

# MT

2017 \_\_\_\_ 1100

MT - SCIENCE & TECHNOLOGY - II (72) - SEMI PRELIM - I : PAPER - 3

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

<b>A.1. (A) Fill in the blanks :</b>												
(1) During unfavourable conditions <b>multiple fission</b> type of fission is seen in Amoeba.		1										
(2) A fragment of DNA that provides complete information about one protein is known as the <b>gene</b> for that protein.		1										
(3) The impurities present in an ore are called as <b>gangue</b> .		1										
<b>A.1. (B) Match the items in column 'A' with those of column 'B' :</b>		2										
<table border="1"><thead><tr><th>Column 'A'</th><th>Column 'B'</th></tr></thead><tbody><tr><td>(1) Benzene</td><td>(c) C<sub>6</sub>H<sub>6</sub></td></tr><tr><td>(2) Sodium ethoxide</td><td>(d) CH<sub>3</sub>CH<sub>2</sub>ONa</td></tr><tr><td>(3) Acetic acid</td><td>(a) CH<sub>3</sub>COOH</td></tr><tr><td>(4) Cyclohexane</td><td>(b) C<sub>6</sub>H<sub>12</sub></td></tr></tbody></table>	Column 'A'	Column 'B'	(1) Benzene	(c) C <sub>6</sub> H <sub>6</sub>	(2) Sodium ethoxide	(d) CH <sub>3</sub> CH <sub>2</sub> ONa	(3) Acetic acid	(a) CH <sub>3</sub> COOH	(4) Cyclohexane	(b) C <sub>6</sub> H <sub>12</sub>		
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<b>A.2. Rewrite the following statements by selecting the correct alternative:</b>												
(1) Ramesh observed a slide of Amoeba with elongated nuclei. It would represent <b>Binary fission</b> .		1										
(2) A systematic study of fossils and its occurrence revealed that the deepest layers were found to have fossils of <b>invertebrates</b> .		1										
(3) A solution of Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> in water is not clear. It is due to <b>hydrolysis of Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> in water</b> .		1										
(4) 2 ml of ethanoic acid was taken in each of test tubes A, B, C and 2 ml, 4 ml, 6 ml of water was added respectively to them. A clear solution is obtained in <b>all the test tubes</b> .		1										

(5)	When sodium bicarbonate solution is added to dilute acetic acid, it is observed that <b>a gas is evolved</b> .	1				
<b>A.3. Answer the following in short : (Any 5)</b>						
(1)	(i) Regeneration is the reconstruction of entire body from the isolated body cells. (ii) e.g. When planaria is cut into many pieces, each piece develops into a whole planaria. (iii) This process occurs only if the planarial body gets cut into pieces. (iv) But animals cannot wait to be cut to reproduce. (v) Therefore, regeneration is not the same as reproduction.	2				
(2)	(i) Methane is formed by the decomposition of plant and animal matter in swamps or marshy areas. (ii) As methane gas bubbles out from marshy area, it is called as marsh gas.					
(3)	Human female reproductive system :	2				
(4)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Roasting</th> <th style="width: 50%; text-align: center;">Calcination</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">                             (i) The burning of sulphide ores in excess of air is called roasting.                              (ii) During roasting SO<sub>2</sub> is evolved. eg.  <math display="block">2\text{ZnS} + 3\text{O}_2 \xrightarrow{\Delta} 2\text{ZnO} + 2\text{SO}_2 \uparrow</math> </td> <td style="vertical-align: top;">                             (i) The burning of carbonate ores in absence or limited supply of air is called calcination.                              (ii) During calcination CO<sub>2</sub> is evolved. eg.  <math display="block">\text{ZnCO}_3 \xrightarrow{\Delta} \text{ZnO} + \text{CO}_2 \uparrow</math> </td> </tr> </tbody> </table>	Roasting	Calcination	(i) The burning of sulphide ores in excess of air is called roasting. (ii) During roasting SO <sub>2</sub> is evolved. eg. $2\text{ZnS} + 3\text{O}_2 \xrightarrow{\Delta} 2\text{ZnO} + 2\text{SO}_2 \uparrow$	(i) The burning of carbonate ores in absence or limited supply of air is called calcination. (ii) During calcination CO <sub>2</sub> is evolved. eg. $\text{ZnCO}_3 \xrightarrow{\Delta} \text{ZnO} + \text{CO}_2 \uparrow$	2
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(5)	<p>Organs which are fundamentally the same in structure, but perhaps modified for widely different functions are termed as homologous organs. e.g.:</p> <p>(i) The forelimbs of man (adapted for handling), bat and bird (adapted for flying), whale and seal (adapted for swimming) have the same principal skeletal composition.</p> <p>(ii) The scales of an ovulate pine cone correspond with the carpels of a flower and the scales of the staminate cone correspond with the stamens of a flower.</p>	<b>2</b>
(6)	<p>When iron nail is placed in copper sulphate solution, more reactive iron displaces less reactive copper and the blue colour of copper sulphate fades gradually to give a greenish solution of iron sulphate and reddish brown deposit of copper is obtained.</p> $\text{Fe}_{(s)} + \text{CuSO}_{4(aq)} \rightarrow \text{FeSO}_{4(aq)} + \text{Cu}_{(s)} \downarrow$ <p style="text-align: center;">Iron      Copper sulphate                  Iron sulphate                  Copper</p>	<b>2</b>
(7)	<p>(a) <b>Galvanising</b> -It is a process of giving a thin coating of zinc on iron or steel to protect it from corrosion.</p>	<b>1</b>
	<p>(b) <b>Allotropy</b> - The phenomenon of existence of a substance in various physical forms but same chemical form is known as allotropy. e.g. diamond and graphite.</p>	<b>1</b>
<b>A.4.</b>	<b>Answer the following in brief : (Any 5)</b>	
(1)	<p>The seven pairs of contrasting traits in a pea plant which were studied by Mendel, were as follows.</p> <p>(1) Stem height      Tall/Dwarf plants</p> <p>(2) Flower colour    Red/White flowers or Violet/White flowers</p> <p>(3) Seed shape        Round / Wrinkled</p> <p>(4) Seed colour        Yellow / Green</p> <p>(5) Flower position   Axial / Terminal position of the flower.</p> <p>(6) Pod colour         Green / Yellow coloured pod.</p> <p>(7) Pod shape         Full / Constricted.</p>	<b>3</b>
(2)	<p>Reactions where substitution of one or more atoms in a molecule by another atom takes place are called substitution reaction.</p> <p>e.g. : Reaction of chlorine with methane :</p> $\text{CH}_4 + \text{Cl}_2 \xrightarrow{\text{UV rays}} \text{CH}_3\text{Cl} + \text{HCl}$ <p>In this reaction H atom of methane is substituted by Cl atom.</p> <p>Reaction of KOH with <math>\text{CH}_3\text{CH}_2\text{I}</math> :</p> $\text{CH}_3\text{CH}_2\text{I} + \text{KOH} \rightarrow \text{CH}_3\text{CH}_2\text{OH} + \text{KI}$ <p>In this reaction I atom is substituted by OH.</p>	<b>3</b>

(3)	<p>(a) <b>Ovaries :</b></p> <p>(i) Produce the female hormone estrogen.</p> <p>(ii) They develop and release eggs into the oviduct.</p> <p>(b) <b>Seminal vesicles and prostate gland :</b> They produce the ejaculatory fluid which helps the sperm in transport and also provides nutrition.</p> <p>(c) <b>Uterus :</b> Due to strong muscles and ability to expand and contract it accommodates the growing foetus and can push the baby during labour.</p>	3
(4)	<p>(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 <math>\text{Cu}_2\text{S}</math> 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>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> $2\text{Cu}_2\text{O} + \text{Cu}_2\text{S} \xrightarrow{\Delta} 6\text{Cu} + \text{SO}_2\uparrow$	3
(5)	<p>The elements are sodium and calcium respectively. In the reactivity series, since sodium is placed above calcium, sodium is more reactive than calcium. When sodium reacts with dilute hydrochloric acid it gives sodium chloride and hydrogen gas is liberated.</p> $2\text{Na}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow 2\text{NaCl}_{(aq)} + \text{H}_2\uparrow$ <p style="text-align: center;">Sodium                  Hydrochloric                  Sodium                  Hydrogen    acid                                  chloride</p> <p>When calcium reacts with dilute hydrochloric acid, it gives calcium chloride and hydrogen gas is liberated.</p> $\text{Ca}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{CaCl}_{2(aq)} + \text{H}_2\uparrow$ <p style="text-align: center;">Calcium                  Hydrochloric                  Calcium                  Hydrogen    acid                                  chloride</p>	3

(6)	Asexual reproduction and Sexual reproduction :	3											
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<b>A.5. Answer in detail: (Any 1)</b>													
(1)	(i) DNA stands for Deoxyribose Nucleic Acid which is present in the nucleus of the cell. DNA is a source of information which is in the coded form, for synthesizing proteins in the cell. (ii) It is the main hereditary factor and consists of genes. (iii) DNA is a double helical structure comprising of ribose sugars, phosphates and nucleic acid. (iv) The ribose sugar and phosphates make up the backbone of the DNA strand. (v) The two strands are attached to each other by pairing of nucleic acid which are placed inside helical structure. (vi) Group of three pairs of nucleic acid forms the gene, which provides the information about one protein. (vii) This model of DNA was put forward by Watson and Crick.		5										
(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 (Na <sup>+</sup> ). (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	5											

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 (Cl<sup>-</sup>) 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 (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.

