

Discipline : <b>MECHANICAL ENGG</b>	Semester : <b>4<sup>TH</sup></b>	Name of the Teaching Faculty: <b>DURYODHAN DAS</b>
Subject: <b>FLUID MECHANICS</b>	No. of days/per week class allotted: <b>05</b>	No. of Weeks: <b>15</b>
<b>Week</b>	<b>Class Day</b>	<b>Theory / Practical Topics</b>
1 <sup>ST</sup>	1 <sup>ST</sup>	<b>1.0</b> Introduction about fluid mechanics and hydraulic machines
	2 <sup>ND</sup>	Definitions and Units of Density, Specific weight
	3 <sup>RD</sup>	Definitions and Units of specific gravity, specific volume
	4 <sup>TH</sup>	Definitions and Units of Dynamic viscosity, kinematic viscosity
	5 <sup>TH</sup>	Definitions and Units of surface tension , Capillary phenomenon
2 <sup>ND</sup>	1 <sup>ST</sup>	<b>2.0</b> Definitions and units of fluid pressure, pressure intensity and pressure head
	2 <sup>ND</sup>	Concept of atmospheric pressure, gauge pressure
	3 <sup>RD</sup>	Concept of vacuum pressure and absolute pressure
	4 <sup>TH</sup>	Describe about Pressure measuring instruments
	5 <sup>TH</sup>	Describe about Manometers: Simple and differential
3 <sup>RD</sup>	1 <sup>ST</sup>	Describe about Bourden tube pressure gauge
	2 <sup>ND</sup>	Simple problems of Simple and differential manometer
	3 <sup>RD</sup>	Simple problems of Bourden tube pressure gauge
	4 <sup>TH</sup>	Definition of hydrostatic pressure
	5 <sup>TH</sup>	Discuss about Total pressure and centre of pressure on immersed bodies
4 <sup>TH</sup>	1 <sup>ST</sup>	Numerical solved of Total pressure and centre of pressure on immersed bodies
	2 <sup>ND</sup>	Discuss about Archimedis' principle
	3 <sup>RD</sup>	Discuss about concept of buoyancy
	4 <sup>TH</sup>	Discuss about metacentre
	5 <sup>TH</sup>	Discuss about metacentric height
5 <sup>TH</sup>	1 <sup>ST</sup>	Discuss about the Concept of floatation
	2 <sup>ND</sup>	Define fluid flow and Types of fluid flow
	3 <sup>RD</sup>	Discuss about Continuity equation (Statement and proof for one dimensional flow)
	4 <sup>TH</sup>	State & proof Bernoulli's theorem
	5 <sup>TH</sup>	Applications and limitations of Bernoulli's theorem
6 <sup>TH</sup>	1 <sup>ST</sup>	Discuss about Venturi meter
	2 <sup>ND</sup>	Simple numerical solved
	3 <sup>RD</sup>	Discuss about pitot tube
	4 <sup>TH</sup>	Simple numerical solved

	5 <sup>TH</sup>	Definition of orifices, Orifice coefficients
7 <sup>TH</sup>	1 <sup>ST</sup>	Discuss Cc, Cv, Cd and relation among them
	2 <sup>ND</sup>	Definition of pipe
	3 <sup>RD</sup>	Discuss Flow through pipe
	4 <sup>TH</sup>	Define laws of fluid friction
	5 <sup>TH</sup>	Head loss due to friction: Darcy's formula
8 <sup>TH</sup>	1 <sup>ST</sup>	Continued
	2 <sup>ND</sup>	Head loss due to friction: Chezy's formula
	3 <sup>RD</sup>	Continued
	4 <sup>TH</sup>	Problem solved
	5 <sup>TH</sup>	Define Hydraulic gradient
9 <sup>TH</sup>	1 <sup>ST</sup>	Define total gradient line
	2 <sup>ND</sup>	Define impact of jets
	3 <sup>RD</sup>	Discuss about various types of impact of jets
	4 <sup>TH</sup>	Discuss about Impact of jet on fixed and moving vertical flat plates
	5 <sup>TH</sup>	Discuss about derivation of work done on series of vanes
10 <sup>TH</sup>	1 <sup>ST</sup>	Discuss about condition for maximum efficiency
	2 <sup>ND</sup>	Discuss about Impact of jet on moving curved vanes
	3 <sup>RD</sup>	Discuss about illustration using velocity triangles
	4 <sup>TH</sup>	Discuss about derivation of work done, efficiency
	5 <sup>TH</sup>	Problem solved
11 <sup>TH</sup>	1 <sup>ST</sup>	Problem solved
	2 <sup>ND</sup>	Discuss about turbine and power plant
	3 <sup>RD</sup>	Layout and features of hydroelectric power plant
	4 <sup>TH</sup>	Definition and classification of hydraulic turbines
	5 <sup>TH</sup>	Construction and working principle of Impulse turbine (Pelton wheel)
12 <sup>TH</sup>	1 <sup>ST</sup>	Continued
	2 <sup>ND</sup>	Velocity triangle of a single bucket, work done and efficiency in Pelton wheel (Numerical Problems)
	3 <sup>RD</sup>	Problem solved
	4 <sup>TH</sup>	Problem solved
	5 <sup>TH</sup>	Construction and working principle of Reaction turbine (Francis turbine)
13 <sup>TH</sup>	1 <sup>ST</sup>	Velocity triangle, work done and efficiency (Numerical Problems)
	2 <sup>ND</sup>	Problem solved
	3 <sup>RD</sup>	Construction and working principle of Kaplan turbine
	4 <sup>TH</sup>	Definition and classification of pumps
	5 <sup>TH</sup>	Discussion of old topic
14 <sup>TH</sup>	1 <sup>ST</sup>	Question practice & assignment
	2 <sup>ND</sup>	Previous year question
	3 <sup>RD</sup>	Problem solved

	4 <sup>TH</sup>	Concept of multistage centrifugal pumps
	5 <sup>TH</sup>	Discuss about Cavitation-Causes and its effect
15 <sup>TH</sup>	1 <sup>ST</sup>	Construction and working principle of single acting
	2 <sup>ND</sup>	Construction and working principle of double acting reciprocating
	3 <sup>RD</sup>	Continued
	4 <sup>TH</sup>	Concept of slip and negative slip
	5 <sup>TH</sup>	Previous year questions discussion

**Learning Resources:**

<b>Text</b>	<b>Title of Book</b>	<b>Author</b>
<b>Books:</b>		
	Fluid Mechanics and Hydraulic Machines	R K Bansal
	Hydraulics, Fluid mechanics and Fluid machines	S Ramamurthan
<b>Reference</b>	Hydraulics and fluid mechanics including hydraulic machines	Modi and Seth
	Fluid Mechanics and Machinery	C S P Ojha

DURYODHAN DAS  
Mech. Engg. Dept.

Discipline – <b>MECHANICAL ENGG.</b>	Semester – <b>4<sup>th</sup></b>	Name of Teacher – <b>MUKESH KUMAR DALEI</b>
<b>Subject – MANUFACTURING TECHNOLOGY</b>	No. of days/week class allotted --- <b>4</b>	No. of weeks - <b>15</b>
<b>Week</b>	<b>Class Day</b>	<b>Theory/Practical Topics</b>
1st	1 <sup>st</sup>	1. Tool Materials
	2 <sup>nd</sup>	Composition of various tool materials
	3 <sup>rd</sup>	Physical properties
	4 <sup>th</sup>	Uses of such tool materials
2nd	1 <sup>st</sup>	2. Cutting Tools
	2 <sup>nd</sup>	Cutting action of various hand tools such as Chisel, hack saw blade, dies and reamer
	3 <sup>rd</sup>	Turning tool geometry and purpose of tool angle
	4 <sup>th</sup>	Machining process parameters (Speed, feed and depth of cut)
3rd	1 <sup>st</sup>	Coolants and lubricants in machining
	2 <sup>nd</sup>	Purpose of coolants and lubricants in machining
	3 <sup>rd</sup>	3. Lathe Machine: Construction and working of lathe
	4 <sup>th</sup>	Operations carried out in a lathe (Turning, thread cutting, taper turning, internal machining, parting off, facing, knurling)
4th	1 <sup>st</sup>	Safety measures during machining
	2 <sup>nd</sup>	Capstan lathe: Difference with respect to engine lathe
	3 <sup>rd</sup>	Major components and their function Define multiple tool holders
	4 <sup>th</sup>	Turret Lathe: Difference with respect to capstan lathe
5th	1 <sup>st</sup>	Major components and their function
	2 <sup>nd</sup>	Draw the tooling lay out for preparation of a hexagonal bolt & bush
	3 <sup>rd</sup>	4. Shaper: Potential application areas of a shaper machine
	4 <sup>th</sup>	Major components and their function

6 <sup>th</sup>	1 <sup>st</sup>	Explain the automatic table feed mechanism
	2 <sup>nd</sup>	Explain the construction & working of tool head
	3 <sup>rd</sup>	Explain the quick return mechanism through sketch
	4 <sup>th</sup>	State the specification of a shaping machine.
7 <sup>th</sup>	1 <sup>st</sup>	5. Planning Machine
	2 <sup>nd</sup>	Application area of a planar and its difference with respect to shaper
	3 <sup>rd</sup>	Major components and their functions
	4 <sup>th</sup>	The table drive mechanism
8 <sup>th</sup>	1 <sup>st</sup>	Working of tool and tool support
	2 <sup>nd</sup>	Clamping of work through sketch.
	3 <sup>rd</sup>	6. Milling Machine
	4 <sup>th</sup>	Types of milling machine and operations performed by them
9 <sup>th</sup>	1 <sup>st</sup>	Explain work holding attachment
	2 <sup>nd</sup>	Construction & working of simple dividing head, universal dividing head
	3 <sup>rd</sup>	Procedure of simple and compound indexing
	4 <sup>th</sup>	Illustration of different indexing methods
10 <sup>th</sup>	1 <sup>th</sup>	7. Slotter: major components
	2 <sup>nd</sup>	Their function
	3 <sup>rd</sup>	Construction of slotter machine
	4 <sup>th</sup>	Working of slotter machine
11 <sup>th</sup>	1 <sup>st</sup>	Tools used in slotter
	2 <sup>nd</sup>	Tools used in slotter
	3 <sup>rd</sup>	8. Grinding: Significance of grinding operations
	4 <sup>th</sup>	Manufacturing of grinding wheels
12 <sup>th</sup>	1 <sup>st</sup>	Criteria for selecting of grinding wheels
	2 <sup>nd</sup>	Specification of grinding wheels with example
	3 <sup>rd</sup>	Working of Cylindrical Grinder, Surface Grinder
	4 <sup>th</sup>	Working of Centre less Grinder
13 <sup>th</sup>	1 <sup>st</sup>	9. Internal Machining operations: Classification of drilling machines

	2 <sup>nd</sup>	Working of Bench drilling machine, Pillar drilling machine
	3 <sup>rd</sup>	Working of Radial drilling machine
	4 <sup>th</sup>	Boring: Basic Principle of Boring
14 <sup>th</sup>	1 <sup>st</sup>	Different between Boring and drilling
	2 <sup>nd</sup>	Broaching: Types of Broaching (pull type, push type), Advantages of Broaching and applications
	3 <sup>rd</sup>	10. Surface finish, lapping: Definition of Surface finish, Define super finishing
	4 <sup>th</sup>	Description of lapping & explain their specific cutting.
15 <sup>th</sup>	1 <sup>st</sup>	Revision and previous year questions
	2 <sup>nd</sup>	Revision and previous year questions
	3 <sup>rd</sup>	Revision and previous year questions
	4 <sup>th</sup>	Revision and previous year questions

**Learning Resources:**

**Text Books:**

1. Work shop Technology by HazraChoudhary Vol.-I, Vol.-II
2. Manufacturing Technology by P. N. Rao, Vol.- I, Vol.-II

MUKESH KUMAR DALEI

<b>Discipline:- MECHANICAL ENGG.</b>	<b>SEM:-4TH</b>	<b>Name of Teaching Faculty:- PRIYABRATA PANDA</b>
<b>SUB:-Theory of Machines</b>	<b>No of Days /per week class allotted:-4</b>	<b>No of Weeks-13</b>
<b>Week</b>	<b>Class Day</b>	<b>Theory Topics</b>
<b>1ST</b>	1st	Introduction, Link, kinematic chain
	2nd	Mechanism, machine
	3rd	Four bar link mechanism
	4th	Inversion
<b>2ND</b>	1st	Lower pair and higher pair, Cam and followers
	2nd	Chapter-1 Discussion & Assignment Questions
	3rd	Friction, Related Problem
	4th	Friction between nut and screw for square thread
<b>3RD</b>	1st	Screw jack
	2nd	Bearing and its classification, Description of roller, needle roller & ball bearings
	3rd	Torque transmission in flat pivot bearings, Related Problem
	4th	Torque transmission in conical pivot bearings, Related Problem
<b>4TH</b>	1st	Flat collar bearing of single and multiple types, Related Problem
	2nd	Torque transmission for single and multiple clutches, Related Problem
	3rd	Working of simple frictional brakes
	4th	Working of Absorption type of dynamometer
<b>5TH</b>	1st	Chapter-2 Discussion & Assignment Questions
	2nd	Concept of power transmission, Type of drives, belt, gear and chain drive
	3rd	Computation of velocity ratio
	4th	Length of belts (open) , Related Problem
<b>6TH</b>	1st	Length of belts (cross), Related Problem

	2nd	Ratio of belt tensions, Related Problem
	3rd	Centrifugal tension, Related Problem
	4th	Initial tension, Related Problem
7TH	1st	V-belts and V-belts pulleys, crowning of pulleys
	2nd	Gear drives and its terminology
	3rd	Gear trains, Working principle of simple gear trains
	4th	Working principle of compound gear trains
8TH	1st	Working principle of reverted gear trains
	2nd	Working principle of epicyclic gear trains
	3rd	Chapter-3 Discussion & Assignment Questions
	4th	Function of governor, Classification of governor
9TH	1st	Working of Watt governors, Related Problem
	2nd	Working of Porter governors, Related Problem
	3rd	Working of Proel governors, Related Problem
	4th	Working of Hartnell governors, Related Problem
10TH	1st	Sensitivity, stability and isochronism
	2nd	Function of flywheel, Comparison between flywheel & governor
	3rd	Fluctuation of energy and coefficient of fluctuation of speed
	4th	Chapter-4 Discussion & Assignment Questions
11TH	1st	Concept of static and dynamic balancing
	2nd	Static balancing of rotating parts
	3rd	Principles of balancing of reciprocating parts
	4th	Causes and effect of unbalance, Difference between static and dynamic balancing
12TH	1st	Chapter-5 Discussion & Assignment Questions
	2nd	Vibration and related terms (Amplitude, time period and frequency, cycle)
	3rd	Classification of vibration
	4th	Basic concept of natural vibration
13TH	1st	Basic concept of forced vibration



	2nd	Basic concept of damped vibration
	3rd	Causes & remedies of vibration
	4th	Chapter-6 Discussion & Assignment Questions

PRIYABRATA PANDA  
Mech. Engg. Dept.

Discipline : <b>MECHANICAL ENGG</b>	Semester : <b>4<sup>TH</sup></b>	Name of the Teaching Faculty: <b>SABYASACHI JAGANNATH MISHRA.</b>
Subject: <b>THERMAL ENGG-II</b>	No. of days/per week class allotted: <b>04</b>	No. of Weeks: <b>15</b>
Week	Class Day	Theory / Practical Topics
1 <sup>ST</sup>	1 <sup>ST</sup>	Introduction to thermodynamics
	2 <sup>ND</sup>	Introduction to Vapor Power cycles
	3 <sup>RD</sup>	Explain Steam Power Plant with its Layout
	4 <sup>TH</sup>	Explain Steam Power Plant with its Layout Contd.
2 <sup>ND</sup>	1 <sup>ST</sup>	Explain working of steam power plant cycle
	2 <sup>ND</sup>	Explain Carnot vapor cycle with property diagram
	3 <sup>RD</sup>	Explain Rankine vapor cycle with property diagram
	4 <sup>TH</sup>	Explain Rankine vapor cycle with property diagram Contd.
3 <sup>RD</sup>	1 <sup>ST</sup>	Explain modifications to Rankine vapor cycle
	2 <sup>ND</sup>	Problem solving
	3 <sup>RD</sup>	Explain the qualities of ideal working fluid of power cycle
	4 <sup>TH</sup>	Explain Binary vapor cycles
4 <sup>TH</sup>	1 <sup>ST</sup>	Previous year question discussion, Assignment
	2 <sup>ND</sup>	Introduction to Gas Power cycles
	3 <sup>RD</sup>	Explain the concept of I C engine
	4 <sup>TH</sup>	Explain the concept of I C engine contd.
5 <sup>TH</sup>	1 <sup>ST</sup>	Explain Otto cycle with property diagram
	2 <sup>ND</sup>	Explain Diesel cycle with property diagram
	3 <sup>RD</sup>	Explain Dual cycle with property diagram
	4 <sup>TH</sup>	Problem solving
6 <sup>TH</sup>	1 <sup>ST</sup>	Problem solving
	2 <sup>ND</sup>	Problem solving
	3 <sup>RD</sup>	Compare Otto, Diesel and Dual cycles
	4 <sup>TH</sup>	Differentiate between 2S and 4S engine
7 <sup>TH</sup>	1 <sup>ST</sup>	Previous year question discussion, Assignment
	2 <sup>ND</sup>	Introduction to Fuels and Combustion
	3 <sup>RD</sup>	Explain Hydrocarbon fuels
	4 <sup>TH</sup>	Explain the different combustion reactions
8 <sup>TH</sup>	1 <sup>ST</sup>	Explain the different combustion reactions contd.
	2 <sup>ND</sup>	Explain enthalpy of formation and enthalpy of reaction
	3 <sup>RD</sup>	Explain heating values for fuels
	4 <sup>TH</sup>	Explain Octane number
9 <sup>TH</sup>	1 <sup>ST</sup>	Explain Cetane number
	2 <sup>ND</sup>	Previous year question discussion, Assignment
	3 <sup>RD</sup>	Introduction to Heat transfer
	4 <sup>TH</sup>	Explain the different modes of heat transfer
10 <sup>TH</sup>	1 <sup>ST</sup>	State Fourier law of heat conduction, define thermal conductivity
	2 <sup>ND</sup>	Explain steady state heat conduction in solids
	3 <sup>RD</sup>	Problem solving

	4 <sup>TH</sup>	Explain convective heat transfer, State Newton's law of cooling
11 <sup>TH</sup>	1 <sup>ST</sup>	Problem solving
	2 <sup>ND</sup>	Explain radiation heat transfer, State Stefan Boltzman law
	3 <sup>RD</sup>	Problem solving
	4 <sup>TH</sup>	Explain the different theories of radiation
12 <sup>TH</sup>	1 <sup>ST</sup>	Explain surface absorption, reflection and transmission
	2 <sup>ND</sup>	State Kirchhoff's law
	3 <sup>RD</sup>	Define heat exchanger and classify it
	4 <sup>TH</sup>	Explain the different types of heat exchangers with its application
13 <sup>TH</sup>	1 <sup>ST</sup>	Explain the different types of heat exchangers with its application
	2 <sup>ND</sup>	Previous year question discussion, Assignment
	3 <sup>RD</sup>	Introduction to refrigeration cycles
	4 <sup>TH</sup>	Explain the concept of refrigerators and heat pumps
14 <sup>TH</sup>	1 <sup>ST</sup>	Problem solving
	2 <sup>ND</sup>	Explain reversed Carnot cycle with its limitations
	3 <sup>RD</sup>	Explain ideal vapor compression refrigeration cycle
	4 <sup>TH</sup>	Explain actual vapor compression refrigeration cycle
15 <sup>TH</sup>	1 <sup>ST</sup>	Explain actual vapor compression refrigeration cycle contd.
	2 <sup>ND</sup>	Introduction to Gas refrigeration cycle
	3 <sup>RD</sup>	Previous year question discussion, Assignment
	4 <sup>TH</sup>	Important question discussion

**Learning Resources:**

01. Thermal Engineering by M M Rathore, Mc Graw Hill Education
02. A textbook of Thermal Engg by R S Khurmi and J K Gupta, S Chand Publisher
03. Steam Tables by K K Ramalingam, Scitech Publication

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