## USN

First/Second Semester B.E. Degree Examination, Dec.2013/Jan.2014				
		Engineering Chemistry		
Tim	Time: 3 hrs.  Max. Marks:100			
Not	2.	Answer any FIVE full questions, choosing at least two from each part.  Answer all objective type questions only on OMR sheet page 5 of the answer booklet.  Answer to objective type questions on sheets other than OMR will not be valued.		
		PART - A		
1	a.	Choose the correct answers for the following:  i) A metal rod is dipped in a solution of its ions. Its electrode potential is independent of:  A) temperature of solution  B) concentration of solution  C) cross of the metal supposed.		
		C) area of the metal exposed  D) nature of metal.  The emf of a cell consisting of a SHE and a metal is found to be 0.74V. The SHE is the positive electrode in the combination. Then the potential of the metal electrode is:  A) +0.74V  B) +1.74V  C) +0.37V  D) -0.74V		
		<ul> <li>iii) Electrode potential of a metal in a dilute solution is:</li> <li>A) same as that in a concentrated solution</li> <li>B) lower than that in concentrated solution</li> <li>C) higher than that in a concentrated solution</li> <li>D) none of these.</li> </ul>		
		iv) The potential of the two metal electrodes used in a cell are 0.35V and 0.85V. The emf		
		of the cell formed by combining them is: A) 1.20V B) 0.5V C) -0.50V D) -1.20V.		
	b.	What are concentration cell? Explain the working of a concentration cell by taking suitable example.  (05 Marks)		
	c. d.	Explain a method for the determination of single electrode potential. (05 Marks)  An electrochemical cell consists of magnesium electrode in 0.042m mg(NO <sub>3</sub> ) <sub>2</sub> solution and silver electrode in 0.35m AgNO <sub>3</sub> solution. The SEP of Mg and Ag are -2.363V and +0.80V respectively. Represent the cell, write the cell reaction and calculate the emf of the cell. (06 Marks)		
2	a.	Choose the correct answers for the following: (04 Marks)		
-	Ct.	i) In lead acid battery the product formed on both anode and cathode is:		
		A) PbO <sub>2</sub> B) PbO C) PbSO <sub>4</sub> D) Pb.  ii) A battery in which a key component is separated from the battery prior to its activation is called:		
39		A) Primary battery B) Secondary battery C) Tertiary battery D) Reserve battery iii) In which of these batteries aqueous KOH is used as an electrolyte?		
		A) Ni-cd B) Ni-MH C) Zn-air D) All of these		
		iv) In which of the following battery the cell reaction is not reversible?  A) Pb-PbO <sub>2</sub> B) Li-MnO <sub>2</sub> C) Ni-MH D) Ni-Cd		
	b.	Explain the construction and working of Zn-MnO <sub>2</sub> battery. (05 Marks)		
c. What are fuel cells? How it differ from battery? Explain the construction and work				
		CH <sub>3</sub> OH-O <sub>2</sub> fuel cell. (07 Marks)		

d. Write the discharging and charging reactions in the following batteries:

i) Ni-Cd battery; ii) Ni-MH battery.

(04 Marks)

3	a.	Cho	ose the correct answers for the following		(04 Marks)	
		i)	When a buried pipeline is protected from	m corrosion by connecting to magne		
			it is called:		<b>:</b>	
			A) Impressed voltage protection	B) Sacrificial cathodic protect	ion	
			C) Sacrificial anodic protection	D) None of these.		
*.		ii)	During galvanic corrosion the move not			
-			A) anode	B) cathode	a 60	
	61		C) anode as well as cathode	D) None of these		
	:	iii)	In water line corrosion, the maximum a			
		111)	A) along a line just above the level of w			
			B) along a line at the level of water mer			
			C) along a line just below the level of w	·		
			D) at the bottom of the vessel.	ater memseus		
		iv)				
		14)	A) occurs at more oxygenated part		vo set	
			C) occurs uniform throughout	B) occurs at less oxygenated p	art	
			c) occurs uniform throughout	D) none of these.		
	b.	Wha	at is metallic corregion? Evaluin electron	chemical theory of correcion by tal	ing iron og	
	0.	What is metallic corrosion? Explain electrochemical theory of corrosion by ta example.				
	c.		lain the corrosion control technique by ca	thadia protection	(06 Marks)	
	d.		lain galvanization process.	thouse protection.	(06 Marks)	
	u.	Елр	iani garvanization process.		(04 Marks)	
4	a.	Cho		(04 Manka)		
	u.	-i)	ose the correct answers for the following In chromium plating electrolyte used in		(04 Marks)	
		1)	A) H <sub>2</sub> CrO <sub>4</sub> +H <sub>2</sub> SO <sub>4</sub>	B) K <sub>2</sub> CrO <sub>4</sub> + H <sub>2</sub> SO <sub>4</sub>		
			C) $HClO_4 + H_2CrO_4$	D) None of these		
		ii)	Printed circuit boards are prepared by the	· ·		
		11)	A) Electroplating			
			C) Electropiating	B) Electro polishing D) Electroforming		
		iii)			ufaca af tha	
		111)	The ability of the plating bath to developed object is measured by its:	op unnorm coating on the entire su	riace of the	
			A) Current density	D) Decommodition not out of		
			10 VI 10 CONT.	B) Decomposition potential		
		()	C) Plating power	D) Throwing power		
		iv)	Polarization effect can be minimized by		201	
	. :		A) Large electrode surface	B) Highly conducting solution		
			C) Low electrolyte concentration	D) All of these		
55	b.	Evnl	ain the following terms:			
	υ.	• • •	Polarization			
		1)				
	0	11) Eval	Decomposition potential.	ffoot the metion of the day for the	(06 Marks)	
	c.	1 Branche and the state of the				
		1)	Current density			
		ii)	pH Complexies as a surf		,	
	,i	111)	Complexing agent.		(06 Marks)	
	d.	What is electroless plating? Explain electroless plating of copper.			(04 Marks)	

## PART - B

5	a.	Cho	pose the correct answers for the following:		(04 Marks	
		i)	A knocking sound is produced in the interr	nal combustion engine when the	,	
			A) burns slowly	B) burns fact		
			C) contains rain water	D) None of these		
		ii)	For good performance, the hydrocarbon m	olecules in a diesel fuel should	be:	
			A) Straight chained	B) Branched chain		
			C) Side chained	D) Aromatic		
		iii)	Catalytic cracking of heavy oil is carried o	ut to get better quality:		
			A) Kerosene	B) Diesel		
			C) Gasoline	D) Lubricating oil		
		iv)	Suitability of diesel fuel is determined by:			
			A) octane number	B) propane number		
			C) cetane number	D) butane number.		
	b.	Defi	ine calorific value. Explain how calorific v	alue of solid fuel is determi	ned by bomb	
			rimeter.		(07 Marks)	
	c.	0.78	g of coal containing 1.9% hydrogen, when	burnt in a bomb calorimeter,	increased the	
			perature of 2.7kg water from 27.2°C to 29.7			
			pecific neat of water 4.187 kJ			
		heat of steam 2457 kJ/kg.				
	d.	Exp	lain the purification of silicon by zone retinir	ng process.	(05 Marks) (04 Marks)	
121		** <u>_</u>				
6	a.	and the following.				
		i)	i) For water system the maximum number of degrees of freedom:			
			A) 0	B) 3		
		22	C) 2	D) 4		
		ii)	When lead is progressively added to molt	en silver, the melting point of	f the resultant	
			alloy is:			
			A) raised	B) lowered		
			C) unaltered	D) unpredictable		
		iii)	The colorimetric analysis is based on:			
			A) Faraday's law	B) Beer-Lambert's law		
9			C) Ohm's law	D) Kohlrauen's law	82 <sub>23</sub>	
		iv)	v) In potentiometric titration platinum electrode act as:		N	
			A) reference electrode	B) standard electrode		
			C) reduction electrode	D) indicator electrode.		
	b.	Drav	ectic and eutectoid point.	(06 Marks)		
	c.		lain Pattinson's process of desilverization of		(04 Marks)	
	d.	Disc	uss the theory and instrumentation of potenti	ometric titration.	(06 Marks)	
					<i>i</i>	

(04 Marks)

7 a. Choose correct		Cho	ose correct answers for the following:	(04 Marks)	
		i) A plastic which can be softened in heating and hardened on cooling is called:			
			A) thermoplastic	B) thermosetting	
248 28			C) thermoelastic	D) thermite	
		ii)	Which of the following is an elastomer:		
			A) PVC	B) Bakelite	
	<i>5</i> ,		C) Nylon	D) Neoprene	
		iii)	Chloroprene is the repeating unit in:		
			A) Polystyrene	B) Neoprene	
			C) PVC	D) Polythene	
		iv)	The process of vulcanization makes rubber:	, ·	
			A) Soluble in water	B) Soft	
			C) Hard	D) More elastic.	
b. What is glass transition temperature? Explain any three factors that influer transition temperature.			any three factors that influence the glass (04 Marks)		
	c.	c. Explain the manufacture of plastic by compression moulding and injection			
		A = -1 *			
	d.	Give	the synthesis of i) Teflon: ii) Neoprene: i	ii) Polyurethane. (06 Marks) (06 Marks)	
8	a.	Cho	ose the correct answers for the following:	(04 Marks)	
		1)	Total alkalinity in water is the sum of:		
			A) OH <sup>-</sup> and CO <sub>3</sub> <sup>2-</sup> ions	B) OH <sup>-</sup> ions only	
			C) CO <sub>3</sub> <sup>2-</sup> ions only	D) OH, $HCO_3^{2-}$ and $CO_3^{2-}$ ions.	
		ii)	The indicator used in the determination argentometric method is:	of chloride context in water sample by	
			A) $K_3$ [Fe(CN) <sub>6</sub> ]	B) K <sub>2</sub> CrO <sub>4</sub>	
			C) $K_2[Fe(CN)_6]$	D) $K_2CN_2O_7$	
		iii)	Primary treatment of sewage is used to remo	ove:	
			A) Suspended and floating solids	B) Soluble inorganic solids	
			C) Pathogenic bacteria	D) All of these	
		iv)	The reagent used in the estimation of sulpha	ate by gravimetric method is:	
			A) Phenol-di-sulphonic acid	B) Barium chloride	
			C) 2-SPADANS	D) Barium sulphate.	
	b.		uss the determination of chloride in water by		
	c.		is alkalinity of water caused? Expla	in the determination of alkalinity by	
		phene	olphthalein indicator.	(06 Marks)	

d. Define COD. Explain the sewage treatment of activated sludge process.