<table>
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<tr>
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<th><strong>FUNDAMENTALS OF GENERAL PHYSIOLOGY</strong></th>
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<tr>
<td>A</td>
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<td>b. Cell membrane. (functions of cell membrane)</td>
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<td>c. <strong>Transport:</strong></td>
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<td>1 Simple diffusion</td>
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<td>2 Passive diffusion</td>
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<td>3 Active transport (primary and secondary)</td>
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<td>d. Intercellular junctions</td>
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<td>B</td>
<td><strong>Body fluids:</strong></td>
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<td>a. Homeostasis.</td>
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<td>b. Body fluids, volume and distribution.</td>
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<td>c. Body fluid composition</td>
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<td>d. Body fluid dynamics.</td>
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<td>e. Edema.</td>
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<td>f. Lymph (definition- lymphatic vessels- functions of lymph)</td>
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<th>2</th>
<th><strong>BLOOD PHYSIOLOGY</strong></th>
<th>10 Hours</th>
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<tr>
<td>A</td>
<td><strong>Red blood cells, anemia, and polycythemia:</strong></td>
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<td>a. Red blood cells:</td>
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<td>1 Production of red blood cell</td>
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<td>2 Formation of hemoglobin</td>
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<td>3 Iron metabolism</td>
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<td>b. Destruction of red blood cells</td>
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<td>c. The anemias- Effects of anemias on the circulatory system</td>
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<td>d. Polycythemia- Effects of polycythemia on the circulatory system</td>
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<td>B</td>
<td><strong>Resistance of the body to infection- the leukocytes, the macrophages system, and inflammation:</strong></td>
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<td>a. The leukocytes (white blood cells):</td>
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<td></td>
<td>1 General characteristics of leukocytes.</td>
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<td>2 Genesis of leukocytes.</td>
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<td>3 Life span of white blood cells, properties of neutrophils, monocytes, and macrophages.</td>
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<td>4 The tissue macrophages system.</td>
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<td>5 Inflammation and function of neutrophils and macrophages.</td>
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<td>6 The process of inflammation.</td>
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<td>7 Neutroahilia caused by conditions other than inflammation.</td>
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<td>8 The eosinophils.</td>
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<td>9 The basophils</td>
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<td>b. Agranulocytosis:</td>
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<td>c. The leukemias- Effects of leukemia on the body</td>
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<td>C</td>
<td><strong>Immunity and allergy:</strong></td>
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<td></td>
<td>a. Innate immunity</td>
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<td>b. Acquired immunity</td>
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</table>
1. Two basic types of acquired immunity
2. Antigens
3. Role of lymphoid tissue in acquired immunity
4. Pre-processing of the T and and B lymphocytes
5. Specificity of antibodies and T lymphocytes- role of lymphocytes clones
6. Origin of many clones of lymphocytes
7. Specific attribute of the B lymphocytes- humoral immunity and the antibodies
8. Special attribute of the T lymphocytes- Activated cells and cell mediated immunity
9. Vaccination
10. Passive immunity

c. **Allergy:**
   1. An allergy that occurs in normal people: delayed allergic reactions.
   2. Allergies in the allergic person

**D Blood groups; transfusion; tissue and organ transplantation:**

a. **Antigenecity and immune reactions of blood:**

b. **O-A-B groups**
   - The A and B antigens called agglutinogens
   - The agglutinins
   - The agglutination process in transfusion reactions
   - Blood typing

c. **The Rh blood types- The Rh immune response**

d. **Other blood factors**

e. **Transfusion- Transfusion reactions resulting from mismatched blood groups**

f. **Transplantation of tissues and organs- Attempts to overcomes the antigen-antibody reactions in transplanted tissue**

**E Hemostasis and blood coagulation:**

a. **Events in Hemostasis:**
   1. Vascular spasm
   2. Formation of platelet plug
   3. Blood coagulation in the ruptured vessel
   4. Fibrous organization or dissolution of the blood clot

b. **Mechanism of blood coagulation:**
   1. Conversion of prothrombin to thrombin
   2. Conversion of fibrinogen to fibrin-formation of the clot
   3. The vicious circle of clot formation
   4. Block of clot growth by blood flow
   5. Initiation of coagulation: formation of prothrombin activator
   6. Prevention of blood clotting in the vascular system- the intravascular anticoagulants
   7. Lysis of blood clot-plasmin

c. **Conditions that cause excessive bleeding in human beings:**
<table>
<thead>
<tr>
<th></th>
<th>1 Decreased prothrombin, factor VII, factor IX, and factor Y caused by vitamin K deficiency</th>
<th>2 Hemophilia</th>
<th>3 Thrombocytopenia</th>
</tr>
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<tr>
<td>d.</td>
<td>Thromboembolic conditions in human beings</td>
<td>1 Femoral thrombosis and massive pulmonary embolism</td>
<td>2 Disseminated intravascular clotting</td>
</tr>
<tr>
<td>e</td>
<td>Anticoagulants for clinical use:</td>
<td>1 Heparin as an intravenous anticoagulant</td>
<td>2 Coumarins as an anticoagulants</td>
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<td></td>
<td>Prevention of blood coagulation outside the body</td>
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<td>f.</td>
<td>Blood coagulation tests:</td>
<td>1 Bleeding time</td>
<td>2 Clotting time</td>
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<td>3 Prothrombin time</td>
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</tbody>
</table>

### PYHIOLOGY OF NERVE AND MUSCLES

**14 Hours**

#### 3. **Excitable tissues**:

##### a. **Nerves**:

2. Excitation and conduction, resting membrane potentials.
3. Ionic basis of RMP, excitation & conduction.
4. The voltage gated sodium and potassium channels.
5. Initiation of action potentials.
8. Nerve fiber types and function.
9. Mixed nerve and compound muscle action potentials.
11. Glial cells

##### b. **Skeletal muscles**:

1. Physiologic anatomy of skeletal muscles.
2. Filaments.
3. Electrical phenomena and ionic fluxes.
5. Excitation contraction coupling.
7. Release of Ca" ion by sarcoplasmic reticulum
8. Energy of muscles.
11. Motor unites.
12. Summation of muscle contraction.

##### c. **Smooth muscles**:

1. Morphology.
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<tbody>
<tr>
<td>2</td>
<td>Visceral smooth muscle.</td>
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<td>3</td>
<td>Multiunit smooth muscles.</td>
</tr>
</tbody>
</table>

**B Synaptic & junctional transmission:**

- **Synaptic transmission:**
  1. Functional anatomy of synapse
  2. Electrical events in presynaptic neurons
  3. Electrical events in postsynaptic neurons
  4. Inhibition and facilitation at synapse
  5. Types of synaptic transmission
  6. Chemical transmission of synaptic activity
  7. Properties of synapses

- **Neuromuscular transmission:**
  1. Neuromuscular junction: structure and function.
  2. Denervation hypersensitivity.
  3. Myasthenia gravis and Lambert-Eaton syndrome

**4. PHYSIOLOGY OF CENTRAL NERVOUS SYSTEM:**

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<table>
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<tr>
<td>A</td>
<td>Sensory nervous system:</td>
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</table>

- **Sensory receptors:**
  1. Sensory receptors: types and structures
  2. Classification of sensory receptors
  3. Electrical and ionic events in sensory receptors.
  4. Sensory unites and receptive field.
  5. Transduction of sensory stimuli into nerve impulse.
  6. Receptor potential.
  7. Adaptation of receptors.

- **Somatic sensation:**
  1. Classification of somatic sense.
  2. Detection and transmission of tactile sensation.
  3.Tickle, itching & position sense.
  4. Mechanoreceptive somatic sense.
  5. Signals into CNS.
  6. Transmission in the dorsal column-medial lemniscal system.
  8. Somatic sensory cortex.
  9. Somatic association areas.
  10. Characteristics of transmission in the dorsal column medial lemniscal system.
  11. Transmission in the anterolateral spinothalamic tract: anatomy and type of sensation transmitted.

- **Pain:**
  1. Acute and slow pain
  2. Pain receptors.
  3. Transmission of pain to CNS.
  4. Analgesia system. - Referred pain.
  5. Visceral pain.
  6. Hyperalgesia and thalamic syndrome.
### d. Headache:
1. Headache of intracranial origin.
2. Extracranial types of headache.

### B Motor system:
#### a. Motor cortex:
1. Primary and premotor areas.
2. Topographic map of motor cortex.
4. Fiber pathway to and from motor cortex.
5. Red nucleus and rubrospinal tract.
6. Extrapyramidal system.
7. Excitation of spinal cord by primary motor cortex and red nucleus.

#### b. Cerebellum and its motor function:
1. Anatomical and functional areas of cerebellum.
2. Neuronal circuits of cerebellum.
3. Function of cerebellum in controlling movements.
4. Function of cerebellum in voluntary muscle control.
5. Cerebellar nuclei.
6. Input and output pathways to cerebellum.
7. Clinical abnormalities of cerebellum.

#### c. Basal ganglia.
1. Structure and physiologic anatomy.
2. Motor function of basal ganglia.
3. Input and output pathways to basal ganglia.
4. Main circuits of basal ganglia.
5. Clinical syndromes results from damage of basal ganglia.

#### d. Brain stem reticular formation.
1. Physiologic anatomy.
2. Role of reticular formation and brain stem nuclei in controlling stereotyped movements.
3. Role of brain stem in supporting the body against gravity.

### C Cerebral cortex and intellectual functions of the brain
#### a. Physiologic anatomy of the cerebral cortex.
1. Function of specific cortical areas.
2. Function of primary sensory and motor areas.
3. Function of parieto-occipito-temporal association areas.
4. Function of prefrontal areas.

#### b. Memory.
1. Types of memory.
2. Physiologic basis of memory.

#### c. Function of brain in communication.

#### d. Role of reticular activating system in wakefulness.

#### e. Brain waves & sleep.
2. Effect of cerebral activity on brain waves.
<table>
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<tr>
<th>3</th>
<th><strong>Sleep: theories of sleep &amp; stages of sleep.</strong></th>
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<td>f.</td>
<td><strong>EEG and its clinical uses, epilepsy.</strong></td>
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<td>g.</td>
<td><strong>Behavioral function of the Brain</strong></td>
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<tr>
<td>1</td>
<td><strong>Limbic system:</strong></td>
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<td></td>
<td>Functional anatomy of limbic system.</td>
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<td>Input and output pathways to limbic system.</td>
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<td>Thalamus: anatomy and function.</td>
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<td>Function of amygdalae</td>
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<td>Function of hippocampus.</td>
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<td>Function of limbic cortex.</td>
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<td><strong>Hypothalamus:</strong></td>
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<td></td>
<td>Functional anatomy of hypothalamus.</td>
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<td>Vegetative and endocrine functions of hypothalamus.</td>
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<td>Behavioural functions of hypothalamus.</td>
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</table>

### D The autonomic nervous system

- **3 Hours**
  - a. Introduction and definition the autonomic reflex action and its comparison to the somatic reflex.
  - b. Functional anatomy: sympathetic and parasympathetic system.
  - c. Types of neurotransmitters secreted in the autonomic synapses.
  - d. Chemical division of the autonomic nervous system- cholinergic and noradrenergic systems.
  - e. Cholinergic and noradrenergic receptors.
  - f. Function of the sympathetic and parasympathetic nervous system the catabolic and anabolic systems.
  - g. Higher control of autonomic nervous system.
  - h. Autonomic pharmacology

### E Special Senses

- **4 Hours**
  - a. Hearing and equilibrium:
    1. Functional anatomy of the ear
    2. Properties of the hearing system
    3. Theories of hearing
    4. Vestibular function
  - b. Vision:
    1. Functional anatomy of the eye
    2. Errors of refraction; myopia, hypermetropia and astigmatism
    3. Physiology of the retina, visual fields and visual pathway
    4. Visual accommodation and visual reflexes, visual acuity
    5. Color vision, cerebral cortical visual function
  - c. Special Senses
    1. Hearing and equilibrium:
      - Functional anatomy of the ear
      - Properties of the hearing system
      - Theories of hearing
      - Theories of hearing
    2. Vision:
      - Functional anatomy of the eye
      - Errors of refraction; myopia, hypermetropia and
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<th>Smell and taste</th>
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<td>Smell receptors and pathways</td>
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<td>Physiology of olfaction</td>
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<td>Taste receptor organs and pathways</td>
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<td>Physiology of taste</td>
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<tr>
<th>5</th>
<th>BODY TEMPERATURE REGULATION</th>
<th>2 Hours</th>
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<td>A</td>
<td>Normal temperature and set-point.</td>
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<td>B</td>
<td>Heat production, shivering and non-shivering thermogenesis.</td>
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<td>C</td>
<td>Heat loss, hypothalamic regulation of body temperature.</td>
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<td>D</td>
<td>Fever and hypothermia.</td>
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<th>RESPIRATORY PHYSIOLOGY</th>
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<td>Pulmonary ventilation:</td>
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<td>a. Mechanics of pulmonary ventilation:</td>
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<td></td>
<td>1 Basic mechanisms of lung expansion and contraction.</td>
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<td>2 Respiratory pressures.</td>
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<td>3 Expansion of the lungs and thorax-compliance.</td>
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<td>4 The work of breathing.</td>
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<td>b. The pulmonary volume and capacities:</td>
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<td>1 Recording changes in pulmonary volume-spirometry.</td>
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<td>2 The pulmonary volumes.</td>
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<td>3 The pulmonary capacities.</td>
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<td>4 Significance of pulmonary volume and capacities</td>
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<td>5 Determination of functional residual capacity-helium dilution method.</td>
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<td>c. The minute respiratory volume-respiratory rate times tidal volume.</td>
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<td>d. Alveolar ventilation-Rate of alveolar ventilation</td>
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<td>e. Functions of the respiratory passageways:</td>
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<td>1 Trachea, bronchi, and bronchioles.</td>
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<td>2 Maximum expiratory flow.</td>
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<td>3 Respiratory functions of the nose</td>
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<td>4 Respiratory functions of the nose</td>
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<td>B</td>
<td>Physical principles of gaseous exchange; diffusion of oxygen and carbon dioxide through the respiratory membrane:</td>
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<tr>
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<td>a. Physics of diffusion and gas pressure:</td>
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<td></td>
<td>1 The molecular bases of gaseous exchange.</td>
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<td>2 Gas pressure in a mixture of gases - partial pressure of individual gases.</td>
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<td>3 Pressure of gases in water and tissues.</td>
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<td>4 The vapour pressure of water.</td>
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<td>5 Diffusion of gases through fluids- the pressure gradient</td>
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### for diffusion.

6 Diffusion of gases through tissues

b. Composition of alveolar air-its relation to atmospheric air:
   1 Rate at which alveolar air is renewed by atmospheric air.
   2 Oxygen concentration and partial pressure in the alveoli.
   3 CO₂ concentration and partial pressure in the alveoli.

c. Diffusion of gases through the respiratory membrane:
   1 Factors that affect rate of gas diffusion through the respiratory membrane.
   2 Diffusion capacity of the respiratory membrane.

d. Effects of ventilation perfusion ratio on alveolar gas concentration.

e. Diffusion-limited and perfusion limited gas exchange

C Transport of oxygen and carbon dioxide in the blood and body fluids:

a. Pressure of O₂ and CO₂ in the lungs, blood, and tissues:
   1 Uptake of O₂ by the pulmonary blood.
   2 Diffusion of O₂ from the capillaries to the interstitial fluid.
   3 Diffusion of O₂ from capillaries to the cells.
   4 Diffusion of O₂ from cells to the tissue capillaries, and from pulmonary capillaries to the alveoli

b. Transport of O₂ in the blood:
   1 The reversible combination of O₂ with HB.
   2 Shift of O₂-HB dissociation curve and its significance.
   3 Transport of O₂ in the dissolved state.
   4 Combination of Hb with CO₂ - Bohr effect

c. Transport of CO₂ in the blood:
   1 Chemical forms in which CO₂ is transported.
   2 The dissociation curve.
   3 Effects of the O₂-HB reaction on CO₂ transport- the Haldane effect.
   4 Change in blood acidity during CO₂ transport

D Regulation of respiration:

a. The respiratory center-Control of overall respiratory center activity

b. Chemical control of respiration- Direct chemical control of respiratory center activity by CO₂ and H⁺

c. The peripheral chemoreceptors system for control of respiratory activity- role of O₂ in respiratory control:

d. Composite effect of P₉₂₀, pH, and Pₐ₂ on respiratory activity

e. Regulation of respiration during exercise:

f. Other factors that affect respiration:

g. Abnormalities of respiratory control:
   1 Respiratory center depression.
   2 Periodic breathing

E Respiratory insufficiency- pathophysiology, diagnosis, oxygen therapy:

a. Physiologic types of respiratory insufficiency:
1. Abnormalities that cause alveolar hypoventilation.
2. Diseases that decreases lung diffusion capacity.
3. Abnormalities of oxygen transport from the lungs to the tissues.

b. Physiologic peculiarities of specific pulmonary abnormalities:
   1. Emphysema.
   2. Pneumonia.
   3. Atelactasis.
   4. Asthma.
   5. Tuberculosis.
   6. Hypoxia- types of hypoxia
   7. Cyanosis
   8. Dyspnea.

c. Hypercapnia- Effects of hypercapnia on the body.
d. Oxygen therapy in different types of hypoxia-Danger of hypercapnia during oxygen therapy

7 THE CARDIOVASCULAR SYSTEM 20 hours

A Introduction to cardiovascular physiology
   a. Anatomical review - contractile and conductive parts.
   b. Ultra structure with comparison to skeletal muscle.
   c. Mechanism of contraction- sliding filament theory.
   d. The electrical activity of the heart
      1. Origin and spread of cardiac excitation.
      2. Pacemaker cells- pacemaker action potential
   e. Effect of autonomic nervous system on the electrical activity of the SA node.
   f. Spread of electrical activity.
   g. Ventricular electrical activity.
   h. Refractory periods of the ventricle.
   i. Relation of electrical activity with mechanical activity.

B Clinical electrocardiography:
   a. Methods of recording- electrocardiographic leads.
   b. Electrocardiogram ( the different ECG waves, segments, and intervals with their clinical significance).
   c. Methods of recording electrical activity (monophasic and biphasic)
   d. Direction of current during electrical activity.
   e. Shape and configuration of waves in different leads.
   f. The clinical uses of ECG:
      1. Diagnosis of arrhythmias.
      2. Ischemic heart diseases.
      3. Heart block.
      4. Plasma electrolyte disturbance
   g. Stages of the cardiac cycle regarding heart sounds and jugular venous pressure.
   h. Pressure volume curve.
### C The cardiac output:

- Regulation of cardiac output through regulation of heart rate and stroke volume.
- Regulation of heart rate by autonomic nervous system.
- Regulation of stroke volume by autonomic nervous system, preload, and afterload.
- Measurement of cardiac output.

### D Arterial blood pressure:

- Systemic and pulmonary blood pressure.
- Measurement of arterial blood pressure.
- Pulse pressure and mean arterial blood pressure.
- Factors affecting blood pressure:
  1. Specific factors.
  2. Gravity.
  3. Sex.
  4. Age.
  5. Effects of exercise on systolic and diastolic blood pressure.
- Hypertension - causes of hypertension.
- Regulation of blood pressure: Short term regulation - Baroreceptors regulatory mechanism:
  1. Adaptation of baroreceptors.
  2. Methods to test intactness of baroreceptors (effects of gravity, carotid sinus message, Valsalva maneuver).
  3. Pulmonary baroreceptors.

### E Circulation of blood:

- Function of large arteries.
- The small arteries and arterioles.
- The large veins and venules.
- Distribution of blood in the circulatory system.
- The coronary circulation.
- Factors affecting the cardiac circulation.
- The cardiovascular regulatory mechanism:
  1. Blood pressure regulatory mechanisms.
  2. Cardiac output regulatory mechanisms.
  3. Regulation of blood flow which:
     a. Local regulatory mechanisms
        - Myogenic theory
        - Metabolic theory
        - Local vasoconstriction
        - Substances secreted by the endothelium (prostaglandins, thromboxane A2, nitric oxide, and endothelins)
     b. Systemic regulatory mechanisms - Nervous control
| F | Disorders of the cardiovascular system |
|   | a. Circulatory shock. |
|   | b. Types of shock. |
|   | c. Compensatory reactions in hemorrhage |

| 8 | ENDOCRINOLOGY | 10 Hours |
|   | A | Introduction to endocrine system |
|   | a. | Nature of a hormone. |
|   | b. | An overview of the important endocrine glands and their hormones. |
|   | c. | Chemistry of hormones. |
|   | d. | Hormone receptors and their activation. |
|   | e. | Mechanisms of hormonal action |
|   |   | 1. The cyclic AMP mechanism for controlling cell function-a second messenger for hormone mediation. |
|   |   | 2. Action of steroid hormones on the genes to cause protein synthesis. |
|   |   | 3. Action of the thyroid hormone in the cell nucleus. |
|   | f. | Measurement of hormone concentration in the blood. |

|   | B | The pituitary hormones and their control by the hypothalamus |
|   | a. | The pituitary gland and its relation to the hypothalamus. |
|   | b. | Cell types in the anterior pituitary gland. |
|   | c. | Control of pituitary secretion by the hypothalamus-The hypothalamus hypophysial portal system |
|   | d. | Physiological functions of the growth hormone |
|   |   | 1. Metabolic effects of growth hormone. |
|   |   | 2. Stimulation of cartilage and bone growth- role of the somatomedins. |
|   |   | 3. Regulation of growth hormone secretion. |
|   |   | 4. Abnormalities of growth hormone secretion (giantism-acromegaly-hypopituitarism-dwarfism) |
|   | e. | The posterior pituitary gland and its relation to the hypothalamus. |
|   |   | 1. Chemical nature of antidiuretic hormone (vasopressin) and oxytocin. |
|   |   | 2. Physiological functions of antidiuretic hormone. |
|   |   | 3. Physiological functions of oxytocin. |

|   | C | The thyroid metabolic hormones: |
|   | a. | Formation and secretion of the thyroid hormones: |
|   |   | 1. Iodide requirement for formation of thyroxine. |
|   |   | 2. The iodide pump. |
|   |   | 3. Thymoglobulin and chemistry of thyroxine and triiodothyronine. |
|   |   | 4. Release of thyroxine and triiodothyronine from thyroglobulin. |
|   |   | 5. Transport of thyroid hormones to the tissues. |
|   | b. | Functions of the thyroid hormones in the tissues: |
|   |   | 1. General increase in metabolic rate. |
|   |   | 2. Effects of thyroid hormones on growth. |
|   |   | 3. Effects of thyroid hormones on specific bodily mechanisms. |
### c. Regulation of thyroid hormone secretion - Antithyroid substances.

### d. Diseases of the thyroid gland:
1. Hyperthyroidism
2. Hypothyroidism

### D The adrenocortical hormones:

#### a. Chemistry of adrenocortical secretion.

#### b. Functions of the mineralocorticoids - aldosterone
1. Renal effects of aldosterone.
2. Effects of aldosterone on sweat, salivary glands, and intestinal absorption.
4. Regulation of aldosterone secretion.

#### c. Functions of glucocorticoids
1. Effects of cortisol on carbohydrate metabolism.
2. Effects of cortisol on protein metabolism.
3. Effects of cortisol on fat metabolism.
4. Other effects of cortisol - Regulation of cortisol secretion - ACTH

#### d. The adrenal androgens.

#### e. Abnormalities of adrenocortical secretion:
3. Primary aldosteronism.
4. Adrenogenital syndrome

### E Insulin, glucagon, and diabetes mellitus:

#### a. Insulin and its metabolic effects:
1. Effects of insulin on carbohydrate metabolism.
2. Effects of insulin on protein metabolism and growth.
3. Effects of insulin on fat metabolism.
4. Control of insulin secretion.
5. Role of insulin in switching between carbohydrate and lipid metabolism.

#### b. Glucagon and its functions:
1. Effects on glucose metabolism.
2. Regulation of glucagon secretion.

#### c. Somatostatin - its effects on inhibition of glucagon and insulin secretion.

#### d. Pancreatic polypeptide.

#### e. Summary of blood glucose regulation

#### f. Diabetes mellitus
1. Pathological physiology of diabetes mellitus.
2. Physiology of diagnosis.
4. Diabetic coma.
5. Hyperinsulinism

### F Parathyroid hormone, calcitonin, calcium and phosphate
metabolism, vitamin D, bone, and teeth.

a. Calcium and phosphate in the ECF and plasma:

b. Functions of vitamin D:
   1. Absorption and excretion of calcium and phosphate.
   2. Vitamin D and its role in calcium and phosphate absorption.
   3. The calcium in the plasma and interstitial fluid.
   4. The inorganic phosphate in the ECF.
   5. Effects of altered calcium and phosphate concentration in the body fluids

c. Bone and its relation to extracellular calcium and phosphates:
   1. Precipitation and absorption of calcium and phosphate in bone equilibrium with ECF.
   2. Exchangeable calcium.

d. Parathyroid hormone:
   1. Effects of PTH on calcium and phosphate concentration in the ECF.
   2. Control of PTH secretion by the calcium ion concentration

e. Calcitonin:

f. Overall control of calcium ion concentration

g. Physiology of parathyroid and bone diseases:
   1. Hypoparathyroidism.
   2. Hyperparathyroidism
   3. Rickets.
   4. Osteoporosis.

h. Physiology of the teeth

9 REPRODUCTIVE SYSTEM: 5 Hours

A Male and female hormones, and sexual activity

B Hormones required for spermatogenesis
   a. Sertoli cells- semineferous tubules:
   b. Testosterone:
      1. Main functions of testosterone.
      2. Functions of testosterone during fetal life.
      3. Regulation of secretion – feedback mechanism
   c. Female sexual life and hormones associated with it:
      1. Sexual activity in female.
      2. Growth of ovarian follicles.
      3. Ovulation.
      4. Luteal phase.
      5. Uterine cycle-monthly endometrial cycle.
      6. Female characteristics.
      8. Puberty and menarche.
      9. Hormone factors in pregnancy
      10. Lactation.
### 10. THE GASTRO-INTESTINAL TRACT

- **A** Movement of food through the alimentary tract:
  
  a. General principles of gastrointestinal motility:
     1. Characteristic of the gastrointestinal wall.
     2. Innervations of the gut - enteric nervous system
     3. Humoral control of gastrointestinal motility
  
  b. Functional types of movements in the GIT:
     1. Mixing movements.
     2. Propulsive movements - peristalsis.
  
  c. Ingestion of food:
     1. Mastication (chewing).
     2. Swallowing (deglutition).
     3. Function of lower esophageal sphincter.
  
  d. Motor functions of the stomach:
     1. Storage function of the stomach.
     2. Mixing and propulsion of food in the stomach - the basic electrical rhythm of the stomach.
     3. Emptying of the stomach.
  
  e. Movements of the small intestine:
     1. Mixing contractions (segmentations).
     2. Propulsive movements
     3. Function of the ileocecal valve
  
  f. Movement of the colon - Defecation
  
  g. Other autonomic reflexes affecting bowel activity:

- **B** Secretary functions of the alimentary tract:
  
  a. General principles of gastrointestinal secretion:
     1. Anatomic types of glands.
     2. Basic mechanisms of stimulation of the gastrointestinal glands.
     3. Basic mechanism of secretion by glandular cells.
     4. Lubricating and protective properties of mucus and its importance in GIT.
  
  b. Secretion of saliva:
  
  c. Oesophageal secretion:
  
  d. Gastric secretion:
     1. Characteristics of gastric secretions
     2. Regulation of gastric secretion by nervous and humoral mechanisms
  
  e. Pancreatic secretion - Regulation of pancreatic secretion
  
  f. Secretion of bile and functions of the biliary tree:
     1. Physiologic anatomy of biliary secretion.
     2. The bile salts and their function.
     3. Secretion of cholesterol - gallstone formation.
  
  g. Secretions of the small intestine:
     1. Secretion of mucus by Brunner’s glands and by mucus cells of the intestinal surface.
2 Secretion of intestinal digestive juices - the crypts of Lieberkuhn.
3 Regulation of small intestinal secretion
h. Secretions of the large intestine:

C Digestion and absorption in the GIT:
a. Digestion of various foods:
   1 Digestion of carbohydrates.
   2 Digestion of fats.
   3 Digestion of proteins.
b. Basic principles of gastrointestinal absorption:
   1 Anatomical basis of absorption
   2 Basic mechanisms of absorption.
c. Absorption in the small intestine:
   1 Absorption of water.
   2 Absorption of ions.
   3 Absorption of nutrients.
d. Absorption in the large intestine.
e. Formation of the faeces.

D Physiology of gastrointestinal disorders:
a. Disorders of the swallowing and of the oesophagus:
b. Disorders of the stomach - Peptic ulcer
c. Disorders of the small intestine.
d. Disorders of the large intestine.
   1 Constipation.
   2 Diarrhoea.
   3 Paralysis of the defecation reflex in spinal cord injury
d. General disorders of GIT:
   1 Vomiting.
   2 Nausea.
   3 Gastrointestinal obstruction.
   4 Gases in the GIT and flatus.

11 RENAL PHYSIOLOGY AND ACID BASE BALANCE 10 Hours

A Renal physiology:
a. Functional anatomy of the kidney.
b. Autoregulation of renal blood flow.
c. Mechanism of glomerular filtration.
d. Mechanism of glomerular filtration rate.
e. Reabsorption and secretion in the tubules.
f. Water and sodium homeostasis.
g. Effects of excessive intake.
h. Effects of water loss.
i. Regulation of tubular reabsorption of sodium.
j. Regulation of potassium balance.
k. Diuretics.

B Acid-base balance:
a. The hydrogen ion and pH.
b. Fundamental chemistry of acids and bases. Concept of pH and H⁺. H⁺ of body fluids, the Henderson - Hasselbach equation.


d. Body buffer systems, distributor of body buffer systems.

e. Respiratory regulation of acid - base balance.


g. Acid - base abnormalities

Practical course 60 hours

1. Blood Physiology 16 Hours
   a. Enumeration of RBC.
   b. Enumeration of WBC.
   c. Differential WBC count - blood film.
   d. Haemoglobin estimation.
   e. Determination of blood groups.
   f. Determination of erythrocytes sedimentation rate.
   g. Absolute blood value.

2. Cardiovascular system 12 Hours
   a. Measurement of arterial blood pressure.
   b. Effect of physical exercise on blood pressure, heart rate and respiratory rate.
   c. Electrocardiography.
   d. Measurement of blood flow (plethysmography).
   e. Effects of drugs on isolated mammalian heart.

3. Respiratory system 8 Hours
   b. Vitalography.
   c. Recording of respiratory movements (Stethograph)

4. Measurement of basal metabolic rate. 2 Hours

5. GIT: Effect of drug on isolated mammalian intestine 4 Hours

6. Nerve-muscle physiology 4 Hours
   a. Recording of simple muscle twitch (frog sciatic nerve gastrocnemius muscle preparation).
   b. Effects of temperature on simple c.muscle twitch
   c. Effects of repeated stimuli on muscle contraction
   d. Effects of fatigue on muscle contraction.

7. CNS: 14 Hours
   a. Special sense.
      1. Vision (Snellen charts for far vision, Ishihara charts for color blindness).
      2. Hearing (tuning fork tests - Rine and Weber test)
   b. Reflexes.
   c. EMG and nerve conduction study
   d. EEG