



**DENTAL COLLEGE HITEC-IMS**

**Study Guide Y1 - B3 - D22**

**1st Year BDS**

**Coordinator: Dr. Saman Malik**



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## List of Abbreviations

- ANS            Automatic Nervous System
- CBL            Case Base Learning
- EECS          Early Exposure to Clinical Skills
- EOB            End of Block Examination
- FGD            Focus Group Discussion
- GIT            Gastrointestinal Tract
- LGIF          Large Group Instructional Format
- LGIS          Large Group Interactive Session
- MCQ          Multiple Choice Question
- MIT            Mode of Information Transfer
- NUMS        National University of Medical Sciences
- OSCE        Objectively Structured Clinical Examination
- OSPE        Objectively Structured Practical Examination
- PMC          Pakistan Medical Commission
- SAQ          Short Answer Question
- SDL          Self-Directed Learning
- SEQ          Structured Essay Questions
- SGD          Small Group Discussion
- TOS          Table of Specification
- WFME        World Federation of Medical Education
- IMLC        Interactive Method to Learn Cranial Nerves



### **NUMS Vision**

The vision of the National University of Medical Sciences is to improve the quality of life through education, research, innovation, and healthcare, thereby contributing to endeavors to make Pakistan and this world a better place to live in.

### **Institutional Vision**

Leading advancement in Oral & Dental health through excellence  
in Education, patient care and research

### **Institutional Mission**

To serve the local and global communities by producing competent, ethical, socially responsible, research oriented and life long learning oral health care professionals



## Block Committee

Coordinator: **Assistant Prof. Dr Saman Malik**

HoD Oral Biology, Contact No: 0312-3456303

S No.	Name	Designation	Departments	Contact Number
1.	Dr Rai Tariq	Professor	Community Dentistry	0333-5718658
2.	Dr Sadaf Mumtaz	Professor	Physiology	0347-5157965
3.	Dr Ayesha Haque	Associate Professor	Anatomy	0314-4568252
4.	Dr Ambreen Gul	Associate Professor	Biochemistry	0300-5905179
5.	Dr Saman Malik	Assistant Professor	Oral Biology	0312-3456303
6.	Dr Faizan Munir	Assistant Professor	Dental Education	0334-0031031
7.	Dr Fatima Tuz Zahra	Lecturer	Behavioural Sciences	0307-5887485
8.	Urwa Liaqat	Student	1 <sup>st</sup> Year	0333-5949679
9.	Arshia Shoukat	Student	2 <sup>nd</sup> Year	0311-0796622
10.	Anas Nadir	Student	2 <sup>nd</sup> Year	0313-6112202



## **Curriculum Overview/Implementation**

### Preface

The curriculum meets the standards of the Pakistan Medical Commission, the Higher Education Commission of Pakistan, and the World Federation of Medical Education. On completion of the program, our students have required competencies as defined worldwide in a graduate doctor.

### Model

The curriculum of Dental College HITEC-IMS is based on the traditional, discipline-based model of educational strategies. However, we have incorporated some elements of the SPICES model, such as its student-centered, integrated, community-oriented, and systematic aspects. In addition, our curriculum has evolved, considering traditional, experiential, behavioral, attributional and constructivist perspectives of curricula.

### Organization

The curriculum is organized and integrated along important vertical and horizontal dimensions. The content taught is integrated concurrently in the horizontal organization and vertically across the years of dental education. The course of the first year is divided into three blocks. In each block, the sequencing of the content is logical and integrated.

### Teaching Strategies

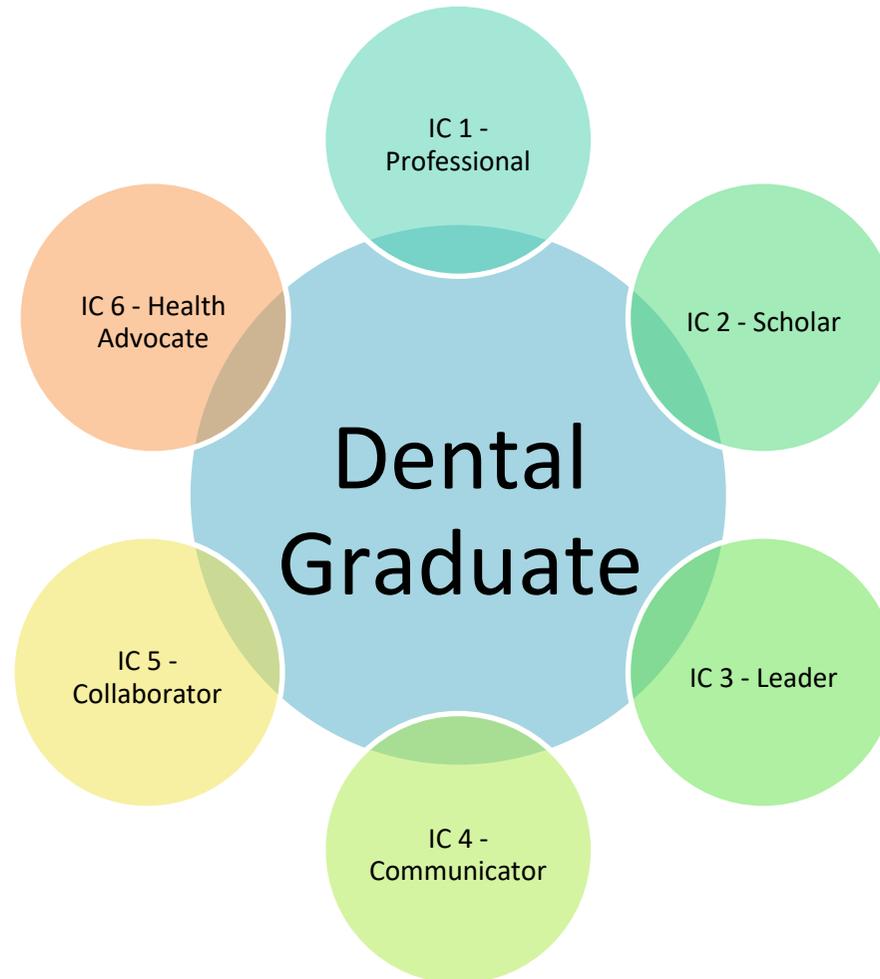
Multiple teaching strategies are used. LGIS are used to provoke thought, understanding and to standardize the delivery of concepts. It helps them to understand general themes of subject matter, updated research and best evidence medical information. We are teaching clinical implications of each topic to integrate basic and clinical sciences. This encounter is based on experience that is contextual, realistic, and relevant. Small group discussions encourage students to learn socially, discuss their concepts and refine their schemas. Working in laboratories and the dissection hall provides experiential and hands-on learning.

### Assessment

The summative assessment includes end of block and pre annual examination. Formative assessment is based on assignments, presentation, flipped classroom journal club, quizzes and class tests. After the block exams and end of academic year, a pre annual examination is conducted according to standards outlined by NUMS.



## 1. Institutional Competency Framework





## **2. Alignment of Block Outcomes with Institutional Competencies**

<b>S. No.</b>	<b>Block Outcomes</b>	<b>Institutional Competencies</b>
1.	Correlate the anatomy of cells and their biochemical reactions with its application in clinical practice	IC 1 to IC 6
2.	Relate the histology of nerve, bone and muscle with its function along with clinical relevance	IC 2 to IC 6
3.	Discuss the anatomical and histological features of hard and soft tissues, including the head and neck region	IC 2
4.	Integrate the fundamental concepts of social and behavioral sciences with knowledge of other medical subjects	IC 1, IC 2, IC 6
5.	Apply the principles of research for writing research proposals	IC 2, IC 4, IC 5, IC 6
6.	Analyze multiple perspectives of Pakistan studies and Islamiyat	IC1, IC 2



## Assessment

### Types and Schedules



Assessment is continuous via class tests, quizzes, and assignments by the department. Continuous assessment is separate from the block exam that will be held at the end of 13<sup>th</sup> weeks of instruction.

Formative assessment will be in the form of tests/ written assignments/reflective writing/ presentations and feedback to the students during the teaching time. The purpose of formative assessment is to provide feedback to the students for improvement and for teachers to identify areas where students need further guidance.

From the 2<sup>nd</sup> week onwards, the class tests of Biochemistry, Physiology, Anatomy and Oral Biology will be held on a rotation basis, respectively. Finally, the 14<sup>th</sup> week will be dedicated to End of Block (EOB) exams. The EOB exam will comprise of theory and practical exam separately. EOB along with pre-annual exams, will contribute to marks in internal assessment, to be submitted to the university.

Students must secure 50% marks in theory and practical exams separately, per university criteria.

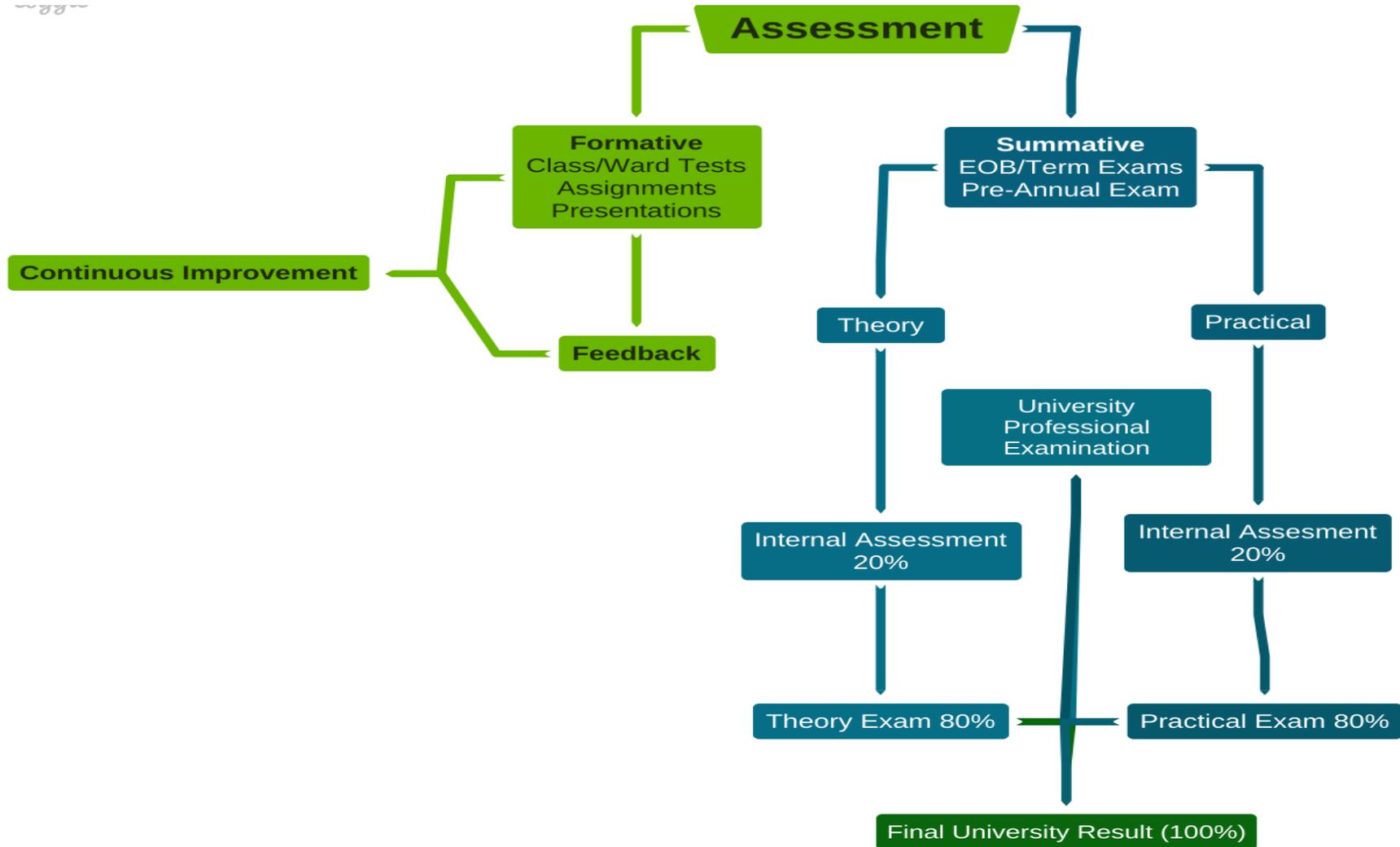
The students who fail at the end of the block exam will be allowed to attend the next block; however, his/her internal assessment will be affected accordingly.

#### **Internal assessment criteria for submission of internal assessment marks of first Professional Examination NUMS:**

1. The weightage of internal assessment shall be 20 marks for a 100 marks Paper (20%) in the annual examination.
2. End of block examinations, and pre-annual examination shall contribute to internal assessment.



## 2. Assessment Map





### 3. Academic Calendar

#### 1<sup>st</sup> Year BDS CLASS-2022

Commencement of Classes - 01.02.2022			
BLOCK - 1 (14 WEEKS)			
(15 – 02 - 22 To 17 – 05 - 22)			
Activity	Duration	From	To
Orientation	01 week	01-02-22	6-02-22
Academics	07 weeks	7-02-22	25-03-22
Sports Week	01 week	28-03-22	01-04-22
Academics	04 weeks	04-04-22	29-04-22
Public Holiday	Nil	-----	----
Block Assessment	01 week (09 days)	09-05-22	17-05-22
Eid Ul Fitr	01 week (09 days)	30-04-22	08-05-22
Block - 2 (13 Weeks)			
(18 – 05 - 22 To 21 – 08 - 22)			
Academics	6 weeks	18-05-22	27-06-22
Public Holidays	Nil	----	-----
Eid-UI Azha+ Vacations	03 weeks	27-06-22	17-07-22
Academics	03 weeks	18-07-22	06-08-22
Block Assessment	01 week	09-08-22	21-08-22
Block - 3 (14 Weeks)			
(22 – 08 - 22 To 09 – 11 - 22)			
Academics	12 weeks	22-08-22	09 -11-22
Public Holiday	Nil	-----	-----
Send-Up	02 weeks	14-11-22	01-12-22
Pre-Prof Leave	26 Days	02-12-22	26-12-22
1 <sup>st</sup> Professional Exam (Tentative)	25 <sup>th</sup> of December 2022		



## Sample Timetable

Day/ Time	8:30-9:20	9:20-10:10	10:10-10:30	10:30-11:20	11:20-12:10	12:10-12:30	12:30-1:50	1:50-3:30	
<b>Monday</b>	<u>Anatomy</u>	<u>Biochemistry</u>	-----Break-----	<u>PHYSIOLOGY</u>		-----Break-----	<u>PRACTICAL</u>	<u>ORAL BIOLOGY</u>  <u>PRACTICAL</u>	
<b>Tuesday</b>	<u>PHYSIOLOGY</u>	<u>ORAL BIOLOGY</u>		<u>ANATOMY</u>			<u>PRACTICAL</u>	<u>1:50-2:50</u> <u>ORAL BIOLOGY</u>	<u>2:50:3:30</u> <u>BEHAVIOR SCIENCES</u>
<b>Wednesday</b>	<u>BIOCHEMISTRY</u>	<u>ANATOMY</u>		<u>PHYSIOLOGY</u>	<u>ORAL BIOLOGY</u>		<u>ANATOMY</u>	<u>ORAL BIOLOGY</u>  <u>PRACTICAL</u>	
<b>Thursday</b>	<u>ANATOMY Dissection</u>			<u>BIOCHEMISTRY</u>	<u>PHYSIOLOGY</u>		<u>PRACTICAL</u>	<u>1:50- 2:30</u>	<u>2:30-3:30</u>
<b>Friday</b>	<u>ORAL BIOLOGY</u>	<u>BIOCHEMISTRY</u>		<u>PHYSIOLOGY</u>	<u>ISLAMIAT/PAK STUDIES</u>		<u>BIOCHEMISTRY</u>	<u>1:00-1:30</u>  <b>Break</b>	<u>PHYSIOLOGY</u>
	8:30-9:20	9:20-10:10	10:10-11:20	11:20-12:00	12:00-1:00	1:00-1:30	1:30-2:30	2:30-3:30	



## **Block – III**

# **Neural, Hormonal & Life Cycle Sciences**



### Structured Summary of Block III

<b>Code</b>	<b>Y1-B3-D22</b>
<b>Title</b>	Neural, Hormonal & Life Cycle Sciences
<b>Duration of block</b>	14 Weeks
<b>Dates</b>	22-8-22 to 18-11-22
<b>Horizontally Integrates Themes</b>	Embryology Ascending and descending tracts
<b>Vertically Integrated Themes</b>	Research Methodology Behavioral Sciences
<b>Prerequisite Blocks</b>	1 <sup>st</sup> and 2 <sup>nd</sup> Blocks – 1 <sup>st</sup> Year



## Tentative Class Test Schedules<sup>1</sup>

DATE	SUBJECT	DAY
5 <sup>th</sup> -Sep-22	Biochemistry	Monday
12 <sup>th</sup> -Sep-22	Physiology	Monday
19 <sup>th</sup> -Sep-22	Anatomy	Monday
26 <sup>th</sup> -Sep-22	Oral Biology	Monday
03 <sup>rd</sup> -Oct-22	Biochemistry	Monday
10 <sup>th</sup> -Oct-22	Physiology	Monday
17 <sup>th</sup> -Oct-22	Anatomy	Monday
24 <sup>th</sup> -Oct-22	Oral Biology	Monday
31 <sup>st</sup> -Oct-22	Integrated test Anatomy/Biochemistry (MCQs)	Monday
07 <sup>th</sup> -Nov-22	Integrated Test Physiology/Oral Biology (MCQs)	Monday

<sup>1</sup> This is a tentative schedule. Therefore, it is subject to change.



## Sendup Exam Tentative Schedule <sup>2</sup>

S. No	DATE /DAY	SUBJECT
01	14-November-22 Monday	Anatomy
02	17-November-22 Thursday	Physiology
03	21-November-22 Monday	Biochemistry
04	24-November-22 Thursday	Oral Biology

### OSPE

S. No	DATE/DAY	SUBJECT
01	28-November-22 Monday	Batch A: Anatomy Batch B: Physiology
02	29-November-22 Tuesday	Batch A: Physiology Batch B: Anatomy
03	30-November-22 Wednesday	Batch A: Biochemistry Batch B: Oral Biology
04	01-December-22 Thursday	Batch A: Oral Biology Batch B: Biochemistry

<sup>2</sup> This is a tentative schedule. Therefore, it is subject to change.



## Learning Outcomes for Block III

### Physiology

S. No.	Topics/Theme	Learning Outcomes	Learning Objectives	IC Codes	MITs	Assessment Tools
		By the end of this block students should be able to:				
1.	Sensory receptors & receptor Potential	<ul style="list-style-type: none"> <li>Interpret the physiological mechanisms controlling the functions of sensory system</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>Classify the various types of sensory receptors</li> <li>Explain the sensory stimuli and differential sensitivity of receptors</li> <li>Explain the sensory transduction into nerve impulses</li> <li>Describe the local electrical currents at nerve endings— receptor potentials, adaptation of receptors</li> <li>Classify the nerve fibers that transmit different types of signals on the physiological basis</li> <li>Describe the transmission of signals of different intensity in nerve tract (spatial and temporal summation)</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce
2.	Sensory tracts and cortex	<ul style="list-style-type: none"> <li>Explain the dorsal column medial lemniscal system and anterolateral pathways</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>Identify the sensations carried by different sensory tracts</li> <li>Differentiate between different sensory tracts</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce



			<ul style="list-style-type: none"> <li>• Describe the somatosensory cortex and somatosensory association areas</li> <li>• Explain the various thermal sensations, thermal receptors and their excitation and transmission of thermal signals in the nervous system</li> </ul>			
3.	Brain analgesia system	<ul style="list-style-type: none"> <li>• Correlate the pathophysiological basis of pain pathways to their clinical significance</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Classify the different types of pain</li> <li>• Compare the perception and transmission of the different types of pain</li> <li>• Explain the pain suppression system in the brain and spinal cord</li> <li>• Describe the brain's opiate system-endorphins and enkephalins</li> <li>• Describe the clinical abnormalities of pain and other somatic sensations</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce
4.	Motor system Spindle / stretch reflex	<ul style="list-style-type: none"> <li>• Interpret the physiological mechanisms controlling the functions of motor system and higher mental functions</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Correlate the organization of grey and white matter in spinal cord to the pathophysiology of various spinal cord injuries</li> <li>• Explain the role of proprioceptors (muscle spindles and Golgi tendon organs) in motor movements</li> <li>• Explain stretch reflex</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce Presentations



			<ul style="list-style-type: none"> <li>Describe the flexor reflex and the crossed extensor reflex</li> <li>Explain the reciprocal inhibition and reciprocal innervation</li> <li>Identify the reflexes of posture and locomotion in the spinal cord</li> </ul>			
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>Perform the deep reflexes</li> </ul>	IC 1 IC 4	Practical demonstration	OSPE
			<p><b>Attitude</b></p> <ul style="list-style-type: none"> <li>Follow proper dress code of a medical laboratory</li> <li>Maintain his/her workstation according to the prescribed SOPs</li> <li>Report any damage to lab equipment immediately</li> </ul>	IC 4 IC 5	Practical demonstration	Formative checklist
<b>Special Senses</b>						
5.	Physiology of Eye	<ul style="list-style-type: none"> <li>Explain the physiology of optical system of eye and understand errors of refraction</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Explain refraction and concept of convergence and divergence</li> <li>Define focal length, focal point and power of lens</li> <li>Differentiate between emmetropia, myopia, hyperopia, astigmatism, presbyopia and describe their treatment</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>Perform the superficial reflexes</li> </ul>	IC 4 IC 5	Practical demonstration	OSPE



			<p><b><u>Attitude</u></b></p> <ul style="list-style-type: none"> <li>• Follow proper dress code of a medical laboratory</li> <li>• Maintain his/her workstation according to the prescribed SOPs</li> <li>• Report any damage to lab equipment immediately</li> </ul>	IC 1 IC 4 IC 5	Practical demonstration	Formative checklists
6.	Physiology of Ear	<ul style="list-style-type: none"> <li>• Explain the physiology of middle ear</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Describe the physiological anatomy of ear</li> <li>• Explain the mechanism of conduction of sound waves through the ear to the cochlea</li> <li>• Describe “Impedance Matching” and its importance</li> <li>• Describe the process of attenuation of sounds</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce
			<p><b><u>Skill</u></b></p> <ul style="list-style-type: none"> <li>• Examine the Cranial Nerves (1<sup>st</sup> till 6<sup>th</sup>)</li> </ul>	IC 1 IC 4	Practical demonstration	OSPE
			<p><b><u>Attitude</u></b></p> <ul style="list-style-type: none"> <li>• Follow proper dress code of a medical laboratory</li> <li>• Maintain his/her workstation according to the prescribed SOPs</li> <li>• Report any damage to lab equipment immediately</li> </ul>	IC 1 IC 4	Practical demonstration	Formative checklists
7.	Physiology of taste		<p><b><u>Knowledge</u></b></p>	IC 2	LGIS	MCQs SEQs



		<ul style="list-style-type: none"> <li>• Explain the physiology of taste sensation and its pathway</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the primary sensations of taste</li> <li>• Describe the mechanism of stimulation of taste buds and the transmission of signals to CNS</li> </ul>			Viva Voce
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Examine the Cranial Nerves (7<sup>th</sup> till 12<sup>th</sup>)</li> </ul>	IC 1 IC 4 IC 5	Practical demonstration	OSPE
			<p><b>Attitude</b></p> <ul style="list-style-type: none"> <li>• Follow proper dress code of a medical laboratory</li> <li>• Maintain his/her workstation according to the prescribed SOPs</li> <li>• Report any damage to lab equipment immediately</li> </ul>	IC 1 IC 4 IC 5	Practical demonstration	Formative checklists
8.	Physiology of olfaction	<ul style="list-style-type: none"> <li>• Explain the physiology of olfaction and its pathway</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Explain the physiological anatomy of olfactory membrane</li> <li>• Explain the mechanism of stimulation of olfactory cells</li> <li>• Identify the primary sensations of smell</li> <li>• Describe the transmission of signals of olfaction into the central nervous system</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce
<b>Endocrinology</b>						
9.	Basics of endocrinology &	<ul style="list-style-type: none"> <li>• Explain the mechanisms of action of hormones</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Identify the various hormone receptors and their activation</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce



	Mechanism of action of hormones		<ul style="list-style-type: none"> <li>• Explain the mechanism of intracellular signaling after hormone receptor activation</li> <li>• Explain the second messenger mechanisms for mediating intracellular hormonal functions</li> <li>• Identify the hormones that act mainly on the genetic machinery of the cell</li> </ul>			
10.	Hormones of hypothalamus and Pituitary gland	<ul style="list-style-type: none"> <li>• Explain the mechanisms of action of hormones</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Explain the pituitary gland and its relation to the hypothalamus</li> <li>• Summarize the hypothalamic-hypophysial portal blood vessels of the anterior pituitary gland and its significance</li> <li>• Recall the functions and regulation of growth hormone</li> <li>• Differentiate between hypopituitarism and hyperpituitarism and its pathophysiological basis</li> <li>• Explain the posterior pituitary gland and its relation to the hypothalamus</li> <li>• Describe the physiological functions of ADH and oxytocin hormone</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce
11.	Thyroid gland	<ul style="list-style-type: none"> <li>• Explain the mechanisms of action of hormones</li> </ul>	<p><b><u>Knowledge</u></b></p>	IC 2	LGIS	MCQs SEQs



			<ul style="list-style-type: none"> <li>Recall the synthesis and secretion of the thyroid hormone</li> <li>Explain the functions of the thyroid hormone</li> <li>Summarize the regulation of thyroid hormone secretion</li> <li>Identify the disorders of the Thyroid gland and their pathophysiological basis</li> </ul>			Viva Voce
12.	Calcium regulating hormones	<ul style="list-style-type: none"> <li>Explain the mechanisms of action of hormones</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Explain the regulation of calcium and phosphate in the extracellular fluid and plasma</li> <li>Enlist the actions of vitamin D</li> </ul> <p>Explain the effect of parathyroid hormone on calcium and phosphate concentrations in the extracellular fluid</p> <ul style="list-style-type: none"> <li>Summarize the control of parathyroid secretion by calcium ion concentration</li> <li>Describe the actions of calcitonin</li> <li>Explain the pathophysiology of parathyroid hormone, vitamin D, and bone diseases</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce
13.	Hormones of adrenal cortex	<ul style="list-style-type: none"> <li>Discuss the mechanisms of action of hormones</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Explain synthesis and secretion of adrenocortical hormones</li> <li>Enlist the functions of aldosterone</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce



			<ul style="list-style-type: none"> <li>• Enlist functions of the glucocorticoids</li> <li>• Describe the disorders of adrenocortical secretion and their pathophysiological basis</li> </ul>			
<b>Reproductive System</b>						
14.	Pregnancy	<ul style="list-style-type: none"> <li>• Explain the physiological adjustments during pregnancy</li> </ul>	<b>Knowledge</b> <ul style="list-style-type: none"> <li>• Summarize the response of the mother's body to pregnancy</li> <li>• Explain the changes in the maternal circulatory system during pregnancy</li> <li>• Explain the role of human chorionic gonadotropin in pregnancy</li> </ul>	IC 2	LGIS	MCQs SEQs Viva Voce



## Anatomy

S. no	Topics/ theme	Learning outcomes	Learning Objectives	IC codes	MIT	Assessment tool
		By the end of this block students should be able to				
1.	Nervous system II	<ul style="list-style-type: none"> <li>Discuss the basic organization of the main structures that form nervous system</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Define the grey matter, white matter, ganglion, nucleus and nerve</li> <li>Explain a three-dimensional appreciation of the parts of the brain and their relative positions to one another</li> <li>Outline the anatomical organization of autonomic nervous system</li> </ul>	IC 2	LGIS	MCQs/SEQs/SAQs/ VIVA VOCE Formative: Presentations/ assignments
2	Lymphoid system	<ul style="list-style-type: none"> <li>Differentiate between H&amp;E stained slides of Different components of lymphoid system</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Enumerate different types of lymphoid cells and identify their distribution in the body</li> <li>Describe the histological features and cells of the lymphoid system</li> <li>Describe the histological features of tonsils, thymus and lymph node</li> </ul>	IC 2	LGIS	MCQs/ SEQs/SAQs/ VIVA VOCE
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>Draw labelled diagrams showing light microscopic structure of tonsils, thymus and lymph node</li> <li>Identify histological sections of tonsils, thymus and lymph node under light microscope and list at least two identification points of each</li> </ul>			



3.	Handling of microscopes and slides	<ul style="list-style-type: none"> <li>• Demonstrate a professional attitude while dealing with learning resources</li> </ul>	<ul style="list-style-type: none"> <li>• Follow proper dress code of laboratory</li> <li>• Handle microscopes and slides properly according to SOPs displayed in lab and switch off microscopes before leaving</li> <li>• Report any damage to lab equipment immediately</li> </ul>	IC 1 IC 4	Laboratory Demonstration	Formative Checklist
4.	Anatomy of cranial cavity	<ul style="list-style-type: none"> <li>• Explain the gross features of cranial cavity and the structures contained within it to understand the anatomical basis of clinical conditions related to them</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Describe and demonstrate the boundaries and gross features of cranial fossae</li> <li>• Enlist and demonstrate foramina along with structures passing through them in anterior, middle and posterior cranial fossae</li> <li>• Recall the important sutures, fontanelle and impressions on the interior of cranial vault</li> </ul>	IC 2	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE  Formative: Presentations/ Assignments
5.	Gross Anatomy of Spinal cord	<ul style="list-style-type: none"> <li>• Correlate the position and functions of the main nervous pathways and nerve cell groups in the spinal cord, with associated segmental injuries and diseases</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Explain the gross appearance and the nerve cell groups in the anterior, posterior and lateral gray columns of spinal cord</li> <li>• Enumerate and illustrate the arrangements of ascending and descending tracts (white matter) in spinal cord at various levels</li> <li>• Explain the given clinical conditions related to ascending and descending tracts of spinal cord</li> </ul>	IC 2	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE  Formative: Presentations/ Assignments



			<ul style="list-style-type: none"> <li>• Trace following pathways of superficial and deep sensations indicating the location of first, second and third order neurons             <ul style="list-style-type: none"> <li>• Pain and temperature pathways</li> <li>• Light touch and pressure pathways</li> <li>• Discriminative touch, vibratory sense and conscious muscle joint sense</li> <li>• Muscle joint sense pathways to the cerebellum</li> <li>• Posterior spinocerebellar tract</li> <li>• Anterior spinocerebellar tract</li> </ul> </li> <li>• Trace following pathways of voluntary movements indicating the location of first, second and third order neurons             <ul style="list-style-type: none"> <li>• Discuss cortico spinal tracts</li> </ul> </li> </ul>			
6.	Gross anatomy of the brainstem	<ul style="list-style-type: none"> <li>• Explain the anatomy of brainstem to assess the signs and symptoms presented by the patient in identifying the exact location of a structural lesion</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Describe the gross appearance and internal structure of the medulla oblongata</li> <li>• Illustrate the cross sections of medulla oblongata at different levels</li> <li>• Apply the knowledge of neuroanatomy to explain the following clinical conditions:</li> </ul>	IC 2	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE  Formative: Presentations/ Assignments



			<p>Arnold-chiari malformation, Medial medullary syndrome, Lateral medullary syndrome, Wallenberg</p> <ul style="list-style-type: none"> <li>• Describe the gross features and internal structure of pons</li> <li>• Illustrate cross section of pons at different levels showing major structures at each level</li> <li>• Analyze the anatomical structures involved in pontine hemorrhage and infarction of pons</li> <li>• Describe the gross appearance, internal structure of mid brain</li> <li>• Illustrate cross section of midbrain at the levels of superior colliculus and inferior colliculus showing major structures at each level</li> <li>• Discuss the lesions of midbrain structures by the blockage of cerebral aqueduct</li> <li>• Identify the gross features of medulla, midbrain and pons on model</li> </ul>			
7.	Gross anatomy of cerebellum & its connections	<ul style="list-style-type: none"> <li>• Discuss the structure, function and connections of the cerebellum with the remainder of the central nervous system to understand</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Discuss the gross features and phylogenetic divisions of cerebellum</li> <li>• Enumerate afferent and efferent fibers of superior, middle and inferior cerebellar peduncles</li> </ul>	IC 2	SGD	<p>MCQs/ SEQs/ SAQs/ VIVA VOCE</p> <p>Formative: Presentations/ assignments</p>



		the anatomical basis of cerebellar dysfunctions	<ul style="list-style-type: none"> <li>• List intracerebellar nuclei and types of fibers constituting white matter of cerebellum and.</li> <li>• List disturbances of voluntary movements, reflexes, ocular movements, speech, posture and gait resulting due to lesions of cerebellum</li> <li>• Demonstrate different parts of cerebellum on given model</li> </ul>			
8.	Gross anatomy of cerebrum	<ul style="list-style-type: none"> <li>• Discuss the structure, function and connections of the cerebrum with the remainder of the central nervous system to understand the anatomical basis of associated clinical conditions</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Describe the topographic anatomy of diencephalon and demonstrate its gross features on a given model</li> <li>• Enlist main sulci and gyri of cerebral hemispheres and describe the extent of each of them</li> <li>• Explain the divisions of cerebral lobes on superolateral, medial and inferior surfaces of cerebral hemispheres</li> <li>• Enumerate fibers making up the white matter of cerebral hemispheres and describe each of them (Summarize parts, relations &amp; fibers forming Internal capsule)</li> <li>• Mark main sulci and gyri on lobes of cerebral hemispheres</li> </ul>	IC 2	SGD	<p>MCQs/ SEQs/ SAQs/ VIVA VOCE</p> <p>Formative: Presentations/ assignments</p>



			<ul style="list-style-type: none"> <li>• Identify commissural, projection and association fibers on brain prosected specimen</li> <li>• Describe and demonstrate the cortical functional areas in different lobes of cerebral hemispheres</li> <li>• Enumerate types of aphasia and describe the lesions of speech areas responsible for producing aphasia</li> <li>• Explain the effects of lesion in the primary and secondary visual cortex</li> <li>• Illustrate the lateral and medial views of cerebral hemispheres showing motor and sensory areas</li> </ul>			
9.	Gross anatomy of reticular formation & limbic system	<ul style="list-style-type: none"> <li>• Correlate the structure and function of the reticular formation and parts of the limbic system with associated clinical conditions</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Enlist the general arrangement and functions of reticular formation</li> <li>• Enumerate components of limbic system and explain hippocampal formation with reference to its afferent and efferent connections</li> </ul> <p><b><u>Skill</u></b></p> <ul style="list-style-type: none"> <li>• Identify different components of limbic system on given model</li> </ul>	IC 2	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE Formative: Presentations/ assignments
				IC 1 IC 4 IC5	Demonstration	OSPE



10.	Gross anatomy of basal nuclei	<ul style="list-style-type: none"> <li>Recognize the location, connections and functions of basal nuclei to explain its common relevant diseases</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>List terminology commonly used to describe the basal nuclei</li> <li>Outline Parkinson disease regarding etiology, characteristics signs and symptoms, types and treatment</li> <li>Identify different components of basal ganglia on given model/specimen</li> </ul>	IC 2	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE Formative: Presentations/ assignments
11.	Gross anatomy of cranial nerves	<ul style="list-style-type: none"> <li>Discuss the location and connections of motor and sensory nuclei of the cranial nerves to identify the correct site of relevant cranial nerve lesions</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>Enumerate the cranial nerves and classify them into sensory, motor and mixed nerves</li> <li>Describe the nuclei and intracranial course of all cranial nerves</li> <li>Apply the knowledge of neuroanatomy to explain the clinical conditions regarding the lesions of various cranial nerves</li> </ul>	IC 2	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE  Formative: Presentations/ Assignments
			<p><b><u>Skill</u></b></p> <ul style="list-style-type: none"> <li>Identify different cranial nerves on given model/specimen</li> </ul>	IC 1 IC 4	Demonstration	OSPE
12.	Gross anatomy of thalamus, Hypothalamus & their connections	<ul style="list-style-type: none"> <li>Explain the structure, function and connections of the thalamus and hypothalamus with the remainder of the central nervous system to</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>Describe the divisions, nuclei and connections of thalamus</li> <li>Summarize the connections of hypothalamus with the pituitary gland</li> <li>Enlist the functions of main hypothalamic nuclei</li> </ul>	IC 2	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE Formative: Presentations/ assignments



		understand the anatomical basis of associated clinical conditions				
13.	Gross anatomy of meninges and Dural venous sinuses of brain & spinal cord	<ul style="list-style-type: none"> <li>Explain the arrangement of the meninges of brain and spinal cord to identify different types of cerebral hemorrhages</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Define meninges of brain and describe the dural reflections in brain</li> <li>Explain the meninges of spinal cord</li> <li>Enumerate the nerves and blood vessels supplying the meninges</li> <li>Differentiate among different varieties of intracranial hemorrhages</li> <li>Demonstrate the supratentorial and infratentorial compartments of tentorium cerebelli in a specimen</li> <li>Define and enumerate paired and unpaired Dural venous sinuses along with their attachments</li> <li>Describe the location, important relations, communications of cavernous sinus and enumerate structures passing through it</li> </ul>	IC 2	SGD	<p>MCQs/ SEQs/ SAQs/ VIVA VOCE</p> <p>Formative: Presentations/ assignments</p>
14.	Gross anatomy of ventricular system, Cerebrospinal Fluid (CSF),	<ul style="list-style-type: none"> <li>Discuss the anatomical organization of ventricular system, CSF, Blood brain &amp; blood-CSF barriers to</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Describe the anatomical organization of ventricular system and boundaries of third ventricle and choroidal plexus of each ventricle</li> </ul>	IC 2	SGD	<p>Assessment tools: MCQs/ SEQs/ SAQs/ VIVA VOCE</p>



	Blood brain & blood-CSF barriers	explain the relevant clinical scenarios	<ul style="list-style-type: none"> <li>• Define arachnoid villous and outline the role of arachnoid villi in absorption of Cerebrospinal fluid(CSF)</li> <li>• Outline the formation of different barriers of brain</li> <li>• Summarize the floor of fourth ventricle</li> </ul>			Formative: Presentations/ assignments
15.	Blood supply of the brain and spinal cord	<ul style="list-style-type: none"> <li>• Explain the blood supply of the brain and spinal cord</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Recognize the blood supply of different parts of brain and spinal cord</li> <li>• Discuss the formation and importance of veins of brain</li> <li>• Enumerate the vessels taking part in formation of circle of Willis with its importance</li> <li>• Correlate the interruption of cerebral circulation of cerebral artery syndromes due to anterior, middle and posterior cerebral artery occlusion</li> <li>• Illustrate circle of Willis</li> </ul>	IC 2	SGD	MCQs/ SEQs/ SAQs/ / VIVA VOCE  Formative: Presentations/ assignments
16.	Handling of models	<ul style="list-style-type: none"> <li>• Demonstrate a professional attitude while dealing with learning resources</li> </ul>	<p><b><u>Attitude</u></b></p> <ul style="list-style-type: none"> <li>• Handle the models according to SOPs displayed on museum walls/</li> <li>• Place the model parts correctly after task and return to authorized person</li> <li>• Report any damage to authorized person</li> </ul>	IC 1 IC 4	Laboratory Demonstration	Formative Checklist



17.	CNS	<ul style="list-style-type: none"> <li>• Discuss the embryological basis behind formation of different components of Nervous system and correlate them with various relevant clinical presentations</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Explain the development of spinal cord</li> <li>• Describe the positional changes of the cord</li> <li>• Explain the causes of neural tube defects</li> <li>• Enlist various variants of spina bifida</li> <li>• Explain the process of development of various variants of spina bifida</li> <li>• Summarize primary and secondary brain vesicles with their derivatives</li> </ul>	IC 2	LGIS	MCQs/ SEQs/ SAQs/ VIVA VOCE
18.	Handling of models	<ul style="list-style-type: none"> <li>• Demonstrate a professional attitude while dealing with learning resources</li> </ul>	<p><b><u>Attitude</u></b></p> <ul style="list-style-type: none"> <li>• Handle the models according to SOPs displayed on museum walls</li> <li>• Place the model parts correctly after task and return to authorized person</li> <li>• Report any damage to the model</li> </ul>	IC 1 IC 4	Laboratory demonstration	Formative Checklist



## Biochemistry

S. No.	Topic/ Theme	Learning Outcomes	Learning Objectives	IC Codes	MIT	Assessment Tool
1.	<b>Carbohydrate Metabolism</b>	<ul style="list-style-type: none"> <li>Apply the knowledge of carbohydrate metabolism for understanding relevant metabolic disorders</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Discuss metabolism, catabolism &amp; anabolism</li> <li>Describe overview of major metabolic pathways (Glycolysis, TCA cycle, Gluconeogenesis, Glycogenesis, Glycogenolysis) their biomedical importance and hormonal regulation</li> <li>Explain phases and reactions of glycolysis, energetics of aerobic and anaerobic glycolysis &amp; the fate of pyruvate</li> <li>Describe the TCA cycle and its energy calculations</li> <li>Discuss gluconeogenesis</li> <li>Explain the various circumvented reactions in gluconeogenesis</li> <li>Describe the regulation of gluconeogenesis</li> <li>Describe the various types of diabetes mellitus and discuss biochemical changes occurring in Diabetes Mellitus</li> </ul>	IC 2	LGIS SGD	MCQ SAQ/SEQ Viva



			<ul style="list-style-type: none"> <li>Enumerate the complications of uncontrolled Diabetes Mellitus</li> </ul>			
2.	<b>Protein Metabolism</b>	<ul style="list-style-type: none"> <li>Apply the knowledge of protein metabolism for understanding relevant metabolic disorder</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Describe amino acid pool, protein turnover and nitrogen balance</li> <li>Discuss the mechanism of nitrogen excretion from the human body</li> <li>Exemplify various mechanisms of transamination, deamination, decarboxylation, deamidation, mechanism of amino acid oxidation</li> <li>Describe the transport of amino group, role of Pyridoxal phosphate, Glutamate, Glutamine and Alanine</li> <li>Draw urea cycle and discuss its regulation in detail</li> <li>Describe genetic defects of urea cycle</li> <li>Explain in detail the concept of Ammonia intoxication</li> <li>Describe various metabolic fates of an amino acid</li> <li>Discuss Specialized products of amino acids (catecholamines, histamine, serotonin, creatine, melanin, melatonin etc)</li> </ul>	IC 2	LGIS SGD	MCQ SAQ/SEQ Viva



3.	<b>Genetics &amp; human-biotechnology</b>	<ul style="list-style-type: none"> <li>Discuss overview of molecular biology, genetics and various biotechnological techniques and to relate with use in clinical medicine</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Describe DNA and RNA structure and its types</li> <li>Discuss the relationship of genetics and human disease</li> <li>Discuss the role of molecular biology in treatment of diseases</li> <li>Discuss molecular techniques.</li> <li>Explain the technique of PCR and briefly discuss its various types and uses</li> <li>Discuss their clinical significance and relevance with health and disease</li> </ul>	IC 2	LGIS SGD	MCQ SAQ/SEQ Viva
<b>Practical</b>						
1.	Practical	<ul style="list-style-type: none"> <li>Perform the quantitative analysis of carbohydrates lipids &amp; proteins in urine</li> <li>Examination of urine and its reporting</li> </ul>	<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>Demonstrate the performance of following procedures:               <ul style="list-style-type: none"> <li>Physical examination of urine</li> <li>Urine report</li> <li>Ehrlich's test</li> <li>Rothera Nitroprusside 's test</li> <li>Heat coagulation test</li> <li>Sulphosalicytic test</li> <li>Microlab/spectrophotometer use</li> <li>Determination of glucose by microlab</li> <li>Estimation of serum amylase</li> </ul> </li> </ul>	IC 1 IC 4 IC 5	Practical Demonstration	Practical performance OSPE



2.	Practical	<ul style="list-style-type: none"><li>• Apply rules of leadership in practice</li></ul>	<b><u>Attitude</u></b> <ul style="list-style-type: none"><li>• Demonstrate effective communication skills</li><li>• Demonstrate time management skills</li></ul>	IC 2 IC 4	SGD/Practical demonstration	Formative Assessment
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## Oral Biology

S. No.	Topic/Theme	Learning Outcomes	Learning Objectives	IC Codes	MITs	Assessment Tools
1.	Swallowing & Masticatory Reflexes	<ul style="list-style-type: none"> <li>Discuss neurophysiology of pain and mastication</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Discuss stages of swallowing</li> <li>Discuss names of higher center along with neurological pathway control</li> <li>Describe physiology of pain proprioception</li> </ul>	IC 2	LGIS SGD	MCQs SCQs VIVA Assignments
2.	Max 1st Molar	<ul style="list-style-type: none"> <li>Explain morphological features of teeth</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Discuss the buccal surface of upper 1<sup>st</sup> Molar</li> <li>molar</li> <li>Discuss the buccal surface of upper 1 molar</li> </ul>	IC 2	SGD	MCQs SEQs Viva
3.	Oral Embryology	<ul style="list-style-type: none"> <li>Discuss development of teeth</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Describe the stages of tooth development</li> </ul>	IC 2	LGIS SGD	MCQs SEQs Viva
4.	Maxillary 1 <sup>st</sup> Molar	<ul style="list-style-type: none"> <li>Explain morphological features of teeth</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Discuss lingual and proximal surfaces of upper 1<sup>st</sup> molar</li> <li>Discuss upper molar on models</li> </ul>	IC 2	LGIS	MCQs SEQs Viva
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>Draw stages of tooth development</li> </ul>	IC 1 IC 4	Practical	OSPE
5.	Oral Embryology		<p><b>Knowledge</b></p>	IC 2	LGIS Demonstrations	MCQs SEQs



		<ul style="list-style-type: none"> <li>Discuss development of teeth</li> </ul>	<ul style="list-style-type: none"> <li>Define various terms and structure involved in tooth development</li> <li>Differentiate between dental lamina and vestibular Lamina and Dental</li> <li>Define enamel knot, Rough endoplasmic reticulum, Enamel cord, Enamel niche</li> </ul>			Viva
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>Draw and label dental and vestibular lamina</li> </ul>	IC 2 IC 4	Demonstrations	OSPE
6.	Maxillary 1 <sup>st</sup> Molar	<ul style="list-style-type: none"> <li>Explain morphological features of teeth</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Discuss occlusal surface of upper 1<sup>st</sup> molar</li> <li>Discuss occlusal surface of upper 1<sup>st</sup> molar</li> </ul>	IC 2 IC 4	LGIS Demonstrations SGD	MCQs SEQs Viva
7.	Oral Embryology	<ul style="list-style-type: none"> <li>Discuss development of teeth</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Explain histological aspect of cap, bud, and bell stage</li> <li>Explain the bell stage ,blood and nerve supply</li> <li>Explain the development and relation of root</li> <li>Explain histological aspect of cap, bud, and bell stage</li> </ul>	IC 2	LGIS Demonstrations	MCQs SEQs Viva
		<ul style="list-style-type: none"> <li>Discuss development of teeth</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Explain the bell stage, blood and nerve supply</li> </ul>	IC 2	LGIS Demonstrations	MCQs SEQs



			<ul style="list-style-type: none"> <li>• Draw and label histology of cap and bud stage</li> </ul>			
8.	Mandibular 1 <sup>st</sup> Molar	<ul style="list-style-type: none"> <li>• Explain morphological features of teeth</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Discuss different surfaces of lower first molar</li> </ul>	IC 2	LGIS SGD	MCQs SEQs Viva
			<p><b><u>Skill</u></b></p> <ul style="list-style-type: none"> <li>• Draw and label surfaces of upper 1<sup>st</sup> molar</li> </ul>	IC 2 IC 4	Practical	OSPE
9.	Oral Embryology	<ul style="list-style-type: none"> <li>• discuss development of teeth with anomalies</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Describe clinical relevance of different histological structures in tooth development</li> <li>• Discuss structural variations of oral mucosa</li> <li>• Discuss arterial supply of oral mucosa</li> </ul>	IC 2	LGIS Demonstration	MCQs SEQs Viva
			<p><b><u>Skill</u></b></p> <ul style="list-style-type: none"> <li>• Draw and label bell stage</li> </ul>	IC 2 IC 4	Demonstration	OSPE
10.	Mandibular 1 <sup>st</sup> Molar	<ul style="list-style-type: none"> <li>• Explain morphological features of teeth</li> </ul>	<p><b><u>Skill</u></b></p> <ul style="list-style-type: none"> <li>• Draw lingual surface of lower first molar</li> </ul>	IC 2 IC 4	Practical Demonstration	OSPE
11.	Oral Mucosa	<ul style="list-style-type: none"> <li>• Discuss Histology of Oral mucosa</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Discuss vermillion border and vermillion zone</li> <li>• Describe histology of oral mucosa</li> <li>• Describe histology of lamina propria</li> </ul>	IC 2	LGIS Demonstration	MCQs SEQs Viva
			<p><b><u>Skill</u></b></p>	IC 2 IC 4	Lab demonstration	OSPE



			<ul style="list-style-type: none"> <li>• Draw and label histological picture of HERS</li> </ul>	IC 5		
12.	Mandibular 1 <sup>st</sup> Molar	<ul style="list-style-type: none"> <li>• Explain morphological features of teeth</li> </ul>	<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Draw occlusal surface of lower 1<sup>st</sup> molar</li> </ul>	IC 2 IC 4	Lab demonstration	OSPE
13.	Oral Mucosa	<ul style="list-style-type: none"> <li>• Discuss Histology of Oral mucosa</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Tabulate difference between keratinized and non-keratinized epithelium</li> <li>• Describe histology of tongue</li> <li>• Define clinical implication associated with oral mucosa</li> </ul>	IC 2	LGIS Demonstrations SGD	MCQs SEQs Viva
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Draw and label histology of oral mucosa</li> </ul>	IC 2	Lab demonstration	OSPE
14.	Maxillary 2 <sup>nd</sup> Molar	<ul style="list-style-type: none"> <li>• Explain morphological features of teeth</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Discuss different surfaces of upper 2<sup>nd</sup> molar</li> </ul>	IC 2	LGIS Demonstrations SGD	MCQs SEQs Viva
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Draw upper 2<sup>nd</sup> molar</li> </ul>	IC 1 IC 4 IC 5	Practical demonstration	OSPE
15.	Tooth Eruption & Shedding	<ul style="list-style-type: none"> <li>• Explain the process and mechanism of tooth eruption with its clinical implications</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Discuss pre-eruption stage</li> <li>• Discuss eruption stage</li> <li>• Discuss post eruption stage</li> </ul>	IC 2	LGIS Demonstrations SGD	MCQs SEQs Viva
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Draw and label gubernacular canal</li> </ul>	IC 2 IC 4	Practical demonstration	OSPE
16.	Mandibular 2 <sup>nd</sup> Molar		<p><b>Knowledge</b></p>	IC 2	LGIS Demonstrations	MCQs SEQs



		<ul style="list-style-type: none"> <li>• Explain morphological features of teeth</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss the tooth surfaces of lower 2<sup>nd</sup> molar</li> </ul>			Viva
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Draw lower 2<sup>nd</sup> molar</li> </ul>	IC 2	Practical demonstration	OSPE
17.	Tooth Eruption & Shedding	<ul style="list-style-type: none"> <li>• Discuss the mechanics of shedding</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Discuss shedding of teeth</li> <li>• Discuss role of odontoclasts in tooth shedding</li> <li>• Discuss the various pulp morphologies</li> </ul>	IC 2	LGIS Demonstrations	MCQs SEQs Viva
			<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Draw and label odontoclasts</li> </ul>	IC 2 IC 4 IC 5	Practical demonstration	OSPE
18.	Maxillary & Mandibular 3 <sup>rd</sup> Molars	Explain normal occlusal morphology along with its development	<p><b>Skill</b></p> <ul style="list-style-type: none"> <li>• Draw upper and lower 3<sup>rd</sup> molar</li> </ul>	IC 2 IC 4 IC 5	Practical demonstration	OSPE
19.	Tooth Eruption & Shedding	<ul style="list-style-type: none"> <li>• Discuss physiological tooth movements</li> <li>• Explain normal occlusal morphology along with its development</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Discuss theories of eruption</li> <li>• Discuss orthodontic tooth movement</li> <li>• Discuss REE, Junctional epithelium , Gubernacular canal formation</li> <li>• Describe the difference between deciduous and permanent dentition</li> <li>• Discuss sequence of eruption</li> </ul>	IC 2	LGIS Demonstrations	MCQs SEQs Viva



			<ul style="list-style-type: none"> <li>• Discuss the clinical presentations on pictures of normal occlusion and malocclusion</li> </ul>			
20.	Tooth Anomalies	<ul style="list-style-type: none"> <li>• Discuss dental anomalies along with its etiology, types and complications</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Discuss anomalies related to size of teeth</li> <li>• Discuss anomalies related to shape of teeth</li> <li>• Discuss anomalies related to cementum</li> </ul>	IC 2	LGIS Demonstrations	MCQs SEQs Viva
21.	Occlusion	<ul style="list-style-type: none"> <li>• Explain normal occlusal morphology along with its development</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>• Discuss occlusion and normal Class 1 occlusion</li> <li>• Describe various features of occlusion</li> <li>• Discuss the three molars' relationship of Occlusion</li> <li>• Discuss molar relationship of deciduous dentition</li> <li>• Discuss normal canine, incisor &amp; molar relationship</li> </ul>	IC 2	LGIS Demonstrations SGD	MCQs SEQs Viva



			<ul style="list-style-type: none"> <li>• Discuss curves of Spee, Wilson and Monsoon</li> </ul>			
			<p><b><u>Skill</u></b></p> <ul style="list-style-type: none"> <li>• Draw overjet and overbite</li> </ul>	IC 2 IC 4	Practical demonstration	OSPE
			<p><b><u>Attitude</u></b></p> <ul style="list-style-type: none"> <li>• Demonstrate effective communication skills</li> <li>• Demonstrate time management skills</li> </ul>	IC 2 IC 4	SGD	Formative Assessment



## Vertically Integrated Modules

### 1. Research Methodology

S. No	Topic/ Theme	Learning Outcomes	Learning Objectives	IC Codes	MIT	Assessment Tool
1.	Research problem and a good research question	<ul style="list-style-type: none"> <li>Identify research problem</li> <li>Formulate a good research question</li> </ul>	<ul style="list-style-type: none"> <li>Identify a research problem</li> <li>Discuss criteria of selection of research topic</li> </ul>	IC2 IC5	LGIS/ Group assignment	MCQ/ SEQ
2.	Title rationale & objectives of the study	<ul style="list-style-type: none"> <li>Justify the research study title with reference to objectives</li> </ul>	<ul style="list-style-type: none"> <li>Discuss characteristic of a good title &amp; Justification of topic Formulation of SMART research</li> </ul>	IC2 IC5	LGIS/ Group assignment	MCQ/ SEQ
3.	Introduction of variable and data	<ul style="list-style-type: none"> <li>Identify different types of data and variables</li> </ul>	<ul style="list-style-type: none"> <li>Discuss types of data</li> <li>Define different types of Qualitative and Quantitative variables,</li> </ul>	IC2	LGIS/ Group assignment	MCQ/ SEQ



## 2. Behavioural Sciences

S. No.	Topic/Theme	Learning Outcomes	Learning Objectives	IC Codes	MIT	Assessment Tool
1.	Healthcare Models and their Application	<ul style="list-style-type: none"> <li>Discuss the healthcare models with their application</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Discuss Eco- Bio Psycho-Social Model in clinical practice</li> </ul>	IC 2	LGIS	MCQ/SEQ
2.	Medical Ethics and Professionalism	<ul style="list-style-type: none"> <li>Discuss important concepts in medical ethics and professionalism</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Discuss favorable and unfavourable attitudes in clinical practice</li> <li>Discuss ethical and scientific skills of taking information from patients and assimilating it to others at clinical setups</li> <li>Demonstrate skills like breaking bad news and handling death, counselling terminally ill patients, carrying out effective crisis intervention, and resolving conflict</li> </ul>	IC 2	LGIS	MCQ/SEQ
3.		<ul style="list-style-type: none"> <li>Discuss importance of taking consent and maintaining patient privacy</li> </ul>	<p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>Take consent for examination (non-intimate/ intimate) Consent for performing procedures (drawing blood, administering injections/ IV lines, lumbar puncture etc.)</li> <li>Maintain Patient privacy and confidentiality.</li> </ul>	IC 2 IC 4	LGIS	MCQ/SEQ



			<ul style="list-style-type: none"> <li>Examine procedures on the anesthetised patient</li> </ul>			
4.		<ul style="list-style-type: none"> <li>Discuss the basic structure and function of the central and peripheral nervous system</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>Examine the structure and function of the nervous system</li> <li>Analyze the function of neurons and neurotransmitters</li> </ul>	IC 2	LGIS	MCQ/SEQ
5.		<ul style="list-style-type: none"> <li>Determine the social interplay of health, illness, and treatment</li> </ul>	<p><b><u>Knowledge</u></b></p> <ul style="list-style-type: none"> <li>Explain the health belief model and explanatory models of health and illness</li> <li>Interpret illness narratives told by patients</li> </ul>	IC 2	LGIS	MCQ/SEQ



6.	Medical Anthropology	<ul style="list-style-type: none"><li>• Assess the impact of culture on global, national and local health care systems</li><li>• Recall the value of society on medical approaches</li></ul>	<b><u>Knowledge</u></b> <ul style="list-style-type: none"><li>• Discuss the role of healing and healers in society</li><li>• Analyze the impact of religion, psychology, culture and anthropology in understanding medicine and healing</li><li>• Analyze disease, sickness, illness, and human life cycle from cultural aspects</li></ul>	IC 2	LGIS	MCQ/SEQ
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## **Block - III**

### **Syllabi**



## Physiology

Sr. No.	Week	Topic Name	MIT
1	1	Introduction to CNS	LGIS
2	1	Transmission and Processing of Signals in the CNS	LGIS
3	1	Types of Sensory Receptors and Transduction of Sensory Stimuli	LGIS
4	1	Sensory Pathways	LGIS
5	1 & 2	Spinal Cord reflexes and Muscle tone	LGIS
6	2	Analgesia system, Visceral & Referred Pain	LGIS
7	2	Muscle spindle and Golgi tendon organ	LGIS
8	3	Functions of Cerebellum and Basal Ganglia	LGIS
9	3	Functions of Hypothalamus	LGIS
10	3	Spinal shock	LGIS
11	3	Errors of Refraction	LGIS
12	3	Photochemistry of vision/Refractive errors	LGIS
13	4	Photochemistry of Vision; Light & dark adaption	LGIS
14	4	Light Reflex Pathway and Accommodation Reflex	LGIS
15	4	Physiological adjustments during pregnancy	LGIS
16	4 & 5	Ear	LGIS
17	5	Taste	LGIS
18	5	Olfaction	LGIS
19	5	Hormones of Pregnancy	LGIS
20	5	Intro to Endocrinology and mechanism of action of hormones	LGIS



21	6	Hypothalamus, Pituitary and Growth hormone	LGIS
22	6	Posterior Pituitary (ADH and Oxytocin)	LGIS
23	6 & 7	Thyroid	LGIS
24	7	Parathyroid	LGIS
25	7	Calcitonin	LGIS
26	7 & 8	Adrenal cortex + Aldosterone	LGIS
27	8	Adrenal cortex & Cortisol	LGIS
28	8	Addison's Disease	LGIS
29	9	Pancreas	LGIS
<b>Sr. #</b>		<b>Topic Name</b>	<b>MIT</b>
1	To be decided	Examine the Cranial Nerves (1 <sup>st</sup> till 6 <sup>th</sup> )	Practical/SGD
2	To be decided	Examine the Cranial Nerves (7 <sup>th</sup> till 12 <sup>th</sup> )	Practical/SGD
3	To be decided	Perform the Deep Reflexes	Practical/SGD
4	To be decided	Perform the Superficial Reflexes	Practical/SGD
5	To be decided	Record the normal body temperature	Practical/SGD



## Anatomy

Sr. No	Topics	Discipline	MIT
<b>WEEK-1</b>			
1	Revision	Histology	Practical
2	Special senses	Neuroanatomy	LGIS
3	Special senses	Neuroanatomy	LGIS
4	Gross Anatomy of spinal cord	Gross anatomy	SGD
5	Gross Anatomy of Medulla	Gross anatomy	SGD
6	Cranial Nerves	Neuroanatomy	IMLC
<b>WEEK-2</b>			
	Revision	Histology	Practical
1.	Introduction to neuroanatomy	Neuroanatomy	LGIS
2.	Ascending tracts I	Neuroanatomy	LGIS
3.	Ascending tracts II	Neuroanatomy	LGIS



4.	Gross Anatomy of Pons	Gross anatomy	SGD
5.	Gross anatomy of midbrain	Gross anatomy	SGD
6.	Cranial nerves	Neuroanatomy	IMLC
<b>WEEK-3</b>			
1.	Revision	Histology	LGIS
	Descending tracts I	Neuroanatomy	LGIS
2.	Descending tracts II	Neuroanatomy	LGIS
3.	Gross Anatomy of cerebellum	Histology	Practical
4.	Brainstem	Embryology	LGIS
5.	Gross Anatomy of cerebrum	Gross anatomy	SGD
6.	Cranial nerves	Gross anatomy	SGD
<b>WEEK-4</b>			
1.	Revision	Histology	Practical
2.	Brainstem I	Neuroanatomy	LGIS
3.	Brainstem II	Neuroanatomy	LGIS



4.	Brainstem III	Neuroanatomy	LGIS
5.	Gross anatomy of cerebrum	Gross anatomy	LGIS
6.	Gross anatomy of limbic system	Gross anatomy	SGD
7.	Cranial nerves	Neuroanatomy	IMLC
<b>WEEK-5</b>			
1.	Revision	Histology	Practical
2.	Diencephalon I	Neuroanatomy	LGIS
3.	Diencephalon II	Neuroanatomy	LGIS
4.	Reticular formation	Neuroanatomy	LGIS
5.	Gross anatomy of basal nuclei	Gross anatomy	SGD
6.	Gross anatomy of ventricular system	Gross anatomy	SGD
7.	Cranial nerves	Neuroanatomy	IMLC
<b>WEEK-6</b>			
1.	Revision	Histology	Practical
2.	Reticular system lesions	Neuroanatomy	LGIS
3.	Reticular system and limbic system	Neuroanatomy	LGIS



4.	Cerebellum	Neuroanatomy	LGIS
5.	Ventricles	Gross anatomy	SGD
6.	Blood Supply of brain	Gross anatomy	SGD
7.	Cranial nerves	Neuroanatomy	IMLC
<b>WEEK-7</b>			
1.	Revision	Histology	Practical
2.	Hydrocephalus	Neuroanatomy	LGIS
3.	Cerebellum	Gross anatomy	LGIS
4.	Basal Nuclei I	Neuroanatomy	LGIS
5.	Blood supply of Brain	Gross anatomy	SGD
<b>WEEK-8</b>			
1.	Revision	Histology	Practical
2.	Basal Nuclei II	Neuroanatomy	LGIS
3.	Basal Nuclei III	Neuroanatomy	LGIS
4.	Cranial nerves	Neuroanatomy	SGD



5.	Revision	Gross anatomy	SGD
	Revision	Histology	Practical
	Spinal cord lesions	Neuroanatomy	LGIS
	Spinal cord lesion	Neuroanatomy	LGIS



<b><u>Oral Biology</u></b>	
<b>Topics</b>	<b>MIT</b>
<b>Week -23</b>	
Discuss stages of swallowing	LGIS
Discuss names of higher center along with neurological pathway control.	LGIS
Describe physiology of pain proprioception	LGIS
Discuss the buccal surface of upper 1 <sup>st</sup> molar	LGIS
Describe physiology of pain.	SGD
Draw surfaces of upper 1 <sup>st</sup> molar	SGD
<b>Week-24</b>	
Tooth development introduction	
Tooth development	LGIS
Stages of tooth development	LGIS
Discuss lingual and proximal surfaces of upper 1 <sup>st</sup> molar	LGIS
Model discussion of upper molar	SGD
Draw stages of tooth development	Practical
<b>Week-25</b>	



Define various terms and structure involved in tooth development	LGIS
Differentiate between dental lamina and vestibular lamina	LGIS
Define enamel knot ,rough endoplasmic reticulum.cord,niche	LGIS
Discuss occlusal surface of upper 1 <sup>st</sup> molar	LGIS
Draw and label dental and vestibular lamina	Practical
Discuss occlusal surface of upper 1 <sup>st</sup> molar	SGD
Week-26	
Explain histological aspect of cap,bud and bell stage	LGIS
Explain the bell stage ,blood and nerve supply	LGIS
Explain the development and relation of root	LGIS
Discuss different surfaces of lower first molar	LGIS
Draw and label surfaces of upper 1 <sup>st</sup> molar	practical
Draw and label histology of cap and bud stage	practical
Week-27	
Describe clinical relevance of different histological structures in tooth development	LGIS
Discuss structural variations of oral mucosa	LGIS
Discuss arterial supply of oral mucosa	LGIS
Discuss lingual surface of lower first molar	LGIS
Draw and label bell stage	Practical
Model discussion 1 <sup>st</sup> lower molar	Practical



Week-28	
Discuss vermilion border and vermilion zone	LGIS
Describe histology of oral mucosa	LGIS
Describe histology of lamina propria	LGIS
Discuss occlusal surface of lower 1 <sup>st</sup> molar.	LGIS
Draw and label histological picture of HERS	practical
Draw occlusal surface upper 1 <sup>st</sup> molar	practical
Week-29	
Tabulate difference between keratinized and non keratinized epithelium	LGIS
Describe histology of tongue	LGIS
Define clinical implication associated with oral mucosa	LGIS
Discuss different surfaces of upper 2 <sup>nd</sup> molar	LGIS
Draw and label histology of oral mucosa	Practical
Draw upper 2 <sup>nd</sup> molar	SGD
Week-30	
Discuss pre eruption stage	LGIS
Discuss eruption stage	LGIS
Discuss post eruption stage	LGIS
Discuss lower 2 <sup>nd</sup> molar	LGIS



Model study lower 2 <sup>nd</sup> molar	SGD
Draw and label graticular canal	practical
Week-31	
Discuss shedding of teeth	LGIS
Discuss role of odontoclasts	LGIS
Odontoclasts in shedding	LGIS
Pulp morphologies	LGIS
Draw and label odontoclasts	Practical
Model study of upper and lower 3 <sup>rd</sup> molar	SGD
Week-32	
Discuss theories of eruption	LGIS
Discuss orthodontic tooth movement	LGIS
Discuss REE, junctional epithelium , gubernacular canal formation.	LGIS
Difference between deciduous and permanent dentition	LGIS
Discuss sequence of eruption	SGD
Pictures of normal and malocclusion discussion	SGD
Week-33	
Discuss anomalies related to size of teeth	LGIS
Discuss anomalies related to shape of teeth	LGIS
Discuss anomalies related to cementum	LGIS



CBL on anomalies	CBL
Draw dilacerating fusion,germination and hypercementosis	practical
CBL on anomalies	CBL
Week-34	
Discuss occlusion and normal Class 1 occlusion	LGIS
Describe various features of occlusion	LGIS
Discuss three molar relationship	LGIS
Discuss molar relationship of deciduous dentition	LGIS
Discuss normal canine incisor molar relationship	LGIS
Draw overjet and overbite	Practical
Discuss curves of spee,Wilson and monson	SGD



## Biochemistry

WEEKS	Lecture No.	TOPICS
Wk-1	<b>Combined OSPE-BLOCK 2</b> Monday 22-8-22	
	Lec 1	Chemistry of glucose transporters-GLUTS
	2	GLYCOLYSIS
	3	Reactions of glycolysis
	4,5	Regulation , energy calculation
Wk-2	Lec-1	Clinical significance
	2	Reactions of TCA Cycle
	3	Energy calculation from TCA cycle
	4,5	Gluconeogenesis
Wk-3	Lec-1	Gluconeogenesis
	2	Regulation of gluconeogenesis
	3	Clinical signifance of gluconeogenesis
	4,5	Diabetes mellitus-1
Wk-4	LEC-1	Diabetes mellitus-1
	2	Complications of DM
	3	Hypoglycemia-1
	4,5	Hypoglycemia -2
Wk-5	1,2	<b>Test</b>
	3	Introduction to protein metabolism
	4,5	Mechanism of Transamination



Wk-6	1	Mechanism of deamination
	2	Ammonia transport to liver
	3	Urea cycle
	4,5	Ammonia metabolism
Wk-7	1	Overview of protein metabolism
	2	Minerals-introduction
	3	Calcium metabolism
	4,5	Calcium metabolism regulation
Wk-8	1	Iron metabolism
	2	Clinical significance-iron metabolism
	3	Sodium metabolism
	4,5	Phosphorous metabolism
Wk-9	1	Micromineral-1
	2	Micromineral-2
	3	Micromineral-3
	4,5	Micromineral-4
Wk-10	1	Genetics –introduction
	2	Overview of DNA replication, transcription, protein synthesis-1
	3	Same-2
	4,5	Biotechnology & human disease-1
Wk-11	1	Biotechnology & human disease-2
	2	PCR
	3	SOUTHERN BLOTTING
	4,5	NORTHERN, WESTERN BLOTTING
WK-12	1	Carcinogens
	2	Amino acid classification
	3	Protein classification
	4,5	Structure of proteins
Wk-13	1	Types of hemoglobin



	2	Heme synthesis
	3	Heme degradation
	4,5	Jaundice
Wk-14	1	Carbohydrate chemistry
	2	Digestion & absorption of carbohydrates
	3	Lipid chemistry
	4,5	Digestion & absorption of lipids
Wk-15	<b>7<sup>th</sup> NOV</b>	<b>Preps</b>
Wk-16		Send-ups

## **Behavioural**

### **Sciences**

<b>Week</b>	<b>Topic/theme</b>	<b>MIT</b>
Week 04	Medical sociology	LGIS
Week 05	Medical sociology	LGIS
Week 06	Medical sociology	LGIS
Week 07	Medical sociology	LGIS
Week 08	Medical sociology	LGIS
Week 09	Health and global Environmental	LGIS



Week 10	Health and global Environmental	LGIS
Week 11	Health and global Environmental	LGIS
Week 12	Health and global Environmental	LGIS

**Research**  
**Methodology**

<b>Sr. No.</b>	<b>Week</b>	<b>Topic / Theme</b>	<b>MIT</b>
1	Week 31	Conducting quality literature search & performing a literature review	LGIS
2	Week 32	Developing quality research hypotheses based on practical operational definitions	LGIS



## Learning Resources

### 1. Physiology

#### TEXTBOOKS

1. Guyton and Hall  
Textbook of Medical Physiology 14<sup>th</sup> Edition.

#### REFERENCE BOOKS

2. Mushtaq Ahmed Essentials of Medical Physiology Vol. 1 and 2 5<sup>th</sup> Edition
3. Lauralee Sherwood Human Physiology 9<sup>th</sup> Edition.

#### PRACTICAL JOURNAL

4. Laboratory Manual in Physiology

### 2. Anatomy

<b>Gross Anatomy</b>	
Textbooks	Reference Books
Clinical Anatomy for medical students By Richard S. Snell (9th Edition)	LAST's Anatomy regional & applied ( 12th Edition)
Clinical Neuroanatomy By Richard S. Snell (7th Edition)	Gray's Anatomy By Henry Gray (40th Edition)
Cunningham's manual of practical anatomy Vol-3 (head& neck and brain)15th Edition	Atlas of Anatomy By Grant's By Netter ( 6th Edition)
<b>Embryology</b>	
Textbooks	Reference Books
Langman's Medical Embryology (13 <sup>th</sup> Edition)	Netter's Embryology Atlas



The Developing Human By Keith L-Moore (10th Edition)	
<b>Histology</b>	
Medical Histology By Prof Laiq Hussain (7th Edition)	Histology by Michel H. Ross (6th edition)
Basic Histology By Luiz Carlos Junqueira (14th Edition)	
Di-Fiore's Atlas of Histology (12th Edition)	
<b>Neuroanatomy</b>	
Snell's Neuroanatomy	
<b>OTHER LEARNING RESOURCES</b>	
Hands-on activities	Students will be involved in practical sessions and hands-on learning activities to enhance their learning
Laboratory Museum and dissection hall	Students will utilize the laboratory to Discuss textbook knowledge to specimens and prosecutions
Videos/CD's/DVDs, Internet Resources	Animated videos of dissections and developmental anatomy are available to reinforce the concepts
Self-Directed Learning	Self- Study is incorporated to help students manage individual tasks and assignments.

### **3. Oral Biology**

- 1) BERKOVITZ 5 T.H. edition
- 2) ORAL HISTOLOGY TENCAT'S (Antonio Nancie 9th edition)
- 3) TOOTH MORPHOLOGY (Wheeler's 9th Edition)
- 4) CONCISE DENTAL ANATOMY AND MORPHOLOGY / James L. Fuller, Gerald E. Denehy



#### **4. Biochemistry**

- 1) Lippincott's Illustrated Review, Latest edition William and Wilkins publishers
- 2) Harpers illustrated Biochemistry, the Latest Edition McGraw Hill publishers.
- 3) Textbook of Medical Biochemistry by Chatterjee. Latest Edition

