

PIPM 7007	HYDRO & NUCLEAR POWER RESOURCES MANAGMENT	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Engineering/Science Graduates				
Co-requisites	Good Command in MS Word and MS PowerPoint				

Course Objectives

- 1 To understand with the major theories, background work, concepts of the Hydro and Nuclear Power.
- 2 To study Safety and disposal of construction material wastages and their disposal and effect on the environment, habitants and on another ecosystem.
- 3 To know Policies/Acts/Tariff related with hydro and nuclear power projects will be discussed and taught region wise in India.
- 4 To learn analysing R&R Policies, upgradation and modernization of old hydro and nuclear power projects in India.
- 5 To make students aware of Construction details of underground hydro power projects and their associated auxiliary systems.

Course Outcomes

On completion of this course, the students will be able to

CO1	To Conceptualize Students the skills required for planning analyzing set up of the existing power plants of hydro and nuclear power plant details and future integrated approach of resources for next 25 years.
CO2	To apply systematic approach to the policies and other DPR related methodologies in practice in Hydro power projects policies
CO3	The analytical understanding of the effects of the delays caused in the progress of development of hydro and nuclear power projects will be learned and their remedial measures will be understood by the student.
CO4	To integrate all regulatory matters/Acts/policies/guidelines/rules ,in planning Hydro Power project.
CO5	To apply the local, regional, national, international practices of augmenting old power plant upgradation/ modernization work

Catalog Description

The main objective of this course is to give broad insight into the different aspects of hydro power and Nuclear Power Projects issues, while providing a solid introduction to power, development and cost analyses. As part of the core in the MBA Power Management program, the course will focus on difficulties in development of hydro and nuclear power projects and their environmental issues stressing demand and economic aspects. It also covers the key principles of regulatory aspects, Safety issues, Planning, Investment, Operations and Maintenance related Issues. Topics covered includes the economic theories of the firms, Markets, Latest Technologies, Cost Models and Production functions.

The focus is given on the Power Development potential, power Policies, feasibility studies, R & R Policies, Waste Disposals, Policies and Acts etc.

Course Content

Unit 1: 3 lecture hours

Global Hydro – Potential And Scenario In India

Unit 2: 3 lecture hours

Problems In Hydro – Power Development In India

Unit 3: 3 lecture hours

Hydro – Power Policy And Planning

Unit 4: 3 lecture hours

Pre-Feasibility & Feasibility Study For Nuclear & Hydro Power Plants

Unit 5: 3 lecture hours

R& R Policy And Environmental Constrains For Hydro Projects

Unit 6: 3 lecture hours

Underground Hydro Power Station

Unit 7: 3 lecture hours

Various Types Of Nuclear And Hydro- Power Plants

Unit 8: 3 lecture hours

Nuclear Power Plant Concept, Construction, Working And Technology

Unit 9: 3 lecture hours

Nuclear Power Plant Safety And Waste Disposal

Unit 10: 4.5 lecture hours

Nuclear Policies And Act

Unit 11: 4.5 lecture hours

Costing And Tariff Calculation For Hydro And Nuclear Power Plant

Text Books and Reports

1. Power Plant Engineering by AK Raja
2. Policy for Development of Micro, Mini& Small Hydro Power Projects Government of Uttarakhand 2015
3. Electricity Act 2003

4. CERC Regulations
5. Ministry of Power/SEBs/MNRE
6. Atomic Energy Act of 1948
7. Reference book of case study of Tehri Hydro Power Corporation
8. Environment / Rehabilitation /resettlement reference material

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination Examination Scheme:

Components	Presentation/Assignment/Projects etc	ESE
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Programme Outcomes
CO1	To Conceptualize Students the skills required for planning analyzing set up of the existing power plants of hydro and nuclear power plant details and future integrated approach of resources for next 25 years.	PO: 1,2,6,8,9,12,13
CO2	To apply systematic approach to the policies and other DPR related methodologies in practice in Hydro power projects policies	PO: 3,2,5,10,12,7
CO3	The analytical understanding of the effects of the delays caused in the progress of development of hydro and nuclear power projects will be learned and their remedial measures will be understood by the student	PO:5,8,9,13,1,2
CO4	To integrate all regulatory matters/Acts/policies/guidelines/rules ,in planning Hydro Power projects	PO: 2,6,9,11,1,4
CO5	To apply the local, regional, national, international practices of augmenting old power plant upgradation/ modernization work.	PO: 1,4,8,12,10,11,13

Course Outcomes	CO1	CO2	CO3	CO4	CO5
PO1	3	3	3	2	1
PO2	3	3	3	2	3
PO3	3	3	3	2	3

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO9	PSO10	PSO11	PSO12	PSO13
		Students will be able to develop and evaluate alternate managerial choices and identify optimal solutions.	Students will demonstrate effective application capabilities of their conceptual understanding of power generation, transmission and distribution.	Students will be able to exhibit effective decision-making skills, employing analytical and critical thinking ability.	Students will demonstrate effective oral and written communication skills in the professional context.	Students will be able to work effectively in teams and demonstrate team-working capabilities.	Students will exhibit leadership and networking skills.	Students will demonstrate sensitivity towards ethical and moral issues and have ability to address them in the context of power management.	Students will demonstrate employability traits in line with the needs of changing dynamics of the power industry.	Students will demonstrate strong conceptual knowledge in fuel management, power generation, transmission, distribution, trading, energy management, financing and regulation, and sustainable development.	Students will demonstrate effective understanding of functioning of power sector.	Students will demonstrate analytical skills in identification and resolution of issues pertaining to fuel management, power generation, transmission, distribution, trading, energy management, financing and regulation, and sustainable development.	Students will exhibit the ability to integrate technical, economic, social and regulatory frameworks for power sector planning and resource management.	Students will exhibit deployable skills pertinent to the power sector.

PO4	3	3	2	3	2
PO5	2	1	3	2	3
PO6	3	2	3	3	2
PO7	3	3	2	2	3
PO8	2	3	3	3	3
PSO 9	1	2	3	2	2
PSO 10	3	3	3	3	2
PSO 11	2	2	2	3	3
PSO 12	3	3	3	2	3
PSO 13	3	2	3	3	2

11	Mechanical Efficiency of Pelton wheel decreases faster with wear and tear than Francis Turbine	[1]	CO2
12	Candu Type of nuclear power reactor require enrichment of fuel uranium (235)	[1]	CO3
13	Uranium (238) isotope is available 100 times of uranium (235) isotope in uranium	[1]	CO1
14	Reprocessing of used fuel in a nuclear reactor is a chemical process	[1]	CO2
15	The weight of fission products produced in a big nuclear reactor is only about 15 ton per year	[1]	CO2
16	Beta particle is lighter than a proton	[1]	CO3
17	The energy produced in a breeder reactor is about 100 times more than the present nuclear power reactor	[1]	CO1
18	Kaplan turbine has fixed blades in place of moving blades	[1]	CO2
19	The overall cost of Hydro Power Plant is Lower if Specific Speed (N_s) is high for a given head and output	[1]	CO2
20	Pelton Turbine is used for Low heads	[1]	CO3
SECTION B (Attempt 4 questions out of 5)			
1	Describe various forms of natural radiations and man - made radiations	[5]	CO1
2	Describe all seven types of nuclear power reactors with their pro and cons.	[5]	CO3
3.	How many techniques are presently available for enrichment of uranium. Describe them with suitable figures	[5]	CO4
4	Draw the diagram of a nuclear power reactor and describe its parts and there function	[5]	CO3
5	Describe the engineering points of selecting a type of a turbine	[5]	CO2
SECTION C (Any Six Questions out of Seven)			
1	Describe in details the design, special features and other provision etc provided in Narora in Uttar Pradesh (UP) Nuclear power Plant	[5]	CO5
2	Describe the advantages and disadvantages of nuclear fusion. What are the technical challenges involved in development of nuclear fusion reactor for electricity generation	[5]	CO1
3	Describe the advantage & dis-advantage and nuclear power reactors	[5]	CO3
4	Describe the Advantage & Dis-Advantage of Underground Power House	[5]	CO4
5	What is the role of prime mover in hydro power plant and how they are classified depending upon the action of water. Compare the Pelton, Francis and Kaplan water turbines	[5]	CO1
6	Describe Fukushima, Japan Nuclear Accident details with future recommendations	[5]	CO5
7	a) Compare a nuclear power plant with a steam power plant. b) Describe the safety majors required at a nuclear power plant.	[5]	CO4

SECTION D (Attempt 2 questions out of 3)			
1	<p>(a) A nuclear fission reaction power plant converts energy in matter to electrical energy by following energy chain</p> <p style="text-align: center;"> Energy in Thermal Mechanical Electrical Matter → Energy → Energy → Energy </p> <p style="text-align: center;">Neglecting losses, how much matter is converted into electrical energy per day by a 10 mW power plant?</p> <p>(b) What is the thermal energy equivalent in terms of coal to the complete fissioning of one Kg of uranium 235</p> <p>(c) The fissioning of one atom of Uranium 235 has an energy 200Mev. What is the energy per fission in (i) Joules (ii) KWH</p>	[15]	CO1
2	<p>a) What is critical mass, describe nuclear fission, and nuclear fusion.</p> <p>b) Write down the energy from fission and full burn up equation with mass balance etc.</p> <p>c) Calculate the energy per megawatt-day by burning one gram of fissionable material.</p>	[15]	CO3
3	<p>a) How DPR is prepared of a Hydro Power Project & Explain the various important points for Submitting poor quality of DPR by the projects developers causing delays in projects.</p> <p>b) Describe nuclear power plant impact on environment with the diagram of a nuclear fuel cycle and describe the process involved.</p> <p>c) Describe all the three types of nuclear waste generated in Nuclear power reactors in detail.</p>	[15]	CO2