Course title	**Physico-chemical Process for Water and Wastewater Treatment**								Course No	**CE5170**			
Department	Civil Engineering	New	L	T	E	P	O	C	Old	L	T	P	C
		Credits	4	0	0	0	8	12	Credits	4	0	0	4
Offered for	M.Tech								Status	Modification			
Faculty	Mathava Kumar S								Type	Theory			
Pre-requisite	Nil								To take effect from	Jan 2021			

Description: 1) To introduce the basic concepts of water quality determination, unit operations and unit processes. 2) To introduce the mechanism of operation of various physicochemical processes adopted in water and wastewater treatment. 3) To introduce the design principles of the physicochemical processes.

Course Content: 1) Water Quality - Physical, chemical and biological parameters of water. Water quality requirement, Potable water standards, Instream standards, Wastewater Effluent standards. 2) Water quality indices. Water purification in natural systems. 3) Physical processes, chemical processes and biological processes -Primary, secondary and tertiary treatments - Unit operations and unit processes. 4) Aeration and gas transfer - Sedimentation, different types of settling and sedimentation tank design 5) Coagulation and flocculation, coagulation processes, stability of colloids, destabilization of colloids, destabilization in water and wastewater treatment, transport of colloidal particles. 6) Filtration: filtration processes, Hydraulics of flow through porous media, Rate control patterns and methods, Filter effluent quality parameters, mathematical model for deep granular filters, slow sand filtration, rapid sand filtration, precoat filtration. 7) Adsorption, adsorption equilibria and adsorption isotherm, rates of adsorption, Sorption kinetics in batch reactors, continuous reactors, factors affecting adsorption. 8) Ion-exchange processes, materials and reactions, and methods of operation. 9) Mechanism and application of membrane processes, reverse-osmosis and ultra-filtration. 10) Electrodialysis, Disinfection and Advanced oxidation processes in water and wastewater treatment.

TextBooks: NIL

Reference Books: 1. Crittenden, J., Trussell, R.R., Hand, D.W., Howe, K.J., Tchobanoglous, G., Water Treatment Principles and Design, MWH, 2nd Edition, John Wiley & Sons Inc., USA, 2005. 2. Weber, W.J, Physicochemical Processes for Water Quality Control, Wiley-Interscience, New York, 1972. 3. Metcalf and Eddy, Wastewater Engineering: Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi, 2003. 4. Droste, R.L, Theory and Practice of Water and Wastewater Treatment, Wiley, New Delhi, 2014. 5. Benefield, L.D, Judkins, J.F, Weand, B.L, Process Chemistry for Water and Wastewater Treatment, Prentice-Hall, New Jersey, 1982. 6. Peavy, H.S, Rowe, D.R, Tchobanoglous, G, Environmental Engineering, McGraw Hill, New York, 2000.