



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering

Subject Code: 3721806

Semester – II

Subject Name: ENVIRONMENTAL MODELLING

Type of course: Applied Mathematics

Prerequisite: Fundamentals of Environmental Systems

Rationale: To understand the dynamics of environmental system and control the parameters causing deterioration of environment system

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction: Scope of Environmental Modeling, Mass balances, Basic concepts of transport phenomena, Chemical reaction kinetics, equilibrium, chemical modeling.	6
2	Environmental Modeling: Eutrophication of lakes, stoichiometry, phosphorus as a limiting nutrient, mass balance on total phosphorus in lakes ,dynamic ecosystem, Models for Eutrophication Assessments	8
3	Conventional pollutants in rivers: Introduction, mass balance equation, plugs flow systems, StreeterPhelps equation, modifications to Streeter Phelps equation, Dissolved oxygen in rivers & estuaries.	10
4	Ground water contamination: Introduction, Darcy's law, flow equations, Contaminant solute transport equation, Bio transformations.	6
5	Air Quality Modeling: Types of modeling techniques, Modeling for nonreactive pollutants, single source, multi source and area source models, fixed box models, diffusion models, dispersion models, receptor and source oriented models	10
6	Applications: Software based applications- Air quality and water quality modeling	2



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Reference Books:

1. Environmental modelling: Fate & transport of pollutants in Water, Air and Soil by Jerald L Schnoor.
2. Environmental Modelling by John Wainwright & Mark Mulligan
3. Modelling the Eutrophication Process by M W Lorenzen

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the concept of Modelling	10%
CO-2	Assess the fate and transport of water pollutants which are discharge into environmental sinks like river & lake	35%
CO-3	Assess the fate and transport of air pollutants which are discharge into air	35%
CO-4	Predict the ground water contamination.	20%

List of Experiments:

Term work will comprise of assignment and exercises based on mass balances, Basic concepts of transport phenomena, chemical modeling, Eutrophication of lakes, Conventional pollutants in rivers, ground water contamination.

List of Open Source Software/learning website:

1. <https://nptel.ac.in/>