

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**II Year B.Tech. EEE-I Sem L T/P/D C**

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**FLUID MECHANICS AND HYDRAULIC MACHINERY**

**UNIT - I**

**Fluid statics:** Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

**Fluid kinematics:** stream line, path line and streak lines and stream tube, classification of flows- steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

**UNIT- II**

**Fluid dynamics:** surface and body forces –Euler’s and Bernoulli’s equations for flow along a stream line, momentum equation and its application on force on pipe bend.

**Closed conduit flow:** Reynold’s experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line - hydraulic gradient line.

**Measurement of flow:** pilot tube, venturimeter, and orifice meter, Flow nozzle.

**UNIT - III**

**Basics of turbo machinery:** hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

**Hydroelectric power stations:** Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

**UNIT - IV**

**Hydraulic Turbines:** classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube-theory- functions and efficiency.

**Performance of hydraulic turbines:** Unit and specific quantities, Model Analysis, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank,

**UNIT - V**

**Centrifugal pumps:** classification, working, work done – manometric head, static head- losses and efficiencies-specific speed- Model analysis, pumps in series and parallel-performance characteristic curves, NPSH, water hammer

**TEXT BOOKS:**

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

## REFERENCE BOOKS:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley, John Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements)