Syllabus for Master of Technology
Department of Mechanical Engineering

Subject Code: 01TH0304

Subject Name: Exergy Analysis of Thermal System

MTech. IInd Year Semester: III

Type of course: Post graduation

Prerequisite: Nil

Rationale: The course is design to impart detailed study of exergy analysis of various thermal systems and exergy-economics

Course Outcome:

After learning the course, the students will be competent to,

1. To make calculations for heat engines, refrigeration system and heat pump in terms of exergy and lost work.
2. To examine various thermal process with exergy view point.
3. To assess exergy analysis for various power plant cycles.
4. To apply exergy analysis for refrigeration system
5. To compute exergy-economics costing of thermal components.

Teaching and Examination Scheme:

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

Content:

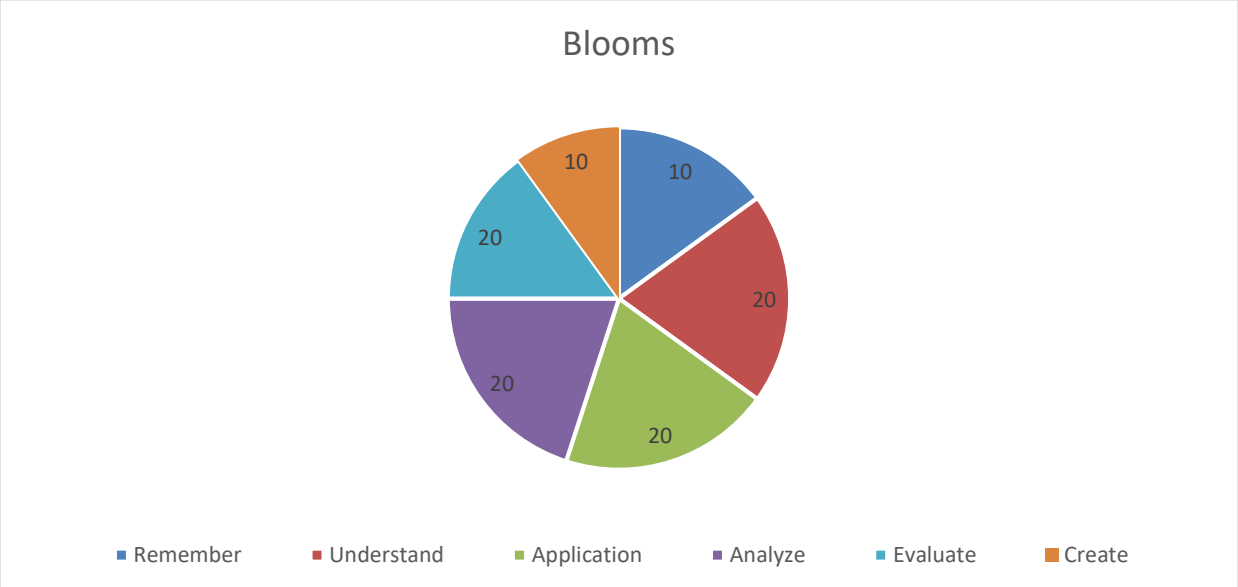
Sr. No.	Content	Total Hrs.
1	**Exergy Destruction:** Lost available work referred to heat engine cycle, refrigeration cycle, heat pump cycle, non-flow and steady flow processes, Mechanism of exergy destruction, modified Gouy-Stodola theorem, concept of effective temperature	**05**

2	**Exergy Analysis of Simple Processes:** Mixing and separation process of fluids of different temperature, heat transfer across a temperature difference, expansion and compression process, combustion process	**09**
3	**Exergy Analysis of Power Plant Cycles:** Maximum power subject to size constraint with fixed heat input and its application to Brayton cycle, Steam turbine power plants: External and internal irreversibility, superheater, reheater, vacuum condenser, regenerative feed water heating, combined feed water heating and reheating Gas turbine power plant: External and internal irreversibility, regeneration, reheater, and intercooler, combined steam and gas turbine power plant	**14**
4	**Exergy analysis of Refrigeration cycle:** Joule-Thomson Expansion, Work-Producing Expansion, Brayton Cycle, Optimal Intermediate Cooling, Exergy analysis of Air- conditioning applications: Mixtures of air and water vapour, total flow exergy of humid air and liquid water, Evaporative cooling process and other aspects	**08**
5	**Creep and Damping - Exergy-economic Analysis:** Fundamental of exergy-economics, exergy costing of different thermal components: steam or gas turbine, boiler, cogeneration system	**06**

Distribution of Theory Marks

R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	20	20	10

Legends: R: Remembrance**; U:** Understanding**; A:** Application, **N:** Analyse**, E:** Evaluate **C**: Create



Reference books:

1. Design and optimization of thermal systems, Y Jaluria, McGraw Hill.
2. Advanced Engineering Thermodynamics by Adrian Bejan, John Wiley & Sons, Inc.
3. The Exergy Method of Thermal Plant Analysis by T J Kotas, Krieger Publishing Company
4. Thermal Design and Optimization by Adrian Bejan, George Tsatsaronis, Michael Moran, John Wiley & Sons, Inc.
5. Advance Thermodynamics for Engineers by Winterbore D E, Arnold Publication
6. Advanced Thermodynamics for Engineers by Kenneth Wark, McGraw Hill Publishing Co. Ltd.
7. Fundamentals of Engineering Thermodynamics by Michel J Moran, Howard N Shapiro, Daisie D Boettner, Margaret B Bailey, John Wiley & Sons, Inc.

List of Open BaseSoftware/learning website:

1. Students can refer to video lectures available on the websites including NPTEL.
2. Students can refer to the CDs which are available with some reference books for the solution of problems using software/spreadsheets.