VIT UNIVERSITY
VELLORE CHENNAI
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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	: 4926, 4927, 4932, 4928, 4941, 4931	**Slot**	: D1+TD1
Faculties Name	: Prof. Sasikumar S, Prof. Sumathi S, Prof. Madhvesh Pathak, Prof. Ravikanth K, Prof. Rajagopal D, Prof. Prabhakaran D		

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 X 5 = 50 Marks)

1. How will one confirm the presence hydroxyl [OH^-] and carbonate ions [CO_3^{2-}] in a tube-well water? Deduce the formula to estimate them.
2. "A single molecule of magnesium chloride is enough to corrode the entire boiler material". Prove the statement.
3. List out the limitations of carbonate conditioning employed to avoid various boiler troubles and suggest the appropriate method(s) to overcome it effectively.
4. Reason out the following statements:
   (i) Can we swap the position of ion exchangers in demineralization method while treating a hard water sample?
   (ii) Generally potash alum and green vitriol are employed during purification of water.
5. Calculate the amount of lime (80% purity) and soda (80% purity) required per kiloliter for chemical treatment of water containing Ca^{2+} = 80 ppm; Mg^{2+} = 32 ppm; HCO_3^- = 195 ppm and $FeSO_4.7H_2O$ (as coagulant) = 73.5 ppm.
6. Why does chlorine work as a better disinfectant in water at lower pH only? What is the significance of dip in the break point chlorination experiment?
7. In view of requisites of drinking water, comment on potability of RO treated water. How UV light setup could improve the worth of machine?
8. Comment on the statement "Caustic embrittlement is an example of stress corrosion".
9. Generally, bicarbonates of magnesium containing hard water would retard the corrosion rate of the metallic vessel storing the same water. Justify.
10. How will a surface engineer explain the gradual deterioration of an iron shaft of a motorbike lying partially immersed in water accumulated in a pothole? Mention the chemical composition of reddish-brown scale appeared on the above-said shaft after a considerable period of time.

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