

**SCHOOL OF ADVANCED SCIENCES**

**CAT – II, Winter Semester 2016-17**

**B. Tech. (Common to All branches)**

**Course name** : Engineering Chemistry

**Duration** : 90 min.

**Course Code** : CHY1001

**Max. Marks** : 50 marks

**Class Numbers** : 4569

**Slot** : F2 + TF2

**Faculties Name** : Prof. S. Senthil Kumar

**Instructions:** Students are allowed to carry their hand-written/photocopies of class notes, photocopied or printed books and course material to the examination.

**Answer ALL the Questions**

**(10 × 5 = 50 Marks)**

1. A standard hard water contains 10 g of  $\text{CaCO}_3$  per litre of water. 18 mL of this consumed 20 mL of EDTA during titration. The same EDTA was diluted twice its initial concentration and then used for estimating the hardness of water sample. 50 mL of water sample required 12 mL of the diluted EDTA and the same sample after boiling required 8 mL of the diluted EDTA. Calculate the temporary hardness of the water sample.
2. Phenolphthalein and methyl orange alkalinity of a water sample were found to be 800 and 1200 ppm, respectively. Find the ions which are responsible for alkalinity in the water sample and also calculate the amount of alkalinity introduced by each of those ions. *1200 - 800 = 400 (41)*
3. Whether chemicals like calcium/bicarbonate, calcium sulphate and silica provide advantages or hurdles to the industries during generation of steam? Justify your answer.
4. Calculate the amount of lime (75% purity) and soda (80% purity) required for softening 80,000 liters of water containing the following impurities in 1 litre of water:  $\text{HCl} = 14.6$  mg,  $\text{Al}_2(\text{SO}_4)_3 = 68.4$  mg;  $\text{MgCl}_2 = 19$  mg;  $\text{NaCl} = 22.65$  mg;  $\text{K}_2\text{SO}_4 = 11.5$  mg and  $\text{HCO}_3^- = 122$  mg.
5. Discuss how ionic polymers are helpful in the demineralization of water. What is the effect on softening if the hard water is first passed through the anionic polymers?
6. VIT management has decided to get water from Vellore Municipal Corporation to meet the water scarcity in hostels for the upcoming summer. The corporation has agreed to supply water whereas it advised VIT to treat the water on its own. Explain the steps to be followed by our management in treating the water before sending it to the hostels.
7. Each and every one of us in VIT campus are enjoying tasty and purified water from the water coolers available throughout the campus. What is the technique used for purification of water in VIT and explain the same.
8. Two vehicles of same brand and model were purchased on the same day. One of them was used in Chennai and the other was used in Vellore. The components of the vehicle used in Chennai were found to corrode severely than that used in Vellore. Explain the reason. *Corrosion / Humidity 331*
9. Explain the corrosion mechanism of the following metals when exposed to dry oxygen atmosphere.  
(i) Beryllium, (ii) Calcium, (iii) Strontium and (iv) Barium. *lg. 330*
10. You are assigned to fabricate a machine by using the following combination of metals. Which combination you will choose and justify your choice: (i) Al-Fe or (ii) Cd-Fe?