MANJARA CHARITABLE TRUST

RAJIV GANDHI INSTITUTE OF TECHNOLOGY, MUMBAI

F E SEM – I Mid Term Test Sept. 2015

Time : $1\frac{1}{2}$ Hrs **APPLIED CHEMISTRY- I** **Max. Marks: [40]**

Atomic weights: Ca=40, Mg=24, H=1, C=12, O=16, S=32, Na= 23, Cl = 35.5, K=39, N=14

1. **Answer any FIVE of the following :** 15

a. **What happens when temporary hard water is boiled? Give equations to explain.**

b. **Give the principle of estimation of hardness of water by EDTA method.**

c. **Calculate all types of hardness of water sample containing : Ca(HCO3)2 = 81ppm, MgSO4 = 60 ppm, MgCO3 = 42 ppm, Ca(NO3)2 = 82 ppm, K2SO4 =5 ppm.**

d. **Define and explain the significance of COD and BOD.**

e. **Write the difference between hard and soft water.**

f. **Discuss the Chlorination treatment method for municipal water.**

g. **25 ml of sewage water is refluxed with 0.1 N K2CrO7 solution in presence of H2SO4 and AgSO4. The unreacted dichromate required 5.5 ml of 0.1N FAS solution. Back titration consumed 15 ml of 0.1N FAS solution. Calculate COD of the effluent in mg/L.**

2a. **Calculate the quantity of pure lime and soda required for softening 50,000 litre of water containing following salts per litre Ca(HCO3)2 = 8.1mg, MgSO4 = 12mg, Mg(HCO3)2 = 7.3mg, CaSO4 = 13.6mg,NaCl = 4.7mg, MgCl2 = 23.75mg.** 6

b. **Explain Zeolite method for softening of water with respect to following points: principle, prcess, diagram, softening and regeneration reaction.** 5

c. **An ion exchange bed required 500 L of 0.1 N HCl solution and 500 L of 0.1 N NaOH solution for regeneration, on softening 10,000 L of water. Find the hardness of water in ppm.** 4

OR

2a.	0.5 g of $CaCO_3$ was dissolved in dilute HCl and diluted to 500 ml, 50 ml of this solution required 45ml of EDTA solution for titration, 50 ml of hard water sample required 15 ml of EDTA solution for titration. 50 ml of same Water on boiling and filtering requires 10 ml of EDTA solution. Calculate temporary, permanent and total hardness in ppm.		6
b.	Explain the principle of Ion exchange method of softening of water and also give the softening and regeneration reactions.		5
c.	The hardness of 50,000 L of water was removed by passing through a zeolite softener. The softener required 200 L of NaCl solution containing 125g/L of NaCl for regeneration. Calculate the hardness of the water.		4
3a.	Describe Electrodialysis method for desalination of water.		5
b.	Explain Activated sludge process with the help of diagram.		5
	OR		
3a.	Give the reactions of lime and soda during the softening process.(Any FIVE reactions).		5
b.	Write a short note on:		5
	i)	Reverse Osmosis	
	ii)	Ultrafiltration	