

WASTEWATER * ENGINEERING

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SECTION * B

SEMESTER * 8th

SUBMITTED TO * ENGR. NADEEM

Ans: 01

Part No (a)"Waste Water Engineering"

Also known as; Sanitary engineering or public Health engineering.

"The application of engineering methods to improve sanitation of human communities, primarily by providing the removal and disposal of human waste, treatment and reuse application for various purposes."

And in addition to the supply of safe potable water.

"Application";

Directly related to improving environment by disposing off treated wastewater and thus reducing the risk of ground water contamination and safeguarding aquatic life. Protect nature's beneficial ecosystems.

Ans 3.2

Relationship; "Wastewater with water supply of a locality."

These are Two main areas in which wastewater is generated from water supply.

- "i" Domestic Area.
- "ii" Industrial Area.

"a" Domestic Area; Divided into four Areas.

- "i" Residential area.
- "ii" Commercial facilities.
- "iii" Institutional facilities.
- "iv" Recreational facilities.

* The water which is supplied to such type of areas 60-80% of that water is wasted and 20% is used.

* So wastewater has a deep relation with water supply.

* If we want to calculate wastewater so we should know the supply of water quantity.

* For calculation the quantity of water first we should calculate population of Area by following two methods.

"i" Arithmetic Increase Method.

"ii" Geometric Increase Method.

"i" Arithmetic Increase Method.

Given as; $P_n = P + nc$

P_n = Population after n th years.

P = Present population.

n = Number of years.

c = Rate of change of population with respect to time.

"ii" Geometric Increase method,

$$P_n = P \left(1 + \frac{I_g}{100} \right)^n$$

I_g = Geometric mean.

- Through these formulas we calculate population then find out quantity of potable water required.
- Wastewater can be find out from quantity of fresh water.
- There is a direct relationship b/w wastewater and water-supply of a locality.

Wastewater \propto Quantity of freshwater
or
water supplied.

Ans: 03

"Importance of Wastewater Characterization"

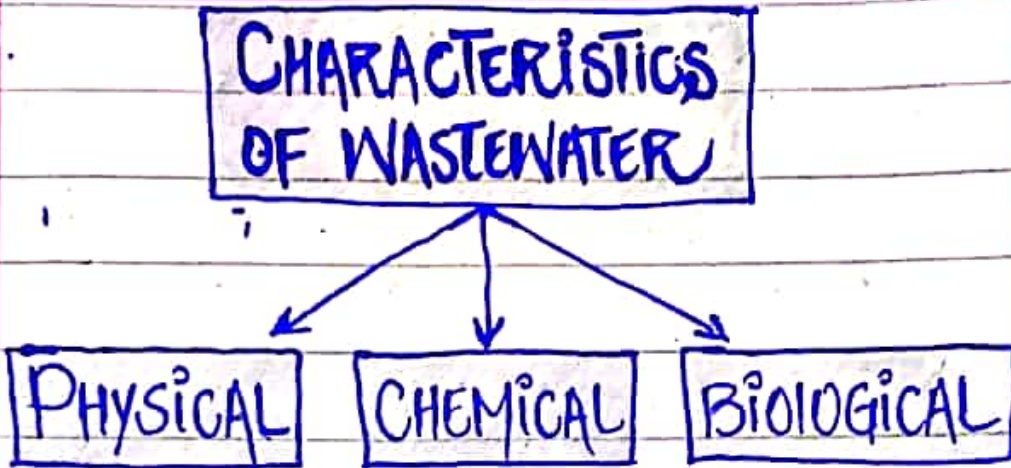
* The scope of sewage management has evolved throughout history with changes in socioeconomic conditions and the environment. Today, sewage infrastructure that is well-planned and operated supports urban sanitation and related activities.

Effective sewage management is essential for nutrient recycling and for maintaining ecosystem integrity. It is also important;

- preserving receiving water quality.
- preventing floods through removal of rainwater and improving the environment.

* The characterization of wastewater provides a wide variety of information through regarding the type and concentration of contaminants present. With characterization of water we determine the nature of contaminant "physical, chemical, biological" then treatment plant is designed according.

Ans: 4



(a) PHYSICAL CHARACTERISTICS;

- "i" Colour
- "ii" Taste and odour
- "iii" Temperature
- "iv" Turbidity
- "v" Density
- "vi" Specific Gravity

(b) CHEMICAL CHARACTERISTICS;

- "i" Hardness
- "ii" "PH" value
- "iii" Organic matter
- "iv" Nitrogen content
- "v" Toxics
- "vi" Chlorides content
- "vii" Dissolved oxygen
- "viii" Fats, oils, Greases
- "ix" Sulphides
- "x" Sulphates
- "xi" Hydrogen gas

"c" "BIOLOGICAL CHARACTERISTICS";

- "i" Bacteria "ii" Fungi
- "iii" Algae "iv" Protozoa
- "v" Viruses
- "vi" Pathogenic micro-organisms groups.

Ans:05 Part No (a)

"a" "COMBINED SEWERAGE SYSTEM"

"i" Advantages;

- "i" Convenience "minimal intervention by users"
- "ii" Low health risk
- "iii" No nuisance from smells, Mosquitoes or flies.
- "iv" Storm water and wastewater can be managed at the same time.
- "v" More suitable in narrow streets.
- "vi" Moderate operation and maintenance cost.

"iii" "Disadvantages";

- "i" Because of large dimensions of sewers, initial cost is high.
- "ii" Need a reliable supply of piped water.
- "iii" Difficult to construct in high density areas.
- "iv" Recycling of nutrients and energy becomes difficult.
- "v" Problem associated with blockages and breakdown of pumping equipment.
- "vi" High Treatment cost due to inclusion of storm water.

"b" "SEPERATE SEWERAGE SYSTEM"

"i" "Advantages";

"i" Size of sewer requires less.

"ii" Less Treatment cost because of exclusion of storm water.

"iii" As the sewer are similar in section they can be easily ventilated.

"iv" Rain water can be discharged into streams without any treatment.

"ii" "Disadvantages";

"i" This system requires laying two sets of pipe which may be difficult in congested area.

"ii" Initial cost is high because two separate set are used.

"iii" Maintenance cost of sewer is also high.

"iv" They are likely to get blocked.

Ans:05

Part No (b)

"NEW TOWNSHIP"

For a proposed new planned Township I will suggest / recommend Separate Sewerage System,

Because of the following reasons. Our main purpose in wastewater engineering is the treatment of water (wastewater).

"i" So in Separate Sewerage System Sanitary Sewage and Storm water flows in a separate pipes, Thus quantity of sewage to be treated is less and easy. is compared to Combined Sewerage System.

"ii" And second also avoid the overflow of storm water.

"iii" Less degree of sanitation is achieved in this system.