



ANDHRA UNIVERSITY

TRANS-DISCIPLINARY RESEARCH HUB

ADVANCED ENVIRONMENTAL ENGINEERING

Unit1.

Air pollutants, dynamics, plume behavior, dispersion of air pollutants, dynamics, plume behavior, dispersion of air pollutants, atmospheric dispersion equation and its solutions. Gaussian plume models. Design concepts for pollution abatement systems for particulates and gases. These include gravity chambers, cyclone separators, filters, electrostatic precipitators, condensation, adsorption and absorption, thermal oxidation and biological processes.

Unit. II

Waste water treatment processes: Design concepts for primary treatment, grid chambers and primary sedimentation basins, biological treatment. Treatment methods — component separation, chemical and biological treatment

Unit. III.

Bacterial population dynamics, kinetics of biological growth and its applications to biological treatment, process design relationships and analysis, determination of kinetic coefficients, activated sludge process.

Unit. IV

Design, trickling filter design considerations, advanced treatment processes. Study of environment pollution from process industries and their abatement. Fertilizer, paper and pulp, inorganic acids, petroleum and petrochemicals, recovery of materials from process effluents.

Unit. V

Solid waste and Hazardous waste management: Sanitary land fill design, Hazardous waste classification and rules, management strategies. Incineration, solidification and stabilization, and disposal methods.

TEXTBOOKS

1. Environmental pollution control engineering, 2 edition (in press), by C.S.Rao.
2. Pollution control in process industries by S.P. Mahajan.

REFERENCES:

1. N.L.Nernerow, "Liquid waste of industry- theories, Practices and Treatment", AddisonWesley, New York, 1971.
2. W.J.Weber, "Physico-Chemical Processes for water quality control", Wiley Interscience, New York, 1969.
3. W.Strauss, "Industrial gas cleaning", Pergamon, London, 1975.
4. A.C.Stern, "Air pollution", Volumes I to VI, academic Press, New York, 1968.



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Time: 3 hours

Max. Marks: 100

All questions carry equal marks.

Answer any FIVE

- 1) What are the health effects due to the presence of particulate matter in air? What are the various techniques available for removal of same? Explain with the help of neat sketch the functioning of a Bag filter.
- 2) How do you classify the water pollutants? Explain the Activated Sludge process.
- 3) Explain the Tertiary treatment methods of water pollution.
- 4) What are the harmful effects of SO_x ? Explain the different methods to reduce the concentration in the effluent gases.
- 5) Discuss the control methods of effluents from fertilizer plants.
- 6) Explain about hazardous wastes in petroleum and petrochemical industries and discuss the risk assessment to handle such wastes. What are the preventive measures?
- 7) Explain how to manage solid waste and explain the disposal and recovery methods.
- 8) Write short notes on
 - (a) Electro static Precipitators
 - (b) Kinetics of Biological growth.