

# MT

2017 \_\_\_\_ 1100

MT - SCIENCE & TECHNOLOGY - II (72) - SEMI PRELIM - I : PAPER - 6

Time : 2 Hours      Semi Prelim - I : Model Answer Paper      Max. Marks : 40

<b>A.1. (A) Fill in the blanks :</b>	
(1) When the transfer of pollen from an anther to stigma occurs in the same flower, the process is called <b>self-pollination</b> .	1
(2) In <b>asexual</b> mode of reproduction the off-springs are with minor differences.	1
(3) Copper reacts with moist carbon dioxide in air and slowly loses its shine to gain a green coat of <b>copper carbonate</b> .	1
<b>A.1. (B) (1) Give examples of / Name the following :</b>	
Condoms, Oral pills, Copper-T are some of the contraceptives.	1
<b>(2) Write the correlated terms:</b>	
Ethane : $\text{CH}_3 - \text{CH}_3$ :: Ethene : $\text{H}_2\text{C} = \text{CH}_2 / \text{CH}_2 = \text{CH}_2$ .	1
<b>A.2. Rewrite the following statements by selecting the correct alternative:</b>	
(1) To observe the Hydra bud clearly, Raju should see it first under the low power lens and then under the high power lens in order to <b>Lessen the area</b> .	1
(2) Inheritance of acquired characteristics is also called <b>soft</b> inheritance.	1
(3) Iron is <b>less reactive than aluminium</b> .	1
(4) <b>Glacial acetic acid</b> is ethanoic acid which solidifies below 290K.	1
(5) <b>FeSO<sub>4</sub></b> solution in water is green in colour.	1

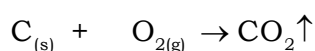
**A.3. Answer the following in short : (Any 5)**

- (1) (i) Testes produce sperms.  
 (ii) Formation of sperms requires a temperature lower than the normal body temperature.  
 (iii) Hence testes are located outside the abdominal cavity in the scrotum.

2

- (2) (1) The oxygen evolved at the anode reacts with carbon anode.  
 (2) The carbon anode is thus oxidized to carbon dioxide and escapes out through an outlet.

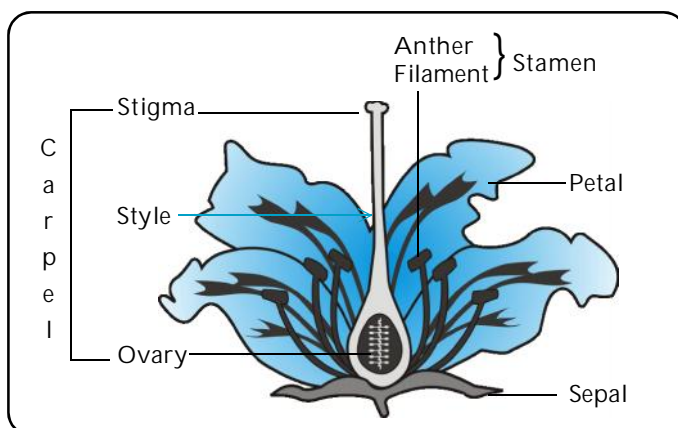
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Hence the carbon anode is consumed and replaced after a certain period of usage.

- (3) **Longitudinal section of flower :**

2



(4)	<b>Diamond</b>	<b>Graphite</b>
	(i) It is a hard, beautiful crystalline substance. (ii) Each carbon atom is linked to four other neighbouring carbon atoms. (iii) Shape is regular tetrahedron. (iv) No mobile electrons in the system and hence it is a non-conductor of electricity.	(i) It is a soft, greyish black crystalline substance. (ii) Each carbon atom is attached to three other carbon atoms. (iii) Shape is hexagonal planar. (iv) Free electrons move throughout the layers and hence it is a good conductor of electricity.

2

(5)	<p>(i) Embryology deals with the study of development of an organism from an embryo.</p> <p>(ii) The comparative study of embryos of different generation of vertebrates exhibits certain interesting facts.</p> <p>(iii) The embryos in their early stages of development show a great deal of similarities, but differ in the later stages of development.</p> <p>(iv) This suggests common ancestry for these animals.</p>	2
(6)	<p>Calcium reacts with cold water to form calcium hydroxide and hydrogen gas.</p> $\text{Ca}_{(s)} + 2\text{H}_2\text{O}_{(l)} \rightarrow \text{Ca}(\text{OH})_{2(aq)} + \text{H}_{2(g)}$ <p style="text-align: center;"> <span style="margin-right: 100px;">Calcium</span> <span style="margin-right: 100px;">Water</span> <span style="margin-right: 100px;">Calcium hydroxide</span> <span>Hydrogen</span> </p>	2
(7)	<p>(a) <b>Tinning</b> : It is the process of giving a coating of tin, i.e., molten tin over other metal to prevent it from corrosion.</p> <p>(b) <b>Saturated hydrocarbon</b> : A hydrocarbon in which the carbon atoms are linked to each other only by single covalent bond is called saturated hydrocarbon or alkane.</p>	1
A.4.	<p><b>Answer the following in brief : (Any 5)</b></p>	
(1)	<p>The diagram illustrates the inheritance of sex chromosomes. It shows a male parent (XY) and a female parent (XX) at the top. Lines represent the segregation of chromosomes into gametes. The male produces two types of gametes: X and Y. The female produces two types of gametes: X and X. These gametes combine to form offspring. The combinations are: X from male and X from female result in XX (female); Y from male and X from female result in XY (male).</p>	3
	<p>(i) Sex determination in human beings is genetical.</p> <p>(ii) One pair of chromosomes decides the sex of the individual. This pair is referred to as sex-chromosome.</p> <p>(iii) In human beings, there are 46 chromosomes or 23 pairs out of which 22 are autosomes and 1 pair is sex chromosomes.</p> <p>(iv) In human males two dissimilar chromosomes are present, longer 'X' and shorter 'Y'.</p>	

	<p>(v) In human females two similar longer 'X' chromosomes are present.</p> <p>(vi) The chance for the child being a male or female is 50 percent.</p> <p>(vii) All children inherit 'X' chromosome from their mother.</p> <p>(viii) Thus the sex of the offspring is determined by the chromosome that they inherit from their father. If it is 'X' then the offspring will be a daughter and if 'Y' then it will be a son.</p> <p>(2) (i) The atomic number of nitrogen is 7. It's electronic configuration is (2, 5). 5 electrons are present in the outermost shell and it requires 3 more electrons to complete its octet. So each nitrogen atom shares its three valence electron with the valence electrons of another nitrogen atom to give three shared pairs of electrons which results in the formation of N<sub>2</sub> molecule.</p> <p>(ii) The structure of N<sub>2</sub> molecule :</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <math display="block">\text{N} :: \text{N} \rightarrow \text{N} \equiv \text{N} \leftrightarrow \text{N}_2</math> </div> <p>(3) (a) Vagina :</p> <p>(i) It provides the route for the menstrual blood to leave the body during menstruation.</p> <p>(ii) It is a pathway through which sperms enter into a woman's body.</p> <p>(iii) It is also a pathway through which a baby comes out of the woman's body during child birth.</p> <p>(b)</p> <p>(i) On reaching puberty, a woman's ovaries usually release one egg each month.</p> <p>(ii) When the egg is not fertilized, this unfertilized egg along with blood and mucous form a flow which leaves the uterus. This is called menstruation which lasts for three to five days.</p> <p>(4) (i) The metals at the bottom of the reactivity series are least reactive. They are often found in free state e.g. gold, silver and copper. But copper and silver are also found in combined state as their sulphide or oxide ores.</p> <p>(ii) The less reactive metals which are quite low in the reactivity series are extracted by the reduction of their oxides by heat alone. The extraction of copper involves 2 steps :            Eg. : Copper which is found as Cu<sub>2</sub>S in nature can be obtained from its ore by just heating in excess of air (roasting).</p> $2\text{Cu}_2\text{S} + 3\text{O}_2 \xrightarrow{\Delta} 2\text{Cu}_2\text{O} + 2\text{SO}_2\uparrow$	<p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>3</b></p>
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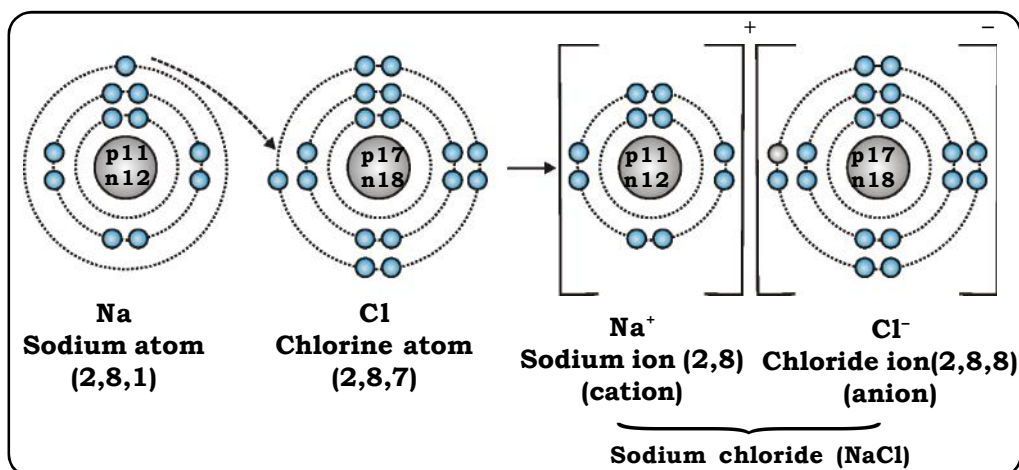
	<p>When a good amount of copper sulphide has been converted to copper oxide, the supply of air is stopped. In the absence of air, copper oxide formed above reacts with remaining copper sulphide to form copper metal and sulphur dioxide.</p> $2\text{Cu}_2\text{O} + \text{Cu}_2\text{S} \xrightarrow{\Delta} 6\text{Cu} + \text{SO}_2\uparrow$									
(5)	<p>When zinc sulphide is heated strongly in excess of air, it decomposes to give zinc oxide and sulphur dioxide gas is liberated.</p> $2\text{ZnS}_{(s)} + 3\text{O}_{2(g)} \xrightarrow[\text{Roasting}]{\Delta} 2\text{ZnO}_{(s)} + 2\text{SO}_{2(g)}$ <p style="text-align: center;"> <span style="margin-right: 100px;">Zinc sulphide</span> <span style="margin-right: 100px;">Oxygen</span> <span style="margin-right: 100px;">Zinc oxide</span> <span style="margin-right: 100px;">Sulphur dioxide</span> </p> <p>When zinc oxide is treated with carbon as a reducing agent, zinc oxide is reduced to zinc and carbon is oxidized to carbon monoxide.</p> $\text{ZnO}_{(s)} + \text{C}_{(s)} \rightarrow \text{Zn}_{(s)} + \text{CO}_{(g)}$ <p style="text-align: center;"> <span style="margin-right: 100px;">Zinc oxide</span> <span style="margin-right: 100px;">Carbon</span> <span style="margin-right: 100px;">Zinc</span> <span style="margin-right: 100px;">Carbon monoxide</span> </p>	<b>3</b>								
(6)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;"><b>Binnary fission</b></th> <th style="width: 50%; text-align: center;"><b>Multiple fission</b></th> </tr> </thead> <tbody> <tr> <td>(i) In this method, the living cell divides into two equal parts.</td> <td>(i) In this method, the nucleus divides within the cyst into many nuclei by repeated division.</td> </tr> <tr> <td>(ii) In this method two daughter cells are formed.</td> <td>(ii) In this method many daughter cells are formed.</td> </tr> <tr> <td>(iii) It occurs under favourable conditions.</td> <td>(iii) It occurs under unfavourable conditions.</td> </tr> </tbody> </table>	<b>Binnary fission</b>	<b>Multiple fission</b>	(i) In this method, the living cell divides into two equal parts.	(i) In this method, the nucleus divides within the cyst into many nuclei by repeated division.	(ii) In this method two daughter cells are formed.	(ii) In this method many daughter cells are formed.	(iii) It occurs under favourable conditions.	(iii) It occurs under unfavourable conditions.	<b>3</b>
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(7)	<p>(a) methanoic acid</p> <p>(b) propan - 2 - one</p> <p>(c) 2, 3 - dimethyl butane</p>	<b>1</b> <b>1</b> <b>1</b>								
<b>A.5. Answer in detail: (Any 1)</b>										
(1)	<p>(a) The sheep from whom the udder cell was taken can be called the real mother of Dolly. Her diploid nucleus was taken, therefore, she is the real mother of Dolly. Moreover, Dolly looked like her.</p> <p>(b) Surrogate mother is the one whose uterus is used for raising the foetus.</p> <p>(c) Sperm was not used in cloning Dolly. Therefore, Dolly had no father.</p> <p>(d) The udder's cell nucleus was used in cloning Dolly.</p>	<b>5</b>								

(e) Sheep, calf, monkey, cat, mice, etc. are the other animals which have been cloned.

(2) (i) Sodium atom has one electron in its outermost shell. If it loses one electron from its "M" shell then its "L" shell becomes the outermost shell to acquire a stable octet. The nucleus of this atom still has 11 protons but the number of electrons has become 10, so there is a net positive charge giving us a sodium cation ( $\text{Na}^+$ ).

(ii) On the other hand chlorine has 7 electrons in its outermost shell and requires one more electron to complete its octet. Thus the electron lost by sodium is taken up by chlorine. After gaining one electron, its K, L and M shells have all together 18 electrons, but the nucleus still has 17 protons. This leads to the formation of chloride anion ( $\text{Cl}^-$ ) Both these elements have a give and take relation between them.

Sodium and chloride ions, being oppositely charged attract each other and are held by strong electrostatic forces of attraction to form sodium chloride ( $\text{NaCl}$ ), resulting in formation of an electrovalent bond or an ionic bond. It should be noted that sodium chloride exist as aggregates of oppositely charged ions in definite geometrical shape.



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