

MT

2017 ___ ___ 1100

MT - SCIENCE & TECHNOLOGY - II (72) - SEMI PRELIM - I : PAPER - 1

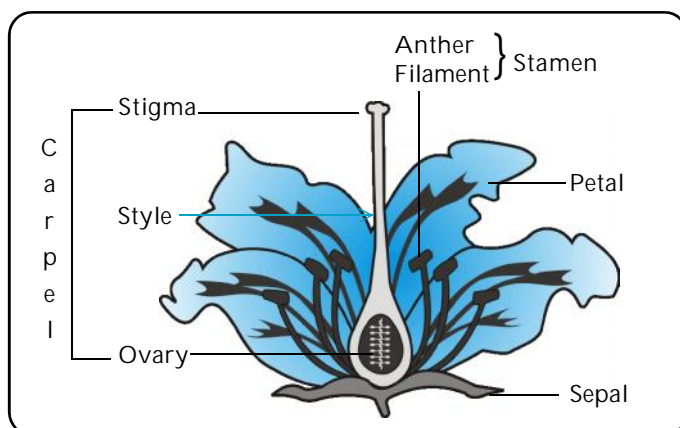
Time : 2 Hours Semi Prelim - I : Model Answer Paper Max. Marks : 40

A.1. (A) Fill in the blanks :												
(1) Hydra uses regenerative cells for reproduction in the process of budding .		1										
(2) If one of the metal is mercury, then the alloy is known as amalgam .		1										
(3) Below 290K acetic acid solidifies to an ice like mass called glacial acetic acid .		1										
A.1. (B) Match the items in column 'A' with those of column 'B' :		2										
<table border="1"><thead><tr><th>Column 'A'</th><th>Column 'B'</th></tr></thead><tbody><tr><td>(1) Peripatus</td><td>(e) Segmental nephridia</td></tr><tr><td>(2) Duck billed platypus</td><td>(c) Like mammals</td></tr><tr><td>(3) Vermiform appendix</td><td>(d) Digestion of cellulose</td></tr><tr><td>(4) Indian pipe plant</td><td>(a) Megasporophyll</td></tr></tbody></table>		Column 'A'	Column 'B'	(1) Peripatus	(e) Segmental nephridia	(2) Duck billed platypus	(c) Like mammals	(3) Vermiform appendix	(d) Digestion of cellulose	(4) Indian pipe plant	(a) Megasporophyll	
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(4) Indian pipe plant	(a) Megasporophyll											
A.2. Rewrite the following statements by selecting the correct alternative:												
(1) To observe Amoeba and Paramecium under microscope Methylene blue stain is used.		1										
(2) Resemblance and differences is the result of heredity .		1										
(3) FeSO₄ solution in water is green in colour.		1										
(4) Some acetic acid is treated with solid NaHCO ₃ . The resulting solution will be colourless .		1										
(5) Acetic acid is pale yellow in colour .		1										
A.3. Answer the following in short : (Any 5)												
(1) (i) Sunflower pollen is heavy and sticky. So it cannot be carried by wind.		2										

- (ii) So, pollen is transferred from one plant to another plant through the agency of honey bees resulting in cross pollination.
- (iii) Cross pollination also increases the yield of seeds.
- (iv) Therefore, in the absence of honey bees, the yield of sunflower goes down tremendously.

- (2) (i) A hydrocarbon in which carbon atoms are linked to each other by double or triple bonds is called unsaturated hydrocarbon.
- (ii) They contain carbon to carbon double bonds. $\left(\begin{array}{c} | & | \\ -C & = & C- \\ | & | \end{array} \right)$
or triple bonds $(-C \equiv C-)$.
- (iii) Ethylene molecule contains two carbon atoms which are bonded to each other by a $C = C$ i.e. carbon - carbon double bond.

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



- (4) **Metals**
- (i) They form positive ions by losing electrons.
 - (ii) Their oxides are basic in nature.
 - (iii) They react with dilute acids and displace hydrogen.

- Non-metals**
- (i) They form negative ions by gaining electrons.
 - (ii) Their oxides are acidic in nature.
 - (iii) They do not react with dil. acids and hence do not displace hydrogen.

(5)	<p>Fossils are preserved remains or traces of plants and animals from the remote past. They are very good palaeontological evidences as by studying the structure and age, evolutionary process can be understood. Fossils are formed when organisms get trapped in soil, rocks etc and the soft parts of the organisms get worn away slowly leaving an impression in the rock. Sometimes the organisms itself hardens into a rock.</p>	2
(6)	<p>When aluminium oxide (being amphoteric in nature) dissolves in aqueous sodium hydroxide, it gives water soluble sodium aluminate,</p> $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$ <p style="text-align: center;"> Aluminium oxide Sodium hydroxide Sodium aluminate Water </p>	2
(7)	<p>(a) Ores : The minerals from which metals are extracted profitably and conveniently are called as ores.</p>	1
	<p>(b) The atom or group of atoms present in the molecule which determines characteristic property of organic compounds is called the functional group.</p>	1
A.4.	Answer the following in brief : (Any 5)	
(1)		3
	<p>(i) Sex determination in human beings is genetical. (ii) One pair of chromosomes decides the sex of the individual. This pair is referred to as sex-chromosome.</p>	

- (iii) In human beings, there are 46 chromosomes or 23 pairs out of which 22 are autosomes and 1 pair is sex chromosomes.
- (iv) In human males two dissimilar chromosomes are present, longer 'X' and shorter 'Y'.
- (v) In human females two similar longer 'X' chromosomes are present.
- (vi) The chance for the child being a male or female is 50 percent.
- (vii) All children inherit 'X' chromosome from their mother.
- (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.

Homologous series :

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 -

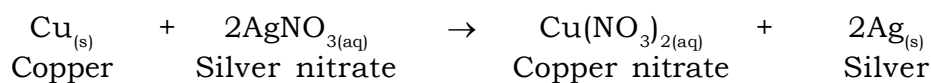
- (i) The general formula of all compounds in the series is the same.
- (ii) They have the same functional group.
- (iii) Physical properties like melting point, boiling point, density, generally show a gradual change with increase of molecular formula in the series.
- (iv) On the other hand, chemical properties of the member shows close resemblance because of the presence of the same functional group in them.
- (v) Consecutive members of the series differ from one another by $-\text{CH}_2-$ group which is known as the methylene group and their molecular weight differs by 14 units.

Example : The alkane family is a homologous series and characterized by the general formula : $\text{C}_n\text{H}_{2n+2}$

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

<p>(3)</p>	<p>Multiple fission :</p> <p>(i) During unfavourable condition, the amoeba withdraws its pseudopodia, becomes almost round and secretes a hard covering called cyst.</p> <p>(ii) Inside the cyst, the nucleus divides into many nuclei by repeated division, followed by the division of cytoplasm.</p> <p>(iii) As a result, many daughter cells are formed.</p> <p>(iv) The cyst bursts to release the daughter cells during favourable condition.</p> <div data-bbox="367 705 1053 1064" style="text-align: center;"> <p>Cyst formation Multiple fission Release of daughter cells during favourable conditions</p> </div>	<p>3</p>
<p>(4)</p>	<p>(i) The metals high up in the reactivity series are very reactive e.g sodium, potassium, calcium, aluminium etc. These metals are obtained by electrolytic reduction. For example, sodium, magnesium and calcium are obtained by electrolysis of their molten chlorides. The metals are deposited at the cathode (–vely charged electrode), whereas, chlorine is liberated at the anode (+vely charged electrode). The reaction of sodium is as follows :</p> <p>At cathode : $\text{Na}^+ + e^- \rightarrow \text{Na}$ At anode : $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2e^-$</p> <p>(ii) Similarly, aluminum is obtained by the electrolytic reduction of aluminum oxide. At cathode : $\text{Al}^{+3} + 3e^- \rightarrow \text{Al}$ At anode : $2\text{O}^{-2} - 4e^- \rightarrow \text{O}_2$</p> <p>(iii) Thus the highly reactive metals are extracted by the electrolytic reduction of their molten chlorides or oxides.</p>	<p>3</p>
<p>(5)</p>	<p>When a copper coin is dipped in silver nitrate solution, the solution becomes blue and shining while silver metal is deposited on the copper coin. In this reaction, copper displaces silver forming copper</p>	<p>3</p>

nitrate and silver metal.

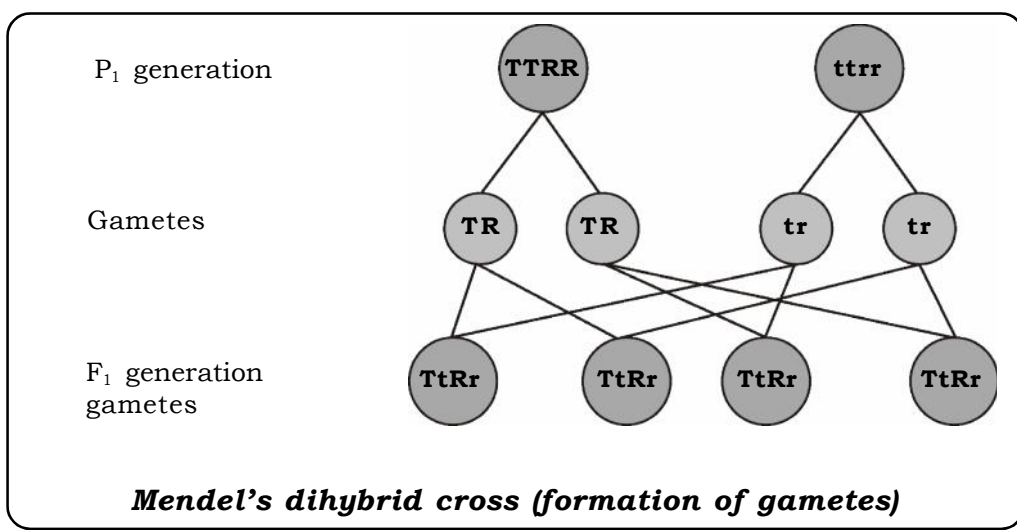


(6)		3								
	<table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%; text-align: center;">Pollination</th> <th style="width: 50%; text-align: center;">Fertilization</th> </tr> </thead> <tbody> <tr> <td>(i) The process of transfer of pollen grains from the anther to the stigma is called as pollination.</td> <td>(i) The process in which the male gamete fuses with the female gamete resulting in the formation of a diploid zygote is called fertilization.</td> </tr> <tr> <td>(ii) It occurs only in plants.</td> <td>(ii) It occurs in plants and animals.</td> </tr> <tr> <td>(iii) It requires agents.</td> <td>(iii) It does not require agents.</td> </tr> </tbody> </table>	Pollination	Fertilization	(i) The process of transfer of pollen grains from the anther to the stigma is called as pollination.	(i) The process in which the male gamete fuses with the female gamete resulting in the formation of a diploid zygote is called fertilization.	(ii) It occurs only in plants.	(ii) It occurs in plants and animals.	(iii) It requires agents.	(iii) It does not require agents.	
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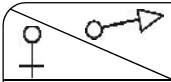
- | | | |
|-----|--|-------------|
| (7) | (a) propan-1-ol
(b) ethanal
(c) 2, 3 - dimethyl butane | 1
1
1 |
|-----|--|-------------|

A.5.

- | | | |
|-----|---|---|
| (1) | (i) Tallness is the dominant character and shortness is a recessive character of pea plant.
(ii) Similarly red colour of the flower is the dominant character and the white colour of the flower is the recessive character.
(iii) Therefore, the gene combinations for the characters will be TT (tallness), tt (shortness), RR (red flowers), rr (white flowers). | 5 |
|-----|---|---|



Cross between TtRr and TtRr :

	TR	Tr	tR	tr
TR	TTRR	TTRr	TtRR	TtRr
Tr	TTRr	TTrr	TtRr	Ttrr
tR	TtRR	TtRr	ttRR	ttRr
tr	TtRr	Ttrr	ttRr	ttrr

The phenotype and genotype is shown in the table below :
The phenotypic ratio of F₂ generation is 9 : 3 : 3 : 1 and the genotypic ratio is 1 : 2 : 2 : 4 : 1 : 1 : 2 : 2 : 1.

Phenotype	No. of squares in chequer board	Genotype	No. of squares in chequer board
Tall with red flowers	9	TTRR	1
Short with red flowers	3	TTRr	2
Tall with white flowers	3	TtRR	2
Short with white flowers	1	TtRr	4
		TTrr	1
		ttRR	1
		ttRr	2
		Ttrr	2
		ttrr	1

- (2) (i) Magnesium is a metal whereas chlorine is a non-metal.
- (ii) The atomic number of magnesium is 12, so its electronic configuration is (2, 8, 2). It has 2 valence electrons. A magnesium atom donates its valence electrons (to two chlorine atoms) and forms a stable magnesium ion (Mg⁺²).
- (iii) The atomic number of chlorine is 17, so its electronic configuration is (2, 8, 7). Chlorine atom has 7 valence electrons. So, it requires only one electron to complete its octet. Since one magnesium atom donates two electrons, so two chlorine atoms take these two electrons and form two chloride ions (2Cl⁻).
- (iv) The positively charged magnesium ions and negatively charged chloride ions are held together by electrostatic force of attraction to form magnesium chloride which is an ionic compound.

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