SEMESTER-II

Course Code	Course Title	Course Type	Credits	Contact Hours		
				L	P	T
CE-504	Physical and Chemical Process in Water and Wastewater Treatment	DC	4	3	0	1

Unit 1

Water Quality, Gas Transfer-Gas Liquid Equilibrium, Two Film Theory, Kinetics, Oxygen Transfer, Aeration Systems, Ammonia Stripping, Coagulation-Colloids, Diffuse Layer Theory, Particle Stability, Mechanisms of Destabilization.

Unit 2

Flocculation-Velocity Gradient, Kinetics, Baffled and Paddle Wheel Flocculation, Sedimentation- Discrete, Flocculent and Hindered Settling, Ideal Horizontal Flow Reactor, Up flow Reactor, Design Parameters, Tube Settlers.

Unit 3

Granular Media Filtration-Rapid and Slow Sand Filter, Particle Removal Mechanisms and Head Loss, Filter Run and Breakthrough, Constant and Declining Rate Filtration, Filter Backwashing, Dissolved Air Flotation-Design Considerations, Water Fluoridation, Iron and Manganese Removal.

Unit 4

Chemical Precipitation-Lime-Soda Softening, Split Treatment, Ion Exchange-Materials and Reactions, Ion Selectivity, Ion Exchange Equilibrium, Regeneration, Disinfection-Kinetics of Disinfection, Disinfectant Types, Available Chlorine, , Membrane Separation Processes, Desalination.

Text Books and Reference Materials

1. Metcalf and Eddy, M.C., "Wastewater Engineering: Treatment, Disposal and Reuse", Tata McGraw-Hill Publications, New Delhi,2003.
2. Benefield, L.D. Judkins J.F. and Weand B.L. (1982). Process ChemistryforWater and Wastewater Treatment, End ed., Prentice-Hall, Inc, New Jersey,USA.
3. Fair G. M., Geyer J. C. &Okun D. A., Water & Wastewater Engg. Vol. I & II, John-Willey & Sons, NewYork.
4. W.J.Weber Physiochemical process for water quality control, John Wiley &Sons
5. CPHEEO, Manual on Water supply and Treatment, Govt. of IndiaPublication.

Course Code	Course Title	Course Type	Credits	Contact Hours		
				L	P	T
CE-505	Air Pollution and Control Engineering	DC	4	3	0	1

Unit 1

Classification, Sources and Effects of air pollutants, Sampling Methods and Measurements of Air Pollutants, Measurement and analyses of primary air pollutants SO_2, NO_x and SPM using high volume sampler, Ambient Air Quality Standards, Emission Standards.

Unit 2

Basic Meteorology, Transport, Dispersion and Transformation of pollutants in Air, Adiabatic Lapse Rate, Atmospheric Stability, Dispersion of Pollutants, Air Pollution Dispersion Models, Point, Line and Area Source Models, Inversions, Plume Behaviour, Mixing Height, Plume Rise, Stack Emissions and Design.

Unit 3

Air Pollution Control Techniques, Control of Particulate Matter, Theory and description of control devices and their applications, Equipments and their Design, Selection of Control Equipments, Engineering Control Concepts Gravity Settling Chamber, Cyclone, Fabric Filter, Electrostatic Precipitator.

Unit 4

Control of Gaseous Pollutants-Oxides of Nitrogen and Sulphur, Sources and effects of noise pollution, Kinetics of noise, Measurement and control of noise pollution, Climate Change, Odour Removal, Atmospheric Chemistry, Photochemical Smog, Global Change-Greenhouse Effect and Global Warming, Ozone Layer Depletion, Acid Rain, Air Emissions from Wastewater Treatment Facilities and their Control.

Text Books and Reference Materials

1. Rao M.N. and Rao H.V. N, Air Pollution, Tata Mc-Graw Hill Publishing Co. New Delhi, Third Edition,1992.
2. Y. Anjaneyulu, A textbook of air pollution & control technology, Alliedpublishers.
3. Nevers N.D, Air Pollution control Engineering, Editions Civil Engineering series,1995.
4. Rao C.S., Environmental Pollution Control Engg, New Age International Pvt. Ltd. Publishers, 2006.
5. Stern A. C, Air pollution, Tata McGraw Hill International, Vol I to IX Winter, G. “Design of Concrete Structures” McGraw Hill, Tokyo,Japan.