Hydropower Structures Design

Course Name	**Hydropower Structures Design**
Course Name as on Certificate	**Hydropower Structures Design**
Certificate Type	Certificate of Completion by IITM Pravartak and L&T EduTech
Certificate Issued by	IIT MADRAS and L&T EduTech
Course Overview	**<u>Course Overview</u>** This course offers a comprehensive examination of the critical components and design principles involved in hydropower engineering. Key topics include storage zones within reservoirs and water level control, forces impacting gravity dams, and hydraulic design principles for dams, barrages, and desilting basins. The course also addresses basic design requirements and procedures for embankment dams. The learners will explore water conductor systems, power intake structures, and methods for hydraulic and structural analysis of these components. The course covers the design of head race tunnels, including considerations for economic diameter, structural integrity, and seepage control. Additionally, the course delves into surge tanks, surge shafts, and surge chambers, focusing on hydraulic and structural design principles. Penstocks and pressure shafts are discussed, including classifications, design load conditions, and design procedures. The course also covers the design of turbine and generator floors, stability analysis of powerhouse structures, and considerations for underground powerhouses. **<u>Course Objectives</u>** • Perform Hydraulic design of dams, barrages, desilting basins • Perform Hydraulic, stability and Structural analysis of power intake structures. • Design effective water conductor systems, head race tunnels, surge tanks, pressure shaft and penstocks. • Evaluate the design loads and structural requirements for both surface and underground hydropower facilities.
Eligibility	Students pursuing Diploma/ UG / PG Programs in Civil Engineering
Pre Requisites	Fluid Mechanics & Machinery , Applied Hydraulics, Water Resources Engineering

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Target Segment	Students pursuing Diploma/ UG / PG Programs in Civil Engineering Faculties / Working Professionals in the above domain & other aspiring learners
Course Content	**See Enclosed Programme details – as Annexure 1**
Pedagogy	Online Self paced E-Learning Content
Assessment	One Final Assessment
Programme Faculty	L&T Industry Experts
Duration	Units : 5 Hours : 8
Class Schedule	Self-Paced
Programme Highlights/USPs	• Design of Headwork • Design of Desilting Basin & Embankment Dam • Analysis and Design of power intake structures • Design of Head Race Tunnel & Surge Shaft • Design of pressure shaft and Powerhouse
Programme Mentor	**Ashutosh Mohod - Engineering Manager in Hydel EDRC of L&T Construction, Heavy Civil IC** He holds a Master of Technology (M. Tech) in Structural Engineering from NIT Jamshedpur. He has been working in the field of Hydel engineering for the past 10 years, focusing on the design of various civil structures. He has published a paper titled "Buckling Analysis of Composite Laminated Plate" in the Structural Engineering Convention 2014 at IIT Chennai. He is actively engaged in the design and development of civil engineering projects.

Total Fees		**Total Fees (Rs.)**	
	Total Programme Fee	Rs 1,900/- inclusive of tax	

ANNEXURE 1

Proposed Course outline / programme / plan – Unit wise syllabus details.

Unit – I: Design of Headworks, Desilting Basin & Embankment Dam
Storage zones and reservoir control levels in a dam - Forces acting on gravity dams - Hydraulic design of dams, barrage, desilting basin - Basic design requirements of embankment dams - design procedures

Unit – II: Analysis of Power intake structures
Water conductor system - Power intake structures - Hydraulic analysis of power intake structures - Stability and structural analysis of power intake structures

Unit – III: Design of Head Race Tunnel
Economic diameter of head race tunnel - Structural design of head race tunnel - Seepage control in head race tunnel - Excavation and rock support system in head race tunnel

Unit – IV: Design of Surge Shaft & Pressure Shaft
Surge tank - Hydraulic design of surge shaft - Structural design of surge chambers – Penstocks-classifications and design load conditions - Pressure rise calculation - Design loads for surface, buried and underground pressure shafts - Design procedures of pressure shaft and pressure pipe

Unit -V: Design of Powerhouse
Turbine and generator floor - Design steps and data collection - Design loads and design load combination - Stability analysis of the powerhouse structure – design of Underground, Superstructure, Substructure powerhouse, Joints in powerhouse and flood protection