

End-Term Examination
(B. Tech IT/MAE/DMAM CBCS) (SUBJECTIVE TYPE)

(April, 2022)

Subject Code: BAS 105	Subject: Applied Chemistry
Time : 3 Hours	Maximum Marks : 60
Note: Q. 1 is compulsory. Attempt one question each from the Units I, II, III & IV.	

Q1.		(2.5*8=20)
	(a) A eutectic mixture has a definite composition and a sharp melting point, yet it is not a compound. Why?	
	(b) Determine the number of Components and phases present in the following systems (1) $\text{MgCO}_3(\text{s}) \rightleftharpoons \text{MgO}(\text{s}) + \text{CO}_2(\text{g})$ (2) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}(\text{s}) \rightleftharpoons \text{CuSO}_4 \cdot 3\text{H}_2\text{O}(\text{s}) + 2\text{H}_2\text{O}(\text{g})$	
	(c) How will you analyze the peaks in DTA graph? What information do you get from these peaks?	
	(d) A solution of Tryptophan has an absorbance at 280 nm of 0.54 in a 0.5 cm length cuvette. Given the absorbance coefficient of tryptophan is $6.4 \times 10^3 \text{ L/mol cm}$. What is the concentration of solution? What are the limitations of Beer-Lambert's law?	
	(e) Describe a chemical method and physical method for the removal of dissolved oxygen from water.	
	(f) Why Calgon conditioning is better than phosphate conditioning? Explain with the help of chemical reactions.	
	(g) What are fullerenes? Explain their characteristic features?	
	(h) Write a short note on sandwich panels with a suitable diagram	
UNIT-I		
Q2.	(a) 100 ml of water sample on titration with N/50 HCl requires 8 mL of acid to phenolphthalein end point and 9 mL of acid to methyl orange end point. Calculate the type and extent of alkalinity present in water sample. (b) Define deionization process. In this process, water is usually first passed through the cation exchanger and then through the anion exchanger. Give reason. (c) Discuss the alkalinity of water in condition $P < \frac{1}{2} M$	(6,2,2)
Q3.	(a) A water sample contains $\text{CaSO}_4 = 102 \text{ mg/L}$, $\text{Mg}(\text{HCO}_3)_2 = 73 \text{ mg/L}$, $\text{Ca}(\text{HCO}_3)_2 = 243 \text{ mg/L}$, $\text{NaCl} = 500 \text{ mg/L}$, $\text{MgCl}_2 = 95 \text{ mg/L}$, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O} = 139 \text{ mg/L}$. Calculate the amount of Lime and Soda required for softening a million of hard water. Purity of lime is 94% and that of soda is 86%. (b) What is the role of buffer during titration of hard water with EDTA solution? Name the buffer we use in this titration?	(7,3)
UNIT-II		
Q4.	(a) Why a rough surface piece of Pt metal acts as a good catalyst in comparison to a smooth surface in the manufacture of H_2SO_4 by contact process. (b) How silver is profitably recovered from the Argentiferous lead? Draw and explain this process with a suitable phase diagram?	(2,8)
Q5.	(a) What are acid base catalysts? Discuss the mechanism of acid catalyzed reaction with suitable example. (b) Explain what do you understand by the following terms (i) Congruent melting point (ii) Eutectic point	(6,4)

UNIT-III

Q6.	(a) Explain the basic principle and instrumentation involved in Thermo gravimetric Analysis (TGA)? (b) What types of substances absorb visible and UV radiation?	(8,2)
Q7.	(a) Write down the instrumentation and quantitative applications of UV-Visible spectrophotometer. (b) What is the effect of crucible geometry and sample characteristics in thermogravimetry results?	(7,3)

UNIT-IV

Q8.	(a) How the properties of a material changes when the size reduces from Bulk to nano? (b) What are the factors that need to be considered in making Fiber-reinforced composites and structural composites? Explain with suitable diagram	(4,6)
Q9.	(a) What are the main advantages of composites over metals? (b) Explain any two Carbon nanostructures based on their dimensions and discuss their unique properties and applications	(3, 7)