BDS

Year-I

Revised Curriculum (2025)

(Version-III)

NATIONAL UNIVERSITY OF MEDICAL SCIENCES

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INTRODUCTION

1. **Preamble**

The recently revised standards by the Pakistan Medical and Dental Council (PM&DC) encourages integration of major subjects both horizontally and longitudinally. This curriculum meets the standards of Pakistan Medical and Dental Council and our students, on completion of program will develop required competencies as defined worldwide in a graduate doctor.

BDS Years I will deal with the normal structure, function and biochemical aspects of topics relevant to dentistry which will be delivered in an integrated manner in clinical context. This curriculum also aims to improve different skills of the future dentists including communication, leadership & management and research skills and inculcate ethical values and professionalism

This curriculum has been developed by the BDS faculty from constituent/affiliated colleges in collaboration with NUMS Academic Directorate

2. **Curriculum perspective**

NUMS curriculum is evolved taking into consideration Constructivist, Cognitivist, behaviorist with some element of Constructivist approach. It allows students to construct their own knowledge based on what they already know and to use that knowledge in purposeful activities requiring decision making, problem solving, and judgments.

3. **Level of integration**

NUMS will follow Correlation i.e level 7 of Harden's level of Integration. The emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching. This session brings together areas of interest common to each of the subjects. Though the teaching is discipline based, topics are correlated and taught with clinical context for better understanding and application of concepts. However clinical teaching increases gradually with advancing years.

a. Curricular organization and structure

1) There will be three blocks in year I, each will have modules, duration of which depends upon the number and complexity of the objectives to be achieved in that module
2) The curriculum will be delivered by modular teams of multidisciplinary basic science faculty and relevant clinical faculty.
3) The planning and delivery will be coordinated by year coordinators who will guide module coordinators of their respective years for efficient implementation

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4) Modular Coordinator will be responsible for teaching and assessment during each module. S/he will be appointed by HoDs in coordination with HPE team All NUMS colleges will provide study guides of each module to the students
5) To attain the integration in BDS program, spiral curriculum is being introduced in which two themes of basic dental (integration of oral biology with other dental subjects) and medical subjects (Anatomy, physiology and biochemistry) will be running simultaneously
6) General Education Courses are an integral part of year I & II. However, assessment of these subjects will be the responsibility of institute itself except for Isamiat and Pakistan Studies which will be assessed by the University in first professional exam
7) Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

4. **Competencies**

The focus of this curriculum is on the roles of a general physician as identified in the can MEDS. These are Medical Expert, Manager, Communicator, Health Advocate, Collaborator, Professional and Scholar. Competencies focused in year I are.

1) Medical Knowledge
2) Problem solving
3) Procedural skills
4) Communication skills
5) Empathy
6) Professionalism
7) Leadership and Management skills
8) Research skills

5. **Outcomes**

By the end of first year, students should be able to:

- Apply the knowledge of orofacial biology and tooth development to its clinical significance.
- Correlate the developmental and anatomical knowledge of different organ systems of human body to their physiological and biochemical basis
- Communicate clearly and effectively.
- Discuss the basic principles of research
- Analyze multiple perspectives of Islamic and Pakistan studies.

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6. **Contact Hours**

SUBJECTS	Subject Teaching
Anatomy	300
Physiology	300
Biochemistry	170
Oral Biology	170
Pre-clinical(Operative & Prosthodontics)	4
Orthodontics	4
Operative	3
Oral Pathology	4
Periodontology	2
OMFS	2
Oral Medicine	3
Community Dentistry	2
Dental Material	3
Prosthodontics	3
Research Methodology & EBM	10
Total Hours	**980**

Generic Competencies	
Quran Kareem	25
Islamiyat	25
Pakistan Studies	25
Expository writing	25
Computer skills	25
Leadership and Management	05
Professionalism	05
Co- curricular activities/sports	50
Total Hours	**185**
GRAND TOTAL	**1165**

7. **Academic Calendar**

Theme: Basis of Medicine I									
Blocks	**BLOCK-I 11+1= 12 weeks**			**BLOCK-II 12+1= 13 weeks**			**BLOCK-III 10+1= 11 weeks**		
Duration	**02 wks**	**06 wks**	**03 wks**	**05 wks**	**02 Wks**	05 wks	**06 Wks**	**02 Wks**	**02 Wks**
Modules	**Foundation I**	**Cell Structure & Function**	**Respiratory System**	**CVS**	**Endocrinology**	**Craniofacial**	**Neuroscience**	**Digestive system & Metabolism**	**Renal system**

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Blocks	BLOCK-I 11 + 1 = 12 weeks				Block-II 12 + 1 = 13 weeks			Block-III 10 + 1 = 11 weeks		
Duration	01 wk	04 wks	03 wks	03 wks	08 wks	03 wks	01 wk	05 wks	02 wks	03 wks
Themes	Essentials of Dentistry I				Dental & Periodontal Tissues in Health & Disease				Craniofacial structures: A comprehensive learning	
Modules	M1 Orofacial Biology	MII Oral Mucosa	MIII Tooth Form & Structure	MIV Growth & Development	MV Dental Tissues	MVI Periodontal Tissues	MVII Tooth Morphology - I	MVIII Tooth Morphology - II	MIX Oral Physiology	MX Paraoral structures
Integrated subjects	Anatomy	Oral Pathology Oral Medicine Prosthodontics	Operative Dentistry Orthodontics	Oral Pathology Orthodontics OMFS	Dental Materials Oral Pathology Operative Dentistry	Periodontology Prosthodontics Orthodontics	Operative Dentistry	Operative Dentistry	Orthodontics	Oral Medicine Prosthodontics

8. **Educational Strategies (These are proposed, but institutes can use other evidence-based teaching methodologies that suit their context)**
   1) Lectures
   2) Small group discussion
   3) Lab practical
   4) Skill lab
   5) Integrated Session
   6) Problem based learning/ Case based learning
   7) Tutorials

9. **Resources**. To be filled in by the institute
   1) Faculty
   2) Facilities
   3) Administration for Course
   4) Administrative structure
   5) Communication with students
10. **Internal Assessment**
    - Formative assessment (low stake) is at faculty discretion like mid module test and other class tests.
    - There will be three end of blocks and one pre-annual examination in year I, which contributes towards the weighting of internal assessment i.e 20% in first professional BDS Examination.
    - Weightage of all exams in internal assessment is attached as **Annex-A**
11. **Annual Professional Examination (80% weightage)**
    - The University will take the first professional Examination at the end of the academic year.
    - There will be a total of five papers in first Professional exam.
    - Paper I, II, III for each block of basic medical subjects and Paper IV will comprise of all blocks of dental subjects
    - Paper I, II, III have three sections of Anatomy, Physiology and Biochemistry with total 40 Marks of each subject in each paper whereas Paper IV will be based on integrated modules of dental sciences of all blocks, with MCQs and SAQs in 70: 30 ratios.

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- There will be 4 x Integrated Practical Exam and structured viva block wise of 150 Marks each.
- It is mandatory to secure minimum 50% passing Marks (aggregate), in theory & practical each, in Prof Exam. However, in theory of integrated exam, min. 40% Marks shall be secured in each subject component (Anatomy, Physiology, and Medical Biochemistry) in every paper. Student will have to repeat the block-wise paper in which he/she secures less than 40% Marks in any section.
- Paper V will be of Islamiyat and Pakistan Studies. There will be 50 marks theory paper each of Islamiat and Pakistan Studies. Non- Muslims may opt for ethics instead of Islamic Studies. Pass marks for Islamic / Pakistan Studies are 50 % which, however will not be counted towards final scoring of the professional examination. It is mandatory to pass Islamic Studies / Ethics and Pakistan Studies before final annual professional of MBBS/BDS.
- **General Education Courses**.
    - DME will be responsible for overseeing the teaching schedule and assessment of General Courses.
    - Teaching methodology and mode of assessment for these courses, will be done by the institute.
    - General Courses shall be assessed by concerned faculty
    - Minimum passing criteria for each course - 50%
    - Faculty of General Courses will submit the final results to Assistant Controller of Examinations of the institute for onward submission to NUMS Exam Dte
    - Marks will not be included in total aggregate marks/ academic awards
    - It is mandatory to pass these courses before final annual professional of MBBS/BDS.

12. **Evaluation of the Course.** To be filled in by the institute.
    - The major goals of the evaluation are to monitor quality of and improve curriculum
    - Student portfolio shall be maintained in the departments in which students will give their feedback either by name or anonymously. Feedback may be taken at the end of module, online and informal student feedback during the running module
    - Faculty suggestions if any, for improvement of curriculum and teaching may be incorporated in the next session
13. **Implementation of curriculum**
    - The university will give academic calendar, block wise distribution of modules, learning outcomes, table of specifications and assessment policy
    - Implementation of curriculum including time table, distribution of content across the whole years and rotations plan is upon the discretion of the medical college/institute
    - Early clinical exposure may be achieved by allocating hours to skill labs, Medicine & Surgery ward visits in each module or patient may be brought before the students as per the decision of institute

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MODULE I ; FOUNDATION MODULE

Duration: 02 weeks

MODULE PLANNING COMMITTEE

Module Coordinator	**To be filled by the institutes**
Members	

ANATOMY				
Topic/ Theme	**Learning Outcomes**	**Learning Objectives/ Contents**	**Instructional Strategy**	**Assessment Tool**
	By the end of the module students will be able to:			
General Anatomy				
Introduction to anatomical terms and planes	Comprehend basic terminology and planes of the sections to facilitate further knowledge	**Knowledge** Define different disciplines of Anatomy Identify terms of position in relation to anatomical position: • Anterior /Posterior • Ventral /Dorsal • Superior /Inferior • Caudal / Rostral / Cranial • Medial /Lateral • Proximal /Distal • Palmar /plantar • Superficial/Deep • Supine /Prone Identify the following anatomical planes with the help of diagrams. • Coronal • Sagittal • Horizontal • Parasagittal Identify the various techniques to study anatomy in the living such as Plain radiographs **Skill:** Identify type of section on a model Demonstrate normal anatomical position in a SP	• Lectures • SGD	• MCQ • SAQ/ OPSE/ Structured viva
	Appraise the movements occurring at different types of movements occurring at different joints of the body .	**Knowledge** Identify the terms of movements with general reference to the axis and planes in which they occur • Flexion /Extension • Abduction /Adduction • Lateral rotation / Medial rotation	• Lectures • SGD	• MCQ • SAQ • OPSE/ • Structured viva

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		• Pronation /Supination • Plantar flexion / Dorsal flexion • Circumduction • Eversion /Inversion **Skill:** Demonstrate these movements in a subject		
Osteology	Summarize the general features of bones.	• Identify the axial and appendicular parts of a human skeleton. • Classify bones according to their development and shape giving examples of each type especially from head and neck (wherever possible). • Describe the process of both types of ossification • Describe blood supply of the long & diploic bones		
Myology	Appraise the general features of muscles	• Classify muscles into three basic types • Correlate skeletal muscles according to their shape, Muscle fibre types and functions with examples of each type		
Arthrology	Anatomize the general Features of joints Classify joints According to their structure with examples of each type especially from head and neck (wherever possible)	• Describe the general structure of a synovial joint • Discuss anatomy of joints with reference to dislocation, sprain, and inflammation • Describe Hilton's law		
PHYSIOLOGY				

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Introduction	Comprehend the basic concepts of Physiology	Describe the organization of human body (from cell to multicellular organism)	LGIS	Assignment
BIOCHEMISTRY				
Introduction to Biochemistry	Comprehend the basic concepts of biochemistry	• What is Biochemistry? • The scope ofbiochemistry ▪ Importance ofbiochemistry	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ ▪ Structured viva

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BDS YEAR I
BLOCK I
MODULE II
Cell Structure & Function
Duration: 06 weeks

MODULE PLANNING COMMITTEE

Module Coordinator	***To be filled by the institutes***
Members	

Learning outcomes

By the end of this module, students will be able to integrate embryological, histomorphological, physiological, and biochemical knowledge to analyze the structure and function of cells, blood components, and appraise the clinical aspects of their dysfunctions

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ANATOMY				
Topic/ Theme	**Learning Outcomes**	**Learning Objectives/ Contents**	**Instructional Strategy**	**Assessment Tool**
	By the end of the module students will be able to:			
Gametogenesis	Elaborate the development of germ cell	• Revisit cell division, mitosis &meiosis • Describe the events of spermatogenesis • Describe the events of spermiogenesis • Describe the relation of ovarian cycle with maturation of follicles. • Describe the stages of follicular maturation - Primary - Preantral - Secondary - Preovulatory. • Describe the process of ovulation and correlate its timing with ovarian cycle. • Define fertilization • State normal site of fertilization • Describe the results of fertilization • Enlist the factors affecting fertilization • Enumerate the changes that occur in spermatozoa before fertilization • Explain the factors affecting penetration of sperm through the zona pellucida for formation of Pro-nuclei.	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/ OPSE/ Structured viva
First week of Development	Appraise the events of first week of development of the embryo	• Appraise the implantation and its normal site • Describe the changes in uterus at time of implantation. • Explain the process of cleavage • Explain the formation of morula and blastula	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/ OPSE/ Structured viva

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		• Describe the formation of inner and outer cell mass within the blastocyst cavity • Appraise abnormal sites for implantation (ectopic pregnancy) and its clinical significance.		
Second week of development	Appraise the events of second week of development of the embryo	• Discuss the formation of bilaminar embryonic disc from embryoblast. • Describe early differentiation of trophoblast • Explain the formation of amniotic cavity • Explain the formation of chorion, secondary yolk sac and chorionic plate. • Explain the establishment of uteroplacental circulation. • Appraise 2nd week as week of twos.	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/ OPSE/ Structured viva
Third week of development	Appraise the events of third week of development of the embryo	• Define gastrulation (formation of three germ layers) • Discuss the development, significance and fate of primitive streak • Describe the development of notochordal process, notochord canal, prechordal plate and cloacal membrane • Compare the topographic arrangement and derivatives of three components of intraembryonic Mesoderm (Paraxial, Intermediate and Lateral Plate Mesoderm) • Describe early development of CVS. • Describe differentiation of trophoblast during third week and formation of primary,	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/ OPSE/ Structured viva

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		secondary and tertiary chorionic villi • Enumerate the parts of placenta • Explain formation and fate of allantois.		
HISTOLOGY				
Cell	Appraise the light microscopic structure of the cells	**Knowledge** • Introduction to histology, microscope • Differentiate between acidophilic and basophilia. • Enumerate different cell organelles and identify staining reaction of each. • Illustrate shapes of different cells with example • Enumerate different components of the cytoskeleton. • Correlate the structure of different type of intercellular junctions with their functions. **Skills** • Focus the prepared slide at different magnifications. • Draw the labeled diagram of cells having various shapes.	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/ OPSE/ Structured viva
Epithelium	Appraise the light microscopic structure of epithelial tissue	**Knowledge** • Define epithelium • Compare surface Epithelium with examples of each type. • Classify glandular epithelium with examples of each type. • Compare the ultrastructure of microvilli, stereocilia and cilia and correlate with their roles in various cellular functions • Classify glands according to their morphology, secretory products and mode of secretion	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/ OPSE/ Structured viva

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		with examples of each type **Skills** • Identify different types of epithelia under light microscope and enlist at least two identification points for each type. • Draw labelled diagrams of each type of epithelium. • Compare and contrast between the histological structure of serous and mucous secreting cells. • Draw labelled diagram of mucous and serous acini		
Connective tissue	Appraise the light microscopic structure of connective tissue	**Knowledge** • Define connective tissue and list three basic components of connective tissue. • List different types of cells and fibers in the connective tissue. • Compare various types of connective tissue with example of each type. • Summarize a brief account • of histological features of different types of connective tissue. **Skills** • Identify the slides of loose connective tissue, dense regular, dense irregular and adipose connective tissue under light microscope and list at least two identification points of each type. • Draw labelled diagrams showing light microscopic structure of loose connective tissue, dense regular, irregular and adipose connective tissue	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/ OPSE/ Structured viva

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Muscle		**Knowledge** • Differentiate the microscopic features skeletal, smooth and cardiac muscle while correlating with their functions. • Explain the histological differencesof different types of muscles. **Skills** • Identify microscopic sections of different types of muscle under light microscope and list at least two identification points of each type • Draw labelled diagrams showing light microscopic structure of different types of muscles**.**	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/ OPSE/ Structured viva
Bone & cartilage	Distinguish and illustrate the microscopic structures of bones and cartilages, and correlate their features with functional significance in dental contexts	**Knowledge** • Compare microscopic structure of compact and cancellous bone. • Correlate the process of bone remodeling with tooth bracing and adjustment. • Compare the microscopic structure of hyaline, elastic and fibro- cartilages • Explain the histological differences of different types of cartilages. **Skills** • Identify the slides of cancellous and compact bone under light microscope and list at least two identification points of each type. • Draw labelled diagrams showing light microscopic structure of different types of cartilages, cancellous and	▪ Lectures ▪ SGD	▪ MCQ ▪ SAQ/OPSE/ Structured viva

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		compact bones.		
PHYSIOLOGY				
CELL & GENERAL PHYSIOLOGY				
Topic/ Theme	**Learning outcomes**	**Learning Objectives/Contents**	**Instructional strategies**	**Assessment tool**
Homeostasis	Appraise functional Organization of the Human Body and Control of the "Internal Environment"	• Recognize the interplay of various organ systems in maintaining homeostasis. • Identify the role of feedback mechanisms (positive, negative, feed forward) in maintaining 'internal milieu'. • Differentiate between composition of intracellular and extra cellular fluid	LGIS	▪ MCQ ▪ SAQ ▪ Structured viva
Cell Physiology	Relate the structure of cell and its various components to metabolic processes, genetic control and locomotion	• Revisit the structure and function of the cell and its organelles (cell Membrane, cytoplasmic organelles, nuclear membrane, nuclear organelles) • Classify various • Compare and contrast modes of transport of substances across the cell-membrane with examples • (osmosis, diffusion, facilitated diffusion, primary active transport, secondary active transport)	LGIS	▪ MCQ ▪ SAQ ▪ Structured viva
FUNCTIONAL ORGANIZATION OF NERVE & MUSCLE				
NERVE & MUSCLE	Relate the structure and function of muscles to their clinical significance Relate the biochemical role of enzymes and coenzymes to its clinical significance	**<u>Anatomy</u>** • Differentiate the microscopic features skeletal, smooth and cardiac muscle while correlating with their functions. • Explain the histological differences of different types of muscles. • Identify microscopic sections of	SGD, LGIS & CBL	MCQs, SAQs, OSPE, Structured Viva

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		different types of muscle under light microscope and list at least two identification points of each type • Draw labelled diagrams showing light microscopic structure of different types of muscles. **Neuro-vasculature of limbs** • Outline the formations, divisions and branches of the brachial plexus • Outline the area of supply of axillary, radial, ulnar, median and sciatic nerves in terms of sensory and motor distribution. • Trace the route of main arteries and veins of upper and lower limbs. • Analyze the clinical importance of vessels present in the cubital fossa. • Identify veins commonly used for cannulation • Elucidate the clinical significance of brachial and radial artery with reference to pulse and BP monitoring. • Mention main arteries supplying lower limb. • Define superficial and deep venous drainage of the lower limb. • Define the importance of great saphenous vein in CABG. • Discuss the anatomical basis of varicose veins. • Define aneurysm. **<u>Surface marking</u>** • Mark the following vessels on a subject Ulnar and radial artery, Cephalic and basilic vein		

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		• Identify main arteries and veins supplying the upper and lower limb on a model. • Examine pulses of upper and lower limb in a subject. **<u>Physiology</u>** **Membrane Potentials and Action Potentials** • Appraise basis of development of membrane potential across excitable membrane. • Recognize Nernst potential and its importance in generation of membrane potential. • Identify various factors/mechanisms responsible for the genesis of membrane potential (role of channels, carrier proteins, stimuli). • Illustrate different phases of action potential mentioning details of ionic changes occurring during each phase of action potential. • Distinguish types and importance of refractory period. • Differentiate between myelinated and non-myelinated nerve fibers based on their structure and characteristics. • Excitation contraction coupling and NMJ • Tabulate macroscopic, microscopic, functional differences of smooth, skeletal and cardiac muscle • Illustrate neuromuscular		

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		junction, sequence of events taking place during neuromuscular transmission • Explain the physiological importance of a motor unit • Describe the ionic and chemical basis of muscle contraction. • Distinguish between phases of muscle contraction in detail. • Relate the pathophysiology of neuromuscular transmission in myasthenia gravis • Excitation and Contraction of Smooth Muscle • Describe the role of SER in smooth muscle contraction **<u>Medical Biochemistry</u>** **Enzymes** • Introduction, definition and classification of Enzymes • Mechanism of catalysis • Coenzymes, co-factors and their biomedical role in human body • Km, Vmax-concept of Enzyme Kinetics and biomedical importance • Factors affecting enzymes activity in the human body • Enzyme inhibitors and their classification and biomedical importance • Overview of regulation of enzyme activity • Overview of Vitamins as coenzymes (B1, B2, B3, B6, biotin, pantothenic acid) • Clinical Enzymology		
Haematology & Immunology				
RBCs	▪ Explain the early	**<u>Anatomy</u>**	LGIS/ SGD	MCQ / SAQ /

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	embryonic development while correlating anatomical changes with their physiological roles and clinical implications ▪ Relate the physiological and biochemical knowledge of red blood cells to analyze relevant clinical scenarios	**<u>Embryology</u>** • List derivatives of: ○ Intraembryonic mesoderm (especially lateral plate and paraxial mesoderm → blood and bone marrow) ○ Endoderm (yolk sac role in early hematopoiesis) • Correlate the relocation of the connecting stalk and its differentiation into the umbilical cord (as umbilical vessels carry early fetal blood). • Identify structures involved in early hematopoietic development on embryology models. **<u>Physiology</u>** **Hemopoiesis** • Differentiate between various types of blood cells on the basis of their morphological and physiological characteristics. • Overview sites of hemopoiesis in the body during different stages of life along with composition and • Functions of bone marrow. • Identify the factors regulating erythropoiesis and maturation of RBC. • Appreciate the composition of blood and general functions of blood. • Explain different types of plasma proteins with their functional significance **Red Blood Cells Dyscrasias** • Relate the morphology and physiology of different types of hemoglobin • Compare and contrast different types of anemia on the basis of		OPSE / Structured viva

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		etiology, pathophysiology, clinical • presentations and blood picture. • Describe etiology, pathophysiology and clinical presentation of polycythemia. **<u>Medical Biochemistry</u>** **Hemoglobin** • Chemistry and biosynthesis of hemoglobin • Structure, functions and types of hemoglobin • Oxygen binding capacity of hemoglobin, factors affecting and regulating the oxygen binding capacity of hemoglobin • Degradation of heme, formation of Bile pigments, their types, transport and excretion • Hyperbilirubinemia and biochemical causes and differentiation • Jaundice and its types • Hemoglobinopathies (HP-S, Thalassemia) and their biochemical causes **Biochemical basis of Anemia** • Role of Vit B9 & B12 in Nutritional Anemia • Role of Fe in Nutritional Anemia • Role of Vitamin C & K in bleeding disorders		
Inflammation & Immunity	Correlate the histological, and physiological knowledge of white	**<u>Anatomy</u>** **<u>Histology</u>** **Lymphoid system**	SGD, LGIS & CBL	MCQs, SAQs, OSPE,

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	blood cells and plasma protiens with their clinical significance	• Enumerate different types of lymphoid cells and identify their distribution in the body • Describe the histological features and cells of the lymphoid system • Describe the histological features of tonsils, thymus, lymph node and spleen. • Identify histological sections of tonsils, thymus, lymph node and spleen under light microscope and list at least two identification points of each. **<u>Physiology</u>** **WBCs & Immunity** • Relate the morphology and physiology of different WBCs with clinical presentations of leucopenia, leukocytosis and leukemia. • Appraise the clinical significance of RES reticuloendothelial system. • Describe pathophysiology of inflammation and necrosis • Describe the physiological basis of vaccination. **<u>Medical Biochemistry</u>** **Plasma proteins and Immunoglobulins** • Describe Plasma proteins & give their clinical significance • Draw and label the Structure of Immunoglobulins • Enumerate major types,		Structured Viva

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		functions & properties of Immunoglobulins		
Blood Grouping, Coagulation, and Clinical Relevance	Describe the key developmental processes during the embryonic period while correlating these events with their clinical significance Apply the knowledge of genetics and molecular biology in treatment of diseases	**<u>Anatomy</u>** Define neurulation Define the process of formation of neural plate, neural tube, and neural crest cells List derivatives of: Surface ectoderm • Neurectoderm • Neural crest (which gives rise to autonomic nervous system elements that modulate vascular tone) • Define folding of the embryo in the median and horizontal planes and correlate with consequences (relates to positioning of developing vessels) • Correlate relocation of the connecting stalk and its transformation into the umbilical cord • Identify embryological structures on models **<u>Physiology</u>** **Hemostasis and Blood Coagulation** • Identify role of cells and proteins involved in the process of maintaining hemostasis. • Differentiate between intrinsic and extrinsic regulations of blood coagulation • Discuss the etiology, pathophysiology and clinical presentation of thrombocytopenia, thrombocytosis and hemophilia	SGD, LGIS & CBL	MCQs, SAQs, OSPE, Structured

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		Blood grouping and Transfusion reactions • Explain the principles of blood grouping keeping in view their physiological significance. Identify the various blood groups and hazards of matched and mismatched blood **<u>Medical Biochemistry</u>** **Genetics** • Overview of replication, transcription & translation (not the steps) • Mutations • Cell Cycle • Overview of Molecular Biology and role in treatment of diseases		

Suggested Linkers	
Cell Organellar Function	Lysosomal Storage Disease, Kartagener Syndrome, Chromosomal Abnormalities, Down Syndrome
Functional Organization of Nerve & Muscle	Neuromuscular Disorders
RBCs	Pallor/ Jaundice
Inflammation & Immunity	Leucocytosis/ Leucopenia
Blood Grouping, Coagulation, and Clinical Relevance	Transfusion Reaction
	Bleeding/ Coagulation Disorders

<u>Practicals</u>

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Anatomy	Identify H & E-Stained Tissues Under the Light Microscope with Identification Points and Examples.
	• **Epithelium;**
	  ○ All types of simple epithelia
	  ○ All types of stratified epithelia
	  ○ Glands
	• **Connective Tissue**
	  ○ Loose Connective Tissue
	  ○ Dense Connective Tissue
	  ○ Reticular Connective Tissue
	  ○ Adipose Tissue
	• **Muscle**
	  ○ Skeletal Muscle
	  ○ Cardiac Muscle
	  ○ Smooth Muscle
	• **Bone**
	  ○ Compact
	  ○ Spongy
	• **Cartilage**
	  ○ Hyaline cartilage
	  ○ Elastic cartilage
	  ○ Fibro cartilage
	• **Lymphoid organs**
	  ○ Lymph Node
	  ○ Thymus
	  ○ Spleen
	  ○ Palatine Tonsils

Physiology	• Study of Microscope • Packed Cell Volume • Study of Hemocytometer • ESR • RBC Count • WBC Count • Bleeding Time • Platelet Count • Clotting time • DLC • Hb Estimation • Blood Group • Red cell Indices

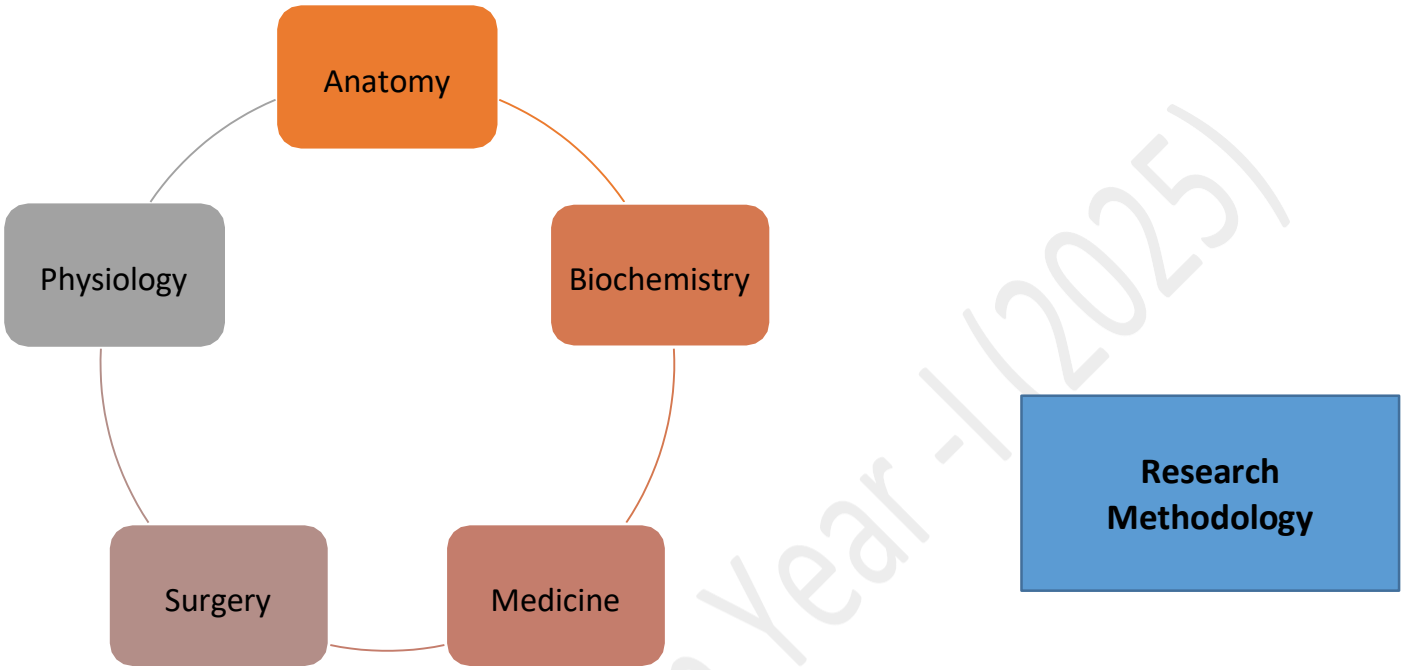
BDS Curriculum Year -I (2025)

Medical Biochemistry	Introduction to use of laboratory Glassware Introduction to use of Laboratory Equipment-I • Micro lab • Incubator • Water Bath • Hot Air Oven Introduction to use of Laboratory Equipment-II • Cytological techniques including Centrifuge • Electric Balance • pH Meter • PCR Safety in laboratories Blood sample collection and storage Estimation & clinical interpretation of Serum Amylase using Micro lab Estimation & clinical interpretation of Serum Bilirubin using Micro lab

BDS Curriculum Year-I (2025)

BDS YEAR I
BLOCK I
MODULE III
Respiratory system
Duration: 03 weeks

Integration of Disciplines in Module



BDS Curriculum Year-I (2025)

MODULE PLANNING COMMITTEE

Module Coordinator	***To be filled by the institutes***
Members	

Preamble

The respiratory system plays a crucial role in maintaining oxygenation and acid-base balance, which are essential for overall health, including oral and systemic functions. Understanding the anatomical structures, physiological mechanisms, and biochemical processes of respiration is vital for dental professionals, as respiratory conditions can directly impact patient management in a clinical setting. By integrating concepts from anatomy, physiology, and biochemistry, students will be better equipped to assess and manage patients with respiratory conditions in dental practice.

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

Module Learning outcomes:

By the end of this module, students should be able to:

1. Correlate respiratory functions with oral and systemic health for understanding the impact of respiratory disorders on dental practice
2. Recognize the importance of airway management in patient care.

BDS Curriculum Year -I (2025)

Learning Outcomes	Subject Learning Outcomes	Teaching & Learning Strategies	Proposed Assessment Strategies
At the end of this module, students will be able to:			
Correlate the anatomy of diaphragm, pleura, ribs and sternum with its functions and biochemical basis in normal and disease State	**<u>Anatomy</u>** **Thorax** • Describe the formation of thoracic apertures. • Trace the course of vagus nerve in thorax • Identify cardio-phrenic angle, hilar shadow and aortic knuckle on chest x ray. • Identify parts of diaphragm • List the apertures in diaphragm with their levels and structures passing through each • Analyze presentation of phrenic nerve lesions with anatomical reasoning • Justify anatomical basis of referred shoulder **Mediastinum** • Define mediastinum. • Enumerate the divisions of mediastinum. • Enlist the structures contained in different mediastina. **Lungs** Identify the borders, surfaces, and hilar apertures.	SGD, LGIS & CBL	MCQs, SAQs, OSPE, Structured Viva
	<u>Physiology</u> **Introduction to Respiratory System** • Recognize the functional anatomy of various parts of respiratory system • Highlight the non-respiratory functions of respiratory tract **Pulmonary Mechanics** • Distinguish functions of inspiratory and expiratory muscles during quiet and forceful respiration • Correlate normal lung volumes/ capacities to various pressures and volume changes during forceful respiration and changes in volume and capacities **Pulmonary Compliance** • Discern lung and chest wall compliance • Identify composition & role of surfactant in	SGD, LGIS & CBL	StructuredViva

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	alveolar surface tension • State concept of work of breathing **Respiratory Membrane & Diffusion of Gases** • Appreciate the layers of respiratory membrane in detail • Appraise concept of diffusing capacity through respiratory membrane • Identify factors affecting gas diffusion through respiratory membrane • **Diffusion of gases & Oxygen transport** • State the mechanics of oxygen diffusion from alveoli to blood • Distinguish mechanism of oxygen transport in the arterial blood, tissue fluid and cell • **Oxygen transport & Dissociative curve** • Identify the role of Hb in oxygen transport • Analyze normal oxygen-hemoglobin dissociation curve by explaining factors that shift oxygen-hemoglobin dissociation curve to right and left • **Carbon dioxide transport** • Identify various chemical form in which C02 is transported in blood • Discern normal C02 dissociation curve explaining Bohr effect, Haldane effect and chloride shift • **Hypoxia and cynosis** • Differentiate between hypoxia and cyanosis • Explain types of hypoxia and cyanosis • Describe manifestations of hypoxia and cyanosis **Nervous regulation of respiration** • State different group of neurons composing respiratory center • Review nervous control of inspiration and respiratory rhythm • Recognize the regulatory mechanism of Hering Breuer inflation reflex **Chemical regulation of respiration** • Appraise location, function and stimulation (by C02 and H+) of central chemosensitive area • Identify the role of peripheral chemoreceptors for control of respiration • Determine the composite effects of PC02, pH, &		

BDS Curriculum Year -I (2025)

	P02 on alveolar ventilation		

	<u>Medical Biochemistry</u>
	Protein Chemistry & Metabolism
	• Definition, biomedical importance and classification of proteins based on:
	  ○ Physiochemical properties
	  ○ Functional properties
	• Amino acids: their structure, properties and functions
	• Classification and nutritional significance of amino acids
	• Structure of proteins and their significance
	• Amino acid transamination, deamination,
	• Transport of Ammonia
	• Ammonia intoxication
	• Urea cycle
	Respiratory Proteins - Chemistry & biomedical significance of respiratory proteins (alpha 1 anti trypsin)
		SGD, LGIS
		& CBL
			MCQs, SAQs,
			OSPE,
			Structured Viva

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Linkers of Integrated Session;

PROPOSED LINKERS
▪ Respiratory Distress ▪ Respiratory Acidosis/Alkalosis

Practicals	
Anatomy	
Physiology	• Spirometry • **Chest Examination**
Medical Biochemistry	Color reactions of Proteins I: Ninhydrin test, Biuret test, Color reactions of Proteins II: Xanthoproteic test, Aldehyde test, Millon Nasse Test Color reactions of Proteins III: Sulphur Test

BDS Curriculum Year-I (2025)

BLOCK-II

BDS Curriculum Year -I (2025)

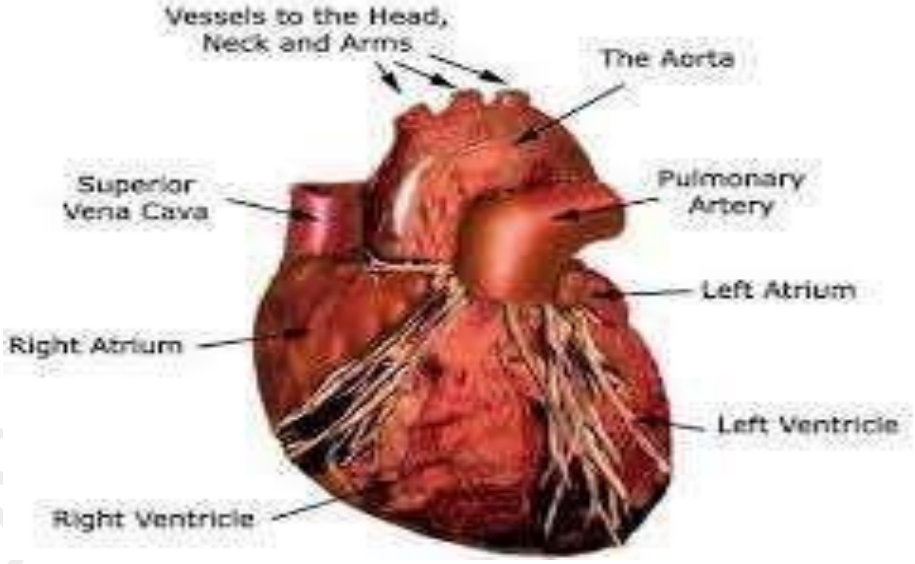
Module: IV

Cardiovascular system

Module Outcome: To relate the structural organization of the cardiovascular system with its physiological mechanism and the role of the role of lipids in cardiovascular function.

MODULE PLANNING COMMITTEE

Module Coordinator	***To be filled by the institutes***
Members	



Learning Outcomes	Learning Objectives/ Contents By the end of the module students will be able to:	Instructional Strategy	Assessment Tool
Apply anatomical, physiological, and biochemical principles of the circulatory system, including the heart, blood vessels, and lipid metabolism, to understand cardiac function, blood flow regulation, ECG interpretation, and clinical conditions such as myocardial infarction, atherosclerosis, and coronary artery disease	**Anatomy** **Circulatory system** • Justify general plan of systemic, portal and lymphatic circulatory system. • Compare blood vessels according to their size sand functions with examples of each type. • Describe various types of anastomoses with example and their Clinical significance **Heart and coronary circulation** • Describe anatomical position, borders, surfaces and external features of heart. • Outline the main internal features of various chambers of heart • Describe the arterial supply, venous drainage and nerve supply of heart. • Define dominance of heart • Define angina pectoris and myocardial infarction, and explain their anatomical basis in case of coronary artery disease. • Explain anatomical basis of cardiac referred pain in case of ischemic heart disease • Define angioplasty, angiography • Locate sites of auscultation of various heart sound son chest wall of a subject • Identify features of heart on a model. **Physiology** **Physiological anatomy of heart & cardiac action potential** • Appreciate the physiological arrangement of right and left hearts along with the parallel arrangement of systemic circulation. • Recognize physiological anatomy of cardiac muscles, its functional syncytium and intercalated disc • Differentiate between cardiac, skeletal and smooth muscles based on macro-, microscopic and functional differences, action potentials.	LGIS/SGD	▪ MCQ ▪ SAQ ▪ Structured viva ▪ OSPE

BDS Curriculum Year-I (2025)

	• Distinguish ionic changes in different phases of action potential within cardiac muscle • Correlate the phases with ionic changes during pacemaker action potential in heart • Comprehend cardiac impulse transmission **Cardiac cycle** • Illustrate pressure and volume changes during various phases of cardiac cycle **Control of Local Blood flow** • Distinguish between acute and chronic control of local blood flow. • Conceptualize active and reactive hyperemia • Relate the blood flow control to total peripheral resistance **Cardiac output and venous return** • Understand the determinants of cardiac output and factors affecting cardiac output. • Appreciate the mechanics of low and high cardiac outputs along with their effects on heart. • Comprehend the factors affecting stroke volume, heart rate and total peripheral resistance • List the functions of veins • Identify factors regulating venous return and significance of venous reservoirs. • Appreciate the equality of Cardiac output and venous return. **Arterial blood pressure** • Comprehend the determinants of arterial pressure, factors affecting and mechanisms regulating blood pressure on short- and long-term basis. • Recognize mean arterial pressure and its significance. • Comprehend the individual and integrative role of baroreceptors, chemoreceptor, volume receptors, arterial natriuretic factors and Renin-angiotensin -aldosterone system in regulation of arterial pressure • Understand the characteristics of regional circulations (skeletal muscles, pulmonary, coronary & cerebral) and factors regulating thereof		

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	Circulatory Shock • Discriminate various types of shock, its types and stages of development • Differentiate between compensated and uncompensated shock. • Recognize the short term and long-term compensatory mechanisms in circulatory shock. • Diagnose and treat various types of shock based on clinical scenarios **ECG** • Draw and label normal ECG showing various waves, segments and intervals • Understand significance of waves, segments and intervals of ECG • Calculation of heart rate and various intervals and segments • Appreciate relationship between vector and lead, type and locations of leads and principles for vector analysis in abnormal heart **Medical Biochemistry** **Lipid chemistry & metabolism** • Definition, classification and biomedical function of lipids • Glycolipids, Sphingolipids and their biochemical significance • Fatty acids, chemistry, classification and biochemical functions • Mobilization & transportation of Fatty Acids • Beta oxidation and energy calculation • Steroids, sterol e.g. cholesterol, their chemistry & functions and clinical significance • Ketogenesis and Ketolysis • Mechanism and utilization of Ketone bodies and their significance • Lipoprotein metabolism & clinical significance • Define and explain Hypercholesterolemia in relation with the pathophysiology of atherosclerosis • Mediterranean diet		

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	• Describe the role of cardiac biomarkers in • Diagnosis of MI • **Phospholipids** - Chemistry, classification and biomedical significance of phospholipids		
Apply the knowledge of eicosanoids for understanding its role in inflammation and allergy	**Eicosanoid Metabolism** Introduction, synthesis and function of eicosanoids and related clinical significance	Lectures SGD	• MCQ • SAQ • Structured viva
Practicals: **Medical Biochemistry** ▪ Estimation & clinical interpretation of Lipid profile using Micro lab (TAGs & Total Cholesterol) ▪ Estimation & clinical interpretation of Creatine Kinase (CK) Physiology ▪ Record the Blood Pressure of an SP using palpatory and auscultatory method ▪ Examine the Radial Pulse ▪ Record & Interpret normal ECG by placing all the chest and limb leads on an SP ▪ Examine the Heart Sound on Pulmonary, Aortic, Mitral and Tricuspid areas			

BDS Curriculum Year-I (2025)

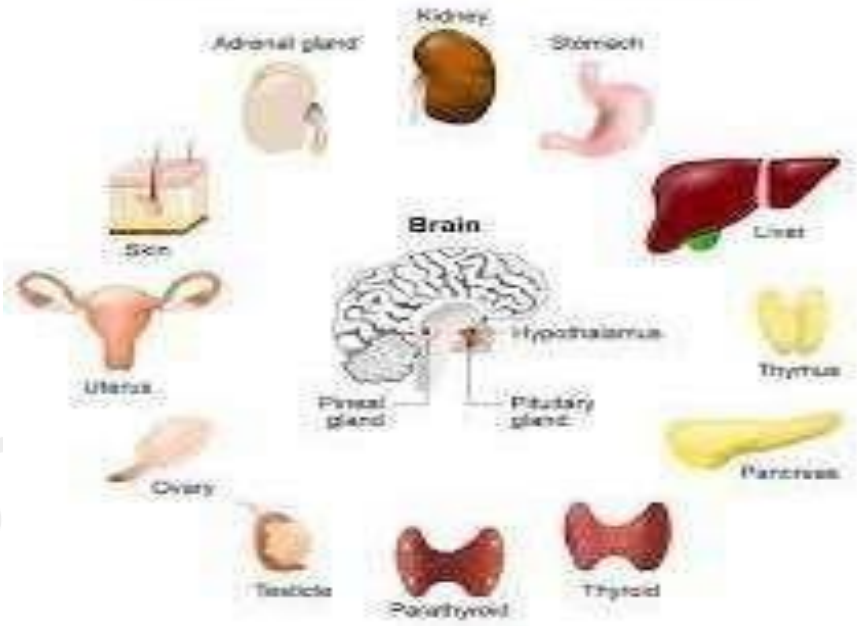
MODULE: V

ENDOCRINOLOGY

Duration: 02 weeks

MODULE PLANNING COMMITTEE

Module Coordinator	***To be filled by the institutes***
Members	



Learning Outcomes	Learning Objectives/ Contents	Instructional Strategy	Assessment Tool
By the end of the module students will be able to:			
Basics of Endocrinology			
Appraise the mechanisms of action of hormones	**<u>Physiology</u>** • Identify the various hormone receptors and their activation • Explain the mechanism of intracellular signaling after hormone receptor activation • Explain the second messenger mechanisms for mediating intracellular hormonal functions • Identify the hormones that act mainly on the genetic machinery of the Cell **Hormones of hypothalamus and Pituitary gland** • Explain the pituitary gland and its relation to the hypothalamus • Summarize the hypothalamic-hyperphysical portal blood vessels of the anterior pituitary gland and its significance • Recall the functions and regulation of growth hormone • Differentiate between hyperpituitarism and hypopituitarism and its pathophysiological basis • Explain the posterior pituitary gland and its relation to the hypothalamus • Describe the physiological functions of ADH and oxytocin Hormone	• LGIS	• MCQ/SAQ/ • structured Viva
Relate the knowledge of chemistry and metabolism of nucleotide in health and disease	**<u>Medical Biochemistry:</u>** **Nucleotides** • Nucleic acids, their types, structure and functions • Chemistry and structure of nucleotides and their biochemical role Nucleotides derivatives and their biochemical role	• Lectures • SGD	• MCQ • SAQ • Structured viva
Thyroid and Parathyroid Glands			
Apply anatomical, physiological, and biochemical knowledge of the thyroid and	**<u>Anatomy</u>** • Identify gross features of thyroid and parathyroid glands on models. • Describe capsule, relations and blood supply of thyroid and parathyroid gland	• Lectures • SGD	• MCQ • Viva • OSPE

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parathyroid glands to understand related clinical disorders	• Justify anatomical basis of movement of thyroid gland during deglutition • Discuss surgical precaution sin thyroid surgery while ligating vessels and enucleation **Physiology** **Thyroid Hormone** • Recall the synthesis and secretion of the thyroid hormone • Explain the functions of the thyroid hormone • Summarize the regulation of thyroid hormone secretion • Identify the disorders of the Thyroid gland and their pathophysiological basis **Calcium regulating hormones** • Explain the regulation of calcium and phosphate in the extracellular fluid and plasma • Enlist the actions of vitamin D • Explain the effect of parathyroid hormone on calcium and phosphate concentrations in the extracellular fluid • Summarize the control of parathyroid secretion by calcium ion concentration • Describe the actions of calcitonin • Explain the pathophysiology of parathyroid hormone, vitamin D, and bone diseases **Medical Biochemistry** **Metabolism of Vitamin D and Calcium** • Vitamin D: Sources, biochemical functions, synthesis, regulation and clinical significance • Calcium: Biochemical functions, regulation and clinical significance		
Practicals: **Medical Biochemistry:** • Estimation & clinical interpretation of Serum Calcium			
OTHER HORMONES			
Appraise the mechanisms of action of hormones	**Physiology** **Hormones of adrenal cortex** • Explain synthesis and secretion of adrenocortical hormones • Enlist the functions of aldosterone	• LGIS	• MCQ/SAQ/ structured Viva

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	• Enlist functions of the glucocorticoids • Describe the disorders of adrenocortical secretion and their pathophysiological basis **Pancreas** Explain glucose metabolism with its regulation		
Practical: **Physiology:** Effect of posture and exercise on blood pressure			
Cancer and Tumor Markers			
Apply the basic knowledge of biochemistry for understanding cancer and biochemical changes in cancer cells	**Cancer and tumor markers** • Biomedical Importance and fundamental features of carcinogenesis • Oncogenes and tumor suppressor genes and key role in carcinogenesis • Tumor biomarkers	• Lectures • SGD	• MCQ • SAQ • Structured viva

BDS Curriculum Year-I (2025)

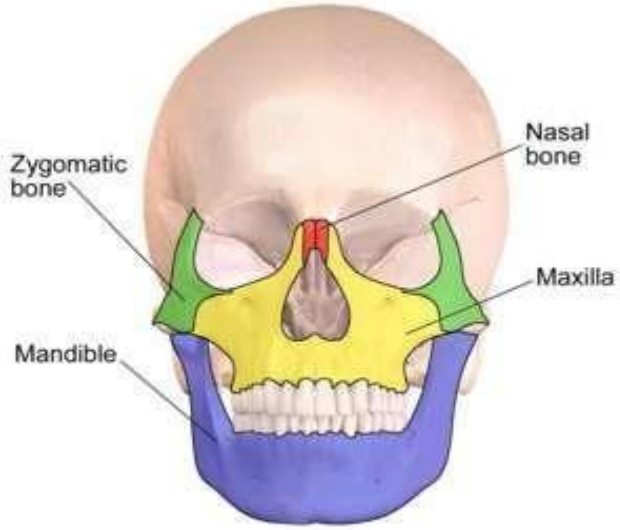
MODULE-VI

CRANIOFACIAL

Duration: 06 weeks

MODULE PLANNING COMMITTEE

Module Coordinator	***To be filled by the institutes***
Members	



Bones of the Face

Head & Neck			
Learning Outcomes	**Learning Objectives/ Contents**	**Instructional Strategy**	**Assessment Tool**
By the end of the module students will be able to:			
Apply anatomical knowledge of the head and neck to understand their functional roles and clinical relevance	**<u>Anatomy</u>** **Development of skull** • Identify the sources of skull • Classify Skull on embryological basis • Describe the events in development of Cartilaginous and membranous neuro cranium and viscero cranium • Outline features of a newborn skull. Identify the fontanelles with reference to their location, closing time and clinical significance • Explain the embryological basis of microcephaly and various types of cranio synostosis **Temporal & infratemporal region** • Identify the location, boundaries, contents and communicationsof temporal and infratemporal fossa on a given model and skull. • Describe the course and distribution of mandibular nerve from origin to distribution • Tabulate the attachments, actions and nerve supply of muscles of mastication. • Trace location, various routes and distribution of optic ganglion • Justify role of lateral pterygoid as a peripheral heart on anatomical basis of pterygoid venous plexus • Elucidate importance of pterygoidvenou splexusin case of intracranial spread of infection to cavernous sinus. • Trace origin and distribution of superficial temporal, first and second Parts of maxillary artery **Pterygopalatine fossa** • Identify the location of pterygopalatine fossa on skull • Enumerate the contents and communications • Describe the distribution of third part of maxillary artery, nerve and pterygopalatine	• Lectures SGD	• MCQ • Viva OSPE

BDS Curriculum Year-I (2025)

	ganglion • Justify the role of pterygopalatine ganglion in hay fever/allergies **Hard and soft Palate** • Discuss the bony frame work of hard palate. • Identify the gross features of hard palate and soft palate. • Identify muscles of soft palate on the model • Describe the attachments, nerve supply and actions of muscles of soft palate • Describe blood supply and nerve supply of soft palate • Identify the main muscles forming the palatoglossal and palatopharyngeal Arches **Mandible** • Identify parts of mandible • Describe ramus and body of mandible with respect to its bony features and attachments. • Muscles producing them. • Describe the clinical signs of anterior dislocation of TMJ and explain the steps of its reduction. **Pharynx** • Differentiate extent, anatomical features, vascular supply, nerve supply of three parts of pharynx on anatomical basis • List muscles of pharynx **Cervical vertebra** • Differentiate typical and atypical cervical vertebrae Give distinguishing features of each cervical vertebra. • Enumerate structures Passing through foramina • Outline ligamentous attachments once rvical vertebrae **Joints of neck** • Name the typical and atypical intervertebral joints of neck. • Identify the types of atlanto-occipital and atlanto-axial joints. • Describe the movements of these joints with muscles producing them **Face** • Outline the characteristic features of facial skin.		

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	• Elucidate the cutaneous innervation of face • Group facial muscles according to the orifices they are guarding • Describe the nerve supply of muscles of facial expressions. • Describe the course of arteries, veins, lymphatics and nerves of the face with the help of model. • Correlate gross features of face with anatomical basis of danger area, trigeminal neuralgia, Bell's palsy. • Identify muscles of facial expressions Illustrate the cut aneousin nervation of face **Mandibular and maxillary branches of Trigeminal nerve** • Describe the pathway of mandibular nerve from nucleustotar get organs • Describe the pathway of maxillary nerve from nucleustotar get organs. • Describe the lesion of nerves with special reference to infections of molar teeth. **Facial nerve** • Revisit the course and distribution off acial nerve • Revisit the relationship of facial nerve with pterygopalatine and submandibular ganglia • Revisit the effects of lesion off acial nerveat different levels • Differentiate anatomical basis of clinical presentation of UMN and LMN lesion off acial nerve. **Parotid region** • Trace the pathway of autonomic supply of parotid gland. • Enumerate structures embedded in parotid gland in a sequential order. • Analyze anatomical basis of clinical presentation of mumps. • Correlate the extra cranial course of facial nerve with Bell's palsy. **Deep cervical Fascia** • Enumerate the layers of deep cervical fascia.		

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	• Trace the attachments of investing, pre-tracheal, carotid sheath and prevertebral layers of fascia. • Identify various modifications and neck spaces formed by fascial attachments. • Comprehend the clinical importance of neck spaces in spread of infection **Back of the neck** • Enumerate the muscles of back of neck. • Identify the boundaries and contents of sub occipital triangle. • Describe the course and relations of 3rd and 4th parts of vertebral arteries. **Muscles of the neck** • Describe the muscles of neck (sternocleidomastoid, trapezius and in Fra hyoid muscles) along with their nerve supply with the help of models. • Enlist the features of Torticollis **Triangles of neck** • Tabulate the attachments, nerve supply, actions of superficial and deep muscles of neck (sternocleidomastoid, suprahyoid, in frahyoid, suboccipital, prevertebral muscles,). • Identify boundaries and contents of triangles of neck on model • Describe the origin, course and distribution of nerves of neck (cervical plexus, Ansa cervicalis, Common carotid artery, Internal jugular vein, subclavian vessels) **Vessels of neck** • Enumerate the main vessels in neck. • Describe the course and branches of - External carotid artery - Subclavian artery - External jugular vein - Internal jugular vein **Nerves of neck** • Enumerate the main cranial nerves supplying in neck • Trace the distribution of cranial nerves • Enumerate branches of each of the above nerve		

BDS Curriculum Year-I (2025)

	and identify their area of supply. **Viscera of neck** • Appraise the relations of Racheal and esophagus in neck region with the help of dissection • Describe the structures involved in cricot hyroidotomy and Tracheostomy with the help of dissection **Larynx** • Describe laryngeal wall in detail with emphasis on cartilages, ligaments, muscles, vascular supply and nerve supply. • Analyze mechanism of abduction and adduction of vocal cords Distinguish clinical presentation so fin jury to external, internal and recurrent laryngeal nerves **Lymphatic drainage of the head and neck** • Enlist the groups of lymph nodes of neck. • Describe their location and areas of drainage • Appraise the formation of jugular lymph trunk Correlate the clinical importance of lymphatic drainage of head and neck		
Apply the basic knowledge of biochemistry to understand biochemical changes associated with free radicals	**<u>Medical Biochemistry</u>** **Free Radicals** • Different reactive oxygen species (ROS) in human body • Mechanism of production of reactive oxygen species (ROS) • Effect of ROS on health and disease • Mechanism of scavenging ROS • Biochemical role of antioxidants (Vit E, Vit C, Glutathione, Lipoic Acid, CoQ10 and NADPH)	▪ Lectures ▪ SGD	▪ MCQ ▪ Viva OSPE
Apply the basic knowledge of biochemistry for understanding xenobiotics	**<u>Medical Biochemistry</u>** **Xenobiotic Metabolism** • Introduction, function and clinical significance of Xenobiotics	▪ Lectures ▪ SGD	▪ MCQ ▪ Viva OSPE
Practicals **Medical Biochemistry**: ▪ Justify the use of Solutions in Clinical Settings			
SPECIAL SENSES			

BDS Curriculum Year-I (2025)

Correlate the anatomical features of the oral cavity and tongue with the physiological mechanisms of taste perception and the biochemical role of collagen in dental health and disease	**Anatomy** **Oral cavity** • Name different boundaries of oral cavity. • Describe blood and nerve supply and lymphatic drainage of oral cavity. • Identify the location of inferior alveolar nerve block • Describe the salient features of floor of mouth. • Discuss the attachments, actions, nerve supply and relations of suprahyoid muscles • Identify parts of tongue • Identify the gross features of dorsal and ventral surfaces of tongue • Name the intrinsic and extrinsic muscles of tongue. • Describe attachments, actions and nerve supply of muscles of tongue • Describe the motor, general and special sensory innervation of Tongue **Physiology of taste** • Describe the primary sensations of taste • Describe the mechanism of stimulation of taste buds and the transmission of signals to CNS **Medical Biochemistry** Role of collagen in dental health & disease **Fibrous proteins** • Collagen • Types, biosynthesis and Collagenopathies	• Lectures • SGD	• MCQ • Viva • OSPE
Correlate the anatomical features of the nose and paranasal sinuses with the physiological mechanisms of olfaction and its clinical significance	**Anatomy** **Nose and paranasal sinuses** • Describe the skeletal framework of different walls of nose • Describe the features, vascular supply, nerve supply and openings in lateral wall of nose • Describe the features, vascular supply, nerve supply of medial wall of nose • Highlight the significance of little's area in a case of epistaxis • Trace the location and drainage of paranasal sinuses in skull and on radiograph **Physiology of olfaction** • Explain the physiological anatomy of Olfactory membrane. • Explain the mechanism of stimulation of olfactory cells.	▪ Lectures ▪ SGD	• MCQ • Viva • OSPE

BDS Curriculum Year -I (2025)

	• Identify the primary sensations of Smell • Describe the transmission of signals of • Olfaction in to the central nervous system		
Correlate the anatomical features of the Eye with the physiological mechanisms of vision, refraction, and accommodation, while understanding the biochemical role of Vitamin A in the visual cycle and its clinical implications	**Anatomy** **Orbit** • Describe the skeletal frame work of bony orbit and its communications • List the contents of orbit • Identify the parts of eyeball on a model • Tabulate the attachments, nerve supply and actions of extraocular muscles • Justify the movements of extraocular muscles based on their attachments • Trace the course and distribution of III, IV and VI Cranial Nerves • Justify the peculiar Position of eye ballin case of lesion of III, IV and VI Cranial Nerves • Trace the route and distribution of ciliary ganglion. • Describe the course and distribution of ophthalmic nerve • Describe the nerve supply of Lacrimal gland **Lacrimal apparatus** • Enumerate the structures forming lacrimal apparatus • Describe the nerve supply of lacrimal apparatus • Correlate the anatomical structures of lacrimal apparatus with the features of blocked Lacrimal duct **Physiology of Eye** • Explain refraction and concept of convergence and divergence. • Define focal length, focal point and power of lens. • Differentiate between ametropic, • myopia, hyperopia, astigmatism, presbyopia and describe their treatment • Explain physiological anatomy of retina • Discuss photo chemistry of vision Explain visual pathways and accommodation reflex pathways	• Lectures • SGD	• MCQ • Viva • OSPE

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	Medical Biochemistry • **Vitamin A:** Relate the role of Vit-A in vision ; Sources, biochemical role in vision – Wald's visual cycle **Practicals:** **Physiology** ▪ Testing the visual acuity ▪ Demonstration of light reflex and accommodation reflex		
Correlate the anatomical features of the ear with the physiological mechanisms of sound conduction, impedance matching, and attenuation, while understanding their clinical significance	**Ear** • Describe the gross anatomical features, boundaries, structures and contents of middle ear cavity. • Describe the structures forming the walls of middle ear cavity on the given model. • Highlight the importance of infection in middle ear cavity in relation to its communications. • Trace the pathway and distribution of facial nerve with in petrous part of temporal bone. **Physiology of Ear** • Describe the physiological Anatomy of ear • Explain the mechanism of conduction of sound waves through the ear to the cochlea • Describe "Impedance Matching" and its importance Describe the process of attenuation of sounds **Practicals:** **Physiology** ▪ Demonstration of Hearing tests	• Lectures • SGD	• MCQ/SAQ • Viva • OSPE

BDS Curriculum Year-I (2025)

BLOCK-III

BDS Curriculum Year-I (2025)

MODULE: VII

NEUROSCIENCES

Duration: 06 weeks

MODULE PLANNING COMMITTEE

Module Coordinator	To be filled by institute
Members	

Learning Outcomes	Learning Objectives / Contents	Instructional Strategy	Assessment Tool
By the end of the module students will be able to:			
Foundation of Neurosciences			
Integrate anatomical, physiological, and biochemical knowledge of the nervous system to understand relevant clinical scenario	**Neuroanatomy** Appraise general anatomy of nervous system. • Nervous Tissue • Receptors • Nerve fiber • Neuroglia Identify the parts of the nervous system contributing information of central and peripheral nervous system Describe the formation, course and distribution of a typical spinal nerve **CNS** • Define the grey matter, white matter, ganglion, nucleus and nerve. • Appraise a three-dimensional appreciation of the parts of the brain and their relative positions to one another • Outline the anatomical organization of autonomic nervous system **Embryology:** • Explain the development of spinal cord. • Describe the positional changes of the cord. • Explain the causes of neural tube defects • Enlist various variants of spina bifida. • Explain the process of development of various variants of spina bifida • Summarize primary and secondary brain vesicles with their derivatives • Discuss birth defects associated with defective development of neural tube **Anatomy of cranial cavity** • Describe and demonstrate the boundaries and gross features of cranial fossae. • Enlist and demonstrate foramina along with structures passing through them in anterior, middle and posterior cranial fossae. • Recognize and demonstrate the important	LGIS/ SGD	• MCQ • SAQ Structured Viva

BDS Curriculum Year-I (2025)

	sutures, fontanelle and impressions on the interior of cranial vault. **Gross Anatomy of Spinal cord** • Explain the gross appearance and the nerve cell groups in the anterior, posterior and lateral gray columns of spinal cord • Enumerate and illustrate the arrangements of ascending and descending tracts (white matter) in spinal cord at various levels. • Explain the given clinical conditions related to ascending and descending tracts of spinal cord, Upper and Lower motor neuron Lesions and hemisection of Spinal Cord. • Trace following pathways of superficial and deep sensations indicating the location of first, second and third order neurons. • Pain and temperature pathways • Light touch and pressure pathways • Discriminative touch, vibratory sense and conscious muscle joint sense. • Muscle joint sense pathways to the cerebellum • Posterior spinocerebellar tract • Anterior spinocerebellar tract • Trace following pathways of voluntary movements indicating the location of first, second and third order neurons. • Cortico spinal tracts, Upper & lower motor neuron lesions. **Brainstem** • Describe the gross appearance and internal structure of the medulla oblongata. • Illustrate the cross sections of medulla oblongata at different levels. • Apply the knowledge of neuroanatomy to explain the following clinical conditions: - Arnold-chiari malformation - Medial medullary syndrome - Lateral medullary syndrome - Wallenberg syndrome • Describe the gross features and internal structure of pons.		

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	• Illustrate cross section of pons at different levels showing major structures at each level. • Analyze the anatomical structures involved in pontine hemorrhage and infarction of pons. • Describe the gross appearance, internal structure of mid brain. • Illustrate cross section of midbrain at the levels of superior colliculus and inferior colliculus showing major structures at each level. • Justify the lesions of midbrain structures by the blockage of cerebral aqueduct. • Identify the gross features of medulla, midbrain and pons on a given model. **Cerebellum and its connections** • Briefly demonstrate the gross features and phylogenetic divisions of cerebellum. • List intracerebellar nuclei and types of fibers constituting white matter of cerebellum. • List disturbances of voluntary movements, reflexes, ocular movements, speech, posture and gait resulting due to lesions of cerebellum. • Demonstrate different parts of cerebellum on given model. **Cerebrum** • Describe the topographic anatomy of diencephalon and demonstrate its gross features on a given model. • Enlist main sulci and gyri of cerebral hemispheres and describe the extent of each of them. • Explain the divisions of cerebral lobes on superolateral, medial and inferior surfaces of cerebral hemispheres. • Enumerate fibers making up the white matter of cerebral hemispheres and describe each of them (Summarize parts, relations & fibers forming Internal capsule). • Mark main sulci and gyri on lobes of cerebral hemispheres. • Identify commissural, projection and association		

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	fibers on brain prosected specimen • Describe and demonstrate the cortical functional areas in different lobes of cerebral hemispheres. • Enumerate types of aphasia and describe the lesions of speech areas responsible for producing aphasia. • Explain the effects of lesion in the primary and secondary visual cortex. • Illustrate the lateral and medial views of cerebral hemispheres showing motor and sensory areas. **Reticular formation and limbic system** • Outline the general arrangement and functions of reticular formation. • Enumerate components of limbic system • Identify different components of limbic system on given model. **Basal nuclei** • List terminology commonly used to describe the basal nuclei. • Outline Parkinson disease regarding characteristics signs and symptoms • identify different components of basal ganglia on given model/specimen **Cranial nerves** • Enumerate the cranial nerves and classify them into sensory, motor and mixed nerves. • Describe the nuclei and intracranial course of all cranial nerves. • Apply the knowledge of neuroanatomy to explain the clinical conditions regarding the lesions of various cranial nerves. • Identify different cranial nerves on given model/specimen **Thalamus, hypothalamus and their connections** • Describe the divisions, nuclei and connections of thalamus. • Summarize the connections of hypothalamus with the pituitary gland. • Enlist the functions of main hypothalamic nuclei. **Meninges and dural venous sinuses of brain and spinal**		

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	cord • Define meninges of brain and describe the Dural reflections in brain. • Explain the meninges of spinal cord • Enumerate the nerves and blood vessels supplying the meninges. • Differentiate among different varieties of intracranial hemorrhages. • Demonstrate the supratentorial and Infratentorial compartments of tentorium cerebelli in a prosected specimen. • Define and enumerate paired and unpaired Dural venous sinuses along with their attachments. • Describe the location, important relations, communications of cavernous sinus and enumerate • structures passing through it. **Ventricular system, CSF, Blood brain barriers** • Describe the anatomical organization of ventricular system and boundaries of third ventricle and choroidal plexus of each ventricle. • Define arachnoid villous and outline the role of arachnoid villi in absorption of CSF. • Outline the formation of different barriers of brain. • Summarize the floor of fourth ventricle. **Blood supply of the brain and spinal cord** • Recognize the blood supply of different parts of brain and spinal cord. • Outline the formation and importance of veins of brain. • Enumerate the vessels taking part in formation of circle of Willis with its importance. • Relate the interruption of cerebral circulation of cerebral artery syndromes due to anterior, middle and posterior cerebral artery occlusion. • Illustrate circle of Willis		
	Physiology **Sensory receptors & receptor Potential** • Classify the various types of sensory receptors.	LGIS/ SGD	• MCQ • SAQ

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	• Explain the sensory stimuli and differential sensitivity of receptors. • Explain the sensory transduction into nerve impulses. • Describe the local electrical currents at nerve endings— receptor potentials, adaptation of receptors • Classify the nerve fibers that transmit different types of signals on the physiological basis. • Describe the transmission of signals of different intensity in nerve tract (spatial and temporal summation) **Sensory tracts and cortex** • Identify the sensations carried by different sensory tracts • Differentiate between different sensory tracts • Describe the somatosensory cortex and somatosensory association areas • Explain the various thermal sensations, thermal receptors and their excitation and transmission of thermal signals in the nervous system **Sensation of pain & Brain analgesia system** • Classify the different types of pain. • Compare and contrast the perception and transmission of the different types of pain. • Explain the pain suppression system in the brain and spinal cord. • Describe the brain's opiate system—endorphins and enkephalins. • Describe the clinical abnormalities of pain and other somatic sensations • Explain pathophysiological significance of referred and visceral pain **Motor system / Spindle / stretch reflex** • Relate the organization of grey and white matter in spinal cord to the pathophysiology of various spinal cord injuries. • Explain the role of proprioceptors (muscle spindles and Golgi tendon organs) in motor movements • Explain stretch reflex • Describe the flexor reflex and the crossed		• Structured Viva

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	extensor reflex. • Explain the reciprocal inhibition and reciprocal innervation. • Identify the reflexes of posture and locomotion in the spinal cord. **Cerebellum & Basal Ganglia** • Explain physiological anatomy of cerebellum and basal ganglia • Explain significance of basal ganglia and cerebellum in motor control **Hypothalamus** Explain functions of hypothalamic nuclei		
	Medical Biochemistry **Neurotransmitters** Relate the importance of various neurotransmitters to its clinical significance • Functions and clinical significance of Catecholamines, their chemistry, synthesis and degradation, biochemical role • Explain role of Acetyl choline, Dopamine, Serotonin and Histamine, Glutamate, GABA and NO	LGIS/ SGD	• MCQ • SAQ • Structured Viva
Physiology Practicals	▪ Perform superficial reflexes ▪ Perform deep tendon reflexes ▪ Examination of motor system ▪ Examination of 1st to 6th cranial nerves ▪ Examination of 7th to 12th cranial nerves	**Practicals/ SGDs**	
Analyze the chemistry and metabolic pathways of carbohydrates and correlate their regulation with associated disorders.	**Medical Biochemistry** **Carbohydrate Chemistry:** • Definition, biochemical functions and classification • Structure, functions and clinical significance of Monosaccharides • Structure, functions and clinical significance of Disaccharides • Structure, functions and clinical significance of Oligosaccharides along with their combination with other macromolecules • Structure, functions, derivatives and clinical significance of Polysaccharides **Carbohydrate Metabolism:** • Glycolysis (Phases and reactions of Glycolysis) & Energetics of Aerobic and Anaerobic glycolysis	• Lectures • SGD • PBL • CBL	MCQ/SAQ

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	• The fate of Pyruvate • The Citric Acid Cycle Reactions, energetics of Citric acid cycle • Gluconeogenesis (Important three by-pass reactions) • HMP shunt (Uses of NADPH) **Clinical relevance:** • Hemolytic anemia (PK deficiency and G6PD deficiency)		
Evaluate the biochemical significance of vitamins in maintaining health and preventing disorders.	**Vitamins** • Classify Vitamins • Discuss Fat soluble vitamins (Vitamin E and K): chemistry, biochemical functions, deficiency manifestations, daily allowances, sources and hypervitaminosis • Discuss Water soluble vitamins: chemistry, biochemical functions, deficiency manifestations, daily allowances, sources and deficiency states		
Evaluate the biochemical basis of diabetes mellitus and integrate metabolic pathways to correlate the significance of ketone bodies in energy metabolism	**Integration of Metabolism** • Explain Biochemical functions of Insulin and glucagon • Discuss Diabetes mellitus • Explain Hypoglycemia • Elaborate on Ketone Bodies and their biomedical significance		
Practicals: **Medical Biochemistry:** Molisch's test Saliwanoff's test Benedict's test Iodine Test Estimation and clinical interpretation of blood Glucose using Micro lab Estimation of Vitamin C in orange juice via Titration method			

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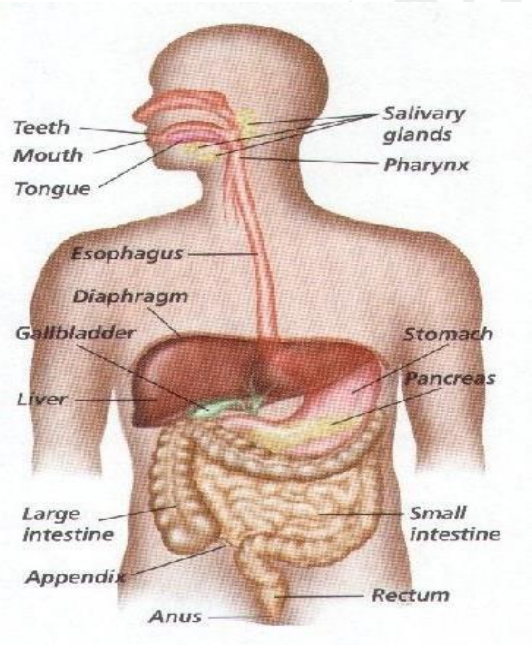
MODULE: VIII

DIGESTIVE SYSTEM & METABOLISM

Duration: 02 weeks

MODULE PLANNING COMMITTEE

Module Coordinator	To be filled by institute
Members	



Foundation of GIT			
Learning Outcomes	**Learning Objectives/ Contents**	**Instructional Strategy**	**Assessment Tool**
By the end of the module students will be able to:			
Relate the basic anatomical, physiological and biochemical principles of the gastrointestinal tract (GIT) to understand GIT functions	**Anatomy:** **GIT (lip, Tongue, esophagus, and salivary glands** **Histology:** • Explain the histological structure of lip. • Describe the microscopic structure of tongue, with special reference to epithelium on its two surfaces, types of lingual papillae and taste buds with their location and structure • Describe the Histological features of parotid, submandibular and sublingual glands with reference to their type, parenchyma, stroma and duct system. • Describe the histological structure of esophagus. • Identify microscopic sections of lip, tongue, submandibular, sublingual and parotid glands and esophagus under light microscope and enlist at least two identification points of each. • Draw labelled diagrams showing light microscopic structure of lip, tongue, submandibular, sublingual and parotid glands **Physiology:** **Neural & Hormonal control of GIT** • Appraise physiologic anatomy of gastrointestinal tract with specific focus on role of interstitial cells of Cajal • Compare functions of mesenteric and myenteric plexuses • Link the role of autonomic nervous system in GI motility • Appraise the role of GI hormones in GI motility & secretions **Medical Biochemistry:** • Overview of digestion and absorption of Lipids, Carbohydrates, Proteins, and nucleic acids	LGIS / SGD	MCQ/SAQ/ OSPE/ structured viva

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	• Outline the introduction, composition, functions of;
	  ○ Saliva
	  ○ Gastric Juice
	  ○ Pancreatic Juice
	  ○ Succus Entericcus
	Clinical relevance:
	• Xerostomia, Sialorrhea
	• Peptic Ulcer Disease
	• Cholelithiasis		

Practical: **Physiology** 1. Recording of body temperature			

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Digestion & Absorption			
Learning outcomes	**Learning objectives/content**	**Teaching strategy**	**Assessment tool**
Relate the anatomical structures, physiological functions, biochemical processes and nutritional aspects involved in digestion and absorption in GIT	**<u>Gross Anatomy:</u>** • Identify abdominal lines and planes dividing the abdomen into its quadrants. • Enlist the structures in each quadrant • Outline of gross features of stomach, small intestine, colon rectum and anal canal. • Enlist the blood vessels that supply gut. - Describe the formation and distribution of portal vein. • Outline gross features of liver. • Describe dual blood supply of the liver. • Learn the components of the biliary apparatus and trace the drainage of bile from liver to duodenum. **<u>Physiology:</u>** • Recognize the role of teeth, tongue, cheeks and saliva in assimilation and digestion of food. • Distinguish three phases of deglutition reflex • Outline different types of peristalsis taking place in esophagus • Explain the mechanism of vomiting reflex • Appraise the location and function of vomiting center/ chemoreceptor trigger zone in the brain • Explain the role of liver in non-metabolic domains and give clinical importance of each • Describe motor function of stomach • Recognize role of gastric secretions in the process of digestion • Explain factors which regulate stomach emptying • Explain role of pancreatic and biliary	• Lectures • SGD • PBL • CBL	MCQ/ SAQ/ Structured Viva

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	secretion in process of digestion • Correlate secretions of small intestine and colon with functions • Give absorption of various nutrients in small and large intestine **<u>Medical Biochemistry:</u>** **Nutrition:** • Describe Balanced Diet, DRIs (EAR, RDA, AI, UL), AMDR • Explain Protein turnover, Amino acid Pool, Nitrogen Balance, Protein Quality, Protein Requirement • Biomedical importance and requirements of dietary Carbohydrates, Proteins and Lipids • Glycemic Index **Clinical Relevance:** • Protein-Energy Malnutrition (Kwashiorkor, Marasmus) • Obesity		

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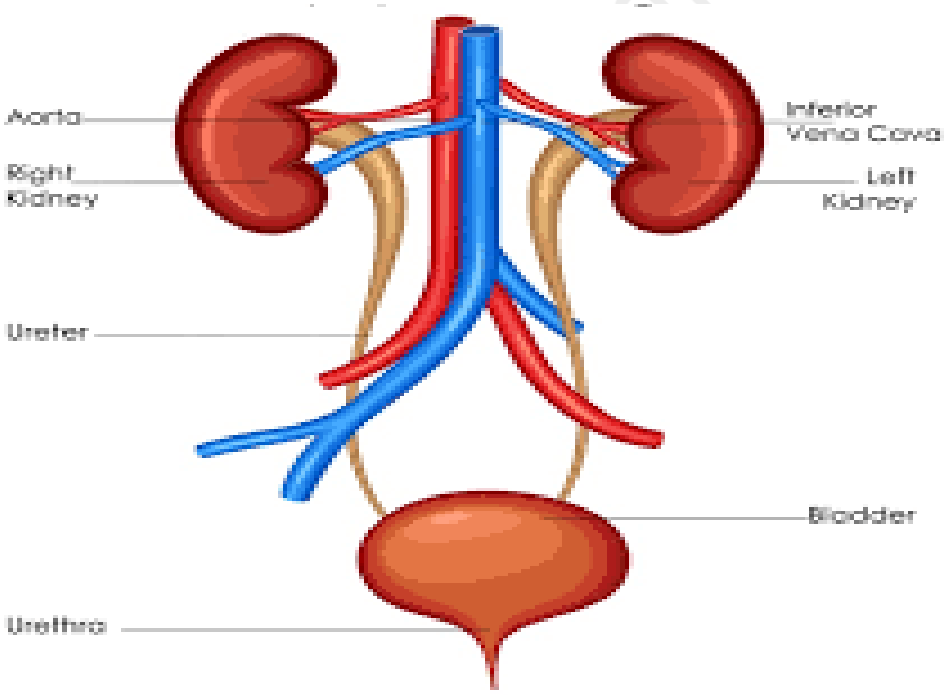
MODULE: IX

RENAL SYSTEM

Duration: 02 weeks

Module Coordinator	To be filled by institute
Members	



Role of Kidney in Homeostasis			
Learning Outcomes	**Learning Objectives / Contents**	**Instructional Strategy**	**Assessment Tool**
By the end of the module students will be able to:			
Correlate the anatomical, physiological, and biochemical aspects of water and fluid homeostasis	**Anatomy:** • Describe the gross features of kidney and relations • Identify the impressions of surrounding structures on both kidneys in the given model **Physiology** • Explain TBW content and its distribution in different body compartments • Give composition of ICF and ECF • Analyze the role of starling forces and other safety factors (lymphatics, negative ISF pressure) in prevention of edema. • Outline the physiological anatomy of nephron and glomerular capillary membrane • List primary and endocrinal functions of kidney • Physiology of micturition reflex • Relate the determinants of GFR to clinical conditions. • Identify the parameters involved in autoregulation of GFR and blood flow. • Explain renal tubular reabsorption and secretion • Discuss effects of arterial pressure on urine output (pressure natriuresis, pressure diuresis and renin angiotensin system) • Discuss renal function test **<u>Medical Biochemistry</u>** • Concept of pH and pH scale • Body Buffers, their types and mechanism of action • Electrolyte balance/imbalance (Sodium, Potassium, Calcium and Magnesium)	LGIS/ SGD	MCQ/SAQ/ structured viva / OSPE

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	• Clinical Significance of water turnover and balance • Production of acids by the body • Production of bases by the body • Maintenance of blood pH by blood buffer, respiratory mechanism & renal mechanism • Disorders of Acid base balance		
Evaluate the biochemical role of minerals in maintaining health and preventing disorders	**Minerals** • Classification and biochemical role of Macro minerals (Cl, PO4) • Classification and biochemical role of Micro minerals (Fe, Zn, Mg, Se, I, F, Cu, Cr, Cd, Mn) • Mechanism of Mercury toxicity		
Practicals: **Medical biochemistry:** Normal constituents of urine Abnormal constituents of urine Interpretation of urine report Estimation & clinical interpretation of Serum Magnesium using Micro lab Physiology: Revision			

BDS Curriculum Year-I (2025)

BLOCK-I (11+1 = 12 Weeks)

Module 1: Orofacial Biology

Duration: 1 week

Topic	Learning outcome	Learning objective	Integrated Learning objectives with other subjects	Instructional strategy	Assessment Tools
Introduction to orofacial structures	Discuss the anatomical features of orofacial structures	Identify the names and locations of skeletal, dental, and soft tissue structures present in orofacial region.		LGIS	MCQs

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Module 2: Oral Mucosa

Duration: 4 weeks

Topic	Learning outcome	Learning objective At the end of this block, student will be able to:	Integrated Learning objective with other subjects	Instructional Strategy	Assessment Tool
Oral Mucosa	Correlate the basic knowledge of oral mucosa to different clinical scenarios.	a. Define oral Mucosa b. Discuss various types or oral mucosa with respect to their distribution, attachment, surface features and physical properties.		LGIS SGD Practical Demo CBL/Integrated Session	MCQs SAQs OSPE
		c. Discuss the gross features, surface landmarks, boundaries, and clinical features of various types of oral mucosa d. Correlate the oral mucosa with clinical scenarios (such as suturing of various types of mucosae etc).	**Preclinical Prosthodontics** Identify anatomical landmarks and limiting structures of maxillary and mandibular arch.		
		e. Discuss the functions of oral mucosa and correlate them clinical scenarios.			
		f. Explain the components of oral mucosa along with its variations in different parts of oral cavity			
		g. Discuss the types and layers of oral epithelium and discuss the differences between the two main types of oral epithelium in each layer.			

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		h. Explain the processes of epithelial proliferation, maturation, and desquamation of oral epithelium at histological and cellular levels.			
		i. List the non-keratinocytes present in oral epithelium and discuss their nature, shape, location, and function in oral epithelium. j. Correlate the non-keratinized epithelium with clinical scenarios such as oral pigmentation etc.	**Oral Pathology** Identify the following oral mucosal lesions: Ulcers Lichen Planus Leukoplakia Squamous Cell Carcinoma Other from the course book of Oral Biology **Oral Medicine** Define the basic clinical terminologies related to oral mucosa (i.e. vesicles, bullae, ulcers and White lesions).		
		k. Discuss the layers and components of basal lamina. l. Correlate basal lamina with various clinical scenarios such as vesiculobullous conditions.			
		m. Explain lamina propria in terms of its components, thickness, histology, and variations in different types of oral mucosa.			

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		n. Discuss the neurovascular supply of oral mucosa in detail o. Correlate neurovascular suuply of oral mucosa with clinical scenarios such administration of local anesthesia.			
		p. Explain the structural variations present in different types of oral mucosa such as lingual papillae, palatine rugae etc. q. Correlate the structural variations in oral mucosa with clinical pictures.			
		r. Discuss the three clinically visible junctions present in oral mucosa, i.e., Mucogingival, mucocutaneous and dentogingival junctions. s) Discuss clinical and histological features of mucogingival, mucocutaneous, and dentogingival junctions. s. Correlate clinically visible junctions with clinical scenarios.			
		t. Define attached gingiva, free gingiva, gingival sulcus, junctional epithelium, sulcular epithelium, dentogingival junction, Col.			

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		u. Discuss the development of oral mucosa. w) Discuss the age changes that take place in oral mucosa. v. Correlate the age changes of oral mucosa with clinical scenarios. **Skills:** Identify in histological pictures/images keratinized and non-keratinized epithelium. Identify tongue papillae in histological slides/images. Draw the histological features, location, and function of taste bud. Identify Fordyce's granules in pictures/images. Identify on study models / images junctions in oral cavity (mucogingival, dentogingival, mucocutaneous).			
		w. Discuss the process of repair and regeneration in oral mucosa.			

*** CBL/Integrated session on Oral Mucosal Lesions**

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Module 3: Tooth Form & Structure

Duration: 3 weeks

Topic	Learning outcome	Learning objective	Integrated Learning objectives with other subjects	Instructional Strategies	Assessment Tool
Introduction to tooth morphology	Discuss the basic nomenclature and tooth numbering systems to understand tooth morphology	Classify dentition	**Pre-clinical Operatives** Discuss the nomenclature and various terminologies used for tooth preparation **Orthodontics** Age estimation on the basis of eruption, shedding, root completion on models, Pictures & radiographs	**LGIS** **SGDs** **Practical** **Demo**	**MCQs** **OSPE**
		Differentiate different tooth numbering system			
		Discuss the basic terminology used to discuss morphological features of teeth.			
		List the sequence of normal tooth eruption and shedding. **Skills:** Identify oral and other associated dental structures. Identify the teeth and their number on models / pictures by using various numbering systems.			
Physiological considerations of tooth morphology	Correlate normal tooth forms and alignment to its function and form the basis of physiologic considerations of teeth and their supporting structures	a) Discuss the functions of the morphological features present on teeth. b) Correlate the functions of teeth and their morphological features with		**LGIS** **SGDs** **Practical** **Demo**	**MCQs** **OSPE**

		clinical scenarios.			
		Explain the general rules / trends observed in certain morphological features such as cervical movement of contact point when moving from anterior to posterior teeth.			

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Module 4: Growth & Development

Duration: 3 weeks

Topic	Learning outcome	Learning objective	Integrated Learning objectives with other subjects	Instructional Strategies	Assessment Tools
Development of orofacial structures	Correlate orofacial development to its clinical significance	a. Define gastrulation (formation of three germ layers) b. Discuss the development, significance, and fate of primitive streak c. Explain the development of notochordal process, notochord canal and prechordal plate. d. List the various derivations of the three germ layers. e. Explain neural crest cells, their formation, migration, and derivatives		**LGIS** **SGDs** **Practical** **Demo** **CBLs/Integrated sessions**	**MCQs** **SAQs** **OSPE**
		Discuss formation of pharyngeal apparatus, its derivatives, and anomalies.			
		Explain the development of face in terms of processes involved and their role in formation of lips, nose, forehead, cheeks, and jaws.	**Orthodontics** Describe briefly the normal growth and development of the craniofacial complex and explain briefly the following growth theories: Sutural growth Drift displacement **Oral Pathology**		

			List the causes of dentofacial deformities.		
		Discuss the developmental anomalies associated with incomplete fusion of facial processes. **Skills:** Identify the pharyngeal apparatus, its derivatives, and associated anomalies in pictures. Identify in pictures/images developmental anomalies associated with incomplete fusion of facial processes.	**OMFS** Classify cleft lip and palate.		
		Discuss etiological factors responsible for congenital defects affecting facial development.	**OMFS** List the OMF problems faced by a cleft patient.		
		Classify developmental anomalies and defects in the development of oral structures. **Skills:** Identify various palatal clefts in pictures.			

Suggested Linkers	
Oral Mucosa	• Oral Mucosal Lesions
Growth & Development	• Cleft Lip & Palate

Practicals	
Oral Mucosa	○ Histology of lip ○ Histology of tongue ○ Histology of lingual papilla ○ Histology of taste buds

Tooth Form & Function	• Identify various classes of teeth on models and pictures • Identify various stages of dentition • Practice tooth numbering systems on models, pictures and radiographs • Identify various anatomical structures on teeth
Growth & Development	• Identify developmental anomalies of craniofacial region given in textbooks of oral biology and general embryology

* Clinical relevance for integrated sessions/CBLs: Cleft Lip & Palate

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BLOCK-II (12+1 = 13 Weeks)

Module 5: Dental Tissues

Duration: 8 weeks

Topic	Learning Outcome	Learning Objectives	Integrated Learning objectives with other subjects	Instructional Strategies	Assessment Tools
Tooth Development	Correlate the knowledge of tooth development to its clinical significance	Outline the formation of odontogenic epithelium, primary epithelial band, and dental placodes.		**LGIS SGDs Practical Demo CBL/Integrated session**	**MCQs SAQs OSPE**
		Explain the formation of dental and vestibular lamina			
		Discuss the process of tooth initiation			
		Discuss the theories tooth type determination			
		Explain the histological features of the stages of tooth development			
		Explain formation of single and multiple roots			
		Discuss the process of hard tissue formation			
		List the sequence of normal tooth eruption and shedding. **Skills:** Draw the histological features of tooth development. Identify the developmental anomalies of tooth in pictures and study models	**Oral Pathology** Discuss the developmental abnormalities associated with teeth (The ones given in tooth morphology text book)		
Enamel	Correlate the developmental and histo-morphological knowledge of	a. Outline the physical properties and chemical composition of enamel	**Operative Dentistry** Orientation of enamel rods during cavity prep	**LGIS SGDs Practical Demo CBL/Integrated**	**MCQs SAQs OSPE**

	enamel with different clinical scenarios		Cavo-surface angle	**session**	
		b. Discuss the process of amelogenesis			
		c. Illustrate the microscopic structure of enamel	**Oral Pathology** Amelogenesis imperfecta		
		d. Illustrate the histological features of enamel			
		e. Correlate the developmental defects of enamel with the process of amelogenesis			
		f. Correlate the physical and chemical properties and microstructure of enamel with various clinical consideration			
		Skills: Draw the microstructure and histological features of enamel. Daw the histological features of amelogenesis. Identify the congenital anomalies associated with enamel			
Dentin-pulp complex	Correlate the developmental and histo-morphological knowledge of Dentin-pulp complex to different clinical scenarios	a. Outline the physical properties and chemical composition of dentin-pulp complex		**LGIS SGDs Practical Demo CBL/Integrated session**	**MCQs SAQs OSPE**
		b. Discuss the process of dentinogenesis			
		c. Illustrate the microscopic structure			

		of dentin-pulp complex			
		d. Illustrate the histological features of dentin-pulp complex			
		e. Correlate the developmental defects of dentinogenesis with the process of amelogenesis			
		f. Discuss the theories of dentin sensitivity			
		Discuss the defensive and reparative mechanisms of dentin-pulp complex.	**Pre-clinical Operative** Discuss the defensive and reparative mechanisms of dentin-pulp complex. (VILP)		
		g. Discuss the physical and chemical properties and microstructure of dentin-pulp complex.	**Science of dental materials** Describe the concept of bonding and adhesion in dentistry. Compare the development of smear layer and hybrid layer with reference to the acid etch technique. **Operative Dentistry** Define adhesion and enumerate the basic concepts of adhesion to enamel and dentin		

		h. List the age changes of dentin-pulp complex and correlate them with clinical scenarios.			
		i. Discuss the process of repair and regeneration in dentin-pulp complex.			
		Skills: Draw the microstructure and histological features of dentin-pulp complex. Draw the histological features of dentinogenesis. Identify the congenital anomalies associated with dentin. Identify the age changes, reparative and defensive features on pictures.	**Operative Dentistry** Discuss the abnormalities associated with tooth structure i.e., enamel, dentin, and cementum defects. (From the textbook of tooth morphology)		

* Clinical relevance for integrated sessions/CBLs: 1) Dental Pain 2) Dentin sensitivity 3) Amelogenesis Imperfecta 4) Developmental anomalies of teeth.

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Module 6: Periodontal Tissues

Duration: 3 weeks

Topic/ Theme	Learning outcome At the end of this module, student will be able to:	Learning objective At the end of this module, student will be able to:	Integrated Learning objectives with other subjects	Instructional Strategies	Assessment Tool
Bone	Correlate the developmental and histo-morphological knowledge of bone to different clinical scenarios.	Outline the physical and chemical properties of bone Explain the general and gross anatomy of bone Explain the gross anatomy of alveolar, mandibular, and maxillary bone Classify the various types of bone with respect to gross appearance, histology, development etc. Illustrate the histological features of bone Discuss the process of bone development and growth Discuss the process of bone remodeling Correlate important anomalies/disorders related to bone with special orofacial development. Discuss the process of repair and regeneration in bone. **Skills:** Draw the microstructure and histological features of bone. Draw the histological features of bone	**Prosthodontics** Explain the alveolar bone resorption pattern in edentulous maxilla and mandible.	LGIS SGDs Practical Demo	MCQs SAQs OSPE

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		development. Identify the age changes in bone in pictures.			
Periodontium	Correlate the developmental and histo-morphological knowledge of periodontium to different clinical scenarios	a. Define the structural and histological components of periodontium. b. Discuss physical and chemical properties of cementum. c. Classify cementum in terms of presence or absence of cells, origin of collagen fibers. d. Discuss the cementum types (primary, secondary, mixed, and acellular) in terms of cells, origin of fibers, location, function, formation/development mineralization. e. Classify cementoenamel junction and discuss clinical significance. f. Discuss histological appearance and significance of cementodentinal junction. g. Discuss age related changes and reparative process occurring in cementum. h. Explain the formation of periodontal ligament development. i. Discuss the location, average width, content function, remodeling and age changes occurring in PDL. j. Discuss the principal fiber bundles of periodontal ligament and the bundles of gingival ligament and	**Periodontology** Describe the clinical significance of periodontium: Gingivitis, Periodontitis, Periodontal Abcess, Periapical and gingival abscess, Clinical attachment loss & Pocket depth. **Orthodontics** Explain normal bone physiology and metabolism with respect to orthodontic tooth movement.	LGIS SGDs Practical Demo Integrated session/CBL	MCQs SAQs OSPE

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		discuss their clinical significance. k. Explain the blood supply of periodontal ligament in terms of names of blood vessels, branching pattern and distribution of the vessels. l. Discuss nerve supply of periodontal ligament in terms of names of nerves, types of nerve fibers, location, type of neural termination and branching pattern. m. Correlate the neurovascular supply of periodontium with clinical scenarios such as wound healing etc. n. Discuss histological changes seen in periodontium in response to various functional demands and correlate it with clinical scenarios o. Discuss the process of repair and regeneration in periodontium **Skills:** p. Identify cementum in images/slides of ground section of tooth. q. Identify the various types of cementum in histological pictures/slides. r. Draw and label the histology of different types of cementum. s. Identify in images/histological slides, draw, and label, and describe the		

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		location, direction/orientation, origin, insertion and function of principal fibers of periodontal ligament and gingival ligament. t. Identify the gingiva, free gingiva, attached gingiva, col, and interdental gingiva in images / study models.			

* Clinical relevance for integrated sessions/CBLs: 1) Gingivitis Vs Periodontitis & Periapical Vs Gingival Vs Periodontal Abscess

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Module 7: Tooth Morphology - 1

Duration: 1 week

Topic/Theme	Learning outcome At the end of this module, student will be able to:	Learning objective At the end of this module, student will be able to:	Integrated Learning objective	Instructional Strategies	Assessment Tool
Morphology of individual permanent anterior teeth	Describe the basic anatomy of permanent dentition and compare the morphological features of teeth within each class, i.e., incisors and canines.	a) Tabulate for all permanent teeth the initiation of calcification, completion of enamel and root in terms of months/years b) Illustrate the morphological features of the crown of each tooth from all aspects with respect to shape, boundaries, dimensions, elevations, and depressions. c) Discuss number, shape, and inclination of root/roots in each tooth. d) Discuss number, location, and significance of pulp canals in each tooth.		LGIS SGDs Practical Demo	MCQs SAQs OSPE

Suggested Linkers	
Dental Tissues	• Developmental anomalies of teeth & amelogenesis imperfecta • Dental pain and dentin sensitivity
Periodontal tissues	• Ginigivitis vs periodontitis & periapical vs gingival vs periodontal abscess

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Practicals	
Dental tissues	○ Histology of tooth development ○ Anomalies associated with development of tooth ○ Histology of enamel, dentin and pulp ○ Developmental anomalies associated with dental tissues
Periodontal tissues	• Gross / surface anatomy of periodontal tissues • Histology of periodontal tissues
Tooth Morphology-1	• Identification and draw and labeling of permanent anterior teeth

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BLOCK-III (10+1 = 11 Weeks)					
Module 8: Tooth Morphology - 2					
Duration: 5 weeks					
Topic/Theme	Learning outcome **At the end of this module, student will be able to:**	Learning objective **At the end of this module, student will be able to:**	Integrated Learning objective	Instructional Strategies	Assessment Tools
Morphology of individual permanent posterior teeth	Describe the basic anatomy of permanent dentition and compare the morphological features of teeth within each class, i.e., premolars and molars.	a) Tabulate for all permanent teeth the initiation of calcification, completion of enamel and root in terms of months/years. b) Illustrate the morphological features of the crown of each tooth from all aspects with respect to shape, boundaries, dimensions, elevations, and depressions. c) Discuss number, shape, inclination of root/roots in each tooth. d) Discuss the number, location, and significance of pulp canals in each tooth. **Skills:** Identify every single tooth on study models / pictures / images based on morphological features. Draw labelled diagrams of morphological features of each tooth from all aspects and sections of crown and root.		LGIS SGDs Practical Demo	MCQs SAQs OSPE

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Morphology of individual deciduous teeth	Discuss the basic anatomy of deciduous dentition and differentiate it from the permanent dentition.	a) Tabulate general morphological differences between permanent and deciduous teeth. b) Illustrate the morphological features of the crown of each tooth from all aspects with respect to shape, boundaries, dimensions, elevations, and depressions. c) Discuss number, shape, inclination of root/roots in each tooth. d) Discuss the number, location, and significance of pulp canals in each tooth. **Skills:** Identify every single tooth in pictures / images based on morphological features. Draw labelled diagrams of the morphological features of each tooth from all aspects and sections of crown and root.		LGIS SGDs Practical Demo	MCQs SAQs OSPE

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Module 9: Oral Physiology

Duration: 2 weeks

Topic/Theme	Learning outcome At the end of this module, student will be able to:	Learning objective At the end of this module, student will be able to:	Integrated Learning objective	Instructional Strategies	Assessment Tools
Eruption & Shedding	Discuss the various types of physiological tooth movements and associate them with clinical scenarios.	a) List the various types of physiological tooth movements.		LGIS SGDs Practical Demo Integrated sessions / CBLs	MCQs SAQs OSPE
		b) Discuss the process of pre-eruptive, eruptive, and post-eruptive tooth movements.			
		c) Explain the various theories of eruptive tooth movement. d) Correlate theories of eruptive tooth movement with clinical scenarios such as eruption of rootless teeth.			
		e) Discuss the histological changes occurring during tooth eruption.			
		f) Discuss the histological features of tooth shedding along with the factors			

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		responsible for this process.			
		g) Correlate the chronological order of tooth eruption and shedding with dental and chronological age and with various clinical scenarios.	**Orthodontics:** Explain briefly the development of dentition. Identify periods of primary, mixed, and permanent dentition and eruption sequence.		
		h) Discuss various types of abnormal tooth movements. i) Correlate various types of abnormal tooth movements clinically.			
		j) Discuss the histological aspects of orthodontic tooth movement. **Skills:** Identify the dental age on images / study models. Draw labelled diagrams the histological features of eruption and shedding.	**Orthodontics:** Mechanism of orthodontic tooth movements		
Taste, mastication & Speech	Correlate the anatomical knowledge for understanding processes of taste, mastication & speech.	a)Discuss basic events of speech production (initiation, phonation, articulation)		LGIS SGDs Practical Demo	MCQs SAQs OSPE

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		b)Classify various types of sounds with respect to manner and place of articulation			
		c)Outline the taste pathway along with its neurological control from higher centers			
		d) Discuss taste receptor cells, tastants and taste buds.			
		e)Explain mastication in terms of structural apparatus, muscles involved, chewing cycle (opening, closing and occlusal phase) and neurological pathway controlling mastication			
		f)Outline stages of mastication and discuss reflexes of mastication (jaw jerk reflex, jaw unloading reflex, jaw open reflex)			

* Clinical relevance for integrated sessions/CBLs: Mechanism of Orthodontic tooth movement

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Module 10: Para-oral structures					
Duration: 3 weeks					
Topic/ Theme	**Learning outcome**	**Learning objective**	**Integrated Learning objective with other subjects**	**Instructional Strategies**	**Assessment tools**
Temporomandibular joint (TMJ)	Correlate the developmental, anatomical, and histological features of temporo-mandibular joint with clinical scenarios	a. Discuss the various types of jaw joints along with the description of their range of motion.		LGIS SGDs Practical Demo Integrated sessions / CBLs	MCQs SAQs OSPE
		b. Discuss the gross anatomy of various parts of TMJ, i.e., Capsule, Synovial membrane, condylar head, articular eminence, Temporal fossa, Articulating disc, associated ligaments and muscles, neurovascular supply.			
		c. Explain the histological features of all components of TMJ.			
		d. Discuss the movement and mechanics of TMJ with reference to the shape of its bony components, muscles of mastication involved, presence of two joint cavities, anatomy and histology of articulating disc and capsule, associated ligaments etc.	**Prosthodontics** Explain the clinical significance of muscles of mastication in dentures.		

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		e. Discuss the process of disc dislocation and locked jaw and explain the maneuver to relocate/reduce the jaw.	**Oral Medicine** Classify TMJ disorders		
		f. Discuss the development of TMJ and associate the development with various clinical scenarios. g. Describe the manoeuvre for TMJ reduction. **Skills:** h. Identify the gross and histological parts of TMJ on study models, specimen, images etc. i. Draw and label the gross anatomy and histology of TMJ.			
Salivary glands	Correlate the development, anatomy, and physiology of Salivary glands with its clinical significance	a. Recall the anatomy of major salivary glands		LGIS SGDs Practical Demo Integrated sessions / CBLs	MCQs SAQs OSPE
		b. Discuss functions of saliva	**Oral Medicine** Discuss composition and functions of saliva		
		c. Explain production and modification of saliva			
		d. Illustrate histology of major and minor salivary glands			
		e. Explain the neurovascular supply of salivary glands			

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		f. Explain development of salivary glands			
		g. Correlate basic knowledge of salivary glands with age changes and clinical scenarios **Skills:** Identify the salivary glands and their ducts on study models/pictures. Draw labelled diagrams of histology of major and minor salivary glands.			

* Clinical relevance for integrated sessions/CBLs: 1) TMJ Dislocation and trismus 2) Xerostomia

Suggested Linkers	
Oral Physiology	• Mechanism of Orthodontic Tooth Movement
Para-oral structures	• TMJ Dislocation & trismus • Xerostomia

Practicals	
Tooth Morphology-2	○ Identification and draw and labeling of permanent posterior teeth Histology of tooth development ○ Identification of deciduous teeth ○ Anomalies associated with tooth
Oral Physiology	• Identify dental age on models, pictures and radiographs
Para-oral structures	• Gross anatomy of TMJ • Histology of TMJ • Gross anatomy of salivary glands • Histology of salivary glands

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