Reg. No.:

Name :

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Mid-term Examinations – Sept - Oct 2019

Programme	:	**B.Tech. (CSE)**	Semester	:	**Fall 2019-20**
Course	:	**Engineering Chemistry**	Code	:	**CHY1001**
Faculty	:	**Dr. Sumit Mittal**	Slot/Class no.	:	**A11+A12+G12/1350**
Time	:	**90 Minutes**	Max. Marks	:	**50**

Answer all the Questions

Q. No.	Sub. Sec.	Question Description	Marks
1		1.2 mg of $CaCO_3$ was dissolved in HCI and the solution made up to 250 mL with distilled water. 50 mL of the solution required 24 mL of EDTA solution for titration. 50 mL of hard water sample required 12 mL of EDTA and after boiling and filtering required 4.5 mL of EDTA solution. Calculate temporary, permanent and total hardness of water.	**10**
2		I sprinkled salt on my Shahi Paneer (in tomato gravy) dish and left it to dry out overnight in the oven. I covered the cooking steel pan with aluminium foil. The next morning the aluminium foil had holes 'burnt' in it and the Paneer surface turned white at the spots where the salt crystals had touched the aluminium foil. How do you explain these observations? And what factors might affect these observations?  	**5**
3		Account for the differences between water and CO_2 phase diagrams although both are one component systems.	**10**
4		Considering the following reactions $Cu^{2+} + 2\ e^- \rightarrow Cu^-$; $E^o = 0.89$ V $Ag^+ + e^- \rightarrow Ag$; $E^o = 0.45$ V reason out whether 1 M silver nitrate solution can be stored in copper vessel or 1 M copper sulphate solution can be stored in silver vessel.	**8**

5		Calculate the potential for the following cells at 25°C:
		
		(a) Pt(s) / Fe^{2+}(0.020 M), Fe^{3+}(0.010 M) // MnO_4^-(0.050 M), Mn^{2+}(0.95 M), H^+(0.10M) / Pt(s)
		
		Fe^{3+}(aq)/Fe^{2+}(aq) E^0 = 0.771 V
		
		MnO_4^-(aq)/Mn^{2+}(aq) E^0 = 1.51 V
		
		(b) Ag(s) / Ag^+(0.10 M) // I_2(s), I^-(0.075 M) / C (graphite)
		
		E(standard) for this cell = -0.26 V
		
		(c) Cr(s) / Cr^{3+}(0.040 M) // Cr^{3+}(2.0 M) / Cr(s)
		
		$E_{Cr3+/Cr}^0$ = - 0.26 V
			7

6		Determine whether the following reaction will occur spontaneously when: [Ce^{4+}] = 0.013 M, [Ce^{3+}] = 0.60 M, [Cl^-] = 0.0030 M, Cl_2= 1.0 atm, and T = 27° C. $$Ce^{4+}(aq) + Cl^-(aq) \rightarrow Ce^{3+}(aq) + Cl_2(g)$$ $E_{Fe^{3+}/Fe^{2+}}$ = 0.77 V, $E_{Ce^{4+}/Ce^{3+}}$ = 1.70 V	**10**

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