**Lesson Plan**

**Name of faculty: Visiting Faculty**

**Discipline: Mechanical**

**Semester: 4th**

**Subject: Fluid Mechanics**

Lesson Plan Duration: 15 weeks (from January, 2018 to April, 2018)

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| **Week** | **Theory** | **Practical** |
|  | **Lecture day** | **Topic(Including assignment/ test)** | **Practical day** | **Topic** |
| 1st |  | **Chapter 1 : Fluid Properties:** Concept of fluid and flow, ,  |  | To determine the meta-centric height of a floating body.  |
|  | Ideal and real fluids, continuum concept |
|  | Properties of fluid: mass density, weight density, specific volume, specific gravity, viscosity, causes of viscosity |
| 2nd |  | Surface tension, capillarity, vapour pressure, compressibility and bulk modulus |  | To verify the Bernoulli’s Theorem |
|  | Newtonian and non-Newtonian fluids  |
|  | Numericals |
| 3rd |  | **Chapter 2 : Fluid Statics:** Pressure, Pascal’s law, hydrostatic law |  | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
|  | Pressure measurement, manometers |
|  | Hydrostatic forces on submerged plane and curved surfaces |
| 4th |  | Buoyancy, stability of floating and submerged bodies |  | To determine coefficient of discharge of an orifice meter |
|  | Liquids in relative equilibrium. |
|  | Problems & Numericals |
| 5th |  | **Chapter 3 : Fluid Kinematics:** Eulerian and Lagrangian description of fluid flow stream |  | To determine the coefficient of discharge of Venturimeter |
|  | Types of fluid flows, streak and path lines |
|  | Acceleration of a fluid particle, flow rate and continuity equation |
| 6th |  | Differential equation of continuity in Cartesian and polar coordinates |  | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
|  | Rotation and vorticity, circulation, stream and potential functions, flow net |
|  | Problems & Numericals |
| 7th |  | **Chapter 4 : Fluid Dynamics:** Concept of system and control volume |  | To determine the coefficient of discharge of Notch (V and Rectangular types) |
|  | Euler’s equation |
|  | Bernoulli’s equation and its practical applications |
| 8th |  | Venturimeter, orifice meter, orifices, mouthpieces |  | To determine the coefficient of discharge, contraction & velocity of an orifice |
|  | Impulse momentum equation, kinetic energy and momentum correction factors |
|  | Problems & Numericals |
| 9th |  | **Chapter 5 : Viscous Flow:** Flow regimes and Reynold’s number |  | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
|  | Navier-Stokes equation |
|  | Relationship between shear stress and pressure gradient |
| 10th |  | Flow of viscous fluids in circular pipe and between stationary and moving parallel plates |  | To find critical Reynolds number for a pipe flow |
|  | Hydrodynamic lubrication, movement of piston in a dashpot, power absorbed in bearings |
|  | Problems & Numericals |
| 11th |  | **Chapter 6: Turbulent Flow Through Pipes:** Transition from laminar to turbulent flow |  | To determine the friction factor for the pipes. |
|  | Reynold’s equation of turbulence, Shear stress in turbulent flow |
|  | Prandtl mixing length hypothesis |
| 12th |  | Major and minor losses in pipes, hydraulic gradient and total energy lines |  | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
|  | Series and parallel connection of pipes, branched pipes; equivalent pipe |
|  | Power transmission through pipes, hydraulically smooth and rough pipes, velocity distribution in pipes |
| 13th |  | Friction coefficients for smooth and rough pipes. Problems & Numericals |  | To determine the minor losses due to sudden enlargement, sudden contraction and bends. |
|  | **Chapter 7 : Boundary Layer Flow:** Boundary layer concept, displacement, momentum and energy thickness |
|  | Blasius solution, Von-Karman momentum integral equation |
| 14th |  | Laminar and turbulent boundary layer flows |  | To demonstrate the working of different pressure measuring devices |
|  | Separation of boundary layer and its control. |
|  | **Chapter 8 : Flow over Bodies:** Drag and lift, friction and pressure drag  |
| 15th |  | Lift and drag coefficients, stream lined and bluff bodies |  | Checking of files and Viva Voce and remedial measures regarding the practical performed ( If any) |
|  | Drag on a flat plate, Drag on a cylinder and an airfoil |
|  | Circulation and lift on a circular cylinder and an airfoil, Numericals & Problems |