BACHELOR OF CIVIL ENGINEERING (PART-TIME) EXAMINATION, 2018
III RD YEAR, SECOND SEMESTER EXAMINATION

SUBJECT: WATER SUPPLY ENGINEERING

Full Marks 3̶0̶/100

Time: T̶w̶o̶ ̶h̶o̶u̶r̶s̶/Three hours/F̶o̶u̶r̶ ̶h̶o̶u̶r̶s̶/̶ ̶S̶i̶x̶ ̶h̶o̶u̶r̶s̶

Use a separate Answer-Script for each part

No. of Questions	PART - I	Marks
	Answer Any Three(3) questions Two marks are reserved for neatness and to the point answer Assume relevant data if necessary	
Q1. (a)	What are the major pollutants in water supply sources? Describe with necessary flow sheet of different types of unit operation for making water fit for potable purposes with logical interpretation considering river is source of water .	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 1.02 centistokes carries solid particle with an average diameter of 0.05mm. and specific gravity 2.5. Calculate settling velocity of settling particles. Check validity of necessary equation to be used for solving the problem.	4
(c)	Discuss the theory of an Ideal Settling Basin. What is its significance?	6
(d)	Calculate the surface area required in an ideal settling tank to achieve 100% removal of all discrete particle with a settling velocity of 0.030mm/sec with a flow rate of 550m3/hr.	3
Q3. (a)	Define surface loading and detention period in a sedimentation tank. What are their significance?	4
(b)	What is the purpose of adding coagulants? Why lime is added at times with alum for chemical sedimentation? Is it mandatory?	4
(c)	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 0f 16mg/l,as CaCO3, how much Ca (OH)2 shall be required daily for optimum coagulation? The alum dose is 60mg/l.Assume data if required Prove that surface area and overflow rate rather than hydraulic retention time govern the design of a settling tank.	4 5
(d)	Filter backwashing requires more water velocity than the bed filtration rate and it also requires air. – justify.	3

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Full Marks 3θ/100

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

Use a separate Answer-Script for each part

No. of Questions		Mark
Q4.		
(a)	What do you understand by filtration of water? What are the different mechanisms involved in filtration process of water through granular bed media.	6
(b)	With the help of a neat illustrative sketch explain the operation principle of a rapid gravity sand filter unit. Show the appropriate position of different valves for efficient operation of the above unit.	10

Bachelor of Civil Engineering (Part Time) Examination 2018

(3rd Year 2nd semester)

Water Supply Engineering

Time: Three Hours

Full Marks: 100

Use separate answer script for each part

(50 marks for each part)

## PART - II

Group A : Answer any two question   **2x15**

1.   The following data have been noted from the census department

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

Determine the future population for the year 2030; estimate by both Geometrical increase method and Incremental increase method.

2.   A pipe network with two loops is shown in Fig. 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 resistances R for different pipes are shown in the figure.
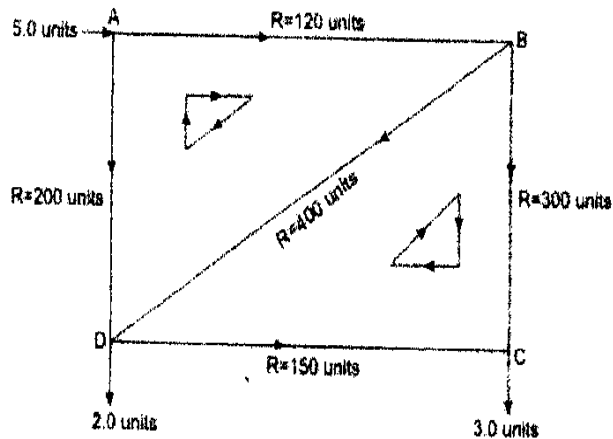
3. The estimated hourly consumptions of water for a town for one day are given in the table. Determine the capacity of the distribution reservoir if the pump installed can supply the water in the reservoir at a uniform rate of 1.45 cu. m/sec.

Time in hr	Consump. in Million litre /hr
1	2.45
2	2.25
3	2.14
4	2.30
5	2.55
6	2.60
7	3.50
8	5.25
9	6.10
10	6.55
11	7.25
12	7.35
13	7.55
14	6.35
15	5.95
16	5.75
17	5.65
18	7.45
19	7.30
20	7.25
21	5.65
22	4.50
23	3.70
24	2.85

Group B: Answer any four questions   4x5

4. Calculate the hydraulic gradient for a concrete pipe of diameter 2.5 m carrying a flow 3.5 cumecs by Modified Hazen William's formula. Assume CR for concrete pipe =1.0

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

6. For a city of a population 1,00,000, find the followings for the city.
   i) Domestic demand
   ii) Fire demand
   iii) Maximum hourly demand for the maximum day

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

8. For municipal water supply to a town, the raw water is to be pumped from a river. The difference of level in elevation between the water level of river and to the entry point of the treatment plant is 40 mt. Daily water demand of the town 30 MLD, Treatment plant is operating 12 hours per day. Assume the head loss of pipe is 4.5 mt. Calculate the H.P of the pump (assuming the efficiency of the pump set as 65%).

9. .Draw the Radial system, Ring system and the Dead end system of water supply network and discuss the merits of each system.