

Ref No. -EX/CE/ 5/T/305/2023

Bachelor of Engineering ( CIVIL ENGINEERING) EXAMINATION,  
III RD YEAR, Second Semester Examination 2023

SUBJECT :- WATER SUPPLY ENGINEERING

Full Marks 30/100

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

Use a separate Answer-Script for each part

No. of Questions	Part I (Marks: 50)	Marks
	Answer Any Four (4) questions Two marks are reserved for neatness and to the point answer Assume relevant data if not given.	
Q1.		
(a)	What are the major dissolved impurities in ground water that to be treated to render fit for consumptive use? Describe with necessary flow sheet different types of unit operation for making water fit for potable purposes considering the above criteria.	4+8
Q2.		
(a)	Discuss briefly the overflow velocity and flow through period in discrete particle settling.	4
(b)	Determine the terminal settling velocity of a spherical particle with diameter 0.4 mm and sp.gr. 2.70 settling through water at 22 <sup>o</sup> C. Check the Reynolds number. Assume $\rho_w$ is 998.2 Kg/ m <sup>3</sup> . $\mu = 1.002 \times 10^{-3}$ N.S/m <sup>2</sup> . Derive necessary equation for solving the above problem. Verify the answer with Hazen's modified equation.	8
Q3.		
(a)	Explain the importance of chemical sedimentation and disinfection for potable water treatment	5
(b)	Discuss the stability phenomenon on colloids in water. How they can be better explained in the light of Double layer ionic theory. Draw a neat sketch for this purpose	7
Q4.		
a)	Alum , Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> .5H <sub>2</sub> O, is to be used for coagulation purpose in a water treatment plant with a capacity of 5MLD. The raw water has a natural alkalinity of 14 mg/l, as CaCO <sub>3</sub> . How much Ca(OH) <sub>2</sub> will be required daily for optimum coagulation? The alum dose is 40 mg/l.	6
(b)	Describe with diagram on JAR Test for estimating optimum coagulant doses.	6
Q5		
(a)	What is filtration process? Discuss the major phenomenon on mechanism of filtration in water.	2+4

[ Turn over

Bachelor of Engineering ( CIVIL ENGINEERING) EXAMINATION,  
III RD YEAR, Second Semester Examination 2023

SUBJECT :- WATER SUPPLY ENGINEERING

Full Marks 30/100

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

Use a separate Answer-Script for each part

No. of Questions	Part I (Marks: 50)	Marks
(b) Q6	With the help of a neat sketch explain the operation principle of rapid gravity sand filter. Show different valves for operation of the filter.	6
(a)	Compare rapid sand and slow sand filter process with different points of criterion.	5
(b)	For effective disinfection, chlorination would be dependent on pH of water- explain clearly.	3
(c)	Laboratory test on a sample of water indicate that a chlorine dose of 1.8 mg/l is to be used in order to destroy 99.90% of pathogen in a contact time of 20 min. It is decided that hypochlorite with 28 % available chlorine shall be used to obtain 99.99 % kill of pathogens in a contact time of 30 mins. Estimate the amount of the hypochlorite (60%pure) required for treatment of 7500m <sup>3</sup> /day of water. Assume n=1.2.	4

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING)  
THIRD YEAR  
SECOND SEMESTER EXAM 2022**

**Sub: WATER SUPPLY ENGINEERING**

**Part II**

**Sub Code: Ex/CE/5/T/305/2023  
Full Marks: 50**

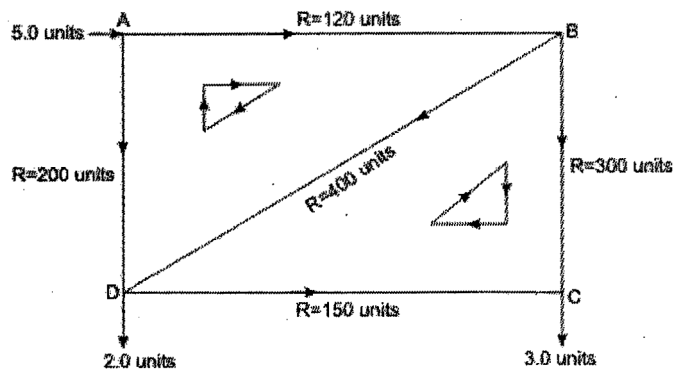
**Group A: Answer two questions**

**2x15**

1. Determine the future population for the year 2031 from the following data for a town; estimate by Geometrical increase and Incremental increase method.

Year	Population
1971	72,000
1981	80,000
1991	1,20,000
2001	1,70,000
2011	2,25,000

2. A pipe network with two loops is shown in. Determine the flow in each pipe for an inflow of 5 units at the junction A and outflows of 2.0 units and 3.0 units at junctions D and C respectively. The resistance R for different pipes are shown in the figure.



[ Turn over

3. Determine the capacity of storage reservoir required to maintain a water supply of  $1.5 \times 10^6$   $\text{m}^3/\text{month}$

Given the following monthly mean runoff values.

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Runoff $Q \times 10^6$ $\text{m}^3$	8.1	6.9	2.1	0.9	0.82	0.67	0.37	0.45	0.3	0.37	0.67	0.82	1.5	4.12	7.87	2.62	1.87

**Group B: Answer any four questions**

**4x5**

4. What are the acceptable limits for drinking water for the followings

a) Turbidity (units in J.T. U), b) Total dissolved solid (mg/l), c) Iron as Fe (mg/l), d) Arsenic as As (mg/l), e) Total Hardness (mg/l) as  $\text{CaCO}_3$ .

5. Discuss the Bacteriological quality guideline for water in distribution system.

7. What are the factors affecting per capita water demand?

8. What are the factors affecting losses and wastes in water distribution systems

9. What are the factors governing the location of an Intake ?

10. Discuss the advantages and disadvantages for dead end system and radial system of water distribution network.