AMFT05 PRINCIPLES OF FLUID MECHANICS

UNIT-1 PROPERTIES OF FLUIDS
1.1 Properties of fluids- definition- units of measurement- Mass density- specific weight,
1.2 Specific volume- specific gravity equation of state- perfect gas- Viscosity- vapour pressure compressibility and elasticity surface tension- capillarity.
1.3 Fluid pressure and measurement- 40 simple,
1.4 Differential and micro manometers- Mechanical gages- calibration.
1.5 Hydrostatic forces on surfaces- total pressure and center of pressure- Horizontal vertical and inclined plane surface- Pressure diagram- total pressure on curved surface.
1.6 Archimedes principles- buoyancy- Meta center- metacentric height

UNIT-2 FLUID FLOW ANALYSIS
2.1 Types of fluid flow- velocity and acceleration of a fluid particle
2.2 Rotational- irrotational- circulation and vorticity
2.3 Flow pattern- stream line- equipotential line- stream tube- path line- steak line- flow net velocity potential- stream function.
2.4 Principles of conservation of mass- energy- momentum
2.5 Continuity equation in Cartesian co-ordinates
2.6 Euler's equation of motion.

UNIT-3 FLOW MEASUREMENTS
3.1 Bernoulli's equation- applications
3.2 Venturimeter- orifice meter- nozzle meter Rota meter- elbow meter pitot tube
3.3 Orifice- sharp edged orifice discharging free- submerged orifice- mouth piece- Flow through orifice under variable head- time of emptying a tank with and without inflow.
3.4 Flow through pipes- laminar and turbulent flow in pipes- Reynold's experiment- Darcy-Weisbach equation for friction head loss
3.5 Chezy's formula- Manning's formula- Hazen-William's formula- Major and minor losses in pipes- hydraulic gradient line- energy gradient line.
3.6 Siphon- water hammer in pipes- gradual and sudden closure of values

UNIT-4 OPEN CHANNEL FLOW
4.1 Types of flow in channel- uniform flow- most economical section of channel- rectangular - trapezoidal.
4.2 Specific energy and critical depth- momentum in open channel flow- specific force- critical flow- computation.
4.3 Flow measurement in channels- notches- rectangular, Cippollette and triangular- float method
4.4 Flow measurement in rivers/ streams/ canals- weirs- free and submerged flow- current meter -Parshall flume.

UNIT-5 DIMENSIONAL ANALYSIS & PUMPS

5.1 Dimensional analysis- concept of geometric, kinematic and dynamic similarity.

5.2 Important no dimensional numbers- Reynolds, Froude, Euler, Mach and Weber.

5.3 Pump terminology- suction lift, suction head, delivery head, discharge, and water horse power- selection of pump capacity.

5.4 Centrifugal pumps- components- working- types of pumps and impellers- Priming

References Books

1 Bansal, R.K., "A text book of fluid mechanics and hydraulic machinery", Laxmi publications

2 Grade, RJ... "Fluid mechanics through problems". Wiley eastern Ltd., Madras, 2002