

Learning Outcomes:

After successful completion of the course, student will be able to understand:

- Electrical and Mechanical events of heart
- Difference between Newtonian and Non Newtonian fluid
- Pressure Volume relationship in different heart valve diseases
- Types of flow in circulatory system and its significance

SYLLABUS

Unit No.	Topics	Lectures (Hours)
1	INTRODUCTION TO CARDIOVASCULAR SYSTEM Cardiovascular system, Geometry and materials of the heart, Electrical system of the heart, Mechanical events in cardiac cycle, correlation between mechanical and electrical events in the heart coronary circulation, Microcirculation	8
2	CARDIAC MUSCLE MECHANICS Ventricular pressure-volume relationship, Change in Pressure-Volume loop in heart valve defects, Operation of heart valves.	6
3	BIO FLUID MECHANICS Newton's laws, Stress, Strain, Elasticity, Hook's law, Fluid characteristics and viscosity, Newtonian fluids, Non-Newtonian fluids, , Laminar Flow of Non Newtonian Fluids, Flow of Non Newtonian Fluids in Elastic Fluids, methods for measuring viscosity, types of fluid flow, Conservation Laws, forces that drive or resist blood flow, Introduction to pipe flow, Laminar blood flow, Turbulent blood flow, Importance of turbulence, Vascular resistance to blood flow, Reynolds number, Poiseuille's law, Application of Poiseuille's law, Bernoulli equation, Pulsatile Flow.	15
4	BLOOD RHEOLOGY Blood hematology and blood Rheology, Blood characteristics, Abnormalities of blood, Blood types, Plasma viscosity, blood pH	7
5	BLOOD VESSEL MECHANICS Anatomy and physiology of blood vessels, Types of vessels, Mechanics of arterial walls, Compliance, Windkessel model, vascular pathologies, coronary artery bypass grafting (CABG).	6

Tutorial/Assignments based on above syllabus

Text Books:

1. Biomechanics: Circulation By Y.C.Fung.
Pub. Springer Verlay. New York.
2. Biofluid Mechanics By Jagan. N. Mazumdar
Pub. World scientific

Reference Books:

1. Medical Physics & Biomedical Engineering By B.H. Brown & R.H. Smallwood
Pub. Overseas press
2. Biofluid mechanics in cardiovascular system By Lee Waite
Pub. Mc Grawhill
3. Snapshots of Hemodynamics By Nico Westerhof
Pub. Springer