Ref No. –EX/CE/ T/313/2019

B.E. CIVIL ENGINEERING EXAMINATION, 2019
III RD YEAR, 1ST Semester Examination (OLD)

SUBJECT: WATER SUPPLY ENGINEERING

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

Full Marks ~~30~~/100

Use a separate Answer-Script for each part

No. of Questions	Part I (Marks:50)	Marks
	Answer Any Three(3) questions Two marks are reserved for neatness and to the point answer Assume relevant data if not given	
Q1 . (a)	What are the major pollutants in water supply sources? Describe with necessary flow sheet different types of unit operation for making water fit for potable purposes.	3+7
(b)	Derive an expression for determine settling velocity of a particle in quiescent water.	6
Q2		
(a)	Distinguish between discrete and flocculent settling .	3
(b)	In a water treatment plant water having viscosity 1.01 centistokes carries solid particle with an average diameter of 0.05mm. and specific gravity 1.2. Calculate settling velocity of settling particles if the temperature of water is 25^0 C.	4
(c)	Discuss the theory of an Ideal Settling Basin. What is its significance?	6
(d)	What is the purpose of adding coagulants? Why lime is added at times with alum for chemical sedimentation?	3
Q3.		
(a)	Calculate the dosage in mg/l required to disinfect a flow of 300,000Lit/day, if 1 kg of bleaching powder of 33% strength is required to be used.	4
(b)	Discuss the mechanism of granular bed filtrations.	4
(c)	.With the help of a neat sketch explains the operation principle of rapid gravity sand filter. Show different valves for operation of the above filter	8

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No. of Questions	Part I (Marks:50)	Marks
Q4.		
(a)	Alum , Al2 (SO4)3, 18 H2O is to be used for coagulation purpose in a water treatment plant with a capacity of 1000000L per hour. The raw water has a natural alkalinity of 13mg/l,as CaCO3, how much Ca (OH)2 shall be required daily for optimum coagulation? The alum dose is 55mg/l.	5
(b)	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.	6
(c)	Explain the action of chlorine for disinfection of water. What do you mean by Breakpoint Chlorination ?	5

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B.E. CIVIL ENGG. 3rd YEAR 1ST SEMESTER EXAMINATION 2019 (Old)

WATER SUPPLY ENGINEERING

Full Marks 100

Time: Three hours (50 marks for this part)

Use a separate Answer-Script for each part

Part-II

Question no. **1** is compulsory

Answer any **two** from the rest

Hazen-William's nomogram is allowed

(Assume any data, if required, reasonably)

Q.1. Write short notes on the following (any four): (4×5) = 20

I. Indian standards for drinking water and health hazards of – (a) Fluoride; and (b) Arsenic

II. CPHEEO recommendation to meet the fire water demand

III. Different usage fresh water

IV. Factors affecting the total water demand

V. Test for the Most Probable Number (MPN) of microorganisms in drinking water

VI. Estimation of the capacity of a distribution/service storage reservoir for balancing the variable demand of water

VII. What are the advantages and disadvantages of 'dead end system' and 'ring main system' of water distribution networks?

Q.2.

Deduce the equation for 'Geometric increase method' of population projection and with this method, solve the following problem.

The populations of a town as per the Census records are given below for the years 1951 to 2011. Assuming that the scheme of water supply will commence to function from 2020, it is required to estimate the population of 30 years and also the intermediate population of 15 years after 2020.

Year	1951	1961	1971	1981	1991	2001	2011
Population	41,650	42,250	60,550	76,350	98,950	123,550	158,850

Q.3.

Find out the capacity of a storage reservoir required for balancing the variable demand for the following situations. The pumping to the reservoir is to be done at a constant rate throughout the 24 hours.
Design population: 2,50,000; Rate of water supply: 200 lpcd.
Hourly demands are as follows:

Periods of day in h	% of Average hourly flow	Periods of day in h	% of Average hourly flow
11 PM – 5 AM	30	12 Noon – 1 PM	150
5 AM – 7 AM	50	1 PM – 2 PM	160
7 AM – 8 AM	90	2 PM – 5 PM	80
8 AM – 11 AM	250	5 PM – 6 PM	200
11 AM – 12 Noon	90	6 PM – 8 PM	100
		8 PM – 11 PM	80

15

Q.4.

A system of pipe network as shown below carries a total flow of 1 m^3/min from A to C. Compute the total head-loss between A and C using equivalent pipe method. Consider Hazen-William's constant 'C' for all pipes as 100.

Pipe segment	Length (m)	Diameter (mm)
AB	700	300
BC	400	250
AD	475	250
DC	450	280

15