

Kadi Sarva Vishwavidyalaya, Gandhinagar
M.E. (Civil Infrastructure Engineering) Semester: I
(w.e.f. Academic Year 2017-18)

Subject Name: Hydropower Engineering

Subject code: MECV106-N-B

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 (Hrs)	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 Energy sources for power generation, Power scenarios, Demand and of power, need of hydropower, General Hydrology, Environment and Hydro Power Development.
2.	Power potential studies Estimation of available water power, Power duration curve, Storage and pondage, Load studies, Technical terms related to hydropower, System integrated operational studies, Load prediction, Installed capacity, Size and number of units.
3.	Water availability and project hydrology Introduction, objectives of planning, Planning for water power development, Economics of hydropower development, Economic value of hydropower, Cost of water power, Total annual cost of a hydro project, Operation and maintenance of hydro plants.
4.	Classification and types of hydropower plant Classifications, types, Storage power development ,components of storage power development, economic aspects, social and rehabilitation aspects, Run-Off-River power development, types of ROR, components of run-off-river power development, Run-of-power development on canal falls, Underground and pumped storage power plants , advantages, types and location of underground power station, its components, types of layout, limitations of underground power plants. Essential requirements of pumped storage power plant (PSPP), economics of PSPP, Cost of power generated, Canal head power plant
5.	Small Hydro Power Development

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Introduction, Advantages of small hydropower, Classification of small hydropower, Components of small hydropower development, Choice of units, Economics of small hydropower schemes.

6. Penstock and Power canal

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 rack, design of intakes.

7. Water Conveyance System

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, Hydraulic Valves

8. Power House Planning

General layout of the power house and arrangement of hydropower units, Number and sizes of units, space allocation and dimensions, Super structure, Indoor, Safety requirements.

9. Hydraulic turbines

Types and classification, constructional features, hydraulic analysis, selection, characteristic curves, governing of turbine, drafts tubes-types, hydraulic principles,. Design of air vent.

D. Lesson Planning:

Unit No	Topics	Hours	Weightage (%)
1.	Introduction	2	4
2.	Power potential studies	4	9
3.	Water availability and project hydrology	5	11
4.	Classification and types of hydropower plant	7	16
5.	Small Hydro Power Development	5	11
6.	Penstock and Power canal:	7	16
7.	Water Conveyance System	5	11
8.	Power House Planning	5	11
9.	Hydraulic turbines	5	11
Total		45	100

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

- 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

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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.
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
7. A Textbook Of Water Power Engineering: R.K.Sharma, T.K.Sharma