BACHELOR OF CIVIL ENGINEERING (PART-TIME)EXAMINATION, 2017
III RD YEAR, 2ND Semester Examination

SUBJECT: WATER SUPPLY ENGINEERING

Full Marks 30/100

Time: ~~Two hours~~/Three hours/~~Four hours/ Six hours~~

No. of Questions		Marks
	Answer Any five(5) questions	
	Assume relevant data if not given	
Q1. (a)	What do you understand by per capita water demand? Explain the factors which influence the annual average water demand.	6
(b)	A water supply scheme has to be designed for a city having a population of 1 lakh. Calculate the maximum daily demand and coincident demand.	5
(c)	Following census data are available for estimation of water demand for the year 2040. Estimate the water requirement assuming the rate of water supply is 180 lpcd. Year :- 1980 1990 ·2000 2010 Population 80 120 168 228.58 In thousand. Use decrease rate of increase method.	9
Q2. (a)	In a water treatment plant, the pH values of incoming and outgoing water are 7.2 and 8.4 respectively. Assuming a linear variation of pH with time, determine the average pH value of water .	6
(b)	What do you mean by water quality? Write down the important physical characteristics of water quality parameters.	4
(c)	What do you understand by hardness of water? Why it is undesirable? Mention the desirable and permissible values of hardness, chloride and iron. in potable water.	5
(d)	What is E-Coli Index? How you can determine the above index?use suitable example.	5
Q3. (a)	What are colloids? What is the effect of their presence in water?	3
(b)	Discuss the stability of colloids with double layer ionic theory. How the optimum dose of alum is obtained by conducting Jar Test ?	7
(c)	Explain the function of alum for clarification of water by destabilization of colloids particle.	4
(d)	A water treatment plant treating 50 MLD water requires 20 mg/L filter alum $AL_2(SO_4)_3$, 18 H_2O. If the water has 6mg/l of natural alkalinity as $caco_3$, determine the quantity of filter alum and quick lime (CaO) required per month . $(Al = 27, Ca = 40, C = 12)$	6

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No. of Questions		Marks
Q4.		
(a)	Discuss the mechanism of granular bed filtrations.	4
(b)	With the help of a neat sketch explain the operation principle of rapid gravity sand filter. Show different valves for operation of the filter.	8
(c)	Laboratory tests show that 99.9% kill could be obtained in 10 min with a concentration of 14mg/l. What should be the contact time to obtain 99.99% kill with the same dose of the disinfectant? Derive necessary expression for solving the problem.	8
Q 5.		
(a)	Explain the action of chlorine for disinfection of water. What do you mean by Breakpoint Chlorination ?	5
(b)	If 0 .6mg/L of total chlorine is required for satisfactory disinfection of water at pH 7.0 what dosage will be necessary at pH8.0 if it is given that initially 12 min contact time is required at Ph =7.0. Find contact time required at pH =8.0 if "n" =1.5.take K_i = 2.7x 10^{-8} mol/L..	7
(c)	What do you mean by Overflow rate of a clarifier.? Calculate the settling velocity of a particle of 0.020mm dia, with sp.gr 2.65 with v = 1.012x10^{-2} cm2/sec. Deduce the necessary equation with necessary assumption for solving the problem.	8
Q6.		
(a)	The peak days water consumption of a community of 50000 people is 200lpcd.The demand variation are as follows :- 6AM-9AM 35%, 9AM.-12 NOON 10% , 12 NOON- 3 P.M 15%, 3P.M. -6 P.M. 15%, 6P.M.-9 P.M 25%. Pumping schedule is as follows :- From 4am-8 am – 50% of total supply. From 4p.m.- 8 p.m – rest 50% . Estimate the balancing reservoir capacity either analytically or graphically.	8
(b)	Draw a neat flow diagram for water treatment plant considering river is the source of water. Justify the purpose of providing the each unit.	8
(c)	Why slow sand filter system is more effective in bacterial removal efficiency as compared to rapid sand filter?	4