DEPARTMENT OF PHYSIOLOGY
CIRCULATION: STUDY GUIDE

CHAPTER 14 & 15:
1. Functional parts of the circulation:
   a. Arteries (Elastic vessels)
   b. Arterioles (Resistance vessels)  
   c. Veins (Capacitance vessels)
   d. Capillaries (Exchange vessels)

2. Veins and their functions
3. Volumes of blood in different parts of circulation.
4. Pressures of blood in different parts of circulation (Pulmonary & Systemic circulations).
5. Blood flow
6. Blood Pressure definitions, units and factors affecting them
7. Resistance needed for understanding the circulatory biophysics only
8. Conductance
9. Distensibility
10. Compliance
11. Formulas:
    - Ohm’s Law
    - For calculating the conductance (Guyton, 12th Ed. 163)
    - Poiseuille’s Law
    - For calculating the Reynold’s number for blood flow (Guyton, 12th Ed. 161)

CHAPTER 16:
1. Starling forces affecting the filtration and reabsorption at the arteriolar and venous end.
2. Lymph: formation, rate of flow & functions.

CHAPTER 17:
1. Local blood flow control
   - Acute Control of Local blood flow:
     - Vasodilator theory (Role of adenosine)
     - Oxygen lack theory
     - Reactive hyperemia
     - Active hyperemia
     - Autoregulation of blood flow (the metabolic and myogenic theory)
     - Role of Nitric oxide and Endothelin
   - Long- Term Control of blood flow:
     - Angiogenesis
     - Role of Oxygen
     - Role of Vascular endothelial growth factor (VEGF), fibroblast growth factor, angiogenin, angistatin and endostatin
     - Formation of Collateral circulation & its importance
2. Humoral blood flow control
   - Vasoconstrictor Agents:
     - Norepinephrine and epinephrine
     - Angiotensin II
     - Vasopressin
   - Vasodilator Agents:
     - Bradykinin
     - Histamine
   - Role of Ions and chemical factors:
     - Calcium
     - Potassium
     - An increase/ decrease in hydrogen ion concentration
CHAPTER 18 & 19: ARTERIAL BLOOD PRESSURE:

- Definitions and normal values:
  - Systolic blood pressure
  - Diastolic blood pressure
  - Pulse pressure
  - Mean arterial pressure

- Variations
  - Physiological variations
  - Pathological variations

- Determinants of Arterial Blood Pressure
  - Central factors
  - Peripheral factors

- Regulation of Arterial Blood Pressure:
  - Short-term control of Blood Pressure
    - Role of the Nervous system
      - Baroreceptor reflex
      - Chemoreceptor reflex
      - Volume reflex
      - Bainbridge reflex
      - CNS Ischemic response & Cushing reaction
      - Abdominal compression reflex
  - Long-term control of Blood Pressure
    - By regulation of ECF
    - The Renin-Angiotensin system

- Intermediate control of Blood Pressure

- Applied Physiology
  - Korotcoff sounds
  - Hypertension (HTN) & its Types
    1. Essential Hypertension.
    2. Goldblatt HTN.
    3. HTN due to increased Renin secretion.
    4. HTN caused by coarctation of aorta.
    5. HTN in Preeclampsia (Toxemia of Pregnancy).
    6. Neurogenic HTN

CHAPTER 20: CARDIAC OUTPUT

- Definitions and normal values:
  - Cardiac output
  - Stroke volume
  - Cardiac index
  - Ejection fraction
  - Cardiac reserve

- Variations in Cardiac Output
- Distribution of Cardiac Output
- Factors affecting Cardiac Output
  - Venous Return
  - Force of contraction
  - Heart rate
- Peripheral resistance
  - Applied Physiology
  - Pathologically high cardiac output and its causes
  - Pathologically low cardiac output and its causes

CHAPTER 21
CORONARY CIRCULATION
- Distribution of Coronary Blood Flow
  - Normal coronary blood flow
  - Coronary arteries
  - Venous drainage
  - Physiological shunt
- Phasic changes in Coronary Blood Flow
  - In the Left & Right ventricle
- Factors regulating Coronary Blood Flow
  - Need for Oxygen
  - Metabolic Factors
  - Nervous factors
  - Applied Physiology
  - Coronary Occlusion
  - Ischemic Heart Disease
  - Myocardial Infarction
  - Cardiac Pain- Angina Pectoris

CHAPTER 22
CARDIAC FAILURE
- Definition
- Causes
- Signs and symptoms
- Types
  - Unilateral Left Heart Failure
  - Low-Output Cardiac Failure
- Compensated VS Decompensated Heart Failure

CHAPTER 23
CONGENITAL HEART DEFECTS
- Congenital anomalies of the heart
  - Definition
  - Types
  - Left-to-right shunt: Patent Ductus Arteriosus
  - Right-to-left shunt: Tetralogy of Fallot
  - Stenosis: congenital aortic valve stenosis & Coarctation of the aorta.

CHAPTER 24
CIRCULATORY SHOCK
- Definition
- Signs & Symptoms of Circulatory Shock
- Stages of Circulatory Shock: Non-progressive stage, Progressive stage & Irreversible.
- Types and causes of Circulatory Shock
  - Hypovolemic shock
  - Neurogenic shock
  - Anaphylactic shock
  - Septic shock
- Treatment of Circulatory Shock
- Circulatory Arrest