Daffodil Institute of Technology

Diploma-in-Civil Technology

7th Semester

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66472 **Sanitary Engineering** **T P C**

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AIMS

 To be able to compare various methods and techniques used to treat and dispose of sewage and control of

water pollution and select appropriate methods for given situations.

 To be able to identify various sewer pipes, fittings, procedures of construction, repair, replacement and maintenance of sewage disposal system.

 To be able to determine the size of circular sewer pipes, septic tanks and soak pit of sewage disposal system.

 To be able to compare various types of pit latrine and biogas generating plants.

 To be able to understand the basic concept of solid waste and management.

 To be able to understand the basic concept of ETP

SHORT DESCRIPTION

Sewage; Sewer pipe; Sewer appurtenance; Flow in sewer; Construction of sewer; Maintenance of sewer; Characteristics of sewage; Sewage disposal; Preliminary Sewage treatment system; Secondary treatment system; Sludge treatment and disposal; Effluent Treatment Plant; Water pollution and its effects on the environment; Rural sanitation; Health and hygiene; Generation of biogas; Sources and classification of solid waste; Municipal and industrial solid waste; different steps of solid management.

DETAIL DESCRIPTION

Theory:

1. Understand sewage, sewer and sewerage system.

1.1 Define sewage, sewer and sewerage.

1.2 Compare various types of sewerage system.

1.3 Outline the advantages and limitations of sewerage system and septic tank.

1.4 Identify various types of sewers of a complete sewerage system.

1.5 Compare the advantages and limitations of uses of different kinds of sewer pipes according to materials

of construction.

1.6 Draw the cross-section of different types of sewers, with different types of bedding.

1.7 Describe various kinds of joint in connecting the pipes with the help of sketches.

1.8 List the requirements of a good sewer joint.

2. Understand sewer appurtenances and their purposes.

2.1 Identify various sewer appurtenances.

2.2 Describe various sewer appurtenances with the help of sketches.

2.3 Discuss the factors to be considered for locating the sewer appurtenances.

2.4 Describe with neat sketch of siphon & inverted siphon.

2.5 Discuss the requirements of sewage pumps.

2.6 List various types of sewage pumps.

2.7 Describe the factors to be considered for locating the site of pumping station and state the capacity of pump and pumping stations.

3. Understand the process of designing sewers.

3.1 State different conditions of flow through a sewer.

3.2 Identify self cleansing velocity and grades of sewer.

3.3 Describe the formulas with notations for various kinds of flow of sewage.

3.4 Explain dry weather flow and storm weather flow.

3.5 Calculate the quantity of storm rain by: Rational method & Empirical method

3.6 Identify different hydraulic elements that govern the flow or discharge of sewage through a sewer.

3.7 Solve problems of discharge rates for circular sewers using cheese's formula.

4. Understand the principle of construction of sewers.

4.1 Explain general aspects for preparation of sewerage scheme.

4.2 Describe procedures followed in the construction of sewers.

4.3 Explain the procedure of laying a sewer in a trench.

4.4 Specify with sketch, the setting- out of the fall of sewer for the continuous gravitational flow of sewage.

4.5 Describe the techniques of testing sewer lines and the precautions should be taken during back filling of trenches.

4.6 State different ways of protection for sewer.

4.7 Describe the methods adopted for ventilating sewers.

5. Understand the process of maintenance of sewer.

5.1 Identify the need for maintenance of sewer.

5.2 Identify the precautions to be taken before entering in sewers.

5.3 Identify the factors to be considered for frequent inspection and supervision of sewer so that proper flow is maintained.

5.4 Describe the procedures used to clean and unlock sewer.

6. Understand the methods used for sewage disposal.

6.1 List various methods of sewage disposal.

6.2 State the characteristics of soil which influence waste water disposal.

6.3 Explain the term dilution and its suitability.

6.4 Describe septic tank.

6.5 Compare the design of septic tanks with a soak pit for 20, 50 and 100 users respectively.

6.6 Explain with sketches the construction and operation of a septic tank.

7. Understand the method of sewage treatment.

7.1 Identity the various conditions which directly affect the self purification of sewage in streams.

7.2 Outline the stages of sewage treatment.

7.3 Explain the purpose of preliminary sewage treatment.

7.4 Explain with the help of sketches: Detritus tanks (grit chambers) & Skimming tanks.

7.5 Describe the function of communicators.

7.6 Name different kinds of treatment process for removing impurities of each stage of the treatment process.

7.7 Describe the schematic layout of a typical sewage treatment plant.

7.8 Describe the vacuum flotation method for removing greases and oils.

7.9 Describe with the help of neat sketch of a sedimentation tank giving the factors, which reduce the efficiency of sedimentation tanks.

7.10 Explain the system of Effluent Treatment Plant.

8. Understand the process of sludge treatment and the method of disposal.

8.1 List the various sources of sludge.

8.2 Explain different purposes served by the sludge digestion.

8.3 Distinguish between anaerobic digestion and aerobic digestion.

8.4 Describe the working principles of a vacuum filters and drying beds.

8.5 Identify the methods of ultimate disposal of sludge.

8.6 Explain advantages and disadvantages of incinerating sludge.

9. Understand the water pollution and its effects on the environment.

9.1 Identify the undesirable changes and its effects of pollution on-

a) Human life

b) Animal life

c) Aquatic life

9.2 Describe various sources of water pollution.

9.3 Classify different types of pollution and explain clearly each type of pollution.

9.4 Describe the precautions that should be taken to prevent pollution of water sources from domestic and industrial effluent disposal systems.

10. Understand the rural sanitation practices in Bangladesh.

10.1 Describe the ventilated improved pit (VIP) latrine and simple pit latrine.

10.2 Draw a neat sketch of VIP latrine and describe the special features of VIP latrine.

10.3 Mention the advantages & disadvantages of VIP and simple pit latrine.

10.4 Mention the advantages & disadvantages of single/twin pit pour flush latrine.

10.5 Describe the construction procedures of VIP, single and twin pit pour flush latrine.

11. Understand health and hygiene.

11.1 Describe the common diseases.

11.2 Explain the importance of hygiene education.

11.3 Describe the scope and methodology for hygiene education.

11.4 Explain the advantages of social mobilization for hygiene practice.

11.5 Explain integrated approach for water, sanitation and health education.

12. Understand the concept of biogas.

12.1 Explain the process of generating fuel gas with cow dung /human waste / other organic wastes.

12.2 Explain the term biogas.

12.3 Explain the working principle of a biogas plant with the help of neat sketch.

12.4 Describe the construction procedure of a biogas plant.

12.5 Compare the advantages and disadvantages of using small scale biogas plant in Bangladesh.

13. Understand the municipal and industrial solid waste and its management.

13.1 Describe the classification of municipal solid waste materials.

13.2 Describe the general sources of municipal solid waste.

13.3 Describe the garbage, rubbish and trash.

13.4 Mention the classification of different types of industrial solid waste.

13.5 Describe the hazardous industrial solid waste.

13.6 Describe the medical waste and its disposal.

13.7 List different steps for collecting solid waste according to category.

13.8 Mention different steps for disposal solid waste.

13.9 Show with neat sketches the flow diagram of different steps of solid waste management from generation to disposal.