VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Department of Metallurgy& Materials Engineering

Lecture Plan- Transport phenomena

Subject Name : Transport phenomena

Credits : 3-1-0-4

Prerequisite : Basic Engineering Mathematics

Department : Metallurgy & Materials Engineering

Session : 2016-17 (Even Semester)

Level : Undergraduate (IV-Semester)

Course Instructor : Nilakantha Sahu

Category : Compulsory course for all B. Tech IV Semester students of MME Department.

Class Schedule			
Monday – B321	Wednesday – B321	Thursday– B321	Friday – B321
8:50-9.00 AM	8:00-8:50 AM	12:10-01:00 AM	11:20-12:10 AM

Marks Distribution		
End Term	Mid Term	Assignments + Class Test
70	**20**	**10**
Total -100 Marks		

Required Text book

1. F.P. Incropera, D. P. Dewitt, T. L. Bergman and A. S. Lavine, Fundamentals of Heat and Mass Transfer, Wiley.
2. H.S. Ray, Kinetics of Metallurgical Reactions.
3. F.M. White, Fluid Mechanics

COURSE CONTENTS

Sl. No	TOPIC	HOURS
1.	Fluid Flow: Classification of fluids	1
2.	Energy balance	2
3.	Laminar and Turbulent flows	1
4.	Flow through pipes and ducts	2
5.	Flow measurement	1
6.	Application of dimensional analysis of fluid flow	2
7.	Concept of boundary layer	1
8.	molecular of Knudsen flow, etc. as in problems and exercises	1
9.	CLASS TEST-1	1
10.	Heat Transfer I: Steady state and Transient conduction in solids	1
11.	One dimensional steady state problems of heat flow through composite walls Cylinder and Spheres	2
12.	Unsteady conduction in one dimensional system.	1
13.	Use of Heisler charts and applications	1
14.	Convective heat transfer	1
15.	equation of energy	1
16.	free and forced convections	1
17.	CLASS TEST-2	1
18.	Radiation, Nature of thermal radiation	1
19.	Black and Grey bodies	1
20.	Stefan and Boltzmann law, Kirchhoff's laws	2
21.	Intensity of radiation, lamberts law	1
22.	View factor	1
23.	Heat transfer between two black walls in an enclosure.	1

	Combined effect of convection, conduction and radiation	1
24.	Overall heat transfer coefficient. Example problems and exercises on systems of steady heat flow important in Metallurgy	1
25.	CLASS TEST-3	1
26.	Mass Transfer and Kinetics: Importance in Heterogeneous metallurgical systems of reactions	1
27.	Steady state one dimensional mass diffusion of component through stationary media	1
28.	Convective mass transfer in fluids, concept of concentration boundary layer	1
29.	Mass transfer coefficient.Heterogeneous reactions of metallurgical importance,	1
30.	their rate controlling steps	1
31.	Discussion of the following examples from metallurgical systems: Nucleation and growth and bubble formation phenomenon	1
32.	Interfacial reaction	1
33.	Carbon gasification by CO_2, slag-metal reaction at the interface	1
34.	Topo-chemical model of gas-solid reaction	1
35.	CLASS TEST -4	1

Note for students:

1. This is the syllabus; I planned for the "Transport phenomena" course of Session 2016-17 (Even semester). If you have any query/suggestions mail me on nilakantha.iitr@gmail.com
2. Our course includes tutorials (from every chapter) and Class test.
3. By end of this course student must have 75% attendance, to eligible for the end semester examination.