Fourth Semester

EC-401 Atmospheric Chemistry

Unit-I: Chemical composition
Earth atmosphere, particles, aerosols and clouds, ozone, cyclic processes including carbon cycle, oxygen cycle, nitrogen cycle, sulphur cycle.

Unit-II: Photochemistry
Photochemical change, photo-dissociation and photo-ionization, reaction of electronically excited species, adiabatic process and the correlation rules.

Application of kinetics to atmosphere (bimolecular reactions, unimolecular and trimolecular reactions, liquid phase reactions, multi-step reaction scheme).

Unit-III: Ozone in Earth's Stratosphere

Chemistry of oxygen, Chapman layers, influence of trace constituents, natural sources and sinks of catalytic species, heterogeneous chemistry.

Unit-IV: Perturbation of the Stratosphere
Solar proton events, solar ultra violet irradiance, El Nino, volcanoes. Man's impact on the stratosphere, consequence of ozone perturbation, airports, rockets and the space shuttle, halocarbon, polar ozone holes.

Unit-V: Ion Chemistry in the Atmosphere

Ionization mechanisms, chemistry of the specific region (F-region processes, E-region processes, D-region positive ion chemistry, D-region negative ion chemistry), a brief idea of ion in stratosphere and troposphere.

Books Recommended
EC-402: Organic Pollutants

Unit-I: Pesticides-I

Organochlorine insecticides, DDT, accumulation and the fate of organochlorine in biological systems, chlorinated cyclopentadiene, detection of pesticides by gas chromatography, organophosphate and carbamate insecticides.

Unit-II: Pesticides-II

Herbicides, triazine herbicides, phenoxy herbicides, dioxine contamination of herbicides and wood preservatives, polychlorinated biphenyls (PCBs), furan contamination of PCBs; toxicity of PCBs, trioxins and furans.

Unit-III

(A) Polynuclear aromatic hydrocarbons (PAHs) as pollutants, mechanism of PAH carcinogenic, environmental estrogen.

(B) A brief idea of the following: Recycling of household and commercial waste, recycling of paper, recycling of tire, recycling of plastics, green chemistry, bioremediation, phytoremediation.

Unit-IV: Mutagenic Pollutants

Mutation, effect of mutations, induction of mutation (UV-light), ionizing radiations, chemical mutagens, metabolism of chemical carcinogens.

Unit-V: Electrochemistry in Pollution Control

Electrochemistry of water splitting, large-scale solar hydrogen production, fixing of CO2, electro chemical removal of wastes (waste water, SO2, removal of metals, destruction of nitrates, organic wastes, sewage disposal).

Books Recommended