PREFACE

In these days, problems related to the health are apparently concerned by the people. In the present world, diseases related to the heart are the major cause for deaths. The cardiovascular system consists of the heart and blood vessels which play an important role in transportation, protection and regulation of human body. Stenosis refers to the narrowing of the tube. It leads to an increase in the resistance to the flow and associated reduction in blood supply. It is caused by unhealthy living conditions such as improper dietary habits and lack of physical activity etc.

The thesis presents the fundamental flow characteristics of the blood in the stenosed artery to understand the blood related problems in a better way and apply them for the bio-medical applications.

The thesis concentrates on the effects of non-Newtonian fluid flows through stenosed arteries, as these flow problems play an important role in the physiological situations.

The thesis is structured into six chapters to facilitate the lucid flow of the material and to enable the researchers for further investigation on the stenosis. Chapter 1 presents a short introduction to nature of stenosis, types of stenosis, the basic equations of three non-Newtonian fluids and gives a motivation to the investigation carried out in the thesis.

In chapter 2, the work done by various researchers in the area related to the research work is being analyzed very minutely under the heading of literature survey.

Chapter 3, describes the effects of non-Newtonian fluid flows through overlapping stenosis. This chapter is further divided into three sections. The first section 3.1, deals with the steady, incompressible flow of Herschel-Bulkley fluid through a tube having overlapping stenosis, it also deals with the effects of various parameters on the resistance to the flow and shear stress acting on the walls. Section 3.2, discusses the Herschel-Bulkley fluid through an inclined tube of uniform cross-section with
overlapping stenosis. Section 3.3 deals with steady flow of an incompressible micropolar fluid through a uniform tube with overlapping stenosis. The later part of the chapter presents the quantitative effects of various parameters on resistance to the flow and wall shear stress.

Chapter 4 serves to provide the effects of stenosis and post stenotic dilatation on different non-Newtonian fluids. It consists of three sub sections. Section 4.1, describes the effects of stenosis and post stenotic dilatation on Herschel-Bulkley fluid through a stenosed artery. It also derives the expressions for the velocity, resistance to the flow and wall shear stress. Section 4.2, presents a mathematical model of micropolar fluid through an artery with the effect of stenosis and post stenotic dilatation. Further, an observation is made on the effects of various parameters on flow resistance and wall shear stress. Section 4.3 describes the effects of stenosis and post stenotic dilatation on Jeffrey fluid flow in arteries.

Chapter 5 deals with the effect of magnetic field on Herschel-Bulkley fluid through multiple stenoses. It also deals with the effects of various parameters on the resistance to the flow and shear stress acting on the walls in the presence of magnetic field.

Chapter 6 summarizes the research work thoroughly.