VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ADVANCED SCIENCES
B.Tech. (Q.P. was given based on slot) – Winter Semester
Continuous Assessment Test–I, January 2019

Course Code	**: CHY1701**	**Duration**	**: 90 min.**
Course name	**: Engineering Chemistry**	**Max. Marks**	**: 50**
Semester	**: Winter 2018-2019**	**Slot**	**: G1**

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Answer ALL the Questions

1. a) Illustrate the permutit method of water softening. Why Zeolite softeners are not recommended for obtaining feed water for boilers? (5 M)

   The hard water on analysis found to contain the following hardness causing salts: $Mg(HCO_3)_2$ = 150 ppm, $Ca(HCO_3)_2$ = 100 ppm, $MgCl_2$ = 95ppm, $CaCl_2$ = 111ppm. Convert them into calcium carbonate equivalent hardness. (5M).

2. What are ion exchange resins? Discuss their application in water-softening with a neat diagram and required chemical equations. How are spent resins regenerated? 10M

3. Discuss the process involved in municipal water treatment. Mention the best method among the available filtration methods and justify the answer. 10M

4. Explain the following boiler troubles and how are they overcome? 10M

   i) Scale formation

   ii) Caustic embrittlement

5. a) Explain the hot lime soda process with a neat diagram. (5 M)

   b) 0.5g of $CaCO_3$ was dissolved using few drops of Con. HCl and the solution made up to one liter with distilled water. 50 mL of the solution requires 48mL of EDTA solution for titration. 50mL of the hard water sample required 15mL of EDTA solution sample water after boiling and filtering required 10 mL of EDTA solution. Calculate the temporary permanent and total hardness in ppm.