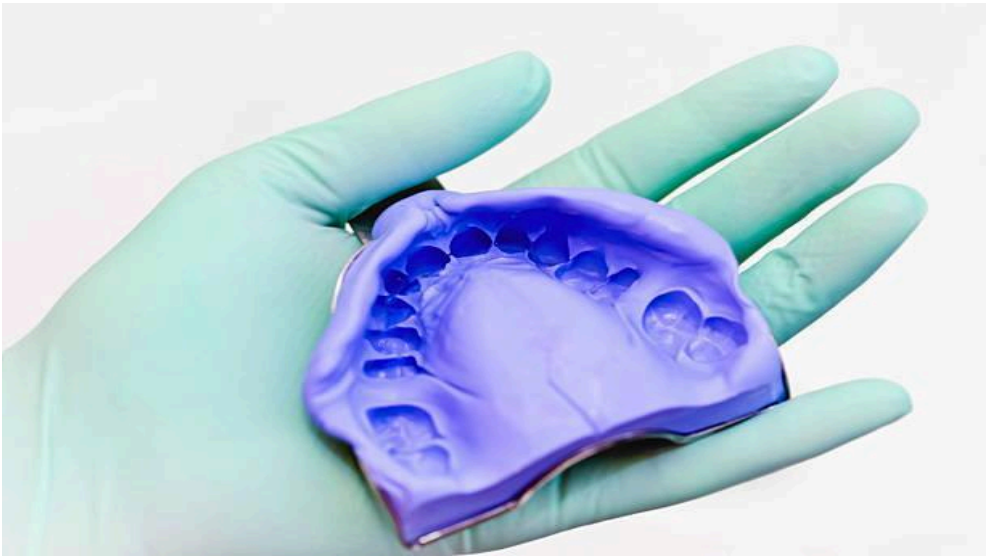
AVICENNA
DENTAL COLLEGE

STUDY GUIDE

2024-2025



Program: Bachelor of Dental Surgery
Year: 2nd Professional Year
Subject: Dental Materials
Batch No: D23
Session: 2024-2025

Content

Introduction to Study Guide

Welcome to the Avicenna Dental College Study Guide!

This guide serves as your essential resource for navigating the complexities of your dental education at Avicenna Medical & Dental College. It integrates comprehensive details on institutional framework, curriculum, assessment methods, policies, and resources, all meticulously aligned with UHS, PMDC and HEC guidelines.

Each subject-specific study guide is crafted through a collaborative effort between the Department of Dental Education and the respective subject departments, ensuring a harmonized and in-depth learning experience tailored to your academic and professional growth.

OBJECTIVES OF THE STUDY GUIDE

1. **Institutional Understanding:**
    - Gain insight into the college's organizational structure, vision, mission, and graduation competencies as defined by PMDC, setting the foundation for your educational journey.
2. **Effective Utilization:**
    - Master the use of this guide to enhance your learning, understanding the collaborative role of the Department of Dental Education and your subject departments, in line with PMDC standards.
3. **Subject Insight:**
    - Obtain a comprehensive overview of your courses, including detailed subject outlines, objectives, and departmental structures, to streamline your academic planning.
4. **Curriculum Framework:**
    - Explore the curriculum framework, academic calendar, and schedules for clinical and community rotations, adhering to the structured guidelines of UHS & PMDC.
5. **Assessment Preparation:**
    - Familiarize yourself with the various assessment tools and methods, including internal exam and external exam criteria, and review sample papers to effectively prepare for professional exams.
6. **Policies and Compliance:**
    - Understand the institutional code of conduct, attendance and assessment policies, and other regulations to ensure adherence to college standards and accrediting body requirements.
7. **Learning Resources:**
    - Utilize the learning methodologies, infrastructure resources, and Learning Management System to maximize your educational experience and academic success.

This guide, meticulously developed in collaboration with your subject departments, is designed to support your academic journey and help you achieve excellence in accordance with the highest standards set by PMDC and HEC.

AVICENNA
DENTAL COLLEGE

BDS Program Outcome Statements

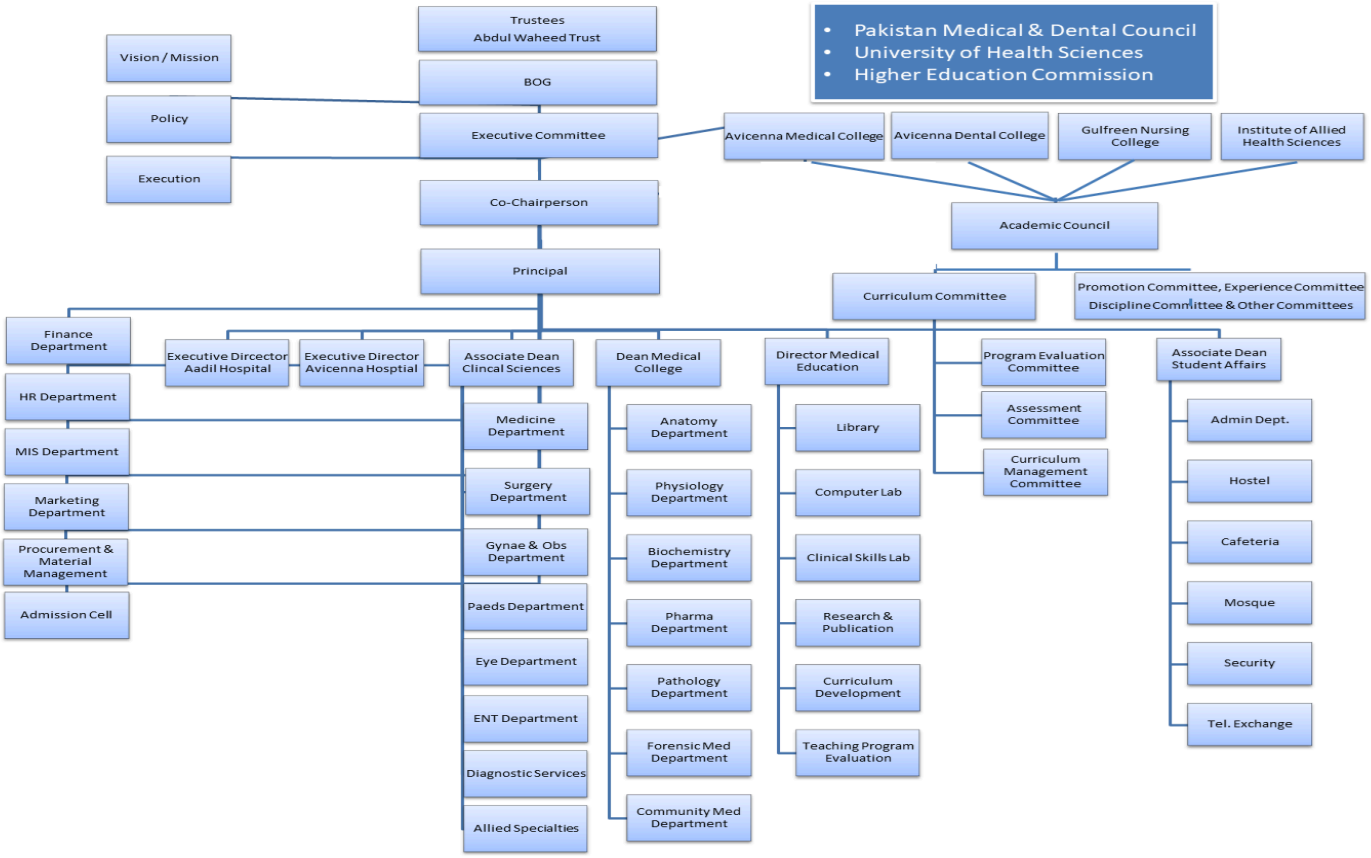
The outcome statements of Avicenna Dental College specify the core competencies and performance standards expected of graduates upon completion of the BDS program.

Upon graduation, students will be able to:

1. Prioritize patient care above all, applying their knowledge and skills in a competent, ethical, and professional manner, and taking responsibility for their actions in complex and uncertain situations.
2. Conduct thorough consultations and assessments of patients.
3. Independently diagnose and manage common, non-critical dental and oral health conditions.
4. Assist in the management of critically ill patients as relevant to dental practice.
5. Demonstrate clear and efficient written and verbal communication skills.
6. Exhibit professional, ethical, and culturally appropriate behavior in all clinical and patient interactions.
7. Promote oral health and advocate for preventive measures against dental diseases.
8. Work effectively as a team member within Pakistan's healthcare system.
9. Apply critical thinking, reflection, research skills, and teamwork capabilities in clinical practice.
10. Pursue personal and professional development with a commitment to lifelong learning.

Avicenna Medical & Dental College Overview

Institutional Organogram



Vision & Mission

AVICENNA MEDICAL COLLEGE

Avicenna Medical & Dental College

AVICENNA DENTAL COLLEGE

Vision

The vision of **Avicenna Medical & Dental College** is to become a college that thrives to achieve improvement in healthcare of masses through creative delivery of educational programs, innovative research, commitment to public service and community engagement in a environment that supports diversity, inclusion, creative thinking, social accountability, life-long learning and respect for all.

Mission

The mission of **Avicenna Medical and Dental College** is to educate and produce competent, research oriented healthcare professionals with professional commitment and passion for life-long learning from a group of motivated students through quality education, research and service delivery for the improvement of health status of the general population.

Message from the Chairman

The Avicenna Medical & Dental College is a project of Abdul Waheed Trust which is a Non-profitable, Non-governmental, Non-political & Social organization, working for the welfare of Humanity and based on Community empowerment. Avicenna Medical College has its own 530 bedded Avicenna teaching Hospital (Not for Profit hospital) within the College Campus & 120 bedded Aadil Hospital, at 15 minutes distance. Separate comfortable hostels for boys & girls are provided on the campus.

Our students benefit from the state of the art College Library with facilities of Internet & online Journals that remain open 15 hours a day, for our students & faculty members. I am particularly pleased with the hard work by the Faculty and Students in the achievement of historic 100% results for all the classes. It is a rare achievement and speaks of dedication of the Faculty and Staff. Our motto is Goodness prevails and we aim at producing Doctors' who are knowledgeable, competent in clinical skills and ethical values.

Avicenna Medical College & Hospital was founded to provide quality health care services to the deserving patients belonging to the rural areas near Avicenna Hospital as well as to provide quality medical education of international standard to our students. The Hospital provides all medical services and Lab diagnostics to the local population at minimal cost. So far by the grace of Allah Almighty the number of patients being treated and operated upon at our Hospital is increasing every day as there is no other public or charity hospital in the circumference of 20km. We have already established two Satellite Clinics in the periphery which are providing outdoor care while admission cases are brought to the Hospital in Hospital transport.

Following the success of our reputable Medical College and Hospital, we were able to successfully establish Avicenna Dental College which is recognized by the Pakistan medical & Dental Council & University of Health Sciences. To date, we have enrolled five batches in our dental college and we aim to achieve the same level of success for our dental students as our medical students.

Chairman
Abdul Waheed Sheikh
Avicenna Medical & Dental College

Message from the Principal

Prof. Dr. Sohail Abbas Khan
Principal Dental College
MDS, Dip Op (Hons) BDS

It is a matter of immense honor and privilege as the first Principal of Avicenna Dental College to welcome you to one of the finest dental institutes in the private sector of Pakistan. Avicenna Dental College is a private dental college, which aims to provide the finest dental education to dental undergraduate students in accordance with the latest trends in Dental Education, and to develop them to practice dentistry in the 21st century.

While educating dental students to become licensed, empathetic and competent professionals, Avicenna Dental College endeavors to educate students in a supportive environment in which they provide dental care for a diverse populace. In the times to come, we wish to transform our graduates into unfeigned teachers, researchers and consultants by starting post-graduation programs as well.

Avicenna Dental College aims to achieve an enterprising curriculum integrating the basic sciences with clinical experience while utilizing modern technological modalities.

In addition to the production of outstanding oral health professionals, we at Avicenna Dental College recognize our responsibility as a private dental institution to the citizens of the country in making the provision of oral health care available to those who are deprived of ready access.

I feel proud to lead this dental establishment such an inspiring time and hope all of you at Avicenna Dental College will share this pride and play your respective roles in materializing the dream of making this institution the premier dental educator in Pakistan

Message from the Vice Principal

Prof. Dr. Usman Muneer
Vice Principal Dental College
BDS, FCPS

It is a matter of great privilege to be associated with Avicenna Dental College. Our institution boasts of renowned, well-qualified and devoted faculty members in each and every specialty of dentistry. We are looking forward to diligently equipping our undergraduates with comprehensive artistic and ethical oral health care.

Our goal is to inspire a lifelong passion for learning and innovation in our students, ensuring they are well-prepared to meet the evolving challenges of the dental profession. I look forward to collaborating with our students on this transformative journey, guiding them toward achieving excellence in oral health care

7-Star Doctor Competencies (PMDC)

According to national regulatory authority PMDC, a Pakistani medical/dental graduate who has attained the status of a 'seven-star doctor' is expected to demonstrate a variety of attributes within each competency. These qualities/ generic competencies are considered essential and must be exhibited by the individual professionally and personally.

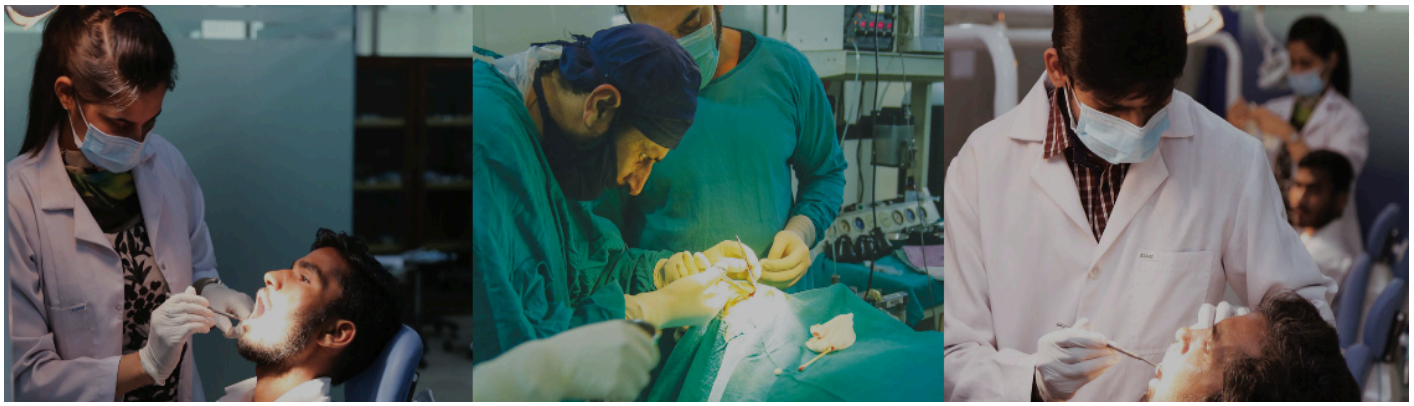
1. Skillful / Care Provider.
2. Knowledgeable / Decision Maker.
3. Community Health Promoter / Community Leader.
4. Critical Thinker / Communicator
5. Professional / Lifelong learner.
6. Scholar / Researcher
7. Leader/ Role Model / Manager

About Avicenna Dental College

Avicenna Dental College is a purpose-built, fully equipped Dental institution with experienced and excellence-driven faculty to train high-quality dental professionals in Pakistan.

Avicenna Dental College runs under the umbrella of Abdul Waheed Trust. Abdul Waheed Trust is a non-profit social welfare organization and registered under the Societies Act with the Registrar of Societies. The Trust is legalized through a Trust Deed that bears necessary rectifications. The Trust Deed is further supported by its Memorandum and Article of Association that authorizes the establishment and operation of the Medical College, the Dental College, the Nursing College, the Allied Health Sciences College, and other activities in the healthcare sector.

In 2018, Avicenna Dental College was recognized by the Pakistan Medical & Dental Council. With the advent of advanced tools and technology in every field of health science, dentistry today has shot up to the greater end of the gamut with superior choice and promises in dental therapy in the very vicinity of the common man. ADC promises to be one such neighborhood.



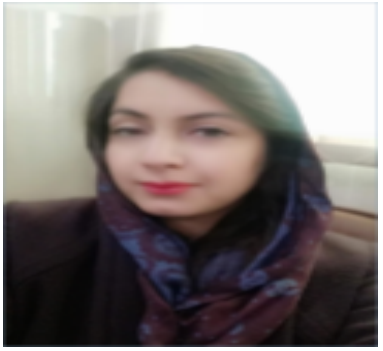
Department & Subject Overview

Note from the Head of Department

Mastering dental materials is the cornerstone of successful dental practice, bridging the gap between theory and clinical reality."

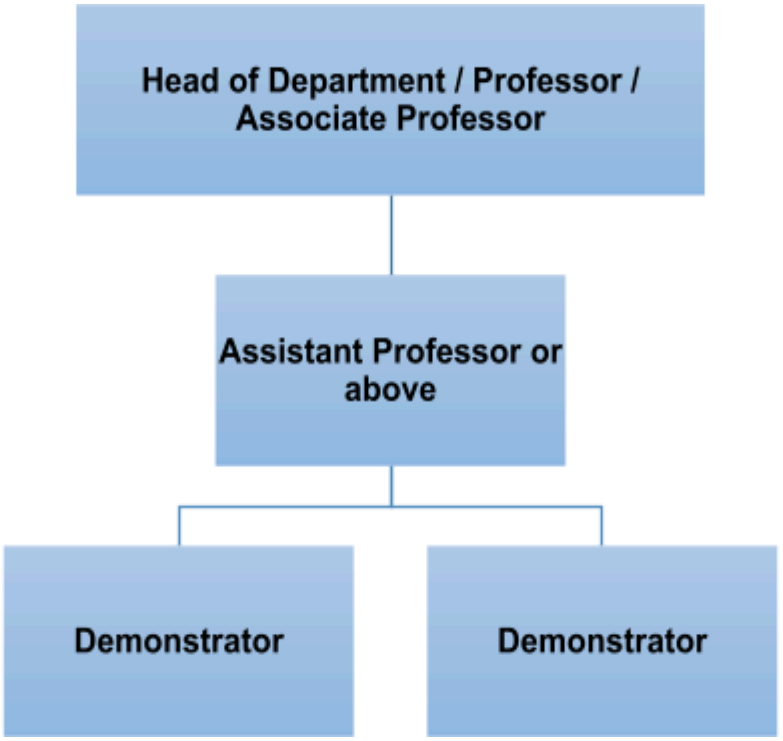
Dental materials is an applied basic sciences subject which forms the backbone of modern dentistry, empowering clinicians to restore, rehabilitate, and revolutionize patient care."

This study guide is crafted to provide a structured learning approach, covering the physical, mechanical, chemical, and biological properties of materials used in dentistry. Our expert faculty and team has carefully curated the content to ensure a seamless blend of theoretical knowledge and practical skills.Our state-of-the-art laboratory facilities further enhance their learning experience, preparing them for successful clinical practice.I wish all of my students, the best in their academic endeavors and look forward to seeing them excel in the field.



Prof. Dr. Nadia Munir
Professor & Head of Department
B.D.S, M.phil, PhD
Department of Dental Materials

Departmental Organogram (as per PMDC guidelines)



Faculty Members

Name	Designation	Qualification
Dr. Nadia Munir	Head of Department / Professor	B.D.S, MPhil, PhD
Dr.Fahad	Assistant Professor	B.D.S, Mphil
Dr. Shahzaib Wazir	Demonstrator	B.D.S
Dr. Khubaib Noor	Demonstrator	B.D.S

Goal of the Department

The Science of Dental Materials is a basic science subject taught in the second year BDS which deals with the physical, mechanical, chemical & biological properties of all materials used in conventional & modern dentistry. An understanding of properties and handling of materials is absolutely essential in both clinical and laboratory settings. It involves the study of composition, manipulative technique, application of dental materials and their interaction with the oral environment.

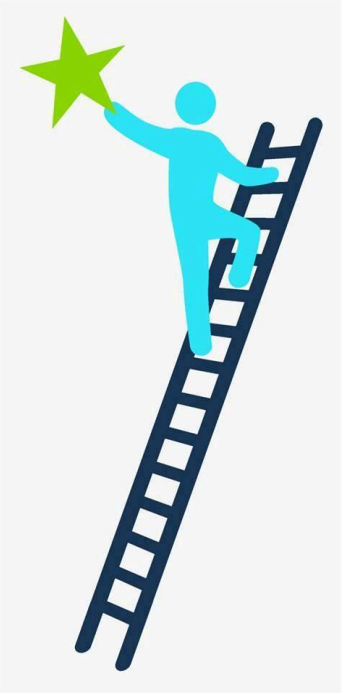
The Department of Dental Materials aims to provide the students with the scientific background and the clinical skills required to handle modern dental materials. The department has a dedicated, state of the art laboratory which enables the students to practice the manipulative techniques before their application in the clinical setup.

Course Objectives

- To inform students how a student learning program has been organized according to their learning objectives.
- Help students organize and manage their studies throughout the course.
- Guide students on assessment methods, rules and regulations
- Communicates information on organization and management of the course. This will help the student to contact the right person in case of any difficulty.
- Defines the objectives which are expected to be achieved at the end of the course.
- Identifies the learning strategies such as lectures, small group teachings, clinical skills, demonstration, tutorial and case-based learning that will be implemented to achieve the course objectives.
- Provides a list of learning resources such as books, computer assisted learning programs, web-links, journals, for students to consult in order to maximize their learning.

Attendance Requirement & Internal Assessment Criteria

The institution follows the regulations for examinations of the UHS in letter and spirit. The students require **85% attendance** in all academic sessions and **50% marks** in internal assessments and send-up examinations to be eligible for the UHS Professional Examinations.

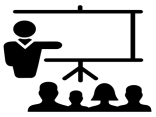


Learning Resources & Pedagogy

Book Recommendations

Sr.	Book Name	Author	Edition
1.	Science of Dental Materials	Philips	12th
2.	Applied Dental Materials	McCabe	14th
3.	Lecture Notes on Dental Materials	Shahina Nusrat	
4.	Textbook of Dental Materials	Sharmila Hussain	
5.	Restorative Dental Material	Robert G. Craig and John M. Power	13th

Traditional & Innovative Teaching Methodologies



Sr.	Pedagogical Methodologies	Description
1.	Lectures	Traditional method where an instructor presents information to a large group of students (large group teaching). This approach focuses on delivering theoretical knowledge and foundational concepts. It is very effective for introducing new topics.
2.	Tutorial	Tutorials involve small group discussion (SGD) where students receive focused instruction and guidance on specific topics.
	Demonstrations	Demonstrations are practical displays of techniques or procedures, often used to illustrate complex concepts or practices, particularly useful in dental education for showing clinical skills.
3.	Practicals	Hands-on sessions where students apply theoretical knowledge to real-world tasks. This might include lab work, clinical procedures, or simulations. Practicals are crucial for developing technical skills and understanding the application of concepts in practice.
4.	Student Presentations	Students prepare and deliver presentations on assigned topics. This method enhances communication skills, encourages students to explore topics in-depth. It also provides opportunities for peer feedback and discussion.
5.	Assignment	Tasks given to students to complete outside of class. Assignments can include research papers, case studies, or practical reports. They are designed to reinforce learning, assess understanding, and develop critical thinking and problem-solving skills.

7.	Self-directed Learning	Students take initiative and responsibility for their own learning process. Students are encouraged to seek resources, set goals, and evaluate their progress. This is a learner-centered approach where students take the initiative to plan, execute, and assess their own learning activities. This method promotes independence, critical thinking, and lifelong learning skills.
8.	Flipped Classroom	In this model, students first engage with learning materials at home (e.g., through videos, readings) and then use class time for interactive activities, discussions, or problem-solving exercises. This approach aims to maximize in-class engagement and application of knowledge.
9.	Peer-Assisted Learning (PAL)	A collaborative learning approach where students help each other understand course material. PAL involves structured peer tutoring, study groups, or collaborative tasks. It enhances comprehension through teaching, reinforces learning, and builds teamwork skills.
10.	Team-based Learning (TBL)	A structured form of small group learning where students work in teams on application-based tasks and problems. Teams are responsible for achieving learning objectives through collaborative efforts, promoting accountability, and deeper understanding of the material.
11.	Problem-based Learning (PBL)	Students work on complex, real-world problems without predefined solutions. They research, discuss, and apply knowledge to develop solutions. PBL fosters critical thinking, problem-solving skills, and the ability to integrate knowledge from various disciplines.
12.	Academic Portfolios	A collection of student's work that showcases learning achievements, reflections, and progress over time. Portfolios include assignments, projects, and self-assessments. They provide a comprehensive view of student development, highlight strengths and areas for improvement, and support reflective learning (experiential learning)

Flipped Classroom

Infrastructure Resources

Sr.	Infrastructure Resources	Description
1.	Lecture Hall	Each year has a dedicated lecture hall, totaling four lecture halls for the four professional years. These halls are equipped with modern audiovisual aids to support effective teaching and learning.
2.	Tutorial Room	The college's tutorial rooms, each with a capacity of 30, are specifically designed to support small group discussions and interactive sessions. These rooms facilitate personalized instruction, enabling more engaged and effective learning through direct interaction between students and instructors.
3.	Lab	The college is equipped with state-of-the-art laboratories for practical and clinical work. Each lab is designed to support various disciplines, to facilitate hands-on learning.
4.	Library on campus	A huge library occupies full floor has 260 seats including study carrels and group-discussion tables. Latest reference books, of Basic and Clinical Sciences along with national & international journals are available in the library.
5.	Digital Library	The digital library offers access to a vast collection of e-books, online journals, research databases, and other digital resources. It supports remote access and provides tools for academic research and learning.
6.	Learning Management System (LMS)	The LMS is a comprehensive online platform that supports course management, content delivery, student assessment, and communication. It provides tools for tracking progress, managing assignments, and facilitates ongoing academic activities.
7.	Phantom Labs	Specialized Phantom Labs are available for advanced simulation and practice in dental procedures. These labs provide high-fidelity models and simulators that help students refine their clinical skills in a controlled environment.
8.	Mess & Cafeteria	The College has its own on-campus Mess which caters to 600 students. All food items including dairy, meat, and vegetables are sourced organically and bought in at the time of cooking, in order to ensure that students get freshly cooked meals at all times Students form the Mess committee which decides the mess menu in consultation with other students. The Mess offers fresh food to all residents three times a day. However, day scholars are also welcome to use the Mess facility at a reasonable cost. Two 50- inch LCD screens provide students an opportunity to get entertained during their meal times.

9.	Gymnasium & Sports	We recognize sports as a pivotal key to shape and maintain students' personality and good health. The College has indoor and outdoor sports facilities to help enhance the cognition and capacity to learn. There is a proper sports section for various games like basketball, football, volleyball, and cricket. The gym itself is fully equipped with modern machinery both for students and faculty.
10.	IT Lab	The IT Lab is equipped with modern computers and software available for students who need access for academic purposes.
11.	Auditorium	The college has a spacious auditorium equipped with advanced audio-visual facilities. It is used for large-scale lectures, guest presentations, and academic conferences, providing a venue for students to engage with experts and participate in important educational events.
12.	Examination Halls	The college provides dedicated examination halls that are designed to accommodate a large number of students comfortably. These halls are equipped with necessary facilities to ensure a smooth and secure examination process, including proper seating arrangements, monitoring systems, and accessibility features.

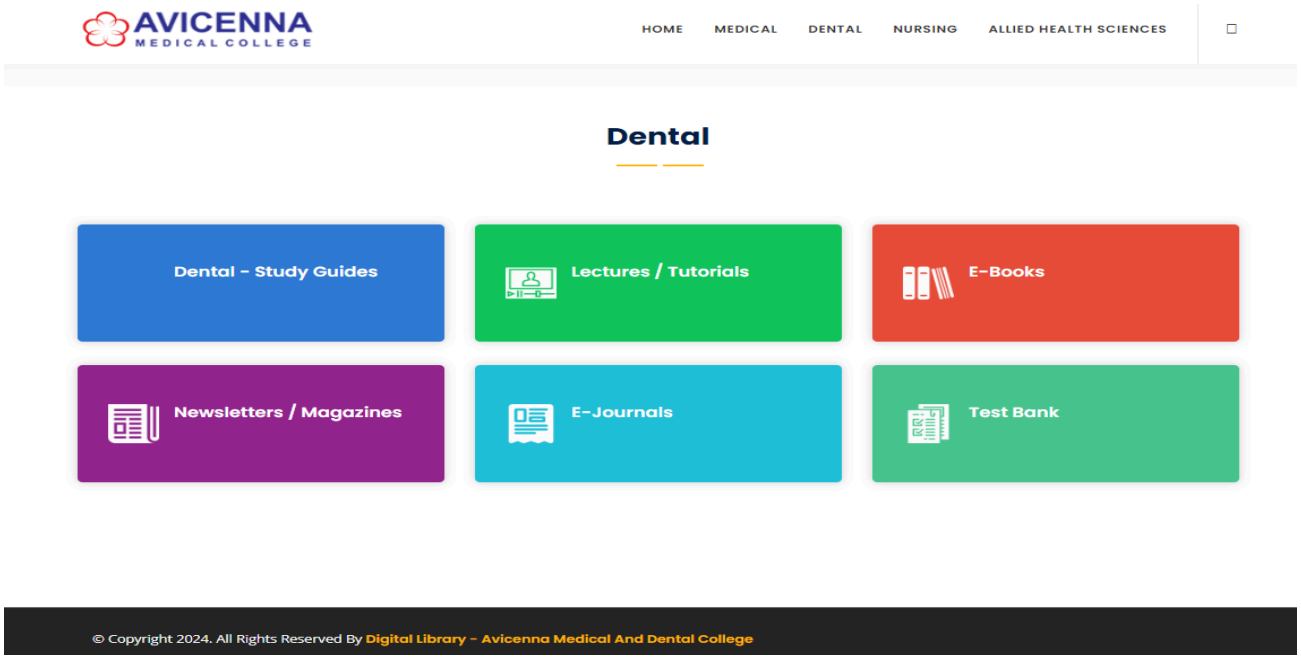





Digital Library & Learning Management System (LMS)

1. The COVID-19 pandemic highlighted the necessity of interactive online teaching for better retention of topics by students. Strategies like online learning management system (LMS), online discussions, online quizzes, assignment design, and flipped learning enhance student engagement in online education when needed.

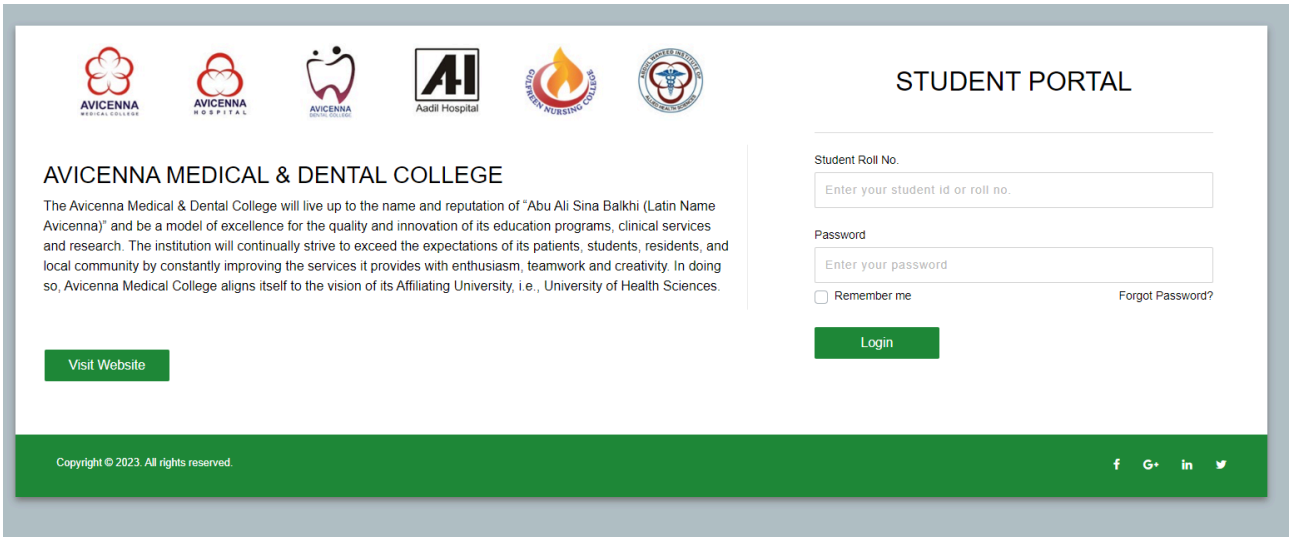
2. Avicenna Medical & Dental College lays emphasis on the provision of learning material and online video lectures, video tutorials in the e-library and learning resource center, which has a dedicated website of Avicenna Medical College to enable the students to develop concepts and clarify their doubts, if they have not been able to do so in the teaching sessions during college hours. The digital library can be approached on http://digital.avicennamch.com/.



3. The institution has also endeavored to link itself with the digital libraries and e-library of the University of Health Science (UHS) and Higher Education Commission (HEC) to enable the students to benefit from the valuable resource material, lectures and knowledge bank at these sites. The links are available with the HEC http://www.digitallibrary.edu.pk/ and learning management system of UHS http://lms.uhs.edu.pk .

4. The Learning Management System (LMS) at Avicenna Medical & Dental College is a comprehensive platform managed by the Department of Student Affairs. It is designed to facilitate effective communication and information exchange between students, parents, faculty, and administrative staff. The LMS portals are specifically tailored to meet the needs of the following stakeholders:

   a. **Students**: For academic resources and scheduling.
   b. **Parents:** For monitoring academic progress and other relevant information.
   c. **Faculty:** For managing course content and academic activities.
   d. **Department of Student Affairs:** For overseeing administrative functions.
   e. **Department of Medical/Dental Education:** For overseeing academic functions.



5. Students can access a comprehensive range of academic resources and information through the student portal. By logging in with their roll number and password, students can:

   - Look at their attendance and results.
   - Review academic activities and weekly timetables/schedules.
   - Access rotation planners and test schedules.
   - Check for any notification, assignment or resource material from their teachers.

6. The information to the parent is duplicated by the issuance of the password and login to the Students Learning Management System which is dedicated to the Academic Program of the students. The parents can view the following by logging in to the mobile app of Avicenna Student Management System:

   a) Syllabus
   b) Table of specifications
   c) Annual Planner
   d) Synopsis
   e) Block Time Table
   f) Weekly training program
   g) Allocation of Marks
   h) Assessment calendar
   i) Results of tests / exams*
   j) Students' attendance record
   k) Fees & fines

Assessment Guidelines

Assessment in dental education is a critical component designed to ensure that dental students acquire the necessary knowledge, skills, and competencies required for effective dental practice.

Assessment drives learning! – George E. Millar

You will encounter a variety of assessment methods, each serving a specific purpose.

- Written examinations, including multiple-choice and essay questions, will test your grasp of theoretical concepts and subject matter.
- Practical assessments will require you to demonstrate your clinical skills and ability to apply knowledge in real-world scenarios.
- Oral exams will evaluate your communication skills and reasoning abilities through case discussions and problem-solving exercises.
- Clinical skills and work-place based assessments will observe your hands-on proficiency and patient management capabilities.

At Avicenna Medical & Dental College, internal assessments are systematically conducted throughout each academic year of the BDS program, as per the guidelines established by the University of Health Sciences (UHS). These assessments, overseen by the Assessment Cell, adhere to either the Annual Subject-Based System or the Integrated/Modular System, depending on the curriculum structure.

Notably, beginning with the 2024-25 academic year, the weightage of internal assessments will be increased from 10% to 20%. The UHS administers professional examinations independently, organizing them at designated neutral sites and appointing external examiners to ensure objectivity and fairness.

Internal Assessment Weightage	10%	100 %
External Assessment Weightage	90%	

Internal Assessment Criteria

Internal Assessment	Assessment Methods	Percentage Weightage
Grand Tests	MCQs SEQs Viva OSPE	30%
Early Session Exam	MCQs SEQs Viva OSPE	70%
Mid Session Exam	MCQs SEQs Viva OSPE	
Send-up Exam	MCQ SEQ	100%
Total		200%

Reference attached on next page.

Avicenna Dental College												
Examination Marks Scheme 2024-2025												
2nd Year BDS												
Form No	BDS-2 Form-1		BDS-2 Form-2		BDS-2 Form-3		BDS-2 Form-4		BDS-2 Form-5		BDS-2 Form-6	
Test Type	Grand Test				Revision Test		Session Exam				Send Up	
Mode of Exam	Theory		Practical		Theory		Theory		Practical		Theory	Practical
Weightage	(1,2)* 30%				0%		(3,4)* 70%				100%	
Pathology 200	MCQ 40, SEQ 30	70	Viva 25, OSPE 25	50	MCQ 20 SEQ 30	50	MCQ 45, SEQ 45	90	Viva 40, OSPE 50	90	MCQ 45, SEQ 45	90	Viva 40, OSPE 50	90
Pharmacology 200	MCQ 40, SEQ 30	70	Viva 25, OSPE 25	50	MCQ 20 SEQ 30	50	MCQ 45, SEQ 45	90	Viva 60, OSPE 30	90	MCQ 45, SEQ 45	90	Viva 60, OSPE 30	90
Beh. Sciences 200	MCQ 40, SEQ 30	70	Viva 25, OSPE 25	50	MCQ 14 SEQ 36	50	MCQ 45, SEQ 45	90	Viva 45, OSPE 45	90	MCQ 45, SEQ 45	90	Viva 45, OSPE 45	90
Dental Materials 200	MCQ 40, SEQ 30	70	Viva 25, OSPE 25	50	MCQ 20 SEQ 30	50	MCQ 45, SEQ 45	90	Viva 50, OSPE 40	90	MCQ 45, SEQ 45	90	Viva 50, OSPE 40	90
Community Dentistry 200	MCQ 40, SEQ 30	70	Viva 25, OSPE 25	50	MCQ 20 SEQ 30	50	MCQ 45, SEQ 45	90	Viva 60, OSPE 30	90	MCQ 45, SEQ 45	90	Viva 60, OSPE 30	90

NOTE 1 : *If Viva/OS+A14:M15PE is held along with Theory test , The Theory test will get 15% weightage & VIVA / OSPE will get 15% Weightage in Grand Test
NOTE 2 : *If Viva/OSPE is not held for any reason Theory test will get full 30% weightage in Grand Test
NOTE 3 : * If Viva/OSPE is held along with Theory test , The Theory test will get 35% weightage & VIVA / OSPE will get 35% Weightage in Session Exam
NOTE 4 : *If Viva/OSPE is not held for any reason Theory test will get full 70% weightage in Session Exam

HOD Community Dentistry	HOD Pathology	HOD Dental Materials	HOD Behavioural Sciences
HOD Assessment Cell	Principal Avicenna Dental College	Chairman Avicenna Medical College	

External Assessment

Paper Details		Assessment Methods	Total Marks	Percentage Weightage
Theory ● 90 marks ● 3 hrs	External Assessment	45 MCQs (1 mark each)	45 marks	50 %
		15 SEQs (3 marks each)	45 marks	
	Internal Assessment	See Internal Assessment Criteria	10 marks	
Practical ● 90 marks ● 3 hrs	External Assessment	Viva & OSPE	90 marks	50%
	Internal Assessment	See Internal Assessment Criteria	10 marks	
Total			200 Marks	100%

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Sample Paper

MCQ

A 25 year old patient came in for filling of upper right premolar which previously was diagnosed with carious cavity class 2. Treatment plan for amalgam restoration was decided. A student while filling the cavity with amalgam found the material too brittle and hard to be condensed in the cavity, how long after trituration should the student have started the material condensation?

Option:

a) 3 minutes*

b) 5 minutes

c) 10 minutes

d) 18 minutes

e) 20 minutes

COGNITIVE LEVEL: Application
DIFFICULTY LEVEL: Moderate
IMPORTANCE: Must Know
REFERENCE: **Philips Science of Dental Materials 12th ed**

SEQ/SAQ

Scenario
A 35-year-old patient presents with a large cavity on their first molar. The patient is concerned about the aesthetics of the restoration and requests a tooth-colored material. However, the patient also has a history of bruxism and is concerned about the durability of the restoration.

Questions	Marks
a) What tooth-colored restorative material would you recommend for this patient, and why?	**1**
b) If the patient's bruxism is severe, what alternative material would you recommend, and how would you justify your choice?	**2**

Key	Marks
a) Composite Resin (specifically, a nanohybrid composite) due to its excellent aesthetics, ability to bond to tooth structure, and moderate durability.	**1**
b) If the patient's bruxism is severe, Lithium Disilicate ceramic is preferred. This material is more durable and resistant to wear than composite resin, making it suitable for patients with severe bruxism. Additionally, it is still tooth-colored and can be used for aesthetic restorations.	**2**

COGNITIVE LEVEL: Recall
DIFFICULTY LEVEL: Hard
IMPORTANCE: Must know
REFERENCE: **Philips Science of Dental Materials 12th ed**

OSPE

Scenario : **Identify the material and manipulate according to guidelines.**
eg: demonstrate mixing of the material given.

Key:

Gypsum/Hard plaster

-Measure and pour 50 ml water into the bowl. (1 mark)
-Measure 100g of powder and mix with water. (1 mark)
-Mix in a circular motion and figure of 8 against the walls of the bowl(1 mark)
-Demonstrate a smooth mix of the gypsum(1 mark)

Ratio: 100g of powder to be mixed with 50 ml water.

CURRICULUM DETAILS

Curricular Framework including allocation of hours (PMDC)

BDS SCHEME OF STUDIES			
Basic Dental Sciences / Preclinical Year		**Clinical Dental Sciences / Clinical Years**	
1st Professional Year	**2nd Professional Year**	**3rd Professional Year**	**4th Professional Year**
Anatomy 300 Hours	**General Pathology** 220 Hours	**General Medicine** 180 Hours	**Operative Dentistry** 250 Hours
Physiology 300 Hours	**Pharmacology** 220 Hours	**General Surgery** 170 Hours	**Prosthodontics** 250 Hours
Biochemistry 180 Hours	**Science of Dental Materials** 300 Hours	**Oral Pathology** 180 Hours	**Orthodontics** 250 Hours
Oral biology & Tooth Morphology 300 Hours	**Community Dentistry** 200 Hours	**Oral Medicine** 150 Hours	**Oral & Maxillofacial Surgery** 250 Hours
General Education 120 Hours (Islamiat, Pakistan Studies Behavioural Sciences, Research, English, Arts & Humanities)	**Preclinical Operative Dentistry** 80 Hours	**Periodontology** 180 Hours	**Paediatric Dentistry** 100 Hours
	Pre-clinical Prosthodontics 80 Hours	**Clinical Operative** 80 Hours	**General Education** 100 Hours (Research, English, Arts & Humanities, ICT)

	General Education 100 Hours (Behavioural Sciences, Research, English, Arts & Humanities, ICT)	**Clinical Prosthodontics** 80 Hours	
		Clinical Oral & Maxillofacial Surgery 80 Hours	
		General Education 100 Hours (Research, English, Arts & Humanities, ICT)	
1200 hours	**1200 hours**	**1200 hours**	**1200 hours**

Curricular Map & Rationale

1. This pictorial, vertical and horizontal presentation of the course content and extent shows the sequence in which various systems are to be covered. Curricular map to cover all the subjects and modules and the time allocated to study of the systems for the undergraduate programs offered at four colleges at campus are as follows:

Rationale 2nd Professional Year	
Subjects	**Dental Materials**
TERM- I	● Introduction to properties of Dental Materials ● Impression Materials ● Gypsum ● Casting defects ● Wax
TERM- II	● Denture based materials ● Dental Ceramics ● Dental Composites ● Dental Cements ● Amalgam ● Direct filling gold
TERM-III	● Investment Materials ● Metals and noble metal alloys ● Introduction to wrought alloys ● Dental Implants

Learning Outcomes

Unit/ Chapter	Topic/ Content	Student Learning Outcomes	Mode of Information (MOIT)	Learning Domain (KSA-Model)
1 **Introduction and properties of Dental Materials**	1.Introduction 2. Classification systems 3. Selection of Materials 4. Electrical Properties 5. Thermal Properties 6. Optical Properties 7. Rheological properties 8. Stress and Strain 9. Elastic And Plastic region properties 10.Hardness, Malleability,Ductility and Shear strength 11. Allergies and Toxicities	By the end of this topic, students will be able to: ● Define Dental materials and explain their Applications and history ● Classify dental materials based on chemistry ● Explain with clinical significance a. Recall Physical properties of materials, including hardness, abrasion b. Thermal, Biological, and Chemical properties c. Rheological, optical, Mechanical, and other related properties	Lecture, Tutorial, Practical,	Knowledge, Skills

2.Impression Materials	1. Introduction 2. Elastic Impression Materials - 1 3. Elastic Impression Materials - 2 4. Elastic Impression Materials - 3 5. Inelastic Impression materials -1 6. Inelastic Impression materials -2 7. Inelastic Impression materials -3	Classification of Impression Materials ● Define and explain the different types of impression materials used in dentistry ● Identify and classify impression materials based on their properties and uses ● Understand the advantages and limitations of each type of impression material Elastomeric Impression Materials ● Describe the composition and properties of elastomeric impression materials ● Explain the uses and indications for elastomeric impression materials ● Demonstrate the correct handling and manipulation of elastomeric impression materials Making Impressions with Elastomeric Materials ● Demonstrate the correct technique for making impressions using elastomeric materials ● Identify and troubleshoot common errors in impression-making with elastomeric materials ● Understand the importance of accurate impression-making for dental restorations	Lecture, Tutorial, Practical,	Knowledge, Skills

		Properties of Elastomeric Impression Materials ● Describe the physical and chemical properties of elastomeric impression materials ● Explain the factors that affect the accuracy and dimensional stability of elastomeric impressions ● Understand the importance of selecting the appropriate elastomeric material for specific clinical situations Hydrocolloids ● Define and explain the composition and properties of hydrocolloid impression materials ● Identify the advantages and limitations of hydrocolloid impression materials ● Demonstrate the correct handling and manipulation of hydrocolloid impression materials Inelastic Impression Materials ● Define and explain the composition and properties of inelastic impression materials ● Identify the advantages and limitations of inelastic impression materials ● Demonstrate the correct handling and manipulation of inelastic impression materials		

3. Gypsum Products	1.Introduction to Gypsum Products 2. Setting Chemistry 3. Manipulation 4. Miscellaneous models and Die materials	By the end of this topic, students will be able to: ● Classify Gypsum products ● Explain the composition of Gypsum ● Explain the process of its production ● Describe the setting reaction ● Explain the properties ● Enlist the clinical applications ● Explain the manipulation	Lecture, Tutorial, Practical,	Knowledge, Skills
4. Dental Waxes	1. Introduction 2. Waxes in dentistry	By the end of this topic, students will be able to: ● Name and classify the dental waxes according to their use ● Describe the properties particular to dental waxes as well as composition and use of base plate wax, casting and inlay wax	Lecture, Tutorial, Practical,	Knowledge, Skills
5. Casting Investments	1. Procedural details of Casting - 1 2. Procedural details of Casting - 2 3. Procedural details of Casting - 3 4. Details and Casting defects - 1 5. Details and Casting defects - 2	By the end of this topic, students will be able to: ● Explain the casting technique and associated processing errors ● Explain the three main investment materials, their composition, properties as well as uses	Lecture, Tutorial, Practical,	Knowledge, Skills
6.Abrasive and Polishing Material	1. Polishing - 1 2. Polishing - 2 3. Polishing - 3	By the end of this topic, students will be able to: ● Recognize available abrasive and polishing agents and differentiate between them according to sources ● Explain the principle and types of abrasive ● Discuss cutting, finishing and polishing final restorations, along with its importance ● Explain the biological hazards of finishing and polishing procedures, and the precautions that must be taken to minimize these effects	Lecture, Tutorial, Practical,	Knowledge, Skills

7.Polymer/ Denture Base Resins	1. Introduction 2. Denture Base acrylic resins - 1 3. Denture Base acrylic resins - 2 4. Denture Base acrylic resins - 3 5. Denture reliners and re-basing materials - 1 6. Denture reliners and re-basing materials - 2	By the end of this topic, students will be able to: ● Explain requirements of denture base materials ● Detail the properties of acrylic resin as a denture base material, its composition, manipulation and processing techniques ● Describe different casting techniques and associated errors ● Identify artificial teeth and their properties ● Understand denture repair, relining and rebasing materials ● Discuss tissue conditioners and soft liners ● Enlist available tissue conditioners	Lecture, Tutorial, Practical,	Knowledge, Skills
8.Dental Ceramics	1. Introduction	By the end of this topic, students will be able to:	Lecture, Tutorial, Practical,	Knowledge, Skills

	2. Methods of strengthening 3. PFM And All ceramic Restorations - 1 4. PFM And All ceramic Restorations - 2 5. PFM And All ceramic Restorations - 3	● Discuss dental ceramics, manufacturing techniques and firing processes ● Enlist properties of dental ceramics with their clinical properties ● Explain strengthening mechanism of dental ceramics		
9.Adhesion, Bonding, Restorative Resins/Composites	1. Introduction 2. Setting Chemistry and Associated Phenomenon 3. Manipulation 4. Wear 5. Introduction 6. Adhesion in Dental Materials 7. Factors governing the adhesion	By the end of this topic, students will be able to: ● Discuss the principal of adhesion and factors associated ● Describe concepts of dentine and enamel bonding ● Explain acid etching its steps and applications ● Enlist different bonding systems with their pros and cons ● Detail composites, their constituents and functions ● Classify according to filler size and curing techniques ● Explain steps of composite filling and manipulation ● Explain mechanism of polymerization shrinkage and the techniques that may be used to minimize it ● Compare the properties of composite with amalgam	Lecture, Tutorial, Practical,	Knowledge, Skills
10. Dental Cements/Endodontic/ Preventive Materials	1. Introduction 2. Oil based cement 3. Water Based cements 4. Miscellaneous cements	By the end of this topic, students will be able to: ● Explain terminologies and importance of water powder ratio and film thickness ● Describe ideal requirements of cements ● Explain composition, setting chemistry, properties as well as applications	Lecture, Tutorial, Practical,	Knowledge, Skills
11. Glass Ionomer	1. Properties 2. Chemistry 3. Composition and manipulation 4. [covered with Dental Cements/Endodontic/Preventive Materials]	By the end of this topic, students will be able to: ● Cements for Luting ● Understand the purpose and requirements of luting cements ● Identify suitable luting cements for various dental restorations Cements for Pulp Protection ● Recognize the importance of pulp protection	Lecture, Tutorial, Practical,	Knowledge, Skills

		● Select appropriate cements for pulp protection Cements for Restoratives ● Understand the role of cements in restorative dentistry ● Identify suitable cements for various restorative materials Zinc Phosphate Cement ● Describe the composition and properties of zinc phosphate cement ● Understand its uses and limitations Zinc Polycarboxylate Cement ● Describe the composition and properties of zinc polycarboxylate cement ● Understand its uses and limitations Glass Ionomer Cement (GIC) ● Describe the composition and properties of GIC ● Understand its uses, limitations, and clinical applications Metal-Reinforced Glass Ionomer Cements ● Understand the benefits and limitations of metal reinforcement ● Identify suitable applications for metal-reinforced GIC High-Viscosity Glass Ionomer Cement ● Describe the properties and uses of high-viscosity GIC ● Understand its advantages and limitations Resin-Modified Glass Ionomer Cement (Hybrid Ionomer)		

		● Describe the composition and properties of resin-modified GIC ● Understand its uses, limitations, and clinical applications		
12. Dental amalgam	1.Introduction 2.Manipulation 3.Setting Chemistry and Associated Phenomenon - 1 4.Setting Chemistry and Associated Phenomenon - 2 5. Biocompatibility 6. Hazards of Mercury and Precautionary Measures	By the end of this topic, students will be able to: ● Define amalgam and its composition ● Classify the different amalgam alloys and their properties ● Explain amalgamation process ● Describe setting chemistry of different amalgam types with emphasis on stoichiometric phases being formed ● Explain in detail steps of amalgam manipulation and restoration ● Understand phenomena of creep and cause of amalgam failure ● Discuss mercury toxicity, its biological effects and disposal		Knowledge, Skills
13. Direct Gold filling	1. Introduction 2. Manipulation - 1 3. Manipulation - 2	By the end of this topic, students will be able to: ● Classify direct gold fillings, and state their general properties and manipulation ● Enumerate dental casting gold alloys, their composition, properties and use		Knowledge, Skills
14. Casting alloys	1. Introduction to metals - 1 2. Introduction to metals - 2 3. Introduction to Noble Metal Alloys 4. Comparison of Noble metal alloys with base metal alloys - 1 5. Comparison of Noble metal alloys with base metal alloys - 2 6. Introduction to Base Metal Alloys 7. Alloying elements - 1	By the end of this topic, students will be able to: ● Describe general properties of pure metals and alloys ● Enlist the types of alloys ● Distinguish between tarnish and corrosion and state its clinical significance ● Discuss wrought alloys, its composition, properties and uses ● Discuss base metal alloys and compare with gold alloy ● Compare properties of different orthodontic wires		Knowledge, Skills

	8. Alloying elements - 2 9. Corrosion and Tarnish - 1 10. Corrosion and Tarnish - 2,3			
15. Soldering/welding, Wrought alloys,Dental Implants Materials	1. Introduction to Wrought Alloys 2. Requirements 3. Manipulation 4. Applications 5. Introduction to Soldering and Welding 6. Soldering Assembly 7. Heat Source 8. Introduction to Dental Implants 9.Materials used for dental implants	By the end of this topic, students will be able to: ● Define welding, brazing and soldering ● Define what are dental implants ● Define what are dental implants ● Understand components of dental implants ● State indications and contraindications of implant ● Explain available materials and surface coatings of implants ● Differentiate between osteointegration and biointegration.		Knowledge, Skills

Assessment TOS/Blueprint

Unit/ Chapter	Assessment Method (No. of Questions)			
	MCQS	SEQs	Viva	OSPE/ Practical
1 Introduction and properties of Dental Materials	2	1	Possible Viva Qs	5 Observed, 5 Unobserved
2.Impression Materials	5	1		
3. Gypsum Products	2	1		
4. Dental Waxes	1	1		
5. Casting Investments	2	1		
6.Abrasive and Polishing Material	2	1		
7.Polymer/ Denture Base Resins	3	1		
8.Dental Ceramics	4	1		
9.Adhesion, Bonding, Restorative Resins/Composites	4	1		
10. Dental Cements/Endodontic/ Preventive Materials	4	1		
11. Glass Ionomer	4	1		
12. Dental amalgam	3	1		
13. Direct Gold filling	1	1		
14. Casting alloys	4	1		
15. Soldering/welding, Wrought alloys,Dental Implants Materials	4	1		
TOTAL	45	15	-	10


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