# Daffodil Polytechnic Institute
# Institute Code: 50238
## Department of Civil Technology

## Lesson Plan

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| **Academic Session:** | January 2025 to June 2025 |
| **Course Title:** | Sanitary Engineering |
| **Course Code:** | 26472 |
| **Semester:** | 7th Semester |
| **Credit Hour:** | 3 |
| **Name & Designation of Teacher:** | **Fawzia Akter Rumki**<br>Instructor, Department of Civil Technology, DPI |
| **Class Hours:** | Sunday: 9:30- 10:15 (Theory)<br>Monday: 11:00- 11:45 (Theory)<br>Thursday: 01:40-3:55 (Practical) |
| **E-mail:** | civil2@bsdi-bd.org |
| **Reference Book:** | 1. Sanitary Engineering (Publisher: Haque Prokashani)<br>2. Waste Water Engineering (Metcalf &Eddy Inc) |

**Marks Distribution:**

| Marks | Grade Point | Letter Grade | Marks | Grade Point | Letter Grade |
|---|---|---|---|---|---|
| 80> | 4.00 | A+ | 55-59 | 2.75 | B- |
| 75-79 | 3.75 | A | 50-54 | 2.50 | C+ |
| 70-74 | 3.50 | A- | 45-49 | 2.25 | C |
| 65-69 | 3.25 | B+ | 40-44 | 2.00 | D |
| 60-64 | 3.00 | B | 0-39 | 0.00 | F |

| Marks Distribution (for 150 Marks) | | | |
|---|---|---|---|
| Theory Marks | | Practical Marks | |
| Midterm | 20 | PC | 25 |
| Class test | 10 | PF | 25 |
| Quiz test | 10 | - | |
| Final | 60 | - | |
| Total | 100 | Total | 50 |

| Class Timing Distribution | |
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| Particulars | Time |
| Greeting with students | 05 Minutes |
| Previous Class Review | 05 Minutes |
| Present Class Topic Discussion and Lecture Delivery | 30 Minutes |
| Present Class Topics Review | 05 Minutes |

## Short Description:

Sanitary Engineering is a branch of civil engineering focused on the planning, design, construction, and maintenance of sewerage systems. It ensures the safe disposal of wastewater, sewage, sludge, and solid waste while maintaining hygienic conditions. Diploma civil engineers play a crucial role in constructing and maintaining sanitary infrastructure. This course covers key concepts such as sewage systems, sewer appurtenances, wastewater treatment, sludge management, solid waste disposal, and rural sanitation. The objective is to equip students with the necessary knowledge and skills to become proficient in sanitary engineering and contribute to a safe and hygienic environment.

## Subject Aims:

Upon successful completion of this course, students will be able to:

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

| Lecture | Chapter/ Exam / Industrial Visit | Learning Area | Learning Outcome | Class/Lab Supporting Equipment's |
|---|---|---|---|---|
| 01 | **Chapter 01-** Understand sewage, sewer and sewerage system. | 1.1 Define sewage, sewer and sewerage.<br>1.2 Compare various types of sewerage system.<br>1.3 Outline the advantages and limitations of sewerage system and septic tank.<br>1.4 Identify various types of sewers of a complete sewerage system.<br>1.5 Compare the advantages and limitations of uses of different kinds of sewer pipes according to materials of construction.<br>1.6 Draw the cross-section of different types of sewers, with different types of bedding.<br>1.7 Describe various kinds of joint in connecting the pipes with the help of sketches.<br>1.8 List the requirements of a good sewer joint. | After the Class, Students will be able to:<br>• Know about sewage, sewer and sewerage.<br>• Can understand requirements of a good sewer joint. | 1) Basic Class Materials<br>2) PC with Internet Connection and Projector.<br>https://www.youtube.com/watch?v=Y3qCwtjkh-w |
| 02 | **Practical-1**<br>**Sketch different types of plumbing fixtures.** | | After the Practical Class, Students will be able to:<br>• Can Practice Sketch different types of plumbing fixtures. | 1) Pencil, Eerier, Set Square, Drawing Sheet, Etc. |
| 03 | **Chapter 02-** Understand sewer appurtenances and their purposes. | 2.1 Identify various sewer appurtenances.<br>2.2 Describe various sewer appurtenances with the help of sketches.<br>2.3 Discuss the factors to be considered for locating the sewer appurtenances.<br>2.4 Describe with neat sketch of siphon & inverted siphon. | After the Class, Students will be able to:<br>• Understand the sewer appurtenances.<br>• Know that the factors to be considered for locating the site of pumping station and state the capacity of pump and pumping stations. | 1) Basic Class Materials<br>2) PC with Internet Connection and Projector.<br>https://www.youtube.com/watch?v=O0OQyailIXA |

| Lecture | Chapter/ Exam / Industrial Visit | Learning Area | Learning Outcome | Class/Lab Supporting Equipment's |
|---|---|---|---|---|
| | | 2.5 Discuss the requirements of sewage pumps.<br>2.6 List various types of sewage pumps.<br>2.7 Describe the factors to be considered for locating the site of pumping station and state the capacity of pump and pumping stations | | |
| 04 | **Chapter 02 -** Understand the organization of contracts department. | 2.1 Define organization.<br>2.2 Describe organizational effectiveness in an organization.<br>2.3 State the staffing pattern in an organization of contract department.<br>2.4 Draw an organizational chart of a contracts department.<br>2.5 Describe the responsibilities and authorities of the components of contracts Department.<br>2.6 List different government engineering department in Bangladesh. | After the Class, Students will be able to:<br>• Understand the organization<br>• To know the function and objectives of consultants. | 1) Basic Class Materials |
| 05 | **Practical-2**<br>**Sketch manhole, septic tank and soak pit.** | | After the Practical Class, Students will be able to:<br>• Understand the Process of Sketch manhole, septic tank and soak pit. | 1) Pencil, Eerier, Set Square, Drawing Sheet, Etc. |
| 06 | **Quiz Test-1** | **Examination Topic: Chapter 1, 2. Examination**<br>**Marks:10**<br>**Pass Marks:04** | | 1) Basic Class Materials<br>2) Examination Khata |
| 07 | **Chapter 03 -** Understand the process of designing sewers. | 3.1 State different conditions of flow through a sewer.<br>3.2 Identify self-cleansing velocity and grades of sewer. | After the Class, Students will be able to:<br>• Understand the conditions of flow through a sewer. | • Basic Class Materials<br>• Projector.<br>https://www.youtube.com/watch?v=O0OQyailIXA |

| Lecture | Chapter/ Exam / Industrial Visit | Learning Area | Learning Outcome | Class/Lab Supporting Equipment's |
|---|---|---|---|---|
| | | 3.3 Describe the formulas with notations for various kinds of flow of sewage.<br>3.4 Explain dry weather flow and storm weather flow.<br>3.5 Calculate the quantity of storm rain by: Rational method & Empirical method<br>3.6 Identify different hydraulic elements that govern the flow or discharge of sewage through a sewer.<br>3.7 Solve problems of discharge rates for circular sewers using cheese's formula. | • To Solve problems of discharge rates for circular sewers using cheese's formula. | |
| 08 | **Practical-3**<br>**Make connection of different sanitary fixtures.** | | After the Practical Class, Students will be able to:<br>• Understand the Process of Make connection of different sanitary fixtures. | 1) Plastic Pipe, Feting, fixtures, Tape, Glue, and Pipe Connection Equipment's. |
| 09 | **Chapter 04 -** Understand the principle of construction of sewers. | 4.1 Explain general aspects for preparation of sewerage scheme.<br>4.2 Describe procedures followed in the construction of sewers.<br>4.3 Explain the procedure of laying a sewer in a trench.<br>4.4 Specify with sketch, the setting- out of the fall of sewer for the continuous gravitational flow of sewage.<br>4.5 Describe the techniques of testing sewer lines and the precautions should be taken during back filling of trenches.<br>4.6 State different ways of protection for sewer.<br>4.7 Describe the methods adopted for ventilating sewers. | After the Class, Students will be able to:<br>• Know about general aspects for preparation of sewerage scheme.<br>• Understand the methods adopted for ventilating sewers. | 1) Basic Class Materials |

| Lecture | Chapter/ Exam / Industrial Visit | Learning Area | Learning Outcome | Class/Lab Supporting Equipment's |
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| 10 | **Chapter 05-** Understand the process of maintenance of sewer. | 5.1 Identify the need for maintenance of sewer.<br>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.<br>5.4 Describe the procedures used to clean and unlock sewer. | After the Class, Students will be able to:<br>1) Understand the need for maintenance of sewer.<br>2) Understand the procedures used to clean and unlock sewer. | 1) Basic Class Materials |
| 11 | **Practical-4**<br>**Replace unserviceable sanitary fixtures.** | | After the Practical Class, Students will be able to:<br>1) Understand the process of replace unserviceable sanitary fixtures. | 1) Plastic Pipe, Feting, fixtures, Tape, Glue, and Pipe Connection Equipment's. |
| 12 | **Class test -1** | **Examination Topic: Chapter-3, 4, 5. Examination Marks:10**<br>**Pass Marks: 04** | | 1) Basic Class Materials<br>2) Examination Khata |
| 13 | **Chapter 06 -** Understand the methods used for sewage disposal. | 6.1 List various methods of sewage disposal.<br>6.2 State the characteristics of soil which influence waste water disposal.<br>6.3 Explain the term dilution and its suitability.<br>6.4 Describe septic tank.<br>6.5 Compare the design of septic tanks with a soak pit for 20, 50 and 100 users respectively.<br>6.6 Explain with sketches the construction and operation of a septic tank. | After the Class, Students will be able to:<br>• Understand the methods of sewage disposal.<br>• Understand the process of sketches the construction and operation of a septic tank. | 1) Basic Class Materials. |

| Lecture | Chapter/ Exam / Industrial Visit | Learning Area | Learning Outcome | Class/Lab Supporting Equipment's |
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| 14 | **Practical-5**<br>**Prepare a model of manhole, septic tank and soak pit.** | | After the Practical Class, Students will be able to:<br>• Understand the prepare a model of manhole, septic tank and soak pit. | 1) Pencil, Eerier, Set Square, Drawing Sheet, Etc.<br>2) PC with Internet Connection and Projector.<br>https://www.youtube.com/watch?v=VvWpDHq37kM |
| 15 | **Chapter 07 -** Understand the method of sewage treatment. | 7.1 Identity the various conditions which directly affect the self-purification of sewage in streams.<br>7.2 Outline the stages of sewage treatment.<br>7.3 Explain the purpose of preliminary sewage treatment.<br>7.4 Explain with the help of sketches: Detritus tanks (grit chambers) & Skimming tanks.<br>7.5 Describe the function of communicators. | After the Class, Students will be able to:<br>• Understand the various conditions which directly affect the self-purification of sewage in streams.<br>• Understand the function of communicators. | • Basic Class Materials. |
| 16 | **Quiz Test-2** | **Examination Topic: Chapter-6, 7. Examination**<br>**Marks:10**<br>**Pass Marks: 04** | | 1) Basic Class Materials<br>2) Examination Khata |
| 17 | **Practical-6**<br>**Sketch Pit latrine, Twin pit latrine, VIP latrine and sketching, layout plan of pipe line.** | | After the Practical Class, Students will be able to:<br>• Understand the process of Sketch Pit latrine, Twin pit latrine, VIP latrine and sketching, layout plan of pipe line. | 1) Pencil, Eerier, Set Square, Drawing Sheet, Etc. |
| 18 | **Chapter 07 -** Understand the method of sewage treatment. | 7.6 Name different kinds of treatment process for removing impurities of each stage of the treatment process.<br>7.7 Describe the schematic layout of a typical sewage treatment plant. | After the Class, Students will be able to:<br>• Understand the various conditions which directly affect the self-purification of sewage in streams. | • Basic Class Materials. |

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| | | 7.8 Describe the vacuum flotation method for removing greases and oils.<br>7.9 Describe with the help of neat sketch of a sedimentation tank giving the factors, which reduce the efficiency of sedimentation tanks.<br>7.10 Explain the system of Effluent Treatment Plant. | • Understand the function of communicators. | |
| | **Mid Term** | **Examination Topic: Chapter-1-8.**<br>**Examination mark: 20**<br>**Passing Mark: 08** | | |
| 19 | **Chapter 08-** Understand the process of sludge treatment and the method of disposal. | 8.1 List the various sources of sludge.<br>8.2 Explain different purposes served by the sludge digestion.<br>8.3 Distinguish between anaerobic digestion and aerobic digestion.<br>8.4 Describe the working principles of a vacuum filters and drying beds.<br>8.5 Identify the methods of ultimate disposal of sludge.<br>8.6 Explain the advantages and disadvantages of incinerating sludge. | After the Class, Students will be able to:<br>• Understand the various sources of sludge.<br>Understand the advantages and disadvantages of incinerating sludge. | Basic Class Materials. |
| 20 | **Practical-7**<br>**Sketch the Effluent Treatment Plant and show the different components in the figure.** | | After the Practical Class, Students will be able to:<br>• Understand the process of sketch the Effluent Treatment Plant and show the different components in the figure. | Pencil, Eerier, Set Square, Drawing Sheet, Etc. |
| 21 | **Class Test-2** | **Examination Topic: Chapter-7, 8.**<br>**Examination mark: 10**<br>**Passing Mark: 04** | | 1) Basic Class Materials<br>Examination Khata |
| 22 | **Chapter 09-** Understand the water pollution and its effects on the environment. | 9.1 Identify the undesirable changes and the effects of pollution on a) Human life b) Animal life c) Aquatic life | After the Class, Students will be able to:<br>• Understand the undesirable changes and the effects of pollution on) Human life b) Animal life c) Aquatic life | Basic Class Materials. |
| 23 | **Chapter 09-** Understand the water pollution and its effects on the environment. | 9.2 Describe various sources of water pollution.<br>9.3 Classify different types of pollution and explain clearly each type of pollution.<br>9.4 Describe the precautions that should be taken to prevent pollution of water sources from domestic and industrial effluent disposal systems. | After the Class, Students will be able to:<br>• Understand the undesirable changes and its effects of pollution ona) Human life b) Animal life c) Aquatic life | Basic Class Materials. |

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| 24 | **Chapter 10-** Understand the rural sanitation practices in Bangladesh. | 10.1 Describe the ventilated improved pit (VIP) latrine and simple pit latrine.<br>10.2 Draw a neat sketch of VIP latrine and describe the special features of VIP latrine.<br>10.3 Mention the advantages & disadvantages of VIP and simple pit latrine.<br>10.4 Mention the advantages & disadvantages of single/twin pit pour flush latrine.<br>10.5 Describe the construction procedures of VIP, single and twin pit pour flush latrine. | After the Class, Students will be able to:<br>• Know that the ventilated improved pit (VIP) latrine and simple pit latrine.<br>• Can understand the construction procedures of VIP, single and twin pit pour flush latrine. | Basic Class Materials. |
| 25 | **Chapter 11-** Understand health and hygiene. | 11.1 Describe the common diseases.<br>11.2 Explain the importance of hygiene education.<br>11.3 Describe the scope and methodology for hygiene education.<br>11.4 Explain the advantages of social mobilization for hygiene practice.<br>Explain integrated approach for water, sanitation and health education. | After the Class, Students will be able to:<br>• Know that the common diseases.<br>• Can understand the integrated approach for water, sanitation and health education. | Basic Class Materials. |
| 26 | **Class Test-3** | **Examination Topic: Chapter-10, 11. Examination mark: 10**<br>**Passing Mark: 04** | | 1) Basic Class Materials<br>2) Examination Khata |
| 27 | **Parctical-8**<br>**Prepare a model of slab with water seal pan with ring.** | | After the Practical Class, Students will be able to:<br>• Understand the process of prepare a model of slab with water seal pan with ring. | Pencil, Eerier, Set Square, Drawing Sheet, Etc. |
| 28 | **Chapter 12 -** Understand the concept of biogas. | 12.1 Explain the process of generating fuel gas with cow dung /human waste / other organic wastes.<br>12.2 Explain the term biogas.<br>12.3 Explain the working principle of a biogas plant with the help of neat sketch.<br>12.4 Describe the construction procedure of a biogas plant. | After the Class, Students will be able to:<br>• Know that the process of generating fuel gas with cow dung /human waste / other organic wastes.<br>Can understand the advantages and disadvantages of using small scale biogas plant in Bangladesh. | Basic Class Materials. |

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| | | 12.5 Compare the advantages and disadvantages of using small scale biogas plant in Bangladesh. | | |
| 29 | **Chapter 13 -** Understand the municipal and industrial solid waste and its management. | 13.1 Describe the classification of municipal solid waste materials.<br>13.2 Describe the general sources of municipal solid waste.<br>13.3 Describe the garbage, rubbish, and trash.<br>13.4 Mention the classification of different types of industrial solid waste.<br>13.5 Describe the hazardous industrial solid waste | After the Class, Students will be able to:<br>• Know that the classification of municipal solid waste materials.<br>• Can understand the procedure neat sketches the flow diagram of different steps of solid waste management from generation to disposal. | Basic Class Materials. |
| 30 | **Quiz Test-3** | **Examination Topic: Chapter- 12.**<br>**Examination mark: 10**<br>**Passing Mark: 04** | | 1) Basic Class Materials<br>2) Examination Khata |
| 31 | **Chapter 13 -** Understand the municipal and industrial solid waste and its management. | 13.6 Describe the medical waste and its disposal.<br>13.7 List different steps for collecting solid waste according to category.<br>13.8 Mention different steps for disposal solid waste.<br>13.9 Show with neat sketches the flow diagram of different steps of solid waste management from generation to disposal. | After the Class, Students will be able to:<br>• Know that the classification of municipal solid waste materials.<br>• Can understand the procedure neat sketches the flow diagram of different steps of solid waste management from generation to disposal. | Basic Class Materials. |
| 32 | **Quiz Test-4** | **Examination Topic: Chapter-13.**<br>**Examination mark: 10**<br>**Passing Mark: 04** | | 1) Basic Class Materials<br>2) Examination Khata |
| 33 Review class | According to the problem of students. | | | After the Class, Students will be able to: Clear knowledge on the lessons. |