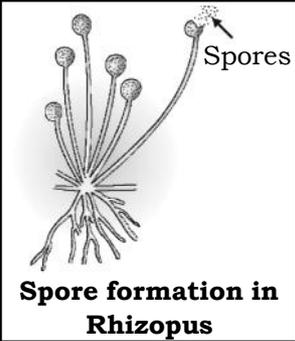


CBSE X	MT EDUCARE LTD.	Set - A
	SUBJECT : SCIENCE	Marks : 80
Date :	QUEST - II (Semi Prelim II)	Time : 3 hrs.
	MODEL ANSWER PAPER	

SECTION - A		
1.	(i) Fossil fuels are conventional sources of energy that will not last longer. (ii) To reduce air pollution.	1
2.	The geographical isolation cannot be a major factor in the speciation of a self pollinating plant species because it does not have to look to other plants for its process of reproduction to be carried out.	1
SECTION - B		
3.	(a) — OH Hydroxyl/Alcohol (b) $\begin{array}{c} \text{O} \\ \\ -\text{C}-\text{OH} \end{array}$ Carboxylic acid	
	(c) $\begin{array}{c} \text{O} \\ \\ -\text{C}- \end{array}$ Ketone (d) $-\overset{ }{\text{C}} = \overset{ }{\text{C}} -$ Alkene	2
4.	(i) The weak ionic currents flowing along the nerve cells produce magnetic field in the human body. (ii) The properties of magnetic field lines are : (i) The magnetic field lines emerge from the north pole of a magnet and end at its south pole. (ii) Magnetic field lines never intersect each other.	1 1
5.	(i) OTEC power plants can operate only if the temperature difference between the surface water and deeper water is 20°C or more. (ii) The energy available due to the difference in the temperature of water at the surface of the ocean and at deeper levels is called ocean thermal energy (OTE).	1 1

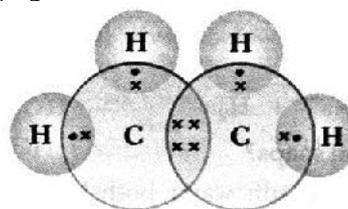
SECTION - C		
6.	<p>(i) (i) If somehow the live wire and neutral wire touch each other, this phenomenon of touching of live wire and neutral wire directly is known as short circuiting.</p> <p>(ii) When two such wires touch each other, the resistance of the circuit so formed is so small that a large quantity of current flows through the conductor wires.</p> <p>(iii) These wires get heated up to a very high temperature and so a fire can set up which can damage the electrical appliance and the building.</p> <p>(iv) In order to prevent such damages, a fuse of proper rating must be used as the fuse wire will melt before the temperature of the heated circuit wire gets too high and the circuit will break.</p>	2
(ii)	An electric motor works on the principle that when a current - carrying conductor is placed in a magnetic field; a force acts on the conductor which makes the conductor move.	1
OR		
6.	<p>(i) Graph I represents a direct current. Graph II represents an alternating current.</p> <p>(ii) A dry cell is a source of direct current. An a.c. generator is a source of alternating current.</p> <p>(iii) Time period of a.c., $T = 0.02 \text{ s}$ Frequency of a.c., $f = \frac{1}{T} = \frac{1}{0.02\text{s}} = 50 \text{ Hz.}$</p>	3
7.	<p>$R = \frac{\rho l}{A}$</p> <p>(i) Resistance (R) is independent of V. \therefore R will remain unchanged.</p> <p>(ii) $R \propto l$ \therefore If l is halved, R will be halved.</p> <p>(iii) $R \propto \frac{1}{A}$ or $R \propto \frac{1}{\pi r^2}$ $\left(r = \frac{D}{2} \right)$ $\therefore R \propto \frac{1}{D^2}$ \therefore If D is doubled, R will reduce to one fourth.</p>	3

<p>8.</p>	<table border="1" data-bbox="411 320 1050 544"> <thead> <tr> <th>Element</th> <th>Electronic configuration</th> </tr> </thead> <tbody> <tr> <td>Be</td> <td>2, 2</td> </tr> <tr> <td>F</td> <td>2, 7</td> </tr> <tr> <td>K</td> <td>2, 8, 8, 1</td> </tr> <tr> <td>Ca</td> <td>2, 8, 8, 2</td> </tr> </tbody> </table> <p>(i) K (ii) Be and Ca as both have same number of valence electrons, i.e., 2.</p> $ \begin{array}{ccc} \text{K} & & \text{X} \\ (2,8,8,1) & & (2,8,7) \\ \downarrow & & \downarrow \\ \text{K}^+ & + & \text{X}^- \longrightarrow \text{KX} \end{array} $ <p>Ionic or electrovalent bond is formed.</p>	Element	Electronic configuration	Be	2, 2	F	2, 7	K	2, 8, 8, 1	Ca	2, 8, 8, 2	<p>3</p>
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F	2, 7											
K	2, 8, 8, 1											
Ca	2, 8, 8, 2											
<p>9.</p>	<p>(i) Li, Na and K are grouped together in the periodic table and belong to group I. They are grouped together because all of them have one electron in their valence shell. Rest of the elements Cl, Br and I are grouped together in the periodic table and belong to group 17. They are grouped together because all of them have seven electrons in their valence shell.</p> <p>(ii) The elements of group 1 are called alkali metals because they react with water to liberate H₂ gas and form alkalies. The elements of group 17 are monovalent non-metals. They form acidic oxides and are called halogens.</p>	<p>3</p>										
<p>10.</p>	<p>Spore formation in Rhizopus : This is an asexual method of reproduction in bacteria and fungi. Spores are unicellular bodies formed by cell division in a parent organism. After detaching from the parent, and if conditions are suitable, they germinate, directly or indirectly and develop into a new individual.</p>	<p>3</p>										
 <p>Spore formation in Rhizopus</p>												
<p>OR</p>												
<p>10.</p>	<p>Menstruation occurs in females when the egg produced inside the ovaries is not fertilized. Since the egg does not fuse with the male gamete, so the thick and soft lining of uterus having a lot of blood capillaries in it is not required. This unfertilized egg dies within a day and the lining breaks down shedding blood along with other tissues. This comes out of the vagina in the form of blood.</p>	<p>3</p>										

<p>11.</p>	<p>The important factors which could lead to the formation of a new species are :</p> <p>(a) Geographical isolation of a population caused by various types of barriers. The geographical isolation leads to reproductive isolation due to which there is no flow of genes between separated groups of population.</p> <p>(b) Genetic drift caused by drastic changes in the frequencies of particular genes by chance alone.</p> <p>(c) Variation caused in individuals due to natural selection.</p>	<p>3</p>				
<p>12. (i)</p>	<table border="1"> <thead> <tr> <th data-bbox="284 779 810 824">Nuclear fusion</th> <th data-bbox="810 779 1329 824">Nuclear fission</th> </tr> </thead> <tbody> <tr> <td data-bbox="284 824 810 1294"> <p>1. In nuclear fusion, two lighter nuclei combine to form a heavy and stable nucleus.</p> <p>2. This reaction takes place only at a very high temperature of the order of 10^9 °C.</p> <p>3. Energy released per nucleon in fusion reaction is much greater than energy released per nucleon in fission reaction.</p> <p>4. It is very difficult to achieve controlled nuclear fusion on the surface of the earth.</p> </td> <td data-bbox="810 824 1329 1294"> <p>1. In nuclear fission, a heavy nucleus splits to form two or more lighter nuclei.</p> <p>2. This reaction can take place at a normal temperature.</p> <p>3. Energy liberated during a single nuclear fission is very less.</p> <p>4. It is not very difficult to achieve controlled nuclear fission for an atomic reactor.</p> </td> </tr> </tbody> </table>	Nuclear fusion	Nuclear fission	<p>1. In nuclear fusion, two lighter nuclei combine to form a heavy and stable nucleus.</p> <p>2. This reaction takes place only at a very high temperature of the order of 10^9 °C.</p> <p>3. Energy released per nucleon in fusion reaction is much greater than energy released per nucleon in fission reaction.</p> <p>4. It is very difficult to achieve controlled nuclear fusion on the surface of the earth.</p>	<p>1. In nuclear fission, a heavy nucleus splits to form two or more lighter nuclei.</p> <p>2. This reaction can take place at a normal temperature.</p> <p>3. Energy liberated during a single nuclear fission is very less.</p> <p>4. It is not very difficult to achieve controlled nuclear fission for an atomic reactor.</p>	<p>3</p>
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<p>(ii)</p>	<p>The region where very hot rocks (magma) occur at some depth below the surface of earth, are called 'hot spots'.</p>	<p>1</p>				
<p>13.</p>	<p>(i) ethane : The molecular formula is C_2H_6. Electron-dot Structure :</p> <div style="text-align: center;"> </div>	<p>1</p>				

(ii) **ethene** : The molecular formula is C_2H_4 .

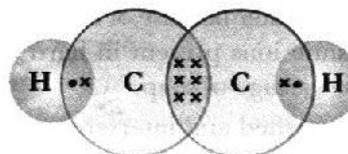
Electron-dot structure :



1

(iii) **ethyne** : The molecular formula is C_2H_2 .

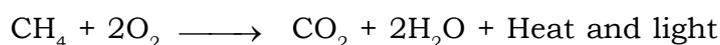
Electron-dot structure :



1

OR

13. (a) **Combustion reaction** : Carbon compounds burns in oxygen to produce carbon dioxide with release of large amount of heat and light



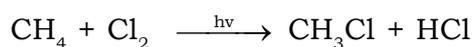
1

(b) **Oxidation reaction** : Ethanol is oxidised to ethanoic acid in the presence of alkaline $KMnO_4$ (oxidising agent) on heating.



1

(c) **Substitution reaction** : In the presence of sunlight, chlorine replaces the hydrogen atom of hydrocarbons.



1

14. **Disadvantages of dams:**

(i) **Social Problems:** Due to dam's construction, large number of human settlements are submerged in water and many people become homeless. The government must provide adequate compensation for the rehabilitation of these people which is not being done.

(ii) **Ecological problems:** Lot of deforestation takes place for the construction of dams, which leads to loss of biodiversity. Many plants get submerged under water and on decomposition this releases methane gas; that is the greenhouse gas; causing global warming.

(iii) Economic problems: For the construction of dams large funds are required, the government invests lot of money in its construction and the benefits of the output is not equivalent.

3

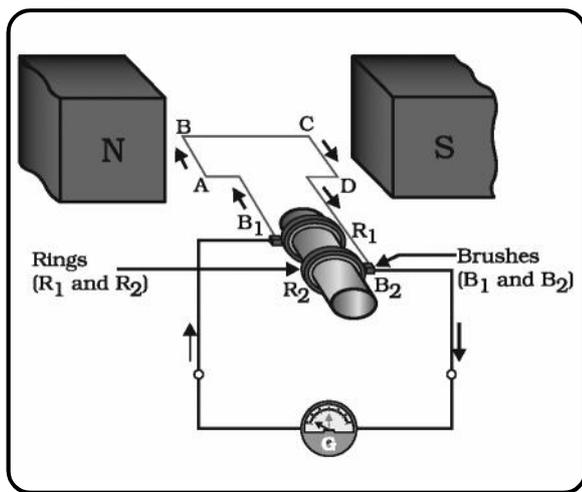
15. Mendel crossed the tall pea plants of the first generation and found that tall plants and dwarf plants were obtained in the second generation in the ratio of 3:1. Mendel noted that the dwarf trait of the parent pea plant which had seemingly disappeared in the first generation of progeny, reappeared in the second generation. Mendel called the repressed trait of dwarfness as 'Recessive trait' and the expressed trait of tallness as the 'Dominant trait'. In this way, Mendel's experiments with tall and dwarf pea plants showed that the traits may be dominant or recessive.

3

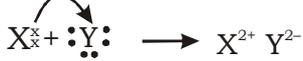
SECTION - D

16. (i) An A.C. electric generator is a device which converts mechanical energy into electrical energy.
 (ii) It generates alternating current.
 (iii) It consists of a rotating rectangular coil ABCD placed between the two poles of a permanent magnet. The two ends of this coil are connected to the two rings R_1 and R_2 . The inner side of these rings are made insulated.

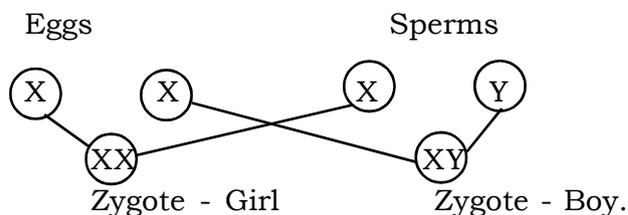
(iv) The two conducting stationary brushes B_1 and B_2 are kept pressed separately on the rings R_1 and R_2 , respectively.
 (v) The two rings R_1 and R_2 are internally attached to an axle. The axle may be mechanically rotated from



outside to rotate the coil inside the magnetic field. Outer ends of the two brushes are connected to the galvanometer to show the flow of current in the given external circuit.
 (vi) When the axle attached to the two rings is rotated such that the arm AB moves up and the arm CD moves down (clockwise) in the magnetic field produced by the permanent magnet.
 (vii) By applying Fleming's right hand rule, the induced currents are set up in these arms along the directions AB and CD. Thus an induced current flows in the direction ABCD.
 (viii) If there are larger numbers of turns in the coil, the current generated in each turn adds up to give a large current through the coil. This means that the current in the external circuit flows from B_2 to B_1 .

	<p>(ix) After half a rotation, arm CD starts moving up and AB moving down. As a result, the directions of the induced currents in both the arms change, giving rise to the net induced current in the direction DCBA. The current in the external circuit now flows from B₁ to B₂.</p> <p>(x) Thus after every half rotation the direction of the current in the respective arms changes. Such a current, which changes direction after equal intervals of time, is called an alternating current (abbreviated as AC). This device is called an AC generator.</p>	<p>5</p>
<p>17.</p>	<p>(a) (i) Atomic radius decreases. (ii) Atomic radius increases</p> <p>(b) Atomic number of element X = 12 Electronic configuration = 2, 8, 2 K L M</p> <p>Atomic number of element Y = 16 Electronic configuration = 2, 8, 6 K L M</p> <p>The period number of an element is equal to the number of electron shells in its atom. These two element have 3 electron shells, therefore they belong to 3rd period.</p>	<p>2</p>
	<p style="text-align: center;">  </p> <p>They will form ionic bond because X is a metal and Y is a non-metal. X loses two electrons which will be gained by Y.</p>	<p>3</p>
<p>OR</p>		
<p>17.</p>	<p>(a) Magnesium (Mg)</p> <p>(b) K, L, M 2, 8, 2</p> <p>(c) $2\text{Mg(s)} + \text{O}_2\text{(g)} \longrightarrow 2\text{MgO(s)}$</p> <p>(d) $\text{MgO(s)} + \text{H}_2\text{O(l)} \longrightarrow \text{Mg(OH)}_2\text{(aq)}$</p> <p>(e) $\text{Mg} + \overset{\text{x x}}{\underset{\text{x x}}{\text{O}}} \longrightarrow [\text{Mg}^{2+} : \overset{\text{x x}}{\underset{\text{x x}}{\text{O}}}]^{2-}$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>18.</p>	<p>The process by which the sex of a person is determined is called sex determination. The chromosomes which determine the sex of a person are called sex chromosomes. These are of two types - X and Y chromosomes.</p> <p>a) A man has one X and one Y chromosomes. b) A women has two X chromosomes. c) If a sperm carrying X chromosome fertilises an ovum which carries X chromosome, then the child will be a girl (XX). d) If a sperm carrying Y chromosome fertilises an ovum which</p>	

carries X chromosome, then the child will be a boy (XY). The sperm cell determines the sex of the child because half of the sperms have X chromosome and the other half have Y chromosome.



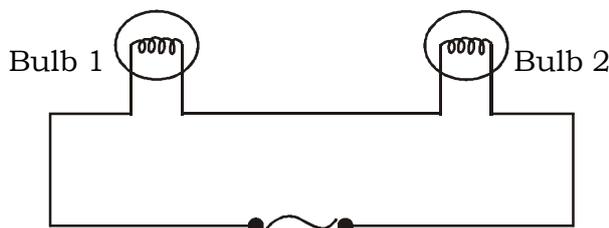
5

19. **Given :** $V = 220 \text{ V}$, $P = 60 \text{ W}$

Solution : (i) $R = \frac{V^2}{P}$ [$P = \frac{W}{t} = \frac{H}{t} = \frac{I^2 R t}{t} = I R = V I = \frac{V V}{R}$]
 $\therefore P = \frac{V^2}{R}$

$$= \frac{(220)^2}{60} = 806.67 \Omega$$

(b) The arrangement of two identical bulb connected in series.



(i) Rate of conversion of energy in each bulb = $\frac{H}{t} = P$

$V = 110 \text{ V}$ (P.D. across each bulb is equal to half of mains voltage)

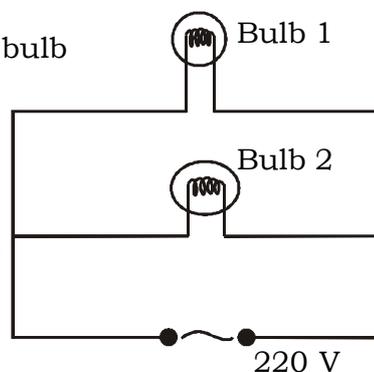
$$= \frac{V^2}{R} = \frac{(110)^2}{806.67} = \mathbf{15 \text{ W}}$$

(ii) Total power consumed in the two bulb

$$= 15 + 15 = \mathbf{30 \text{ W}}$$

(c) When connected in parallel

Total power consumed in the two bulbs
 $= (60 + 60) \text{ W}$
 $= \mathbf{120 \text{ W}}$



5

<p>20.</p>	<p>(i) Ethanol is highly inflammable liquid. It catches fire easily and starts burning. Ethanol burns readily in air with a blue flame to form carbon dioxide and water vapour:</p> $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \xrightarrow{\text{Combustion}} 2\text{CO}_2 + 3\text{H}_2\text{O}$ <p>A lot of heat is produced during the combustion of ethanol.</p>	<p>1</p>
<p>(ii)</p>	<p>Ethanol reacts with sodium to produce sodium ethoxide and hydrogen gas :</p> $2\text{C}_2\text{H}_5\text{OH} + 2\text{Na} \longrightarrow 2\text{C}_2\text{H}_5\text{ONa} + \text{H}_2$	<p>2</p>
<p>(iii)</p>	<p>Ethanol reacts with ethanoic acid in presence of concentrated sulphuric acid to form a sweet smelling ester, ethyl ethanoate.</p> $\underset{\text{Ethanol}}{\text{C}_2\text{H}_5\text{OH}} + \text{CH}_3\text{COOH} \xrightarrow{\text{H}_2\text{SO}_4} \underset{\text{Ethyl ethanoate}}{\text{CH}_3\text{COOC}_2\text{H}_5} + \text{H}_2\text{O}$	<p>2</p>
<p>21. (a) Fertilisation occurs when the male gamete present in pollen grain fuses with the female gamete present in ovule. (b) When a pollen grain falls on the stigma of the carpel, it bursts, open and grows a pollen tube downwards through the style towards the female gamete in the ovary. (c) A male gamete moves downwards the pollen tube. The pollen tube enters the ovule in the ovary. The tip of pollen tube bursts open and male gamete comes out of pollen tube. (d) In ovary, the male gamete of pollen tube combines with the nucleus of female gamete to form a fertilised egg (zygote).</p>		<p>5</p>
<p>OR</p>		
<p>21. (a)</p>	<p>Functions of the following in human female reproductive system: (i) Ovary: Ovary performs dual functions of production of female gamete or ovum and the secretion of female sex hormones, oestrogen and progesterone. (ii) Oviduct: It carries ova or egg cells from the ovary to the uterus. (iii) Uterus: It is a hollow pear-shaped organ within which the embryo develops.</p> <p>(b) (i) The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta.</p>	<p>2</p>

	<p>(ii) It is the special tissue in the form of a disc which is embedded in the uterus wall. It provides large surface area for glucose and oxygen to pass from mother to the embryo.</p> <p>(iii) The waste generated by the embryo also passes into the mother's blood through this placenta.</p> <p style="text-align: center;">SECTION - E</p> <p>22. Atomic numebr of X = Mass number of X – Numbert of neutrons = 35 – 18 = 17</p> <p>Therefore, electronic configuarion of X = 2, 8, 7 Group numebr = 17 Period number = 3 Valency = 8 – 7 = 1</p> <p>23. 'X' is Benzene with molecular formula C₆H₆ Structural formula</p> <div style="display: flex; justify-content: space-around; align-items: center;">  $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H}-\text{C}=\text{C}=\text{C}-\text{H} \\ \\ \text{H} \end{array}$ </div> <p>24. (i) Broccoli: Arrested flower development (ii) Cauliflower: Sterile flowers (iii) Kohlrabi: Swollen parts (iv) Kale: Larger leaves</p> <p>25. (i) Different types of pollutions like air, water, noise, soil. (ii) Loss of bio-diversities because of deforestation. (iii) Nuclear radiation emitted by nuclear power plants. (iv) Environmental problems like acid rains, global warming.</p> <p>26. In case of series combination the effective resistance (= R₁ + R₂) is more, hence slope of V-I graph will be more. It is other wise in case of I – V graph. So, series and parallel are correctly marked in graph (ii)</p>	<p style="text-align: center;">3</p> <p style="text-align: center;">2</p>
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OR

26. Resistance of each part = $\frac{R}{5}$

When the five parts are connected in parallel, the equivalent resistance R' is given by

$$\frac{1}{R'} = \frac{5}{R} + \frac{5}{R} + \frac{5}{R} + \frac{5}{R} + \frac{5}{R} = \frac{25}{R}$$

$$\therefore \frac{R}{R'} = 25$$

2

27. The direction of earth's magnetic field is from geographical south to geographical north. According to Fleming's left hand rule, the current carrying straight conductor placed in east-west direction will be deflected downwards.

On reversing the direction, the conductor is deflected in the upward direction.

2