The present thesis entitled "Mhd three dimensional flows of couple stress fluid through a parallel plate channel" has been spread over six chapters.

In the first chapter we discuss the basic concepts, some important applications of fluid mechanics and porous media and the basic equations for the viscous fluid flow and the fluid flow through a composite and porous medium.

In the second chapter, we discuss the steady hydro magnetic three dimensional couette flow of an incompressible viscous flow through a porous medium between two infinite parallel plates under the influence of transverse magnetic filed and taking viscous dissipation into account. The stationary plate is subjected to a slightly sinusoidal surface temperature with transverse sinusoidal suction velocity while moving plate is isothermal with injection velocity. The velocity and temperature expressions are evaluated by using perturbation technique. The components of skin friction at the stationery plate and the insulated plate and rate of heat transfer are also obtained and its behaviour computationally discussed with reference to the various governing parameters in detail. This chapter has been accepted for publication in
the International Journal of Physics and Mathematical Sciences.

In the third chapter we discuss the steady hydro magnetic flow of a couple stress fluid in a parallel plate channel through a porous medium under the influence of a uniform inclined magnetic field of strength $H_0$, inclined at an angle of inclination $\alpha$ with the normal to the boundaries and taking into hall current. The perturbations are created by a constant pressure gradient along the plates. The equations for the couple stress fluid flow in the porous medium are based on Brinkman's model. The exact solution of the velocity in the porous medium is analytically derived, its behaviour computationally discussed with reference to the various governing parameters. The shear stresses on the boundaries and the discharge between the plates are also obtained analytically and their behaviour is computationally discussed. Part of this chapter has been accepted for publication in the International Journal of Dynamics of fluids.

In the fourth chapter, we discuss the steady hydro magnetic flow of an incompressible couple stress fluid in a parallel plate channel bounded on one side by a porous bed under the influence of a uniform inclined magnetic field of strength $H_0$ inclined at an angle of inclination $\alpha$ with the normal to the boundaries. The perturbations are created by a constant pressure gradient along the plates. The equations for
the couple stress fluid flow in non porous region are based on Stokes constitutive equations while in the porous bed the equations are based on Brinkman's model. The exact solutions of the velocity in the clean fluid and the porous medium consists of steady state are analytically derived, its behaviour computationally discussed with reference to the various governing parameters with the help of graphs. The shear stresses on the boundaries and the mass flux are also obtained analytically and their behaviour is computationally discussed. This chapter has been communicated for publication in the Ultra Scientist of Physical Sciences.

In the fifth chapter, we discuss the steady hydro magnetic flow of an incompressible electrically conducting couple stress fluid in a parallel plate channel bounded on one side by a porous bed under the influence of a uniform inclined magnetic field of strength $H_0$ inclined at an angle of inclination $\alpha$ with the normal to the boundaries taking hall current into account. The perturbations are created by a constant pressure gradient along the plates. The equations for the couple stress fluid flow in non porous region are based on Stokes constitutive equations while in the porous bed the equations are based on Brinkman's model. The exact solutions of the velocity in the clean fluid and the porous medium consists of steady state are analytically derived, Its behaviour computationally discussed with reference to the
various governing parameters with the help of graphs. The shear stresses on the boundaries and the mass flux are also obtained analytically and their behaviour is computationally discussed. This chapter has been communicated for publication in the Journal of Computer and Mathematical Sciences.

In the sixth chapter, we discuss an analytical study of unsteady magneto hydro dynamic flow of an incompressible electrically conducting couple stress fluid through a porous medium between parallel plates, taking into account pulsation of the pressure gradient effect and under the influence of a uniform inclined magnetic field of strength $H_0$ inclined at an angle of inclination $\alpha$ with the normal to the boundaries. The solution of the problem is obtained with the help of perturbation technique. Analytical expression is given for the velocity field and the effects of the various governing parameters entering into the problem are discussed with the help of graphs. The shear stresses on the boundaries and the discharge between the plates are also obtained analytically and their behaviour computationally discussed with different variations in the governing parameters in detail. Part of this chapter has been accepted for publication in the International Journal of Scientific and Engineering Research, vol. 2, Issue 7, Jan. 2012.