PCH233 SELECTED TOPICS IN HEAT TRANSFER

L	T	P	Cr
3	1	0	3.5

Course Objective:

To learn the basics and advanced concepts of heat transfer and design methodologies involved in various types of heat transfer devices.

Shell-and-Tube Heat Exchangers: Classification, Design methodology, TEMA standards, Mechanical turbulators.

Plate Heat Exchangers: Introduction, Classification, Types of corrugations, Advantages over conventional heat exchangers, Design methodology.

Reactor Heating and Cooling Systems: Time required for heating and cooling of agitated batch reactors, Helical cooling coils, Jacketed vessels.

Cross Flow Compact Heat Exchangers: Classification, Types of fins, Tube-fin and plate-fin heat exchangers, Limitations, Design methodology.

Advanced Thermal Systems: Heat Pipes: Classification, Applications, Limitations, Design methodology, Micro channels**:** Applications, Advantages, Nanofluids in thermal systems.

Computational Fluid Dynamics: Applications of CFD in heat transfer systems design.

Course learning outcomes (CLOs):

The students will be able to

1. understand various types of heat transfer processes and devices
2. select and analyze the heat transfer device
3. solve the problems of heat transfer related to nano-fluids, micro-channels and heat pipes
4. use software tools for solving heat transfer problems

Recommended Books:

1. *Saunders E.A.D., Heat Exchangers: Selection, Design and Construction, Longman Scientific and Technical (1988).*
2. *Kakaç, S., and Liu, H., Heat Exchangers: Selection, Rating, and Thermal Design, CRC Press (2002).*
3. *Sinnott, R.K., Coulson, J.M., and Richardson, J.F., Chemical Engineering Design, Butterworth-Heinemann (2005).*
4. *Shah, R.K., Subbarao, E.C., andMashelkar, R.A., Heat Transfer Equipment Design, Taylor & Francis (1988).*
5. *Das, S.K., Choi, S.U., Yu, W., and Pradeep, T., Nanofluids: Science and Technology, Wiley & Sons (2007).*
6. *Anderson, D.A., Introduction to Computational Fluid Dynamics, Cambridge University Press (2005).*

Evaluation Scheme:

S.No.	Evaluation Elements	Weightage (%)
1.	MST	30
2.	EST	45
3.	Sessional (may include Assignments/Projects/Tutorials/Quizes/Lab Evaluations)	25