

**M.E. (Civil) (Infrastructure Engineering) Semester: I**

**Subject Name: Hydro Power Engineering**

**Subject code : MECV106 - A**

**A. Learning objectives:**

The objective of this course is

- To understand the different forms of energy, types of power plant, hydropower development in India.
- Elements of hydropower scheme, Identification of the components of the hydro power plant scheme, including locations, and understand what they do in this study.

**B. Teaching Scheme (Credits and Hours)**

Teaching Scheme				Credit Scheme			Evaluation Scheme				
Lect Hrs	Tu Hrs	Prac. Hrs	Total	Theory	Pra/TW	Total	UE	IE	CIA	Prac/Viva	Total
03	00	00	03	03	00	03	70	30	20	00	120

**C. Detailed Syllabus**

**Unit No.**

**Topics**

- 1 Introduction:** Sources and forms of energy, types of power plants, and elements of hydropower scheme, hydropower development in India. Power house structures-substructure and superstructure Layout and dimensions, design considerations. Hydropower plants classification: Surface and underground power stations, Low medium-high head plants-layout and components, pumped storage plants, tidal power plants, microtidal units. Load and power studies: load curve, load factor, load duration curve, firm capacity, reservoir capacity, capacity factor.
- 2 Penstocks and power canals:** Classification of penstocks, Design of Penstocks, economic diameter, bends, anchor blocks, surges in canals design criteria of power canals. Intake structures: Location function and types of intakes, energy losses at intake trash rock, design of intakes.

- 3 **Water hammer and surge tanks:** Rigid and elastic water column theories, water hammer pressure. Behavior of surge tanks, types of surge tanks, hydraulic design, design of simple surge tank-stability
- 4 **Hydraulic turbines:** types and classification, constructional features, hydraulic analysis, selection, characteristic curves, governing of turbine, draft tubes-types, hydraulic principles, and design. Gates and valves types. Design of air vent.

**D. Lesson Planning:**

Unit No	Topics	Hours	Weightage
1	Introduction	12	25%
2	Penstocks and power canals	11	25%
3	Water hammer and surge tanks	11	25%
4	Hydraulic turbines	11	25%

**E. Instructional Method and Pedagogy** (Continuous Internal Assessment (CIA) Scheme)

- Two Faculties will be covering the syllabus
- Attendance is compulsory in lectures which carries 05 Marks.
- At regular intervals assignments is given to all students which carries 10 marks. Evaluation of these assignments will be observed under Daily Homework Daily Assessment (DHDA) System.
- One internal exam of 30 marks is conducted as a part of internal theory evaluation.

**F. Students Learning Outcomes:**

At the end of the course

- Able to understand the types and suitability of different hydro power plant
- The importance and working of different power plant component.
- Understand the Problems and related solution in operating the different component

**G. Text Books & Reference Books:**

- 1 B.Water power Development :Mosonyi
- 2 Hydroelectric hand book: Creagar, W.P. and Justin, J.D., John Wiley & Sons, New York.

*Kadi Sarva Vishwavidyalaya, Gandhinagar*

- 3** Davis' Handbook of applied hydraulics :Zipparro, V. J. and Hasen H., Mc-Graw Hill, Inc., New York
- 4** Hydropower structures :R.S.Varshiray, Nem Chand and Bros. Roorkee
- 5** Water Power Engineering: M.M.Desmukh, Dhanpatrai and Sons.
- 6** Water Power Engineering: M.M.Dandekar and K.N.Sharma, VikasPub.House