



ديبلوم تطبيقات التحكم الأوتوماتيكي في نظم القوى الميكانيكية

MEP 590 Heat and Mass Transfer

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مق 590 إنتقال الحرارة وإنتقال الكتلة:

إنتقال الحرارة بالتوصيل، إنتقال الحرارة بالحمل، إنتقال الحرارة بالإشعاع، إنتقال الحرارة تحت ظروف التكثيف والغليان، المبادلات الحرارية، إنتقال الكتلة.

What do we have in the Heat and Mass Transfer Course?

MEP 590 - Heat and Mass Transfer:

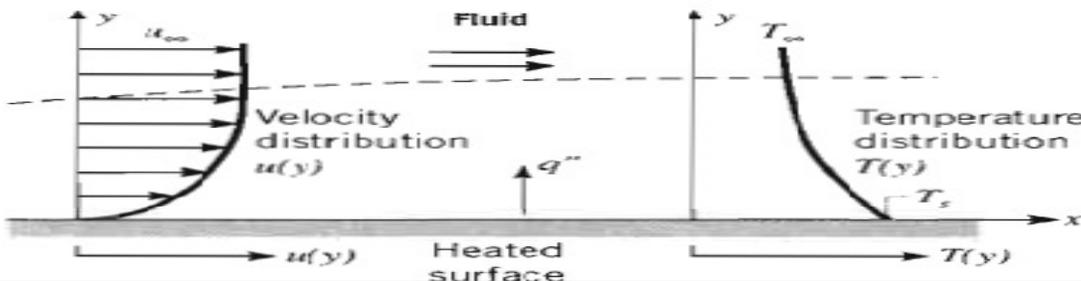
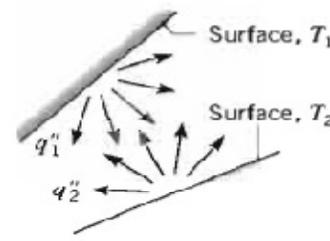
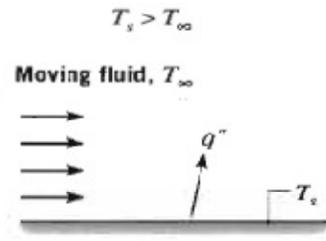
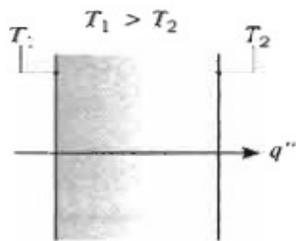
Heat transfer by conduction – Heat transfer by convection – Heat transfer by radiation – Heat transfer during conditions of Boiling and Condensation - Heat exchangers – Mass Transfer.

Contents

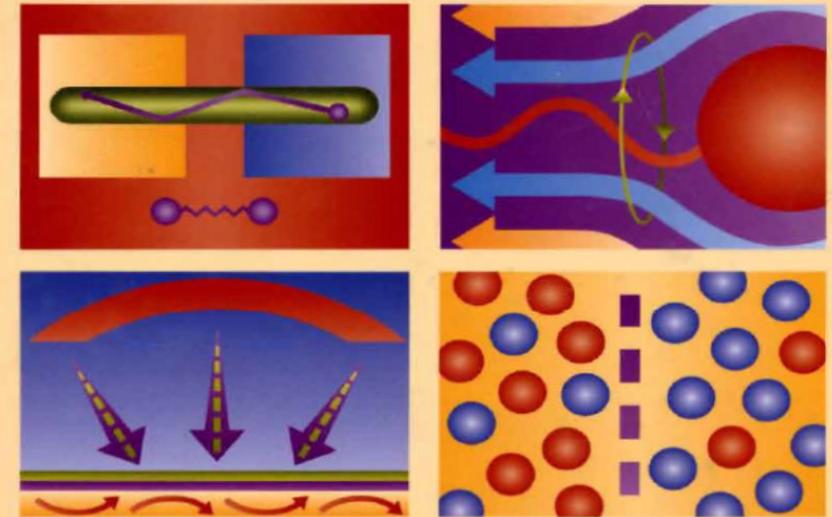
1. Introduction
2. Steady one-dimensional heat conduction
3. Heat transfer by convection
4. Heat transfer by radiation

References

1. "Heat Transfer" by J.P. Holman
2. "Introduction to Heat Transfer" by F.P. Incropera
3. "Principles of Heat Transfer" by F. Kreith



Fundamentals of Heat and Mass Transfer



Course Specifications & Basic Information

1. Title:	Heat and Mass Transfer			Code:MEP590
2.Credit hrs per week	Lectures= 3 hours per week	Tutorial= 0.0	Practical= 0.0	Total=3 Cr.Hrs

B- Professional Information

1. Course description: Overall Aims:

This is one elective course of the 4 elective courses requirements of the Diploma. It is designed to review the essentials of Heat and Mass Transfer processes in many important applications of mechanical power systems. It is designed to enhance skills and give participants a broad based understanding of the most important concepts of Heat and Mass transfer and thermo-fluid processes in practical automatic control systems. The course includes large number of practical examples and problems for Heat and Mass Transfer systems and processes.

Course overall aims is to review various definitions, basics, and conservation equations of different types of applications of Heat and Mass Transfer processes.

-To study relation between heat transfer processes and thermodynamic processes.

-To examine different modes of heat transfer and their physical origin.

-To study, analyze, and examine Steady 1-D conduction, uniform & non-uniform thermal conductivity, heat sources, and extended surfaces.

-To study, analyze, and examine Transient 1-D conduction covering: lumped capacitance method and Heizer charts.

-To study, analyze, and examine Different free convection processes and problems involving horizontal cylinders, horizontal plates, spheres, vertical walls and vertical cylinders.

-To study, analyze, and examine Different forced convection problems involving flow across single cylinder, flow across single sphere, flow across tube banks & internal flow through tubes.

2. Intended Learning Outcomes of Course (ILOs):

a) Knowledge and Understanding:

Having successfully completed this course, the post-graduate student should have knowledge and understanding of:

- Basics, various definitions & terminologies associated with Heat and Mass Transfer processes.

- Relation between heat transfer processes and thermodynamic processes.

- Different modes of heat transfer and their physical origin.

- Steady 1-D conduction, uniform and non-uniform thermal conductivity, heat sources, and extended surfaces.

- Transient 1-D conduction covering: lumped capacitance method and Heizer charts.

- Different heat transfer processes involving free convection processes and problems involving horizontal cylinders, horizontal plates, spheres, vertical walls and vertical cylinders.

- Different forced convection problems involving flow across single cylinder, flow across single sphere, flow across tube banks & internal flow through tubes.

- Multi-mode heat transfer problems and basic types and performance of heat exchangers.

b) Intellectual Skills:

Having successfully completed this course, the student should have the ability to do:

- Select and apply appropriate technical and optimum method in doing engineering design and analysis of automatic control problems.
- Searching for scientific information and adopting self-learning capabilities.
- Analyze and compare the component effects, performance, and efficiency of different types of Heat and Mass Transfer systems.
- Compare between various types of Heat and Mass Transfer processes, components, and systems.
- Select and apply appropriate Heat and Mass Transfer processes, components to design, model, analyze, and solve automatic control problems.

c) Professional and Practical Skills:

Having successfully completed this course, the student should have the ability to do:

- Identify several types of Heat and Mass Transfer control problems which are essential for design and operation of mechanical power systems and energy transfer processes.
- Perform professional design & modelling for different Heat & Mass Transfer control systems.
- Suggest possible alternative solutions for various types Heat and Mass Transfer components and parts.
- Diagnose efficiency and performance of different types of Heat and Mass Transfer systems.

d) General and Transferable Skills:

Having successfully completed this course, the student should have the ability to do:

- Perform engineering calculations, draw feed-back control circuits, block diagrams, graphical presentation of experimental data, and perform data-regression analysis.
- Transfer knowledge, Work in group, & Communicate in written & oral forms, in English.
- Use IT& evolutionary technological tools& PC applications (Excel, Mat lab, Virtual labs, .etc).
- Prepare & write reports, Manipulate & sort data, Think logically, and continuous self-E-learning.
- Identify practical problems, compare between different technologies for measurement systems.
- Organise & manage time & resources effectively; for short-term and longer-term commitments.