KONERU LAKSHMAIAH EDUCATION FOUNDATION
(Deemed to be University, Estd. u/s. 3 of UGC Act 1956)

B.Tech - Odd Sem : End Semester Exam
Academic Year:2020-2021

18CY1001 - Engineering Chemistry

Set No: 3

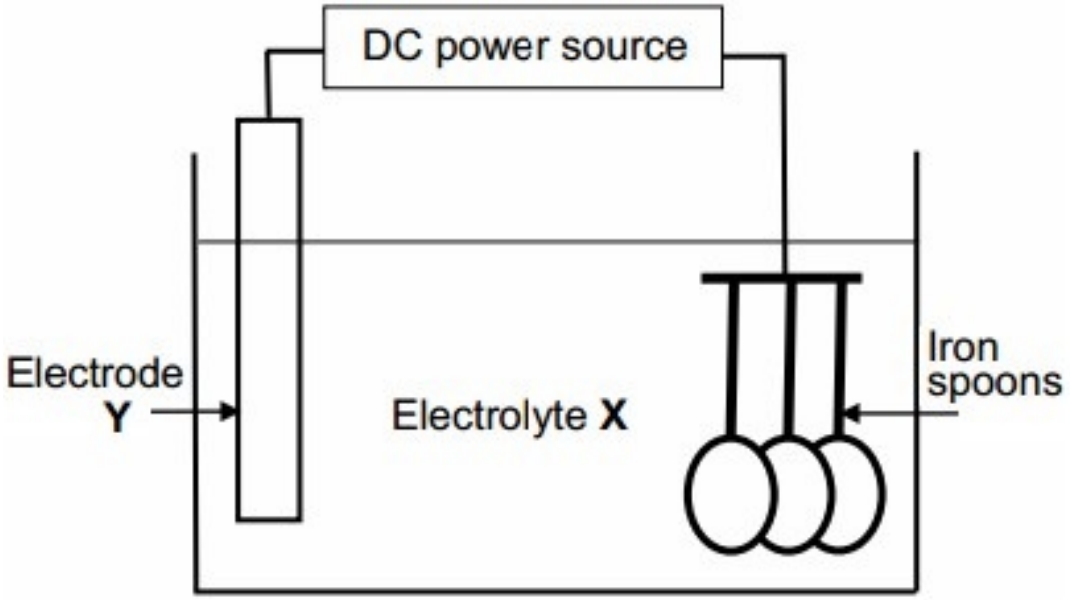
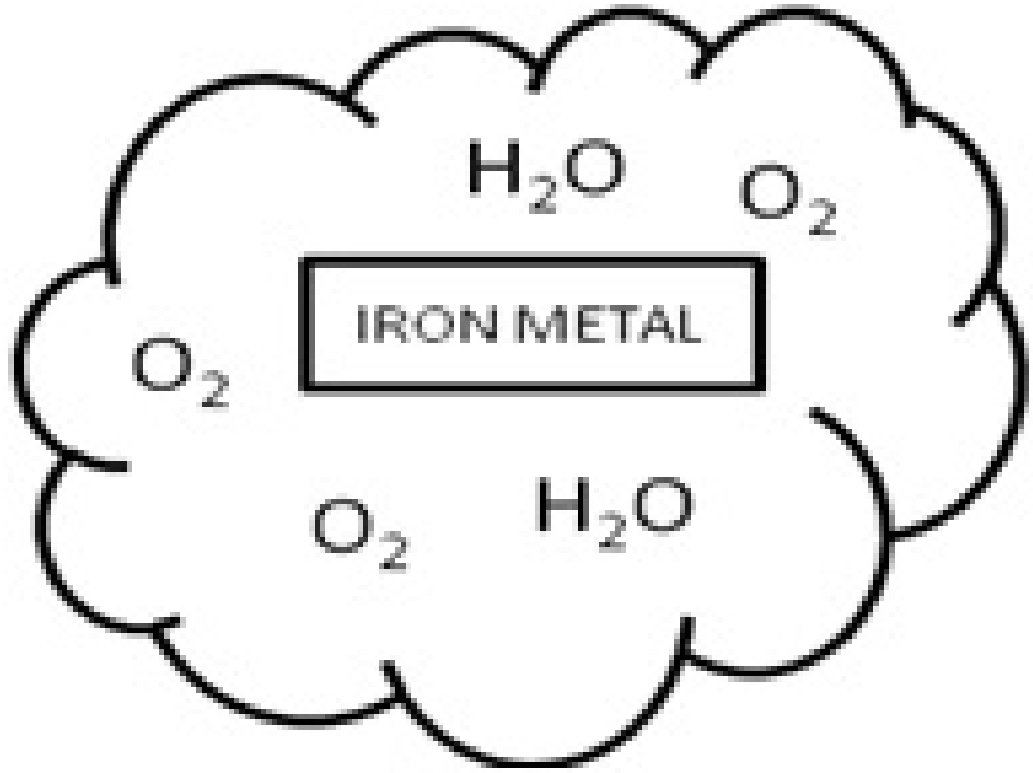
Time: **Max.Marks: 100**

S.NO	Answer All Questions	Choice	Options	Marks	CO
1.	Using values from the table of standard reduction potentials, calculate the cell potentials, ∇G and log K under standard conditions of the following cell: $Li(s)/Li^{+}(aq)//Ag^{+}(aq)/Ag(s)$	choice Q-2		10Marks	CO1
2.	Describe the working principle and construction of Ni-Metal Hydride battery?			10Marks	CO1
3.	Explain procedure and Calculation for the determination of PH of unknown solution using Calomel and Glass electrodes?	choice Q-4		15Marks	CO1
4.	Electrode potentials are specified as potentials relative to a standard hydrogen reference electrode. Why is the electrode potential specified in this manner rather than absolute values being given? Also explain the measurement of Electro potentials values of any ONE electrode with neat diagram and necessary cell notations?			15Marks	CO1
5.	Illustrate with the aid of label diagrams that show how a D.C Electrical power supply could be used to prevent or at least decrease the extent of corrosion of a steel underground pipeline used for carrying gases?	choice Q-6		10Marks	CO2
6.	Describe the electrochemical mechanism of rusting of iron in humid atmosphere containing SO2 along with O2 and CO2?			10Marks	CO2
7.	The simplified diagram below shows an electrolytic cell used at an electroplating company to coat iron spoons with silver. 7.1 Write down the energy conversion that takes place in this cell. 7.2 Direct current (DC) is used in this process. 7.3 Give a reason why the concentration of electrolyte X remains constant during electroplating. 7.4 Apart from the income generated, write down ONE major reason why the company electroplates the spoons. 7.5 Write down the TWO major expenses for the company during the process.	choice Q-8		15Marks	CO2

For CO1 data is must.

Element	Electrode Reaction (Reduction)	Standard Electrode Reduction Potential E^{o}, Volt
Li	$Li^{+} + e^{-} = Li$	-3.05
K	$K^{+} + e^{-} = K$	-2.925
Ca	$Ca^{2+} + 2e^{-} = Ca$	-2.87
Na	$Na^{+} + e^{-} = Na$	-2.714
Mg	$Mg^{2+} + 2e^{-} = Mg$	-2.37
Al	$Al^{3+} + 3e^{-} = Al$	-1.66
Zn	$Zn^{2+} + 2e^{-} = Zn$	-0.7628
Cr	$Cr^{3+} + 3e^{-} = Cr$	-0.74
Fe	$Fe^{2+} + 2e^{-} = Fe$	-0.44
Cd	$Cd^{2+} + 2e^{-} = Cd$	-0.403
Ni	$Ni^{2+} + 2e^{-} = Ni$	-0.25
Sn	$Sn^{2+} + 2e^{-} = Sn$	-0.14
Pb	$Pb^{2+} + 2e^{-} = Pb$	-0.13
H_2	$2H^{+} + 2e^{-} = H_2$	0.00
Cu	$Cu^{2+} + 2e^{-} = Cu$	+0.337
I_2	$I_2 + 2e^{-} = 2I^{-}$	+0.535
Ag	$Ag^{+} + e^{-} = Ag$	+0.80
Hg	$Hg^{2+} + 2e^{-} = Hg$	+0.885
Br_2	$Br_2 + 2e^{-} = 2Br^{-}$	+1.08
Cl_2	$Cl_2 + 2e^{-} = 2Cl^{-}$	+1.36
Au	$Au^{3+} + 3e^{-} = Au$	+1.50
F_2	$F_2 + 2e^{-} = 2F^{-}$	+2.87

Parameter	Value
R	8.314 $JK^{-1}mol^{-1}$
F	96,500 Coulombs
T	298 K

					
8.	Identify and explain in detail mechanism of the possible type of corrosion that Iron metal will undergo in the pictured environment. 			15Marks	CO2
9.	Write a short note on Caustic embrittlement?	choice Q-10		10Marks	CO3
10.	Explain the method of determination of alkalinity of water?			10Marks	CO3
11.	Give the specifications of “Water for Steam Generation”. Explain scale and sludge formation, Boiler corrosion?	choice Q-12		15Marks	CO3
12.	A water sample is alkaline to both phenolphthalein and methyl orange. From this water sample, 100 ml on titration with 1/50 N HCl required 12 mL of acid to reach phenolphthalein end point. When 4 drops of MO are added to the same solution and titration is further continued, the yellow color of the solution just turned pink after addition of another 4 mL of acid solution. Report the type and extent of alkalinity present in water sample. Also write the chemical reactions involved in titration?			15Marks	CO3
13.	Write a short note on Slow, Moderate and fast reactions with examples?	choice Q-14		10Marks	CO4
14.	Explain addition polymerization with examples?			10Marks	CO4
15.	Write Zeigler-Natta mechanism. What is its significance?	choice Q-16		15Marks	CO4
16.	Explain the doping mechanism of Polyaniline (Conducting polymer) and give its engineering applications?			15Marks	CO4

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