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SCHOOL OF ADVANCED SCIENCES
CAT – I, Fall Semester 2017-18
B. Tech. (Common to All branches) and M.Tech.

Course Code	: CHY1701	Duration	: 90 minutes
Course Name	: Engineering Chemistry	Marks	: 50
Slot	: D2+TD2	Date	: 22-08-2017
Class number	: 5962, 5968, 5974, 5980, 5821	Time	: 2.00 PM – 3.30 PM
Faculty Names	: Prof. Nawaz Khan F, Prof. Rajagopal D, Prof. Jianping Hu, Prof. Himaja M, Prof. Barnali Maiti		

Answer ALL the Questions

(5 x 10 = 50 marks)

1. Explain zeolite method for softening water.
2. List out the different chlorination methods of disinfection and describe break point chlorination with a neat diagram.
3. Explain the principle, chemical equations, and treatment method involved in the softening of hard water sample by lime soda process with suitable diagram.
4. (a) Calculate Total, Temporary and Permanent hardness of the given hard water sample with following analysis report:

   [i] 50 mL of standard hard water sample consumed 42 mL of EDTA solution.

   [ii] 50 mL of hard water sample consumed 19.9 mL of EDTA before boiling.

   [iii] 50 mL of hard sample consumed 8.9 mL of EDTA solution after boiling.

   Standard hard water is prepared by dissolving 1.2 gm of $CaCO_3$ per liter.

   (b) Explain with chemical equations and calculate the amount of lime and soda needed for softening 1, 00,000 liters water containing the following HCl = 7.3 mg/L, $Al_2(SO_4)_3$ = 34.2 mg/L; $MgCl_2$ = 9.5 mg/L; NaCl = 29.25 mg/L. Purity of lime is 90% and soda is 98%. 10% chemical are used in excess to complete the reaction quickly. Mg = 24, Ca = 40, S = 32, Na = 23, Fe = 56, Cl = 35.5, Al = 27
5. Describe micro, ultra, nano and reverse osmosis filtration process for water purification?