Planning and Development of Hydropower Projects

Code	Credit Hours
CE- 827	3-0

Course Description

The general objective of the course is to provide theoretical understanding and practical insights into the planning and development of hydropower projects. The specific objectives of the course are to understand the different forms of energy, types of power plant, hydropower development in Pakistan.

Reference Book:

1. Planning and Implementation of Hydropower Projects, Volume 5 of Hydropower development, Jarle Ravn, Norwegian Institute of Technology, Division of Hydraulic Engineering, 1992
2. Hydropower Engineering Handbook, Gulliver, John S., Arndt, Roger E.A., McGraw-Hill, Inc., 1991
3. Guideline and Manual for Hydropower Development Vol. 2 Small Scale Hydropower, Japan International Cooperation Agency (JICA), Electric Power Development Co., Ltd. JP Design Co., Ltd., 2011
4. Code for Preparation of Hydropower Planning of Rivers (DL/T 5042-2010), HYDROCHINA CORPORATION China Renewable Energy, 2016

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Term	30%
ESE	50%

Teaching Plan

Week No	Topics	Learning Outcomes
1	Hydropower's role in the energy supply	Introduction to hydropower energy and its role in the energy supply

2	Comparison with other energy sources	Forms of energy, energy sources and comparison of hydropower with other energy sources
3	Stages of hydro power development.	Hydropower Development Cycles, Resource Studies, Site Specific Studies
4-5	Selection criteria and approval, components, low head and high head, pumped storage hydropower, low head developments; civil components; hydro-mechanical, components; electromechanical components and auxiliary equipment.	Types of projects, Classification of hydropower plants, Major steps in the planning of hydropower projects, Components of a hydroelectric scheme
6	**MID TERM IN WEEK 9**	
7-8	Project layout and sizing, low head and high head, interdependence between layout, sizing and economics; alternative project layout.	Layout and sizing of hydropower project, Difference between low and high head, Nexus between layout, sizing and economics
9	**MID TERM EXAM**	
10-12	Selection of project components; level of detail of quantities and costs in different stages of project development; optimization and selection of the plant size and estimation of quantities and costs, determination of unit cost and tariff.	Project components selection, Preparation of BOQs, Cost estimation, Optimization of plant size, Costs & tariff
13-14	Peaking plants, Risk analysis for public and private sector investments.	Concept of peaking power plants, Concept of Public Private Partnership (PPP), Various risks associated with PPPs projects, PPP Project Risk Analysis and Allocation
15-17	Approval processes for public and private sector investments in hydropower projects	Operation & Procedure for Applicati0n And Processing of Proposals

18	**End Semester Exam**