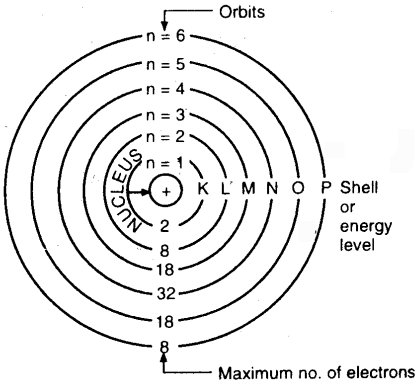
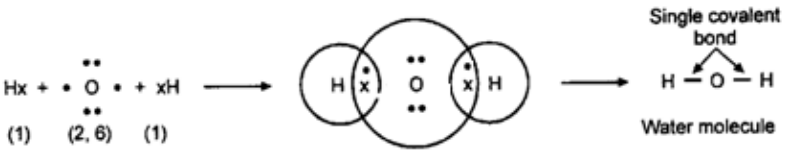
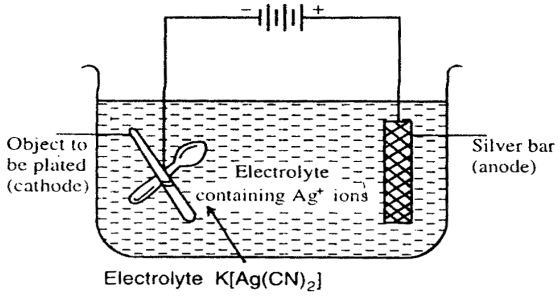
Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
		Important Instructions to examiners: 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme. 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the 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.		

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
1		**Attempt any Nine of the following.**		**18**
	a)	**Define atom .Name the sub atomic particles.**		**2**
		Atom: It is the smallest particle of an element which can not be further subdivided & which can take part in all chemical changes.	**1**	
		Sub atomic particles: Electron ,Proton, Neutron	**1**	
	b)	**State the number of subshells in K, L, M, N shells.**		**2**
		Shell | Number of subshells | Sub Shells K (n=1) | 1 | 1s L (n=2) | 2 | 2 s , 2p M (n=3) | 3 | 3s, 3p, 3d N (n=4) | 4 | 4s, 4p, 4d. 4f	**½ Mark each**	
	c)	**Why chlorine is electronegative? What type of valency it will show with hydrogen.**		**2**
		$C1 + e^- \xrightarrow{\text{gain of } 1e^-} C1^-$ (2,8,7) (2,8,8)	**1**	
		Chlorine gains one electron from another atom so as to complete its octet therefore chlorine is electronegative.		
		Type of valency with hydrogen : **Co-valency**.	**1**	
	d)	**Differentiate between strong and weak electrolyte.**		**2**
		Strong electrolytes | **Weak Electrolytes** 1) Electrolytes which are highly ionized in solution & hence have high degree of ionization are known as strong electrolytes. | 1) Electrolytes which are weakly ionized in solution & hence have low degree of ionization are known as weak electrolytes. 2) They have high degree of ionization. | 2) They have low degree of ionization. 3) They have high electrical conductivity. | 3) They have low electrical conductivity. 4)e.g. Strong acids – HCl, HNO_3 Strong bases – KOH, NaOH | 4) e.g. Weak acids – CH_3COOH, H_2CO_3, Weak base-NH_4OH **(Any Two points)**	**1Mark each**	

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
1.	**e)**	**What is the affect of temperature on degree of dissociation?** At higher temperature, molecules acquire thermal energy .Hence the velocity of molecules increases and it overcomes the electrostatic force of attraction between ions and separate the ions.Hence degree of ionization increases with increase in temperature.	**2**	**2**
	f)	**Define electrochemical equivalent. Give its unit.** **Electrochemical equivalent:** Electrochemical equivalent of an electrolyte is defined as the amount of substance deposited or liberated at an electrode by passing **1 ampere current** for **one second.** **OR** Electrochemical equivalent of an electrolyte is defined as the amount of substance deposited or liberated at an electrode by passing 1 coulomb of electricity through an electrolyte solution. **Unit:** gms/ coulomb	**1** **1**	**2**
	g)	**A solution has pH = 6.45. Calculate the hydrogen ion concentration.** **Given:** pH = **6.45.** [H +] = ? **Solution:** pH = $- \log_{10} [H^+]$ 6.45 = $- \log_{10} [H^+]$ $[H^+]$ = antilog (- 6.45) **$[H^+]$ = 3.5481×10^{-7} gm ions/ lit.**	**1** **1**	**2**
	h)	**Differentiate between calcination and roasting.** **Calcination** / **Roasting** 1)Process of heating the ore strongly in absence of air below its M.P. / 1)Process of heating the ore strongly in excess of air below its M.P. 2)This process is used to convert carbonate & hydroxide into their oxides / 2) This process is used to convert sulphide into oxide & sulphate. 3)Purpose is to remove the moisture & volatile impurities from the ore / 3)Purpose is to remove moisture & oxidation of ore & the impurities like S,P,As etc. 4)In calcination, the mass becomes porous, so that it can be easily reduced to metallic state. / 4) In roasting, the sulphide ore chemically changed into suitable form (oxides & sulphates) can be reduced to metallic state. 5) Process done in hearth of a reverberatory furnace when the doors are kept closed. / 5) Process done in hearth of a reverberatory furnace when the doors are kept opened. **(Any two points)**	**1 mark each**	**2**

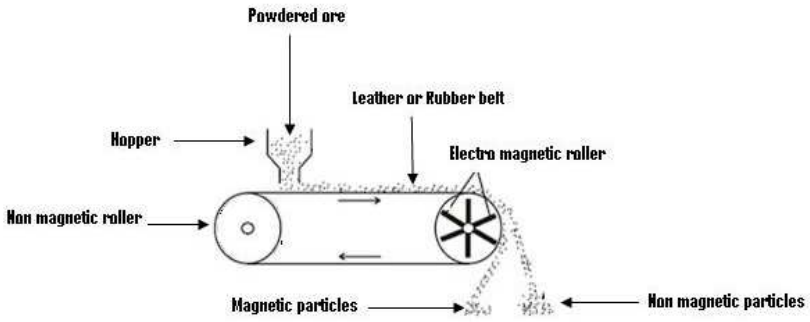
Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
1.	i)	**Define Alloy.Name two methods of preparing alloy.** **Alloy :-** It is defined as homogeneous **mixture of two or more elements** one of which must be a metal. **Methods of preparing alloy.** 1. Fusion 2. Compression	**1** **1**	**2**
	j)	**Why duralumin sheets are used in making aeroplanes body?** Duralumin sheets possess following properties: 1. Light in weight, tough. 2. Corrosion resistant. 3. Easily castable. 4. Strong as mild steel with good tensile strength. Because of these properties it is used in making aeroplanes body. **(Any two relevant properties)**	**1 mark each**	**2**
	k)	**Name four synthetic rubber.** 1. Buna – S or SBR 2. Buna – N 3. Butyl rubber 4. Neoprene 5. Thiokol **(Any Four names)**	**½ mark each**	**2**
	l)	**Write two properties of glass wool and its uses related to the property.** **Properties** / **Uses** 1.Low Thermal conductivity — 1.Used as thermal insulating material in domestics & industrial appliances such as motors, ovens, refrigerators. 2.Resistant to chemicals — 2.Used for filtering hot, corrosive liquids like acids, alkali etc 3. Average diameter is 0.00005 cm — 3. In air filters as a dust filtering material. 4.Sound-proof & low electrical conductivity — 4. Used as sound absorber and electrical insulation. 5.Low density — 5. Manufacturing fiber glass by reinforcing with plastic resins. **(Any two properties and related uses : 1 mark each)**	**1 mark each**	**2**

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
2.		**Attempt any four of the following.**		**16**
	a)	**Write four postulates of Bohr's atomic theory.** **1.** An atom consists of a dense positively charged central part called as **Nucleus.** **2.** The electrons revolve around the nucleus in fixed circular paths are called **orbits or shells**. The electrostatic force of attraction between nucleus & electron balanced by the centrifugal force. Hence the electrons do not fall into the nucleus and therefore atom remains stable. **3.** Electron can rotate only in certain permitted orbits known as **stationary states.** **4.** Each stationary state is having definite amount of energy called **energy levels or orbits or shells.** **5.** Energy levels are named as **K,L,M,N** for **n= 1,2,3,4 …..** **6.** Electrons in the energy level nearest to the nucleus have **lower** energy while those are at **greater** distance from the nucleus have **higher** energy. **7.** 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. When the excited electron jumps from **lower to higher** energy level, it **absorbs or gain** energy.Whereas the excited electron jumps from **higher to lower** energy level, it **emits or loses** energy. **8.** The angular momentum of an electron(mvr) must be an itegral multiple of $h/2\pi$. Hence **$mvr = nh/2\pi$**  **(Any four points can be considered for four marks)**	**1 mark each**	**4**

Que. No.	Sub. Que.	Model Answers	Marks	Total Marks
2	b)	**Name the type of bonding in water molecule and explain its formation.** **Type of bonding** : Single co-valent bonding. **Formation of Water Molecule:** H (Z = 1) $1S^1$ (1) O (Z = 8) $1S^2$, $2S^2$, $2P^4$ (2, 6) Water molecule (H_2O) contains two atoms of hydrogen & one atom of oxygen. Each hydrogen atom is in short of 1 electron of complete its duplet & oxygen atom is in short of 2 electrons to complete its octet. In the formation of water molecule, oxygen atom completes its octet by sharing one electron each with two hydrogen atoms. Similarly, each hydrogen atom complete its duplet by sharing one electron with oxygen atom. Thus, **two separate single co-valent bonds** are formed between hydrogen & oxygen atoms.  	**1** **1** **1** **1**	4
	c)	**Write the orbital electronic configuration of the following elements:** **i)** $_{19}K^{39}$ **ii)** $_{24}Cr^{52}$ **iii)** $_{10}Ne^{20}$ **iv)** $_{16}S^{32}$ **i)** $_{19}K^{39}$ $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1$ **ii)** $_{24}Cr^{52}$ $1s^2, 2s^2, 2p^6\ 3s^2, 3p^6, 3d^5, 4s^1$ **iii)** $_{10}Ne^{20}$ $1s^2, 2s^2, 2p^6$ **iv)** $_{16}S^{32}$ $1s^2, 2s^2, 2p^6, 3s^2, 3p^4$	**1 mark each**	4
	d)	**Explain the process of electroplating of an iron spoon with silver.**  	**1**	4

Que. No.	Sub. Que.	Model Answers	Marks	Total Marks
2.		**1.** Electroplating of silver on iron – spoon is carried out in a rectangular steel tank. **2.** Iron spoon, which is to be electroplated, is cleaned by boiling with caustic soda in order to remove the grease & dirt. **3**. Further it is washed with water & carefully polished. **4.** The iron spoon is then made as cathode & the anode consists of pure silver metal plate. **5.** The anode & cathode both are suspended in the electrolyte potassium argento-cyanide $K[Ag(CN)_2]$ in the cell. **6.** On passing the direct electric current, at the applied voltage, the iron spoon gets plated with a silver. Silver anode gets slowly dissolve in solution by giving Ag^+ ions. **The schematic representation is :** Ionisation: $K[Ag(CN)_2]$ ---------- $K^+ + [Ag(CN)_2^-]$ $[Ag(CN)_2^-]$ ---------- $Ag^+ + 2CN^-$ **At Cathode:** $Ag^+ + e^-$ ---------- Ag **At Anode:** Ag ---------- $Ag^+ + e^-$	**3**	
	e)	**Define electrolytic dissociation.State Arrhenius theory of electrolytic dissociation.** **Electrolytic dissociation: -** The process of splitting up of an electrovalent compound (Electrolyte) into its ions when dissolved in proper solvent like water is called as electrolytic dissociation. **Arrhenius theory of electrolytic dissociation.** 1) The molecules of an electrolyte when dissolved in water, split up into two kinds of charged particles, positively charged particle known as cation, negatively charged particle known as anion. 2) Cations are generally metallic radicals obtained by loss of electrons from metallic atoms, anions are generally non-metallic radicals obtained by gain of electrons from non-metallic atoms or groups of non-metals. 3) In solution, the total numbers of cations (positive charges) is equal to the total number of anions (negative charges) & hence the solution as a whole is electrically neutral. 4) The cations& anions present in the solution reunite together to form original electrovalent compound, hence it is reversible process. e.g. $NaCl \rightarrow Na^+ + Cl^-$ 5) The number of positve or negative charges that can be present on cation or anion depends upon valency of parent atom. **(Any 3 points : 1 mark each)**	**1** **1 mark each**	**4**

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
2.	**f.**	**A current of 2.5 amperes is passed through a solution of silver nitrate for half an hour. What is the mass of silver deposited on cathode? (Given: Equivalent weight of Ag= 108)** **Given**: c = 2.5 amperes t = Half an hour= 30 minutes = 1800 seconds Equivalent weight of Ag(Chemical equivalent) = 108 **Step I]** C.E. = E.C.E.(z) x 96500 108 = z x 96500 z = 108/96500 z = 0.001119 g/c **Step II]** From First law of Faraday, we have, W = z c t = 0.001119 x 2.5 x 1800 W = 5.036 g.	**1** **1** **1** **1**	**4**
3.		**Attempt any four of the following:**		**16**
	a)	**Define the term:** **i)Tensile strength** **ii) Hardness** **iii) Ductility** **iv) Soldering** i)**Tensile Strength :** Tensile Strength is the ability of metal to carry a load without breaking. ii)**Hardness :-** Hardness is the ability of metal to resist wear or abrasion and resist penetration. iii)**Ductilility:** Ductility is the ability of a metal due to which it can be stretched and converted into thin wire without breaking iv)**Soldering :-** The process of joining two metal surfaces by introducing a non ferrous alloy having melting point below 400^0c in between them is called as soldering.	**1 mark each**	**4**

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
3.	**b.**	**Explain with diagram electromagnetic separation method** **Principle**- This method is based upon magnetism **Process** –In this process powdered ore is allowed to fall through hopper on leather or rubber belt which is constantly moving over two rollers one of which is electromagnetic in nature. The magnetic particles present in the ore when come in contact with the magnetic field of the electromagnetic roller they get attracted towards the roller and hence get collected near the roller, while non magnetic particles present in the ore are not attracted towards the roller hence fall away from the roller. **e.g.** 1.concentration of magnetic ore like Haematite which contains non magnetic impurities 2. concentration of non magnetic ore like Tinstone which contains magnetic impurities  	**2** **1** **1**	**4**
	c.	**Give the composition, properties and uses of babbit metal** **Composition:** Sn = 88% Sb = 8% Cu =4% **Properties:** i) It is silvery white, soft metal alloy. ii) It has very low coefficient of friction. iii) It has very high corrosion and wear and tear resistance. iv) It can take high polish. v) It does not tarnish easily vi) It distributes the load uniformly. **Uses :** **i)** It is used for making engine bearing. **ii)** It is also used as a common bearing metal in cast iron boxes. (**Any two properties & two applications**)	**2** **1** **1**	**4**

<table>
<tr><th>Que. No.</th><th>Sub. Que.</th><th>Model Answer</th><th>Marks</th><th>Total Marks</th></tr>
<tr><td>3</td><td>d.</td><td>Give four properties and its related applications of rubber

<table>
<tr><th>Properties of rubber</th><th>Related application</th></tr>
<tr><td>1. Elasticity</td><td>For preparation of rubber bands, balloons, tubes for all vehicles</td></tr>
<tr><td>2 .High abrasion resistance</td><td>For preparation of tyres of all vehicles, shoe sols & shoe heels, conveyer belts, floor tiles ,rubber mats</td></tr>
<tr><td>3. Shock absorbing</td><td>For preparation of sports goods, toys, helmets, goggles, for mounting heavy machines, to reduce noise & vibrations</td></tr>
<tr><td>4. Excellent Electrical insulator</td><td>For insulation of electrical wires and cables , For hand gloves of electrician</td></tr>
<tr><td>5 .High Chemical resistance</td><td>Rubber lined tanks are used for storing corrosive chemicals rubber hoses are used for transmission of corrosive chemicals ,rubber gaskets & seals are used for sealing.</td></tr>
<tr><td>6 .Hardness</td><td>Rubber gaskets are used for sealing pressure cookers, refrigerators ,ovens, cabinet doors, autoclaves etc.</td></tr>
<tr><td>7 .Excellent thermal & sound insulator</td><td>Sponge insulator in auditoriums, theaters, in different filters.</td></tr>
<tr><td>8. Airproof</td><td>For preparation of balloons, tubes, air pillows, cushions, mattresses.</td></tr>
<tr><td>9 .Waterproof</td><td>For preparation of rain coats.</td></tr>
</table>

(Any four properties & related applications of rubber)</td><td>1 mark each</td><td>4</td></tr>
</table>

<table>
<tr><th>Que. No.</th><th>Sub. Que.</th><th>Model Answer</th><th>Marks</th><th>Total Marks</th></tr>
<tr><td>3</td><td>e.</td><td>Differentiate between thermosoftening and thermosetting plastics.
<table>
<tr><th>Thermo softening plastics</th><th>Thermo setting plastics</th></tr>
<tr><td>1 The plastics who possess linear long chain structure without cross linkages are called as thermo softening plastics</td><td>1 The plastics who possess three dimensional complicated structure with cross linkages are called as thermo setting plastics</td></tr>
<tr><td>2 They are formed by addition polymerization</td><td>2 They are formed by condensation polymerization</td></tr>
<tr><td>3 They consist of polymers of smaller molecular weight</td><td>3 They consist of polymers of higher molecular weight</td></tr>
<tr><td>4 They are softer, weaker &less brittle</td><td>4 They are harder, stronger & more brittle</td></tr>
<tr><td>5 They have low tensile strength</td><td>5 They have high tensile strength</td></tr>
<tr><td>6 Their inter molecular bonds are weak</td><td>6 Their inter molecular bonds are strong covalent bonds</td></tr>
<tr><td>7 They soften on heating</td><td>7 They do not soften on heating</td></tr>
<tr><td>8 They are soluble in organic solvent</td><td>8 They are insoluble in organic solvent</td></tr>
<tr><td>9 They can be reshaped and reused</td><td>9 They cannot be reshaped and reused</td></tr>
<tr><td>10 They can be reclaimed from the waste</td><td>10 They cannot be reclaimed from the waste</td></tr>
<tr><td>11 Examples- Polythene, Polystyrene, PVC, Teflon</td><td>11 Examples- Bakelite, Polyester, Nylon66, Urea formaldehyde,Silicon plastic</td></tr>
</table>
(Any four differences)</td><td>1 mark each</td><td>4</td></tr>
</table>

Que. No.	Sub. Que.	Model Answer	Marks	Total Marks
3	f.	**How is thermacole prepared? Write two uses and two properties of thermacole** **Preparation :-** Thermacole is prepared by blowing air through molten poly styrene or poly urethrane plastics **Properties :- (Any Two)** 1) It is light in weight 2) It is spongy, porous & has foam like structure. 3) It has low thermal & electrical conductivity. 4) It is resistant to chemicals & ageing 5) It is quite strong, has low density. 6) It is waterproof. 7) It absorbs shocks and vibrations. 8) It is stable up to 55^{o} C **Applications : (Any Two)** 1) It is used for decorative purposes. 2) It is used as ideal packing material for packing glassware, delicate electronic & electrical equipments. 3) It is used as thermal insulator in refrigerators & air conditioners. 4) It is widely used for preparation of various scientific models. 5) It is used for protecting screens in radars. 6) It is used for storing ice, ice creams & medicines. 7) It is used as a float for swimming.	**2** **½ mark each** **½ mark each**	4