Convective Heat and Mass Transfer

Swayam Prabha Course Code – M83

PROFESSOR'S NAME	Prof. A.W. Date
DEPARTMENT	Department ofMechanical Engineering
INSTITUTE	Indian Institute of Technology Bombay
COURSE OUTLINE	This course assumes that the students have undergone UG courses in Engineering Mathematics, Thermodynamics, Heat Transfer and Fluid Mechanics and are familiar with the use of experimentally derived CORRELATIONS for estimating heat/mass transfer coefficient in a variety of flow situations. The purpose of this course is to justify the basis and the form of these correlations on the basis of fundamental transport laws governing heat/mass transfer. The treatment is highly mathematical and, through assignments, students are expected to formulate and solve problems to derive expressions for the heat/mass transfer coefficient in different situations. The course will interest students wishing to embark on a research career in heat/mass transfer.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1.	L1	Introduction to Convective Heat and Mass Transfer
2.	L2	Flow Classifications
3.	L3	Laws of Convection
4.	L4	Scalar Transport Equations
5.	L5	Laminar Boundary Layers
6.	L6	Similarity Method
7.	L7	Similaity Solution to Velocity BL
8.	L8	Similaity Solution to Temperature BL - I

9.	**L9**	Similaity Solution to Temperature BL - II
10.	**L10**	Integral Equations of BL
11.	**L11**	Integral Solutions to Laminar Velocity BL
12.	**L12**	Integral Solutions to Laminar Velocity BL
13.	**L13**	Superposition Theory and Application
14.	**L14**	Laminar Internal Flows
15.	**L15**	Fully-Developed Laminar Flows - I
16.	**L16**	Fully-Developed Laminar Flows - II
17.	**L17**	Fully-Developed Laminar Flows Heat Transfer - I
18.	**L18**	Fully-Developed Laminar Flows Heat Transfer - II
19.	**L19**	Laminar Developing Heat Transfer
20.	**L20**	Superposition Technique
21.	**L21**	Nature of Turbulent Flows
22.	**L22**	Sustaining Mechanism of Turbulence - I
23.	**L23**	Sustaining Mechanism of Turbulence - I
24.	**L24**	Sustaining Mechanism of Turbulence - II
25.	**L25**	Near-Wall Turbulent Flows - I
26.	**L26**	Near-Wall Turbulent Flows - II
27.	**L27**	Turbulence Models - I
28.	**L28**	Turbulence Models - II
29.	**L29**	Turbulence Models - III
30.	**L30**	Prediction of Turbulent Flows
31.	**L31**	Prediction of Turbulent Heat Transfer
32.	**L32**	Convective Mass Transfer
33.	**L33**	Stefan Flow Model
34.	**L34**	Couette Flow Model
35.	**L35**	Reynolds Flow Model
36.	**L36**	Boundary Layer Flow Model

37.	**L37**	Evaluation of g and Nw
38.	**L38**	Di ffusion Mass Transfer Problems
39.	**L39**	CONV- MT Couette Flow Model
40.	**L40**	CONV MT Reynolds Flow Model - I
41.	**L41**	CONV MT Reynolds Flow Model - II
42.	**L42**	Natural Convection BLs
43.	**L43**	Diffusion Jet Flames

List of reference material/ books:

Kays W M and Crawford M E, "Convective Heat and Mass Transfer",McGraw Hill Int Edition, 3rd edition, 1993.

Spalding D B, "Introduction to Convective Mass Transfer", McGraw Hill, 1963.

Bird R. B., Stewart W. E. and Lightfoot E. N., " Transport Phenomena ", John Wiley and sons, Inc., 1960.

Schlichting H., " Boundary Layer Theory ", Sixth edition, McGraw Hill , 1968.

Name and contact details of two referees for the course: