and far from each other where the field is weak.				
(2)	Based on electronic configuration, the modern periodic table is divided into four blocks namely, s-block, p-block, d-block, f-block.				<b>5</b>
		<b>s-block</b>	<b>p-block</b>	<b>d-block</b>	<b>f-block</b>
No. of shells incomplete/ valence electrons	Outermost shell incomplete (1 or 2 valence electrons).	Outermost shell incomplete except zero group elements that have completely filled shells (3 to 8 valence electrons).	Last two shells incomplete.	Last three shells incomplete.	
Position	I A, II A and hydrogen.	III A to VII A and zero group.	Group IIIB to II B along with group VIII.	Lanthanides and actinides placed separately at the bottom of the periodic table.	
Includes	All metals except hydrogen.	Metals, non-metals, metalloids, zero group elements.	Metals.	Metals.	
Types of elements	Normal elements.	Normal and inert elements.	Transition elements.	Inner-transition elements.	

SECTION - B		
<b>Q.5. (A) Answer the following sub-questions :</b>		
(1) The exit of the food from the stomach is regulated by the <b>sphincter muscle</b> .		<b>1</b>
(2) <b>True.</b>		<b>1</b>
(3) A hydrocarbon in which the carbon atoms are linked to each other only by single covalent bond is called saturated hydrocarbons.		<b>1</b>
(4) Bonds formed by sharing of electrons are known as covalent bond.		<b>1</b>
(5) Homoeostasis.		<b>1</b>
<b>Q.5. (B) Rewrite the following statements by selecting the correct options :</b>		
(1) Guard cells lose turgidity in <b>darkness</b> .		<b>1</b>
(2) The utilized sugar is stored in the form of <b>starch</b> in plants.		<b>1</b>
(3) A student soaked 5 g of raisins in beaker A containing 25 ml of ice cold water and another 5 g of raisins in beaker B containing 25 ml of tap water at room temperature. After one hour the student observed that, <b>the water absorbed by raisins in beaker B is more than the water absorbed by raisins in beaker A.</b>		<b>1</b>
(4) To observe stomata in a dicot leaf, we must prepare a slide by taking <b>the lower epidermis of the leaf.</b>		<b>1</b>
(5) <b>H<sub>2</sub></b> is liberated when acetic acid reacts with sodium metal.		<b>1</b>
<b>Q.6. Attempt any FIVE of the following :</b>		
(1) When zinc sulphide is heated in excess of air, it decomposes to give zinc oxide and sulphur dioxide gas is liberated. $2\text{ZnS}_{(s)} + 3\text{O}_{2(g)} \xrightarrow{\Delta} 2\text{ZnO}_{(s)} + 2\text{SO}_{2(g)}$ Zinc sulphide    Oxygen                      Zinc oxide    Sulphur dioxide		<b>2</b>
(2) 1. Meiosis is a type of cell division leading to production of gametes. 2. It is a process in which halving the number of chromosomes (2n to n) takes place resulting in the formation of haploid gametes. 3. It occurs in reproductive cells. 4. Diagrammatically it can be represented as :		<b>2</b>
<pre> graph LR     A["Parent cell 2n (diploid)"] -- "Meiosis Reduction division" --&gt; B["n"]     A -- "Meiosis Reduction division" --&gt; C["n"]     B -- "Mitosis" --&gt; D["n"]     B -- "Mitosis" --&gt; E["n"]     C -- "Mitosis" --&gt; F["n"]     C -- "Mitosis" --&gt; G["n"]     subgraph Gametes     D     E     F     G     end </pre>		

(3)	<ol style="list-style-type: none"> <li>1. Phenotype is the appearance of any detectable characteristic feature of an individual whereas the genotype is the genetic composition of an individual.</li> <li>2. The genes responsible for any particular character is present in pairs.</li> <li>3. Though, there are two genes, the phenotype depends on the presence of the dominant gene. Eg. the genotype for red colour flower is Rr or RR.</li> <li>4. Therefore, phenotypic and genotypic ratios are different.</li> </ol>	2										
(4)	<p>Functions of MPCB:</p> <ol style="list-style-type: none"> <li>(i) To plan comprehensive programmes for the prevention, control or abatement of pollution.</li> <li>(ii) To inspect sewage or trade effluent treatment and disposal facilities.</li> <li>(iii) To support and encourage the developments in the fields of pollution control, waste recycle reuse, eco-friendly practices, etc.</li> <li>(iv) To educate and guide the entrepreneurs in improving environment by suggesting appropriate pollution control technologies and techniques.</li> <li>(v) To create public awareness about the clean and healthy environment and consider the public complaints regarding pollution.</li> </ol>	2										
(5)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th data-bbox="300 1211 805 1245" style="text-align: center;"><b>Diamond</b></th> <th data-bbox="805 1211 1316 1245" style="text-align: center;"><b>Graphite</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="300 1245 805 1323">1. It is a hard, beautiful crystalline substance.</td> <td data-bbox="805 1245 1316 1323">1. It is a soft, greyish black crystalline substance.</td> </tr> <tr> <td data-bbox="300 1323 805 1447">2. Each carbon atom is linked to four other neighbouring carbon atoms.</td> <td data-bbox="805 1323 1316 1447">2. Each carbon atom is attached to three other carbon atoms.</td> </tr> <tr> <td data-bbox="300 1447 805 1503">3. Shape is regular tetrahedron.</td> <td data-bbox="805 1447 1316 1503">3. Shape is hexagonal planar.</td> </tr> <tr> <td data-bbox="300 1503 805 1659">4. No mobile electrons in the system and hence it is a non-conductor of electricity.</td> <td data-bbox="805 1503 1316 1659">4. Free electrons move throughout the layers and hence it is a good conductor of electricity.</td> </tr> </tbody> </table>	<b>Diamond</b>	<b>Graphite</b>	1. It is a hard, beautiful crystalline substance.	1. It is a soft, greyish black crystalline substance.	2. Each carbon atom is linked to four other neighbouring carbon atoms.	2. Each carbon atom is attached to three other carbon atoms.	3. Shape is regular tetrahedron.	3. Shape is hexagonal planar.	4. No mobile electrons in the system and hence it is a non-conductor of electricity.	4. Free electrons move throughout the layers and hence it is a good conductor of electricity.	2
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4. No mobile electrons in the system and hence it is a non-conductor of electricity.	4. Free electrons move throughout the layers and hence it is a good conductor of electricity.											
(6)	<ol style="list-style-type: none"> <li>1. The oxygen evolved at the anode reacts with carbon anode.</li> <li>2. The carbon anode is thus oxidized to carbon dioxide and escapes out through an outlet.</li> </ol> $\text{C}_{(s)} + \text{O}_{2(g)} \rightarrow \text{CO}_2\uparrow$ <p>Hence the carbon anode is hence consumed and replaced after a certain period of usage.</p>	2										

<p><b>Q.7.</b></p> <p>(1)</p> <p>(2)</p> <p>(3)</p>	<p><b>Attempt any FIVE of the following :</b></p> <p>(i) Alternative fuels are obtained through research.</p> <p>(ii) The organic waste from agriculture, factories and domestic use is utilized to produce alternative fuels. Biogas, bagasse and ethanol are some of the examples.</p> <p>(iii) Biogas is obtained by the fermentation of organic waste and animal dung in the biogas plant.</p> <p>(iv) Bagasse is the biomass left behind when sugarcane stalks are crushed to extract juice. This bagasse is used as fuel for boilers, and for manufacture of paper and production of ethanol.</p> <p>(v) Ethanol is produced by fermentation of wheat, maize, potatoes or sugarcane. This ethanol is mixed with petrol or diesel. Hence it is an alternative source of fuel.</p> <p>(vi) Solar power, wind power, tidal power, hydropower, geothermal power, etc. are also alternate sources of energy which are non polluting and inexhaustible.</p> <table border="1" data-bbox="300 925 1321 1346"> <thead> <tr> <th data-bbox="300 925 810 965"><b>Voluntary movements</b></th> <th data-bbox="810 925 1321 965"><b>Involuntary movements</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="300 965 810 1070">1. Movements which are under our control are called voluntary movements.</td> <td data-bbox="810 965 1321 1070">1. Movements which are not under our control are called involuntary movements.</td> </tr> <tr> <td data-bbox="300 1070 810 1133">2. Voluntary movements require thinking.</td> <td data-bbox="810 1070 1321 1133">2. Involuntary movements do not require thinking.</td> </tr> <tr> <td data-bbox="300 1133 810 1196">3. Voluntary movements are controlled by cerebellum.</td> <td data-bbox="810 1133 1321 1196">3. Involuntary movements are controlled by midbrain and hindbrain.</td> </tr> <tr> <td data-bbox="300 1196 810 1346">4. Eg. Moving a table, kicking a ball, walking, clapping hands etc.</td> <td data-bbox="810 1196 1321 1346">4. Eg. Blood flow, breathing, sneezing etc.</td> </tr> </tbody> </table> <p>A group of organic compounds containing same functional group, which can be represented by the same general formula and which more or less shows similar trends in their properties is known as Homologous series. Some important characteristics of homologous series are -</p> <ol style="list-style-type: none"> <li>1. The general formula of all compounds in the series is the same.</li> <li>2. They have the same functional group.</li> <li>3. Physical properties like melting point, boiling point, density, generally show a gradual change with increase of molecular formula in the series.</li> <li>4. On the other hand, chemical properties of the member shown close resemblance because of the presence of the same functional group in them.</li> <li>5. Consecutive members of the series differ from one another by - <math>\text{CH}_2</math>- group which is known as the methylene group and their</li> </ol>	<b>Voluntary movements</b>	<b>Involuntary movements</b>	1. Movements which are under our control are called voluntary movements.	1. Movements which are not under our control are called involuntary movements.	2. Voluntary movements require thinking.	2. Involuntary movements do not require thinking.	3. Voluntary movements are controlled by cerebellum.	3. Involuntary movements are controlled by midbrain and hindbrain.	4. Eg. Moving a table, kicking a ball, walking, clapping hands etc.	4. Eg. Blood flow, breathing, sneezing etc.	<p><b>3</b></p> <p><b>3</b></p> <p><b>3</b></p>
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molecular weight differs by 14 units.

Example : The alkane family is a homologous series and characterized by the general formula :  $C_nH_{2n+2}$

Methane	-	$CH_4$	- these differ by - $CH_2$ units.
Ethane	-	$C_2H_6$	
Ethane	-	$C_2H_6$	- these differ by - $CH_2$ units.
Propane	-	$C_3H_8$	
Butane	-	$C_4H_{10}$	- these differ by - $CH_2$ units.
Pentane	-	$C_5H_{12}$	

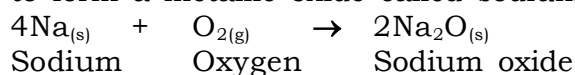
- (4) A human adult at rest, on an average breathes about 12-20 times per minute i.e. 28800 times per day. The mechanism of breathing in human beings involves two processes : Inhalation and Exhalation. 3

- Inhalation** : When the muscular diaphragm of the body contracts, volume of the thoracic cavity increases and air pressure inside the cavity decreases. The air from outside enters the lungs through the nostrils and the alveolar sacs are filled with air rich in oxygen.
- Exhalation** : When the diaphragm relaxes or becomes convex, the thoracic cavity decreases in volume. Lungs come to their original size, forcing the air outside the lungs through the same path but in the opposite direction.

- (5) 1. As  $X_2O$  turns red litmus blue, it is a metal oxide. Metal oxides as basic in nature. 3

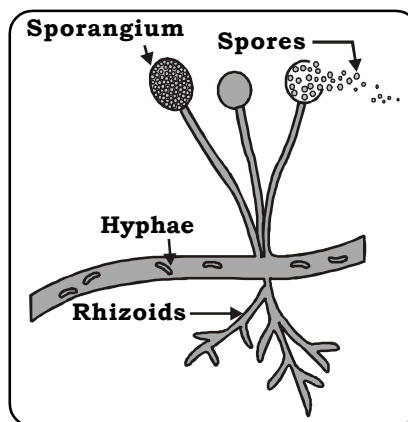
Metal + Oxygen  $\rightarrow$  Metal oxide (basic oxide)  
So, the element is a metal.

2. Eg. : When sodium reacts with oxygen of air at room temperature to form a metallic oxide called sodium oxide.



(Note : Student can write potassium or lithium in place of sodium.)

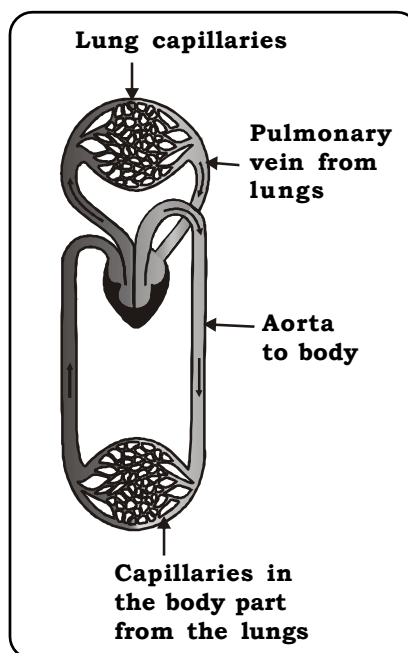
- (6) 1. The hyphae of bread mould (Mucor) are thread like structures.  
2. The mould forms spores inside the sporangium.  
3. When the spores are ready to leave the sporangium, it breaks open.  
4. If they land in a moist place, they germinate to form new mould. 3



**Q.8. Attempt any ONE of the following :**

(1)

1. The muscles of the atria are relaxed.
2. The right atrium receives deoxygenated blood collected from different organs of the body via large veins called venacava. The left atrium receives oxygen rich blood from the lungs simultaneously through the four pulmonary veins.
3. The atria contract and pour the blood into respective ventricles which expand to receive the blood. Left ventricle gets filled with oxygenated blood and right ventricle gets filled with deoxygenated blood.
4. Now both the thick walled ventricles contract resulting in pumping out the oxygenated blood to all the parts of the body through the aorta (the largest artery) and the deoxygenated blood from the right ventricle enters the lungs through the pulmonary artery for oxygenation.
5. The valves between the atria and ventricles ensure that the blood does not flow backwards.
6. Thus the deoxygenated blood enters the right part of the heart and again after oxygenation it enters the left part of the heart so the blood goes through the heart twice during each cycle. This is known as double circulation.



5

(2)

1. Darwin's theory of evolution is based on natural selection.
2. On the basis of observations, Darwin suggested that only the fittest survive. All those plants and animals which are not fit, die.
3. These fit species reproduce and pass on the relevant characteristics to the following generation which in turn would make them fit for survival.
4. The process of selection of characteristics that contribute to the fitness for survival was called natural selection by Darwin.
5. Only those factors which help any individual to survive are retained and others are lost.
6. This process continues from generation after generations. The total effect is that after several generations, the number of individuals having the relevant factors, that are better adapted

5



to their surroundings, is much more than in the previous generations. These adapted individuals may also be very different from the original species.

7. This process is described as a natural selection of these individuals which have characteristics best adapted for survival.
8. Selection by nature is not deliberate but is natural. The criterion for the natural selection is only one i.e. successful adaptation for growth and reproduction in the given environment.
9. The theory of natural selection which was proposed by Charles Darwin helped to explain the process of development of living things.
10. However, the theory did not explain how an individual plant or animal acquired factors that made it better adapted to its surroundings.
11. In the course of time these questions were answered by the discovery of the laws governing heredity and mutation and thus Darwin's theory came to be universally accepted.

