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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Fifth Semester, B.E. - Civil Engineering
Semester End Examination; February / March - 2022
Water Supply and Treatment

Time: 3 hrs   Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Apply knowledge of mathematics to forecast population of community to determine total quantity of water to meet demands of community.

CO2: Apply knowledge of basic science for testing and analyze the drinking water quality parameters from public health consideration as per standards.

CO3: Design various water treatment units to remove selected impurities in raw water.

CO4: Analyze the community pipe network of water distribution.

<u>Note</u>: I) **PART - A** is compulsory. **Two** marks for each question.

II) **PART - B**: Answer any <u>Two</u> sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Explain any two equations used to calculate the quantity of water for fire fighting.	2	L2	CO1	PO1
b.	Explain why fluoride is referred as two edge sword?	2	L2	CO2	PO1,2
c.	Explain briefly the principle involved in continuous flow type tank.	2	L2	CO3	PO3
d.	What is the reason for maintaining residual chlorine in chlorination process?	2	L2	CO3	PO3
e.	Explain the functions of service reservoirs.	2	L2	CO4	PO2
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	With a neat sketch, explain the variation of water demand and its effects in the design of water supply components.	9	L2	CO1	PO2
b.	With a neat sketch, explain river intake structure.	9	L2	CO1	PO1
c.	Water is to be pumped to an elevated reservoir at 78 m at a constant rate of 8,00,000 liters per hour from a water reservoir 3 m deep and maximum water level at 31 m. The distance is 1300 m. Give the economical diameter of the rising main and the horse power of the pump. Neglect minor losses and take f = 0.04.	9	L3	CO1	PO2
	UNIT - II	**18**			
2 a.	Explain physical and chemical properties of water.	9	L2	CO3	PO2
b.	Explain in brief the common water borne diseases.	9	L2	CO2	PO2
c.	With a neat sketch, explain cascade aerator.	9	L2	CO3	PO3

UNIT - III   18

3 a. Two primary settling basins are 30 m in diameter with a 2.2 m side water depth. Single effluent weirs are located on the peripheries of the tank. For the water flow of 28000 m^3/d, calculate;

   i) Surface area and volume   9   L3   CO3   PO3

   ii) Overflow rate in m^3/m^2/d

   iii) Detention time in hours

   iv) Weir loading in m^3/m.d

  b. Explain in brief the different types of common coagulants for water treatment.   9   L2   CO3   PO3

  c. Design a plain sedimentation basin to treat 3.5 million liters of water per day so as to settle at least 80% of the particles of grain size 0.002 cm or more. Assume suitable data required.   9   L3   CO3   PO3

UNIT - IV   18

4 a. A filter unit is 4.5 m by 9.0 m. After filtering 10000 cubic meters per day in 24 hour period. The filter is back washed at a rate of 10 L/m^2/sec for 15 min. Compute the average filtration rate, quantity and percentage of treated water used in washing and the rate of wash water flow in each trough. Assume four troughs.   9   L3   CO3   PO3

  b. Explain disinfection methods with the usage of excess lime and ozone.   9   L2   CO3   PO3

  c. With a neat sketch, explain break point chlorination.   9   L2   CO3   PO3

UNIT - V   18

5 a. With a neat sketch, explain dead end system along with advantages and disadvantages.   9   L2   CO4   PO2

  b. Explain the working principle of reverse osmosis.   9   L3   CO3   PO3

  c. Explain the gate valve and air valve used in water pipe lines.   9   L2   CO4   PO2

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