

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Full Time				
Subject Code & Name		Instructions Hours per Week			Credits			
DTR1E4 Thermal Systems : Simulation and Design		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

COURSE CONTENTS

Objective of the Subject:

The basic objective of the subject is to have goal of achieving a workable system and of designing an optimum system. The possibility of optimization represents one of the few facets of this subject.

Pre requisites: Thermodynamics, Heat & Mass Transfer.

UNIT- 1

Designing a Workable System and its Economics:

Steps in Arriving at a Workable System, Creativity in Concept Selection, Design of any Thermal Process Plant, Preliminaries to the Study of Optimization.

UNIT- 2

Dynamic Behaviour of Thermal Systems:

Dynamic Analysis, One Dynamic Element in a Steady State Simulation, Laplace Transformers, Inversion of Laplace Transforms, Feedback Control Loops, Time Constants Blocks, Cascaded Time Constant Blocks, Stability Analysis..

UNIT- 3

Modelling Thermal Equipment:

Using Physical Insight, Selecting vs Simulating a Heat Exchanger, Evaporators and Condensers, Condensation of a Binary Mixture, Overview of Search Methods, Assessment of Single Variable Searches.

UNIT-4

System Simulation:

Description of System Simulation, Uses of Simulation, Information Flow Diagrams, Sequential and Simultaneous Calculations, Taylor Series Expansion, Newton Raphson Method with Multiple Equations .

UNIT- 5

Optimization:

Levels of Optimization, Mathematical Representation of Optimization Problems, Linear Programming, Setting up the Mathematical Statement, Calculus Methods of Optimization, Expansion of Lagrange Multiplier Equations, Unconstrained Optimization.

BOOKS RECOMMENDED

- [1] Cengel YA., *Heat Transfer-A Practical Approach*, Tata McGraw Hill, New Delhi 2e,2002.
- [2] Stoecker, WF. *Design of Thermal Systems*, McGraw Hill International Editions, New Delhi, 2007
- [3] Woodson, TT. *Introduction to Engineering Design*, McGraw Hill, New York, 1996.
- [4] Rudd, DF. *Strategy of Process Design*, McGraw Hill, New York, 1996