Topic :- Electro Chemistry

1 **(d)**

$$E^{°}_{cell} = \frac{0.059}{n} \log K_c$$

$0.295 = \frac{0.059}{2} \log K_c; \quad \because K_c = 10^{10}$

2 **(b)**

Fe being above Cu in electrochemical series and thus, liberates Cu from $CuSO_4$.

3 **(a)**

$2Al + dil .H_2SO_4 \rightarrow Al_2SO_4 + H_2\uparrow$
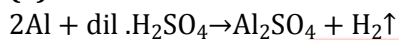
4 **(a)**

As 'A' has more $E^{°}_{red}$ value than B, A will act as cathode in the galvanic cell.

Hence,

$E^{°}_{cell} = E^{°}_{cathode} - E^{°}_{anode}$

$= (2.23) – (-1.43)$

$= 2.23 + 1.43 = 3.66$ V

5 **(d)**

H_2SO_4 will furnish maximum H^+.

6 **(c)**

Hg is placed below H in electrochemical series.

7 **(c)**

Eq. of H_2 = Eq. of Al = $\frac{4.5}{27/3}$ = 0.5

$\because$ 1 eq. H_2 = 11.2 L

$\therefore$ 0.5 eq. H_2 = 5.6 L

8 **(b)**

No. of moles of H_2 = $\frac{11.2}{22400}$

No .of equivalence of hydrogen

$= \frac{1.12 \times 2}{22400} = 10^{-4}$

No. of Faradays required $= 10^{-4}$

$\therefore$ Current to be passed in one second

$= 96500 \times 10^{-4}$

$= 9.65$ A

9   **(d)**

Nature of ion also includes size, charge on ion.

10   **(a)**

During rusting, oxidation of iron takes place, *i.e.*, it acts as anode. Hence, coating/connecting iron with metal of lower reduction potential (in comparison to iron) is the best way to prevent its rusting. In this process, the metal with low reduction potential undergoes oxidation (*i.e.* acts as anode) while iron acts as cathode. **(Cathodic protection)**

Use of saline water accelerates the process of rusting thereby increasing the electric conduction of electrolyte solution formed on the metal surface.

11   **(b)**

$$E_{RP} = E_{RP}^{\circ} + \frac{0.059}{1}\log[H^+]$$
$$= 0 + 0.059 \times (-3) = -0.177 \text{ V}.$$

13   **(a)**

E_{op}° of K $> E_{Op}^{\circ}$ of Al.

14   **(d)**

In concentration cell net redox change is zero and the decrease in free energy during transfer of matter is responsible for electrical work.
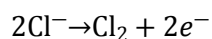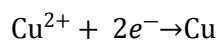
15   **(b)**

$Mn^{7+} + 5e \rightarrow Mn^{2+}$;

Thus, 5 mole electron = 5 faraday.

16   **(b)**

$$E_{cell} = E_{cell}^{\circ} + \frac{0.0592}{n} \log \frac{[Cu^{2+}]}{[Tl^+]^2}$$
$$n = 2$$

∴ According to above equation E_{cell} can be increased by increasing [Cu^{2+}].

17   **(c)**

Only Zn and Fe are above H;

Also Fe^{3+} can be reduced to Fe^{2+} by H.

18   **(b)**

The cathode and anode reactions respectively are

$Cu^{2+} + 2e^- \rightarrow Cu$

$2Cl^- \rightarrow Cl_2 + 2e^-$

The two moles of electrons have been transferred from anode to cathode to produce Cu and Cl_2 in a mole ratio of 1:1. Thus, 2F electricity is required

19   **(b)**

On dilution, ionic mobility increases but number of ions present in 1 mL decreases; Thus, only conductivity decreases and rest all increases.

20   **(d)**

$$E_{cell} = E_{OP_{anode}} + E_{RP_{cathode}}$$
$$= E_{OP_{anode}} - E_{OP_{cathode}}$$

ANSWER-KEY										
Q.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A.	**A**	**A**	**D**	**C**	**A**	**B**	**C**	**B**	**B**	**A**
Q.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A.	**A**	**B**	**C**	**B**	**A**	**C**	**C**	**C**	**C**	**C**