

Savitribai Phule Pune University
TE Civil (2015 Course) w.e.f. June 2017
301011 Environmental Engineering-I

Teaching scheme	Examination scheme
Lectures: 4 hours/week	In semester exam: 30 marks--1 hour Paper
Practical: 2 hours/week	End semester exam: 70 marks—2.5 hours Paper
	Practical Exam: 50 Marks

Unit-I

(08 hours)

A) Noise Pollution: Sound measurements – Sound pressure, Intensity, Sound pressure level, Loudness, Equivalent noise level and Cumulative noise level.

B) Air Pollution: Atmospheric stability, Mixing heights, Meteorological parameters.

Air pollution control mechanism. Equipment for particulate contaminants. Principle and working of Settling chamber, Cyclone, Fabric filter, ESP. Gaseous contaminants control by adsorption and absorption technique.

C) Municipal Solid Waste: Concept of Municipal Solid waste management, Sources, Classifications, Treatment (composting & anaerobic digestion) Disposal (sanitary land fill)

Unit -II

(08 hours)

A) Introduction to water supply scheme: Data collection for water supply scheme, Components and layout. Design period, Factors affecting design period.

B) Quantity: Rate of water consumption for various purposes like domestic, Industrial, Institutional, Commercial, Fire demand and Water system losses, Factors affecting rate of demand, Population forecasting.

C) Quality: Physical, Chemical, Radioactivity and Bacteriological Characteristics, Heavy metals. Standards as per IS: 10500 (2012)

Unit –III

(08 hours)

A) Water treatment: Principles of water treatment operations and processes, Water treatment flow sheets.

B) Aeration: Principle and Concept, Necessity, Methods, Removal of taste and odour. Design of aeration fountain.

C) Sedimentation: Plain and chemical assisted - principle, efficiency of an ideal settling basin, Settling velocity, Types of sedimentation tanks, Design of sedimentation tank. Introduction & design of tube settlers.

Unit -IV

(08 hours)

A) Coagulation and flocculation: Principle of coagulation, Common coagulants alum & ferric salts, Introduction to other coagulant aids like bentonite clay, Lime stone, Silicates and Polyelectrolytes, Introduction of natural coagulants, Mean velocity gradient “G” and Power consumption, Design of Flocculation chamber, Design of Clari-flocculator.

B) Filtration: Theory of filtration, Mechanism of filtration, Filter materials, Types: Rapid, Gravity, Pressure filter, Multimedia and dual media filters, Components, Under drainage system, Working and cleaning of filters, Operational troubles, Design of Rapid sand Gravity filters.

Unit -V

(08 hours)

A) Disinfection: Mechanism, Factors affecting disinfection, Types of disinfectants, Types and methods of chlorination, Break point chlorination, Bleaching powder estimation.

B) Water softening methods and Demineralization : lime-soda, Ion-Exchange, R.O. and Electrodialysis

C) Fluoridation and defluoridation.

Unit-VI

(08 hours)

A) Water distribution system: System of water supply- Continuous and intermittent system. Different distribution systems and their components. ESR- Design of ESR capacity. Wastage and leakage of Water- Detection and Prevention.

B) Rainwater harvesting: Introduction, need, methods and components of domestic rainwater harvesting system. Design of roof top rainwater harvesting system.

C) Introduction to Packaged WTP in townships, big commercial plants, necessity (On-site water treatment)

Term Work

Note- Any 8 out of 10 Practicals. (a ,b & c are compulsory.)

a) Practicals.

1. pH and Alkalinity of raw water, soft drinks & tea.

2. Total hardness and components of raw water.

3. Chlorides in water.

4. Chlorine demand and residual chlorine.

5. Sodium or Potassium or Calcium using flame photometer.

6. Turbidity and optimum dose of alum.

7. Fluorides or Iron contents in water.

8. Most Probable Number (MPN)

9. Ambient air quality monitoring for PM10/PM2.5, SO₂ & NO_x.

10. Measurement of noise levels at various locations using sound level meter, Calculate cumulative noise level at any one location.

b) Site visit to water treatment plant and Detailed Report.

c) Assignment 1. Study of Water intake structures.

2. Complete Design of WTP using appropriate software.

Text / Reference Books

Reference Books:

1. Environmental Engineering: Peavy and Rowe, McGraw Hill Publications.
2. Optimal Design of Water Distribution Networks: P. R. Bhawe, Narosa Publishing House.
3. Rain Water Harvesting: Making water every body's business by CSE (Centre for Science and Environment) www.cse.org
4. Harvesting Faith: Linda K. Hubalek. Published by Butterfield books.
5. CPHEEO Manual on Water Supply & Treatment.
6. Standard Methods for the examination of water and waste water, 20th Edition (American Public health Association).

Text Books:

1. Water Supply Engineering: S. K. Garg, Khanna Publishers, New Delhi.
2. Water Supply and Sanitary Engineering: G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company, New Delhi.
3. Environmental Engineering 1: Water Supply Engineering: B. C. Punmia, Ashok Jain and Arun Jain. Laxmi Publications (P) Ltd.
4. Air Pollution: H. V. N. Rao and M. N. Rao, TMH Publications.
5. Theory and practice of water and waste water treatment--Wiley
6. Water Supply and Treatment Manual: Govt. of India Publication.
7. Waste Water Treatment-Concept Design and Approach---C.L.Karia,R.A.Christian--PHI
8. Environmental Remote Sensing from Regional to Global Scales—Ed.Giles Foody—Wiley
9. Water Supply and Sanitary Engineering: G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company, New Delhi.

Suggested Reading:

- Environmental Engineering by N. N. Barak , MGH
- Environmental Engineering by Venugopal Rao, PHI
- Environmental Engineering by Steel,McGhee , MGH
- Water Supply & Engineering by Pande and Carne , Tata McGraw Hill
- Water Supply Engineering by Harold Eaton Babbitt & James Joseph Doland , MGH
- Principles of Water Treatment by Keny J. Howe, MWH.
- Water treatment : principles & Design 3rd edition by John C Crittenden R. Rhodes
- Water quality & Treatment : Handbook on Drinking Water 6th Edition by James K. Edzwald.
- Standard Methods, APHA,AWWA.
- Environmental Engineering Laboratory Manual by B. Kotain & Dr. N. Kumarswamy
- NEERJ Laboratory Manual