COMPUTATIONAL FLUID DYNAMICS LAB

Course Code: 15ME2319	**L**	**P**	**C**
	0	**3**	**2**

Pre requisites: Theory courses in Heat Transfer and Numerical Methods

Course Outcomes: At the end of the course, the student will be able to

CO1: solve steady state and transient heat conduction problems using a software package

CO2: solve heat transfer problems in fins and duct low using a CFD software

CO3: analyse natural convection problems using a CFD package

CO4: solve diffusion problems using FVM

CO5: apply central and upwind methods to convection-diffusion problems

LIST OF NUMERICAL PROBLEMS:

Any TEN numerical problems.

Problems 1 to 5: Obtain results a commercial CFD software, such as COMSOL or FLUENT

Problems 6 to 11: To be solved using Finite Volume method and by writing a computer source code

1. Steady state one-dimensional heat conduction in a composite wall
2. Transient one dimensional heat conduction in a slab
3. Heat transfer from a rectangular fin
4. Laminar flow and heat transfer in a circular pipe
5. Natural convection from a vertical plate
6. Heat diffusion in an insulated rod with internal heat source
7. Heat transfer in a cylindrical fin, and comparison with exact solution
8. Use of central differencing scheme to convection-diffusion problem at low velocity

9. Use of upwind differencing scheme to convection-diffusion problem at high velocity
10. Gauss elimination to solve a set of three algebraic equations
11. Explicit method to solve a transient 1-D heat conduction equation