

Semester:	6				
Course Code:	ME5040				
Course Name:	Thermal System Design				
Credits Value:	3 (Notional hours: 150)				
Pre-requisites:	ME3040				
Core/ Optional:	Optional				
Hourly Breakdown	Lectures (hours)	Tutorials (hours)	Practical classes (hours)	Assignments (hours)	Independent Learning & Assessment (hours)
	10			70	70

Course Aim: This course aims to provide knowledge on the design of thermal systems and planning of complete engineering solutions for applications of steam generation & distribution, industrial refrigeration & air conditioning systems and associated utilities with exposure to identification and use of relevant codes and standards to prepare necessary specifications.

Intended Learning Outcomes:

On successful completion of the course, the students should be able to;

- **conceptualize** a design for thermal systems and develop engineering solution to industry applications involving steam generation, refrigeration and air conditioning applications
- **prepare** appropriate design, **select** suitable components, based on relevant standards, subject to economic, health, safety and hygienic constraints,
- **conduct** design performance evaluations, and basic economic analysis
- **communicate** design solutions effectively

Course Content:

- **Boilers and steam distribution system:** Development of concept of steam distribution system & estimation of capacities based on design guidelines & standards. Hardware & utility selection (boiler, fuel, water supply, water treatment, condensate recovery, piping, thermal insulation, steam traps and other auxiliaries etc) , cost benefit analysis
- **Industrial refrigeration applications:** Selection of system configuration and refrigerant, heat transfer fluid, heat rejection equipment, defrosting method and insulation, primary energy source etc. Environmental, health & safety regulations. Preparation of P&ID diagrams, & evaluation of performance , design commissioning, and economics.
- **Industrial air conditioning applications:** Industrial air conditioning system: Cooling load estimate, design of ducts/heat transfer fluid circuits, selection of appropriate cooling system and distribution/air-handling systems, heat rejection equipment, power supply system, controls strategy, regulations of operation and health & hygiene aspects. Preparation of working drawings,

design commissioning, plant safety, and economics.

Teaching/ Learning Methods:

Classroom lectures, in-class exercises and assignments

Assessment Strategy:

Continuous Assessment 40%	Final Assessment 60%		
Details:	Theory (%)	Practical (%)	Other (%)
Assignments/Quizzes /Presentations 40%			Design report and presentation of solution to a panel 60%

Recommended Reading:

- ASHRAE Standard 15 -2007 - Safety standard for refrigeration systems
- ASHRAE Handbook (4 volumes) - American society of heating, refrigeration and air conditioning engineers