Heat Transfer (CH21004)

Assignment - 1

Due date: 23rd January, 2020

Each problem carries equal marks Full Marks - 20

1. Derive the heat transfer correlation (Nusselt number correlation) for a flat plate with constant wall temperature, laminar flow and low Prandtl number (Pr << 1). (Hint: Since Pr <<1, the hydrodynamic boundary layer is very thin in compared to thermal boundary layer. Hence, it may be assumed that the velocity in the entire thermal boundary layer is free stream velocity)
2. Obtain Nusselt number correlation by using dimensional analysis for an isothermal flat plate and laminar flow.
3. Re-derive the expression for momentum boundary layer thickness by using the boundary integral method.
4. Re-derive the expression for thermal boundary layer thickness by using the boundary integral method.