FACULTY OF ENGINEERING & TECHNOLOGY

First Year Master of Engineering

Semester II

Course Code: 102440207

Course Title: Thermal Systems Design

Type of Course: Program Elective III

Course Objectives: To familiarize on design methodologies of thermal systems and facilitate analysis and optimization for performance enhancement.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	40 /16	20/08	60 /24	30/12	150/60

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	THERMAL SYSTEMS Energy systems, heat exchangers – classification, review of different design methodologies, pressure drop analysis, thin fin analysis, fouling, corrosion, and erosion, design and operational issues, exergy analysis, surface comparisons, size and weight relationships.	10
2	MODELLING OF THERMAL SYSTEMS Design of energy systems- mathematical analysis - thermodynamic modeling and analysis of energy conversion equipments - heat exchangers, motors, fans, pumps, compressors, turbines, piping, ducts, etc. and efficiency analysis.	12
3	HEAT TRANSFER ENHANCEMENT TECHNIQUES Flow distribution and header design, reduction of non-uniform heat transfer in heat exchangers, reduction of fouling, role of pitch analysis in a thermal system.	8
4	WASTE HEAT RECOVERY SYSTEMS Sources of waste heat, selection of waste heat recovery technologies and financial considerations, design aspects of waste heat recovery systems.	9
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Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
10%	15%	30%	20%	20%	05%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1	Design of Thermal Systems, Stoecker W G, McGraw Hill, 2011.
2	Developments in the Design of Thermal Systems, Robert F Boehm, Cambridge University Press, 2016.
3	Fundamentals of Heat Exchanger Design, Ramesh K Shah and Dusan P Sekulic, Wiley Publications, 2007.
4	Heat Transfer Enhancement of Heat Exchangers, Sadik Kakac and Hongtanliu, Kluwer academic publishers, 1998.
5	Principles of Enhanced Heat Transfer, Ralph L WebbandNae – Hywn Kim, Taylor and Francis, 2005.
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Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Students able to know the design and operational issues of thermal system.	**25**
CO-2	Students able to understand the modelling of the thermal system.	**35**
CO-3	Students able to perform the enhance heat transfer techniques	**20**
CO-4	Students able to identify the waste heat source and design the waste heat recovery system.	**20**
CO-5	Click or tap here to enter text.	**Click**
CO-6	Click or tap here to enter text.	Click
CO-7	Click or tap here to enter text.	Click
CO-8	Click or tap here to enter text.	Click
CO-9	Click or tap here to enter text.	Click
CO-10	Click or tap here to enter text.	Click

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List of Practicals / Tutorials:

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1	To study thermal aspects of heat exchanger design
2	Design and experimental analysis of double pipe Heat exchanger
3	To study about basic design methodologies and fouling of Heat exchangers
4	Study of Tinkers model & TEMA standards
5	Study of Bell Deware's method for shell and tube type heat exchanger design
6	Analysis and design regenerative heat exchanger
7	Design of compact heat exchanger
8	Design and experimental analysis of plate type heat exchanger
9	To study about Heat exchange networking
10	To study about various heat recovery systems
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Supplementary learning Material:	
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Curriculum Revision:	
Version:	**1**
Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22

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