PEC-2 - Design of Water and Waste Water Treatment

P. Pages : 2

Time : Three Hours

GUG/W/23/14336

Max. Marks : 80

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Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and Chemical equation should be given wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Draw a flow sheet and conventional water treatment plant for surface water sources and explain function of each unit in brief. **8**

b) State various point to be considered while selecting site for water treatment plant. **8**

OR

2. a) Design and draw the neat sketch of a cascade aerator for a design flow of 10 MLD assume suitable data. **8**

b) Describe the various types of aerators with neat sketch. **8**

3. a) What are the objectives of Coagulation and Flocculation? Write down difference between Coagulation and Flocculation. **8**

b) What are various feeding methods of Coagulant to water. Explain with neat sketch. **8**

OR

4. a) Design a Clariflocculator unit for a flow of $200 \, m^3 / hr$. Assume the temperature at treatment site is 20ºC. Draw a neat sketch. **10**

b) Find the settling velocity of spherical silica particle of specific gravity 2.67 in water and 25ºC. If the diameter of particle is 0.004 cm. **6**

5. a) Describe in detail various types of filters with neat sketch. **8**

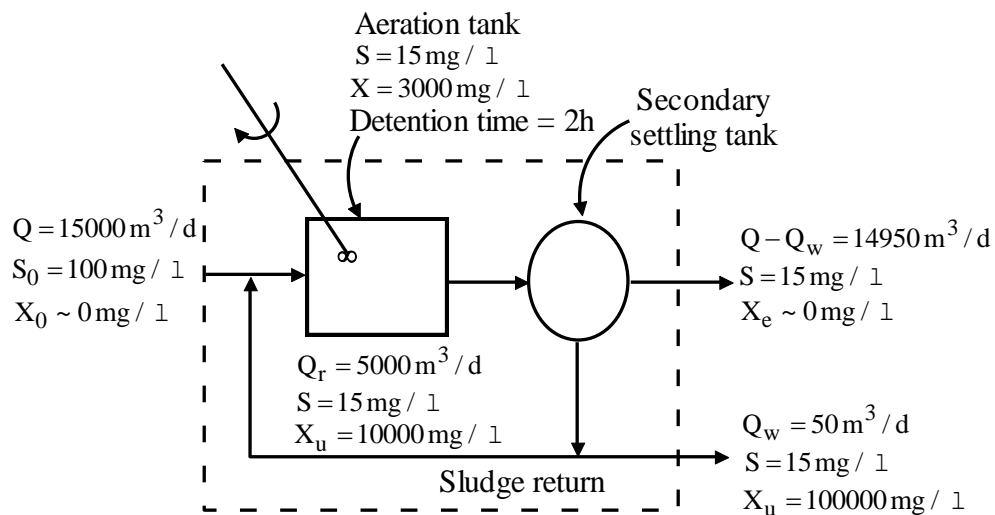b) Design a rapid sand filter unit for 4 million litres per day of supply with all its principal components. **8**

OR

6. a) With neat sketch explain 'Break Point Clorination'. What are the factors which influence the disinfections efficiency of Chlorine. **8**

b) State and explain various methods of disinfection. **8**

7. a) Draw a neat diagram of conventional sewage treatment plant. Explain the function of each unit in treatment plant. **8**

	b)	Design a bar screen for a peak average flow of 20 MLD. Assuming necessary design parameter if needed.	**8**

<div align="center">**OR**</div>

8.	a)	Explain with neat sketch working of skimming tank.	**8**
	b)	Design a primary settling tank of rectangular shape to treat 10 MLD of waste water generated from a town. Assume suitable data, if needed.	**8**
9.	a)	What is activated sludge? Describe with sketches any one modification of activated sludge process.	**10**
	b)	A schematic flow diagram of a completely mixed biological reactor with provision for recycling of solids is shown in figure.	**6**

S_o, S = readily biodegradable soluble BOD in mg/l

Q, Q_r, Q_w = flow rates in m^3/d

X_o, X_e, X_u, X = MLVSS in mg/l

Determine mean cell Residence Time.

<div align="center">**OR**</div>

10.	Write a note on **any four.**	**16**

    i)   Stabilization pond

    ii)   Oxidation pond

    iii) Sludge drying bed

    iv) Imhoff tank

    v)   BOD/COD ratio

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