GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: PG

Branch: Mechanical Engineering (Thermal Engineering)

Course / Subject Code :ME01083031

Course / Subject Name : Thermal and Nuclear Power Plants

w. e. f. Academic Year:	2024-25
Semester:	1st Semester
Category of the Course:	PEC

Prerequisite:	Nil
Rationale:	The course is prepared to provide the detailed insight of Thermal & Nuclear power plants

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Make use of thermal analysis of steam power plants	Apply
2	Apply thermal analysis of various gas turbine cycles	Apply
3	Explain components of different types of nuclear power plants and demonstrate their safety	Understand
4	Make use of different power plant instructions	Apply

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction:** Types of Power plant, thermal & nuclear power plants in India, comparison of thermal & nuclear power plants, Layout of thermal & nuclear power plants, recent developments in power generation	3	7

2.	**Steam power plant**: Major elements and working of steam power plant, thermodynamic analysis of simple Rankine cycle, performance enhancement methods; regeneration (up to 3-stages), reheat, thermal analysis of steam condenser & cooling tower, recent development and advancement in steam power plant engineering, maintenance as well as safety measure of components of steam power plant.	13	29
3.	**Gas turbine power plant:** Elements of gas turbine power plant, thermal analysis of simple gas turbine power plant, performance enhancement methods; intercooling, reheat & regeneration, cogeneration, combined cycle power plant, waste heat recovery systems, maintenance as well as safety measure of components of gas turbine power plant, the concept of fluidized bed combustion and recent developments.	13	29
4.	**Nuclear power plant:** Nuclear reaction, Nuclear Reactor, Classifications, Types of reactors, Site Selection, Method of enriching uranium, Nuclear Power Plant Safety, Bi-Product of nuclear power generation, Nuclear power plant in India, three stage program, Future of nuclear power.	10	22
5.	**Power plant instrumentations:** Pressure measuring instruments, Temperature measurement and Flow Measurement, pollution types, methods of control, factors affecting the economics, loading factors, utilization factor, performance and operating characteristics of power plant.	6	13
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
-	**20**	**80**	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Power Plant Engineering by P.K. Nag, McGraw-Hill, New Delhi
2. Steam Turbine Theory and Practice by W. J. Kearton, CBS Publishers
3. Power Plant Engineering by R. K. Rajput, Lakshmi Publications

4. Power Plant Engineering by P. C. Sharma, / Kataria Publications
5. Power Plant Technology by El-Wakil, McGraw-Hill , New Delhi

(b) Open-source software and website:

1.
2.

Suggested Course Practical List:

1. During the semester students must visit steam turbine power plant, gas turbine power plant and nuclear power plant and prepare the reports of their outcomes.
2. Assignments based on the thermal analysis of various power plant cycles

List of Laboratory/Learning Resources Required:

Suggested Project List:

Suggested Activities for Students: Students are required to download 3-5 research papers from reputed international journals on the recent advancement in the areas of thermal and nuclear power plants. They need to go through the same and prepare a review for the research papers. The review should have three parts: Summary, Critical Evaluation and Creative synthesize

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