INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT/CENTRE/SCHOOL: Civil Engineering

Subject Code: CEC-501 **Course Title:** Environmental Separation Processes

L-T-P: 3-**1-0** Credits: **04** Subject Area: **PCC** Theory : **3** Practical : **0**

Course Outlines: Introduction to environmental contaminants, unit operations, processes in water, wastewater treatment processes; Separation of suspended impurities; coagulation and flocculation fundamentals, rapid mixing, different types of mixers and flocculators; Adsorption, fundamentals, different types of adsorption, factors affecting adsorption, adsorption isotherms, activated carbon as adsorbent; Ion exchange, types of ion exchangers, organic-based ion exchange resins; Gas-liquid separation; Membrane-based processes.

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT/CENTRE/SCHOOL: Civil Engineering

Subject Code: CEC-503 **Course Title:** Wastewater Treatment

L-T-P:3-0-0 Credits**: 04** Subject Area**: PCC** Theory : **3** Practical : **0**

Course Outlines: Introduction; Process Analysis; Sewerage System; Activated Sludge Process; Activated sludge process design for nutrient removal; Process operation; Biofilm Process; Anaerobic Processes.

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT/CENTRE/SCHOOL: Civil Engineering

Subject Code: CEC-505 **Course Title:** Environmental Chemistry

L-T-P: **3-1-2** Credits**: 05** Subject Area**: PCC** Theory : **3** Practical : **0**

Course Outlines: Introduction, Fundamentals of chemical processes; Acid/Base Reactions; Aqueous Complex Formation; Precipitation/Dissolution; Oxidation/Reduction; Fundamentals of Environment Organic Chemistry; Surface Complex Adsorption Models.

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPARTMENT/CENTRE/SCHOOL: Civil Engineering

Subject Code: CEC-507 **Course Title:** Environmental Modelling and Simulation

L-T-P: 3-**0-2** Credits**: 04** Subject Area**: PCC** Theory : **3** Practical : **0**

Course Outlines: Introduction to modeling and simulation; development process and applications; Lumped and distributed parameter models, solution methods using MATLAB; Design of experiments; Reactor Modeling, kinetics, parameter estimation; RTD studies and flow regimes; Cluster analysis; Microbial dynamics; Modeling transport phenomena; Environmental risk management.