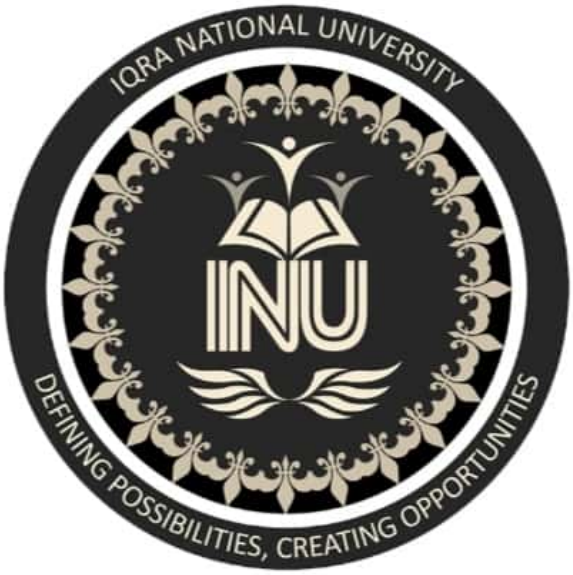
WASTEWATER ENGINEERING



Submitted by:

Arqam Habib

ID: 7702

Section : A

Submitted to:

Engr. Nadeem Ullah

IQRA NATIONAL UNIVERSITY PESHAWAR

Question

Part (a)

i) Hydraulic Retention Time

The hydraulic retention time (HRT) also known as hydraulic residence time. The hydraulic retention time in wastewater treatment is a measure at an average length of time holding the wastewater in a tank.

It is the relation between volume and flow rate

$$HRT = \frac{V}{\text{Flow rate}}$$

Time of stay of water in reactor. This time is usually used for the determination of the quantity of the influent used in a particular volume of a reactor.

HRT is an important parameter in wastewater treatment which directly affects the design operation / investment cost and energy requirements and in general, higher HRT will lead greater investment costs. Therefore, having HRT also has a significant effect on the power generation and wastewater treatment characteristics of the MFC & MEC

ii) Solid Retention Time (SRT)

The solids retention time (SRT) is the time the solid fraction of the wastewater spends in a treatment unit. The SRT is an important design and operating parameter for the activated sludge process and is usually expressed in days.

It is the quantity of solids maintained in the reactor divided by the quantity of solids coming out of the reactor each day:

$$SRT = V \cdot cd / Q_{out} \cdot C_{out}$$

where:

- V is the digester Volume
- Cd is the Solids Concentration
- Q_{out} is the Volume Wasted each day
- C_{out} is the solids concentration of the effluent.

- The Solids retention time (SRT) controls the concentration of bacteria throughout the treatment system. A higher SRT contributes to a higher bacterial concentration in the reactor which gives rise to

- Smaller reactor size
- Larger Seperator "
- Reduced Sludge Production.
- Higher aeration requirements due to the extra oxygen required for the endogenous respiration.

Part (b)

Methods Used For Decoupling SRT From HRT

- The methods which are used for decoupling SRT from HRT are

- Recuperative Thickening
- Anaerobic Municipal wastewater Treatment
- Integrated Waste Management
- Distiller Grains.

Advantages of decoupling SRT from HRT:

⇒ To produce the solids free better quality effluents while the use of anaerobic biomass

⇒ The main advantage of decoupling SRT from HRT is that it will be operated and be easily clarified

⇒ To investigate the effect of hydraulic retention time

⇒ By decoupling SRT from HRT the liquid wastewater can be processed faster.

⇒ Energy can be recovered, thus providing ecological and economical benefits