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Deemed to be University, Hyderabad, and Telangana – 500055



SCHOOL OF DENTAL SCIENCES AND TECHNOLOGY

CURRICULUM AND PROGRAMME FRAMEWORK DOCUMENT

Bachelor of Science (B.Sc) in Dental Technology

Four-Year Undergraduate Programme

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1. Preamble

This document constitutes the Programme Framework for the B.Sc. in Dental Technology, a four-year (eight-semester) undergraduate programme proposed under the School of Dental Sciences and Technology, Malla Reddy Vishwavidyalapeeth (MRV), Hyderabad. The programme is structured as a Choice Based Credit System (CBCS) curriculum consonant with the UGC Curriculum and Credit Framework for Undergraduate Programmes (CCFUP) under NEP 2020, incorporating Major Core (MC), Minor Stream (M), Ability Enhancement Courses (AEC), Skill Enhancement Courses (SEC), Value Added Courses (VAC), Summer Internships (SI), and a capstone Research Project/Industry Collaboration (RP) in the terminal semester.

B.Sc. Dental Technology trains allied dental professionals (dental technologists) competent in the design, fabrication, and quality control of dental prostheses and appliances, spanning conventional laboratory craft, removable and fixed prosthodontic, orthodontic appliance fabrication, maxillofacial prosthetics, and digital/CAD-CAM dental laboratory workflows.

1.1 Nomenclature and Duration

Parameter	Detail
Programme Title	B.Sc. in Dental Technology
Degree Awarded	Bachelor of Science (B.Sc.) Honours / Honours with Research, as per exit stage
Duration	4 Years (8 Semesters); multiple entry-exit as per NEP 2020
Credit System	Choice Based Credit System (CBCS), aligned to UGC CCFUP/NEP 2020
Total Credits	160 credits (meeting the UGC CCFUP requirement for a 4-year UG programme)
Medium of Instruction	English
Administering School	School of Dental Sciences and Technology, MRV
Mode	Full-time, on-campus, with dental-laboratory and industry postings

2. Need and Justification for the Programme

2.1 Rationale

Dental technology is the allied science responsible for translating a clinician's prescription into a functional, fitting, and aesthetic dental prosthesis or appliance – complete/removable dentures, fixed crowns and bridges, orthodontic appliances, implant-supported prostheses, and maxillofacial replacements. India's dental-care sector, driven by rising oral-health awareness, an ageing population, and expanding dental-tourism and cosmetic-dentistry markets, faces a persistent shortage of formally trained dental technologists, most of whom currently enter the field through informal apprenticeship rather than structured university education.

The rapid digitization of the dental laboratory – intraoral scanning, CAD/CAM milling, 3D printing, and digital implant planning – has widened the gap between traditional apprenticeship-trained technicians and the skill set modern dental laboratories now require. A structured, university-level B.Sc. Dental Technology programme addresses this gap by combining classical prosthodontic-laboratory craftsmanship with digital dental-laboratory competence, quality systems, and business/laboratory-management training.

2.2 Justification

- Acute national shortage of formally qualified dental technologists relative to the growing number of registered dental practitioners and dental laboratories.
- Rapid adoption of digital dentistry (CAD/CAM, 3D printing, digital impressions) in Indian dental laboratories, requiring technologists trained in both manual and digital fabrication workflows.
- Growing organized dental laboratory and dental-products industry (including export-oriented laboratories) that requires quality-assured, formally certified technical manpower.
- Employability pathways in dental laboratories, hospitals, dental product manufacturing companies, maxillofacial prosthetic units, teaching/training institutions, and self-employment (independent dental laboratory ownership).
- Consistency with NEP 2020's emphasis on skill-based, industry-relevant undergraduate education, multiple entry-exit stages, and a Major-Minor CBCS structure.
- Synergy with MRV's multidisciplinary health-sciences ecosystem (dental, medical, pharmacy, engineering schools), enabling shared clinical exposure, faculty, and laboratory infrastructure.

2.3 Societal and Industry Need

Consultations with dental laboratories and dental-product manufacturers indicate consistent demand for graduates who can:

- (a) Fabricate removable and fixed prostheses to prescribed quality standards;
- (b) Operate digital scanning, CAD/CAM design, and 3D-printing/milling systems;
- (c) Manage laboratory workflow, infection control, and quality assurance; and
- (d) Support maxillofacial and implant-prosthetic laboratories under supervision. This programme's curriculum has been justified and designed around these industry-articulated competency needs.

3. Vision and Mission

3.1 Vision

To be a nationally recognized center of excellence producing highly skilled, digitally competent dental technologists who combine traditional prosthodontic-laboratory craftsmanship with contemporary digital dental-laboratory practice, serving the evolving needs of dental healthcare delivery.

3.2 Mission

- To deliver an integrated curriculum combining dental material science, oral biosciences, prosthodontic-laboratory technique, and digital dental-laboratory technology.
- To build strong hands-on laboratory competence through a structured, progressive Comprehensive/Digital Laboratory Practice series across all eight semesters.
- To develop professional, ethical, and quality-conscious dental technologists capable of independent laboratory practice or industry employment.
- To cultivate entrepreneurial capability for independent dental-laboratory establishment and management.
- To instill research aptitude, communication skill, and lifelong learning through a dedicated research-methods cluster and capstone industry-linked project.

4. Programme Educational Objectives (PEOs)

The Programme Educational Objectives describe the broad career and professional accomplishments expected of graduates within 3–5 years of graduation.

PEO	Statement
PEO1	Fabricate high-quality removable, fixed, and orthodontic, implant, and maxillofacial dental prostheses using both conventional and digital laboratory techniques.
PEO2	Function effectively as dental technologists/laboratory managers in hospitals, private dental laboratories, and dental-products manufacturing units.
PEO3	Pursue higher education (M.Sc. Dental Technology/Materials, MDT, or related postgraduate/certification programmes) or specialised digital-dentistry training.
PEO4	Practice with professional ethics, infection control, and quality-assurance discipline expected of allied dental healthcare professionals.
PEO5	Establish and manage independent dental laboratories or digital dental-design units, demonstrating entrepreneurial and business-management capability.

5. Governance Structure

The programme is governed through a multi-tier academic governance structure consistent with UGC Deemed-to-be-University norms and MRV's Statutes/Ordinances.

Body	Role
University Court / Board of Management	Apex governance; approves new programmes, policy, and resource allocation.
Academic Council	Approves curriculum, regulations, examination rules, and academic calendar for all programmes including this one.
Board of Studies (BoS), School of Dental Sciences and Technology	Designs and periodically revises the curriculum, course content, CO-PO mapping, and question-paper templates; includes external subject experts and dental-laboratory industry representatives.
Programme Committee / Departmental Academic Committee	Day-to-day academic planning, timetabling, internal-assessment moderation, and course-file audit.
Examination Committee / Controller of Examinations (CoE) Office	Conducts internal and end-semester examinations, results processing, and grievance redressal.
Programme Coordinator	Single point of accountability for curriculum delivery, student mentoring, dental-laboratory internship liaison, and outcome-based education (OBE) documentation.
Internal Quality Assurance Cell (IQAC)	Monitors quality benchmarks, accreditation readiness, and continuous improvement through CO-PO attainment review.
Anti-Ragging, Grievance Redressal, ICC and Ethics Committees	Student welfare, safety, and disciplinary oversight as per statutory requirement.

Governance follows a bottom-up curriculum design and top-down approval flow: Programme Committee → Board of Studies → Academic Council → Board of Management, with the IQAC providing continuous feedback loops based on stakeholder (student, alumni, dental-laboratory employer, faculty) surveys and CO-PO attainment data.

6. Academic Structure

The programme spans 4 years / 8 semesters and is organized into course categories as prescribed under CBCS/NEP 2020:

Course Category	Description
Major Core (MC)	Discipline-defining courses in dental material science, oral biosciences, prosthodontics, orthodontic appliances, maxillofacial prosthetics, and dental-laboratory management.
Minor Stream (M)	Cross-disciplinary elective courses (two 2-credit courses per semester chosen from that semester's elective pool of 4–5 options; 4 credits/semester) e.g., Biomedical Engineering, Bioinformatics, Diagnostic Sciences, Systems Biology, Healthcare Management, Neurobiology.
Skill Enhancement Courses (SEC)	Hands-on laboratory-practice courses the Comprehensive Laboratory Practice (I–IV) and Digital Laboratory (I–II) series, progressing from basics to implant/CAD-CAM prosthodontics.
Ability Enhancement Courses (AEC)	Communication, digital literacy, entrepreneurship, time-management, and cultural-competence courses.
Value Added Courses (VAC)	Courses on Indian knowledge systems, interpersonal/healthcare communication, and SWAYAM-based online value-added courses (mandatory completion, university-recognized).
Summer Internship (SI)	Skill-based internship placements between semesters (Semesters I/II, IV, VI).
Research Project / Industry Collaboration (RP)	Capstone major project (Semester VIII) with dental-laboratory/industry mentorship, culminating in a dissertation and viva-voce.
Non-Academic / Extension Credits	NCC/NSS/Sports/Extra-curricular and Yoga mandatory but outside the CGPA-bearing credit count.

6.1 Year-wise Progression

Year	Semesters	Academic Focus
I	I–II	Dental material science, oral biosciences/morphology, human anatomy/physiology, biochemistry, oral microbiology, oral pathology and radiology basics, foundational laboratory practice.
II	III–IV	Foundations for clinical dentistry, restorative dentistry, removable and fixed prosthodontics, orthodontic materials/appliances, maxillofacial prosthetics, dental-laboratory management, implant-prosthodontic laboratory practice.
III	V–VI	Emerging materials, dental machinery/maintenance, implant prosthetics, advanced CAD/CAM & digital impression techniques, digital laboratory practice (complete denture with implant; cast partial/fixed denture), quality control and business management.
IV	VII–VIII	Research foundations & ethics, scientific communication, collaborative/applied research, start-up incubation, and the capstone Research Project/Industry Collaboration.

6.2 Scheme of Multiple Entry and Exit (NEP 2020)

In accordance with the National Education Policy (NEP) 2020 and the UGC Curriculum and Credit Framework for Undergraduate Programmes (CCFUP), the B.Sc. Dental Technology programme offers multiple entry and exit options, enabling students to exit with a certification commensurate with the credits earned and to re-enter later to complete the remaining stage(s). Credits earned at each stage are recorded on the Academic Bank of Credits (ABC) and are available for lateral re-entry or credit transfer, subject to University regulations:

Exit Stage	Duration	Minimum Credits	Award / Qualification	Additional Requirement
UG Certificate	After 1 Year (2 Semesters)	40–44 credits	UG Certificate in Dental Technology	Requires 4 credits of skill-based courses (Summer Internship, Semester II, and Comprehensive Laboratory Practice I–II) for students exiting at this stage.
UG Diploma	After 2 Years (4 Semesters)	80–88 credits	UG Diploma in Dental Technology	–
Bachelor's Degree	After 3 Years (6 Semesters)	120–132 credits	B.Sc. in Dental Technology	–
Bachelor's Degree (Honours)	After 4 Years (8 Semesters)	160 credits (Annexure III)	B.Sc. (Honours) in Dental Technology	Awarded on completion of the full 4-year programme, including the Semester VIII Industry Collaboration (Major Project) report and viva-voce.
Bachelor's Degree (Honours with Research)	After 4 Years (8 Semesters)	160 credits (Annexure III)	B.Sc. (Honours with Research) in Dental Technology	Awarded to students who, in addition, complete an independent research dissertation (Semester VIII) evaluated by an external examiner and maintain a minimum CGPA of 7.5, as per UGC norms.

Students exiting with a UG Certificate or UG Diploma may re-enter the programme to complete the subsequent stage(s) within the maximum permissible period prescribed by the University/UGC, subject to seat availability, academic eligibility norms, and validity of credits recorded in the Academic Bank of Credits (ABC).

7. UG Eligibility Criteria

7.1 Academic Eligibility

Candidates must have passed the 10+2 (Higher Secondary/Senior Secondary Certificate) examination or an equivalent qualification recognised by the Association of Indian Universities, with Physics, Chemistry, and Biology (PCB), securing a minimum of 50% aggregate marks (45% for SC/ST/OBC and other categories as per applicable reservation policy).

7.2 Age and Other Requirements

- No specific upper age limit unless prescribed by a professional regulatory body governing allied dental sciences/dental technology.
- Candidates must satisfy the University's admission process, which may include a Common Entrance Test conducted/recognised by MRV, followed by counselling and document verification.
- Medical fitness certificate and immunisation record (Hepatitis-B, etc.) mandatory prior to laboratory postings, given exposure to dental materials, chemicals, and infectious/biological specimens.
- Colour-vision and manual-dexterity screening recommended at admission, given the shade-matching and fine hand-skill demands of prosthodontic-laboratory work.
- Reservation policy for SC/ST/OBC/EWS/PwD categories to be applied as per applicable statutory norms.

8. Programme Outcomes (POs)

On completion of the programme, graduates are expected to demonstrate the following Programme Outcomes (PO1–PO8), which also constitute the referent 'PLO' codes used for course-level CO mapping in the detailed syllabus:

PO	Title	Statement
PO1	Disciplinary Knowledge	Demonstrate comprehensive knowledge of dental materials science, oral biosciences, and prosthodontic/dental-laboratory principles.
PO2	Application & Problem Solving	Apply scientific and technical knowledge to design, select materials for, and fabricate dental prostheses and appliances.
PO3	Practical & Psychomotor Skills	Demonstrate competence in conventional and digital dental-laboratory techniques, instrumentation, and fine manual fabrication skills.
PO4	Communication & Teamwork	Communicate effectively with dental clinicians and laboratory teams, and present technical work and case documentation clearly.
PO5	Analysis & Critical Thinking	Analyse case requirements, evaluate prosthesis fit/function/aesthetics, and troubleshoot fabrication or material-related problems.
PO6	Ethics & Professionalism	Apply infection-control, biosafety, and professional/quality standards in dental-laboratory practice.
PO7	Research & Innovation	Conduct guided research and demonstrate innovation/design-thinking in dental-materials and digital-laboratory problem solving.
PO8	Lifelong Learning & Environment/Society	Engage in continuous professional development and recognise the societal, environmental, and economic context of dental-laboratory practice.

8.1 Graduate Attributes (GAs) of the Programme

In addition to the programme-specific Programme Outcomes (POs, Section 8) and Programme Specific Outcomes (PSOs, Section 9), the School defines ten institution-level Graduate Attributes (GAs). These are the generic qualities, values and transferable capabilities that every B.Sc. Dental Technology graduate is expected to demonstrate at the time of graduation, irrespective of specialization.

Graduate Attributes are cascaded into every course through the Course Outcomes (COs) and are mapped to the POs/PSOs so that the curriculum-to-outcomes linkage required for NEP 2020/UGC Outcome-Based Education (OBE) and accreditation review is demonstrable at the programme, course and unit level.

GA	Title	Description
GA1	Disciplinary Knowledge	Demonstrate integrated foundational and applied knowledge across dental materials science, oral biosciences, and prosthodontic/digital-laboratory technology.
GA2	Critical Thinking & Problem Solving	Analyse case requirements and dental-laboratory problems and design evidence-based, workable fabrication solutions.
GA3	Technical & Digital Literacy	Select, use and evaluate conventional laboratory instruments and digital dental technologies (CAD/CAM, 3D printing, digital scanning) competently and responsibly.
GA4	Research Aptitude & Evidence-Based Practice	Formulate research questions, apply scientific methods and biostatistics, and use evidence to inform dental-materials and laboratory-practice decisions.
GA5	Effective Communication	Communicate clearly, in speech and writing, with clinicians, laboratory colleagues and clients, and present technical/case work persuasively.
GA6	Teamwork & Collaborative Leadership	Function effectively as a member or leader of multidisciplinary dental-laboratory and clinical-liaison teams.
GA7	Ethical Reasoning & Professional Integrity	Apply infection-control norms, quality standards and professional codes of conduct with integrity and accountability.
GA8	Social Responsibility & Global Citizenship	Recognise the societal, economic, environmental and equity implications of dental-laboratory technologies for local and global communities.
GA9	Entrepreneurship & Innovation Mindset	Identify opportunities and apply design-thinking, laboratory-management and entrepreneurial skills to establish or improve dental-laboratory ventures.

GA	Title	Description
GA10	Lifelong Learning & Self-Directed Growth	Engage independently and continuously in learning to keep pace with rapidly evolving dental materials, digital tools and laboratory techniques.

8.2 Mapping of Graduate Attributes (GAs) to Programme Outcomes (POs)

The table below shows the correlation of each Graduate Attribute with the eight Programme Outcomes (Section 8) on a qualitative scale: H = High, M = Medium, '-' = Not directly addressed.

GA	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
GA1	H	M	M	-	-	-	-	M
GA2	M	H	M	-	H	-	M	-
GA3	M	H	H	-	-	-	-	M
GA4	-	M	-	-	-	H	M	M
GA5	-	-	-	H	-	-	-	-
GA6	-	-	-	H	-	M	-	-
GA7	-	-	M	-	M	-	H	M
GA8	-	-	-	-	M	-	-	H
GA9	M	M	-	-	-	M	H	M
GA10	-	-	M	-	-	M	-	H

This GA-PO matrix, together with the course-level CO-PLO matrices (Section 12, Annexure I) and the course-level Graduate Attributes lines in Annexure IV, completes the outcome hierarchy: Graduate Attributes -> Programme Outcomes/POs -> Course Outcomes -> Unit-level content and assessment, as required for NEP 2020-compliant Outcome-Based Education.

9. Programme Specific Outcomes (PSOs)

PSO	Statement
PSO1	Fabricate removable, fixed, orthodontic, implant-supported, and maxillofacial dental prostheses to prescribed clinical and quality standards.
PSO2	Operate and apply digital dental-laboratory technologies intraoral/laboratory scanning, CAD/CAM design and milling, and 3D printing for prosthesis design and fabrication.
PSO3	Manage dental-laboratory workflow, infection control, quality assurance, and equipment maintenance in conventional and digital laboratory settings.
PSO4	Contribute to dental-materials/laboratory research, entrepreneurship, and industry-academia translational projects.

10. Credit Framework

The credit framework follows the UGC CCFUP (NEP 2020) norm of 1 credit = 1 hour/week of lecture (L) or tutorial (T), and 1 credit = 2 hours/week of practical/practicum (P), computed over a 15-week semester. The programme's total credit load of 160 meets the UGC CCFUP requirement for a 4-year Honours/Honours-with-Research degree, with semester loads within the 18–22 credit norm. In the semester tables, L-T-P denote scheduled weekly contact hours; the credit value of each course is as approved by the Board of Studies and also reflects supervised laboratory, self-study and project work in addition to scheduled contact hours.

Semester	Credits	Total Marks	No. of Courses
I	21	900	9
II	22	1000	10
III	21	800	8
IV	20	800	8
V	20	900	9
VI	20	800	8
VII	18	600	6
VIII	18	1100	3

Total Credits: 160 | Total Marks: 6900 | Non-credit mandatory: NCC/NSS/Sports/Extra-curricular & Yoga (Extension Activities)

10.1 Category-wise Credit Distribution (Indicative, 4-Year Programme)

Category	Approx. Credits	Coverage
Major Core (MC)	76	Discipline-defining dental-material-science and prosthodontic-technology courses across Semesters I–VI plus the Semester VII research cluster (Research Foundations, Research Proposal, Scientific Communication, Collaborative Research; 14 credits)
Minor Stream (M)	24	Two 2-credit minors per semester from an elective pool (Semesters I–VI)
Skill Enhancement Courses (SEC)	14	Comprehensive Laboratory Practice I–IV, Digital Laboratory Practice I–II and Start-up Incubation & Industry
Ability Enhancement Courses (AEC)	12	Communication, digital literacy, entrepreneurship, time-management, cultural competence
Value Added Courses (VAC)	16	Indian knowledge systems, interpersonal skills, clinical research and SWAYAM-based courses (Semesters V, VII, VIII)
Summer Internship (SI)	6	Skill-based internships, Semesters II, IV and VI
Research Project / Industry Collaboration (RP)	12	Semester VIII Industry Collaboration (Major Project)

11. Semester-wise Curriculum (Academic Structure)

The consolidated semester-wise course structure (Major Core, Minor Stream, SEC, AEC, VAC, SI, and Research Project components) is summarized below. Each course carries a detailed course-file specifying Course Objectives, Course Outcomes (COs) mapped to Programme Outcomes (PO/PLO), unit-wise content, practical schedule, and assessment rubric, maintained as Annexure to this framework.

Semester I

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409101	Dental Material Science I	1-1-1	3	100
Major Core	BDT1409102	Oral Biosciences & Morphology	1-0-1	3	100

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409103	Human Anatomy and Physiology (Head and Neck Focus)	1-1-1	3	100
Major Core	BDT1409104	Biochemistry – Oral Health	1-0-1	2	100
Minor Stream	BDT1409105–109	Bioinformatics for Oral Research / Biomedical Engineering / Basics of Dental Imaging & Radiology / Nutrition & Health / Health & Society (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409110	Comprehensive Laboratory Practice I (Basics)	1-0-1	2	100
AEC	BDT1409111	English Communication Skills I	1-0-1	2	100
VAC	BDT1409112	Communication & Interpersonal Skills for Healthcare Professionals	1-0-1	2	100

Semester Total: 21 Credits | 900 Marks

Semester II

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409201	Dental Material Science II	1-1-1	3	100
Major Core	BDT1409202	Oral Microbiology	1-0-1	2	100
Major Core	BDT1409203	Oral Pathology: Diseases of Hard & Soft Tissues with Radiology	1-1-1	3	100
Major Core	BDT1409204	Health and Prevention in Dentistry	1-0-1	2	100
Minor Stream	BDT1409205–209	Bioinformatics for Oral Research / Biomedical Engineering / Basics of Dental Imaging & Radiology / Nutrition & Health / Health & Society (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409210	Comprehensive Laboratory Practice II (Removable Prosthodontics)	1-0-1	2	100
AEC	BDT1409211	English Communication Skills II	1-0-1	2	100
VAC	BDT1409212	Understanding India: Cultural & Scientific Contributions	1-0-1	2	100
SI	BDT1409213	Summer Internship (Skill-Adding)	-	2	100

Semester Total: 22 Credits | 1000 Marks

Semester III

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409301	Foundations for Clinical Dentistry	1-1-1	3	100
Major Core	BDT1409302	Restorative Dentistry	2-1-1	4	100
Major Core	BDT1409303	Removable & Fixed Prosthodontics	1-1-1	4	100
Minor Stream	BDT1409304–307	Quality Improvement & Safety in Healthcare / Diagnostic Sciences / Systems Biology / Healthcare Management (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409308	Comprehensive Laboratory Practice III (Fixed Prosthodontics)	1-0-1	2	100
AEC	BDT1409309	Entrepreneurship and Innovation	1-0-1	2	100

Category	Code	Course Title	L-T-P	Credits	Marks
VAC	BDT1409310	Clinical Research I	1-0-1	2	100

Semester Total: 21 Credits | 800 Marks

Semester IV

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409401	Orthodontic Materials and Appliances	1-1-1	3	100
Major Core	BDT1409402	Maxillofacial Prosthetics	1-2-1	3	100
Major Core	BDT1409403	Dental Laboratory Management & Workflow	1-2-1	4	100
Minor Stream	BDT1409404–407	Quality Improvement & Safety / Diagnostic Sciences / Systems Biology / Healthcare Management (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409408	Comprehensive Laboratory Practice IV (Implant Prosthodontics)	1-0-1	2	100
AEC	BDT1409409	Digital Literacy & Basic Programming for Healthcare Applications	1-0-1	2	100
SI	BDT1409410	Summer Internship (Skill-Adding)	-	2	100

Semester Total: 20 Credits | 800 Marks

Semester V

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409501	Emerging Materials	1-1-0	2	100
Major Core	BDT1409502	Fundamentals of Dental Machinery and Maintenance	1-1-0	2	100
Major Core	BDT1409503	Implant Prosthetics	1-1-0	3	100
Major Core	BDT1409504	Advanced CAD/CAM & Digital Impression Techniques	1-1-1	3	100
Minor Stream	BDT1409505–509	Computational Biology / 3D Printing / Biomaterials / Epidemiology / Neurobiology (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409510	Digital Lab I Complete Denture with Implant	1-0-1	2	100
AEC	BDT1409511	Time Management and Organizational Skills	1-1-0	2	100
VAC	BDT1409512	Value-Added Course (SWAYAM platform)	2-0-0	2	100

Semester Total: 20 Credits | 900 Marks

Semester VI

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409601	Healthcare Waste Management in Dental Labs	1-1-1	3	100
Major Core	BDT1409602	Quality Control & Safety in Dental Lab	1-1-1	3	100
Major Core	BDT1409603	Business Management and Ethics	1-2-1	4	100

Category	Code	Course Title	L-T-P	Credits	Marks
Minor Stream	BDT1409604–608	Computational Biology / 3D Printing / Biomaterials / Epidemiology / Neurobiology (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409609	Digital Lab II Cast Partial and Fixed Denture	1-0-1	2	100
AEC	BDT1409610	Cultural Competence in Healthcare	1-0-1	2	100
SI	BDT1409611	Summer Internship (Skill-Adding)	-	2	100

Semester Total: 20 Credits | 800 Marks

Semester VII

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409701	Research Foundations and Ethics	3-1-0	4	100
Major Core	BDT1409702	Research Proposal and Funding Skills	3-1-0	4	100
Major Core	BDT1409703	Scientific Communication and Presentation	2-1-0	3	100
Major Core	BDT1409704	Collaborative and Applied Research Practice	2-1-0	3	100
SEC	BDT1409705	Start-up Incubation & Industry	2-0-0	2	100
VAC	BDT1409706	Value-Added Course (SWAYAM platform)	2-0-0	2	100

Semester Total: 18 Credits | 600 Marks

Semester VIII

Category	Code	Course Title	L-T-P	Credits	Marks
Research Project	BDT1409801	Industry Collaboration (Major Project)	Project	12	900 (100 Int. + 800 Ext.)
VAC	BDT1409802	Value-Added Course (SWAYAM platform)	-	3	100
VAC	BDT1409803	Value-Added Course (SWAYAM platform)	-	3	100

Semester Total: 18 Credits | 1100 Marks

Note: Where two consecutive minor-stream rows share the same course pool, students select any two 2-credit courses per semester (4 credits total) as per the CBCS Minor Stream rule. 'L-T-P' denotes weekly Lecture-Tutorial-Practical hours. Non-credit Extension Activities (NCC/NSS/Sports/Extra-curricular, Yoga) run throughout the programme and are mandatory for the award of degree though not counted toward CGPA.

12. Course Outcome – Programme Outcome (CO-PO) Mapping Framework

Every course in the curriculum defines 5 Course Outcomes (CO1–CO5) framed using Bloom's Taxonomy action verbs (Remember/Understand → Apply → Analyse → Evaluate/Create, with corresponding Psychomotor P1–P5 and Affective A1–A5 domains for laboratory-heavy courses). Each CO is mapped to one or more of the 8 Programme Outcomes (PO1–PO8, referenced as PLO1–PLO8 in individual course files) on a 3-point scale (1 = Slight, 2 = Moderate, 3 = Substantial correlation).

12.1 Illustrative CO-PO Matrix Course: Dental Material Science I (Semester I)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1	-	1	-	-	1
CO2	2	3	2	-	2	1	-	1
CO3	1	2	3	1	2	1	-	1
CO4	2	2	3	-	2	2	1	1
CO5	1	2	2	2	3	2	2	2

An identical CO-PO/PSO matrix (extended with PSO1–PSO4 for discipline-specific courses) is prepared for all courses across the 8 semesters and is compiled as a separate CO-PO Attainment Handbook maintained by the Programme Coordinator and reviewed annually by the Board of Studies and IQAC. Attainment is computed by combining direct assessment (internal + external marks mapped to CO-level rubrics) with indirect assessment (course-end student feedback), using a threshold of 60% for 'PO attained' at course level, aggregated to programme level through a weighted average across the curriculum.

12.2 PSO Mapping (Discipline-Specific Courses)

Representative Courses	Primary PSO Addressed
Comprehensive Laboratory Practice I–IV / Removable & Fixed Prosthodontics / Maxillofacial Prosthetics	PSO1
Advanced CAD/CAM & Digital Impression Techniques / Digital Lab I–II	PSO2
Dental Laboratory Management & Workflow / Quality Control & Safety in Dental Lab / Healthcare Waste Management	PSO3
Research Foundations & Ethics / Start-up Incubation & Industry / Industry Collaboration (Major Project)	PSO4

13. Assessment Scheme

Each theory-cum-practical course of 100 marks is assessed through a 30:70 Internal–External split (as reflected in the course structure tables); the Major Project (Semester VIII) is assessed on a 100 (Internal) + 800 (External, phased) basis given its extended industry-collaboration format.

13.1 Internal Assessment (30 Marks, typical theory course)

Component	Marks
Continuous Internal Tests (2 tests, best of / average)	15
Assignments / Quizzes / Case Presentations	5
Practical / Laboratory Record & Viva (fabrication quality of test prostheses)	5
Attendance & Class Participation	5

13.2 External (End-Semester) Examination (70 Marks)

- Theory paper: 70 marks, covering all course units, structured as Section A (short answer, CO1–CO2), Section B (long/analytical answer, CO3–CO4), and Section C (case-based application, CO5; psychomotor and affective outcomes are otherwise assessed through the practical/internal components).

- Practical/Laboratory Examination (for SEC/Digital Lab courses): fabrication of a prescribed prosthesis/appliance under observation, evaluated by internal + one external examiner on technique, accuracy of fit, finish, and infection-control practice.
- Seminar/Project-based courses (Research Foundations, Scientific Communication, and Collaborative Research Practice): evaluated via proposal defense, presentation, and report.

13.3 Assessment of Research Project / Industry Collaboration (Semester VIII)

Component	Weightage	Marks
Project Proposal & Initial Planning	10%	80
Workplace Observation and Experience	15%	120
Industry Collaboration (Practical Application)	20%	160
Data Collection and Analysis in Industry	20%	160
Research Report (Industry Focus)	15%	120
Industry Feedback on Student's Work	10%	80
Final Presentation (Viva-Voce)	10%	80

Total: 100% | 800 Marks (plus 100 Internal Marks for continuous mentoring/log-book evaluation) = 900 Marks

14. Grading System

The University follows a 10-point absolute/relative Grade Point Average system as per UGC norms, with letter grades assigned on the percentage of marks (Internal + External) secured in each course.

Marks (%)	Letter Grade	Grade Point
90–100	O (Outstanding)	10
80–89	A+ (Excellent)	9
70–79	A (Very Good)	8
60–69	B+ (Good)	7
55–59	B (Above Average)	6
50–54	C (Average)	5
45–49	P (Pass)	4
Below 45	F (Fail)	0
	Ab (Absent)	0

SGPA (Semester Grade Point Average) = $\Sigma(\text{Credit} \times \text{Grade Point}) / \Sigma(\text{Credit})$ for that semester. CGPA (Cumulative Grade Point Average) = $\Sigma(\text{SGPA} \times \text{Semester Credits}) / \Sigma(\text{Total Credits})$ across all completed semesters.

A minimum of Grade P (45%) in both Internal and External components is required to pass a course, and a minimum grade in each laboratory-practice course's fabrication/skill-viva component is mandatory irrespective of overall theory performance, given the hands-on nature of the discipline. Non-credit Extension Activities are graded Satisfactory/Unsatisfactory and are mandatory for degree conferral but excluded from CGPA computation.

15. Progression and Examination Rules

15.1 Attendance

A minimum of 75% attendance in each course (theory and practical, calculated separately) is mandatory to be eligible to appear for the End-Semester Examination, subject to condonation up to 65% by the competent authority for genuine medical/other grounds, as per University ordinance.

15.2 Promotion / Progression Rule

- Students are promoted from one semester to the next irrespective of the number of backlog courses, subject to a maximum backlog cap (e.g., not exceeding 4 courses at the end of an academic year) as prescribed in the University's Academic Regulations.
- A student must clear all first-year (Semester I–II) backlogs before being permitted to register for Semester V (Third Year), and all second-year backlogs before registering for Semester VII (mirroring standard UG progression norms).
- Eligibility to proceed to the Semester VIII Research Project/Industry Collaboration requires successful completion of Research Foundations and Ethics, Research Proposal and Funding Skills, and Scientific Communication and Presentation (Semester VII) with at least a P grade.
- Progressive laboratory-skill certification: a student must satisfactorily clear each Comprehensive/Digital Laboratory Practice course before undertaking the next in sequence, given the cumulative fabrication-skill design of the laboratory series.
- Maximum duration to complete the 4-year programme shall not exceed 7 years (i.e., 8 semesters plus 3 additional years) from the date of first admission, beyond which re-admission under the then-current curriculum will be required.

15.3 Re-Examination / Supplementary Examination

Students who secure an F grade or remain absent are permitted to appear for supplementary/re-examinations conducted typically within 4–6 weeks of result declaration, or in the subsequent regular examination cycle, with internal marks carried forward and only the external component re-evaluated, subject to University norms. For practical/laboratory-skill courses, re-examination requires re-submission of a fabricated prosthesis/appliance meeting the prescribed quality benchmark.

15.4 Malpractice and Grievance

Examination malpractice is dealt with under the University's Unfair Means/Malpractice Regulations. Grade or evaluation grievances may be raised through revaluation/photocopy-of-answer-script requests within the notified window, adjudicated by the Examination Grievance Redressal Committee.

15.5 Award of Degree

- Successful completion of 160 credits across 8 semesters with a minimum CGPA of 5.0 (or as prescribed) and completion of all mandatory Extension Activities.
- Successful defence (viva-voce) of the Research Project/Industry Collaboration report.
- No pending disciplinary action and clearance of all institutional dues (library, laboratory, hostel).
- 'Honours with Research' classification requires a CGPA ≥ 7.5 (or equivalent threshold) and a research-intensive Semester VIII project evaluated by an external examiner, per NEP 2020 norms.

16. Infrastructure

The School of Dental Sciences and Technology shall provide dedicated infrastructure to support the theory, laboratory, and industry-exposure components of the programme.

- Smart classrooms with LCD projection, audio-visual aids, and recording facility for flipped-classroom delivery one classroom per 60 students (as per intake).
- Seminar halls / auditorium for guest lectures, conferences, and student presentations.
- Dedicated Dental Technology Laboratory Block housing conventional prosthodontic-laboratory benches, digital CAD/CAM & 3D-printing suites, and material-testing facilities (detailed in Section 17).
- Shared biomedical-science laboratories (Anatomy, Physiology, Biochemistry, Microbiology, and Pathology) of the School of Allied Health Sciences, used for Semester I–II practicals.
- Model/plaster preparation room, casting and polishing room, and porcelain/ceramic-firing furnace room, each with appropriate ventilation and dust/fume extraction.
- Digital Dentistry Centre with intraoral and laboratory (desktop) scanners, CAD design workstations, milling units, and 3D printers.
- Student amenities: hostel accommodation, cafeteria, sports and recreation facilities, health centre, and Wi-Fi campus network.
- Barrier-free access (ramps, lifts) for differently-abled students and staff, as per statutory accessibility norms.
- Fire-safety, biomedical/dental-waste management, and chemical (acrylic monomer, solvents) handling and storage infrastructure appropriate to a dental laboratory.

17. Laboratories and Learning Resources

Laboratory	Key Facilities / Purpose
Comprehensive Laboratory Practice Suite (I–IV)	Progressive fabrication training basics, removable prosthodontic, fixed prosthodontic, implant prosthodontic with individual workbenches, model-trimmers, and articulators.
Digital Dental Laboratory (CAD/CAM & 3D Printing)	Intraoral/desktop scanners, CAD design software workstations, dry/wet milling units, and 3D printers for Digital Lab I–II and Advanced CAD/CAM courses.
Oral Biosciences & Histology Laboratory	Microscopy, tissue-processing, and histopathology teaching sets for oral biosciences/pathology courses.
Dental Material Science Laboratory	Mechanical (UTM, hardness tester), thermal, and setting-time test benches for dental-material characterization.
Casting and Metallurgy Laboratory	Induction/centrifugal casting units, investment and burn-out ovens, and metal-finishing equipment for fixed-prosthodontic and orthodontic-appliance fabrication.
Ceramics and Polymer Laboratory	Porcelain-firing furnaces, acrylic-processing units (heat-cure/self-cure), and polymer-based denture-base fabrication stations.
Maxillofacial Prosthetics Laboratory	Silicone/elastomer processing units and specialized moulds for facial/maxillofacial prosthesis fabrication.
Radiology & Imaging Demonstration Laboratory	Dental X-ray and imaging-technique training resources for Basics of Dental Imaging and Radiology and Oral Pathology with Radiology courses.
Dental Machinery & Maintenance Workshop	Hands-on servicing/maintenance training for laboratory handpiece, lathes, and casting/milling equipment.

Laboratory staffing follows a student: workbench ratio of not more than 1:1 for the fabrication-intensive Comprehensive/Digital Laboratory Practice courses, with a qualified laboratory technician/demonstrator per 15–20

students, and standard operating procedures (SOPs), infection-control, and PPE protocols displayed and enforced in every laboratory.

18. Library and Digital Resources

- Central Library with a dedicated Dental Technology & Prosthodontic section textbooks, atlases of prosthodontic and orthodontic technique, and dental-technology journals (print and bound volumes).
- Subscription to e-journal databases relevant to dental materials, prosthodontic, and digital dentistry (e.g., Science Direct, Pub Med/Pub Med Central access, Scopus/Web of Science for research faculty and students).
- Institutional Repository / Learning Management System (LMS) hosting lecture notes, technique-demonstration videos, question banks, and course files.
- Access to SWAYAM/NPTEL/MOOC platforms for mandatory Value-Added Courses and supplementary skill development.
- Digital library of CAD/CAM design files, case libraries, and prosthesis-design templates for student reference.
- Remote/VPN-based off-campus access to e-resources for registered students and faculty.
- Turnitin/plagiarism-detection software access for dissertation and research-report screening.
- 24x7 digital library/reading-room access during examination periods; dedicated librarian support for literature-search training in the Research Methodology courses.

19. Faculty and Supportive Staff

Faculty strength and qualifications shall conform to the applicable UGC/regulatory student-teacher ratio (recommended 1:15–1:20 for a laboratory-intensive allied-health programme) with a balanced mix of core dental-technology faculty and cross-appointed clinical/prosthodontic faculty.

Category	Qualification / Profile	Indicative Strength
Professor / Programme Coordinator	M.D.S. (Prosthodontics) / Ph.D. in Dental Materials or Dental Technology with ≥10 years' experience	1–2
Associate Professors	M.D.S./Ph.D. with specialisation in Prosthodontics, Dental Materials, or Maxillofacial Prosthetics	2–3
Assistant Professors	M.D.S./M.Sc. Dental Technology or relevant PG in Oral Biosciences, Biochemistry, Microbiology, Anatomy, etc.	6–8
Senior Dental Technologists / Chief Instructors	B.Sc. Dental Technology / Diploma in Dental Mechanics with substantial industry/laboratory experience	3–4
Adjunct / Visiting Faculty (Industry & Clinical)	Practising prosthodontists, maxillofacial surgeons, and dental-laboratory/CAD-CAM industry experts for guest modules and internship mentorship	As required
Laboratory Technicians / Demonstrators	B.Sc./Diploma with relevant dental-laboratory certification	1 per laboratory bench-cluster (minimum)
Administrative & Support Staff	Programme office, IT/LMS support, library staff, dental-waste handling personnel	As per School norms

Faculty development is supported through mandatory annual Faculty Development Programmes (FDPs), Continuing Dental Education (CDE) credits, hands-on CAD/CAM and digital-dentistry certification, and industry-immersion sabbaticals to keep pace with fast-evolving digital dental-laboratory technology.

20. ICT and Simulation Infrastructure

- Campus-wide Learning Management System (LMS) for content delivery, assignment submission, plagiarism screening, and CO-level internal-assessment analytics.
- Smart/interactive classrooms with recording capability to support blended and flipped-classroom pedagogy, including recorded technique-demonstration videos.
- Simulation/phantom-head laboratory bay for procedural familiarization and preliminary fabrication-technique practice prior to live case work.
- Digital-impression and intraoral-scanning simulation stations for early, low-risk skill-building before patient/clinical-case exposure.
- CAD/CAM design and 3D-printing software suites for the Advanced CAD/CAM & Digital Impression Techniques and Digital Lab I–II courses.
- Video-conferencing infrastructure for guest lectures, industry-expert sessions, and remote examination/viva components where permitted.
- Centralized IT helpdesk, licensed software (CAD design, laboratory-management systems), and cybersecurity/data-privacy protocols for student and case-record data.
- Biometric/ID-based access control for high-value laboratories (CAD/CAM, casting, and ceramics) to ensure safety and equipment accountability.

Annexures

Annexure I: Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

A. Programme Outcomes

PO	Title	Statement
PO1	Disciplinary Knowledge	Demonstrate comprehensive knowledge of dental materials science, oral biosciences, and prosthodontic/dental-laboratory principles.
PO2	Application & Problem Solving	Apply scientific and technical knowledge to design, select materials for, and fabricate dental prostheses and appliances.
PO3	Practical & Psychomotor Skills	Demonstrate competence in conventional and digital dental-laboratory techniques, instrumentation, and fine manual fabrication skills.
PO4	Communication & Teamwork	Communicate effectively with dental clinicians and laboratory teams, and present technical work and case documentation clearly.
PO5	Analysis & Critical Thinking	Analyse case requirements, evaluate prosthesis fit/function/aesthetics, and troubleshoot fabrication or material-related problems.
PO6	Ethics & Professionalism	Apply infection-control, biosafety, and professional/quality standards in dental-laboratory practice.
PO7	Research & Innovation	Conduct guided research and demonstrate innovation/design-thinking in dental-materials and digital-laboratory problem solving.
PO8	Lifelong Learning & Environment/Society	Engage in continuous professional development and recognise the societal, environmental, and economic context of dental-laboratory practice.

B. Programme Specific Outcomes

PSO	Statement
PSO1	Fabricate removable, fixed, orthodontic, implant-supported, and maxillofacial dental prostheses to prescribed clinical and quality standards.
PSO2	Operate and apply digital dental-laboratory technologies intraoral/laboratory scanning, CAD/CAM design and milling, and 3D printing for prosthesis design and fabrication.
PSO3	Manage dental-laboratory workflow, infection control, quality assurance, and equipment maintenance in conventional and digital laboratory settings.
PSO4	Contribute to dental-materials/laboratory research, entrepreneurship, and industry-academia translational projects.

Annexure II: Minimum Credit Distribution (Category-wise, Indicative 4-Year Programme)

The table below consolidates the minimum indicative credit distribution across course categories for the B.Sc. Dental Technology programme, in line with the UGC CCFUP (NEP 2020) credit framework detailed in Section 10.1.

Category	Approx. Credits	Coverage
Major Core (MC)	76	Discipline-defining dental-material-science and prosthodontic-technology courses across Semesters I–VI plus the Semester VII research cluster (Research Foundations, Research Proposal, Scientific Communication, Collaborative Research; 14 credits)

Category	Approx. Credits	Coverage
Minor Stream (M)	24	Two 2-credit minors per semester from an elective pool (Semesters I–VI)
Skill Enhancement Courses (SEC)	14	Comprehensive Laboratory Practice I–IV, Digital Laboratory Practice I–II and Start-up Incubation & Industry
Ability Enhancement Courses (AEC)	12	Communication, digital literacy, entrepreneurship, time-management, cultural competence
Value Added Courses (VAC)	16	Indian knowledge systems, interpersonal skills, clinical research and SWAYAM-based courses (Semesters V, VII, VIII)
Summer Internship (SI)	6	Skill-based internships, Semesters II, IV and VI
Research Project / Industry Collaboration (RP)	12	Semester VIII Industry Collaboration (Major Project)

Annexure III: Consolidated Semester-wise Scheme of Instruction (L-T-P-C)

Detailed semester-wise tables appear in Section 11; a consolidated single-annexure view of the entire 8-semester scheme is provided below for ready reference.

Semester I

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409101	Dental Material Science I	1-1-1	3	100
Major Core	BDT1409102	Oral Biosciences & Morphology	1-0-1	3	100
Major Core	BDT1409103	Human Anatomy and Physiology (Head and Neck Focus)	1-1-1	3	100
Major Core	BDT1409104	Biochemistry – Oral Health	1-0-1	2	100
Minor Stream	BDT1409105–109	Bioinformatics for Oral Research / Biomedical Engineering / Basics of Dental Imaging & Radiology / Nutrition & Health / Health & Society (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409110	Comprehensive Laboratory Practice I (Basics)	1-0-1	2	100
AEC	BDT1409111	English Communication Skills I	1-0-1	2	100
VAC	BDT1409112	Communication & Interpersonal Skills for Healthcare Professionals	1-0-1	2	100

Semester Total: 21 Credits | 900 Marks

Semester II

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409201	Dental Material Science II	1-1-1	3	100
Major Core	BDT1409202	Oral Microbiology	1-0-1	2	100
Major Core	BDT1409203	Oral Pathology: Diseases of Hard & Soft Tissues with Radiology	1-1-1	3	100

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409204	Health and Prevention in Dentistry	1-0-1	2	100
Minor Stream	BDT1409205–209	Bioinformatics for Oral Research / Biomedical Engineering / Basics of Dental Imaging & Radiology / Nutrition & Health / Health & Society (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409210	Comprehensive Laboratory Practice II (Removable Prosthodontics)	1-0-1	2	100
AEC	BDT1409211	English Communication Skills II	1-0-1	2	100
VAC	BDT1409212	Understanding India: Cultural & Scientific Contributions	1-0-1	2	100
SI	BDT1409213	Summer Internship (Skill-Adding)	-	2	100

Semester Total: 22 Credits | 1000 Marks

Semester III

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409301	Foundations for Clinical Dentistry	1-1-1	3	100
Major Core	BDT1409302	Restorative Dentistry	2-1-1	4	100
Major Core	BDT1409303	Removable & Fixed Prosthodontics	1-1-1	4	100
Minor Stream	BDT1409304–307	Quality Improvement & Safety in Healthcare / Diagnostic Sciences / Systems Biology / Healthcare Management (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409308	Comprehensive Laboratory Practice III (Fixed Prosthodontics)	1-0-1	2	100
AEC	BDT1409309	Entrepreneurship and Innovation	1-0-1	2	100
VAC	BDT1409310	Clinical Research I	1-0-1	2	100

Semester Total: 21 Credits | 800 Marks

Semester IV

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409401	Orthodontic Materials and Appliances	1-1-1	3	100
Major Core	BDT1409402	Maxillofacial Prosthetics	1-2-1	3	100
Major Core	BDT1409403	Dental Laboratory Management & Workflow	1-2-1	4	100
Minor Stream	BDT1409404–407	Quality Improvement & Safety / Diagnostic Sciences / Systems Biology / Healthcare Management (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409408	Comprehensive Laboratory Practice IV (Implant Prosthodontics)	1-0-1	2	100
AEC	BDT1409409	Digital Literacy & Basic Programming for Healthcare Applications	1-0-1	2	100
SI	BDT1409410	Summer Internship (Skill-Adding)	-	2	100

Semester Total: 20 Credits | 800 Marks

Semester V

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409501	Emerging Materials	1-1-0	2	100
Major Core	BDT1409502	Fundamentals of Dental Machinery and Maintenance	1-1-0	2	100
Major Core	BDT1409503	Implant Prosthetics	1-1-0	3	100
Major Core	BDT1409504	Advanced CAD/CAM & Digital Impression Techniques	1-1-1	3	100
Minor Stream	BDT1409505–509	Computational Biology / 3D Printing / Biomaterials / Epidemiology / Neurobiology (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409510	Digital Lab I Complete Denture with Implant	1-0-1	2	100
AEC	BDT1409511	Time Management and Organizational Skills	1-1-0	2	100
VAC	BDT1409512	Value-Added Course (SWAYAM platform)	2-0-0	2	100

Semester Total: 20 Credits | 900 Marks

Semester VI

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409601	Healthcare Waste Management in Dental Labs	1-1-1	3	100
Major Core	BDT1409602	Quality Control & Safety in Dental Lab	1-1-1	3	100
Major Core	BDT1409603	Business Management and Ethics	1-2-1	4	100
Minor Stream	BDT1409604–608	Computational Biology / 3D Printing / Biomaterials / Epidemiology / Neurobiology (choose 2)	1-0-1	2+2	100+100
SEC	BDT1409609	Digital Lab II Cast Partial and Fixed Denture	1-0-1	2	100
AEC	BDT1409610	Cultural Competence in Healthcare	1-0-1	2	100
SI	BDT1409611	Summer Internship (Skill-Adding)	-	2	100

Semester Total: 20 Credits | 800 Marks

Semester VII

Category	Code	Course Title	L-T-P	Credits	Marks
Major Core	BDT1409701	Research Foundations and Ethics	3-1-0	4	100
Major Core	BDT1409702	Research Proposal and Funding Skills	3-1-0	4	100
Major Core	BDT1409703	Scientific Communication and Presentation	2-1-0	3	100
Major Core	BDT1409704	Collaborative and Applied Research Practice	2-1-0	3	100
SEC	BDT1409705	Start-up Incubation & Industry	2-0-0	2	100
VAC	BDT1409706	Value-Added Course (SWAYAM platform)	2-0-0	2	100

Semester Total: 18 Credits | 600 Marks

Semester VIII

Category	Code	Course Title	L-T-P	Credits	Marks
Research Project	BDT1409801	Industry Collaboration (Major Project)	Project	12	900 (100 Int. + 800 Ext.)
VAC	BDT1409802	Value-Added Course (SWAYAM platform)	-	3	100
VAC	BDT1409803	Value-Added Course (SWAYAM platform)	-	3	100

Semester Total: 18 Credits | 1100 Marks

Annexure IV: Detailed Course Syllabi (Unit-wise, All Courses)

This Annexure furnishes the complete unit-wise syllabus for every course in the B.Sc. Dental Technology curriculum (Sections 11 and Annexure III), other than the SWAYAM-based Value Added Courses, which follow the syllabus of the SWAYAM course selected by the student and approved by the Board of Studies. Course Outcomes are numbered CO1-CO5 and map to the Programme Outcomes (PO1-PO8/PLO1-PLO8, Section 8) and, where marked, to the Programme Specific Outcomes (PSO1-PSO4, Section 9), following the CO-PO-PSO Mapping Template at Annexure V. Each entry also records the primary Graduate Attributes (GA, Section 8.1) addressed by the course.

Semester I

Dental Material Science I

Category: Major Core | L-T-P: 1-1-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Dental Material Science I, covering introduction to dental materials, impression materials, gypsum products and basic material testing, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe introduction to dental materials.

CO2 [C1]: Describe impression materials.

CO3 [C2]: Apply basic knowledge of gypsum products to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to basic material testing, under guidance.

CO5 [A1]: Show willingness to apply Dental Material Science I concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Introduction to dental materials: classification, requirements and biocompatibility of materials used in dentistry

Unit 2: Impression materials: hydrocolloids (agar, alginate) and elastomeric impression materials - composition, manipulation, properties

Unit 3: Gypsum products: types, composition, setting reaction, manipulation and model/die preparation

Unit 4: Basic material testing: setting time, dimensional stability, strength and safety/infection-control considerations in material handling

Reference Books:

- Anusavice KJ, Shen C, Rawls HR. Phillips' Science of Dental Materials. Latest edition, Elsevier.
- Craig RG, Powers JM. Restorative Dental Materials. Latest edition, Mosby.

Oral Biosciences & Morphology

Category: Major Core | L-T-P: 1-0-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Oral Biosciences & Morphology, covering tooth morphology, development and eruption of teeth; structure of enamel, occlusion and articulation and applied oral morphology in prosthodontic and orthodontic laboratory practice, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe tooth morphology.

CO2 [C1]: Describe development and eruption of teeth; structure of enamel.

CO3 [C2]: Apply basic knowledge of occlusion and articulation to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to applied oral morphology in prosthodontic and orthodontic laboratory practice, under guidance.

CO5 [A1]: Show willingness to apply Oral Biosciences & Morphology concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Tooth morphology: nomenclature, classification and morphological features of permanent and deciduous teeth

Unit 2: Development and eruption of teeth; structure of enamel, dentin, cementum and pulp

Unit 3: Occlusion and articulation: terminology, tooth contact relationships and functional occlusion

Unit 4: Applied oral morphology in prosthodontic and orthodontic laboratory practice

Reference Books:

- Chaurasia BD. Human Anatomy (Head, Neck and Brain). Latest edition, CBS Publishers.
- Berkovitz BKB, Holland GR, Moxham BJ. Oral Anatomy, Histology and Embryology. Latest edition, Elsevier.

Biochemistry - Oral Health

Category: Major Core | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Biochemistry - Oral Health, covering biomolecules, enzymes, biochemistry of saliva and nutritional and metabolic factors influencing oral health, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe biomolecules.

CO2 [C1]: Describe enzymes.

CO3 [C2]: Apply basic knowledge of biochemistry of saliva to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to nutritional and metabolic factors influencing oral health, under guidance.

CO5 [A1]: Show willingness to apply Biochemistry - Oral Health concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Biomolecules: carbohydrates, proteins and lipids relevant to oral tissues

Unit 2: Enzymes, buffers and acid-base balance in saliva and oral fluids

Unit 3: Biochemistry of saliva, dental plaque and calculus formation

Unit 4: Nutritional and metabolic factors influencing oral health

Reference Books:

- Satyanarayana U, Chakrapani U. Biochemistry. Latest edition, Elsevier.
- Lieberman M, Peet A. Marks' Basic Medical Biochemistry. Latest edition, Wolters Kluwer.

Bioinformatics for Oral Research

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) I, II

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Bioinformatics for Oral Research, covering introduction to bioinformatics, biological databases (NCBI, GenBank), sequence alignment and comparative analysis of oral microbial/gene data and applications of bioinformatics in oral-disease and dental-material research, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe introduction to bioinformatics.

CO2 [C1]: Describe biological databases (NCBI, GenBank).

CO3 [C2]: Apply basic knowledge of sequence alignment and comparative analysis of oral microbial/gene data to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to applications of bioinformatics in oral-disease and dental-material research, under guidance.

CO5 [A1]: Show willingness to apply Bioinformatics for Oral Research concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Introduction to bioinformatics, genomics and proteomics concepts relevant to oral research

Unit 2: Biological databases (NCBI, GenBank) and sequence-retrieval tools

Unit 3: Sequence alignment and comparative analysis of oral microbial/gene data

Unit 4: Applications of bioinformatics in oral-disease and dental-material research

Reference Books:

- Latest edition standard textbook(s) prescribed by the Board of Studies for the course.
- Relevant peer-reviewed journal articles, standard operating procedures and manufacturer technical documentation as applicable to the topic.

Biomedical Engineering

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) I, II

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Biomedical Engineering, covering scope of biomedical engineering in healthcare and dentistry, biomaterials used in dental and craniofacial applications, diagnostic and therapeutic biomedical devices relevant to oral healthcare and biomedical technologies in tissue regeneration and implantology, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe scope of biomedical engineering in healthcare and dentistry.

CO2 [C1]: Describe biomaterials used in dental and craniofacial applications.

CO3 [C2]: Apply basic knowledge of diagnostic and therapeutic biomedical devices relevant to oral healthcare to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to biomedical technologies in tissue regeneration and implantology, under guidance.

CO5 [A1]: Show willingness to apply Biomedical Engineering concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Scope of biomedical engineering in healthcare and dentistry

Unit 2: Biomaterials used in dental and craniofacial applications

Unit 3: Diagnostic and therapeutic biomedical devices relevant to oral healthcare

Unit 4: Biomedical technologies in tissue regeneration and implantology

Reference Books:

- Miyazaki T, Hotta Y. CAD/CAM Systems in Dental Restoration and Fabrication. Latest edition, Springer.
- van Noort R. Introduction to Dental Materials. Latest edition, Elsevier.

Basics of Dental Imaging and Radiology

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) I, II

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Basics of Dental Imaging and Radiology, covering principles of X-ray production and dental radiographic techniques, intraoral and extraoral imaging, radiographic interpretation relevant to prosthodontic and implant planning and radiation safety, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe principles of X-ray production and dental radiographic techniques.

CO2 [C1]: Describe intraoral and extraoral imaging.

CO3 [C2]: Apply basic knowledge of radiographic interpretation relevant to prosthodontic and implant planning to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to radiation safety, under guidance.

CO5 [A1]: Show willingness to apply Basics of Dental Imaging and Radiology concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Principles of X-ray production and dental radiographic techniques

Unit 2: Intraoral and extraoral imaging: periapical, bitewing, panoramic radiographs

Unit 3: Radiographic interpretation relevant to prosthodontic and implant planning

Unit 4: Radiation safety, protection and digital imaging systems

Reference Books:

- Marsh PD, Martin MV. Oral Microbiology. Latest edition, Elsevier.

- Soames JV, Southam JC. Oral Pathology. Latest edition, Oxford University Press.

Nutrition and Health

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) I, II

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Nutrition and Health, covering macronutrients, role of nutrition in oral-tissue development, nutritional assessment and diet planning and nutrition-related oral conditions and dietary intervention, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe macronutrients.

CO2 [C1]: Describe role of nutrition in oral-tissue development.

CO3 [C2]: Apply basic knowledge of nutritional assessment and diet planning to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to nutrition-related oral conditions and dietary intervention, under guidance.

CO5 [A1]: Show willingness to apply Nutrition and Health concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Macronutrients, micronutrients and dietary sources relevant to general and oral health

Unit 2: Role of nutrition in oral-tissue development, maintenance and disease prevention

Unit 3: Nutritional assessment and diet planning

Unit 4: Nutrition-related oral conditions and dietary intervention

Reference Books:

- Satyanarayana U, Chakrapani U. Biochemistry. Latest edition, Elsevier.
- Lieberman M, Peet A. Marks' Basic Medical Biochemistry. Latest edition, Wolters Kluwer.

Health and Society

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) I, II

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Health and Society, covering determinants of health and illness; social and cultural influences on oral-health practices, health equity, public-health policy and its effect on dental-healthcare delivery and community-focused oral-health promotion and intervention design, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe determinants of health and illness; social and cultural influences on oral-health practices.

CO2 [C1]: Describe health equity.

CO3 [C2]: Apply basic knowledge of public-health policy and its effect on dental-healthcare delivery to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to community-focused oral-health promotion and intervention design, under guidance.

CO5 [A1]: Show willingness to apply Health and Society concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Determinants of health and illness; social and cultural influences on oral-health practices

Unit 2: Health equity, access to care and community engagement

Unit 3: Public-health policy and its effect on dental-healthcare delivery

Unit 4: Community-focused oral-health promotion and intervention design

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Comprehensive Laboratory Practice I (Basics)

Category: SEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA3, GA6, GA7

Course Objectives:

This course enables students to understand and apply the principles of Comprehensive Laboratory Practice I (Basics), covering orientation to dental-laboratory equipment, mixing and manipulation of impression and gypsum materials, basic model and die preparation techniques and infection control, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe orientation to dental-laboratory equipment.

CO2 [C1]: Describe mixing and manipulation of impression and gypsum materials.

CO3 [C2]: Apply basic knowledge of model and die preparation techniques to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to infection control, under guidance.

CO5 [A1]: Show willingness to apply Comprehensive Laboratory Practice I (Basics) concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Orientation to dental-laboratory equipment, instruments and workbench organisation

Unit 2: Mixing and manipulation of impression and gypsum materials

Unit 3: Basic model and die preparation techniques

Unit 4: Infection control, PPE and laboratory-safety protocols

Reference Books:

- Anusavice KJ, Shen C, Rawls HR. Phillips' Science of Dental Materials. Latest edition, Elsevier.
- Craig RG, Powers JM. Restorative Dental Materials. Latest edition, Mosby.

English Communication Skills I

Category: AEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA5, GA6

Course Objectives:

This course enables students to understand and apply the principles of English Communication Skills I, covering grammar fundamentals, reading and comprehension of scientific and healthcare texts, written communication and oral communication, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C1]: Describe grammar fundamentals.
- CO2 [C1]: Describe reading and comprehension of scientific and healthcare texts.
- CO3 [C2]: Apply basic knowledge of written communication to simple laboratory or professional situations.
- CO4 [P1]: Demonstrate basic procedures related to oral communication, under guidance.
- CO5 [A1]: Show willingness to apply English Communication Skills I concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Grammar fundamentals, sentence structure and scientific/technical vocabulary

Unit 2: Reading and comprehension of scientific and healthcare texts

Unit 3: Written communication: paragraphs, summaries and technical/laboratory reports

Unit 4: Oral communication: presentations, group discussion and professional interaction

Reference Books:

- Latest edition standard textbook(s) prescribed by the Board of Studies for the course.
- Relevant peer-reviewed journal articles, standard operating procedures and manufacturer technical documentation as applicable to the topic.

Communication & Interpersonal Skills for Healthcare Professionals

Category: VAC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA7, GA8

Course Objectives:

This course enables students to understand and apply the principles of Communication & Interpersonal Skills for Healthcare Professionals, covering principles of effective interpersonal communication in healthcare settings, verbal and non-verbal communication with clinicians and laboratory colleagues, active listening and professional etiquette and teamwork in a dental-laboratory environment, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C1]: Describe principles of effective interpersonal communication in healthcare settings.
- CO2 [C1]: Describe verbal and non-verbal communication with clinicians and laboratory colleagues.
- CO3 [C2]: Apply basic knowledge of active listening to simple laboratory or professional situations.
- CO4 [P1]: Demonstrate basic procedures related to professional etiquette and teamwork in a dental-laboratory environment, under guidance.
- CO5 [A1]: Show willingness to apply Communication & Interpersonal Skills for Healthcare Professionals concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Principles of effective interpersonal communication in healthcare settings

Unit 2: Verbal and non-verbal communication with clinicians and laboratory colleagues

Unit 3: Active listening, empathy and conflict resolution

Unit 4: Professional etiquette and teamwork in a dental-laboratory environment

Reference Books:

- Latest edition standard textbook(s) prescribed by the Board of Studies for the course.
- Relevant peer-reviewed journal articles, standard operating procedures and manufacturer technical documentation as applicable to the topic.

Semester II

Dental Material Science II

Category: Major Core | L-T-P: 1-1-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Dental Material Science II, covering waxes, denture-base resins, dental casting alloys and investment materials and dental ceramics and porcelain, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe waxes.

CO2 [C1]: Describe denture-base resins.

CO3 [C2]: Apply basic knowledge of dental casting alloys and investment materials to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to dental ceramics and porcelain, under guidance.

CO5 [A1]: Show willingness to apply Dental Material Science II concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Waxes: composition, classification and applications in dental-laboratory procedures

Unit 2: Denture-base resins: acrylic (heat-cure, self-cure) processing and properties

Unit 3: Dental casting alloys and investment materials

Unit 4: Dental ceramics and porcelain: composition, firing and applications

Reference Books:

- Anusavice KJ, Shen C, Rawls HR. Phillips' Science of Dental Materials. Latest edition, Elsevier.
- Craig RG, Powers JM. Restorative Dental Materials. Latest edition, Mosby.

Oral Microbiology

Category: Major Core | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Oral Microbiology, covering general microbiology relevant to the oral cavity, oral microbial flora, microbiology of dental caries and periodontal disease and sterilisation, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C1]: Describe general microbiology relevant to the oral cavity.
- CO2 [C1]: Describe oral microbial flora.
- CO3 [C2]: Apply basic knowledge of microbiology of dental caries and periodontal disease to simple laboratory or professional situations.
- CO4 [P1]: Demonstrate basic procedures related to sterilisation, under guidance.
- CO5 [A1]: Show willingness to apply Oral Microbiology concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: General microbiology relevant to the oral cavity: bacteria, fungi and viruses

Unit 2: Oral microbial flora, biofilm and dental-plaque formation

Unit 3: Microbiology of dental caries and periodontal disease

Unit 4: Sterilisation, disinfection and cross-infection control in the dental laboratory

Reference Books:

- Marsh PD, Martin MV. Oral Microbiology. Latest edition, Elsevier.
- Soames JV, Southam JC. Oral Pathology. Latest edition, Oxford University Press.

Oral Pathology: Diseases of Hard & Soft Tissues with Radiology

Category: Major Core | L-T-P: 1-1-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Oral Pathology: Diseases of Hard & Soft Tissues with Radiology, covering general principles of disease and inflammation applied to oral tissues, diseases of dental hard tissues, diseases of oral soft tissues and periodontium and radiographic correlation of common oral pathological conditions, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C1]: Describe general principles of disease and inflammation applied to oral tissues.
- CO2 [C1]: Describe diseases of dental hard tissues.
- CO3 [C2]: Apply basic knowledge of diseases of oral soft tissues and periodontium to simple laboratory or professional situations.
- CO4 [P1]: Demonstrate basic procedures related to radiographic correlation of common oral pathological conditions, under guidance.
- CO5 [A1]: Show willingness to apply Oral Pathology: Diseases of Hard & Soft Tissues with Radiology concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: General principles of disease and inflammation applied to oral tissues

Unit 2: Diseases of dental hard tissues: caries, attrition, erosion and developmental anomalies

Unit 3: Diseases of oral soft tissues and periodontium

Unit 4: Radiographic correlation of common oral pathological conditions

Reference Books:

- Marsh PD, Martin MV. Oral Microbiology. Latest edition, Elsevier.

- Soames JV, Southam JC. Oral Pathology. Latest edition, Oxford University Press.

Health and Prevention in Dentistry

Category: Major Core | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Health and Prevention in Dentistry, covering concepts of preventive and community dentistry, dental caries and periodontal-disease prevention strategies, fluorides and oral-health education and promotion programmes, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe concepts of preventive and community dentistry.

CO2 [C1]: Describe dental caries and periodontal-disease prevention strategies.

CO3 [C2]: Apply basic knowledge of fluorides to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to oral-health education and promotion programmes, under guidance.

CO5 [A1]: Show willingness to apply Health and Prevention in Dentistry concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Concepts of preventive and community dentistry

Unit 2: Dental caries and periodontal-disease prevention strategies

Unit 3: Fluorides, sealants and preventive laboratory-fabricated appliances

Unit 4: Oral-health education and promotion programmes

Reference Books:

- Marsh PD, Martin MV. Oral Microbiology. Latest edition, Elsevier.
- Soames JV, Southam JC. Oral Pathology. Latest edition, Oxford University Press.

Comprehensive Laboratory Practice II (Removable Prosthodontics)

Category: SEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA3, GA6, GA7

Course Objectives:

This course enables students to understand and apply the principles of Comprehensive Laboratory Practice II (Removable Prosthodontics), covering fabrication of custom trays and record bases, complete-denture laboratory procedures, flasking and finishing, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe fabrication of custom trays and record bases.

CO2 [C1]: Describe complete-denture laboratory procedures.

CO3 [C2]: Apply basic knowledge of flasking, dewaxing and packing to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to finishing, under guidance.

CO5 [A1]: Show willingness to apply Comprehensive Laboratory Practice II (Removable Prosthodontics) concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Fabrication of custom trays and record bases

Unit 2: Complete-denture laboratory procedures: articulation, waxing and try-in

Unit 3: Flasking, dewaxing, packing and processing of complete dentures

Unit 4: Finishing, polishing and quality evaluation of removable prostheses

Reference Books:

- Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic Treatment for Edentulous Patients. Latest edition, Mosby.
- Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics. Latest edition, Elsevier.

English Communication Skills II

Category: AEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA5, GA6

Course Objectives:

This course enables students to understand and apply the principles of English Communication Skills II, covering advanced grammar and technical-writing conventions, report and case-documentation writing for dental-laboratory work, presentation skills and professional correspondence and interview skills and workplace communication, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C1]: Describe advanced grammar and technical-writing conventions.
- CO2 [C1]: Describe report and case-documentation writing for dental-laboratory work.
- CO3 [C2]: Apply basic knowledge of presentation skills and professional correspondence to simple laboratory or professional situations.
- CO4 [P1]: Demonstrate basic procedures related to interview skills and workplace communication, under guidance.
- CO5 [A1]: Show willingness to apply English Communication Skills II concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Advanced grammar and technical-writing conventions

Unit 2: Report and case-documentation writing for dental-laboratory work

Unit 3: Presentation skills and professional correspondence

Unit 4: Interview skills and workplace communication

Reference Books:

- Latest edition standard textbook(s) prescribed by the Board of Studies for the course.
- Relevant peer-reviewed journal articles, standard operating procedures and manufacturer technical documentation as applicable to the topic.

Understanding India: Cultural & Scientific Contributions

Category: VAC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA7, GA8

Course Objectives:

This course enables students to understand and apply the principles of Understanding India: Cultural & Scientific Contributions, covering overview of India's scientific and cultural heritage, contributions to mathematics, medicine and the natural sciences, traditional knowledge systems relevant to healthcare and contemporary relevance of Indian scientific and cultural traditions, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe overview of India's scientific and cultural heritage.

CO2 [C1]: Describe contributions to mathematics, medicine and the natural sciences.

CO3 [C2]: Apply basic knowledge of traditional knowledge systems relevant to healthcare to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to contemporary relevance of Indian scientific and cultural traditions, under guidance.

CO5 [A1]: Show willingness to apply Understanding India: Cultural & Scientific Contributions concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Overview of India's scientific and cultural heritage

Unit 2: Contributions to mathematics, medicine and the natural sciences

Unit 3: Traditional knowledge systems relevant to healthcare

Unit 4: Contemporary relevance of Indian scientific and cultural traditions

Reference Books:

- Latest edition standard textbook(s) prescribed by the Board of Studies for the course.
- Relevant peer-reviewed journal articles, standard operating procedures and manufacturer technical documentation as applicable to the topic.

Summer Internship (Skill-Adding) I

Category: SI | L-T-P: - | Credits: 2 | Offered in: Semester(s) II, IV, VI

Graduate Attributes Addressed: GA6, GA9, GA10

Course Objectives:

This course enables students to understand and apply the principles of Summer Internship (Skill-Adding) I, covering orientation to the host dental laboratory/industry unit and workplace protocols, supervised exposure to laboratory workflow and equipment operation, skill-adding tasks assigned by the industry mentor and preparation and submission of an internship report with mentor feedback, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C1]: Describe orientation to the host dental laboratory/industry unit and workplace protocols.

CO2 [C1]: Describe supervised exposure to laboratory workflow and equipment operation.

CO3 [C2]: Apply basic knowledge of skill-adding tasks assigned by the industry mentor to simple laboratory or professional situations.

CO4 [P1]: Demonstrate basic procedures related to preparation and submission of an internship report with mentor feedback, under guidance.

CO5 [A1]: Show willingness to apply Summer Internship (Skill-Adding) I concepts responsibly in laboratory tasks and professional practice.

Course Content (Unit-wise):

Unit 1: Orientation to the host dental laboratory/industry unit and workplace protocols

Unit 2: Supervised exposure to laboratory workflow and equipment operation

Unit 3: Skill-adding tasks assigned by the industry mentor, logged in a daily journal

Unit 4: Preparation and submission of an internship report with mentor feedback

Reference Books:

- Latest edition standard textbook(s) prescribed by the Board of Studies for the course.
- Relevant peer-reviewed journal articles, standard operating procedures and manufacturer technical documentation as applicable to the topic.

Semester III

Foundations for Clinical Dentistry

Category: Major Core | L-T-P: 1-1-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Foundations for Clinical Dentistry, covering overview of clinical dental specialties and their relation to laboratory practice, dental charting, clinician-laboratory communication protocols and ethical and legal aspects of clinical-laboratory interaction, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C2]: Explain overview of clinical dental specialties and their relation to laboratory practice.

CO2 [C2]: Explain dental charting and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply clinician-laboratory communication protocols to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to ethical and legal aspects of clinical-laboratory interaction, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Foundations for Clinical Dentistry.

Course Content (Unit-wise):

Unit 1: Overview of clinical dental specialties and their relation to laboratory practice

Unit 2: Dental charting, case-history documentation and prescription interpretation

Unit 3: Clinician-laboratory communication protocols

Unit 4: Ethical and legal aspects of clinical-laboratory interaction

Reference Books:

- Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic Treatment for Edentulous Patients. Latest edition, Mosby.
- Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics. Latest edition, Elsevier.

Restorative Dentistry

Category: Major Core | L-T-P: 2-1-1 | Credits: 4

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Restorative Dentistry, covering principles of cavity preparation and restorative materials, direct restorative materials, indirect restorations and quality evaluation and finishing of restorative work, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C2]: Explain principles of cavity preparation and restorative materials.
- CO2 [C2]: Explain direct restorative materials and its relevance to laboratory or clinical practice.
- CO3 [C3]: Apply indirect restorations to routine laboratory or clinical procedures.
- CO4 [P2]: Perform procedures related to quality evaluation and finishing of restorative work, with guidance.
- CO5 [A2]: Respond appropriately to professional and safety requirements associated with Restorative Dentistry.

Course Content (Unit-wise):

Unit 1: Principles of cavity preparation and restorative materials

Unit 2: Direct restorative materials: amalgam, composite resins and glass ionomer cements

Unit 3: Indirect restorations: inlays, onlays and their laboratory fabrication

Unit 4: Quality evaluation and finishing of restorative work

Reference Books:

- Anusavice KJ, Shen C, Rawls HR. Phillips' Science of Dental Materials. Latest edition, Elsevier.
- Craig RG, Powers JM. Restorative Dental Materials. Latest edition, Mosby.

Removable & Fixed Prosthodontics

Category: Major Core | L-T-P: 1-1-1 | Credits: 4

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Removable & Fixed Prosthodontics, covering principles of removable partial-denture design and framework fabrication, complete-denture prosthodontics, fixed-prosthodontic fundamentals and occlusal schemes and articulator systems in prosthodontic laboratory work, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C2]: Explain principles of removable partial-denture design and framework fabrication.
- CO2 [C2]: Explain complete-denture prosthodontics and its relevance to laboratory or clinical practice.
- CO3 [C3]: Apply fixed-prosthodontic fundamentals to routine laboratory or clinical procedures.
- CO4 [P2]: Perform procedures related to occlusal schemes and articulator systems in prosthodontic laboratory work, with guidance.
- CO5 [A2]: Respond appropriately to professional and safety requirements associated with Removable & Fixed Prosthodontics.

Course Content (Unit-wise):

Unit 1: Principles of removable partial-denture design and framework fabrication

Unit 2: Complete-denture prosthodontics: laboratory workflow and quality parameters

Unit 3: Fixed-prosthodontic fundamentals: crown and bridge fabrication sequence

Unit 4: Occlusal schemes and articulator systems in prosthodontic laboratory work

Reference Books:

- Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic Treatment for Edentulous Patients. Latest edition, Mosby.
- Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics. Latest edition, Elsevier.

Quality Improvement & Safety in Healthcare

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) III, IV

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Quality Improvement & Safety in Healthcare, covering concepts of quality improvement and patient/laboratory safety, quality-management tools (PDCA, root-cause analysis), risk management and error-reporting systems and accreditation standards relevant to dental laboratories, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C2]: Explain concepts of quality improvement and patient/laboratory safety.
- CO2 [C2]: Explain quality-management tools (PDCA, root-cause analysis) and its relevance to laboratory or clinical practice.
- CO3 [C3]: Apply risk management and error-reporting systems to routine laboratory or clinical procedures.
- CO4 [P2]: Perform procedures related to accreditation standards relevant to dental laboratories, with guidance.
- CO5 [A2]: Respond appropriately to professional and safety requirements associated with Quality Improvement & Safety in Healthcare.

Course Content (Unit-wise):

Unit 1: Concepts of quality improvement and patient/laboratory safety

Unit 2: Quality-management tools (PDCA, root-cause analysis) applied to healthcare/laboratory settings

Unit 3: Risk management and error-reporting systems

Unit 4: Accreditation standards relevant to dental laboratories

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Diagnostic Sciences

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) III, IV

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Diagnostic Sciences, covering principles of clinical and laboratory diagnosis in dentistry, diagnostic imaging and laboratory-investigation basics, diagnostic aids relevant to prosthodontic treatment planning and case-based application of diagnostic-science principles, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C2]: Explain principles of clinical and laboratory diagnosis in dentistry.

CO2 [C2]: Explain diagnostic imaging and laboratory-investigation basics and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply diagnostic aids relevant to prosthodontic treatment planning to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to case-based application of diagnostic-science principles, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Diagnostic Sciences.

Course Content (Unit-wise):

Unit 1: Principles of clinical and laboratory diagnosis in dentistry

Unit 2: Diagnostic imaging and laboratory-investigation basics

Unit 3: Diagnostic aids relevant to prosthodontic treatment planning

Unit 4: Case-based application of diagnostic-science principles

Reference Books:

- Marsh PD, Martin MV. Oral Microbiology. Latest edition, Elsevier.
- Soames JV, Southam JC. Oral Pathology. Latest edition, Oxford University Press.

Systems Biology

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) III, IV

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Systems Biology, covering introduction to systems biology and integrative approaches to biological data, cell signalling and regulatory networks relevant to oral tissues, omics data integration (genomics, proteomics, metabolomics) and applications of systems biology in dental-material and tissue research, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C2]: Explain introduction to systems biology and integrative approaches to biological data.

CO2 [C2]: Explain cell signalling and regulatory networks relevant to oral tissues and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply omics data integration (genomics, proteomics, metabolomics) to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to applications of systems biology in dental-material and tissue research, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Systems Biology.

Course Content (Unit-wise):

Unit 1: Introduction to systems biology and integrative approaches to biological data

Unit 2: Cell signalling and regulatory networks relevant to oral tissues

Unit 3: Omics data integration (genomics, proteomics, metabolomics)

Unit 4: Applications of systems biology in dental-material and tissue research

Reference Books:

- Satyanarayana U, Chakrapani U. Biochemistry. Latest edition, Elsevier.
- Lieberman M, Peet A. Marks' Basic Medical Biochemistry. Latest edition, Wolters Kluwer.

Healthcare Management

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) III, IV

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Healthcare Management, covering principles of healthcare and laboratory management, planning, staffing and resource management, financial and inventory management basics and leadership and organisational behaviour in healthcare settings, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C2]: Explain principles of healthcare and laboratory management.

CO2 [C2]: Explain planning, staffing and resource management and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply financial and inventory management basics to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to leadership and organisational behaviour in healthcare settings, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Healthcare Management.

Course Content (Unit-wise):

Unit 1: Principles of healthcare and laboratory management

Unit 2: Planning, staffing and resource management in a dental laboratory

Unit 3: Financial and inventory management basics

Unit 4: Leadership and organisational behaviour in healthcare settings

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Comprehensive Laboratory Practice III (Fixed Prosthodontics)

Category: SEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA3, GA6, GA7

Course Objectives:

This course enables students to understand and apply the principles of Comprehensive Laboratory Practice III (Fixed Prosthodontics), covering die preparation and wax pattern fabrication for crowns and bridges, spruing, investing and casting, metal finishing and porcelain firing, and fit verification, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C2]: Explain die preparation and wax pattern fabrication for crowns and bridges.

CO2 [C2]: Explain spruing, investing and casting of fixed-prosthodontic frameworks and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply metal finishing, porcelain build-up and firing to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to fit verification, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Comprehensive Laboratory Practice III (Fixed Prosthodontics).

Course Content (Unit-wise):

Unit 1: Die preparation and wax pattern fabrication for crowns and bridges

Unit 2: Spruing, investing and casting of fixed-prosthetic frameworks

Unit 3: Metal finishing, porcelain build-up and firing

Unit 4: Fit verification, finishing and polishing of fixed prostheses

Reference Books:

- Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthetic Treatment for Edentulous Patients. Latest edition, Mosby.
- Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics. Latest edition, Elsevier.

Entrepreneurship and Innovation

Category: AEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA5, GA6

Course Objectives:

This course enables students to understand and apply the principles of Entrepreneurship and Innovation, covering concepts of entrepreneurship and innovation in the dental-laboratory sector, business-model development and opportunity identification, basics of start-up finance and business-plan preparation and pitching for a dental-laboratory venture, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C2]: Explain concepts of entrepreneurship and innovation in the dental-laboratory sector.

CO2 [C2]: Explain business-model development and opportunity identification and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply basics of start-up finance to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to business-plan preparation and pitching for a dental-laboratory venture, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Entrepreneurship and Innovation.

Course Content (Unit-wise):

Unit 1: Concepts of entrepreneurship and innovation in the dental-laboratory sector

Unit 2: Business-model development and opportunity identification

Unit 3: Basics of start-up finance, funding sources and legal structures

Unit 4: Business-plan preparation and pitching for a dental-laboratory venture

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Clinical Research I

Category: VAC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA7, GA8

Course Objectives:

This course enables students to understand and apply the principles of Clinical Research I, covering introduction to clinical and translational dental research, study designs relevant to dental-materials and prosthodontic research, data collection instruments and basic statistical concepts and research ethics and informed consent in clinical/laboratory research, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C2]: Explain introduction to clinical and translational dental research.

CO2 [C2]: Explain study designs relevant to dental-materials and prosthodontic research and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply data collection instruments and basic statistical concepts to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to research ethics and informed consent in clinical/laboratory research, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Clinical Research I.

Course Content (Unit-wise):

Unit 1: Introduction to clinical and translational dental research

Unit 2: Study designs relevant to dental-materials and prosthodontic research

Unit 3: Data collection instruments and basic statistical concepts

Unit 4: Research ethics and informed consent in clinical/laboratory research

Reference Books:

- Kothari CR. Research Methodology: Methods and Techniques. Latest edition, New Age International.
- Indrayan A, Malhotra RK. Medical Biostatistics. Latest edition, CRC Press.

Semester IV

Orthodontic Materials and Appliances

Category: Major Core | L-T-P: 1-1-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Orthodontic Materials and Appliances, covering principles of orthodontic tooth movement relevant to appliance design, orthodontic wires, fabrication of removable orthodontic appliances and fabrication of fixed-appliance components and retainers, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C2]: Explain principles of orthodontic tooth movement relevant to appliance design.

CO2 [C2]: Explain orthodontic wires and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply fabrication of removable orthodontic appliances to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to fabrication of fixed-appliance components and retainers, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Orthodontic Materials and Appliances.

Course Content (Unit-wise):

Unit 1: Principles of orthodontic tooth movement relevant to appliance design

Unit 2: Orthodontic wires, brackets and auxiliary materials

Unit 3: Fabrication of removable orthodontic appliances

Unit 4: Fabrication of fixed-appliance components and retainers

Reference Books:

- Anusavice KJ, Shen C, Rawls HR. Phillips' Science of Dental Materials. Latest edition, Elsevier.
- Craig RG, Powers JM. Restorative Dental Materials. Latest edition, Mosby.

Maxillofacial Prosthetics

Category: Major Core | L-T-P: 1-2-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Maxillofacial Prosthetics, covering principles of maxillofacial prosthetic rehabilitation, materials for facial and intraoral maxillofacial prostheses (silicones, elastomers), fabrication techniques for obturators and facial prostheses and colour-matching, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C2]: Explain principles of maxillofacial prosthetic rehabilitation.

CO2 [C2]: Explain materials for facial and intraoral maxillofacial prostheses (silicones, elastomers) and its relevance to laboratory or clinical practice.

CO3 [C3]: Apply fabrication techniques for obturators and facial prostheses to routine laboratory or clinical procedures.

CO4 [P2]: Perform procedures related to colour-matching, with guidance.

CO5 [A2]: Respond appropriately to professional and safety requirements associated with Maxillofacial Prosthetics.

Course Content (Unit-wise):

Unit 1: Principles of maxillofacial prosthetic rehabilitation

Unit 2: Materials for facial and intraoral maxillofacial prostheses (silicones, elastomers)

Unit 3: Fabrication techniques for obturators and facial prostheses

Unit 4: Colour-matching, finishing and maintenance of maxillofacial prostheses

Reference Books:

- Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic Treatment for Edentulous Patients. Latest edition, Mosby.
- Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics. Latest edition, Elsevier.

Dental Laboratory Management & Workflow

Category: Major Core | L-T-P: 1-2-1 | Credits: 4

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Dental Laboratory Management & Workflow, covering dental-laboratory workflow design and case-tracking systems, standard operating procedures and quality documentation, inventory and equipment maintenance, and digital case-management and laboratory-information systems, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C2]: Explain dental-laboratory workflow design and case-tracking systems.
- CO2 [C2]: Explain standard operating procedures and quality documentation and its relevance to laboratory or clinical practice.
- CO3 [C3]: Apply inventory, equipment-maintenance and cost-management practices to routine laboratory or clinical procedures.
- CO4 [P2]: Perform procedures related to digital case-management and laboratory-information systems, with guidance.
- CO5 [A2]: Respond appropriately to professional and safety requirements associated with Dental Laboratory Management & Workflow.

Course Content (Unit-wise):

Unit 1: Dental-laboratory workflow design and case-tracking systems

Unit 2: Standard operating procedures, documentation and quality records

Unit 3: Inventory, equipment maintenance and cost management in the laboratory

Unit 4: Digital case-management and laboratory-information systems

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Comprehensive Laboratory Practice IV (Implant Prosthodontics)

Category: SEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA3, GA6, GA7

Course Objectives:

This course enables students to understand and apply the principles of Comprehensive Laboratory Practice IV (Implant Prosthodontics), covering basics of dental-implant components and laboratory-relevant terminology, fabrication of implant-supported prosthesis components, impression and model techniques for implant cases and quality evaluation and passive-fit verification of implant frameworks, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C2]: Explain basics of dental-implant components and laboratory-relevant terminology.
- CO2 [C2]: Explain fabrication of implant-supported prosthesis components and its relevance to laboratory or clinical practice.
- CO3 [C3]: Apply impression and model techniques for implant cases to routine laboratory or clinical procedures.
- CO4 [P2]: Perform procedures related to quality evaluation and passive-fit verification of implant frameworks, with guidance.
- CO5 [A2]: Respond appropriately to professional and safety requirements associated with Comprehensive Laboratory Practice IV (Implant Prosthodontics).

Course Content (Unit-wise):

Unit 1: Basics of dental-implant components and laboratory-relevant terminology

Unit 2: Fabrication of implant-supported prosthesis components

Unit 3: Impression and model techniques for implant cases

Unit 4: Quality evaluation and passive-fit verification of implant frameworks

Reference Books:

- Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic Treatment for Edentulous Patients. Latest edition, Mosby.
- Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics. Latest edition, Elsevier.

Digital Literacy & Basic Programming for Healthcare Applications

Category: AEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA5, GA6

Course Objectives:

This course enables students to understand and apply the principles of Digital Literacy & Basic Programming for Healthcare Applications, covering computer fundamentals and digital-literacy essentials, office productivity and data-management tools for healthcare/laboratory records, basic programming logic and introductory scripting and introduction to healthcare/laboratory-management software applications, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C2]: Explain computer fundamentals and digital-literacy essentials.
- CO2 [C2]: Explain office productivity and data-management tools for healthcare/laboratory records and its relevance to laboratory or clinical practice.
- CO3 [C3]: Apply basic programming logic and introductory scripting to routine laboratory or clinical procedures.
- CO4 [P2]: Perform procedures related to introduction to healthcare/laboratory-management software applications, with guidance.
- CO5 [A2]: Respond appropriately to professional and safety requirements associated with Digital Literacy & Basic Programming for Healthcare Applications.

Course Content (Unit-wise):

Unit 1: Computer fundamentals and digital-literacy essentials

Unit 2: Office productivity and data-management tools for healthcare/laboratory records

Unit 3: Basic programming logic and introductory scripting

Unit 4: Introduction to healthcare/laboratory-management software applications

Reference Books:

- Miyazaki T, Hotta Y. CAD/CAM Systems in Dental Restoration and Fabrication. Latest edition, Springer.
- van Noort R. Introduction to Dental Materials. Latest edition, Elsevier.

Semester V

Emerging Materials

Category: Major Core | L-T-P: 1-1-0 | Credits: 2

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Emerging Materials, covering nanomaterials and nanotechnology applications in dentistry, advanced polymers and composite materials, bioactive and regenerative dental materials and trends and future directions in dental-material innovation, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply nanomaterials and nanotechnology applications in dentistry to laboratory or clinical situations.
- CO2 [C3]: Apply advanced polymers and composite materials to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse bioactive and regenerative dental materials to identify issues in laboratory or clinical scenarios.
- CO4 [P3]: Demonstrate precise, independent performance of procedures related to trends and future directions in dental-material innovation.
- CO5 [A3]: Value and uphold professional and ethical standards associated with Emerging Materials in practice.

Course Content (Unit-wise):

Unit 1: Nanomaterials and nanotechnology applications in dentistry

Unit 2: Advanced polymers and composite materials

Unit 3: Bioactive and regenerative dental materials

Unit 4: Trends and future directions in dental-material innovation

Reference Books:

- Anusavice KJ, Shen C, Rawls HR. Phillips' Science of Dental Materials. Latest edition, Elsevier.
- Craig RG, Powers JM. Restorative Dental Materials. Latest edition, Mosby.

Fundamentals of Dental Machinery and Maintenance

Category: Major Core | L-T-P: 1-1-0 | Credits: 2

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Fundamentals of Dental Machinery and Maintenance, covering common dental-laboratory machinery, operating principles and safe-use protocols, preventive maintenance schedules and troubleshooting and calibration and equipment-lifecycle management, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply common dental-laboratory machinery to laboratory or clinical situations.
- CO2 [C3]: Apply operating principles and safe-use protocols to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse preventive maintenance schedules and troubleshooting to identify issues in laboratory or clinical scenarios.
- CO4 [P3]: Demonstrate precise, independent performance of procedures related to calibration and equipment-lifecycle management.
- CO5 [A3]: Value and uphold professional and ethical standards associated with Fundamentals of Dental Machinery and Maintenance in practice.

Course Content (Unit-wise):

Unit 1: Common dental-laboratory machinery: lathes, casting units, furnaces and milling units

Unit 2: Operating principles and safe-use protocols

Unit 3: Preventive maintenance schedules and troubleshooting

Unit 4: Calibration and equipment-lifecycle management

Reference Books:

- Miyazaki T, Hotta Y. CAD/CAM Systems in Dental Restoration and Fabrication. Latest edition, Springer.

- van Noort R. Introduction to Dental Materials. Latest edition, Elsevier.

Implant Prosthetics

Category: Major Core | L-T-P: 1-1-0 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Implant Prosthetics, covering biology of osseointegration and implant-prosthetic principles, implant components and prosthetic-connection systems, laboratory fabrication of implant-supported fixed and removable prostheses and complications and maintenance of implant prostheses, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply biology of osseointegration and implant-prosthetic principles to laboratory or clinical situations.
- CO2 [C3]: Apply implant components and prosthetic-connection systems to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse laboratory fabrication of implant-supported fixed and removable prostheses to identify issues in laboratory or clinical scenarios.
- CO4 [P3]: Demonstrate precise, independent performance of procedures related to complications and maintenance of implant prostheses.
- CO5 [A3]: Value and uphold professional and ethical standards associated with Implant Prosthetics in practice.

Course Content (Unit-wise):

Unit 1: Biology of osseointegration and implant-prosthetic principles

Unit 2: Implant components and prosthetic-connection systems

Unit 3: Laboratory fabrication of implant-supported fixed and removable prostheses

Unit 4: Complications and maintenance of implant prostheses

Reference Books:

- Zarb GA, Hobkirk J, Eckert S, Jacob R. Prosthodontic Treatment for Edentulous Patients. Latest edition, Mosby.
- Rosenstiel SF, Land MF, Fujimoto J. Contemporary Fixed Prosthodontics. Latest edition, Elsevier.

Advanced CAD/CAM & Digital Impression Techniques

Category: Major Core | L-T-P: 1-1-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Advanced CAD/CAM & Digital Impression Techniques, covering principles of digital impression-taking and intraoral/laboratory scanning, CAD software workflow for prosthesis design, CAM milling and subtractive-manufacturing techniques, and quality control and integration of digital workflow with conventional laboratory steps, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply principles of digital impression-taking and intraoral/laboratory scanning to laboratory or clinical situations.
- CO2 [C3]: Apply CAD software workflow for prosthesis design to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse CAM milling and subtractive-manufacturing techniques to identify issues in laboratory or clinical scenarios.

CO4 [P3]: Demonstrate precise, independent performance of procedures related to quality control and integration of digital workflow with conventional laboratory steps.

CO5 [A3]: Value and uphold professional and ethical standards associated with Advanced CAD/CAM & Digital Impression Techniques in practice.

Course Content (Unit-wise):

Unit 1: Principles of digital impression-taking and intraoral/laboratory scanning

Unit 2: CAD software workflow for prosthesis design

Unit 3: CAM: milling and subtractive-manufacturing techniques

Unit 4: Quality control and integration of digital workflow with conventional laboratory steps

Reference Books:

- Miyazaki T, Hotta Y. CAD/CAM Systems in Dental Restoration and Fabrication. Latest edition, Springer.
- van Noort R. Introduction to Dental Materials. Latest edition, Elsevier.

Computational Biology

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) V, VI

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Computational Biology, covering introduction to computational approaches in biology, modelling of biological structures relevant to oral tissues, data-analysis tools for biological research and applications of computational biology in dental-materials research, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C3]: Apply introduction to computational approaches in biology to laboratory or clinical situations.

CO2 [C3]: Apply modelling of biological structures relevant to oral tissues to routine laboratory or clinical procedures.

CO3 [C4]: Analyse data-analysis tools for biological research to identify issues in laboratory or clinical scenarios.

CO4 [P3]: Demonstrate precise, independent performance of procedures related to applications of computational biology in dental-materials research.

CO5 [A3]: Value and uphold professional and ethical standards associated with Computational Biology in practice.

Course Content (Unit-wise):

Unit 1: Introduction to computational approaches in biology

Unit 2: Modelling of biological structures relevant to oral tissues

Unit 3: Data-analysis tools for biological research

Unit 4: Applications of computational biology in dental-materials research

Reference Books:

- Satyanarayana U, Chakrapani U. Biochemistry. Latest edition, Elsevier.
- Lieberman M, Peet A. Marks' Basic Medical Biochemistry. Latest edition, Wolters Kluwer.

3D Printing

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) V, VI

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of 3D Printing, covering principles of additive manufacturing and 3D-printing technologies, 3D-printing materials relevant to dental applications, digital-model preparation and print-setting optimisation and post-processing, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply principles of additive manufacturing and 3D-printing technologies to laboratory or clinical situations.
- CO2 [C3]: Apply 3D-printing materials relevant to dental applications to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse digital-model preparation and print-setting optimisation to identify issues in laboratory or clinical scenarios.
- CO4 [P3]: Demonstrate precise, independent performance of procedures related to post-processing.
- CO5 [A3]: Value and uphold professional and ethical standards associated with 3D Printing in practice.

Course Content (Unit-wise):

Unit 1: Principles of additive manufacturing and 3D-printing technologies

Unit 2: 3D-printing materials relevant to dental applications

Unit 3: Digital-model preparation and print-setting optimisation

Unit 4: Post-processing, quality control and applications in dental-laboratory practice

Reference Books:

- Miyazaki T, Hotta Y. CAD/CAM Systems in Dental Restoration and Fabrication. Latest edition, Springer.
- van Noort R. Introduction to Dental Materials. Latest edition, Elsevier.

Biomaterials

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) V, VI

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Biomaterials, covering classification and properties of biomaterials, biocompatibility and biological response to implanted/appliance materials, metallic, ceramic and polymeric biomaterials, and emerging biomaterials and regenerative applications, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply classification and properties of biomaterials to laboratory or clinical situations.
- CO2 [C3]: Apply biocompatibility and biological response to implanted/appliance materials to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse metallic, ceramic and polymeric biomaterials to identify issues in laboratory or clinical scenarios.
- CO4 [P3]: Demonstrate precise, independent performance of procedures related to emerging biomaterials and regenerative applications.
- CO5 [A3]: Value and uphold professional and ethical standards associated with Biomaterials in practice.

Course Content (Unit-wise):

Unit 1: Classification and properties of biomaterials

Unit 2: Biocompatibility and biological response to implanted/appliance materials

Unit 3: Metallic, ceramic and polymeric biomaterials in dentistry

Unit 4: Emerging biomaterials and regenerative applications

Reference Books:

- Anusavice KJ, Shen C, Rawls HR. Phillips' Science of Dental Materials. Latest edition, Elsevier.
- Craig RG, Powers JM. Restorative Dental Materials. Latest edition, Mosby.

Epidemiology

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) V, VI

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Epidemiology, covering principles of epidemiology and measures of disease frequency, study designs in epidemiological research, epidemiology of oral diseases and edentulism and application of epidemiological data in dental-health planning, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply principles of epidemiology and measures of disease frequency to laboratory or clinical situations.
- CO2 [C3]: Apply study designs in epidemiological research to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse epidemiology of oral diseases and edentulism to identify issues in laboratory or clinical scenarios.
- CO4 [P3]: Demonstrate precise, independent performance of procedures related to application of epidemiological data in dental-health planning.
- CO5 [A3]: Value and uphold professional and ethical standards associated with Epidemiology in practice.

Course Content (Unit-wise):

Unit 1: Principles of epidemiology and measures of disease frequency

Unit 2: Study designs in epidemiological research

Unit 3: Epidemiology of oral diseases and edentulism

Unit 4: Application of epidemiological data in dental-health planning

Reference Books:

- Kothari CR. Research Methodology: Methods and Techniques. Latest edition, New Age International.
- Indrayan A, Malhotra RK. Medical Biostatistics. Latest edition, CRC Press.

Neurobiology

Category: Minor Stream | L-T-P: 1-0-1 | Credits: 2 | Offered in: Semester(s) V, VI

Graduate Attributes Addressed: GA1, GA4

Course Objectives:

This course enables students to understand and apply the principles of Neurobiology, covering basic organisation of the nervous system, neurophysiology of pain and sensory perception relevant to orofacial structures, neural control of mastication and swallowing and clinical correlations relevant to prosthodontic and maxillofacial rehabilitation, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply basic organization of the nervous system to laboratory or clinical situations.
- CO2 [C3]: Apply neurophysiology of pain and sensory perception relevant to orofacial structures to routine laboratory or clinical procedures.

CO3 [C4]: Analyse neural control of mastication and swallowing to identify issues in laboratory or clinical scenarios.

CO4 [P3]: Demonstrate precise, independent performance of procedures related to clinical correlations relevant to prosthodontic and maxillofacial rehabilitation.

CO5 [A3]: Value and uphold professional and ethical standards associated with Neurobiology in practice.

Course Content (Unit-wise):

Unit 1: Basic organisation of the nervous system

Unit 2: Neurophysiology of pain and sensory perception relevant to orofacial structures

Unit 3: Neural control of mastication and swallowing

Unit 4: Clinical correlations relevant to prosthodontic and maxillofacial rehabilitation

Reference Books:

- Chaurasia BD. Human Anatomy (Head, Neck and Brain). Latest edition, CBS Publishers.
- Berkovitz BKB, Holland GR, Moxham BJ. Oral Anatomy, Histology and Embryology. Latest edition, Elsevier.

Digital Lab I - Complete Denture with Implant

Category: SEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA3, GA6, GA7

Course Objectives:

This course enables students to understand and apply the principles of Digital Lab I - Complete Denture with Implant, covering digital workflow for implant-supported complete-denture cases, digital design of denture base and tooth arrangement, milling/printing of implant-supported denture components and try-in, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C3]: Apply digital workflow for implant-supported complete-denture cases to laboratory or clinical situations.

CO2 [C3]: Apply digital design of denture base and tooth arrangement to routine laboratory or clinical procedures.

CO3 [C4]: Analyse milling/printing of implant-supported denture components to identify issues in laboratory or clinical scenarios.

CO4 [P3]: Demonstrate precise, independent performance of procedures related to try-in.

CO5 [A3]: Value and uphold professional and ethical standards associated with Digital Lab I - Complete Denture with Implant in practice.

Course Content (Unit-wise):

Unit 1: Digital workflow for implant-supported complete-denture cases

Unit 2: Digital design of denture base and tooth arrangement

Unit 3: Milling/printing of implant-supported denture components

Unit 4: Try-in, verification and finishing of the digitally fabricated prosthesis

Reference Books:

- Miyazaki T, Hotta Y. CAD/CAM Systems in Dental Restoration and Fabrication. Latest edition, Springer.
- van Noort R. Introduction to Dental Materials. Latest edition, Elsevier.

Time Management and Organizational Skills

Category: AEC | L-T-P: 1-1-0 | Credits: 2

Graduate Attributes Addressed: GA5, GA6

Course Objectives:

This course enables students to understand and apply the principles of Time Management and Organizational Skills, covering principles of time management and prioritisation, organisational skills for laboratory workflow and case scheduling, goal-setting and productivity tools and managing multiple deadlines in a dental-laboratory environment, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C3]: Apply principles of time management and prioritisation to laboratory or clinical situations.

CO2 [C3]: Apply organisational skills for laboratory workflow and case scheduling to routine laboratory or clinical procedures.

CO3 [C4]: Analyse goal-setting and productivity tools to identify issues in laboratory or clinical scenarios.

CO4 [P3]: Demonstrate precise, independent performance of procedures related to managing multiple deadlines in a dental-laboratory environment.

CO5 [A3]: Value and uphold professional and ethical standards associated with Time Management and Organizational Skills in practice.

Course Content (Unit-wise):

Unit 1: Principles of time management and prioritisation

Unit 2: Organisational skills for laboratory workflow and case scheduling

Unit 3: Goal-setting and productivity tools

Unit 4: Managing multiple deadlines in a dental-laboratory environment

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Semester VI

Healthcare Waste Management in Dental Labs

Category: Major Core | L-T-P: 1-1-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Healthcare Waste Management in Dental Labs, covering categories of biomedical and dental-laboratory waste, waste segregation, regulatory framework for biomedical-waste management and environmental and occupational-safety considerations in the dental laboratory, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C3]: Apply categories of biomedical and dental-laboratory waste to laboratory or clinical situations.

CO2 [C3]: Apply waste segregation to routine laboratory or clinical procedures.

CO3 [C4]: Analyse regulatory framework for biomedical-waste management to identify issues in laboratory or clinical scenarios.

CO4 [P3]: Demonstrate precise, independent performance of procedures related to environmental and occupational-safety considerations in the dental laboratory.

CO5 [A3]: Value and uphold professional and ethical standards associated with Healthcare Waste Management in Dental Labs in practice.

Course Content (Unit-wise):

Unit 1: Categories of biomedical and dental-laboratory waste

Unit 2: Waste segregation, handling, storage and disposal protocols

Unit 3: Regulatory framework for biomedical-waste management

Unit 4: Environmental and occupational-safety considerations in the dental laboratory

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Quality Control & Safety in Dental Lab

Category: Major Core | L-T-P: 1-1-1 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Quality Control & Safety in Dental Lab, covering quality-control principles applied to dental-laboratory output, standard operating procedures and inspection checklists, occupational safety and documentation and audit systems for laboratory quality assurance, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C3]: Apply quality-control principles applied to dental-laboratory output to laboratory or clinical situations.

CO2 [C3]: Apply standard operating procedures and inspection checklists to routine laboratory or clinical procedures.

CO3 [C4]: Analyse occupational safety to identify issues in laboratory or clinical scenarios.

CO4 [P3]: Demonstrate precise, independent performance of procedures related to documentation and audit systems for laboratory quality assurance.

CO5 [A3]: Value and uphold professional and ethical standards associated with Quality Control & Safety in Dental Lab in practice.

Course Content (Unit-wise):

Unit 1: Quality-control principles applied to dental-laboratory output

Unit 2: Standard operating procedures and inspection checklists

Unit 3: Occupational safety, PPE and hazard-communication in the laboratory

Unit 4: Documentation and audit systems for laboratory quality assurance

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Business Management and Ethics

Category: Major Core | L-T-P: 1-2-1 | Credits: 4

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Business Management and Ethics, covering fundamentals of business management applied to dental-laboratory enterprises, marketing and client relations, professional and business ethics in dental-technology practice and legal and regulatory considerations for independent laboratory practice, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply fundamentals of business management applied to dental-laboratory enterprises to laboratory or clinical situations.
- CO2 [C3]: Apply marketing, client relations and service pricing to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse professional and business ethics in dental-technology practice to identify issues in laboratory or clinical scenarios.
- CO4 [P3]: Demonstrate precise, independent performance of procedures related to legal and regulatory considerations for independent laboratory practice.
- CO5 [A3]: Value and uphold professional and ethical standards associated with Business Management and Ethics in practice.

Course Content (Unit-wise):

Unit 1: Fundamentals of business management applied to dental-laboratory enterprises

Unit 2: Marketing, client relations and laboratory-service pricing

Unit 3: Professional and business ethics in dental-technology practice

Unit 4: Legal and regulatory considerations for independent laboratory practice

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Digital Lab II - Cast Partial and Fixed Denture

Category: SEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA3, GA6, GA7

Course Objectives:

This course enables students to understand and apply the principles of Digital Lab II - Cast Partial and Fixed Denture, covering digital workflow for cast partial-denture framework design, digital design and milling/printing of fixed-prosthodontic restorations, integration of digital design with conventional finishing techniques and quality verification of digitally fabricated cast-partial and fixed prostheses, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C3]: Apply digital workflow for cast partial-denture framework design to laboratory or clinical situations.
- CO2 [C3]: Apply digital design and milling/printing of fixed-prosthodontic restorations to routine laboratory or clinical procedures.
- CO3 [C4]: Analyse integration of digital design with conventional finishing techniques to identify issues in laboratory or clinical scenarios.
- CO4 [P3]: Demonstrate precise, independent performance of procedures related to quality verification of digitally fabricated cast-partial and fixed prostheses.

CO5 [A3]: Value and uphold professional and ethical standards associated with Digital Lab II - Cast Partial and Fixed Denture in practice.

Course Content (Unit-wise):

Unit 1: Digital workflow for cast partial-denture framework design

Unit 2: Digital design and milling/printing of fixed-prosthodontic restorations

Unit 3: Integration of digital design with conventional finishing techniques

Unit 4: Quality verification of digitally fabricated cast-partial and fixed prostheses

Reference Books:

- Miyazaki T, Hotta Y. CAD/CAM Systems in Dental Restoration and Fabrication. Latest edition, Springer.
- van Noort R. Introduction to Dental Materials. Latest edition, Elsevier.

Cultural Competence in Healthcare

Category: AEC | L-T-P: 1-0-1 | Credits: 2

Graduate Attributes Addressed: GA5, GA6

Course Objectives:

This course enables students to understand and apply the principles of Cultural Competence in Healthcare, covering concepts of cultural competence and diversity in healthcare, communicating across cultural and linguistic differences, addressing bias and promoting inclusive patient/client care and cultural considerations in dental-laboratory client interaction, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C3]: Apply concepts of cultural competence and diversity in healthcare to laboratory or clinical situations.

CO2 [C3]: Apply communicating across cultural and linguistic differences to routine laboratory or clinical procedures.

CO3 [C4]: Analyse addressing bias and promoting inclusive patient/client care to identify issues in laboratory or clinical scenarios.

CO4 [P3]: Demonstrate precise, independent performance of procedures related to cultural considerations in dental-laboratory client interaction.

CO5 [A3]: Value and uphold professional and ethical standards associated with Cultural Competence in Healthcare in practice.

Course Content (Unit-wise):

Unit 1: Concepts of cultural competence and diversity in healthcare

Unit 2: Communicating across cultural and linguistic differences

Unit 3: Addressing bias and promoting inclusive patient/client care

Unit 4: Cultural considerations in dental-laboratory client interaction

Reference Books:

- Latest edition standard textbook(s) prescribed by the Board of Studies for the course.
- Relevant peer-reviewed journal articles, standard operating procedures and manufacturer technical documentation as applicable to the topic.

Semester VII

Research Foundations and Ethics

Category: Major Core | L-T-P: 3-1-0 | Credits: 4

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Research Foundations and Ethics, covering foundational concepts of research design and methodology, ethical principles and regulatory requirements in research, research misconduct and drafting informed consent and research protocols, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C4]: Analyse foundational concepts of research design and methodology in relation to professional and research practice.
- CO2 [C4]: Analyse ethical principles and regulatory requirements in research to evaluate laboratory, clinical or research approaches.
- CO3 [C5]: Evaluate research misconduct to justify appropriate laboratory, clinical or research decisions.
- CO4 [P4]: Independently perform and integrate complex procedures related to drafting informed consent and research protocols.
- CO5 [A4]: Organize and prioritize professional, ethical and quality-related responsibilities associated with Research Foundations and Ethics.

Course Content (Unit-wise):

Unit 1: Foundational concepts of research design and methodology

Unit 2: Ethical principles and regulatory requirements in research

Unit 3: Research misconduct, case studies and ethical dilemmas

Unit 4: Drafting informed consent and research protocols

Reference Books:

- Kothari CR. Research Methodology: Methods and Techniques. Latest edition, New Age International.
- Indrayan A, Malhotra RK. Medical Biostatistics. Latest edition, CRC Press.

Research Proposal and Funding Skills

Category: Major Core | L-T-P: 3-1-0 | Credits: 4

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Research Proposal and Funding Skills, covering structure and components of a research proposal, literature review and formulation of research questions/hypotheses, identifying funding sources and grant-writing basics and budgeting and project-planning for a research proposal, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C4]: Analyse structure and components of a research proposal in relation to professional and research practice.
- CO2 [C4]: Analyse literature review and formulation of research questions/hypotheses to evaluate laboratory, clinical or research approaches.

CO3 [C5]: Evaluate identifying funding sources and grant-writing basics to justify appropriate laboratory, clinical or research decisions.

CO4 [P4]: Independently perform and integrate complex procedures related to budgeting and project-planning for a research proposal.

CO5 [A4]: Organize and prioritize professional, ethical and quality-related responsibilities associated with Research Proposal and Funding Skills.

Course Content (Unit-wise):

Unit 1: Structure and components of a research proposal

Unit 2: Literature review and formulation of research questions/hypotheses

Unit 3: Identifying funding sources and grant-writing basics

Unit 4: Budgeting and project-planning for a research proposal

Reference Books:

- Kothari CR. Research Methodology: Methods and Techniques. Latest edition, New Age International.
- Indrayan A, Malhotra RK. Medical Biostatistics. Latest edition, CRC Press.

Scientific Communication and Presentation

Category: Major Core | L-T-P: 2-1-0 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Scientific Communication and Presentation, covering principles of scientific writing and manuscript structure, poster and oral-presentation design, presenting technical/laboratory data effectively and peer review and responding to scientific critique, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C4]: Analyse principles of scientific writing and manuscript structure in relation to professional and research practice.

CO2 [C4]: Analyse poster and oral-presentation design to evaluate laboratory, clinical or research approaches.

CO3 [C5]: Evaluate presenting technical/laboratory data effectively to justify appropriate laboratory, clinical or research decisions.

CO4 [P4]: Independently perform and integrate complex procedures related to peer review and responding to scientific critique.

CO5 [A4]: Organize and prioritize professional, ethical and quality-related responsibilities associated with Scientific Communication and Presentation.

Course Content (Unit-wise):

Unit 1: Principles of scientific writing and manuscript structure

Unit 2: Poster and oral-presentation design

Unit 3: Presenting technical/laboratory data effectively

Unit 4: Peer review and responding to scientific critique

Reference Books:

- Latest edition standard textbook(s) prescribed by the Board of Studies for the course.

- Relevant peer-reviewed journal articles, standard operating procedures and manufacturer technical documentation as applicable to the topic.

Collaborative and Applied Research Practice

Category: Major Core | L-T-P: 2-1-0 | Credits: 3

Graduate Attributes Addressed: GA1, GA2, GA3

Course Objectives:

This course enables students to understand and apply the principles of Collaborative and Applied Research Practice, covering principles of collaborative and interdisciplinary research, applied research design in dental-materials/laboratory contexts, data collection and translating applied-research findings into laboratory practice, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C4]: Analyse principles of collaborative and interdisciplinary research in relation to professional and research practice.
- CO2 [C4]: Analyse applied research design in dental-materials/laboratory contexts to evaluate laboratory, clinical or research approaches.
- CO3 [C5]: Evaluate data collection to justify appropriate laboratory, clinical or research decisions.
- CO4 [P4]: Independently perform and integrate complex procedures related to translating applied-research findings into laboratory practice.
- CO5 [A4]: Organize and prioritize professional, ethical and quality-related responsibilities associated with Collaborative and Applied Research Practice.

Course Content (Unit-wise):

Unit 1: Principles of collaborative and interdisciplinary research

Unit 2: Applied research design in dental-materials/laboratory contexts

Unit 3: Data collection, analysis and interpretation in applied projects

Unit 4: Translating applied-research findings into laboratory practice

Reference Books:

- Kothari CR. Research Methodology: Methods and Techniques. Latest edition, New Age International.
- Indrayan A, Malhotra RK. Medical Biostatistics. Latest edition, CRC Press.

Start-up Incubation & Industry

Category: SEC | L-T-P: 2-0-0 | Credits: 2

Graduate Attributes Addressed: GA3, GA6, GA7

Course Objectives:

This course enables students to understand and apply the principles of Start-up Incubation & Industry, covering start-up incubation process and support ecosystem, industry engagement, prototype development and minimum-viable-product concepts for laboratory services and pitching to investors/industry partners, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

- CO1 [C4]: Analyse start-up incubation process and support ecosystem in relation to professional and research practice.
- CO2 [C4]: Analyse industry engagement to evaluate laboratory, clinical or research approaches.

CO3 [C5]: Evaluate prototype development and minimum-viable-product concepts for laboratory services to justify appropriate laboratory, clinical or research decisions.

CO4 [P4]: Independently perform and integrate complex procedures related to pitching to investors/industry partners.

CO5 [A4]: Organize and prioritize professional, ethical and quality-related responsibilities associated with Start-up Incubation & Industry.

Course Content (Unit-wise):

Unit 1: Start-up incubation process and support ecosystem

Unit 2: Industry engagement, mentorship and networking

Unit 3: Prototype development and minimum-viable-product concepts for laboratory services

Unit 4: Pitching to investors/industry partners

Reference Books:

- Robbins SP, Coulter M. Management. Latest edition, Pearson.
- Kotler P, Keller KL. Marketing Management. Latest edition, Pearson.

Semester VIII

Industry Collaboration (Major Project)

Category: Research Project | L-T-P: Project | Credits: 12

Graduate Attributes Addressed: GA4, GA9, GA10

Course Objectives:

This course enables students to understand and apply the principles of Industry Collaboration (Major Project), covering project proposal preparation and initial planning with the industry partner, workplace observation, data collection and analysis in the industry/laboratory setting and preparation of the industry-focused research report and final viva-voce presentation, with emphasis on practical application in dental-technology laboratory and professional practice.

Course Outcomes:

CO1 [C4]: Analyse project proposal preparation and initial planning with the industry partner in relation to professional and research practice.

CO2 [C4]: Analyse workplace observation to evaluate laboratory, clinical or research approaches.

CO3 [C5]: Evaluate data collection and analysis in the industry/laboratory setting to justify appropriate laboratory, clinical or research decisions.

CO4 [P4]: Independently perform and integrate complex procedures related to preparation of the industry-focused research report and final viva-voce presentation.

CO5 [A4]: Organize and prioritize professional, ethical and quality-related responsibilities associated with Industry Collaboration (Major Project).

Course Content (Unit-wise):

Unit 1: Project proposal preparation and initial planning with the industry partner

Unit 2: Workplace observation, supervised practical application and skill integration

Unit 3: Data collection and analysis in the industry/laboratory setting

Unit 4: Preparation of the industry-focused research report and final viva-voce presentation

Reference Books:

- Kothari CR. Research Methodology: Methods and Techniques. Latest edition, New Age International.
- Indrayan A, Malhotra RK. Medical Biostatistics. Latest edition, CRC Press.

Annexure V: CO-PO-PSO Mapping Template (Sample, Course-level)

Every course file maintained by the course coordinator must include a completed CO-PO-PSO matrix in the format below (1 = Low, 2 = Medium, 3 = High correlation; leave blank/'-' for no correlation). The illustrative CO-PO matrix for 'Dental Material Science I' is shown in Section 12.1 as a worked example; course coordinators shall replicate this format for every course listed in Annexure IV.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1												
CO2												
CO3												
CO4												
CO5												

Annexure VI: Model Question Paper Pattern

The following template applies to all 100-mark theory-cum-practical Major Core, Minor Stream, AEC, and VAC courses assessed via the standard 30 (Internal) : 70 (External) split described in Section 13. Course-specific question papers are drafted by the concerned faculty and moderated by the Board of Studies-nominated paper-setting panel.

End-Semester Theory Examination 70 Marks, Duration: 3 Hours

Section	Nature of Questions	CO Coverage	Marks
Section A	5 short-answer questions (definitions, list, brief explanation), attempt all 4 marks each	CO1–CO2 (Remember/Understand)	20
Section B	3 of 5 long/analytical answer questions 10 marks each	CO3–CO4 (Apply/Analyse)	30
Section C	2 of 3 case-based / application questions 10 marks each	CO5 (case-based application of skill and professional-attitude outcomes)	20

Practical / Laboratory Examination Applicable to SEC (Comprehensive/Digital Laboratory Practice) Courses

Component	Description	Marks
Task Execution	Fabrication of a prescribed prosthesis/appliance within the allotted time	40
Fit, Accuracy & Finish	Evaluated against a fit/accuracy/finish rubric by internal + external examiner	20
Viva-Voce	Oral examination on technique, material rationale, and infection-control practice	10

Internal Assessment Model Question Paper 15-Mark Continuous Internal Test

Q1 (Compulsory): 5 short-answer questions, 1 mark each (5 marks).

Q2: 2 of 3 medium-answer questions, 2.5 marks each (5 marks).

Q3: 1 of 2 case-based/application question, 5 marks (5 marks).

Annexure VII: Faculty Requirement Norms and Staffing Pattern

The staffing plan below is duly completed against an illustrative intake of 60 students per year (240 across the 4-year programme steady state), applying the 1:15–1:20 student-teacher ratio recommended in Section 19. Actual sanctioned strength is to be finalized by the Board of Management on the basis of the approved intake and applicable regulatory norms.

Category	Sanctioned Positions (Steady State)	Minimum Qualification	Priority Specializations for Recruitment
Professor / Programme Coordinator	1	M.D.S./Ph.D., ≥10 years	Prosthodontic, Dental Materials, Dental Technology
Associate Professor	2	M.D.S./Ph.D., ≥6 years	Prosthodontic, Dental Materials, Maxillofacial Prosthetics
Assistant Professor	7	M.D.S./M.Sc. Dental Technology or relevant PG	Oral Biosciences, Biochemistry, Microbiology, Anatomy
Senior Dental Technologist / Chief Instructor	3–4	B.Sc. Dental Technology / Diploma + industry experience	Fixed/removable prosthodontic, implant prosthodontic, CAD/CAM
Adjunct/Visiting Faculty	As required	Practising prosthodontists, maxillofacial surgeons, industry experts	Dental-laboratory and CAD/CAM industry liaison
Laboratory Technician/Demonstrator	9 (1 per lab, minimum)	B.Sc./Diploma	Comprehensive/digital laboratory operations
Administrative & Support Staff	3–4	As per School norms	Programme office, LMS support

Annexure VIII: List of Laboratories and Equipment

The laboratories and indicative equipment/software listed below (Section 17) support the practical, Skill Enhancement Course (SEC) and Digital Laboratory Practice components of the B.Sc. Dental Technology curriculum.

Laboratory	Key Facilities / Purpose
Comprehensive Laboratory Practice Suite (I–IV)	Progressive fabrication training basics, removable prosthodontic, fixed prosthodontic, implant prosthodontic with individual workbenches, model-trimmers, and articulators.
Digital Dental Laboratory (CAD/CAM & 3D Printing)	Intraoral/desktop scanners, CAD design software workstations, dry/wet milling units, and 3D printers for Digital Lab I–II and Advanced CAD/CAM courses.
Oral Biosciences & Histology Laboratory	Microscopy, tissue-processing, and histopathology teaching sets for oral biosciences/pathology courses.
Dental Material Science Laboratory	Mechanical (UTM, hardness tester), thermal, and setting-time test benches for dental-material characterisation.
Casting and Metallurgy Laboratory	Induction/centrifugal casting units, investment and burn-out ovens, and metal-finishing equipment for fixed-prosthodontic and orthodontic-appliance fabrication.
Ceramics and Polymer Laboratory	Porcelain-firing furnaces, acrylic-processing units (heat-cure/self-cure), and polymer-based denture-base fabrication stations.

Laboratory	Key Facilities / Purpose
Maxillofacial Prosthetics Laboratory	Silicone/elastomer processing units and specialised moulds for facial/maxillofacial prosthesis fabrication.
Radiology & Imaging Demonstration Laboratory	Dental X-ray and imaging-technique training resources for Basics of Dental Imaging and Radiology and Oral Pathology with Radiology courses.
Dental Machinery & Maintenance Workshop	Hands-on servicing/maintenance training for laboratory handpieces, lathes, and casting/milling equipment.

In addition, shared biomedical-science laboratories (Anatomy, Physiology, Biochemistry, Microbiology, and Pathology) of the School of Allied Health Sciences are utilized for Semester I-II practicals, as referenced in Section 16.

Annexure IX: Laboratory Manual Index and Standard Operating Procedures (SOPs)

Each laboratory listed in Section 17 maintains a dedicated manual covering safety induction, equipment operating procedure, stepwise fabrication protocol, and assessment rubric. The manual index below is duly completed for implementation and is to be printed, laminated, and displayed at each workbench cluster.

Laboratory	Manual Sections Included	Governing SOP Focus
Comprehensive Laboratory Practice Suite (I–IV)	Induction checklist; basics/removable/fixed/implant-prosthetic task sheets I–IV; grading rubric; equipment log	Model-trimmer and articulator handling; fabrication sequence protocol
Digital Dental Laboratory (CAD/CAM & 3D Printing)	Scanner/software login procedure; design-file checklist; milling/printing safety log	Scan-accuracy verification; tool-wear monitoring; resin/coolant handling
Oral Biosciences & Histology Laboratory	Tissue-processing and staining SOPs; microscopy task sheets	Fixative handling; specimen chain-of-custody
Dental Material Science Laboratory	Mechanical/thermal/setting-time test task sheets; instrument calibration log	Test-specimen preparation; equipment calibration
Casting and Metallurgy Laboratory	Induction/centrifugal casting SOP; investment/burn-out oven checklist	High-temperature equipment safety; metal-dust extraction
Ceramics and Polymer Laboratory	Porcelain-firing furnace SOP; acrylic-processing (heat-cure/self-cure) task sheets	Furnace safety; monomer-vapour ventilation compliance
Maxillofacial Prosthetics Laboratory	Silicone/elastomer processing task sheets; mould-preparation checklist	Chemical handling; mould-release safety
Radiology & Imaging Demonstration Laboratory	Image-acquisition checklist; radiation-safety briefing record	Radiation dose monitoring; patient/model-data confidentiality
Dental Machinery & Maintenance Workshop	Hand piece/lathe/casting-unit servicing checklist; maintenance log	Lock-out/tag-out procedure; equipment maintenance scheduling

Common Laboratory Safety and Infection-Control SOPs (applicable to all laboratories)

- Mandatory safety/infection-control induction for every student prior to first laboratory access, logged and signed off by the laboratory in-charge.
- Personal protective equipment (PPE) gloves, eyewear, mask mandatory in all chemical/resin-handling, casting, and ceramics laboratories.

- All models/impressions with patient contact handled under standard infection-control protocol prior to laboratory processing.
- Equipment fault, near-miss, or material-spillage incidents logged in the laboratory incident register and reported to the Programme Coordinator within 24 hours.
- Bi-annual equipment calibration/maintenance audit and consumable-stock review, coordinated by the senior laboratory technician.

Annexure X: Model Memorandum of Understanding (MoU) Dental-Laboratory/Industry Partner

The following model MoU structure is duly completed as a ready-to-execute template for engaging dental laboratories, dental-materials manufacturers, and CAD/CAM service bureaus as Semester VIII Industry Collaboration and Summer Internship partners. Institution-specific legal review is required before execution.

Clause 1: Parties and Purpose

This Memorandum of Understanding is entered into between Malla Reddy Vishwavidyalaya (MRV), through its School of Dental Sciences and Technology, and [Partner Organization Name], for the purpose of providing structured internship placements, Semester VIII Industry Collaboration (Major Project) hosting, guest-faculty contribution, and collaborative research opportunities for students of the B.Sc. Dental Technology programme.

Clause 2: Scope of Collaboration

- Hosting of Summer Internships (Semesters I–II, IV, VI) for skill-adding industry exposure.
- Hosting of the Semester VIII Industry Collaboration (Major Project) under joint academic-industry mentorship, including workplace observation, practical application, data collection/analysis, and a final industry-feedback component (per the assessment scheme in Section 13.3).
- Provision of guest lectures, live case studies, and equipment/technique demonstrations for relevant Major Core and SEC courses.
- Collaborative research and innovation projects, including potential co-guidance of student capstone projects.
- Feedback to the Board of Studies on curriculum relevance and emerging industry skill requirements.

Clause 3: Responsibilities of the Partner Organization

- Provide a safe, supervised laboratory environment and designate a qualified mentor for each intern/project student.
- Furnish periodic performance feedback and complete the prescribed industry-feedback assessment component.
- Ensure compliance with applicable data-protection and confidentiality norms for any patient or proprietary data accessed by students.

Clause 4: Responsibilities of the University

- Nominate an academic supervisor/coordinator for each cohort placed with the partner.
- Ensure students are adequately prepared (technically and ethically) prior to placement.
- Maintain confidentiality of any proprietary information shared by the partner organisation.

Clause 5: Duration, Renewal, and Termination

This MoU shall remain in force for a period of [3] years from the date of signature, renewable by mutual written consent. Either party may terminate this MoU by providing [60] days' written notice, without prejudice to the completion of any ongoing student placement or project.

Clause 6: Signatories

For Malla Reddy Vishwavidyalaya (MRV)

Name / Designation: _____

Signature: _____

Date: _____

For [Partner Organisation Name]

Name / Designation: _____

Signature: _____

Date: _____