



WINTER- 16 EXAMINATION

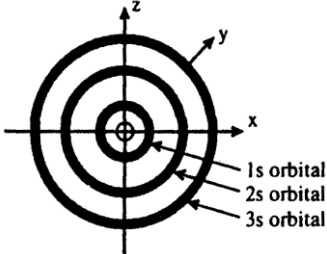
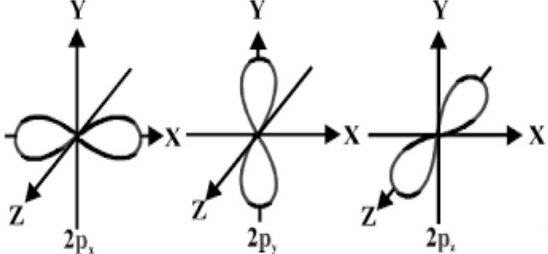
Model Answer

Subject Code:

17103

**Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q.N.	Answer	Marking Scheme
1	a)	<p><b>Attempt any NINE of Following:</b></p> <p><b>Draw shapes of s and p orbitals.</b></p>  <p>s orbital</p>  <p>p orbitals</p> <p>(1 mark for s orbital and 1 mark for p orbital)</p>	<p><b>18</b></p> <p>2</p> <p>1 mark each</p>
	b)	<p><b>If atomic number and atomic mass number of an element are 11 and 23 respectively, write number of protons, neutrons and electrons in it.</b></p> <p><b>Given:</b> Atomic number (Z) : 11 Atomic mass number (A) : 23</p> <p>1) Number of protons (p): <math>Z = p = 11</math></p> <p>2) Number of neutrons (n): <math>A - Z = 23 - 11 = 12</math></p> <p>3) Number of electrons (e): <math>Z = p = e = 11</math></p>	<p>2</p> <p>½ mark each step</p>



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1	c)	<p><b>Give two postulates of Bohr's Theory.</b></p> <ol style="list-style-type: none"> <li>1. An atom consists of a dense positively charged central part called as <b>Nucleus</b>.</li> <li>2. The electrons revolve around the nucleus in fixed circular paths are called <b>orbit or shell</b>. The electrostatic force of attraction between nucleus &amp; electron balanced by the centrifugal force. Hence the electrons do not fall into the nucleus and therefore atom remains stable.</li> <li>3. Electron can rotate only in certain permitted orbits known as <b>stationary state</b>.</li> <li>4. Each stationary state is having definite amount of energy hence called as <b>energy level</b>.</li> <li>5. Electrons in the energy level nearest to the nucleus have <b>lower</b> energy while those are at <b>greater</b> distance from the nucleus have <b>higher</b> energy.</li> <li>6. As long as the electron stays in the same energy level, the energy remains constant. The energy of an electron can change only when it moves from one level to another.</li> <li>7. When the excited electron jumps from <b>lower to higher</b> energy level, it <b>absorbs or gain</b> energy. When the excited electron jumps from <b>higher to lower</b> energy level, it <b>emits or loses</b> energy.</li> <li>8. The angular momentum of an electron (<math>mvr</math>) must be an integral multiple of <math>h/2\pi</math>. Hence <math>mvr = nh/2\pi</math></li> </ol>	<p><b>2</b></p> <p>1 mark each</p>
	d)	<p><b>List the factors affecting on degree of ionization.</b></p> <p>Factors affecting degree of ionization:-</p> <ol style="list-style-type: none"> <li>1. Nature of Solute</li> <li>2. Nature of Solvent</li> <li>3. Concentration of the solution</li> <li>4. Temperature</li> </ol>	<p><b>2</b></p> <p>½ mark each</p>
	e)	<p><b>Establish the relation between chemical equivalence and electrochemical equivalence.</b></p> <p>The quantity of electricity, 96500 coulombs required to liberate or deposit 1 gm equivalent of a substance. 1 coulomb liberates/deposits the quantity of same substance (in grams) equal to its electrochemical equivalent. Thus, equivalent weight of a substance is 96,500 times the electrochemical equivalent.</p> <p><b>C.E. (Eq. Wt.) = 96,500 x E.C.E.</b></p>	<p><b>2</b></p> <p>2</p>
	f)	<p><b>State Faraday's second law of electrolysis.</b></p> <p><b>Faraday's Second Law of Electrolysis:</b> This law states that, when the same quantity of electricity is passed through the different electrolyte solutions which are connected in series, the amount of the substance deposited or liberated at the electrodes are directly proportional to their chemical equivalents.</p>	<p><b>2</b></p> <p>2</p>



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1	g)	<p><b>Calculate pH of 0.1 molar sulphuric acid. Assume complete dissociation.</b> As Sulphuric acid is dibasic acid Concentration of <math>H_2SO_4 = 0.1M = 0.2N</math> <math>pH = -\log_{10}[H^+]</math> <math>pH = -\log_{10}[0.2]</math> <math>pH = -[-0.69]</math> <math>pH = 0.69</math></p>	<p>2  <math>\frac{1}{2}</math>    <math>1\frac{1}{2}</math></p>												
	h)	<p><b>Give two uses of Duralumin.</b>  <b>Uses:</b> i) For making aeroplane, automobile &amp; locomotive parts from "alcad" sheets. ii) In making cables, surgical instruments and fluorescent tube caps. iii) For making rivets, bars, body of vehicles and housing cases etc.</p>	<p>2     1 mark each</p>												
	i)	<p><b>Differentiate between mineral and ore.</b></p> <table border="1" data-bbox="219 1045 1414 1444"> <thead> <tr> <th>Sr. No.</th> <th>Mineral</th> <th>Ore</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>It is a naturally occurring substance which contains metal either in free state or in combined state.</td> <td>Ore is a mineral from which metal can be extracted economically and profitably.</td> </tr> <tr> <td>2</td> <td>All Minerals are ores.</td> <td>All ores are not minerals.</td> </tr> <tr> <td>3</td> <td>Example: Clay : <math>Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O</math></td> <td>Example : Bauxite: <math>Al_2O_3 \cdot 2H_2O</math></td> </tr> </tbody> </table>	Sr. No.	Mineral	Ore	1	It is a naturally occurring substance which contains metal either in free state or in combined state.	Ore is a mineral from which metal can be extracted economically and profitably.	2	All Minerals are ores.	All ores are not minerals.	3	Example: Clay : $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$	Example : Bauxite: $Al_2O_3 \cdot 2H_2O$	<p>2     1 mark each</p>
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j)	<p><b>Give the principle of Gravity Separation Method.</b>  <b>Principle:</b> This method of concentration of ore is based on the difference in densities of the ore and impurities.</p>	<p>2   2</p>													
k)	<p><b>Name the organic compound present in natural rubber. Give its structure.</b>  The organic compound present in natural rubber is <b>Isoprene.</b>  <b>Structure of isoprene:</b></p> $CH_2 = \overset{\overset{CH_3}{ }}{C} - CH = CH_2$	<p>2  1  1</p>													



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2	1)	<p><b>Why the use of thermal Insulator is very important in various industries.</b></p> <p>The loss of heat takes place by conduction, convection and radiation. Thermal insulators prevent this loss of heat. They acts as barriers or retarders in the passage of heat. Due to this property thermal insulator is very important in various industry.</p> <p><b>Attempt any FOUR of following:</b></p>	<p>2</p> <p>2</p> <p>16</p>
	a)	<p><b>Write electronic configuration of following element.</b> <math>_{11}\text{Na}^{23}</math>, <math>_{14}\text{Si}^{28}</math>, <math>_{18}\text{Ar}^{40}</math>, <math>_{24}\text{Cr}^{52}</math>.</p> <p>Electronic configuration of above elements are as follow:</p> <p><math>_{11}\text{Na}^{23}</math> - <math>1s^2, 2s^2, 2p^6, 3s^1</math>.</p> <p><math>_{14}\text{Si}^{28}</math> - <math>1s^2, 2s^2, 2p^6, 3s^2, 3p^2</math>.</p> <p><math>_{18}\text{Ar}^{40}</math> - <math>1s^2, 2s^2, 2p^6, 3s^2, 3p^6</math>.</p> <p><math>_{24}\text{Cr}^{52}</math> - <math>1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1, 3d^5</math>.</p>	<p>4</p> <p>1 mark each</p>
	b)	<p><b>Explain formation of <math>\text{N}_2</math> molecule.</b></p> <div style="text-align: center;"> </div>	<p>4</p> <p>2</p>
		<p>Nitrogen molecule is diatomic. Each nitrogen atom (2, 5) is in short of 3 electrons to complete the octet. So each nitrogen atom contributes 3 electrons for sharing. Thus, nitrogen molecule is formed by sharing three pairs of electrons between two atoms of nitrogen &amp; hence completing the octet of each. Three shared pairs form a triple covalent bond.</p>	<p>2</p>





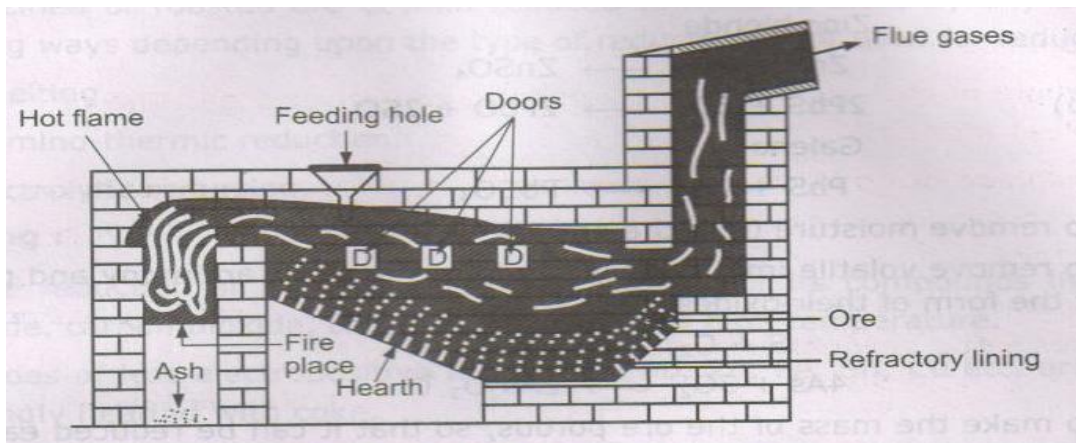
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2	f)	<p><b>Define oxidation potential and reduction potential.</b></p> <p><b>Oxidation Potential:</b> It is defined as the tendency of an electrode to lose electrons is a direct measure of its tendency to get oxidized and this tendency is called as oxidation potential.</p> <p><b>Reduction Potential:</b> It is defined as the tendency of an electrode to gain electrons is a direct measure of its tendency to get reduced and this tendency is called as reduction potential.</p>	4 2 2
3	a)	<p><b>Attempt any FOUR of following:</b></p> <p><b>Explain the process of calcination with labelled diagram.</b></p> <p><b>Calcination:-</b> 'Calcination is the process of heating the ore strongly in the absence of air to a temperature insufficient to melt it.' It is done in the hearth of a reverberatory furnace when the doors are kept closed. (i.e. in absence of air). Generally, carbonate &amp; hydroxide ores are concentrated by this method.</p> <p><b>Purposes of Calcination :- (consider any two points)</b></p> <ol style="list-style-type: none"><li>To convert carbonate &amp; hydroxide ore into oxide. <math>\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2 \uparrow</math> Limestone <math>\text{CuCO}_3 \cdot \text{Cu(OH)}_2 \rightarrow 2\text{CuO} + \text{CO}_2 \uparrow + \text{H}_2\text{O} \uparrow</math> Malachite</li><li>To remove the moisture. <math>\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O} \rightarrow \text{Fe}_2\text{O}_3 + 3\text{H}_2\text{O}</math> Haematite</li><li>To remove the volatile impurities.</li><li>To make mass porous, so that it can be easily reduced to the metallic state.</li></ol>	16 4 1 2 1





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3	b)	<p><b>Give composition, properties and uses of Wood's metal.</b></p> <p><b>Composition:-</b> Bi=50% Pb = 25% Sn = 12.5% Cd = 12.5%</p> <p><b>Properties:</b> i) It is an easily fusible alloy. ii) Its melting point is low, 71<sup>0</sup>C</p> <p><b>Uses:</b> It is used in- (any two) i) Safety plugs of pressure cookers ii) Safety plugs of Boilers iii) Fire alarms iv) Automatic water sprinklers v) Soft solder vi) For casting of dental work</p>	<p>4</p> <p>2</p> <p>½ mark each</p> <p>½ mark each</p>
	c)	<p><b>Define Refining. Explain poling (oxidation) method.</b></p> <p><b>Refining:-</b> The process of purification of metal to get extra - pure metal is known as refining.</p> <p><b>Poling (oxidation of impurities):</b> When the impurity has greater affinity for oxygen than the metal itself, then this method is used.</p> <p>This method consists of stirring the hot crude molten metal with green logs of wood. The wood gases (Hydrocarbons like methane etc.) so produced reduce any metal oxide impurity present in the metallic form. Moreover, during stirring large quantity of air is absorbed by the molten metal and such absorbed air oxidizes the easily oxidisable impurities. The oxidized impurities escape either as vapour or form 'scum' over molten metal. The scum so formed is removed by perforated ladle.</p> <div style="text-align: center;"> </div>	<p>4</p> <p>1</p> <p>2</p> <p>1</p>



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3	d)	<p><b>Give characteristics of insulating material.</b></p> <ol style="list-style-type: none"> <li>1) It should have very low thermal conductivity.</li> <li>2) It should be fire proof.</li> <li>3) It should be cheap.</li> <li>4) It should be colourless.</li> <li>5) Its density should be low.</li> <li>6) It should be water proof.</li> <li>7) It should be chemically inert to water, surrounding atmosphere and temperature.</li> <li>8) It should be odourless during use.</li> <li>9) It should be light in weight.</li> <li>10) It should be stable at working operation.</li> </ol> <p><b>(any eight)</b></p>	<p><b>4</b></p> <p>½ mark each</p>
	e)	<p><b>Describe the vulcanization of rubber.</b></p> <p><b>Vulcanization of rubber:-</b>“The process which involves addition of sulphur or H<sub>2</sub>S to crude (raw) natural rubber at high temperature &amp; pressure to improve properties of crude natural rubber is called vulcanization.”</p> <p>This process is used to improve the properties of natural rubber. It brings about a stiffening of rubber by a cross-linking and preventing intermolecular movement or sliding of rubber springs.</p> <p>Most of all the processes of vulcanization is addition of ‘sulphur’. Heating the raw rubber with sulphur to a high temperature, sulphur combines chemically at double bonds in the rubber molecule of different rubber springs.</p> <div style="text-align: center;"> <p>Crude rubber springs + 2S <math>\xrightarrow{\text{Vulcanisation}}</math> Vulcanised rubber</p> </div>	<p><b>4</b></p> <p>2</p> <p>2</p>





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3	f)	<p><b>Differentiate between addition polymerization and condensation polymerization.</b></p> <table border="1"><thead><tr><th>Sr. No.</th><th>Addition Polymerisation</th><th>Condensation Polymerisation</th></tr></thead><tbody><tr><td>i)</td><td>It is a process in which the monomers undergo repeated addition resulting in the formation of long chain polymer without the elimination of simple molecules like H<sub>2</sub>O, HCl, NH<sub>3</sub> etc.’’</td><td>It is a process in which the monomers of different types joined together by the condensation forming a large polymer with the elimination of simple molecules like H<sub>2</sub>O, HCl, CH<sub>3</sub>OH etc.</td></tr><tr><td>ii)</td><td>Unsaturated monomers undergo this polymerisation.</td><td>Functional monomers undergo this polymerisation..</td></tr><tr><td>iii)</td><td>It is fast reaction.</td><td>It is slow reaction.</td></tr><tr><td>iv)</td><td>Reaction gives only main product.</td><td>Reaction gives only main product &amp; subsidiary product.</td></tr><tr><td>v)</td><td>Reaction given product having linear or chain structures</td><td>Reaction gives product having three dimensional structures.</td></tr><tr><td>vi)</td><td>Reaction occurs without the elimination of simple molecules like H<sub>2</sub>O, HCl, NH<sub>3</sub> etc.’’</td><td>Reaction occurs with the elimination of simple molecules like H<sub>2</sub>O, HCl, CH<sub>3</sub>OH etc.</td></tr><tr><td>vii)</td><td>Polymers formed by addition polymerization are called as Thermosoftening plastics.</td><td>Polymers formed by condensation polymerization are called as Thermo setting plastics.</td></tr><tr><td>viii)</td><td>Polymers formed by addition polymerization are weak, soft and has low tensile strength.</td><td>Polymers formed by condensation polymerization are hard, tough &amp; has high tensile strength.</td></tr><tr><td>ix)</td><td>The bonds formed by addition polymerization are weak covalent bond</td><td>The bonds formed by addition polymerization are strong covalent bond</td></tr><tr><td>x)</td><td>e.g. Polyethene, Teflon, PVC, Polystyrene</td><td>e.g. Phenol formaldehyde, Nylon 6, 6</td></tr></tbody></table> <p><b>(Note: Consider any four points)</b></p>	Sr. No.	Addition Polymerisation	Condensation Polymerisation	i)	It is a process in which the monomers undergo repeated addition resulting in the formation of long chain polymer without the elimination of simple molecules like H <sub>2</sub> O, HCl, NH <sub>3</sub> etc.’’	It is a process in which the monomers of different types joined together by the condensation forming a large polymer with the elimination of simple molecules like H <sub>2</sub> O, HCl, CH <sub>3</sub> OH etc.	ii)	Unsaturated monomers undergo this polymerisation.	Functional monomers undergo this polymerisation..	iii)	It is fast reaction.	It is slow reaction.	iv)	Reaction gives only main product.	Reaction gives only main product & subsidiary product.	v)	Reaction given product having linear or chain structures	Reaction gives product having three dimensional structures.	vi)	Reaction occurs without the elimination of simple molecules like H <sub>2</sub> O, HCl, NH <sub>3</sub> etc.’’	Reaction occurs with the elimination of simple molecules like H <sub>2</sub> O, HCl, CH <sub>3</sub> OH etc.	vii)	Polymers formed by addition polymerization are called as Thermosoftening plastics.	Polymers formed by condensation polymerization are called as Thermo setting plastics.	viii)	Polymers formed by addition polymerization are weak, soft and has low tensile strength.	Polymers formed by condensation polymerization are hard, tough & has high tensile strength.	ix)	The bonds formed by addition polymerization are weak covalent bond	The bonds formed by addition polymerization are strong covalent bond	x)	e.g. Polyethene, Teflon, PVC, Polystyrene	e.g. Phenol formaldehyde, Nylon 6, 6	4  1 mark each
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