

**FOR ENGINEERING DIPLOMA LEVEL ELECTIVE SUBJECT**

**For the branches in Mechanical, Chemical Engineering**

1. **Subject Code:** \_\_\_\_\_ **Course Title: Hydro Power Plants**

2. **Contact Hours: L: T: P:**

3. **Examination Duration (Hrs.): Theory :** \_\_\_\_\_ **Practical :** \_\_\_\_\_

4. **Relative Weightage : CWS PRS MTE ETE**  
**PRE**

5. **Credit:** \_\_\_\_\_ 6. **Semester:**     
**Autumn Spring**

**Both**

7. **Pre-requisite: NIL** 8. **Subject Area:** \_\_\_\_\_

9. **Details of Course:**

10. **Details of Course:**

Sl. No.	Particulars	Contact Hours
1.	HYDROLOGY : Introduction The hydrological cycle, Measurement of run off, Hydrograph, flow duration curve, mass curve, Numerical Problems.	
2.	Essential Elements of Hydro Power Plants: Catchment area, Reservoir, dams, Spillways, conduits, Surge Tank, Prime movers, Draft tubes, powerhouse equipment. Government Hydropower policies, environmental issues, SWOT-(Strength weakness opportunity threatening) of hydropower projects, type of clearance required for Hydropower project, master plan, topography, catchments area, types of streams, allotment of site-(Open bid, Mou, Joint venture). Survey & investigation, PFR-(Pre-feasibility report), DPR (Detailed Project Report), Process of development of site (announcement, allotment, clearance, agreement, commissioning).Types of survey- Topographical, metrological, hydrological, ecological, geological. Arial Rainfall Measurement, Type of flow measurement Devices-(Notch, weir, flume), dilution method, and Flow duration curve (important), flood – discharge estimation kripitech formula, dickens formula, English formula, hydrograph, unit hydrograph. Financial institution, SOI Map, Cost / Estimation – wheeling charges, Banking, Moratorium, PPA-(Power purchase agreement), SERC-(State electricity regulatory commission) Hydrological cycle.	
3.	Types of Hydro Power Plants: High, medium and low head plants, Base load and peak load plants, Run-or-river plant with pondage, Run-of-river plant without pondage, Storage type plant and pump storage plants, Mini and microhydro plants, Under ground	

	hydropower plants.	
4.	Hydraulic Turbines: Classifications of water turbines, principles of working. Impulse turbine – constructional details, velocity triangles power and $\eta$ calculations, governing of impulse turbines. Reaction Turbines --, Francis turbines, propeller and Kaplan turbines, construction details, velocity triangles, power and $\eta$ calculations, degree of reaction, draft tubes, sp speed of turbine, cavitation and methods of prevention, principle of similarity, unit and sp. Quantity, selection of turbines, governing of reaction turbines.	
5.	Auxiliaries of Hydro Power Plants: Exciter, governor oil system, lubricating oil system, coolant pumps, air compressors, drainage pump, cranes, gate hoists, valves etc.	
6.	Control of Hydraulic Power Plants: Hydraulic control-different types, Machine control-starting and stopping of voltage control of generators and system. Protection of machine against break down. Automatic and remote control of hydro plants-fully automatic plants, partially automatic plant, remote control of plants.	
7.	Electrical and Mechanical Equipment in Hydro Power Plant: Electrical Equipment-Generator, exciter, voltage regulators, transformers, switch gears, control room equipments. Mech. Equipments—Compressors, air duets, shafts, couplings, bearings, braking equipment's for generator, oil circuits and pumps, cranes and other lifting devices, ventilation's and cooling system, equipment for water supply and drainage equipment for power house lighting.	
8.	Safety Measures in Hydro Power Plants: Surge tanks, screens, sand traps, jets dispersers, pressure regulators, Preventative maintenance, erosion of blades and prevention.	
9.	Lay out of Hydro Power Plant: Types of layouts on the basis of types of plants. Schematic arrangement of different elements in a hydropower plant.	
10.	Cost of Hydro Power : Calculations of hydropower, cost of hydro plant economics of hydro power generation (fixed cost, running cost, transmission cost) etc.	

### Suggested Readings:

### REFERENCES:--

1. Power Plant Engg. – P.K.Nag -TMH Pub. New Delhi
2. Power Plant Engg. – R.K. Rajput—Laxmi publications New Delhi
3. Power Plant Engg. – “F.T. Morse” affiliated to East West press pvt. Ltd Ned Delhi/Madras

4. Power Plant Engg. – Mahesh Verma – Metropolitan book Co. Pvt. Ltd.,  
New Delhi
5. Power Plant Technology – El. Vakil – TMH Pub. New Delhi