

ENVIRONMENTAL MODELING

Paper Code: ETEN-406
Paper: Environmental Modeling

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: The overall aims of the course are for students to acquire:

1. *The appropriate level of advanced theoretical knowledge required to interpret and analyse contemporary and past environmental data for modeling.*
2. *The modelling skills required to investigate the interrelationships between environmental variables, and to predict their responses to changing internal and external conditions.*

UNIT – I

Environmental systems-an introduction, An overview of mathematical models applied to various environmental issues, Concept, Need, Scope and objectives of environmental modelling, Role of mathematical models in environmental quality management, Model classification – Brief review of different types of models, Mathematical (Deterministic), Numerical, Stochastic and Physical Models.

Different stages involved in model building, Calibration and verification of model, Limitations in modelling.

[T1, T2][No. of Hrs. 11]

UNIT – II

Transport phenomenon, Diffusion, Dispersion, Advection, Adsorption, Conservative and non conservative pollutants.

Surface water quality modelling – River and streams, Estuaries and lakes.

[T1, T2][No. of Hrs. 11]

UNIT – III

Governing Equations for flow and transport of pollutants, Simplified models for sub-surface plume movements.

Case studies using appropriate software for flow and transport of pollutants.

[T2][No. of Hrs. 12]

UNIT – IV

Dissolved oxygen models – DO sag model, BOD model, Streeter Phelps equation for point and distributed sources.

Eutrophication models for lakes and flowing water; Use of QUAL2K and Water Quality Analysis Simulation Program (WASP). Application of appropriate model for wastewater disposal in river, lake and estuary, application of Air pollution plume model.

[T1, T2][No. of Hrs. 11]

Text Books:

[T1] Chapra S.C., “Surface water quality modelling”, McGraw Hill., New York.

[T2] Ramaswami A. “Integrated Environmental Modelling”, John Wiley, New York.

Reference Books:

[R1] Rumynin B.G., “Subsurface Solute Transport Model”, Springer, Netherlands.

[R2] Schnoor J., “Environmental Modelling”, John Wiley, New York.

[R3] Jacobson M.Z., “Fundamentals of Atmospheric Modelling”, Cambridge University Press, New York.

[R4] Schnelle K.B. and Dey P.R., “Atmospheric Dispersion Modelling Compliance (1999) Guide”, McGraw-Hill, New York.