

16CE301

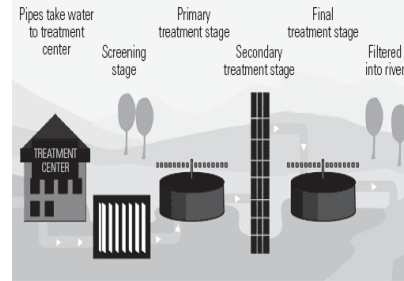
ENVIRONMENTAL ENGINEERING - II

Hours Per Week :

| L | T | P | C |
|---|---|---|---|
| 3 | - | 2 | 4 |

Total Hours :

| L | T | P | WA/RA | SSH/HSB | CS | SA | S | BS |
|----|---|----|-------|---------|----|----|---|----|
| 45 | - | 30 | 20 | 48 | - | 15 | 3 | 3 |



Course Description and Objectives:

This course offers an introduction to current environmental problems such as water bodies and air pollution due to different development activities. In addition, it covers procedure methods to monitor and measure pollution and to control the same. The main objective of the course is to familiarize with the water supply and wastewater disposal by understanding the function of natural and engineered environmental systems, and the ability to design their components and processes to meet the desired needs of society.

Course Outcomes:

The students will be able to:

- understand key current environmental problems.
- identify and evaluate the effect of pollutants on water bodies.
- plan different strategies to control, reduce and monitor pollution.
- select the most appropriate technique to purify and/or control pollutants.
- apply an Environmental Management System (EMS) to an industrial activity.
- know the basic environmental legislation.

SKILLS:

- ✓ *Design various units in a wastewater treatment plant*
- ✓ *Design of Sewer appurtenances.*
- ✓ *Design Trickling filter.*
- ✓ *Perform Treatment of sludge .*
- ✓ *Manage solid waste.*

ACTIVITIES:

- *Assess the characteristics of sewage*
- *Design of various units in a waste water treatment plant.*
- *Prepare a model of Trickling filter.*
- *Prepare a flow chart of Activated sludge process.*

UNIT - 1**L-9**

INTRODUCTION TO SANITARY ENGINEERING: Sanitation, Conservancy and water carriage systems, Sewage and storm water estimation, Time of concentration, Storm water overflows combined flow characteristics of sewage, Cycles of decay, Decomposition of sewage, Examination of sewage, B.O.D., C.O.D. Equations, Design of sewers, Sewer appurtenances, Man holes, Drop man holes, Lamp holes, Flushing tanks, Inverted syphons, Street inlets, Catch basins.

UNIT - 2**L-9**

PRIMARY TREATMENT OF SEWAGE: Layout and general outline of various units in a waste water treatment plant, Primary treatment design of screens, Grit chambers, Skimming tanks, Sedimentation tanks, Principles of design.

UNIT - 3**L-9**

SECONDARY TREATMENT OF SEWAGE: Biological treatment, Trickling filters, Standard and high rate, Activated sludge process, Principle of action, Activated sludge process vs. Trickling filter process, Sewage disposal, Objects, Methods, Disposal by dilution, Disposal by irrigation, Sewage sickness, Reuse of treated sewage, Ground water recharge.

UNIT - 4**L-9**

SLUDGE TREATMENT AND DISPOSAL: Characteristics of sewage sludge, Sludge digestion, Factors effecting the sludge digestion, Sludge disposal by drying, Sludge thickening, Sludge conditioning, Methods of dewatering the sludge, Methods of sludge disposal.

UNIT - 5**L-9**

URBAN SOLID WASTE MANAGEMENT: Sources of the solid waste, Quantities and characteristics of the solid waste, Classification, Collection and transportation, Recovery and reuse, Treatment Methods of the solid waste, Composting, Incineration, Sanitary landfill and pyrolysis.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS

Total Hours: 30

1. Total suspended and dissolved solids in water / sewage sample.
2. Fixed and volatile solids in water / sewage sample.
3. Settle able Solids.
4. Turbidity of water / sewage sample.
5. pH value of water / sewage sample.
6. Nitrates of water / sewage sample.
7. Sulphates of water / sewage sample.
8. Temporary and permanent hardness of water sample.
9. Chloride concentration of water / sewage sample.
10. Acidity of water sample.
11. Alkalinity of water sample.
12. Fluorides in water sample.
13. Dissolved Oxygen of Water / Sewage Sample
14. Biochemical Oxygen Demand (BOD) of waste water.
15. Chemical Oxygen Demand (COD) of waste water.
16. Noise levels at various places.

TEXT BOOKS:

1. K. N. Duggal, "Elements of Environmental Engineering", Vol. II, 7th edition, S. Chand and Company Ltd., New Delhi, 2010.
2. S. K. Garg, "Environmental Engineering", Vol. II, 4th edition, Khanna Publishers, Delhi, 2005.
3. C. S. Rao, "Environmental Pollution Control Engineering", Vol. I, 5th edition, Wiley Eastern Ltd., New Delhi, 2006.

REFERENCE BOOKS:

1. Met Calf and Eddy, "Wastewater Engineering Treatment, Disposal and Reuse", 2nd edition, Tata Mc.Graw Hill Publishing Co. Ltd., New Delhi, 2001.
2. Peavy and Rowe, "Environmental Engineering", Vol. I, 4th edition, McGrawhill, Newyork, 1998.
3. Ministry of Works and Housing, "Manual on Sewerage and Sewage Treatment", 2nd edition, CPH and EEO, Govt. of India, New Delhi, 1996.