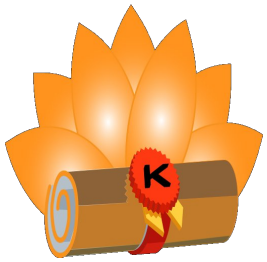
www.kamaldnp.com



KAMALDNP

kamaldnp.com • IT Training, Varanasi

PDF created by Raj Kamal using AI

Fluid Mechanics & Hydraulic Machinery — Complete Syllabus

BTEUP Diploma in Mechanical Engineering • 3rd Semester • Session 2026–27

Subject 3.2 (Theory) • Total 100 Marks • 3 Credits

KAMALDNP

About this document: this is the complete official syllabus of Fluid Mechanics & Hydraulic Machinery (subject 3.2), a theory paper of the Mechanical 3rd semester — all five units, the marks distribution and the reference books, in the official order. The matching practical paper (subject 3.4, Fluid Mechanics & Hydraulic Machinery Lab) is covered in a separate syllabus PDF.

Examination Scheme

Code	Paper	Type	L – P	Credits	Internal	External	Total
3.2	Fluid Mechanics & Hydraulic Machinery	Theory	4 – 0	3	Theory 40	Theory 60 (3 hrs)	100
Fluid Mechanics & Hydraulic Machinery Total				**3**	**40**	**60**	**100**

What This Subject Aims To Do

Diploma holders in mechanical engineering have to deal with problems of fluids and with the use of hydraulics in power generation. This subject gives the knowledge and skills of fluid mechanics, hydraulic machinery and hydraulic systems needed for that work. By the end you should be able to: explain fluid properties, their units and conversions; measure different types of pressures; calculate flow and discharge of various liquids; apply Bernoulli's theorem for calculating pipe diameter and the height of a pipe from the ground; calculate pipe friction

www.kamaldnp.com

and losses in pipelines; specify hydraulic machines for different applications; and apply Pascal's law in practical applications.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks
1	Properties of Fluid & Fluid Pressure	10	12
2	Pressure Measurement	8	12
3	Fluid Flow & Flow Through Pipes	14	12
4	Hydraulic Turbines & Pumps	16	12
5	Hydraulic System & Hydro Power Plant	8	12
Total		56	60

Unit 1 — Properties of Fluid & Fluid Pressure (10 Periods, 12 Marks)

Topics: Properties of Fluid: Definition of fluid, Density, Specific gravity, Specific Weight, Specific Volume, Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility. Different types of fluids: Ideal fluid, Real fluid, Ideal plastic fluid, Plastic fluid, Newtonian and Non-Newtonian fluid. Simple numerical problems. Fluid Pressure: Fluid pressure, Pressure head, Conversion of Pressure head, Pressure Intensity, Statement of Pascal law and its applications. Concept of vacuum and gauge pressures, atmospheric pressure, absolute pressure. Simple numerical problem.

In simple words: What a fluid is, how its properties are measured, and how pressure works in a fluid at rest — including Pascal's law, the principle behind every hydraulic press, jack and brake.

Unit 2 — Pressure Measurement (8 Periods, 12 Marks)

Topics: Barometer, Simple manometer, differential manometers and sensitive Manometers, Bourdon pressure gauge. Concept of Total pressure on immersed bodies, Center of pressure, Simple problems on Manometers.

In simple words: How pressure is measured in practice — barometers, manometers and the Bourdon gauge — and the total force water exerts on a submerged surface, and where that force acts.

www.kamaldnp.com

Unit 3 — Fluid Flow & Flow Through Pipes (14 Periods, 12 Marks)

Topics: Fluid Flow: Types of fluid flows, Path line, Streamline and streak lines, Continuity equation, Bernoulli's theorem, Principle of operation of Venturi meter and Orifice meter, Principle of operation of Pitot tube and rotameter. Concept and relation of Cd, Cv and Cc. Simple numerical problem. Flow Through Pipes: Laminar and turbulent flows; Reynold's number and its effect on pipe friction; critical velocity, siphon, Water hammer. Darcy's equation and Chezy's equation for frictional losses, Minor losses in pipes. Hydraulic gradient, Simple numerical problem.

In simple words: How fluids move — the continuity equation and Bernoulli's theorem — how flow is measured with venturi and orifice meters, and how much head a pipeline loses to friction.

Unit 4 — Hydraulic Turbines & Pumps (16 Periods, 12 Marks)

Topics: Hydraulic Turbines: Classification of hydraulic turbines, Selection of turbine on the basis of head and discharge available, Construction and working principle of Pelton wheel, Francis and Kaplan turbines, Draft tubes – types and construction, Concept of cavitation in turbines, Cavitation causes, effects and remedies. Centrifugal Pumps: Principle of working and applications, Types of casings and impellers, Concept of multistage, Priming and its methods. Reciprocating Pumps: Construction, working principle and applications of single and double acting reciprocating pumps, Concept of Slip, Negative slip, Cavitation and separation.

In simple words: The machines that use water power or move water: Pelton, Francis and Kaplan turbines, centrifugal pumps and reciprocating pumps — how each works and when each is chosen.

Unit 5 — Hydraulic System & Hydro Power Plant (8 Periods, 12 Marks)

Topics: Hydraulic System: Description, operation and application of hydraulic systems – hydraulic ram, hydraulic jack, hydraulic brake, hydraulic accumulator, hydraulic door closer, hydraulic press. Hydro Power plant: Introduction, type of hydropower plant, tidal and wave energy.

In simple words: Everyday hydraulic devices — the jack, the brake, the press — and how falling water, tides and waves are turned into electricity.

Reference Books (as listed in the syllabus)

- Fluid Mechanics by K. L. Kumar; S. Chand and Co. Ltd., Ram Nagar, New Delhi.
- Hydraulics and Fluid Mechanics Machine by R. S. Khurmi; S. Chand & Co. Ltd., New Delhi.
- Fluid Mechanics through Problems by R. J. Garde; Wiley Eastern Ltd., New Delhi.

www.kamaldnp.com

- Fluid Mechanics by Dr. A. K. Jain, Khanna Publishers, New Delhi.
- Hydraulic and Pneumatic Control by K. Shanmuga Sundaram, S. Chand & Co. Ltd., New Delhi.
- Hydraulics and Hydraulic Machinery by Dr. Jagadish Lal; Metropolitan Book Company Ltd., Delhi.
- Hydraulic and Pneumatic Power and Control: Design, Performance and Application by Yeaple, McGraw Hill, New York.
- Pneumatic Controls by Festo Didactic, Bangalore.
- Pneumatics Control: An Introduction to the Principles by Werner Deppert and Kurt Stoll; Vogel-Verlag.

KAMALDNP • kamaldnp.com • support@kamaldnp.com

Source: IRDT Kanpur NEP-2020 curriculum for the Diploma in Mechanical Engineering (Automobile), effective session 2025-26 (urise.up.gov.in). Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text. Please confirm with your own polytechnic for any local changes.

KAMALDNP