

Subject Code	Courses	L	T	P	Hrs.	Credits
ME5EL41	Fluid Flow and Heat Transfer in IC Engines	4	0	0	4	4

Unit 1

Introduction: Basics Laws, Solution of Navier Stokes Equation, Couette Flow, Hagen Poiseuille Flow, Low Reynold's Flow, Stokes Flow, propagation of infinitesimal waves

Unit 2

Laminar and Turbulent Flows: Laminar boundary layer, displacement, momentum and energy thickness, Prandtl mixing length theory, Turbulent flow, governing equation, shear stress model, universal velocity distribution law, fully developed turbulent flow.

Unit 3

Compressible Flow: Basic Equations, steady isentropic flow in non parallel sided ducts neglecting friction, mass flow through an orifice or convergent divergent nozzles, condition for maximum discharge, De Laval nozzle

Unit 4

Engine Lubrication: Sources of losses in engine, effects of engine variables on friction, theory of lubrication, functions of lubrications, relationship between shear stress and pressure gradient, hydrodynamic lubrication, Dash-pot mechanism: movement of piston in Dash-pot, viscous resistance

Unit 5

Convective Heat Transfer: Convective Heat Transfer - Parallel Flow (Hagen - Poiseuille Flow), Sudden acceleration of a Flat Plate, Creeping flow, Mass transfer Diffusion, combined Heat and Mass Transfer, Heat transfer in Porous Media.

Text / Reference Books:

1. Fluid Mechanics and hydraulic machines; S C Gupta, Pearson Education.
2. Fluid Mechanics, John F Douglas, Pearson Education.
3. Viscous Fluid Flow; Frank M. White,, 3rd Edition, McGraw Hill, 2011.
4. I C Engines; V Ganeshan, McGraw Hills.
5. Heat transfer, J P Holman & Sovik Bhattacharya, McGraw Hills.