B. N. Bandodkar college of Science, Thane
Semester End examination, March-2015
Semester II
USCH201

Time: 2 hrs. 30 min. **Marks:75**

N. B. :
1. All the questions are compulsory
2. Figures to the right indicates full marks
3. Use of log table/ non programmable calculator is allowed

1	a	Distinguish between Ideal and Real gases.	4
		OR	
	a	Explain Soddy and Fajan's group displacement law.	4
	b	At 298 K and under a pressure of 1.0135×10^7 N m^{-2}, the compressibility factor of a gas is 0.92. Calculate the amount of gas required to fill a cylinder of capacity 10 dm^3, assuming (i) Real behavior (ii) Ideal behavior [R = 8.3144 J K^{-1} mol^{-1}].	4
		OR	
	b	Write in short about the reasons for deviations from the ideal gas laws.	4
	c	Using van der Waals constants, calculate the pressure exerted by 1.5 moles of ammonia occupying a volume of 1.5 dm^3 at 300 K. Compare it with the ideal value a = 0.4226 Nm^4 mol^{-2}, b = 3.71×10^{-5} m^3 mol^{-1}, R = 8.3144 J K^{-1} mol^{-1}.	4
		OR	
	c	Write a note on Joule–Thomson Effect.	4
	d	Distinguish between isotopes and isobars.	4
		OR	
	d	The half life of a radio element is 5.4 minutes.Starting with 1×10^{-3} Kg of it, how much of it would be left behind after 30 minutes?	4
	e	Give important characteristics of α–particles.	4
		OR	
	e	Derive the Decay constant equation.	4
2	a	Explain Henderson's equation for basic buffers.	4
		OR	
	a	Give characteristics of colloidal state.	4
	b	Give differences between oxidation and reduction.	4
		OR	
	b	Balance the following equation in acidic medium: $FeCl_3 + Na_2S \rightarrow FeCl_2 + NaCl + S$	4
	c	Give mechanism for buffer action of acidic buffers.	4
		OR	
	c	Give effects of following on solubility of precipitate, (i) Common ion effect (ii) Temperature (iii) Effect of pH.	4
	d	Give oxidation number of underlined elements in compound, (i) $H_2\underline{S}O_4$ (ii) $H_3\underline{As}O_3$ (iii) $\underline{C}H_2Cl_2$ (iv) $\underline{Al}Cl_3$	4
		OR	
	d	Calculate the pH of the buffer solution containing 0.1M each of NH_4OH and NH_4Cl. What will be the change in pH on adding, 0.01M HCl to 1L of the solution (Given: $K_b = 1.8X\ 10^{-5}$).	4
	e	What is digestion of the precipitate? Give its importance in gravimetric analysis.	4
		OR	

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	e	Balance the following equation in basic medium. $MnO_4^- + H_2O + I^- \rightarrow IO_3^- + MnO_2$	4
Q. 3	a	Explain in detail acid-base titrations with suitable examples.	4
		OR	
	a	What is a standard solution? What properties must it possess?	4
	b	Discuss the theory of acid-base indicators.	4
		OR	
	b	Discuss the principles of titrimetric analysis. What are the requirements a reaction must fulfill to be studied by titrimetric analysis?	4
	c	Write a short note on titration curve (Neutralization curve) between strong acid and strong base.	4
		OR	
	c	Write a short note on primary and secondary standard substances.	4
	d	Discuss the choice of indicators in acid-base titration when, (i) Titrant is an acid and titrand is base (ii) Titrant is base and titrand is an acid.	4
		OR	
	d	Explain the terms (i) Titrant (ii) Titrand (iii) Equivalence point (iv) End point.	4
	e	Calculate the pH of the solution when (i) 5.0 mL (ii) 7.0 mL (iii) 9.0 mL (iv) 9.9 mL of 0.1 M of NaOH is added from burette to 10 mL of 0.1 M HCl solution.	4
		OR	
	e	Write a short note on precipitation titrations and complexometric titrations.	4
Q. 4	a	$^{236}_{92}U$ emits 3 alpha and 3 beta particles. Show the isotopes and isobars formed.	3
		OR	
	a	Explain the term Joule-Thomson coefficient.	3
	b	What is buffer capacity?	3
		OR	
	b	Explain Redox reaction with suitable examples.	3
	c	Define the term indicator. Enlist the indicators used in acid-base and complexometric titrations (one indicator for each).	3
		OR	
	c	Describe the redox titration with suitable examples.	3
	d	State Boyle's law.	2
		OR	
	d	Define Natural Radioactivity.	2
	e	Define (i) Oxidising Agent (ii) Reducing Agent	2
		OR	
	e	Define the terms (i) Acidic buffer (ii) Buffer action.	2
	f	Define the term transition range of the indictors. Write the pH range (transition range) of the phenolphthalein indicator.	2
		OR	
	f	Define the term standardization with suitable example.	2

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