

## TEST PAPER NO.03

TOPIC : ELECTROCHEMISTRY

M.M. 50

TIME: 3 HRS.

Name of Student \_\_\_\_\_ Roll No. \_\_\_\_\_

Q.NO. 1-10 carries 1 mark, 11-20 2 marks, 21-25 carries 3 marks, 26 carries 5 marks.

1. Write the reaction involved in Lead Storage Battery?
2. Why Zn-HgO cell volatage remains constant during its life?
3. Define conductivity and molar conductivity?
4. The conductivity of 0.20 M solution KCl at 298 K is  $0.0248 \text{ S cm}^{-1}$ . Calculate its molar conductivity?
5. Write the unit of molar and equivalent conductivity?
6. Define Kohlrausch law?
7. What are the units of molar and equivalent conductance?
8. Calculate the potential of hydrogen electrode in contact with a solution pH=10
9. Calculate the equilibrium constant of the reaction:  
$$\text{Cu}_{(s)} + 2\text{Ag}^+_{(aq)} \longrightarrow \text{Cu}^{2+} + 2\text{Ag}_{(s)} \quad E^\circ_{\text{cell}} = 0.46 \text{ V}$$
10. Can we store copper sulfate solution in a zinc pot?
11. What are the factors which affect conductance of ions in solution?
12. A  $\text{CuSO}_4$  solution is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at cathode? ( $\text{Cu} = 63.5 \text{ u}$ )
13. Explain the Fuel Cell with equations and its application?
14. Explain the mechanism of corrosion with equation and prevention?
15. What is the effect of dilution on weak and strong electrolyte. Explain graphically?
16. How much electricitiy in terms of Faraday is required to produce:
  - a. 20 gm of Ca from molten  $\text{CaCl}_2$
  - b. 40 gm of Al from molten  $\text{Al}_2\text{O}_3$
17. How much electricity is required in coulomb for the oxidation of
  - a. 1 mol of  $\text{H}_2\text{O}$  to  $\text{O}_2$
  - b. 1 mol of  $\text{FeO}$  to  $\text{Fe}_2\text{O}_3$
18. A sp;itopm pf  $\text{Ni}(\text{NO}_3)_2$  is electrolysed b/w platinum electrodes using a current 5 amperes for 20 minutes. What mass of Ni is deposited at the time of cathode?
19. Predict the products of electrolysis in each of the following:
  - a. An aqueous solution of  $\text{AgNO}_3$  with silver electrode.
  - b. An aqueous soluiton of  $\text{AgNO}_3$  with platinum electrodes.
  - c. A dilute solution of  $\text{H}_2\text{SO}_4$  with platinum electrodes.
  - d. An aqueous solution of  $\text{CaCl}_2$  with platinum electrodes.
20. The electrical resistance of a column of  $0.05 \text{ mol L}^{-1}$  NaOH solution of diameter 1 cm and legth 50 cm is  $5.55 \times 10^3 \text{ ohm}$ . Calculate its resistivity, conductivity and molar conductivity.

21. Represent the cell in which the following reaction takes place:  

$$\text{Mg}_{(s)} + 2 \text{Ag}^+_{(0.0001 \text{ M})} \longrightarrow \text{Mg}^{2+}_{(0.130 \text{ M})} + 2 \text{Ag}_{(s)}$$
 Calculate its  $E_{(\text{cell})}$  if  $E^\circ = 3.17 \text{ V}$ ,  $G^\circ$  and  $K_c$
22. How much charge is required for the following reductins:  
 a. 1 mol of  $\text{Al}^{3+}$  to  $\text{Al}$   
 b. 1 mol of  $\text{Cu}^{2+}$  to  $\text{Cu}$   
 c. 1. mol of  $\text{MnO}_4^{-1}$  to  $\text{Mn}^{2+}$
23. Three electrolytic cells A,B,C containing solutions  $\text{ZnSO}_4$ ,  $\text{AgNO}_3$  and  $\text{CuSO}_4$  respectively are connected in series. A steady current of 1.5 amperes was passed through them until 1.45 gm of silver deposited at the cathode of cell B. How long did the current flow? What mass of copper and zinc were deposited?
24. Suggest the list of metals that are extracted electrolytically?  
 If a current of 0.5 ampere flows through a metallic wire for 2 hours, then how many electrons would flow through the wire?
25. Explain the difference b/w Electrochemical and Galvanic cell?  
 What are electrolytes? How are electrolytes responsible for conduction in soltuion?
26. a. Calculate  $\lambda_m^\circ$  for  $\text{CaCl}_2$  and  $\text{MgSO}_4$  from the given data:  
 $\lambda_{\text{Ca}^{2+}}^\circ = 119$   $\lambda_{\text{Cl}^-}^\circ = 76.3$   $\lambda_{\text{Mg}^{2+}}^\circ = 106$   $\lambda_{\text{SO}_4^{2-}}^\circ = 160 \text{ S cm}^2\text{mol}^{-1}$   
 b.  $\lambda_m^\circ$  for  $\text{NaCl}$ ,  $\text{HCl}$  and  $\text{NaAc}$  are 126.4,425.9 and 91.0  $\text{S cm}^2\text{mol}^{-1}$  respectively Calculate  $\lambda_m^\circ$  for  $\text{HAc}$ .