

**ORISSA SCHOOL OF MINING ENGINEERING, KEONJHAR**  
**DEPARTMENT OF AUTOMOBILE ENGINEERING**



**LESSON PLAN**

**SUBJECT: FLUID MECHANICS AND FLUID POWER**  
**FACULTY: KULADEEP MOHAPATRA**

**ACCADEMIC SESSION: 2026-27**  
**SEMESTER: 3<sup>RD</sup>**

  
Sd/-  
HOD (Automobile Engg.)

|                                                               |                  |                                                                                                       |                                                                                               |
|---------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Discipline:- <b>Automobile Engineering</b>                    |                  | Semester :- <b>3<sup>rd</sup></b>                                                                     | Name of the teaching faculty :- <b>KULADEEP MOHAPATRA</b>                                     |
| Subject Name :- <b>FLUID MECHANICS AND FLUID POWER (TH-4)</b> |                  | No. Of Days/Week Class Allotted :- <b>03 Periods/Week (Thursday, Saturday – 2 Period Each)</b>        | Semester from Date - <b>01/07/2026</b> To Date - <b>05/11/2026</b><br><b>No. of Weeks: 18</b> |
| <b>WEEK</b>                                                   | <b>CLASS DAY</b> | <b>THEORY TOPICS</b>                                                                                  |                                                                                               |
| <b>1<sup>ST</sup></b>                                         | 02.07.2026       | <b>1. PROPERTIES OF A FLUID AND HYDROSTATICS:</b><br>Definition of a fluid, classification of fluids, |                                                                                               |
|                                                               | 02.07.2026       | 1.1 Various fluid properties such as density, specific weight, specific gravity.                      |                                                                                               |
|                                                               | 04.07.2026       | 1.2 Viscosity and surface tension and state the units                                                 |                                                                                               |
|                                                               | 04.07.2026       | 1.3 Fluid pressure, total pressure (hydrostatic force) on vertical Surface.                           |                                                                                               |
|                                                               | 09.07.2026       | 1.4 Location of centre of pressure on vertical Surface.                                               |                                                                                               |
| <b>2<sup>ND</sup></b>                                         | 09.07.2026       | 1.5 Fluid pressure, total pressure (hydrostatic force) on Horizontal surface.                         |                                                                                               |
|                                                               | 18.07.2026       | 1.6 Location of centre of pressure on Horizontal surface by the fluid.                                |                                                                                               |
| <b>3<sup>RD</sup></b>                                         | 18.07.2026       | 1.7 Fluid pressure, total pressure (hydrostatic force) on Inclined Surface.                           |                                                                                               |
|                                                               | 23.07.2026       | 1.8 Location of centre of pressure on Inclined Surface by the fluid.                                  |                                                                                               |
| <b>4<sup>TH</sup></b>                                         | 23.07.2026       | 1.9 Fluid pressure, total pressure (hydrostatic force) on Curved Surface.                             |                                                                                               |
|                                                               | 30.07.2026       | 1.10 Location of centre of pressure on Curved Surface by the fluid.                                   |                                                                                               |
| <b>5<sup>TH</sup></b>                                         | 30.07.2026       | 1.11 Working of various measuring devices for pressure, the principle of manometers of simple.        |                                                                                               |
|                                                               | 01.08.2026       | 1.12 Differential and inverted types U-Tube Manometers.                                               |                                                                                               |

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|                  | 01.08.2026 | 1.13 Principle of buoyancy and floatation. Simple numerical on Manometer.                                                                                                       |
| 6 <sup>TH</sup>  | 06.08.2026 | <b>2. KINEMATICS AND DYNAMICS OF FLUID MECHANICS</b><br>Various types of flow, circulation and vorticity, stream-line, path line and streak-line.                               |
|                  | 06.08.2026 | 2.1 Various energies of fluid.                                                                                                                                                  |
|                  | 13.08.2026 | 2.2 Law of conservation of mass, energy equation -Bernoulli's Theorem.                                                                                                          |
| 7 <sup>TH</sup>  | 13.08.2026 | 2.3 The limitations of same-application of Bernoulli's equation, the working of venturimeter, pitot tube.                                                                       |
|                  | 20.08.2026 | 2.4 Equation of flow rate and velocity with respect to venturimeter and pitot tube respectively.                                                                                |
| 8 <sup>TH</sup>  | 20.08.2026 | 2.5 The working of flowmeter: current meter, Simple numericals.                                                                                                                 |
|                  | 29.08.2026 | <b>3. FLOW THROUGH ORIFICES AND NOTCHES, PIPES:-</b><br>3.1 Definition –orifice, orifice coefficient such as $C_c$ , $C_v$ , $C_d$ , Relationship between orifice coefficients. |
|                  | 29.08.2026 | 3.2 weir and notch, Discharge over rectangular notch and weir, Triangular notch. Simple numerical.                                                                              |
| 9 <sup>TH</sup>  | 03.09.2026 | 3.3 Definition of a pipe. laws of fluid friction, Equation of loss of Head through pipe due to friction.                                                                        |
|                  | 03.09.2026 | 3.4 Darcy's formula and Chezy's formula.                                                                                                                                        |
|                  | 05.09.2026 | 3.5 Hydraulic gradient and total energy line, Nozzle and its Application.                                                                                                       |
| 10 <sup>TH</sup> | 05.09.2026 | 3.6 Power transmission through nozzle the condition of maximum power transmission through nozzle.                                                                               |
|                  | 10.09.2026 | 3.7 Expression for diameter of nozzle for maximum power transmission.                                                                                                           |
|                  | 10.09.2026 | <b>4. Turbines and Pumps:</b><br>4.1 Classification of hydraulic turbines, Selection of turbine on the basis of head and discharge available.                                   |
| 11 <sup>TH</sup> | 10.09.2026 |                                                                                                                                                                                 |

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|                  | 17.09.2026 | 4.2 Construction and working principle of Pelton wheel.                                                                |
| 12 <sup>TH</sup> | 17.09.2026 | 4.3 Construction and working principle of Francis Turbine.                                                             |
|                  | 19.09.2026 | 4.4 Construction and working principle of Kaplan Turbine.                                                              |
|                  | 19.09.2026 | 4.5 Draft tubes – types and construction.                                                                              |
| 13 <sup>TH</sup> | 24.09.2026 | 4.6 Concept of cavitation in turbines, Calculation of Work done, Power, efficiency of turbines, Simple numerical.      |
|                  | 24.09.2026 | 4.7 <b>Centrifugal Pumps:</b> Principle of working and applications.                                                   |
|                  | 01.10.2026 | 4.8 Types of casings and impellers, Concept of multistage, Priming and its methods                                     |
| 14 <sup>TH</sup> | 01.10.2026 | 4.9 Manometric head, Work done, Manometric efficiency, Overall efficiency. Simple numericals.                          |
|                  | 03.10.2026 | 4.10 <b>Reciprocating Pumps:</b> Construction, working principle and Applications of single acting reciprocating pump. |
|                  | 03.10.2026 | 4.11 Construction, working principle and applications of Double acting reciprocating pump.                             |
|                  | 08.10.2026 | 4.12 Concept of Slip, Negative slip, Cavitation and separation. Simple numericals.                                     |
| 15 <sup>TH</sup> | 08.10.2026 | <b>5. FLUID POWER:</b>                                                                                                 |
|                  |            | 5.1 Definition of fluid power, classification – hydraulic power and pneumatic power.                                   |
|                  | 22.10.2026 | 5.2 Hydraulic Systems -Basic principle of enclosed hydraulic system – Pascal's law.                                    |
| 16 <sup>TH</sup> | 22.10.2026 | 5.3 Oil hydraulic system – reservoir, filter pressure limiting valves, direction control valves, flow control valves.  |
|                  | 29.10.2026 | 5.4 actuators (linear and rotary), accumulator, pipes and fittings.                                                    |
|                  | 29.10.2026 | 5.5 Various positive displacement pumps-gear, vane, piston.                                                            |
| 17 <sup>TH</sup> | 31.10.2026 | 5.6 drawing of hydraulic circuits - extension and retraction of linear actuator,                                       |
|                  | 31.10.2026 | 5.7 Motion of rotary actuator, holding a job, hydraulic press etc.                                                     |
| 18 <sup>TH</sup> | 05.11.2026 | <b>REVISION</b>                                                                                                        |
|                  | 05.11.2026 |                                                                                                                        |
|                  | 05.11.2026 | <b>MOCK TEST</b>                                                                                                       |