

COURSE TITLE : MECHANICAL ENGINEERING

COURSE CODE : 3034

COURSE CATEGORY : B

PERIODS/WEEK : 4

PERIODS/SEMESTER : 60

CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Fluid Pressure and Measurements	15
2	Energy in Fluid Motion	15
3	Steam Boilers and IC Engines	15
4	Water Turbines and Pumps	15
Total		60

Course Outcome:

Sl.	Sub	On completion of this course the student will be able:
1	1	To understand fluid pressure
	2	To understand fluid pressure measurements.
2	1	To understand Bernoulli's theorem
	2	To know flow through pipes
3	1	To understand the working of steam boilers.
	2	To comprehend the working of IC Engines
4	1	To comprehend the working of water turbines.
	2	To understand the working of water pumps

Specific Outcome:

MODULE 1 Fluid Pressure and Measurements

- 1.1.1 To state atmospheric pressure, gauge pressure and absolute pressure.
- 1.1.2 To compute the absolute pressure from the given gauge pressure.
- 1.1.3 To explain how pressure can be measured using piezometer.
- 1.1.4 To list different types of manometers.
- 1.1.5 To compute the pressure difference between two pipe lines running full capacity.
- 1.1.6 To calculate the pressure inside a pipe line running in full capacity using a U tube manometer and an inverted U tube manometer.
- 1.1.7 To illustrate the working of differential manometer.
- 1.1.8 To explain how to calculate the pressure difference between two points of a pipe line running full capacity.
- 1.1.9 To know various types of flows-uniform flow - non-uniform flow - streamline flow – turbulent flow - steady and unsteady flow.

MODULE 2 Energy in Fluid Motion

- 2.1.1 To state the energy in fluid motion.
- 2.1.2 To define the datum head, pressure head and velocity head.
- 2.1.3 To state Bernoulli's theorem and its limitations.
- 2.1.4 To explain the constructional details of venturimeter.
- 2.1.5 To calculate the discharge through the venturimeter.
- 2.1.6 To identify flow through pipes.
- 2.1.7 To understand Chezy's and Darcy's formula.
- 2.1.8 To define the Hydraulic gradient line and total energy line.
- 2.1.9 To explain the water hammer and its effects.
- 2.1.10 To define laminar flow and turbulent flow.

MODULE 3 Steam Boilers and IC Engines

- 3.1.1 To explain the functions of steam generators.
- 3.1.2 To classify the steam boilers such as fire tube boilers and water tube boilers.
- 3.1.3 To explain the working of a simple boiler.
- 3.1.4 To compare fire tube and water tube boilers.
- 3.1.5 To illustrate the working of steam turbines.
- 3.1.6 To explain the working principle of steam turbines.
- 3.1.7 To classify the steam turbines.

- 3.1.8 To illustrate the different types of turbines used in thermal power stations.
- 3.1.9 To list the classifications of IC engines.
- 3.1.10 To explain the working of two stroke and four stroke petrol engines.
- 3.1.11 To explain the working of two stroke and four stroke diesel engines.
- 3.1.12 To compare two stroke & four stroke.
- 3.1.13 To compare petrol & diesel engines.

MODULE 4 Water Turbines and Pumps

- 4.1.1 To classify the water turbines.
- 4.1.2 To illustrate the impulse turbines.
- 4.1.3 To illustrate the reaction turbines.
- 4.1.4 To state the water power, Break power and overall efficiency.
- 4.1.5 To illustrate the working of Pelton wheel.
- 4.1.6 To describe the working of Francis and turbine.
- 4.1.7 To describe the working of Kaplan turbine.
- 4.1.8 To know choice of turbine based on specific speed.
- 4.1.9 To list the classification of various pumps.
- 4.1.10 To illustrate the working of reciprocating pump.
- 4.1.11 To illustrate the working of centrifugal pump.
- 4.1.12 To compare the centrifugal pump & reciprocating pump.
- 4.1.13 To distinguish airlift and deep well pumps (Description only).
- 4.1.14 To select a suitable water pump.

CONTENTS

MODULE – I

Fluid pressure and measurement of atmospheric pressure - gauge pressure and absolute pressure
 Piezometer – manometer – U tube – Inverted U tube- differential manometer – (Simple problems) Flow
 of Fluids Types of flow – uniform flow - non-uniform flow - streamline flow – turbulent flow - steady and
 unsteady flow.

MODULE – II

Energy in fluid motion- datum head - pressure head - velocity head – total energy of fluid in motion –
 Bernoulli’s theorem - limitations – Practical application of Bernoulli’s theorem – Venturi meter, (Simple
 problems) Flow through pipes major and minor losses – Loss of head at entrance - due to sudden
 enlargement - due to sudden contractions - Loss of head at exit of pipe – Frictional loss in a pipe (Simple
 problems) . Chezy’s and Darcy’s formula – Discharge through parallel pipes connected to reservoir

(Simple problems)- Water Hammer and its effect (description only) – Laminar and turbulent flow – critical velocity.

MODULE III

Steam Boilers Functions – classifications – fire tube and water tube – water tube boilers – Simple boiler – Brief explanation with line sketches – steam turbines – advantages over steam engine – types – working principles of impulse and reaction turbines (use line sketches) - IC Engines - Two stroke and Four Stroke - comparison of Petrol and diesel engines

MODULE IV

Water Turbines- Classifications of turbines – impulse and reaction turbines – define- water power - break power - overall efficiency – Pelton wheel - description of working – Reaction turbines -Francis turbine and Kaplan turbines – specific speed - Choice of turbine based on specific speed. Pumps Classifications- reciprocating pumps - centrifugal pump working - foot valve - Multistage pumps- propeller- jet - Airlift and deep well pumps (Description only). Selection of kW rating motor- pump set based on head, quantity of discharge and discharge pressure.

REFERENCES

1. R.S. Khurmi. A Textbook of Hydraulics: Khanna Publishers
2. R.S. Khurmi. A Textbook of Thermal Engineering: Khanna Publishers