GUJARAT TECHNOLOGICAL UNIVERSITY
M.E Semester: 2
Mechanical Engineering (Thermal Engineering)

Subject Name: THERMAL POWER PLANT ENGINEERING

Sr. No.	Course Content
1.	Recent trends in Steam Power Plants, design of combustion chambers, Fluidized bed combustion chambers, burners and selection criteria, combustion calculations, design and selection for economizers, air-preheater, superheater, desuperheaters, and reheaters. Performance testing and maintenance.
2.	Design of Advanced boiler and steam system, heat balance sheet, co-generation and combined cycle, boiler efficiency, thermodynamics and power plant cycle analysis. Power plant layout and selection, Arrangement of units. Advancement in high pressure boilers and miniature boilers.
3.	Classification and comparison of different types of gas turbine power plants, Thermodynamic cycles, Analysis of closed cycle and open cycle gas turbine plants, Methods of improving the thermal efficiency and power output of gas turbine plants.
4.	Different components of gas turbine plants and different arrangements of gas turbine components. Types of combustion chambers used, fuels and fuel handling equipments, Governing of gas turbines. Combined steam and gas turbine plants. Recent developments of gas turbine power plants.
5.	Modern nuclear power plants and their arrangement, types of nuclear furnaces and moderator, heat exchangers, turbines for nuclear power plants. Nuclear waste disposal, Gas disposal system.
6.	Advances in diesel electric power plant, types of engines used, analysis of thermodynamic cycles, supercharging of diesel engine, performance and analysis of diesel power plant, present development in diesel power plant.
7.	Economics Analysis of Power Plant. Cost electric energy, selection of type of generation and generating equipment, performance and operating characteristic, load division and tariff method,

8.	Fluctuating Loads on Power Plants: Introduction, load curves, Different terms and definitions, Effect of variable load on power plant design and operation, Method to meet variable loads.
9.	Peak Load Plants: Requirements, Pump storage power plants, Economical justification of pump storage plant, Their advantages and disadvantages compressed air storage plants, Their advantages and limitation.
10.	Energy conservation and management, distribution of energy consumption, load sharing, need of energy conservation, methods of energy conservation, energy management techniques.

List of Experiments:

1. Case study on selection of size of different elements of steam power plant.
2. Performance and operation methods of in-house (PIET) Power Plant.
3. Experimental performance test on steam power plant: To study boiler operation and calculate boiler capacity, efficiency and all other necessary parameters.
4. Experimental performance test on steam power plant: To study steam turbine operation and calculate steam turbine efficiency, fuel consumption, steam quality, flow rate, condenser effectiveness and all other necessary parameters.
5. Experimental performance test on steam power plant: To calculate dryness fraction of steam, heat balance and energy utilization.
6. Industrial visit of Steam Power Plant, and prepare detail study report.
7. Study of Fluidized bed combustion system and its design.
8. Study of Nuclear Power Plants, properties and reaction of nuclear fuel
9. Study of co-generation and combine cycle.
10. Industrial visit of Nuclear Power Plant, and prepare detail study report.

Reference Books:

1. Black and Vetach, “Power Plant Engineering”, Chapman and Hall, International Thomson Publishing Co., 2001.
2. El, Wakil, ”Power Plant Technology”, McGraw-Hill, 2003.
3. Gebhartt, G. F., ”Steam Power Plant Engineering”, John Wiley & Sons, 2002.
4. Kearton, ”Steam Turbine Theory and Practice”, ELBS, 2001.
5. Burger R., “Cooling Tower Technology”, Chemical Publishing Company
6. Shields, C. D., “Boilers”, McGraw Hill, New York, 2001
7. Babcock-Wilcox manual “Steam”
8. Vandagriff, R.L “Practical guide to boiler systems”, Marcel Dekker, 2000
9. Oliver, K.G “Industrial boiler management, an operations guide, Industrial Press, NewYork. 2002