Chemical and Biochemical Engineering

Semester VII								
S.No	Course Code	Course Name	L	Т	P	C		
1		HSS Elective	3	0	0	6		
2		Institute Elective-I	3	0	0	6		
3		Institute Elective-II	3	0	0	6		
4		Programme elective-V/ BTP-I	3	0	0	6		
5		Programme elective-VI	3	0	0	6		
6	CL 402	Advanced Transport phenomena	3	0	0	6		
		Total Credits				24		

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1	Title of the course	Advanced Transport phenomena			
1	(L-T-P-C)	(3-0-0-6)			
2	Pre-requisite courses(s)				
3	Course content	Introduction: Review of Transport Equations, Scaling and Ordering analysis, Asymptotic solutions. Exact solutions: Pul-satile flow in circular tube, Creeping flows and stream function solutions. Motion of deformable and slender bodies: Condi-tions at a deformable interface, Creeping flow past a drop, Marangoni E ects, Flows past Sphere and Oblate Solid bodies, Slender-Body Theory. Asymptotic Approximations for simple flows: Pulsatile flow limiting cases, Motion of fluid through curved tube, Bubble growth in Quiescent fluid. Thin films and Lubrication: Eccentric Couette cylinder, Lubrication theory, Slider block, Cylinder and Plane. Convective Heat and Mass transfer: Heat transfer from sphere (Pe << 1) in uniform and shear flow, Low Re expansion for Pe << 1, Pe >> 1 for low Re. Mass transfer from a Drop Laminar Boundary Layer Theory: Review of Boundary Layer Equations and Solution, Boundary layer separation, Approximate method to estimate shear stresses, Spherical bubble, Limiting cases of Thermal boundary layers. Natural convection: Boussines Equations, Combined forced and free convection, The Raleigh-Benard Problem.			
4	Texts/References	L. G. Leal, Laminar Flow and Convective Transport Processes, Butterworth-Heinemann, 1992.			