Subject Code: 01ME1505
Subject Name: Power Plant Engineering
B. Tech. Year - III (Semester - 5)

Type of course : Core

Prerequisite : Engineering Thermodynamics, Fluid Mechanics

Rationale : To impart basic knowledge of various types of power plants & components with required equations.

Course Outcome:
After completion of this course, student will be able to

1. Understand basics of power plant including thermodynamic cycles, site selection criteria and modern power plant concept.
2. Understand working of different types of steam generators and different material handling system for power plant.
3. Analyze functioning of condensers and cooling systems.
4. Analyze working and performance parameters of different draught systems.
5. Understand various types of feed water treatment.
6. Understand nuclear power plants with basic physics and new concepts.

Teaching and Examination Scheme :

Teaching Scheme			Credits	Examination Marks					
				Theory Marks			Practical Marks		Total Marks
THEORY	TUTORIAL	PRACTICAL	C	ESE(E)	IA	CSE	Viva (V)	Term Work (TW)	
3	0	2	4	50	30	20	25	25	150

Content :

Sr. No.	Content	Total Hrs.
1	**INTRODUCTION:** Classification of power plant, Thermodynamic cycles related to power plant, Rankine Cycle, General Layout of a modern power plant, site selection criteria, current scenario of power generation in India.	04
2	**STEAM GENERATORS:** Introduction and unique features of high pressure boilers, Advantages of high pressure boilers, construction and working of La-Mont, Loeffler, Benson, Schmidt Hartmann, and Velox Boiler, Boiler Mountings and accessories.	08

3	**Coal and Ash Handling Systems:** Coal storage, Burning systems, Types of stokers and their working, Pulverized fuel handling systems, Pulverized mills, Pulverized coal burners, Oil burners, Necessity of ash disposal, types of ash handling systems, Dust collection and its disposal, Mechanical dust collector.	**10**
4	**CONCEPT OF CONDENSERS AND COOLING TOWERS:** Introduction, types of condensers, Air leakage & its effect on performance, Dalton's law of partial pressure, vacuum & condenser efficiency, requirement of quantity of cooling water, Edward air pump, necessity of cooling towers & ponds and types.	**08**
5	**INTRODUCTION TO DRAUGHT SYSTEM:** Working principle of natural draught & chimney height formula with maximum discharge condition, types of artificial draught systems, and power requirement of blowers.	**04**
6	**FEED WATER TRETMENT:** Requirement of feed water treatment, various impurities & its effects, different types of water treatment processes.	**06**
7	**NUCLEAR POWER PLANTS:** Nuclear fusion and fission, comparison of fusion-fission, nuclear fuels, chain reaction, components of nuclear reactors, pressurized water reactor, boiling water reactor, gas cooled reactor, CANDU reactor, liquid metal cooled reactor, fast breeder reactor, nuclear waste and its disposal, Site selection for nuclear reactor, current scenario of nuclear power generation in India.	**08**

Distribution of Theory Marks

R Level	**U** Level	**A** Level	**N** Level	**E`** Level	**C** Level
10	**20**	**25**	**25**	**10**	**10**

Legends: R: Remember**; U:** Understand**; A:** Apply**; N:** Analyze**; E:** Evaluate**; C**: Create

List of Experiments :

1. To find out efficiency of Rankine cycle.
2. To find the efficiency of boiler by direct method.
3. To find the efficiency of boiler by indirect method.
4. To prepare heat balance sheet for given boiler
5. To find the condenser efficiencies
6. To find the cooling tower efficiencies.
7. To find the efficiency of furnace.
8. To do the energy performance assessment of textile industry.
9. To do the energy performance assessment of pump.
10. To do the energy performance assessment of thermal power station

11 To do the energy performance assessment of steel industry.

12 To do the energy performance assessment of cement industry.

Reference books :

1. Power Plant Engineering, P.K. Nag, McGraw-Hill Education
2. Power Plant Technology, M.M. El-Wakil, McGraw-Hill Education
3. Thermal Engineering, R.K.Rajput, Laxmi Publication
4. Gas Turbines by V Ganeshan, McGraw Hill Education
5. Steam Turbine Theory and Practice, William J. Kearton, CBS Publication
6. Veatch & Black, "Power Plant Engineering", CBS Publishers & Distributors New Delhi

List of Open Base Software / learning website :

1. http://nptel.ac.in/
2. https://en.wikipedia.org/wiki/Plasma_(physics)
3. https://en.wikipedia.org/wiki/Tokamak
4. https://www.wartsila.com/
5. http://www.oegindia.com/
6. https://aerb.gov.in/index.php/english/
7. http://www.vitkovice.cz/