INDUSTRIAL POLLUTION AND CONTROL

Course Code: 13CH1118

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Course Educational Objectives:

This course helps the student in understanding the following aspects

- Different types of pollution, their sources and effects.
- Detailed study of air and water pollution.
- Management of municipal, radioactive and biomedical wastes.
- Understanding of waste water treatment processes and their design aspects.
- Working principles of air pollution control equipment.

Course Outcomes:

After completion of this course the student would be able to

- Understand the need to control environment pollution.
- Apply different methods of pollution control and reduce the level of pollution from various sources in air, water and soil.
- Help maintain a clean and healthy environment.

UNIT-I (10 Lectures)

Types of pollution, types of emissions from chemical industries and effects of environment, environment legislation, , Effluent guidelines and standards.

UNIT-II (14 Lectures)

POLLUTANT SAMPLING AND MEASUREMENT:

Ambient air sampling: collection of gaseous air pollutants, collection of particulate air pollutants. Stack sampling:

Sampling system, particulate sampling, and gaseous sampling.

Analysis of air pollutants: Sulphur dioxide, nitrogen oxides, carbon monoxide, oxidants and Ozones, hydrocarbons, particulate matter.

Sources and characteristics of pollutants in fertilizer, paper and pulp industry, petroleum and petroleum industry. Treatment of liquid and gaseous effluent in fertilizer industry.

UNIT-III (14 Lectures)

AIR POLLUTION CONTROL METHODS AND EQUIPMENTS:

Source collection methods: raw material changes, process changes, and equipment modification. Cleaning of gaseous equipments particulate emission control: collection efficiency, control equipment like gravitational settling chambers, Cyclone separators, fabric filters, ESP and their constructional details and design aspects. Scrubbers: wet scrubbers, spray towers, centrifugal scrubbers, packed beds and plate columns, venturi scrubbers, their design aspects. Control of gaseous emissions: absorption by liquids, absorption equipments, adsorption by solids, equipment and the design aspects.

UNIT-IV (12 Lectures)

Characterization of effluent streams, oxygen demands and their determination (BOD, COD, and TOC), Oxygen sag curve, BOD curve mathematical, controlling of BOD curve, self purification of running streams, sources of wastewater. Introduction to waste water treatment, Methods of primary treatments: screening, sedimentation, flotation, neutralization. Biological treatment of wastewater, bacterial and bacterial growth curve, aerobic processes, suspended growth processes, activated aerated lagoons and stabilization ponds, Attached growth processes, trickling filters, rotary drum filters, anaerobic processes. Methods of tertiary treatment. A brief study of carbon absorption, ion exchange, reverse osmosis, ultra filtration, chlorination, ozonation, treatment and disposal.

UNIT-V (10 Lectures)

MUNICIPAL SOLID WASTE SOURCES, AND CONTROL METHODS HAZARDOUS WASTE MANAGEMENT:

Nuclear wastes: health and environment effects, sources and disposal methods. Chemical wastes: health and environmental effects, treatment and disposal: treatment and disposal by industry, off site treatment and disposal, treatment practices in various countries. Biomedical wastes: types of wastes and their control.

TEXT BOOKS:

1. Rao. C.S., "*Environmental Pollution and Control Engineering*", 2nd Edition, Revised, Wiley Eastern Limited, India, 2006.
2. Mahajan. S.P., "*Pollution Control in Process Industries*", Tata-McGraw Hill, New Delhi, 1985.

REFERENCES:

1. Narayana Rao, M. and Datta, A.K., "*Waste Water Treatment*", 2nd Edition, Oxford and IBH Publications, New Delhi, 2005.
2. Prathap Mouli, P. and Venkata Subbayya, N., "*Air Pollution Control*", Divya Jyothi Publishers, Jodhpur.
3. Swamy, A.V.N., "*Industrial Pollution Control and Engineering*", Galgotia Publications, Hyderabad, 2005.