

Applied Fluid Mechanics

ME-505B

Contracts: 3L

Credits- 3

Module 1

Specific energy, Hydraulic Jump [3]

Module 2

Compressible Flow: speed of propagation of a small disturbance through a compressible fluid, sonic velocity, Mach number, mach cone and Mach wave; isentropic flow, stagnation properties of a compressible flow, isentropic pressure, temperature and density ratios; compressibility correction factor in the measurement of air speed; area – velocity relationship for compressible flow through a variable area duct, mass flow rate through a duct, critical condition and choking; flow through convergent-divergent nozzle. [6]

Module 3

Ideal Fluid Flow: rotation of a fluid particle, vorticity, rotational and irrotational motion; velocity potential function, circulation, stream function, flownet; governing equation for two dimensional irrotational motion, simple two dimensional irrotational flows like uniform flow, plane source, plane sink etc; superimposition of simple irrotational flows, combination of a source and a sink. [5]

Module 4

Analysis of flow through propellers and windmills – slip stream theory, actuated disc theory; jet propulsion devices – analysis of thrust and other performance parameters. [5]

Module 5

Similarity and model study in turbomachines: dimensional analysis of incompressible flow turbomachines, flow coefficient, head coefficient and power coefficient; nondimensional plot of performance curves; specific speed; ordier diagram; specific speed as a design parameter of incompressible flow turbomachines; unit quantities for hydroturbines. [4]

Module 6

Mechanical, hydraulic and volumetric loss in a turbo-pump; different types of losses in a hydroturbine installation; different efficiencies in turbomachines. [3]

Module 7

Interaction of a turbomachine with the pipeline system; system head curve and point of operation, surging, series and parallel operation of pumps and fans. [4]

Module 8

Testing of hydroturbines, different performance characteristics of hydroturbines like operating characteristics, main characteristics, Muschel curves; speed governing of hydroturbines – different methods. [4]

Module 9

Torque converter and fluid coupling – function and performance. [2]

REFERENCES

1. Mechanics of fluids – Massey, T & F
2. Fluid mechanics and turbo machines – M M Das, PHI
3. Introduction to Fluid Mechanics & Fluid machines – Some & Biswas, TMH
4. Introduction to Fluid Mechanics – Fox & Mcdonald, Wiley
5. Fluid mechanics and machinery – Bansal, Luxmi.
6. Ojha, C S P, Berndtsson, R, Chandramouli. P. N.
7. Fluid Mechanics & Hydraulic machines-K Subramanya, 2011, TMH
8. Fluid Mechanics-Potter & Wiggert, 2010, Cengage Learning