

II YEAR II SEM

**15AME18-FLUID MECHANICS AND HYDRAULIC MACHINERY**

L T P C

3 1 0 3

**Course Objectives:**

- The purpose of this course is to learn the Fluid properties and fundamentals of Fluid statics and fluid flow
- To introduce the concepts of flow measurements and flow through pipes
- To introduce the concepts of momentum principles
- To impart the knowledge on pumps and turbines

**UNIT - I : Fluid Statics:** Dimensions and units: physical properties of fluids – specific gravity, porosity surface tension – vapour pressure and their influence on fluid motion – atmospheric gauge and vacuum pressure – measurement of pressure – Piezometer, U-tube 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.

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

**UNIT – II: 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, Turbine current meter.**

**UNIT – III: 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 efficiency, flow over radial vanes.

**Hydroelectric Power Stations:** Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements.


**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, characteristic c governing of turbines, selection of type of turbine, cavitation, surge tank, hammer.

**UNIT – V: Centrifugal Pumps:** Classification, working, work done – manometric head – loss efficiencies – specific speed – pumps in series and parallel – performance characteristic curves, NPSH.

**Text Books :**

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics by FM Streeter, TMH
3. Fluid Mechanics by Dr.R.K.Bansal, Lakshmi Publications Pvt.Ltd.

  
**Head**  
**Mechanical Engineering Department,**  
**JNTUA College of Engineering,**  
**PULIVENDULA - 516 390.**

**Reference Books :**

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria &.
2. Fluid Mechanics and Machinery by D.Rama Durgaiyah, New Age Internat.
3. hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Instrumentation for Engineering Measurements by James W.Dally, Wiley Riley, John Wiley & Sons Inc. 2004

**Course Outcomes**

- Read and follow directions for laboratory experiments.
- Operate fluid flow equipment and instrumentation.
- Collect and analyze data using fluid mechanics principles and experimentation methods.
- Prepare reports following accepted writing and graphical techniques.
- Perform exercises in small teams.
- Demonstrate principles discussed in Fluid Mechanics lecture course.
- Student can able to identify the type of turbine with known specific speed.
- Student can able to identify and design the pumps with known specific speed and manometric head

  
Head  
Mechanical Engineering Department,  
JNTUA College of Engineering,  
PULIVENDULA - 516 390,

