

MT

2017 ____ 1100

MT - SCIENCE & TECHNOLOGY - I (72) - SEMI PRELIM - II : PAPER - 4

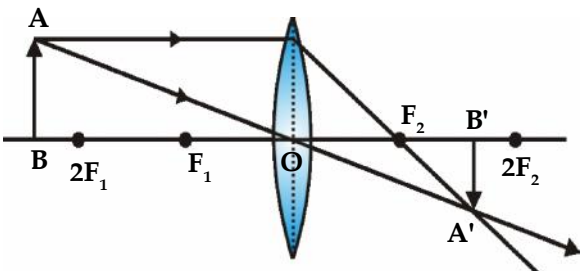
Time : 2 Hours

Model Answer Paper

Max. Marks : 40

A.1. (A) Fill in the blanks:	
(1) The formula of chloride of metal is MCl_2 , the metal M belongs to II A/2 group.	1
(2) The image of an object is formed behind retina in hypermetropia.	1
(3) The SI unit of charge is coulomb .	1
A.1. (B) State whether the following statements are true or false and if false, write the correct statement:	
(1) False - It is an example of combination reaction.	1
(2) False - Electric bulb consists of filament whose melting point is high.	1
A.2. Rewrite the following statements by selecting the correct alternative:	
(1) (b) white precipitate is formed	1
(2) (a) $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$	1
(3) (a) $f = \frac{R}{2}$	1
(4) (c) towards the screen	1
(5) (c) Ohm's law	1
A.3. Answer the following in short : (Any 5)	
(1) When sulphur dioxide reacts with hydrogen sulphide it gives sulphur and water.	2
$SO_{2(g)} + 2H_{2S(g)} \rightarrow 3S_{(s)} + 2H_2O_{(l)}$	
Sulphur dioxide Hydrogen sulphide Sulphur Water	

(2)	<p>(i) Valency is the number of electrons donated, accepted or shared by the atoms of an element so as to complete the octet (duplet in case of He) in the outermost orbit.</p> <p>(ii) Valency is dependent on the number of electrons present in the outermost shell of an atom called valence electrons.</p> <p>(iii) Elements in the same group have same number of valence electrons, irrespective of the number of orbits. Hence, elements in the same group show the same valency.</p>	2				
(3)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Groups</th> <th style="width: 50%; text-align: center;">Periods</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <p>(i) Vertical columns of elements in the Modern Periodic Table are called groups.</p> <p>(ii) There are 18 groups in the Periodic Table.</p> <p>(iii) The group number indicates the valence electrons in the outermost shell.</p> <p>(iv) The elements in same group have similar chemical properties.</p> </td> <td style="vertical-align: top;"> <p>(i) Horizontal rows of elements in the Modern Periodic Table are called periods.</p> <p>(ii) There are 7 periods in the Periodic Table.</p> <p>(iii) The period number indicates the number of shells in the atoms of an element.</p> <p>(iv) The elements in a period exhibit gradual change in properties from left to right.</p> </td> </tr> </tbody> </table>	Groups	Periods	<p>(i) Vertical columns of elements in the Modern Periodic Table are called groups.</p> <p>(ii) There are 18 groups in the Periodic Table.</p> <p>(iii) The group number indicates the valence electrons in the outermost shell.</p> <p>(iv) The elements in same group have similar chemical properties.</p>	<p>(i) Horizontal rows of elements in the Modern Periodic Table are called periods.</p> <p>(ii) There are 7 periods in the Periodic Table.</p> <p>(iii) The period number indicates the number of shells in the atoms of an element.</p> <p>(iv) The elements in a period exhibit gradual change in properties from left to right.</p>	2
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(4)	<p>When zinc reacts with copper sulphate, zinc being more reactive than copper, displaces copper to give colourless zinc sulphate and reddish brown deposit of copper. So, it is a displacement reaction. The blue colour of copper sulphate fades due to formation of colourless zinc sulphate.</p> $ \begin{array}{ccccccc} \text{CuSO}_{4(s)} & + & \text{Zn}_{(s)} & \rightarrow & \text{ZnSO}_{4(aq)} & + & \text{Cu}_{(s)} \\ \text{Copper} & & \text{Zinc} & & \text{Zinc sulphate} & & \text{Copper} \\ \text{sulphate} & & & & & & \end{array} $	2				
(5)	<p>(i) Copper and aluminium are good conductors of electricity.</p> <p>(ii) They have low electrical resistance.</p> <p>(iii) As they are malleable and ductile they can be drawn into thin wires. Hence connecting wires in a circuit are made of copper or aluminium.</p>	2				

(6)	<p style="text-align: center;">Convex mirror</p> <p>(i) In a convex mirror, the reflecting surface is on the outer side. (ii) It is called as diverging mirror. (iii) The focus of a convex mirror is virtual. (iv) It can form only a virtual image (v) It can form only a diminished image.</p>	<p style="text-align: center;">Concave mirror</p> <p>(i) In a concave mirror, the reflecting surface is on the inner side. (ii) It is called as converging mirror. (iii) The focus of a concave mirror is real. (iv) It can form a real as well as a virtual image. (v) It can form an enlarged, diminished as well as the same size image.</p>	2
(7)	 <p>Image position : Between F_2 and $2F_2$. Nature : Real, inverted and diminished.</p>		2
A.4.	<p>Answer the following in brief : (Any 5)</p> <p>(1) (i) On the basis of electronic configuration of elements, the periodic table is divided into four blocks namely, s-block, p-block, d-block and f-block. (ii) The elements of s-block (except hydrogen), d-block and f-block are all metals. (iii) In the p-block, all the three types of elements, i.e metals, non-metals and metalloids are present. (iv) A zig-zag line separates the metals on the left side from the non-metals on the right side of the periodic table. (v) The bordering elements along the zig-zag line are the metalloids. These are Antimony (Sb), Germanium (Ge), Boron (B), Silicon (Si), Arsenic (As), Tellurium (Te), Polonium (Po). They show intermediate properties and are called as metalloids or semi-metals.</p>		3

(2)	<p>(i) The symbols or molecular formulae of the reactants are written on the left hand side and products are on the right hand side.</p> <p>(ii) Reactants and products are connected with an arrow (\rightarrow) pointing towards product side.</p> <p>(iii) Whenever there are two or more reactants, a plus (+) sign is written between each of them. Similarly, if there are two or more products, a plus sign is written between them.</p> <p>(iv) Certain reactions have to be carried out under specific condition such as temperature, pressure, catalyst. These conditions are mentioned on and below the arrow pointing from reactants to product.</p> <p>(v) The physical states of reactants and products are also mentioned in a chemical equation to make it more informative.</p> <p>(vi) The notations like g, l, s, aq are written in brackets as subscripts along with symbols/formulae of reactants and products.</p> <p>\uparrow or (g) - Gas (l) - Liquid (s) - Solid (aq) - Aqueous solution \downarrow - Precipitate.</p>	3
(3)	<p>(a) (i) The physical states of the reactants and products are to be mentioned in the chemical equation, when necessary to make it more informative.</p> <p>(ii) The gaseous, liquid and solid states are symbolized as (g), (l) and (s) respectively.</p> <p>(iii) If the reactants or products are present as solution in excess of water it is represented as aqueous (aq).</p> <p>(b) Reduction reaction : The chemical reaction where reactants lose oxygen or combine with hydrogen to form a product is called reduction reaction.</p>	2 1
(4)	<p>(a) The electric current (I) flowing in a metallic conductor is directly proportional to the potential difference (V) across its terminals, provided physical conditions of the conductor such as length, area of cross section, temperature and material remain constant.</p> $V \propto I \text{ or } R = \frac{V}{I}$ <p>(b) Given : Current (I) = 0.24 A P.D. (V) = 24 V To find : Resistance (R) = ?</p>	3

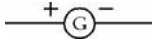

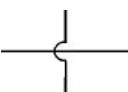
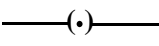
	<p>Formula : $V = IR$</p> <p>Solution : $V = IR$</p> $\therefore R = \frac{V}{I}$ $\therefore R = \frac{24}{0.24}$ $\therefore R = 100 \Omega$ <p>\therefore The resistance of the conductor is 100Ω.</p>	
(5)	<p>(a) Centre of curvature of a lens : It is the centre of the imaginary sphere, which forms the given lens. Each lens has two centres of curvature C_1 and C_2 respectively.</p> <p>(b) Principal axis of a lens : It is an imaginary straight line passing through the two centres of curvatures of lens.</p> <p>(c) Optical centre of a lens : The central point of lens on the principal axis is its optical centre. When a ray of light passes through the optical centre of a lens, it passes without undergoing any deviation.</p>	3
(6)	<p>Given : $R_1 = 8 \Omega$ $R_2 = 12 \Omega$ $R_3 = 7.2 \Omega$</p> <p>To find : Total resistance (R) = ?</p> <p>Formula : $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ $R = R_p + R_3$</p> <p>Solution : $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$</p> $\therefore \frac{1}{R_p} = \frac{1}{8} + \frac{1}{12}$ $\therefore \frac{1}{R_p} = \frac{3+2}{24}$ $\therefore \frac{1}{R_p} = \frac{5}{24}$ $\therefore R_p = \frac{24}{5}$ $\therefore R = 4.8 \Omega$	3

$$\begin{aligned} \therefore R &= R_p + R_3 \\ \therefore R &= 4.8 + 7.2 \\ \therefore R &= 12 \Omega \end{aligned}$$

The total resistance of the circuit is 12 h.

(7) Draw the symbols of any three of the following :

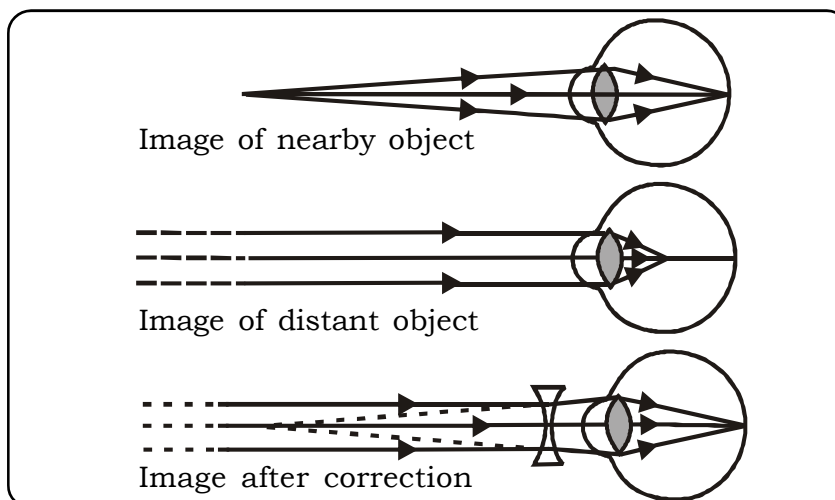
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- (a) Galvanometer  (b) Tap key open 
- (c) Wire crossing  (d) Plug key closed 

A.5. Answer in detail: (Any 1)

- (1) (i) It is the defect in which a human eye can see nearby objects clearly but is unable to see distant objects clearly.
 (ii) In myopia, the image of distant object is formed in front of retina.
 (iii) There are two possible reasons of myopia :
 (a) As ciliary muscles do not relax sufficiently, converging power of eye lens becomes high.
 (b) The distance between eye lens and retina increases as the eyeball is lengthened or lens is curved.

5



- (iv) A concave lens of suitable focal length can correct this defect.
 (v) The power of concave lens is so chosen that it creates required divergence and hence after the converging action of eye lens, the image is formed on the retina.

(2)	Based on electronic configuration, the modern periodic table is divided into four blocks namely, s-block, p-block, d-block, f-block.				5	
		s - block	p - block	d - block		f - block
	No. of shells incomplete/valence electrons	Outermost shell incomplete (1 or 2 valence electrons).	Outermost shell incomplete except zero group elements that have completely filled shells (3 to 8 valence electrons).	Last two shells incomplete.		Last three shells incomplete.
	Position	IA, IIA and hydrogen.	III A to VII A and zero group.	Group IIIB to IIB along with group VIII.		Lanthanides and actinides placed separately at the bottom of the periodic table.
	Includes	All metals except hydrogen.	Metals, non-metals, metalloids, zero group elements.	Metals.		Metals.
Types of elements	Normal elements.	Normal and inert elements.	Transition elements.	Inner-transition elements.		
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