Course Number and Name	
BCE074 - PHYSICAL AND CHEMICAL TREATMENT OF WATER AND WASTEWATER	
Credits and Contact Hours	
3 & 45	
Course Coordinator's Name	
Dr P.Rajasulochana	
Text Books and References	

REFERENCES:

- Metcalf and Eddy, Wastewater Engineering, Treatment and Reuse Tata McGraw-Hill, New Delhi, 2003.
- Manual on water supply and Treatment CPHEEO, Ministry of Urban Development ,GOI, New Delhi,1999.
- Lee ,CC and Shun dar Lin , Handbook of Environmental Engineering Calculations, McGraw-hill,Newyork , 1999.
- Qasim,S.R motely, E.N., Zhu, G. Water Works Engineering – Planning, Design and Operation,Prentice Hall,New Delhi, 2002.
- Casey, T.J.Unit Treatment Processes in Water and Wastewater Engineering, John Wiley and Sons, London1993.

Course Description

- To educate the student on the working principles and design of various physical and chemical treatment systems for water and wastewater

Prerequisites	Co-requisites
Environmental Engineering	NIL
required, elective, or selected elective (as per Table 5-1)	

Course Outcomes (COs)	
CO1	To make them understand the fundamentals of waste water treatment .To learn about the various Pollutants in water and waste water and also to study about their characteristics.
CO2	To understand about the methods of waste characterization , source reduction and to study the various methods of generation of wastes.
CO3	To understand in detail about the various principles of chemical treatment which include precipitation coagulation etc.
CO4	To improve the knowledge on the Selection of unit operation and processes and to study the design oriented aspects of sand filters and other treatment processes.
CO5	To know about the basics of the design of industrial waste water treatment and reclamation processes
Student Outcomes (SOs) from Criterion 3 covered by this Course	

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	H				M					L	
CO2				M			M		H		
CO3	H					H					
CO4							H		L		
CO5	H	M			H		M			L	

List of Topics Covered

UNITI INTRODUCTION 9

Pollutant in water and wastewater – characteristics, standards for performance – significant and need for physic – chemical treatment.

UNITII PHYSICAL TREATMENT PRINICIPLES 9

Principles of screening – mixing, equalizations –sedimentation – filtration –modeling –backwashing – evaporation-incineration- gas transfer-mass transfer coefficients. Adsorption-isotherms-principles, equilibrates and kinetics, reactors, regeneration, membrane separation, reverse osmosis, nano filtration ultra filtration and hyper filtration – electro dialysis, distillation – stripping and crystallization-recent advances.

UNITIII CHEMICAL TREATMENT PRINCIPLES 9

Principles of chemical treatment – coagulation flocculation – precipitation –floatation, solidification and stabilization- disinfection .ion exchange, electrolytic methods -Solvent extraction –advanced oxidation / reduction –recent advances.

UNITIV DESIGN OF CONVENTIONAL TREATMENT PLANTS 9

Selection of unit operation and processes – design of conventional water treatment plant units –aerators – chemical feeding –flocculation –clarifier – filters –rapid sand filter, slow sand filter, pressure filter-chlorinators. Displacement and gaseous type. layouts- flowcharts –hydraulic profile –O & M aspects-case studies , residue management – up gradation of existing plants – recent advances.

UNITVDESIGN OF INDUSTRIAL WATER TREATMENT AND ECLAMATIO 9

Selection of process –design of softeners – demineralisers –wastewater reclamation – reverse osmosis plants –residue management – O & M aspects –recent advances –case studies.