



## **PATHOLOGY STUDY GUIDE**



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**Authored by:**

**Dr. Shoaib Raza Rizvi**

**Dr. Rehana Faryal Mehdi**

**Dr. Syeda Tazeen Binte Naseem**

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## **VISION**

To set local and global standards for quality patient outcomes- creating a culture of excellence to promote a transformative experience for the 21st century clinicians, educators and researchers to benefit all humanity.

## **MISSION**

We are committed to develop well rounded academics, thinkers, clinicians and researchers by strengthening a global view, broadening intellectual foundation and teaching effective communication. It is our aspiration to cultivate creative and critical thinking skills for problem solving, sensitive to cultural and ethical values and responsibilities. Our graduates will be role models and leaders for society.

## **VALUES**

- Equity
- Quality
- Compassionate behavior
- Social accountability
- Social justice
- Humanistic approach
- Leadership
- Innovation
- Integrity
- Collaboration

## **PROGRAM LEARNING OUTCOMES – 7 STAR DOCTOR - (PMDC)**

Our dental graduate shall be able to:

- Develop insight, imagination and curiosity, define one's unique self, one's values and one's place in the world, while incorporating the qualities of a good physician.
- Answer complex questions facing physicians, including the role they should play in society, politics, and promotion of social justice.
- Display enlightenment and moral values to prepare themselves for life and work in a problematic, changing and diverse world.
- Be responsible leaders for their own good of their family, community and country.
- Be humane and socially equipped individuals, in tune with rights of patients and vulnerable groups
- Develop moral reasoning for ethical dilemmas
- Be experts of critical situational analysis
- Believe in diversity in practice
- Display effective communication
- Be able to address population health system issues on the basis of demography, by statistics, epidemiology and cultural nuances.

## PATHOLOGY COURSE

### INTRODUCTION

Pathology is the scientific study of disease and forms the foundation of all clinical disciplines. It is a broad and dynamic field that seeks to understand how diseases develop, how cells and tissues respond to injury, and how these changes lead to functional and structural abnormalities. Diseases are diagnosed in pathology through the systematic examination of organs, tissues, body fluids, and sometimes the whole body, making it central to accurate clinical decision-making.

**In dental practice**, many systemic diseases such as diabetes, anemia, autoimmune disorders, and infections first manifest in the oral cavity. A sound knowledge of pathology enables dentists to recognize these early clues, correlate clinical and radiographic findings, and make informed decisions regarding investigations, referrals, and treatment planning. It also plays a vital role in understanding the progression of oral diseases, including dental caries, periodontal disease, cysts, tumors, and potentially malignant disorders.

The subject of pathology is taught under two broad components: **Pathology and Medical Microbiology**, each of which is further divided into **general (basic)** and **systemic (special)** aspects.

**General pathology** deals with the fundamental mechanisms common to all diseases, while **systemic pathology** focuses on diseases affecting specific organs and systems.

General pathology covers the basic disease processes occurring in the body and includes topics such as cellular adaptation and injury, inflammation and tissue repair, fluid and hemodynamic disorders, neoplasia, genetic disorders, environmental and nutritional disorders, and immunology.

**Systemic or special pathology** focuses on diseases of individual organ systems, including the cardiovascular, hematopoietic, respiratory, endocrine, and gastrointestinal systems, many of which have direct or indirect implications for oral health.

**Medical Microbiology** deals with the study of infectious agents that cause disease in humans. It includes bacteriology, virology, parasitology, mycology, and immunology. The basic component covers the structure, classification, physiology, pathogenesis, antimicrobial agents, drug resistance, sterilization, disinfection, and vaccines. The clinical component emphasizes epidemiology, clinical features, laboratory diagnosis, treatment, and prevention of infectious diseases.

The section on immunology further explains innate and acquired immunity, both humoral and cell-mediated, and their role in host defense. It also includes immunopathology, such as hypersensitivity reactions, autoimmune disorders, immunodeficiency diseases, and serological techniques used in diagnosis.

Thus, pathology is not merely a subject to be studied for examinations; it is a clinical tool that sharpens diagnostic skills, enhances patient safety, and supports evidence-based dental care. By mastering pathology, dental students develop the ability to think critically, diagnose confidently, and practice dentistry with a deeper understanding of disease processes affecting both oral and systemic health

## **LEARNING OUTCOMES FOR BDS PATHOLOGY SECOND YEAR**

### **Course Learning Outcomes (CLOs)**

#### **Second Year BDS – Pathology**

By the end of the course, the student will be able to:

1. **Explain and analyze** the fundamental mechanisms of disease including cellular adaptation and injury, inflammation, hemodynamic disorders, and neoplasia and **correlate these processes with common oral and maxillofacial pathological conditions** encountered in dental practice.
2. **Describe and interpret** the etiology, pathogenesis, morphological features (gross and microscopic), and clinical manifestations of systemic diseases affecting major organ systems, with **emphasis on their oral and dental implications**.
3. **Identify and differentiate** adaptive, inflammatory, preneoplastic, and neoplastic lesions based on histopathological and gross features, and **relate these findings to early detection of oral potentially malignant disorders and oral cancers**.
4. **Explain and apply** the principles of microbiology by classifying infectious agents, describing their pathogenesis, and **correlating them with oral and dental infections**, including those relevant to periodontal disease and odontogenic infections.
5. **Demonstrate and apply** appropriate laboratory diagnostic skills, including specimen collection, staining techniques, culture methods, biochemical tests, sterilization, disinfection, and **interpretation of basic hematological and microbiological reports relevant to dental patients**.

## **TEACHING AND LEARNING STRATEGIES**

The teaching–learning approach for second-year BDS students in General & Systemic Pathology and Microbiology & Immunology is designed to be interactive, student-centered, and clinically relevant. A blend of interactive lectures, case-based learning (CBLs), tutorials, practical sessions, and flipped classrooms is employed to enhance conceptual clarity and application.

**Interactive Lectures** form the foundation of large-group teaching, conducted three times a week for 50 minutes. These sessions actively engage students through quizzes, active learning strategies, and mini student presentations to promote participation and critical thinking.

**Case-Based Learning (CBLs)** is integrated to bridge theory with clinical practice, encouraging analytical reasoning, problem-solving, and application of basic science concepts to real-life dental scenarios.

**Tutorials** are conducted weekly in small groups to reinforce complex topics, clarify doubts, and stimulate discussion, allowing personalized learning and deeper understanding.

**Practical Sessions** in microbiology and histopathology laboratories complement theoretical knowledge by providing hands-on experience with diagnostic techniques and specimen interpretation.

**Flipped Classrooms** and Learning Guidance further support learning by providing students with pre-class resources such as videos, selected book chapters, and study materials. Individual and group assignments are used to encourage self-directed and collaborative learning.

**E-Learning** platforms support both routine and distance learning. Students have continuous access to recorded lectures, learning materials, practical demonstration videos, and assignments through the Google Classroom. Real-time online lectures and tutorials are conducted via Zoom when required, ensuring continuity and flexibility in learning.

## **ASSESSMENT TOOLS AND STRATEGIES:**

### **IN-CLASS ASSESSMENT:**

1. Participation/ interaction
2. Quizzes.
3. Presentations.
4. Assignments

### **FORMATIVE ASSESSMENTS:**

Formative assessments will be conducted regularly alongside routine assessments to continuously monitor student progress. These assessments will provide timely feedback, helping students identify learning gaps and improve understanding. This ongoing evaluation ensures active engagement and promotes productive, outcome-based learning.

### **MIDTERM EXAMINATIONS:**

These are conducted in the mid of the academic year. It has the following components:

<b>Component</b>	<b>Marks</b>
BCQs	100
OBSERVED OSCE	50
NON-OBSERVED OSCE	40
INTERNAL EVALUATION/JOURNAL	10
<b>TOTAL</b>	<b>200</b>

### **PRE-PROFESSIONAL EXAMINATIONS:**

These are conducted at the end of the academic year before the final professional examination so that students have a chance to practice for the final exam. The break-up is as follows:

<b>Component</b>	<b>Marks</b>
BCQs	100
OBSERVED OSCE	50
NON-OBSERVED OSCE	40
INTERNAL EVALUATION/JOURNAL	10
<b>TOTAL</b>	<b>200</b>

## INTERNAL EVALUATION/CONTINUOUS ASSESSMENT POLICY:

### CONTINUOUS ASSESSMENT:

Internal Evaluation Breakup		
1	Assignment/ class test/ ward test etc.	25%
2	Mid-term exam	35%
3	Pre-prof. exam	35%
4	Extra effort	5%

Details of assignments/ Test/Mid-term/ Pre-prof.		
1.	Present and fail	25%
2.	Pass	Actual percentage
3.	<b>ABSENT</b>	<b>ZERO</b>

### PROFESSIONAL ANNUAL EXAMINATION

Professional annual examinations are conducted by the University (JSMU) and comprise theory examinations and OSPE/OSCE.

#### Eligibility criteria for sitting in the Professional Annual Examinations is as follows:

1. Minimum of **40% aggregate** marks in all internal examinations (Mid-Term, Pre-Professionals, Assignments and Tests)
2. Students less than **75% overall attendance** will not be allowed to sit in the Annual Professional Examinations.
3. Clinical attendance will be maintained separately. Attendance in any clinical rotation which falls below **75%** must be made up by students.
4. Students must obtain **passing marks in the clinical ward tests**. Failing to do so, students will have to sit for re-take ward test (Only one re-take is allowed).

**To be considered successful in the annual professional examination the students must pass individual components of the professional examination.**

**This is to say that the students must pass theory and OSPE/ OSCE examinations independent of each other.**

## CONTENT OF PATHOLOGY

### GENERAL PATHOLOGY & SYSTEMIC/SPECIAL PATHOLOGY

S. No.	Topic
01	Cellular Responses to Stress & Noxious Stimuli: Adaptations of Cellular Growth and Differentiation
02	Sequence and events of cell injury
03	Mechanisms of Cell Injury
04	Overview of cell death: Necrosis
05	Apoptosis
06	Abnormal Intracellular Depositions and Calcifications
07	General Features and Causes of Inflammation
08	Acute inflammation
09	Principal Mediators of acute Inflammation
10	Morphologic Patterns of Acute Inflammation
11	Chronic inflammation
12	Repair by Regeneration-1&2
13	Edema and effusion
14	Hemorrhage, Hyperemia and Congestion
15	Hemostasis, Hemorrhagic Disorders, and Thrombosis
16	Embolism
17	Infarcts
18	Shock
19	Introduction to neoplasia: Nomenclature & Classification
20	Characteristics of Benign and Malignant Neoplasms
21	Molecular Basis of Cancer I & II
22	Carcinogenic Agents and Their Cellular Interactions
23	Clinical aspect of neoplasia
24	Tumor diagnosis
25	Environmental diseases
26	Nutritional Diseases
27	Mutation
28	Mendelian disorders: Enlist and classify inherited and cytogenic disorders
29	Blood disorders
30	Blood vessels disorders
31	CVS disorders
32	Respiratory system disorders

33	GIT disorders
34	Endocrine disorders

## MICROBIOLOGY & IMMUNOLOGY

<b>S. No.</b>	Introduction to Microbiology: Eukaryotes & Prokaryotes
01	Morphology of bacteria
02	Anatomy of bacterial cell
03	Physiology of bacteria
04	Genetics of bacteria
05	Classification of medically important bacteria
06	Normal human microbiome
07	Pathogenesis of bacterial infections
08	Lab diagnosis of bacterial infections
09	Sterilization & Disinfection
10	Overview of major pathogens & Anaerobic bacteria
11	Gram positive cocci: Staphylococci
12	Gram positive cocci: Streptococci
13	Gram negative cocci: Neisseria
14	Gram positive rods: Bacillus sp., Anaerobes: Clostridium tetani & C. difficile
15	Gram positive rods: Aerobes: C. diphtheriae
16	Gram negative rods: Enterobacteriaceae: E. coli
17	Gram negative rods: Salmonella
18	Gram negative rods: Pseudomonas, Klebsiella, Vibrio cholerae, Campylobacter Helicobacter
19	Gram negative respiratory rods: H.influenzae & Bordetella, Zoonotic organisms
20	Mycobacteria
21	Introduction to Virology: Basic virology
22	Clinical virology: Herpes viruses
23	Hepatitis viruses
24	HIV
25	Dengue virus, Measles virus, Polio virus
26	Influenza virus, Corona virus & Covid-19, Mumps virus
27	Introduction to Parasitology, Protozoa: <i>Entamoeba histolytica</i> & <i>Giardia</i>
28	Protozoa: Malaria & <i>Leishmania</i>
29	Nematodes
30	Introduction to Basic mycology, Dermatophytes (Taenias)

31	Opportunistic mycosis: <i>Candida</i> , <i>Aspergillus</i> & <i>Cryptococcus</i>
32	Introduction of immune system & Innate immunity
33	Adaptive immunity: Cell mediated
34	Adaptive immunity: Humoral immunity
35	Complement
36	MHC
37	Immune pathology: Hypersensitivity
38	Autoimmunity
39	Immunodeficiency diseases
40	Immunization
41	Serological techniques

## CURRICULUM OF PATHOLOGY- SECOND YEAR BDS

### GENERAL PATHOLOGY AND SPECIAL PATHOLOGY

#### 2.1.1 CELLULAR RESPONSES TO STRESS AND NOXIOUS STIMULI

S. No.	TOPIC	LEARNING OBJECTIVES By the end of lectures, the second year BDS student should be able to:	MODE OF TEACHING	ASSESSMENT TOOLS
1	Introduction to Pathology	<ol style="list-style-type: none"> <li>1. Define Pathology</li> <li>2. Classify its various types with regards to its application</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> </ol>
2	Cellular Responses to Stress and Noxious Stimuli: Adaptations of Cellular Growth and Differentiation	<ol style="list-style-type: none"> <li>1. List nature of various injurious Stimulus</li> <li>2. Describe cellular adaptations</li> </ol> <ol style="list-style-type: none"> <li>1. Define Hyperplasia, Metaplasia, Atrophy and Hypertrophy.</li> <li>2. Explain with example: Hyperplasia, Metaplasia, Atrophy and Hypertrophy.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
3	Sequence and events of cell injury	<ol style="list-style-type: none"> <li>1. Describe morphologic alterations and biochemical changes in response to reversible and irreversible cell injury.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> </ol>
4	Mechanisms of Cell Injury	<ol style="list-style-type: none"> <li>1. Explain mechanism of cell injury in context with effect on various cell organelles Mitochondria, Cell membrane &amp; DNA</li> <li>2. Discuss role of Ischemia, Free radical and calcium accumulation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> </ol>
5	Overview of cell death Necrosis	<ol style="list-style-type: none"> <li>1. Define two principal types of cell death, Necrosis and Apoptosis.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

		<ol style="list-style-type: none"> <li>2. Classify the various types of necrosis</li> <li>3. Discuss briefly: <ul style="list-style-type: none"> <li>● Coagulative necrosis</li> <li>● Liquefactive necrosis</li> <li>● Fat necrosis</li> <li>● Caseous necrosis</li> <li>● Fibrinoid necrosis</li> </ul> </li> </ol>		
6	Apoptosis	<ol style="list-style-type: none"> <li>1. Discuss the pathogenesis and its significance in physiology and disease</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
7	Abnormal Intracellular Depositions and Calcifications	<ol style="list-style-type: none"> <li>1. Enlist the various abnormal intracellular deposit associated with cell damage.</li> <li>2. Discuss and differentiate b/w dystrophic and metastatic calcification along with clinical significance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

### 2.1.2 INFLAMMATION AND WOUND HEALING

S. No.	LECTURE TOPIC	LEARNING OBJECTIVES	MODE OF TEACHING	ASSESSMENT TOOLS
1	General Features and Causes of Inflammation	<ol style="list-style-type: none"> <li>1. Define inflammation</li> <li>2. Discuss causes and features of acute and chronic inflammation</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
2	Acute inflammation	<ol style="list-style-type: none"> <li>1. Discuss the steps of acute inflammation in response to: <ul style="list-style-type: none"> <li>● Recognition of the injurious agent.</li> <li>● Recruitment of leukocytes.</li> <li>● Removal of the agent.</li> <li>● Regulation (control) of the response</li> <li>● Resolution (Repair)</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

<b>3</b>	Principal Mediators of acute Inflammation	<ol style="list-style-type: none"> <li>1. List the cell derived and plasma derived chemical mediators of acute inflammation.</li> <li>2. Discuss the pathway and principal Actions of Arachidonic acid metabolites, complement and coagulation pathways.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQs</li> <li>2. OSPE</li> </ol>
<b>4</b>	Morphologic Patterns of Acute Inflammation	<ol style="list-style-type: none"> <li>1. Describe the various morphological features of acute inflammation.</li> <li>2. Discuss systemic effects and outcome of inflammation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQs</li> <li>2. OSPE</li> </ol>
<b>5</b>	Chronic inflammation	<ol style="list-style-type: none"> <li>1. Define chronic inflammation.</li> <li>2. List the causes of nonspecific and specific (granulomatous) inflammation.</li> <li>3. Define granuloma, its pathogenesis, types and morphology.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. CBL</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQs</li> <li>2. OSPE</li> </ol>
<b>6</b>	Repair by Regeneration-1&2	<ol style="list-style-type: none"> <li>1. Define regeneration and repair</li> <li>2. Discuss healing by 1<sup>st</sup> and 2<sup>nd</sup> intention.</li> <li>3. List the factors that delay wound healing.</li> <li>4. Discuss briefly complications of wound healing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>BCQS</li> <li>OSPE</li> </ol>

### 2.1.3. FLUID & HEMODYNAMIC DISORDERS

<b>S. No.</b>	<b>LECTURE TOPIC</b>	<b>LEARNING OBJECTIVES</b>	<b>MODE OF TEACHING</b>	<b>ASSESSMENT TOOLS</b>
<b>1</b>	Edema and effusion	<ol style="list-style-type: none"> <li>1. Define edema</li> <li>2. List the causes of edema.</li> <li>3. Define various Categories of Edema, ascites, hydrothorax and anasarca.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> </ol>

2	Hemorrhage, Hyperemia and Congestion	<ol style="list-style-type: none"> <li>1. Define various term of hemorrhagic manifestation</li> <li>2. Differentiate between Hyperemia and Congestion</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> </ol>
3	Hemostasis, Hemorrhagic Disorders, and Thrombosis	<ol style="list-style-type: none"> <li>1. Explain primary abnormalities <ul style="list-style-type: none"> <li>● Endothelial injury</li> <li>● Stasis or turbulent blood flow</li> <li>● Hypercoagulability of the blood (the so-called Virchow triad) which lead to thrombosis</li> </ul> </li> <li>2. Describe: Thrombus, its types with examples &amp; DIC</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. Case presentation</li> <li>2. BCQS</li> </ol>
4	Embolism	<ol style="list-style-type: none"> <li>1. Define embolism formation.</li> <li>2. Discuss the mechanism of various embolism formation.</li> <li>3. Discuss: <ul style="list-style-type: none"> <li>● Pulmonary Embolism, e.g. Fat</li> <li>● Marrow Embolism</li> <li>● Air Embolism</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> </ol>
5	Infarcts	<ol style="list-style-type: none"> <li>1. Define infarcts</li> <li>2. Differentiate between red and white infarct.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
6	Shock	<ol style="list-style-type: none"> <li>1. Define and classify various type of shock</li> <li>2. Discuss pathogenesis of various type of shock</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. CBL</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

#### 2.1.4 NEOPLASIA

S. No.	LECTURE TOPIC	LEARNING OBJECTIVES	MODE OF TEACHING	ASSESSMENT TOOLS
1	Introduction to neoplasia	<ol style="list-style-type: none"> <li>1. Define neoplasia</li> <li>2. List the Nomenclature of various Tumors with regard to their cell and tissue of origin.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

2	Characteristics of Benign and Malignant Neoplasms	<ol style="list-style-type: none"> <li>1. Discuss Characteristics of Benign and Malignant Neoplasms</li> <li>2. Discuss differentiation and features of anaplastic changes.</li> <li>3. Describe route of spread of tumors.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
3	Molecular Basis of Cancer I & II	<ol style="list-style-type: none"> <li>1. Discuss epidemiology and molecular basis with role of genetics, Oncogenes, Oncoproteins.</li> <li>2. Discuss role of tumor suppressor gene (p53 &amp; Rb gene) and Unregulated Cell Proliferation</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
4	Carcinogenic Agents and Their Cellular Interactions	<ol style="list-style-type: none"> <li>1. Classify the carcinogenic agents.</li> <li>2. Discuss chemical, radiation and microbial carcinogenic agents associated with various tumors.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	1. BCQS
5	Clinical aspect of neoplasia	<ol style="list-style-type: none"> <li>1. Explain the clinical manifestation Cachexia etc. and paraneoplastic syndrome</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
6	Tumor diagnosis	<ol style="list-style-type: none"> <li>1. Explain: <ul style="list-style-type: none"> <li>● Staging,</li> <li>● Grading,</li> <li>● Tumor markers</li> <li>● Specific lab tests</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. CBL</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

### 2.1.5 ENVIRONMENTAL AND NUTRITIONAL DISEASES

S. No.	LECTURE TOPIC	LEARNING OBJECTIVES	MODE OF TEACHING	ASSESSMENT TOOLS
1	Environmental diseases	<ol style="list-style-type: none"> <li>1. Describe: <ul style="list-style-type: none"> <li>● Effects of Tobacco</li> <li>● Burns and Radiation</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	1. BCQS
2	Nutritional Diseases	<ol style="list-style-type: none"> <li>1. Describe: <ul style="list-style-type: none"> <li>● Nutritional deficiencies</li> <li>● Effects of Alcohol</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	1. BCQS

### 2.1.6 GENETIC DISORDERS

S. No.	LECTURE TOPIC	LEARNING OBJECTIVES	MODE OF TEACHING	ASSESSMENT TOOLS
1	Mutation	<ol style="list-style-type: none"> <li>1. Define mutation.</li> <li>2. List various types of mutation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. CBL</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
2	Enumerate and Discuss the various common genetic disorders	<ol style="list-style-type: none"> <li>1. Describe: <ul style="list-style-type: none"> <li>● Mendelian Disorders.</li> <li>● Autosomal Dominant Disorders</li> <li>● Autosomal Recessive Disorders</li> <li>● X-Linked Disorders</li> </ul> </li> <li>2. Describe cytogenetic disorders: <ul style="list-style-type: none"> <li>● Down Syndrome</li> <li>● Klinefelter Syndrome</li> <li>● Turner Syndrome</li> </ul> </li> </ol>		

### 2.1.7 SYSTEMIC / SPECIAL PATHOLOGY

S. No.	LECTURE TOPIC	LEARNING OBJECTIVES	MODE OF TEACHING	ASSESSMENT TOOLS
1	Blood disorders	<ol style="list-style-type: none"> <li>1. Define anemia.</li> <li>2. Classify anemia.</li> <li>3. Describe various types of anemias: Iron deficiency &amp; sickle cell anemia</li> <li>4. Interpret lab results of various type of anemia</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. CBL</li> <li>3. Practical interpretation of *CBC*</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
		Disorders of WBCs: Neoplastic and Proliferative Disorders	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. CBL</li> </ol>	
		Discuss bleeding and clotting disorders <ul style="list-style-type: none"> <li>● Hemophilia</li> <li>● Von Willebrand disease</li> <li>● Thrombocytopenia</li> <li>● Discuss briefly Blood Transfusions</li> </ul>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	

2	Blood vessels disorders	<ol style="list-style-type: none"> <li>1. Define atherosclerosis</li> <li>2. Discuss atherosclerosis's: <ul style="list-style-type: none"> <li>● Risk factors</li> <li>● Pathogenesis</li> <li>● Characteristic microscopic features</li> <li>● Complications</li> </ul> </li> <li>3. List the common causes of hypertension.</li> <li>4. Describe the effects of hypertension on blood vessels and heart.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
3	CVS disorders	<ol style="list-style-type: none"> <li>1. Discuss types and features of Ischemic heart disease.</li> <li>2. Define myocardial infarction</li> <li>3. Discuss: <ul style="list-style-type: none"> <li>● Clinical feature of MI.</li> <li>● Morphological feature of MI.</li> <li>● Lab diagnosis of MI.</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
		<ol style="list-style-type: none"> <li>1. Discuss pathogenesis, complication and diagnostic criteria of rheumatic heart disease.</li> <li>2. Define Endocarditis.</li> <li>3. Explain causes of acute and Sub-acute infective endocarditis.</li> <li>4. Discuss differentiating feature of acute and Sub-acute infective endocarditis.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. CBL</li> </ol>	
4	Respiratory system disorders	<ol style="list-style-type: none"> <li>1. Discuss pathogenesis, clinical features of asthma</li> <li>2. Discuss briefly chronic bronchitis, emphysema &amp; bronchiectasis.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
5	GIT disorders	Discuss briefly Peptic ulcer disease and gastritis GERD.	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQs</li> <li>2. OSPE</li> </ol>
		IBD (Crohn's disease & Ulcerative colitis)		

6	Endocrine disorders	1. Thyroid disorders (briefly discuss Grave disease its pathogenesis and diagnosis)	1. Lecture 2. CBL 3. Practical *Diabetes screening tests	1. BCQs 2. OSPE
		1. Diabetes mellitus (discuss briefly its types pathogenesis, complications and diagnosis)		

## **MICROBIOLOGY**

### **2.1.8 GENERAL BACTERIOLOGY**

S. No.	LECTURE TOPIC	LEARNING OBJECTIVES	MODE OF TEACHING	ASSESSMENT TOOLS
1	Introduction to Microbiology: Eukaryotes & Prokaryotes	1. Define microbiology 2. Classify the different groups of microorganisms with examples 3. Differentiate Eukaryotes from prokaryotes and give examples	1. Lectures 2. SGD	1. BCQS 2. OSPE
2	Morphology of bacteria	1. Describe staining procedures for bacteria 2. Identify various shapes of bacteria 3. Report presence or absence of motility & accessory structures	1. Lectures 2. SGD 3. Practicals	1. BCQS 2. OSPE
3	Anatomy of bacterial cell	1. Describe essential & non-essential structures of bacteria with regards to their properties and functions 2. Differentiate between gram positive & negative bacterial cell walls.	1. Lectures 2. SGD 3. Practicals	1. BCQS 2. OSPE
4	Physiology of bacteria	1. Categorize bacteria according to their oxygen requirements 2. List different examples of aerobes, anaerobes, microaerophilic, carboxyphilic organism. 3. Discuss their nutritional requirements 4. Describe their growth curve.	1. Lectures 2. SGD	1. BCQS 2. OSPE

<b>5</b>	Genetics of bacteria	1. Describe different methods of transfer of genetic material between bacterial cells	1. Lecture 2. SGD	1. BCQS 2. OSPE
<b>6</b>	Classification of medically important bacteria	1. Classify medically important bacteria based on their various characteristics	1. Lecture 2. SGD	1. BCQS
<b>7</b>	Normal human microbiome	1. List the microorganisms present as normal flora at various body sites 2. Discuss the significance of normal flora 3. Describe briefly normal flora of oral cavity	1. Lecture 2. SGD	1. BCQS 2. OSPE
<b>8</b>	Pathogenesis of bacterial infections 1&2	1. Define communicable endemic, epidemic and pandemic infections, carriers, pathogens, opportunists, commensals and colonizers 2. Identify the stages of pathogenesis 3. Explain determinants of bacterial pathogenesis in regards to methods of transmission of infections, adherence to cell surface and invasion and intracellular survival	1. Lecture 2. SGD	1. BCQS 2. OSPE
		1. Discuss bacterial virulence factors: <ul style="list-style-type: none"> <li>● Structural</li> <li>● Enzymes</li> <li>● Toxins</li> </ul> 2. Differentiate between exotoxins and endotoxins 3. Describe the typical stages of an infectious disease		
<b>9</b>	Lab diagnosis of bacterial infections 1&2	1. Discuss the principles of proper collection, submission and transport of specimens	1. Lectures 2. SGD 3. Practicals	1. BCQS 2. OSPE

		<p>(throat swabs, blood culture etc.) for laboratory investigations with due precautions.</p> <ol style="list-style-type: none"> <li>2. Describe the principles and steps of the following lab procedures: <ul style="list-style-type: none"> <li>● Preparation of smears of specimens</li> <li>● Use of relevant staining methods</li> <li>● Observation by direct microscopy</li> <li>● Use of unstained preparation in wet mount</li> </ul> </li> <li>3. Describe the general principles of Mountox test</li> </ol> <hr/> <ol style="list-style-type: none"> <li>4. Demonstrate and inoculate different culture media and discuss their use: <ul style="list-style-type: none"> <li>● Enriched &amp; selective media</li> <li>● SDA</li> </ul> </li> <li>5. Describe different types of hemolysis</li> <li>6. Demonstrate different methods of anaerobic culture: <ul style="list-style-type: none"> <li>● Cooked meat media</li> <li>● Thioglycolate broth</li> <li>● Gas pack jar</li> </ul> </li> <li>7. Describe the principles and steps of Culture &amp; Sensitivity testing and media used for it</li> <li>8. Demonstrate sensitivity plates</li> <li>9. Perform biochemical testing: <ul style="list-style-type: none"> <li>● Coagulase</li> <li>● Catalase</li> <li>● Oxidase</li> <li>● TSI &amp; Urease</li> </ul> </li> <li>10. Discuss serological tests of bacterial diseases: <ul style="list-style-type: none"> <li>● Widal test demonstration</li> <li>● Typhidot</li> </ul> </li> </ol>		
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<b>10</b>	<b>Sterilization &amp; Disinfection</b>	<ol style="list-style-type: none"> <li>1. Differentiate between sterilization and disinfection.</li> <li>2. Describe the principles of aseptic techniques.</li> <li>3. Describe universal precautions for infection control.</li> <li>4. Describe various physical &amp; chemical methods of sterilization with examples</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
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### 2.1.9 SPECIAL BACTERIOLOGY

<b>S. No.</b>	<b>LECTURE TOPIC</b>	<b>LEARNING OBJECTIVES</b>	<b>MODE OF TEACHING</b>	<b>ASSESSMENT TOOLS</b>
<b>1</b>	Overview of major pathogens & anaerobic bacteria	<ol style="list-style-type: none"> <li>1. Summarize major bacterial pathogens</li> <li>2. Classify medically important anaerobic bacteria</li> <li>3. Describe briefly important properties, pathogenesis, clinical infections &amp; lab diagnosis of Bacteroides</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>2</b>	Gram positive cocci: Staphylococci	<ol style="list-style-type: none"> <li>1. Classify Staphylococci</li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of Staphylococci</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>3</b>	Gram positive cocci: Streptococci	<ol style="list-style-type: none"> <li>1. Classify Streptococci</li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of Streptococcus pyogenes and S. pneumoniae</li> <li>3. Discuss briefly other Streptococci</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>OSPE</li> </ol>
<b>4</b>	Gram negative cocci: Neisseria	<ol style="list-style-type: none"> <li>1. Describe important properties, diseases, pathogenesis, clinical features &amp; lab diagnosis, of N. meningitis and N.gonorrhoeae</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

5	Gram positive rods: Aerobes: <i>C. diphtheriae</i>	<ol style="list-style-type: none"> <li>1. Classify gram positive rods</li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of <i>C. diphtheriae</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
6	Gram positive rods: <i>Bacillus</i> sp., Anaerobes: <i>Clostridium tetani</i> & <i>C. difficile</i>	<ol style="list-style-type: none"> <li>1. Classify Clostridia</li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of <i>Clostridium tetani</i> &amp; <i>C. difficile</i></li> <li>3. Discuss briefly <i>Bacillus</i> species</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
7	Gram negative rods: Enterobacteriaceae : <i>E. coli</i>	<ol style="list-style-type: none"> <li>1. Classify gram negative rods</li> <li>2. List organisms in each group</li> <li>3. Describe the properties of family Enterobacteraceae</li> <li>4. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of <i>E. coli</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practicals</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
8	Gram negative rods: <i>Salmonella</i>	<ol style="list-style-type: none"> <li>1. Classify <i>Salmonella</i></li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of <i>Salmonella typhi</i></li> <li>3. Discuss other groups of <i>Salmonella</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
9	Gram negative rods: <i>Pseudomonas</i> , <i>Klebsiella</i> , <i>Vibrio cholerae</i> , <i>Campylobacter</i> , <i>Helicobacter</i>	<ol style="list-style-type: none"> <li>1. Discuss briefly important properties, diseases, clinical features &amp; lab diagnosis of the following enteric rods: <ul style="list-style-type: none"> <li>● <i>Pseudomonas aeruginosa</i></li> <li>● <i>Klebsiella</i></li> <li>● <i>Vibrio cholerae</i></li> <li>● <i>Campylobacter enterocolitis</i></li> <li>● <i>Helicobacter gastritis</i>, peptic ulcer</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

<b>10</b>	Gram negative respiratory rods: H.influenzae & Bordetella, Zoonotic organisms	<ol style="list-style-type: none"> <li>1. Classify respiratory pathogens</li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of H.influenzae &amp; Bordetella pertussis.</li> <li>3. List zoonotic organisms and their diseases</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>11</b>	Mycobacteria	<ol style="list-style-type: none"> <li>1. Classify Mycobacteria</li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of Mycobacterium tuberculosis</li> <li>3. Discuss Mycobacterium leprae</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

### 2.1.10 VIROLOGY

<b>S. No.</b>	<b>LECTURE TOPIC</b>	<b>LEARNING OBJECTIVES</b>	<b>MODE OF TEACHING</b>	<b>ASSESSMENT TOOLS</b>
<b>1</b>	Introduction to Virology: Basic virology1&2	<ol style="list-style-type: none"> <li>1. Discuss basic concept of viral structure, growth curve, replicative cycle and atypical virus like agents</li> <li>2. List the major group of DNA and RNA viruses</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
		<ol style="list-style-type: none"> <li>1. Discuss viral pathogenesis</li> <li>2. Demonstrate specific lab diagnosis of viral infection.</li> </ol>		
<b>2</b>	Clinical virology	<ol style="list-style-type: none"> <li>1. Classify Herpes viruses.</li> <li>2. Discuss important properties, clinical feature and complication of herpes simplex &amp; herpes zoster viruses.</li> <li>3. Discuss briefly VZV, EBV &amp; CMV</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

		<ol style="list-style-type: none"> <li>1. Classify Hepatitis viruses, explain their mode of transmission.</li> <li>2. Discuss structure, clinical manifestation, complication and serological markers of HBV &amp; HCV</li> </ol>		
		<ol style="list-style-type: none"> <li>1. Discuss structure function, clinical features, opportunistic infection and lab diagnosis of HIV.</li> </ol>		
		<ol style="list-style-type: none"> <li>1. Describe important properties, clinical manifestation, lab diagnosis and preventive measure for following viruses: <ul style="list-style-type: none"> <li>● Dengue,</li> <li>● Measles</li> <li>● Polio virus</li> </ul> </li> </ol>		
		<ol style="list-style-type: none"> <li>1. Describe important properties, clinical manifestation, lab diagnosis and preventive measure for following viruses: <ul style="list-style-type: none"> <li>● Influenza virus</li> <li>● Corona virus &amp; Covid-19</li> <li>● Mumps virus</li> </ul> </li> </ol>		

### 2.1.11 PARASITOLOGY

S. No.	LECTURE TOPIC	LEARNING OBJECTIVES	MODE OF TEACHING	ASSESSMENT TOOLS
1	Introduction to Parasitology, Protozoa: <i>Entameba histolytica</i> & <i>Giardia</i>	<ol style="list-style-type: none"> <li>1. Classify parasites</li> <li>2. Define different types of parasites, hosts, vectors</li> <li>3. Classify protozoa</li> <li>4. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis,</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

		treatment and prevention of <i>E. histolytica</i> & <i>Giardia</i>		
2	Protozoa: Malaria & <i>Leishmania</i>	<ol style="list-style-type: none"> <li>1. Classify malarial parasites (plasmodia)</li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of <i>Plasmodium falciparum</i> and <i>P. vivax</i>.</li> <li>3. Discuss briefly <i>Leishmania</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
3	Nematodes	<ol style="list-style-type: none"> <li>1. Classify Helminthes</li> <li>2. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of <i>Hookworms</i>, <i>Ascaris lumbricoides</i> &amp; <i>Entrobilus vermicularis</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

### 2.1.12 MYCOLOGY

S. No.	LECTURE TOPIC	LEARNING OBJECTIVES	MODE OF TEACHING	ASSESSMENT TOOLS
1	Introduction to Basic mycology, Dermatophytes (Taenias)	<ol style="list-style-type: none"> <li>1. Classify Fungi</li> <li>2. Discuss the structure, growth and general features of fungi</li> <li>3. Describe important properties, diseases, pathogenesis, clinical features, lab diagnosis, treatment and prevention of Dermatophytes (Taenias)</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>OSPE</li> </ol>
2	Opportunistic mycosis: <i>Candida</i> , <i>Aspergillus</i> & <i>Cryptococcus</i>	<ol style="list-style-type: none"> <li>1. Define opportunistic mycosis</li> <li>2. Describe important properties, diseases, clinical features &amp; lab diagnosis of opportunistic mycoses: <i>Candida albicans</i>, <i>Aspergillus</i> &amp; <i>Cryptococcus</i></li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> <li>3. Practical</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

**2.1.13 IMMUNOLOGY**

<b>S. No.</b>	<b>LECTURE TOPIC</b>	<b>LEARNING OBJECTIVES</b>	<b>MODE OF TEACHING</b>	<b>ASSESSMENT TOOLS</b>
<b>1</b>	Introduction of immune system & Innate immunity	<ol style="list-style-type: none"> <li>1. Define immunity.</li> <li>2. Classify immunity</li> <li>3. Define antigen &amp; antibodies</li> <li>4. Explain main components of innate immunity and their mode of action.</li> <li>5. Compare the feature of specific and non-specific immunity.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>2</b>	Cell mediated immunity	Discuss the role and function of cell mediated immunity	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>3</b>	Humoral immunity	<ol style="list-style-type: none"> <li>1. Classify antibodies</li> <li>2. Discuss their structure and function.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>4</b>	Complement	Define and discuss pathway, function and clinical aspect of complement system.	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>5</b>	MHC	<ol style="list-style-type: none"> <li>1. Discuss MHC and its significance in immune regulation and autoimmune diseases.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>6</b>	Immune pathology: Hypersensitivity	<ol style="list-style-type: none"> <li>1. Define hypersensitivity</li> <li>2. Discuss mechanism of action of type I, 2, 3 and 4 hypersensitivity with examples.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>7</b>	Autoimmunity	<ol style="list-style-type: none"> <li>1. Discuss tolerance induction of tolerance list various single organ and multi organ autoimmune disorder.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. CBL</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>8</b>	Immuno-deficiency diseases	List various B cell, T cell, complement and phagocyte cell deficiency diseases.	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>
<b>9</b>	Immunization	<ol style="list-style-type: none"> <li>1. Define various vaccines.</li> <li>2. Classify various vaccines.</li> <li>3. Discuss EPI schedule.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. SGD</li> </ol>	<ol style="list-style-type: none"> <li>1. BCQS</li> <li>2. OSPE</li> </ol>

<b>10</b>	Serological testing	1. Discuss the concept of agglutination/ Precipitation test along with commonly used serological techniques: <ul style="list-style-type: none"><li>● ELISA</li><li>● ICT e.g. Malaria</li><li>● Typhidot</li></ul> PCR basic concept	1. Lectures 2. SGD	1.BCQS 2. OSPE
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## **TEACHING STRATEGIES OTHER THAN LECTURES**



**CASE BASED  
SESSIONS**

**TUTORIALS**

**PRACTICALS**

## **Introduction of Case Based Learning**

The integration of Case-Based Learning (CBL) into the 2nd professional Pathology and Microbiology curriculum for dentistry students represents a **structured and learner-centered** educational approach aimed at enhancing clinical relevance.

By presenting real-life dental and medical scenarios, CBL effectively **bridges the gap between foundational biomedical sciences and clinical practice**. This method facilitates the application of theoretical knowledge to patient-centered problems, thereby strengthening students' understanding of disease mechanisms, microbial pathogenesis, and host responses.

Furthermore, CBL promotes critical thinking, diagnostic reasoning, and evidence-based decision-making while encouraging active participation and collaborative learning. The interdisciplinary nature of this approach reinforces meaningful integration between pathology, microbiology, and clinical dentistry, ultimately fostering **self-directed learning and preparing students for competent and reflective professional practice**.



**Planned CBL sessions for Year 2026**

S.NO	Microbiology CBLs	HistoPathology CBLs
1	Drug resistance	Gingival hyperplasia
2	Opportunistic mycoses	Necrosis
3	Down syndrome	Acute appendicitis
4	Hypersensitivity	Granulomatous inflammation
5	SLE	Shock
6	Staph/ Strep	OSCC
7	Tb	Anemia
8	Salmonella	Bleeding disorder
9	H.pylori	Infective endocarditis
10	Herpes virus	Diabetes
11	Measles/ mumps	
12	Hepatitis	
13	Ascariasis	

**Sample CBL session Flow (120 minutes)**

The learning objectives of the Cbl will be uploaded at least 5-6 days prior to the session.

**Time      Activity**

15 min    Case presentation

30 min    Self -study time using resources (Books, lectures, articles)

45 min    Group discussion with the facilitator

10 min    Reflective writing

10 min    MCQs for formative assessment

10 min    Key takeaways

## **Structured Tutorials**

The incorporation of structured tutorials into the Pathology and Microbiology curriculum serves as an effective strategy to strengthen students' understanding of complex diseases and their underlying pathogenesis.

Tutorials provide a guided, interactive learning environment where core concepts can be revisited, clarified, and reinforced through discussion and problem-solving. By breaking down multifactorial disease processes into logical, sequential components, tutorials help students integrate molecular mechanisms, immunological responses, and pathological changes with clinical manifestations.

This approach encourages active engagement, allows timely feedback, and addresses individual learning gaps, thereby promoting deeper conceptual clarity. Ultimately, tutorials enhance analytical thinking and support the development of a strong foundational framework essential for comprehending complex disease processes and their clinical relevance.

### **Sample Tutorial Flow (60 minutes)**

<b>Time</b>	<b>Activity</b>
05 min	Slide/ trigger question
10 min	Small group discussion
15 min	Pathogenesis + slide discussion
15 min	Clinical correlation
10 min	MCQs + reflection
05 min	Key takeaways

Following strategies will be used for an effective tutorial:

➤ **Flipped classroom strategy: Google Classroom**

**Before tutorial (Pre-reading):**

- Share:
  - 1 short video ( $\leq 10$  min)
  - 1 histopathology image
  - 3 guiding questions

**During tutorial:**

- NO repetition of slides
- Focus on:
  - Clarifying misconceptions
  - Applying concepts

➤ **Concept Mapping (High-Yield)**

- Ask students to map:
- Etiology → Pathogenesis → Morphology → Clinical features → Complications

➤ **Use High-Impact Assessment**

Instead of long tests:

- 3 MCQs (application-based)
- “One key learning today”
- “One confusing point”

➤ **Optional: Add Digital Tools**

If available:

- Polls (Google Forms)
- Virtual slides
- Padlet for group answers

### List of Tutorials (Year 2026)

1. Edema
2. Congestion
3. Thrombosis
4. Neoplasia
5. Inflammatory Bowel Disease
6. Atherosclerosis
7. Sample Collection
8. Bacterial Structure
9. Pathogenesis of Bacterial infections
10. Basic Virology
11. Genetic disorders
12. Compliment Systems
13. Gram Positive rods
14. Serological testing for bacterial diseases
15. Life cycle of Malarial Parasite



## **Histopathology and Microbiology Practicals:**

Practical demonstration sessions are an essential component of the curriculum, designed to familiarize students with key laboratory techniques and procedures commonly used in diagnostic practice.

These sessions provide hands-on exposure to standard methods such as specimen collection, staining techniques, microscopy, culture procedures, and basic molecular and immunological assays. By observing and performing these procedures under supervision, students develop a clear understanding of laboratory workflows, quality control measures, and biosafety practices.

Practical demonstrations bridge theoretical knowledge with real diagnostic applications, enhance technical competence, and improve interpretative skills, thereby preparing students for effective collaboration with diagnostic laboratories in clinical settings.

### **ASSESSMENT TOOLS**

OSCEs and direct observation of procedural skills will be used to assess students during mid-teaching and end-of-teaching practical tests.



WEEKS	PRACTICAL DESCRIPTION	TEACHING METHODOLOGY
1	<ul style="list-style-type: none"> <li>• To study the parts of light microscope.</li> <li>• To analyze a biopsy slide under the microscope</li> </ul>	Demonstration on microscope & multimedia
2	<ul style="list-style-type: none"> <li>• To study the slide of necrosis</li> </ul>	Practical demonstration
3	<ul style="list-style-type: none"> <li>• To perform the Simple staining method.</li> </ul>	Practical demonstration
4	<ul style="list-style-type: none"> <li>• To perform the Gram staining method.</li> </ul>	Practical demonstration
5	Formative Assessment	
6	<ul style="list-style-type: none"> <li>• To study the slide of Acute Inflammation.</li> </ul>	Practical demonstration
7	<ul style="list-style-type: none"> <li>• To study the slide of Chronic Inflammation Granulomatosis</li> </ul>	Practical demonstration
8	Eid ul Fiter	
9	Formative Assessment	

10	<ul style="list-style-type: none"> <li>To identify the Fungus under the microscope.</li> </ul>	Practical demonstration
11	<ul style="list-style-type: none"> <li>To study gross specimen and slide of Thrombosis</li> </ul>	Practical demonstration
12	Laboratory visit (Medicare hospital)	
13		
14		
15	Formative Assessment	
16	Viva	
17	Viva	
18	Eid Al-Adha	
19	<ul style="list-style-type: none"> <li>To study gross specimen and slide of Benign Tumor</li> </ul>	Practical demonstration

20	<ul style="list-style-type: none"> <li>To study gross specimen and slide of Malignant Tumor</li> </ul>	Practical demonstration
21	<ul style="list-style-type: none"> <li>To study the slide of Anemia</li> </ul>	Practical demonstration
22	Formative Assessment	
23	<ul style="list-style-type: none"> <li>To perform and interpret the results of catalase and coagulase tests</li> </ul>	Practical demonstration
24	Preparation for Poster Competition	
25		
26	Poster Presentation	
27	<ul style="list-style-type: none"> <li>To perform Acid fast staining (Ziehl- Neilsen staining) for <i>M. Tuberculosis</i></li> </ul>	Practical demonstration
28	<ul style="list-style-type: none"> <li>To study different culture media</li> </ul>	Demonstration

29	<ul style="list-style-type: none"> <li>To observe and interpret the Biochemical tests results</li> </ul>	Demonstration
30	Formative Assessment	
31	<ul style="list-style-type: none"> <li>To study the principle and procedure of antibacterial susceptibility testing</li> <li>To observe and interpret the results of AST</li> </ul>	Practical Demonstration
32	OSPE Preparation	
33	<ul style="list-style-type: none"> <li>To study the different techniques Urine analysis</li> <li>To correlate the findings of Urine analysis with the diseases.</li> <li>To interpret the detailed report of Urine sample.</li> </ul>	Practical Demonstration
34	<ul style="list-style-type: none"> <li>Laboratory Visit (Sohail Trust Hospital Korangi)</li> </ul>	
35		
36	<ul style="list-style-type: none"> <li>To observe the wet mount being prepared in the Laboratory</li> </ul>	Practical Demonstration

**RECOMMENDED BOOKS (Latest editions):****TEXT BOOKS:**

General Pathology: Basic Pathology by Robbins.

Microbiology & Immunology: Review of Medical Microbiology & Immunology- Levinson

**REFERENCE BOOKS:**

General Pathology: Pathological basis of disease by Robbins & Cotran. Microbiology:

Medical Microbiology- Jawetz



