



Tulsiramji Gaikwad-Patil College of Engineering and Technology
 Wardha Road, Nagpur-441 108
NAAC Accredited (A+ Grade) & NBA Accredited
An Autonomous Institute affiliated to RTMNU Nagpur



Third Year (Semester-VI) B.Tech. Electrical Engineering

BEE3611: - Geothermal Energy Utilization

Teaching Scheme

Lectures	4 Hrs/week
Tutorial	0 Hrs/week
Total Credit	4

Examination Scheme

CT-1	15 Marks
CT-2	15 Marks
CA	10 Marks
ESE	60 Marks
Total	100 Marks

Duration of ESE: 03 Hrs 00 Min.

Course Objective:

1	Knowledge regarding energy sources including fossil, nuclear and renewable, and current and future energy conversion technologies.
2	Understand theoretical and practical limits of energy conversion among different forms and corresponding efficiencies.
3	To better understanding of thermodynamics, thermo chemistry and electrochemistry and their applications to energy conversion.

Course Contents

Hours

Unit I	General concept of renewable energy technology, World energy futures for geothermal, geothermal energy sources and their availability –Commercial or conventional energy sources, new trends in renewable energy technologies.	(9)
Unit II	Introduction to Geothermal energy, Important aspects of Geothermal Energy, Structure of Earth's interior, Geothermal system-Hot Spring structure, Geothermal Resources (Hydrothermal, Geopressured, Petro-thermal system, Magma Resources), Advantages and disadvantages of geothermal energy over other energy forms, application of geothermal energy.	(9)
Unit III	Geothermal reservoirs, water-dominated (hot water field, wet steam field), vapor dominated, Underground water, Aquifer, Underground water Vs Aquifer, Categories of Geothermal sites: Hyper Thermal Regions, Semi thermal Regions, Normal Regions, Earth's Thermal Engine Classification of geothermal resources: Hot Dry Rock Systems, Geo pressured Reservoirs, Magma Energy, Hot Dry Rock Fracturing Technique, Estimation of Potential from Dry Rocks, and Estimation of potential from hot aquifers.	(9)
Unit IV	Introduction to Geothermal Resources, Cocept of Geothermal Power Plants (Dry Steam Units, Single-Flashing Units, Dual Flashing Units, Several Flashing Processes: A Useful Theoretical, Binary Units, Hybrid Geothermal-Fossil Power Units), Effects of Impurities in the Geothermal Fluid, Cooling Systems, Geothermal District Heating: An Example of Energy Savings and Environmental Benefit, Environmental Effects	(9)

Unit V	Classification of geothermal power plants, Geothermal systems for electricity generation, Dry steam power plant, Binary cycle (ORC) power plant, Single-flash power plant, Double-flash power plant.	(9)
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Text Books

1	Kriti Yadav , Anirbid Sircar , Apurwa Yadav “Geothermal Energy Utilization, Technology and Financing,” 1st Edition, 2022
2	Carlo Roselli, Maurizio Sasso , “Geothermal Energy Utilization and Technologies”, 2020
3	Mario Fanelli , Mary H. Dickson “ GEOTHERMAL ENERGY UTILIZATION AND TECHNOLOGY”, 1 st edition 2005

Reference Books

1	E Huenges, “Geothermal Energy Systems Exploration, Development, and Utilization,” 2 nd edition 19 April 2010
2	William E. Glassley, “Geothermal Energy: Renewable Energy and the Environment, Second Edition” 13 October 2014

Useful Links

1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/

	Course Outcomes	CL
BEE3611.1	Understand the world renewable energy scenario and its availability	2
BEE3611.2	Illustrate the parameters and subsystem for geothermal technology	4
BEE3611.3	Analyze the concepts of geothermal power plants and its benefit.	4
BEE3611.4	Determine and understand the hybrid technology with respect to geothermal power plants	3
BEE3611.5	Distinguish various types of geothermal power plants	4


HOD

Department Of Electrical Engineering
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