Semester VII						
Sr No	**Course Code**	**Course Name**	**L**	**T**	**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

1	**Title of the course (L-T-P-C)**	**Advanced Transport phenomena (3-0-0-6)**
2	**Pre-requisite courses(s)**	**Reaction Engineering**
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.