Work Plan and Methodology:

In the present work, it is proposed to investigate some problems of self-gravitational instability, K-H instability, and R-T instability of quantum plasma. The research work is completely theoretical and based on magneto hydrodynamic (MHD) theory. The fluid theory of plasma physics will be applied for solving various problems. The normal mode analysis method will be used for the discussion of instability of the unbounded and bounded configurations. In the investigation of various problems related to these instabilities the usual MHD set of equations with different configurations will be used. The general dispersion relation obtained using perturbation equations with appropriate boundary conditions will be reduced for the special cases of propagation and the condition of instability and stability will be obtained. In solving the problem of K-H instability and R-T instability the appropriate boundary conditions will be applied in quantum plasma. The new results will be obtained by plotting the curves between the dimensionless growth rate and the dimensionless wave number for various physical parameters involved (viz. rotation, conductivity, porosity, polytrophic indices etc.) in the problem.

In the present work, we propose to investigate the problem of self-gravitational instability of anisotropic heat conducting plasma in presence of rotation. In this study we wish to examine the effect of heat conduction parameter on the growth rate of the system. In the other problem of self-gravitational instability of anisotropic pressure plasma we propose to investigate the effect of finite electron inertia, Hall current, rotation and finite electrical resistivity on the Jeans instability criterion using generalized polytrope laws. Along with this the effect of radiative heat-loss function, finite electron inertia, Hall current and finite electrical resistivity on magneto thermal instability of rotating viscous plasma will also be investigated.
In the case of K-H instability, we propose to investigate the K-H instability of anisotropic quantum plasma with generalized polytrope laws and magnetic field using three-dimensional configurations in a compressible medium. The aim of this study is to see how the condition of instability and stability changes with changing polytropic indices and direction of the magnetic field. In the other problems of K-H instability of incompressible plasma medium, we will discuss the effect of porosity, magnetic field, surface tension, viscosity and suspended dust particles on the K-H and R-T instability. It is also proposed to discuss the effect of FLR corrections, rotation and polytropic pressure law on K-H instability. Our aim is to study how the condition of stability as well as instability and growth rate changes with changing in these parameters.