



Government Polytechnic Bhatapara (C.G)

Department of Mechanical Engineering

Board of study: Mechanical Engineering

Lesson Plan for the Subject: Fluid Mechanics and Machinery

Name of faculty		Bhushan Kumar Nayak				
Course code: 2037474(037)		Semester: 4th				
Duration: 16 Weeks						
Teaching Scheme		Examination Scheme				
Theory: 3 hrs/week		End Semester Exam: 70 Marks				
		End Semester Exam(Lab) : 30 Marks				
Laboratory : 2 hrs/week		Teacher's Assessment (Assignment & Quiz): 30 Marks				
		Teacher's Assessment Lab (Assignment & Quiz): 50 Marks				
Credit: 4		Internal Assessment (CT): 20 Marks				
		Total Marks: 200 Marks				
CO-1:	Analyze various fluid characteristics.					
CO-2:	Apply the fluid flow energy equations to real field situations.					
CO-3:	Calculate various losses in flow through pipes.					
CO-4:	Select relevant turbine as per the situation.					
CO-5:	Select a relevant pump as per the requirement.					
Unit No. 01: Fluid and Its Properties						
Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
1	Fluid properties and Fluid Pressure	02-03-2026				
2	Introduction and classification of fluid	03-03-2026				
3	Fluid properties- Density, Specific gravity, specific weight, specific volume, Dynamic & Kinematic viscosity, Surface tension, Capillarity, Vapour, pressure, Compressibility, Bulk modulus.	09-03-2026				
4	Types of fluids: Ideal, Real, Newtonian, Non Newtonian fluid	10-03-2026				
5	Continuity equation and simple numerical problems based on it	11-03-2026				
6	Pressure, Fluid pressure, pressure head, Pressure Intensity, Concept of absolute Vacuum, Gauge Pressure, Atmospheric Pressure, Absolute Pressure,	16-03-2026				

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
7	Pressure measurement- Manometer, U- tube manometer, Incline manometer, Inverted, U manometer, Piezometer	17-03-2026				
8	Concept of Total pressure, Centre of pressure, Pascal's law, Hydrostatic forces on plane and curved surface immersed in liquid and simple problems on it	18-03-2026				
9	Metacenter	23-03-2026				

Unit No. 02: Fluid Flow Energy Equation

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
1	Various forms of energies applicable to fluid flow – Potential energy, Kinetic energy, Pressure energy, Total energy	24-03-2026				
2	Concept of datum pressure, Velocity and total head of fluid in motion	25-03-2026				
3	Energy equation- Steady flow energy equation	30-03-2026				
4	Derivation of Bernoulli Theorem and its assumption and practical application.	01-04-2026				
5	Simple numerical problems on Bernoulli equation	06-04-2026				

Unit No. 03: Losses in Pipes

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
1	Fluid flow- Steady, unsteady, uniform, non uniform, laminar and turbulent flow	07-04-2026				
2	Flow measurement definition and types of orifices, Vena contraction, coefficient of contraction, Experimental determination of Cc, Cd, Cv	08-04-2026				
3	Construction, working, application and simple problem on – Venturimeter, orifice meter, pitot tube, Nozzle	13-04-2026				
4	Viscous flow-Concept of viscosity of fluids, Reynolds number and its criteria for plate and pipes,	15-04-2026				
5	Darcy -Weisbach equation, loss of head due to friction in pipe, Hagen-Poiseuille formula	20-04-2026				

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
6	Flow through pipes- Pipes in series, Pipes in parallel, Head losses, various types of minor and major energy loss occur in fluid flow through pipes.	21-04-2026				
7	H.G.L. and T.E.L., surge tank, water hammer and its effects	22-04-2026				

Unit No. 04: Turbines

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
1	Classification of hydraulic turbines, Functions and working principle of Impulse and reaction turbine	27-04-2026				
2	Comparison of impulse and reaction turbine	28-04-2026				
3	Construction and working principle of Pelton wheel, Francis and Kaplan turbine	29-04-2026				
4	Selection of turbine on the basis of head and discharge	04-05-2026				
5	Draft tube – types, constructions, and benefit of draft tubes, Safety precaution on turbines	05-05-2026				
6	Calculation of work done, power, efficiency of turbines	06-05-2026				
7	Impact of jet on flat and curved plate in stationary and moving blades.	11-05-2026				

Unit No. 05: Pumps

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
1	Centrifugal pumps- Construction, working principle and application of centrifugal pump.	12-05-2026				
2	Total head of pump, Classification of centrifugal pump, impellers, casing, stages, priming and cavitations.	13-05-2026				
3	Reciprocating pumps principle and application of reciprocating pump, single acting and double acting,	17-06-2026				
4	Slip, negative slip, use of air vessels, Comparison of centrifugal and reciprocating pump	22-06-2026				
5	Submersible pump- Construction, working principle and application of submersible pump	23-06-2026				

Lecture No.	Topics to be covered	Planned Date	Execution Date	Remarks	Sign of Faculty	Sign of HoD
List of Books						
<i>S.No.</i>	<i>Book Title</i>	<i>Author</i>		<i>Publisher</i>		
1	<i>Hydraulics, Fluid Mechanics and Hydraulic Machines</i>	<i>Khurmi R.S., Khurmi N.</i>		<i>S Chand and company, New Delhi</i>		
2	<i>Fluid mechanics and hydraulic machines</i>	<i>Bansal R.K.</i>		<i>Laxami Publication, New Delhi</i>		
2	<i>Fluid mechanics and hydraulic machines</i>	<i>Rajput R.K.</i>		<i>S. Chand and Co. Ltd., New Delhi</i>		