

Hydraulics and Hydraulic Machinery (Code No: A40111)

UNIT - I

Open Channel Flow: Types of flows - Types of channels - Velocity distribution - Energy and momentum correction factors - Chezy's, Manning's, and Bazin formulae for uniform flow - Most Economical sections. Critical flow: Specific energy-critical depth - computation of critical depth - critical sub - critical and super critical flows.

Non uniform flow - Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT - II

Dimensional Analysis and Similitude: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models - Geometric, kinematic and dynamic similarities-dimensionless numbers - model and prototype relations.

UNIT - III

Hydrodynamic Force on Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency Angular momentum principle, Applications to radial flow turbines. Layout of a typical Hydropower installation - Heads and efficiencies.

UNIT - IV

Hydraulic Turbines: Classification of turbines-pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube - theory and function efficiency.

Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

UNIT - V

Centrifugal-Pumps: Pump installation details-classification-work done-Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel- performance of pumps- characteristic curves- NPSH-cavitation.

Classification of Hydropower plants - Definition of terms - load factor, utilization factor, capacity factor, estimation of hydropower potential.