

# Prelim - Model Answer Paper

## Science and Technology

Time : 2½ Hrs.

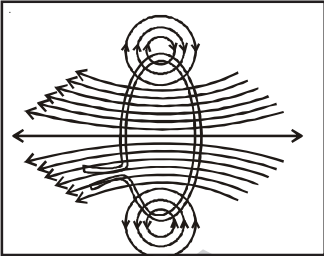
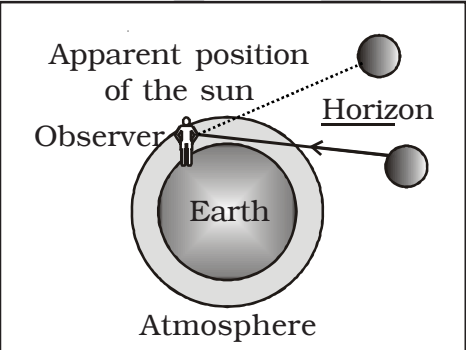
(Pages 10)

Marks : 60

<b>Section A</b>			
<b>A.1.</b>	<b>(A) Fill in the blanks :</b>		
1.	When acids and alkalies react together <b>salt</b> and <b>water</b> are formed.	<b>1</b>	
2.	Very fine particles mainly scatter <b>blue</b> light.	<b>1</b>	
3.	The apparent random wavering of the hot air rising above the heated roads is called <b>mirage</b> .	<b>1</b>	
	<b>(B) Match the following :</b>		
	<b>Group A</b>	<b>Group B</b>	
1.	Manganese –	Transition metal	<b>1</b>
2.	Cerium –	Lanthanide	<b>1</b>
	<b>(C) State true or false. If false correct it.</b>		
1.	True.		<b>1</b>
	<b>(D) Find the odd one out</b>		
1.	CH <sub>3</sub> COOH. It is a weak acid while the rest are strong acids.		<b>1</b>
<b>A.2.</b>	<b>Answer the following questions :</b>		
1.	1. Those elements which have a tendency to lose their valence electrons and form positive ions are considered metals.		<b>2</b>
	2. On moving across a period, nuclear pull increases due to the increase in atomic number and thus, atomic size decreases. Hence, elements cannot lose electrons easily.		
	3. Therefore, the metallic character decreases across a period, moving from left to right.		

<p>2.</p>	<p>The characteristics of magnetic lines of force are :</p> <ol style="list-style-type: none"> <li>1. Magnetic lines of force are closed continuous curves. They start from north pole and ends on south pole.</li> <li>2. The tangent at any point on the magnetic lines of force gives the direction of the magnetic field at that point.</li> <li>3. No two magnetic lines of force can intersect each other.</li> <li>4. Magnetic lines of force are crowded where the magnetic field is strong and far from each other where the field is weak.</li> </ol>	<p>2</p>
<p>3.</p>	<p>a) <math>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(g)}</math>  Ethyl alcohol      Sodium              Sodium ethoxide      Hydrogen</p>	<p>1</p>
<p></p>	<p>b) <math>2\text{CuCl}_2 + 2\text{KI} \longrightarrow \text{Cu}_2\text{I}_2 \downarrow + 2\text{KCl}</math>  Copper chloride      Potassium iodide              Cupric iodide (brown precipitate)      Potassium chloride</p>	<p>1</p>
<p><b>A.3.</b></p>	<p><b>Answer the following questions : (Any four)</b></p>	<p></p>
<p>1.</p>	<ol style="list-style-type: none"> <li>1. The strength of an acid or base is measured on a scale of numbers called the pH scale.</li> <li>2. pH scale helps in measuring hydrogen ion concentration in solutions.</li> <li>3. The scale reads from zero (most acidic) to 14 (most basic).</li> <li>4. The value of pH indicates acidic or basic nature of a solution.</li> <li>5. When the pH value is in between 0 to 7, the solution is acidic in nature. At value 7, the solution is neutral and between 7 to 14 the nature of the solution becomes alkaline/basic.</li> <li>6. Strongly acidic substance have a very low pH. In fact, lower the pH, the stronger the acid.</li> <li>7. The solutions having pH values of 11, 12, 13 and 14 are usually considered strong bases. In fact higher the pH, the stronger the base.</li> </ol>	<p>3</p>
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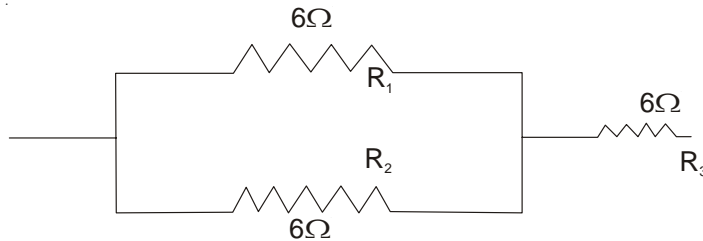
<p>2.</p>	<p>a) <b>Joule's law</b> : Joule's law can be stated as : The quantity of heat generated (H) in a conductor of Resistance (R), when a current (I) flows through it for a time (t) is directly proportional to :</p> <ol style="list-style-type: none"> <li>1. The square of the current.</li> <li>2. The resistance of the conductor, and</li> <li>3. The time for which the current flows. <math>H = \frac{I^2Rt}{4.18} \text{ cal}</math></li> </ol> <p><b>Given</b> : Potential Difference (V) = 250V Resistance (R) = 1000Ω Time (t) = 12 sec.</p> <p><b>To find</b> : (i) The current I (ii) Heat energy produced in joules</p> <p><b>Formula</b> : <math>I = \frac{V}{R}</math> <math>H = I^2Rt \text{ Joules}</math></p> <p><b>Solution</b> : (i) <math>I = \frac{V}{R}</math> <math>I = \frac{250V}{1000\Omega} = \frac{1}{4}</math> <math>I = 0.25 \text{ A}</math></p> <p>(ii) <math>H = I^2Rt \text{ Joules}</math> <math>H = (0.25 \text{ A})^2 \times 1000\Omega \times 12 \text{ sec.}</math> <math>= 0.0625 \times 1000 \times 12</math> <math>= 750 \text{ Joules}</math></p> <p><b>(i) Current produced in a electric iron = 0.25A.</b> <b>(ii) Heat energy produced in Joules = 750 Joules.</b></p>	<p>3</p>
<p>3.</p>	<ol style="list-style-type: none"> <li>1. At every point of the circular loop, the magnetic field lines are in the form of concentric circles.</li> <li>2. These circles would become larger and larger as we move away from the loop.</li> <li>3. At the center of the loop, the areas of these circles would appear as straight lines.</li> </ol>	<p>3</p>

<p>4.</p> <p>5.</p> <p>4.</p> <p>5.</p>	<p>4. The magnetic field produced by a current carrying wire at a given point depends directly on the current passing through it.</p> <p>5. Thus, if a coil has 'n' turns, the field produced is 'n' times larger than that produced by a single turn.</p> <p>6. This is because the current in each circular turn has the same direction, and the field due to each turn then just adds up.</p> <p>a) 20 cm    b) 35 cm    c) 30 cm.</p> <p>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.</p> <p>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.</p> <p>3. The large scale effect of this phenomenon is the twinkling of stars, advanced sunrise and delayed sunset.</p> <p>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.</p> <p>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.</p> <p>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.</p>	<p><b>Magnetic field lines due to current through circular</b></p>  <p><b>Atmospheric refraction at Sunset</b></p>  <p><b>3</b></p> <p><b>3</b></p>
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**A.4. Answer the following questions : (Any one)**

**5**

1.



Resistance in parallel combination,

$$\begin{aligned} \frac{1}{R_p} &= \frac{1}{R_1} + \frac{1}{R_2} \\ &= \frac{1}{6} + \frac{1}{6} \\ &= \frac{2}{6} \end{aligned}$$

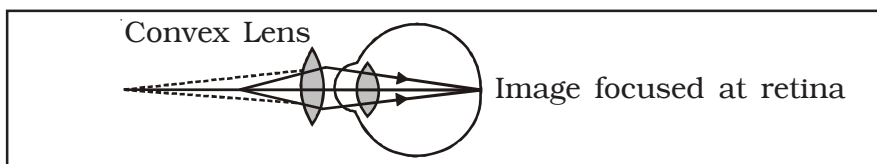
$$\therefore R_p = \frac{6}{2} = 3\Omega$$

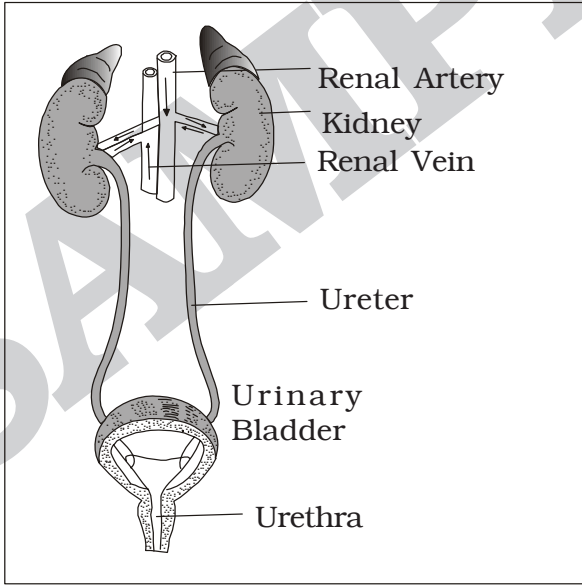
Total resistance in the combination,

$$\begin{aligned} R_s &= R_p + R_3 \\ &= 3 + 6 \\ &= 9\Omega \end{aligned}$$

- 2.
1. The defect of vision is hypermetropia.
  2. The two possible reasons of hypermetropia are :
    - (a) Weak action of ciliary muscles cause low converging power of eye lens.
    - (b) The distance between eye lens and retina decreases on account of either shortening of eyeball or flattening of lens.
  3. The defect is corrected using convex lens.
  4. The convex lens converges the light rays and image is now formed on the retina.

**5**



<b>Section B</b>		
<b>A.1.</b>	<b>(A) Fill in the blanks :</b>	
1.	<b>Reproduction</b> is necessary to maintain the number of individuals of a species.	<b>1</b>
2.	The botanical name of garden pea is <b>Pisum sativum</b>	<b>1</b>
3.	Solidified ethanoic acid is called <b>glacial acetic acid</b> .	<b>1</b>
	<b>(B) Name the following :</b>	
1.	Xylem and phloem.	<b>1</b>
2.	Carbondioxide and water	<b>1</b>
	<b>(C) Find odd one out :</b>	
1.	Al <sub>2</sub> O <sub>3</sub> . It is an amphoteric oxide while the rest are basic oxides.	<b>1</b>
2.	Heart. It is a circulatory organ while the rest are excretory organs.	<b>1</b>
<b>A.2.</b>	<b>Answer the following questions :</b>	
1.	<b>Human excretory system.</b>	<b>2</b>
		
2.	<ol style="list-style-type: none"> <li>1. Based on their functions, the neurons are classified into three groups namely sensory neurons, motor neurons and association neurons.</li> <li>2. Sensory neurons conduct impulses from the sense organs to the brain and spinal cord.</li> <li>3. Motor neurons conduct impulses from the brain and spinal cord to the effector organs like muscles and glands.</li> </ol>	<b>2</b>

	<p>4. Association neurons perform the integrative functions of nervous system.</p> <p>3. 1. Honey bees are beneficial to sunflower crop because they carry pollen from plant to plant which results in cross pollination.                  2. Cross pollination improves the quality and quantity of seeds which results in high yield.                  3. In the absence of honey bees, cross pollination does not occur and hence, the yield of sunflower goes down tremendously.</p> <p><b>A.3. Answer the following questions : (Any four)</b></p> <p>1. Connection links :</p> <ol style="list-style-type: none"> <li>Organisms which are structurally intermediate between two different groups are referred to as connecting links.</li> <li>Peripatus is a connecting link because it has segmental nephridia, thin cuticle and parapodia like appendages as in Annelida.</li> <li>At the same time it has trachea and open circulation as in Arthropoda.</li> <li>The duck-billed platypus lays eggs like reptile and has hair and memory glands like mammals.</li> <li>Lung fishes though a fish breathes air through its lungs.</li> <li>These organisms point strongly to the fact that : Mammals have evolved from Reptiles and Amphibia from fishes.</li> </ol> <p>2. Male parent                      Female parent</p> <p>..... gametes</p> <p>Female offspring              Male offspring</p> <ol style="list-style-type: none"> <li>Sex determination in human beings is genetical.</li> <li>In human beings there are 46 chromosomes or 23 pairs out of which 22 pairs are autosomes and one pair is sex chromosome.</li> </ol>	<p><b>2</b></p> <p><b>3</b></p> <p><b>3</b></p>
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	<p>3. In human males two dissimilar chromosomes XY are present and in human females similar chromosomes XX are present.</p> <p>4. All children inherit 'X' chromosome from their mother and 'X' or 'Y' from their father.</p> <p>5. Therefore, the sex of the offspring is determined by the chromosome that they inherit from their father.</p> <p>6. If it is 'X' then the offspring will be a daughter and if 'Y' then it will be a son.</p> <p>3. 1. When Hydra reaches maturity and is well fed its body wall begins to form a rounded growth from the stalk of the adult.</p> <p>2. This growth is called a bud which develops in time into a miniature hydra.</p> <p>3. The body layers, body cavity and the digestive cavity of the young hydra are continuous with that of the parent hydra.</p> <p>4. The young hydra gets nourishment from the parent.</p> <p>5. When the young hydra is sufficiently developed to take up an independent existence, the base of the new hydra seals off and thus, allows the new individual to break off from the parent hydra.</p> <div data-bbox="359 1258 1157 1563" data-label="Diagram"> </div>	<p><b>3</b></p>
	<p>4. 1. The movement or growth of any part of a plant in response to an external stimulus is called tropism or tropic movements. These movements are growth dependent.</p> <p>2. The movement of shoot system of a plant in response to the stimulus light is called phototropism. e.g. stem bends towards the light.</p> <p>3. The movement of root system of a plant in response to the stimulus of gravity is called gravitropism. e.g. roots grow downwards.</p>	<p><b>3</b></p>



