

## **MEPC2003 FLUID MECHANICS AND HYDRAULIC MACHINES (3-0-0)**

### **Module I (06hrs)**

Introduction: Scope of fluid mechanics; Properties of fluids (density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus); Fluid classification

Fluid Statics: Pressure, Pascal's law, Pressure variation for incompressible fluid, Atmospheric pressure, Absolute pressure. Gauge pressure and vacuum pressure, Manometers, Hydrostatic forces on submerged surfaces, Force on a horizontal submerged plane surface, force on a vertical submerged plane surface, Buoyancy and flotation, Archimedes' principle, Stability of immersed and floating bodies, Determination of metacentric height.

### **Module II (06hrs)**

Fluid Kinematics: Introduction, Description of fluid flow, Classification of fluid flow, Reynolds number, Acceleration of fluid flow, Flow rate, Continuity equation, Differential equation of continuity, Mathematical description of irrotational and rotational flow, Circulation, Potential function and stream function, Flow net.

### **Module III (06hrs)**

Fluid Dynamics: Introduction to Navier Stokes equation, Non-dimensional numbers, Euler's equation along a streamline, Energy equation, Bernoulli's equation and its application to venturimeter, Orificemeter, Pitot tube and siphon, Flow in pipes and ducts, Hydraulic gradient lines (HGL), Total energy line (TEL), Power transmission in fluid flow through pipes, Fluid flow in pipes in series and parallel.

### **Module IV (06hrs)**

Impact of Jets: Flat, inclined and curved plates with stationary and moving cases.

Hydraulic Turbines: Classifications, Impulse and Reaction turbines, Efficiency and performance curves.

Reaction Turbines: Francis turbine and Kaplan turbine, velocity triangle and efficiencies, performance curve, Function of draft tube and casing cavitation.

### **Module V (06hrs)**

Centrifugal Pump: Constructional features, Vane shapes, Velocity triangles, efficiencies, Multistaging, Pump characteristics, NPSH and Cavitation.

Positive Displacement Pumps: Reciprocating pumps, Working principles, Discharge, Work done and Power requirement, Slip, Indicator diagram.

### **Books:**

- Fluid Mechanics, Y.A.Cengel, Publisher: TMH.
- Fluid Mechanics and Hydraulic Machines, Modi and Sheth.
- Introduction to Fluid Mechanics and Fluid Machines, S.K.Som and G. Biswas, TMH.
- Fluid Mechanics and Fluid Machines, A. K. Jain, Khanna Publications.
- Introduction to Fluid Mechanics, Fox, McDonald, Willey Publications.
- An Introduction to Fluid Dynamics, G.K. Batchelor, Cambridge University Press.
- Fluid Mechanics, J.F. Douglas, J.M. Gasiorek, J.A. Swaffield and L.B. Jack, Pearson Education.