Thin Films of silver and gold (spec-pure) are prepared at room temperature by the evaporation method and are annealed under vacuum. Resistance, Hall voltage, thickness, polarization (optical constants) and transmittance measurements are carried out on annealed films. For investigation, the selected film-thickness range is 100 Å to 500 Å, the wavelength range is 4,000 Å to 10,000 Å and the range of magnetic field strength is 1,400 to 19,900 gauss.

The variation of resistivity, Hall coefficient and of optical constants with film-thickness are studied. The dependence of the film properties on the thickness are obviously due to departure of the structure of the film from that of the bulk metal. With increasing film-thickness, the structure of the film becomes similar to that of the bulk material; and it is observed that the film properties also approach the bulk properties. However, even for the thickest film (more than 1000 Å), the physical properties never attain the same values as that of bulk metal. This may be due to the difference in the texture of the film and bulk metal (viz; due to the granular structure of the film which depends much more upon the conditions and mode of film preparation). Spectral transmittance behaviour of gold film shows a peak (for maximum) at the wavelength 5100 Å.

Fuchs-Sondheimer's theory is solved graphically for normalized conductivity, Hall coefficient and for normalized mean free path. Using theoretical curves, bulk constants,
measured data (resistance, Hall voltage etc) and classical relations, the film-thicknesses are determined by various methods (viz; conductivity method, Hall coefficient method and mean free path method). The film-thicknesses determined by the methods based on Fuchs-Sondheimer's theory, are nearly equal and differed (30%) from the thickness $l_{MBI}$. The disagreement is explained on the basis of Neugebauer and Webb's (1962) "Island Structure Model" of the evaporated thin-film. The explanation suggests that "In the treatment of Fuchs-Sondheimer's theory, the scattering probabilities of electrons within the film boundaries, should also be taken into consideration.

Murmann-Fösterling's theory is solved graphically for optical constants of thin films (for oblique incident light) A comprehensive set of theoretical graphs (42 graphs) are prepared for universal use; and is given at the end of the thesis. For computation work IBM 1960 is used, assuming the angle of incident light (on film) $\theta$ and the refractive index of glass substrate 1.5. Using theoretical graphs, angles ($\Psi$ & $\Delta$) and film-thickness; optical constants $n$ & $k$ of the film (under investigation) are determined. The optical constants are used to calculate transmittance intensity (through the film) at normal angle of incident light. The calculated transmittance is compared with the observed transmittance (on spectrophotometer). The comparison suggests that Murmann-Fösterling's theory seems to be valid for silver films, in the longer wavelength (red) region of the spectrum.