II Year – I SEMESTER

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FLUID MECHANICS

UNIT I
INTRODUCTION : Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

UNTI – II
HYDROSTATICS: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.
FLUID KINEMATICS: Description of fluid flow, 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, two , three dimensional flows – stream and velocity potential functions, flow net analysis.

UNIT – III
FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Navier – Stokes equations (Explanationary) Momentum equation and its application – forces on pipe bend.

UNIT – IV
BOUNDARY LAYER THEORY: Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers, no deviations BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT – V
LAMINAR FLOW: Reynold's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.
CLOSED CONDUIT FLOW: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and

hydraulic gradient line.Pipe network problems, variation of friction factor with Reynold's number – Moody's Chart.

UNIT – VI

MEASUREMENT OF FLOW: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs.

TEXT BOOKS:

1. Fluid Mechanics by Modi and Seth, TEXT BOOKS house.
2. Introduction to Fluid Machines by S.K. Som & G. Biswas, Tata Mc Graw Hill Pvt. Ltd.
3. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi

REFERENCES:

1. Fluid Mechanics by Merie C. potter and David C. Wiggert, Cengage learning
2. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer, Oxford University Press, New Delhi
3. Fluid Mechanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi

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