

**B.E Semester: V Mechanical Engineering**

**Subject Name: Thermal Power Plant Engineering**

**A. Course Objective**

- To present a problem oriented in depth knowledge of Thermal Power Plant Engineering.
- To address the underlying concepts, methods and application of different Thermal Power Plant Engineering Concepts.

**B. Teaching / Examination Scheme**

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
CODE	NAME	L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
		Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
ME506	Thermal Power Plant Engineering	3	0	0	3	3	70	30	20	-	120	

**C. Detailed Syllabus**

**1. Thermal Power Plant:**

General layout of modern thermal power plant, Site selection, Presents status of power generation in India.

**2. High Pressure Boilers & Accessories:**

Unique features and advantages of high pressure boilers, critical and supercritical, Supercharged and fluidized bed combustion boiler. Different types of super-heaters, Re-heaters, economizers, Air pre-heaters, Methods of superheat control, Corrosion in boilers and its prevention.

**3. Coal & Ash Handling Systems:**

Coal handling storage of coal, Burning systems, Types of stokers their working, Pulverized fuel handling systems, Unit and central systems, Pulverized mills- ball mill, Bowl mill, Ball & race mill, Impact or hammer mill, Pulverized coal burners, Oil burners. Necessity of ash disposal with respect to state and central pollution control rules, Mechanical, Hydraulic, pneumatic and steam jet ash handling system, Dust collection and its disposal, Mechanical dust collector, Electrostatic precipitator.

**4. Draught System:**

Natural draught- estimation of height of chimney, Maximum discharge, Condition, Forced, Induced and balanced draught, Power requirement by fans.

**5. Condensers and Cooling Towers:**

Types of condensers, sources of air in condenser, Effects of air leakage, Methods of obtaining maximum vacuum in condenser, Dalton's law of partial pressure, vacuum & condenser efficiency, Mass of cooling water required, Air pump-Edward air pump. Necessity of cooling ponds and cooling towers, Condenser water cooling systems, Types of cooling towers, cooling ponds.

**6. Feed Water Treatment:**

Necessity of feed water treatment, Different impurities found in feed water, Effect of impurities, pH & its role in corrosion and scale formation, Internal & external water treatment systems- hot lime soda process, Zeolite ion exchange process, Demineralization plants, Reverse osmosis process, Sea water treatment using reverse osmosis, De-aeration with respect to state and central pollution control rules.

**7. Diesel Power Plant:**

Essential components of diesel power plant, Different systems like fuel supply system, Engine cooling system, Engine lubrication system, Exhaust system, Engine starting and stopping system.

**8. Nuclear Power Plant:**

Nuclear fusion and fission, Chain reaction, Nuclear fuels, Components of nuclear reactor, Classification of reactors, Pressurized water reactor, Boiling water reactor, Gas cooled reactor, CANDU reactor, Fast breeder reactor, Nuclear waste and its disposal, Nuclear power plants in India.

**9. Pollution and its Control:**

Central and state pollution control rules and data, Air pollution by thermal power plants and its control, Effect of different pollutants on human health, Water pollution by thermal power plants and its control, Acid rains.

**10. Economics of Power Generation:**

Load curves, Load duration curves, Connected load, Maximum load, Peak load, base load and peak load power plants, Load factor, Plant capacity factor, Plant use factor, Demand factor, Diversity factor, Cost of power plant, Performance and operating characteristics of power plant, Tariff for electric energy.

**D. Lesson planning**

<b>SR.NO</b>	<b>DATE/WEEK</b>	<b>UNIT NO</b>	<b>%WEIGHTAGE</b>	<b>TOPIC NO</b>
1	1 <sup>ST</sup> , 2 <sup>ND</sup> , 3 <sup>RD</sup>	1,2	20	1,2
2	4 <sup>TH</sup> , 5 <sup>TH</sup> , 6 <sup>TH</sup>	3,4	20	3,4
3	7 <sup>TH</sup> , 8 <sup>TH</sup> , 9 <sup>TH</sup>	5,6	20	5,6
4	10 <sup>TH</sup> , 11 <sup>TH</sup> , 12 <sup>TH</sup>	7,8	20	7,8
5	13 <sup>TH</sup> , 14 <sup>TH</sup> , 15 <sup>TH</sup>	9,10	20	9,10

**E. Instructional Method & Pedagogy**

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
2. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4. One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7. The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.

**F. Students Learning Outcomes**

- The student can identify different areas of Thermal Power Plant Engineering.
- Can find the applications of all the areas in day to day life.

**G. Recommended Demonstrate Materials**

1. Power Plant Engineering, Arora & Domkundwar, Dhanpat Rai & Co. Delhi.
2. Power Plant Engineering, R.K. Rajput, Laxmi Publication, Delhi
3. Power Plant Engineering, A.K. Raja, New Age International, Delhi
4. Power Plant Engineering, Dr. P.C. Sharma, S.K. Kataria & Sons, Delhi
5. Power Plant Engineering, P.K. Nag, Tata McGrahill Co., Delhi
6. Power Plant Engineering, Nagpal, Khanna Publishers, Delhi.
7. Power Plant Engineering, C. Elanchazhian, I.K. International, Delhi