In this thesis, the biophysical properties of human renal excretory fluid i.e. urine has been studied in both in vitro and in vivo. The urine is a bio fluid; the metabolic wastes in the human body are excreted in the form of urine. The urine is studied extensively by physiologist, biochemists, and bio-medical engineers. But it has not drawn much attention of physicists. The application of concepts, principles and techniques of physics for the solution of problems in biology at different levels of complexity to get internal picture is drawing the attention of many researchers. The aim of the thesis is to develop these ideas at molecular level by studying the biophysical properties of human urine at different physiological conditions.

In this thesis the physical properties of urine such as specific gravity, refractive index, viscosity, surface tension, pH, electrical conductivity and Fourier transform infrared spectroscopy has been studied for both normal subjects and physiological disorders.

In this thesis brief information of kidney parts and their function, urine formation, Physico-chemical properties and microscopic examination is discussed. The theoretical aspect of the physical properties under investigation and FT-IR spectroscopy is discussed. The techniques - capillary rise method, surface tension, Ostwald viscometer, Abbe's refractometer for refractive index are used. The electrical conductivity is measured by conductivity meter of cell
constant 1 and specific gravity of urine by specific gravity bottle. The FT-IR spectra for urinary sample are recorded on Advanced Thermo Nicolet Nexus 670.

The physical properties of urine of normal subjects of different age groups of both first morning and randomly collected are studied and compared. The physical properties are found for normal urine samples of four subjects treated with glucose, urea, albumin and bilirubin at different concentration levels, pathological urine samples of diabetic mellitus and chronic kidney disease. The results are tabulated and shown graphically.

The FT-IR spectra of normal urine and urine treated with glucose, albumin, urea and creatinine are recorded with which the specific peaks for these urinary components are found and the amount of urine is quantified.