

# General Anatomy

## AN OUTLINE OF THE COURSE CONTENT:

1. General anatomy: Introduction of anatomical terms and brief outline of various systems of the body.
2. Regional anatomy of head & neck with osteology of bones of head & neck, with emphasis on topics of dental importance.
3. General disposition of thoracic, abdominal & pelvic organs.
4. The regional anatomy of the sites of intramuscular & intra vascular injections, & lumbar puncture.
5. General embryology & systemic embryology with respect to development of head & neck.
6. Histology of basic tissues and of the organs of gastrointestinal, respiratory, Endocrine, excretory systems & gonads.
7. Medical genetics.

## FURTHER DETAILS OF THE COURSE.

1. Anatomical terms.
2. Skin, superficial fascia & deep fascia
3. Cardiovascular system, portal system collateral circulation and arteries.
4. Lymphatic system, regional lymph nodes
5. Osteology - Including ossification & growth of bones
6. Myology – Including types of muscle tissue & innervation.
7. Syndesmology – Including classification of Joints.
8. Nervous system

## **II. HEAD & NECK:**

1. Scalp, face & temple, lacrimal apparatus
02. Neck - Deep fascia of neck, posterior triangle, suboccipital triangle, anterior triangle, anterior median region of the neck, deep structures in the neck.
03. Cranial cavity - Meninges, parts of brain, ventricles of brain, dural venous sinuses, cranial nerves attached to the brain, pituitary gland.
04. Cranial nerves - III, IV, V, VI, VII, IX, XII in detail.
5. Orbital cavity – Muscles of the eye ball, supports of the eye ball, nerves and vessels in the orbit.
6. Parotid gland.
07. Temporo mandibular joint, muscles of mastication, infratemporal fossa,

pterygo - palatine fossa. 08. Submandibular region 09. Walls of the nasal cavity, paranasal air sinuses 10. Palate 11. Oral cavity, Tongue 12. Pharynx (palatine tonsil and the auditory tube) Larynx. **OSTEOLOGY** – Foetal skull, adult skull, individual bones of the skull, hyoid bone and cervical vertebrae

## **III. THORAX : Demonstration on a dissected specimen of**

1. Thoracic wall
2. Heart chambers
3. Coronary arteries
4. Pericardium
5. Lungs – surfaces ; pleural cavity
6. Diaphragm

## **IV. ABDOMEN : Demonstration on a dissected specimen of**

1. Peritoneal cavity
2. Organs in the abdominal & pelvic cavity.

## **V. CLINICAL PROCEDURES :**

- a) Intramuscular injections: Demonstration on a dissected specimen and on a living person of the following sites of injection.
  1. Deltoid muscle and its relation to the axillary nerve and radial nerve.
  2. Gluteal region and the relation of the sciatic nerve.
  3. Vastus lateralis muscle.
- b) Intravenous injections & venesection: Demonstration of veins in the dissected specimen and on a living person.
  1. Median cubital vein
  2. Cephalic vein
  3. Basilic vein
  4. Long saphenous vein
- c) Arterial pulsations: Demonstration of arteries on a dissected specimen and feeling of pulsation of the following arteries on a living person.
  1. Superficial temporal
  2. Facial
  3. Carotid
  4. Axillary
  5. Brachial
  6. Radial
  7. Ulnar
  8. Femoral
  9. Popliteal
  10. Dorsalis pedis

- d) Lumbar puncture: Demonstration on a dissected specimen of the spinal cord, cauda equina & epidural space and the inter vertebral space between L4 & L5 .

#### VI. EMBRYOLOGY :

Oogenesis, Spermatogenesis, Fertilisation, Placenta, Primitive streak, Neural crest, Bilaminar and trilaminar embryonic disc, Intra embryonic mesoderm - formation and fate, notochord formation & fate, Pharyngeal arches, pouches & clefts, Development of face, tongue, palate, thyroid gland, pituitary gland, salivary glands, and anomalies in their development, Tooth development in brief.

#### VII. HISTOLOGY :

The Cell :

Basic tissues - Epithelium, Connective tissue including cartilage and bone, Muscle Tissue, Nervous tissue : Peripheral nerve, optic nerve, sensory ganglion, motor ganglion, Skin  
Classification of Glands

Salivary glands (serous, mucous and mixed gland), Blood vessels, Lymphoid tissue  
Tooth, lip, tongue, hard palate, oesophagus, stomach, duodenum, ileum, colon, vermiform appendix  
Liver, Pancreas, Lung, Trachea, Epiglottis, Thyroid gland, para thyroid gland, supra renal gland and pituitary gland, Kidney, Ureter, Urinary bladder, Ovary and testis.

#### VIII. MEDICAL GENETICS :

Mitosis, meiosis, Chromosomes, gene structure, Mendelism, modes of inheritance

#### RECOMMENDED BOOKS:

1. SNELL (Richard S.) Clinical Anatomy for Medical Students, Ed. 5, Little Brown & company, Boston.
2. RJ LAST'S Anatomy – McMinn, 9<sup>th</sup> edition.
3. ROMANES(G.J.) Cunningham Manual of Practical Anatomy : Head & Neck & Brain Ed.15.Vol.III, Oxford Medical publication.
4. WHEATER,BURKITT & DANIELS, Functional Histology, Ed. 2, Churchill Livingstone.
5. SADLER , LANGMAN'S, Medical Embryology, Ed. 6.
6. JAMES E ANDERSON, Grant's Atlas of Anatomy. Williams & Wilkins.
7. WILLIAMS, Gray's Anatomy, Ed.38. ,Churchill Livingstone.
8. EMERY,Medical Genetics.

## HUMAN PHYSIOLOGY

### 1. GENERAL PHYSIOLOGY

1. Homeostasis: Basic concept, Feed back mechanisms
2. Structure of cell membrane, transport across cell membrane
3. Membrane potentials

### 2. BLOOD:

Composition & functions of blood.

Specific gravity, Packed cell volume, factors affecting & methods of determination.

Plasma proteins - Types, concentration, functions & variations.

Erythrocyte - Morphology, functions & variations. Erythropoiesis & factors affecting erythropoiesis.

ESR- Methods of estimation, factors affecting, variations & significance.

Haemoglobin - Normal concentration, method of determination & variation in concentration.

Blood Indices - MCV, MCH, MCHC - definition, normal values, variation.

Anaemia - Definition, classification, life span of RBC's destruction of RBC's , formation & fate of bile pigments, Jaundice - types.

Leucocytes : Classification, number, percentage, distribution morphology, properties, functions & variation. Role of lymphocytes in immunity , leucopoiesis life span & fate of leucocytes.

Thrombocytes - Morphology, , number, variations, function & thrombopoiesis.

Haemostasis - Role of vasoconstriction, platelet plug formation in haemostasis, coagulation factors, intrinsic & extrinsic pathways of coagulation, clot retraction.

Tests of haemostatic function, platelet count, clotting time, bleeding time, prothrombin time - normal values, method & variations. Anticoagulants - mechanism of action. Bleeding disorders.

Blood groups: ABO & Rh system, method of determination, importance, indications & dangers of blood transfusion, blood substitutes.

Blood volume: Normal values, variations.

Body fluids : distribution of total body water, intracellular & extracellular compartments, major anions & cations in intra and extra cellular fluid.

Tissue fluids & lymph : Formation of tissue fluid, composition, circulation & functions of lymph.

Oedema - causes.

Functions of reticulo endothelial system.

### 3. MUSCLE AND NERVE

Classification of nerves, structure of skeletal muscle - Molecular mechanism of muscle contraction, neuromuscular transmission. Properties of skeletal muscle. Structure and properties of cardiac muscle & smooth muscle.

### 4. DIGESTIVE SYSTEM :

Introduction to digestion : General structure of G.I. tract, Innervation.

Salivary glands: Structure of salivary glands, composition , regulation of secretion & functions of saliva. Stomach: Composition and functions of gastric juice, mechanism and regulation of gastric secretion. Exocrine Pancreas - Structure, composition of pancreatic juice, functions of each component, regulation of pancreatic secretion.

Liver : structure , composition of bile, functions of bile, regulation of secretion –

Gall bladder : structure, functions.

Small intestine - Composition, functions & regulation of secretion of intestinal juice.

Large intestine - Functions.

Motor functions of GIT: Mastication, deglutition, gastric filling & emptying, movements of small and large intestine, defecation.

### 5. EXCRETORY SYSTEM :

Structure & functions of kidney, functional unit of kidney & functions of different parts.

Juxta glomerular apparatus, renal blood flow.

Formation of Urine : Glomerular filtration rate - definition, determination , normal values, factors influencing G.F.R. Tubular reabsorption - Reabsorption of sodium, glucose, water & other substances. Tubular secretion - secretion of urea, hydrogen and other substances. Mechanism of concentration & dilution of urine.

Role of kidney in the regulation of pH of the blood.

Micturition : anatomy & innervation of Urinary bladder, mechanism of micturition & abnormalities.

### 6. BODY TEMPERATURE & FUNCTIONS OF SKIN

### 7. ENDOCRINOLOGY

General endocrinology - Enumeration of endocrine glands & hormones - General functions of endocrine system, chemistry, mechanism of secretion, transport, metabolism, regulation of secretion of hormones. Hormones of anterior pituitary & their actions, hypothalamic regulation of anterior pituitary function. Disorders of secretion of anterior pituitary hormones.

Posterior pituitary : Functions, regulation & disorders of secretion.

Thyroid: Histology, synthesis, secretion & transport of hormones, actions of hormones, regulation of secretion & disorders, Thyroid function tests.

Adrenal cortex & Medulla -synthesis, secretion, action, metabolism, regulation of secretion of hormones & disorders.

Other hormones - Angiotensin, A.N.F.

## 8. REPRODUCTION

Sex differentiation, Physiological anatomy of male and female sex organs,  
Female reproductive system : Menstrual cycle, functions of ovary, actions of oestrogen & Progesterone, control of secretion of ovarian hormones, tests for ovulation, fertilisation, implantation, maternal changes during pregnancy, pregnancy tests & parturition.

Lactation, composition of milk, factors controlling lactation, milk ejection, reflex, Male reproductive system :spermatogenesis, semen and contraception.

## 9. CARDIO VASCULAR SYSTEM

Functional anatomy and innervation of heart Properties of cardiac muscle Origin & propagation of cardiac impulse and heart block.

Electrocardiogram - Normal electrocardiogram. Two changes in ECG in myocardial infarction.

Cardiac cycle - Phases, Pressure changes in atria, ventricles & aorta.

Volume changes in ventricles. Jugular venous pulse, arterial pulse.

Heart sounds: Mention of murmurs.

Heart rate: Normal value, variation & regulation.

Cardiac output: Definition, normal values, one method of determination, variation, factors affecting heart rate and stroke volume.

Arterial blood pressure: Definition, normal values & variations,determinants, regulation & measurement of blood pressure.

Coronary circulation.

Cardio vascular homeostasis - Exercise & posture.

## 10. RESPIRATORY SYSTEM

Physiology of Respiration : External & internal respiration.

Functional anatomy of respiratory passage & lungs.

Respiratory movements: Muscles of respiration, Mechanism of inflation & deflation of lungs.

Intra pleural & intra pulmonary pressures & their changes during the phases of respiration.

Mechanics of breathing - surfactant, compliance & work of breathing.

Spirometry: Lung volumes & capacities definition, normal values, significance, factors affecting vital capacity, variations in vital capacity, FEV & its variations.

Pulmonary ventilation - alveolar ventilation & dead space – ventilation.

Composition of inspired air, alveolar air and expired air.

Exchange of gases: Diffusing capacity, factors affecting it.

Transport of Oxygen & carbon dioxide in the blood.

Regulation of respiration – neural & chemical.

Hypoxia, cyanosis, dyspnoea, periodic breathing.

Artificial respiration, pulmonary function tests.

## 11. CENTRAL NERVOUS SYSTEM

1. Organisation of central nervous system

2. Neuronal organisation at spinal cord level

3. Synapse receptors, reflexes, sensations and tracts

4. Physiology of pain

5. Functions of cerebellum, thalamus, hypothalamus and cerebral cortex.

6. Formation and functions of CSF

7. Autonomic nervous system

## 12. SPECIAL SENSES

Fundamental knowledge of vision, hearing, taste and smell.

## PRACTICALS

The following list of practical is minimum and essential. All the practical have been categorised as procedures and demonstrations. The procedures are to be performed by the students during practical classes to acquire skills. All the procedures are to be included in the University practical examination. Those categorised as demonstrations are to be shown to the students during practical classes. However these demonstrations would not be included in the University examinations but question based on this would be given in the form of charts, graphs and calculations for interpretation by the students.

#### **PROCEDURES**

1. Enumeration of Red Blood Cells
2. Enumeration of White Blood Cells
3. Differential leucocyte counts
4. Determination of Haemoglobin
5. Determination of blood group
6. Determination of bleeding time and clotting time
7. Examination of pulse
8. Recording of blood pressure.

#### **DEMONSTRATION:**

1. Determination of packed cell volume and erythrocyte sedimentation rate
2. Determination of specific gravity of blood
3. Determination of erythrocyte fragility
4. Determination of vital capacity and timed vital capacity
5. Skeletal muscle experiments.

Study of laboratory appliances in experimental physiology. Frog's gastrocnemius sciatic preparation. Simple muscle curve, effects of two successive stimuli, effects of increasing strength of stimuli, effects of temperature, genesis of fatigue and tetanus. Effect of after load and free load on muscle contraction, calculation of work done.

6. Electrocardiography: Demonstration of recording of normal Electro cardiogram
7. Clinical examination of cardiovascular and respiratory system.

#### **TEXT BOOKS:**

Guyton; Text book of Physiology, 9<sup>th</sup> edition.  
Ganong; Review of Medical Physiology, 19<sup>th</sup> edition  
Vander; Human physiology, 5<sup>th</sup> edition  
Choudhari; Concise Medical Physiology, 2<sup>nd</sup> edition  
Chaterjee; Human Physiology, 10<sup>th</sup> edition  
A.K. Jain; Human Physiology for BDS students, 1<sup>st</sup> edition

#### **BOOKS FOR REFERENCE:**

- i) Berne & Levey; Physiology, 2<sup>nd</sup> edition
- ii) West-Best & Taylor's, Physiological basis of Medical Practise, 11<sup>th</sup> edition

#### **EXPERIMENTAL PHYSIOLOGY:**

- i) Rannade; Practical Physiology, 4<sup>th</sup> edition
- ii) Ghai; a text book of practical physiology
- iii) Hutchison's; Clinical Methods, 20<sup>th</sup> edition

## **BIOCHEMISTRY**

### **1. CHEMISTRY OF BIOORGANIC MOLECULES**

**Carbohydrates:** Definition, biological importance and classification. Monosaccharides - Isomerism, anomerism. Sugar derivatives, Disaccharides. Polysaccharides. Structures of starch and glycogen. **Lipids :** Definition, biological importance and classification. Fats and

**fatty acids. Introduction to compound lipids. Hydrophobic and hydrophilic groups. Cholesterol. Bile salts. Micelle. Bimolecular leaflet.**

**Proteins: Biological importance. Aminoacids: Classification. Introduction to peptides. Proteins : Simple and conjugated; globular and fibrous. Charge properties. Buffer action . Introduction to protein conformation . Denaturation.**

**Nucleic acids: Building units . Nucleotides. Outline structure of DNA and RNA.**

**High energy compounds: ATP , Phosphorylamidines, Thiolesters, Enol phosphates.**

## **2. MACRONUTRIENTS AND DIGESTION**

**Energy needs: Basal metabolic rate. Dietary carbohydrates, fibres. Dietary lipids, essential fatty acids. Nitrogen balance. Essential amino acids. Protein quality and requirement (methods for evaluation of protein quality to be excluded). Protein calorie malnutrition. Balanced diet.**

**Enzymatic hydrolysis of dietary carbohydrates. Mechanism of uptake of monosaccharides. Digestion and absorption of triacylglycerols. Enzymatic hydrolysis of dietary proteins and uptake of amino acids.**

## **3. MICRONUTRIENTS**

**Vitamins: Definition, classification, daily requirement, sources and deficiency symptoms. Brief account of water-soluble vitamins with biochemical functions. Vitamins A functions including visual process. Vitamin D and its role in calcium metabolism. Vitamin E. Vitamin K and gamma carboxylation. Introduction to antivitamins and hypervitaminosis.**

**Minerals :Classification, daily requirement. Calcium and phosphate: sources, uptake, excretion,**

**function. Serum calcium regulation. Iron: sources, uptake and transport.**

**Heme and nonheme iron functions; deficiency. Iodine: Brief introduction to thyroxine synthesis. General functions of thyroxine. Fluoride: function, deficiency and excess. Indications of role of other minerals.**

## **4. ENERGY METABOLISM**

**Overview: Outlines of glycolysis, pyruvate oxidation and citric acid cycle. Beta oxidation of fatty acids. Electron transport chain and oxidative phosphorylation. Ketone body formation and utilisation. Introduction to glycogenesis, glycogenolysis, fatty acid synthesis, lipogenesis and lipolysis. Gluconeogenesis. Lactate metabolism . Protein utilisation for energy. Glucogenic and ketogenic amino acids. Integration of metabolism.**

## **5. SPECIAL ASPECTS OF METABOLISM**

**Importance of pentose phosphate pathway. Formation of glucuronic acid. Outlines of cholesterol synthesis and breakdown. Ammonia metabolism. Urea formation. Phosphocreatine formation. Transmethylation. Amines. Introduction to other functions of amino acids including one carbon transfer. Detoxication : Typical reactions. Examples of toxic compounds. Oxygen toxicity**

## **6. BIOCHEMICAL GENETICS AND PROTEIN SYNTHESIS**

**Introduction to nucleotides; formation and degradation. DNA as genetic material. Introduction to replication and transcription. Forms and functions of RNA. Genetic code and mutation. Outline of translation process. Antimetabolites and antibiotics interfering in replication, transcription and translation. Introduction to cancer, viruses and oncogenes.**

## **7. ENZYME AND METABOLIC REGULATION**

**Enzymes: Definition, classification, specificity and active site. Cofactors. Effect of pH, temperature and substrate concentration. Introduction to enzyme inhibitors, proenzymes and isoenzymes. Introduction to allosteric regulation, covalent modification and regulation by induction/repression.**

**Overview of hormones. Introduction to second messengers, cyclic AMP, calcium ion, inositol triphosphate. Mechanism of action of steroid hormones, epinephrine, glucagon and insulin in brief. Acid base regulation. Electrolyte balance.**

## 8. STRUCTURAL COMPONENTS AND BLOOD PROTEINS

Connective tissue: Collagen and elastin. Glycosaminoglycans. Bone structure. Structure of membranes.

Membrane associated processes in brief. Exocytosis and endocytosis. Introduction to cytoskeleton.

Myofibril and muscle contraction in brief.

Haemoglobin: functions. Introduction to heme synthesis and degradation. Plasma proteins: classification and separation. Functions of albumin. A brief account of immunoglobulins. Plasma lipoproteins: Formation, function and turnover.

## 9. MEDICAL BIOCHEMISTRY

Regulation of blood glucose. Diabetes mellitus and related disorders. Evaluation of glycemic status. Hyperthyroidism and hypothyroidism: Biochemical evaluation. Hyperlipoproteinemias and atherosclerosis, Approaches to treatment. Jaundice: Classification and evaluation. Liver function tests: Plasma protein pattern, serum enzymes levels. Brief introduction to kidney function tests and gastric function tests. Acid base imbalance. Electrolyte imbalance: evaluation. Gout. Examples of genetic disorders including lysosomal storage disorders, glycogen storage disorders, glucose 6- phosphate dehydrogenase deficiency, hemoglobinopathies, inborn errors of amino acid metabolism and muscular dystrophy ( one or two examples with biochemical basis will be adequate). Serum enzymes in diagnosis.

**PRACTICALS: Contact hours 50**

1. Qualitative analysis of carbohydrates	4
2. Color reactions of proteins and amino acids	4
3. Identification of nonprotein nitrogen substance	4
4. Normal constituents of urine	4
5. Abnormal constituents of urine	4
6. Analysis of saliva including amylase	2
7. Analysis of milk Quantitative estimations	2
8. Titrable acidity and ammonia in urine	2
9. Free and total acidity in gastric juice	2
10. Blood glucose estimation	2
11. Serum total protein estimation	2
12. Urine creatinine estimation Demonstration	2
13. Paper electrophoresis charts/clinical data evaluation	2
14. Glucose tolerance test profiles	2
15. Serum lipid profiles	1
16. Profiles of hypothyroidism and hyperthyroidism	1
17. Profiles of hyper and hypoparathyroidism	1
18. Profiles of liver function	1
19. Urea, uric acid creatinine profile in kidney disorders	1
20. Blood gas profile in acidosis/ alkalosis	1

### RECOMMENDED BOOKS:

1. Concise text book of Biochemistry (3<sup>rd</sup> edition) 2001, T.N. Pattabiraman
2. Nutritional Biochemistry 1995, S. Ramakrishnan and S.V. Rao
3. lecture notes in Biochemistry 1984, J.K. Kandlish
  
1. Text book of Biochemistry with clinical correlations 1997, T.N. Devlin
2. Harper's Biochemistry, 1996., R.K. Murray et.al
3. Basic and applied Dental Biochemistry, 1979, R.A.D. Williams & J.C.Elliot

# DENTAL ANATOMY, EMBRYOLOGY AND ORAL HISTOLOGY

1. Introduction to tooth morphology:  
Human dentition, types of teeth, & functions, Palmer's & Binomial notation systems, tooth surfaces, their junctions - line angles & point angles, definition of terms used in dental morphology, geometric concepts in tooth morphology, contact areas & embrasures - Clinical significance.
2. Morphology of permanent teeth :  
Description of individual teeth, along with their endodontic anatomy & including a note on their chronology of development, differences between similar class of teeth & identification of individual teeth.

Variations & Anomalies commonly seen in individual teeth.

3. Morphology of Deciduous teeth :  
Generalized differences between Deciduous & Permanent teeth.  
Description of individual deciduous teeth, including their chronology of development, endodontic anatomy, differences between similar class of teeth & identification of individual teeth.
4. Occlusion :  
Definition, factors influencing occlusion - basal bone, arch, individual teeth, external & internal forces & sequence of eruption.  
Inclination of individual teeth - compensatory curves.  
Centric relation & Centric occlusion - protrusive, retrusive & lateral occlusion. Clinical significance of normal occlusion.  
Introduction to & Classification of Malocclusion.

## II. ORAL EMBRYOLOGY

1. Brief review of development of face, jaws, lip, palate & tongue, with applied aspects.
2. Development of teeth :  
Epithelial mesenchymal interaction, detailed study of different stages of development of crown, root & supporting tissues of tooth & detailed study of formation of calcified tissues.  
Applied aspects of disorders in development of teeth.
3. Eruption of deciduous & Permanent teeth :  
Mechanisms in tooth eruption, different theories & histology of eruption, formation of dentogingival junction, role of gubernacular cord in eruption of permanent teeth.  
Clinical or Applied aspects of disorders of eruption.
4. Shedding of teeth :  
Factors & mechanisms of shedding of deciduous teeth. Complications of shedding.

## III. ORAL HISTOLOGY

1. Detailed microscopic study of Enamel, Dentine, Cementum & Pulp tissue. Age changes & Applied aspects (Clinical and forensic significance) of histological considerations - Fluoride applications, transparent dentine, dentine hypersensitivity, reaction of pulp tissue to varying insults to exposed dentine ; Pulp calcifications & Hypercementosis.
2. Detailed microscopic study of Periodontal ligament & alveolar bone, age changes, histological changes in periodontal ligament & bone in normal & orthodontic tooth movement, applied aspects of alveolar bone resorption.
3. Detailed microscopic study of Oral Mucosa, variation in structure in relation to functional requirements, mechanisms of keratinization, clinical parts of gingiva, Dentogingival & Mucocutaneous junctions & lingual papillae. Age changes & clinical considerations.
4. Salivary Glands :



Detailed microscopic study of acini & ductal system. Age changes & clinical considerations.

Review of basic anatomical aspects & microscopic study & clinical considerations.

Microscopic study, anatomical variations, functions & clinical relevance of maxillary sinus in dental practice.

7. Processing of Hard & soft tissues for microscopic study :  
Ground sections, decalcified sections & routine staining procedures.

8. Basic histochemical staining patterns of oral tissues.

#### IV. ORAL PHYSIOLOGY

##### 1. Saliva :

Composition of saliva - variations, formation of saliva & mechanisms of secretion, salivary reflexes, brief review of secretomotor pathway, functions, role of saliva in dental caries & applied aspects of hyper & hypo salivation.

##### 2. Mastication :

Masticatory force & its measurement - need for mastication, peculiarities of masticatory muscles, masticatory cycle, masticatory reflexes & neural control of mastication.

Review of the steps in deglutition, swallowing in infants, neural control of deglutition & dysphagia.

##### 4. Calcium, Phosphorous & fluoride metabolism :

Source, requirements, absorption, distribution, functions & excretion, clinical considerations, hypo & hypercalcemia & hyper & hypo phosphatemia & fluorosis.

##### 4. Theories of Mineralization :

Definition, mechanisms, theories & their drawbacks.

Applied aspects of physiology of mineralization, pathological considerations - calculus formation.

Innervation of taste buds & taste pathway, physiologic basis of taste sensation, age changes & applied aspects - taste disorders.

Review of basic anatomy of larynx & vocal cords.

Voice production, resonators, production of vowels & different consonants - Role of palate, teeth & tongue.

Effects of dental prosthesis & appliances on speech & basic speech disorders.

#### RECOMMENDED TEXT BOOKS

1. Orban's Oral Histology & Embryology - S.N.Bhaskar
2. Oral Development & Histology - James & Avery
3. Wheeler's Dental Anatomy, Physiology & Occlusion - Major.M.Ash
4. Dental Anatomy - its relevance to dentistry - Woelfel & Scheid
5. Applied Physiology of the mouth - Lavelle
6. Physiology & Biochemistry of the mouth - Jenkins