MM2302: Transport Phenomena

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Module Wise Lecture Plan

No.	Topic	Date
Module I → Introduction and Necessary Mathematical Concepts		
Lecture 1	Part A : Introduction	
	Part B : Vector and Tensor Representation	
Lecture 2	Tensor Analysis	
Lecture 3	Vector Calculus Part A : Differentiation Part B : Integration and Curvilinear Coordinates	
Lecture 4	Part A : Concept of Continuum	
	Part B : Noether's Theorem and Conservation Laws	
	Part C : Symmetries and Examples of Conserved Quantities	
Lecture 5	Part A : Dimensional Analysis	
	Part B : Eulerian and Lagrangian View	
Module II → Fluid Flow Behaviour (Fluid Dynamics)		
Lecture 6	Laminar Fluid Flow	
Lecture 7	Control Volume, Boundary, Momentum Balance, and Equation of Continuity	
Lecture 8	Continuum Hypothesis and Fluid Properties	
Lecture 9	Viscosities of Gases	
Lecture 10	Stress – Strain-rate Curves of Time Independent Fluid	
Lecture 11	Classification of Flow Phenomena	
Lecture 12	Momentum Flow and Momentum Equation for Laminar Flow	
Lecture 13	Fluid Element Trajectories	
Lecture 14	Stream Function and Velocity Potential	
Lecture 15	Bernoulli Equation	
Lecture 16	Turbulent Flow	
Lecture 17	Compressible Channel Flow and Sonic Conditions	
Module III → Heat Transfer		
Lecture 18	Basics of Heat Transfer	
Lecture 19	Conduction Heat Transfer : I	
Lecture 20	Conduction Heat Transfer : II	
Lecture 21	Convective Heat Transfer	
Lecture 22	Combined Conduction and Convection and Temperature Distributions in the Presence of Heat Sources	
Lecture 23	Transient Heat Transfer (Convective Cooling or Heating), Boiling and Condensation	
Lecture 24	Radiation Heat Transfer	
Module IV → Mass Transfer (Diffusion)		
Lecture 25	Diffusion: Phenomenological Description, Diffusion Coefficient and Fick's Law	
Lecture 26	Driving Force for Diffusion	
Lecture 27	Microscopic Picture of Diffusion	
Lecture 28	The Concept of Thermal Activation	
Lecture 29	Atomic Mechanisms of Diffusion	
Lecture 30	Diffusion of Vacancies and Diffusion with Correlated Jumps	
Lecture 31	Fast Diffusion Paths	
Lecture 32	Diffusion in Nanocrystalline Materials	