NIRMA UNIVERSITY

Institute:	**Institute of Technology, School of Technology**
Name of Programme:	**B Tech in Electronics and Instrumentation Engineering**
Semester:	**VII**
Course Code:	4EI103ME25
Course Title:	**Power Plant Automation**
Course Type:	**Department Elective-IV**
Year of Introduction:	**2024-25**

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Course Learning Outcomes (CLOs):

At the end of the course, the students will be able to –

1. describe operational aspects of different power plants (BL2)
2. demonstration various control systems for thermal power plants (BL3)
3. explain various subsystems and health monitoring systems of thermal power plants (BL2)
4. analyse the operation of thermal power plants with an optimization approach. (BL4)

Unit	Contents	Teaching hours (Total 45)
Unit- I	**Introduction** Overview of Power Generation and Distribution, Types of power plants - thermal, hydro, combined cycle, nuclear and other non-conventional power generation, Indian and Global Power generation scenario, Overview of super critical thermal power plant, Economics of Power generation.	09
Unit- II	**Boiler Control** Boiler process, Operation, Drum level control, Fuel-to-Air ratio control, Super-heated steam temperature control, Steam pressure control, Furnace pressure control, Flue gas temperature control, Sequential control operation.	09
Unit- III	**Turbine Supervisory Control** Overview of steam turbine operation, Health monitoring system of turbine, Speed controls of turbine	07
Unit- IV	**Power Plant Subsystem Automation** Coal handling system, Pulverizer and its control, Ash handling system, Electro Static Precipitator (ESP), Performance of ESP, Feed water treatment system	08
Unit- V	**Power Plant Instruments** Flue gas monitoring instruments, Water and steam quality measurement instruments, Smoke detecting instruments	06
Unit- VI	**Plant Optimization** Performance measurement of power plant, Excess O2 optimization, Water side optimization, Performance optimization with multivariable control.	06

Self Study:
The self -study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial:
Tutorial work will be based on above syllabus with minimum 10 tutorials to be incorporated.

Suggested Reading:

1. Bela G. Liptak , *Instrumentation Engg's Handbook on, Process Control*, CRC Press
2. Max Jervis, *Power Station Instrumentation*, Butterworth-Heinemann Publication
3. Arora and Domkundwar, *Power Plant Engineering*, Dhanpatrai and Sons Publication
4. Krishnaswamy K, Bala M, P*ower Plant Instrumentation*, PHI Publication

Suggested List of Tutorial :

Sr. No.	Title
1.	Implementation of Piping and Instrumentation drawing for boiler Control
2.	Statistical analysis and comparison of different renewable and non-renewable power plants in terms of their contribution in Indian and Global energy demands
3.	Implementation of Piping and Instrumentation drawing for Turbine Control
4.	Design of Process Flow diagram for Thermal Power Plant
5.	Summarize the understanding from annual report of any thermal power plant
6.	Analyse the thermal power power plant with reference to its impact on the environment and possible remedies
7.	Design the Process Flow diagram for Coal handling system
8.	Study available Burner Management System from ABB and Rockwell Automation. Compare them in detail
9.	Study environment regulations designed by Indian government for thermal power plan
10.	Design the Process Flow diagram for Feed water treatment system