BMEE326L	Power Plant Engineering	L	T	P	C
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Pre-requisite	**BMEE203L**	**Syllabus version**			
		1.0			

Course Objectives

1. To equip students about the working of various power generation units and steam cycles.
2. To educate the students about the steam generators, combustion and firing methods in order to make the fullest use of thermal power potentialities.
3. Enable the students to understand in detail about nuclear, gas turbine, diesel and renewable power plants, which play an important role in power generation.

Course Outcome

At the end of the course, the student will be able to

1. Demonstrate the various components and layouts of steam power plant.
2. Analyze the different types of steam generators and their subsystems.
3. Analyze the gas turbine, nuclear and diesel power plants.
4. Assess the selection and layout of different renewable power plants.
5. Evaluate the economic aspects of power plant installation and operation.

Module:1	**Introduction to Power Plants**	**4 hours**

Classification power plants - Current scenario of national and global power generation, per capita energy consumption - Energy trilemma index - Climate change - Carbon capture and storage.

Module:2	**Steam Power Plant**	**7 hours**

Site selection, Components and Layouts - Coal handling and preparation - Combustion equipment and firing methods - Mechanical stokers - Pulverized coal firing systems - Cyclone furnace - Ash handling systems- Dust collection - Electrostatic precipitator- Fabric filter and Bag house - Chimney draught systems.

Module:3	**Steam Generators and heat exchangers**	**6 hours**

Vapor power cycles - Steam Generators - Classification of Boilers: Fire tube and Water tube boilers, High pressure and Supercritical boilers - Positive circulation boilers - Fluidized bed boiler - Waste heat recovery boiler.

Heat Exchangers: Feed water heaters - Super heaters - Reheater - Economizer - Condenser - Cooling tower.

Module:4	**Nuclear Power Plants**	**7 hours**

Site selection, Principles of nuclear energy - Energy from nuclear reactions - Indian nuclear programme. Components and Layout, Thermal reactors: Boiling water reactor - Pressurized water reactor- Pressurized Heavy Water Reactor - Gas cooled reactor - High temperature gas cooled reactor - Fast breeder reactor -reactor materials - Radiation shielding- Nuclear waste disposal.

Module:5	**Gas Turbine and Diesel Power Plants**	**8 hours**

Gas Turbine plant: Site selection, Components and Layout, Open and closed cycles - Intercooling - Reheating and Regenerating - Combined cycle power plant, Cogeneration plants.

Diesel power plant: Site selection, Components and Layout, Subsystems: starting and stopping, air intake and exhaust systems - Lubricating and Cooling systems - Constraints in operating range.

Module:6	**Renewable power plants**	**6 hours**

Hydroelectric power plant: Site selection, Components and Layout, Estimation of power potential, Classification of Hydro - electric power plants- Selection of turbines- Governing of turbines. Introduction to solar, wind, tidal and geo-thermal power plants.

Module:7	**Economics of Power Plants**	**5 hours**

Terminologies in power plant economics - Load curves - Cost of electric energy generation

-Energy rates - Types of tariffs – Payback period- Affordable and clean energy.			
Module:8	**Contemporary issues**		**2 hours**
	Total Lecture hours:		**45 hours**
Text Books			
1.	El-Wakil M.M, Power Plant Technology, 2017, 1st Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi.		
2.	Nag P.K, Power Plant Engineering: Steam and Nuclear, 2017, 4th Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2017.		
Reference Books			
1.	Hegde R.K, Power Plant Engineering, 2015, 1st edition, Pearson India Education services (P) Ltd., Noida, India.		
Mode of Evaluation: CAT, written assignment, Quiz, FAT.			
Recommended by Board of Studies	09-03-2022		
Approved by Academic Council	No. 65	Date	17-03-2022