**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86.**
**(for candidates admitted during the academic year 20011 – 12)**
**M.Phil. DEGREE EXAMINATION - April 2014**
**Mathematics**
**Second Semester**

**Subject Code: 11MT/RO/FD2 05**
**Max Marks: 100**
**Time: 3 Hours**

**Course : Optional**
**Paper : Fluid Dynamics**

**Answer any five questions**

1. a) Derive Navier Stokes equations of motion of a viscous fluid.
   b) Discuss the steady flow between concentric rotating cylinders.

2. a) Define 'Dynamical similarity' and obtain an expression for Reynold's number.
   b) Explain Oseen's improvement of the equation for flow due to moving bodies at small Reynold's number and discuss the sphere problem.

3. a) Explain the phenomenon of boundary layer separation.
   b) Derive the energy equation (with usual notations)

4. a) Discuss the boundary layer flow past a thin plate at zero incidence. Hence obtain Blassius's solution.
   b) Derive Prandtl's boundary layer equations.

5. a) Discuss the Darcy model for a flow through porous medium.
   b) Obtain Brinkmen's equation to discuss the flow through porous medium.

6. Explain the concept of separation of the boundary layer. Define the separation point and prove that the position of the separation point is independent of the Reynold's number.

7. a) Discuss Stoke's second problem.
   b) Explain mass transfer in a porous medium

8. a) Derive Maxwell's electromagnetic field equation for medium in motion.
   b) Obtain the equation of motion of a conducting fluid and its rate of flow of charge.