# CONSERVATIVE DENTISTRY AND ENDODONTICS

## Goal

To design a post graduate training programme to develop independent capability in a student, to learn to restore the tooth defect most conservatively, to achieve original form, function and esthetics, in harmony with adjacent soft and hard tissues. Treat pulpal and periapical pathologies to retain every permanent tooth.

## Objectives

a) Knowledge

At the end of scheduled training, the student should be able to:

1. Describe aetiology, pathophysiology, periapical diagnosis and management of common restorative situations, endodontic situations that will include contemporary management of dental caries, management of trauma and pulpal pathoses including periodontal situations.
2. Demonstrate an understanding of basic sciences as relevant to conservative / restorative dentistry and endodontics.
3. Have a thorough knowledge of infection control measures in dental clinical environment and laboratories.
4. Identify risk factors at socio-economic, environmental and emotional levels individually and for the community at large.
5. Ability to recognize conditions that may require multi disciplinary approach and refer to appropriate specialist.
6. Impart the desire for self- study by attending basic and advanced courses, conferences, seminars, and workshops in the specialty of conservative dentistry and endodontics, dental materials and restorative dentistry.
7. Ability to teach and guide colleagues and other students.
8. Use information technology tools and carry out research both basic and clinical with the aim of publishing and presenting the same at a scientific platform.

b) Skills

1. To acquire history, perform relevant tests and interpret them to come to a reasonable diagnosis about the dental condition in general and conservative dentistry and endodontics in particular.
2. Manage acute pulpal and endo-periodontal conditions.
3. Perform all levels of restorative work and conservative esthetic treatments, surgical and non-surgical endodontics, as well as endo-periodontal surgical procedures as part of multidisciplinary approach.
4. Provide Basic Life Support (BLS) in emergency situations.

# COURSE CONTENT

## FIRST YEAR

### I. Applied Anatomy

1. Development
    a. Face.
    b. Paranasal sinuses and the associated structures and their anomalies.
    c. Cranial and facial bones.

2. Anatomy
    a. TMJ anatomy and function.
    b. Brief consideration of structures and functions of brain.
    c. Muscles of face and neck including muscles of mastication, deglutition and speech and their functional anatomy.
    d. Arterial and venous drainage of head and neck.
    e. Brief consideration of cranial nerves (V, VII, IX and XI) and autonomic nervous system of head and neck.
    f. Salivary glands – development, anatomy, functions and clinical considerations.

### II. Applied Histology

Skin, oral mucosa, bone cartilage, blood vessels, lymphatics, nerves, muscles, tongue and its significance.

### III. Oral anatomy and Histology

1. Detailed anatomy of deciduous and permanent teeth, general consideration in physiology of permanent dentition, form, function, alignment, contact, occlusion and its significance.
2. Enamel - Development and composition, physical characteristics, chemical properties, structure
3. Dentin - Development, physical and chemical properties, structure type of dentin, innervations, age and functional changes.
4. Pulp - Development, histological structures, innervations, functions, regressive changes and clinical considerations.
5. Cementum - Composition, cementogenesis, structure, function and clinical consideration.
6. Periodontal ligament - Development, structure, function and clinical consideration.
7. Alveolar bone.
8. Age changes of teeth.
9. Eruption of teeth.

## IV. Applied Physiology

1. Mastication, deglutition, digestion and assimilation, fluid and electrolyte balance.
2. Physiology of saliva - Composition, function, clinical significance.
3. Blood composition, volume, function, blood groups, hemostasis, coagulation, blood transfusion, circulation, heart, pulse, blood pressure, shock.
4. Respiration, control, anoxia, hypoxia, asphyxia & artificial respiration.
5. Endocrinology - Pituitary, thyroid, parathyroid, adrenals including pregnancy and lactation.
6. Sympathetic and Para sympathetic nervous system: Physiology of pain, pain pathways, physiology of pulpal pain, Odontogenic and Non-odontogenic pain.
7. Biochemistry: Osmotic pressure, electrolytic dissociation, oxidation, reduction, carbohydrates, proteins, lipids, nucleoproteins, nucleic acid and their metabolism. Enzymes, vitamins and minerals, metabolism of inorganic elements, detoxification in the body, anti metabolites, chemistry of blood, lymph, urine and their clinical significance.

## V. General Pathology

1. Inflammation, repair, degeneration, necrosis and gangrene.
2. Circulatory disturbances - Ischemia, hyperemia, edema, thrombosis, embolism, infarction.
3. Neoplasms - Classifications of tumors, characteristics of benign and malignant tumors and spread tumors.
4. Blood dyscrasias.

## VI. Oral Pathology

1. Developmental disturbances of oral and para oral structures, dental caries, regressive changes of teeth, pulp, periapical pathology, pulp reaction to dental caries and dental procedures.
2. Bacterial, viral and mycotic infections of the oral cavity.

## VII. General Microbiology

1. Cross infection, infection control, sterilization and disinfection.
2. Immunology - antigen antibody reaction, allergy, hypersensitivity and anaphylaxis, auto immunity, grafts, viral hepatitis, HIV infections and AIDS.

## VIII. Oral Microbiology

1. Oral flora and microorganisms associated with endodontic diseases. Pathogenesis, host defense, bacterial virulence factors and theory of focal infections.
2. Identification and isolation of microorganisms from infected root canals. Culture medium and culturing technique (Aerobic and anaerobic interpretation and antibiotic sensitivity test).

## IX. Pharmacology

1. Pharmacokinetics of drugs, drug addiction and tolerance of hypersensitivity reactions.
2. Local anesthesia - Agents and chemistry, pharmacological actions, fate and metabolism of anaesthetic, ideal properties, techniques and complications.
3. Immunosuppressant, sympathomimetic drugs, antibiotics and analgesics, antihistamines, corticosteroids, chemotherapeutic, haemostatic agents, anticoagulants, anti sialogogue, vitamins (A, B, C, D, E, **K, I**ron), minerals , antiseptics, disinfectants, anti viral agents and drugs acting on CNS.
4. Drug resistance and interactions.

## X. Biostatistics

1. Statistical principles, data collection, method of presentation, method of summarizing.

2. Methods of analysis - Sampling and sampling techniques, tests of significance. Experimental models, design and interpretation. Development of skills for preparing clear concise and cogent scientific abstracts and publication.

## XI. Applied Research Methodology

Experimental design, animal experimental protocol, principles in the development, execution and interpretation of methodologies, critical scientific appraisal of literature.

## XII. Applied Dental Materials

1. Physical, mechanical properties and biocompatibility of dental materials.
2. Tarnish and corrosion.
3. Detailed- study of various restorative materials and their recent advances : Dental amalgam, direct filling gold, casting alloys, inlay wax, die materials, investments, dental cements for restoration and pulp protection (luting agents, liners, bases), cavity varnishes, restorative resins, bonding agents and impression materials.
4. Casting procedures and defects
5. Dental ceramics and their recent advances.
6. Finishing and polishing materials.
7. Dental burs - design and mechanics of cutting & other modalities for tooth preparation.

## XIII. Conservative Dentistry

1. Examination, diagnosis and treatment plan.
2. Infection control procedures and isolation.
3. Occlusion as related to conservative dentistry, contact, contour and its significance.
4. Dental caries – diagnosis.
5. Hand and rotary cutting instruments, speed ranges and hazards.
6. Separation of teeth and matrices.
7. Tooth preparation and restorative techniques for amalgam, composite (direct and indirect) and glass ionomer cements.
8. Impression procedures.
9. Cast metal restorations, indications, contraindications, tooth preparation for inlay, onlay and full crown restorations. Direct and indirect methods of fabrication, investment and casting procedures.
10. Indirect tooth colored restorations- ceramic, inlays, onlays, veneers and crowns.

## XIV. Endodontics

1. Rationale of endodontics.
2. Knowledge of internal anatomy of permanent teeth, anatomy of root apex and its implications in endodontic treatment.
3. Dentin and pulp complex.
4. Pulp and periapical pathology
5. Case selection and treatment planning
6. Various aids used for diagnosis.
7. Infection control.
8. Local anesthesia in endodontics.
9. Access cavity preparation - objectives and principles
10. Hand and rotary instruments and instrumentation.
11. Working length determination and cleaning and shaping of root canal system
12. Root canal irrigants
13. Obturation – materials and techniques.
14. Restoration of endodontically treated teeth

**Pre Clinical Work**

**To be completed in the first 6 months**

- **Wax carving –** Permanent teeth.
- **Mixing of dental cements** – All cements in luting and restorative consistency
- **Making of impression and separable die** - Alginate and rubber base impressions.

**a. Extracted Permanent human teeth**

1. Dental Amalgam – Class II
   a. Conservative Preparation - 02 nos.
   b. Conventional Preparation - 02 nos.
   c. Pin retained amalgam on molar teeth - 02 nos.
2. Cast restorations (Tooth preparation, wax pattern, removable dies, casting)
   a. Inlays on Premolars and Molars MO, DO, MOD - 04 nos.
   b. Onlays on Molars - 02 nos.
   **c.** Full Crown Anterior, Posterior - 03 each.
   d. Post and core Anterior, posterior - 02 each.
3. Veneers on anterior teeth (indirect method) - 02 nos.
4. Composite (Class II) - 03 nos.

- **Typhodont teeth**

1. Dental Amalgam – Class II
   a. Conservative Preparation - 03 nos.
   b. Conventional Preparation - 03 nos.
2. Cast restorations (Tooth Preparation, Wax Pattern, Casting )
   a. Inlays on Premolars and Molars MO, DO, MOD - 06 nos.
   b. Onlays on Molars - 02 nos.
   c. Full Crown – Anterior, Posterior - 02 each.

**Endodontics**

1. Tooth sectioning of all maxillary and mandibular permanent teeth
2. Full mouth IOPA & bite wing radiographs of patient.
3. Rubber dam application on phantom head.
4. Root canal therapy of maxillary and mandibular permanent teeth - 12 nos.
   a. Access cavity preparation
   b. Cleaning and Shaping techniques ( hand and rotary ) - 03 each
      - ❖ Conventional preparation
      - ❖ Step back
      - ❖ Crown down
   c. Obturation - 03 each.
      - ❖ Lateral condensation
      - ❖ Vertical condensation
      - ❖ Hybrid technique

**CLINICAL WORK (NEXT 6 MONTHS)**

| | | |
|---|---|---|
| 1. | Dental amalgam restorations | 10 nos. |
| 2. | Composite restorations [anterior and posterior] | 30 nos. |
| 3. | Glass ionomer cements restorations | 20 nos. |
| 4. | Root canal treatment for anterior teeth | 20 nos. |
| 5. | Ceramic crowns | 05 nos. |

**Approach of**

1. Seminars and journal clubs – 5 by each student.
2. Submission of synopsis at the end of first 6 months
3. Commencement of library dissertation work
4. Internal assessment - theory and clinicals.

**This is basic minimum requirement, however a student needs to know all the related aspects of the above mentioned topics.**

## SECOND YEAR

### I. CONSERVATIVE DENTISTRY

1. Dental caries- epidemiology, recent concept of etiological factors, pathophysiology, Histopathology, diagnosis, caries activity tests, prevention of dental caries and management - recent methods.
2. Development of rotary equipments - recent developments
3. Tissue management
4. Direct gold restorations.
5. Recent advances in restorative materials and techniques.
6. Failures of restorations and their management .
7. Management of non-carious lesions.
8. Minimal intervention dentistry.
9. Recent advances in restoration of endodontically treated teeth and grossly mutilated teeth.
10. Hypersensitivity, theories, causes and management.

### II. Endodontics

1. Diagnostic procedure - recent advances and various aids.
2. Endodontic instruments and instrumentation -detailed description and recent developments.
3. Recent developments in techniques of working length determination / cleaning and shaping of root canal system.
4. Root canal irrigants and intra canal medicaments.
5. Recent advances in obturation.
6. Endodontic microbiology.
7. Traumatic injuries and management - endodontic treatment for young permanent teeth. Pediatric endodontics - treatment of immature apex.
8. Endodontic surgeries.
9. Drugs and chemicals used in endodontics.
10. Endodontic emergencies and management.
11. Biologic response of pulp to various restorative materials and operative procedures.
12. Endodontic radiology- digital technology in endodontic practice.
13. Procedural errors in endodontics and their management.
14. Endodontic failures and retreatment.
15. Endo-perio interrelationship, endo-perio lesions and management.
16. Single visit endodontics, current concepts and controversies.

**CLINICAL WORK**

1. Case discussion 5 nos.
2. Cast gold inlay 5 nos.
3. Composite direct restorations 5 nos.
4. Composite inlay + veneers (direct and indirect) 5 nos.
5. Bleaching - Vital teeth 5 nos.
   Non vital teeth 5 nos.
6. Ceramic jacket crowns 10 nos.
7. Full crowns for posterior teeth 15 nos.
8. Post and core for anterior teeth and posterior teeth 10 nos.
9. Other special types of work such as splinting, reattachment of fractured teeth. 05 nos.
10. Root canal treatment of Anterior teeth 20 nos.
11. Root canal treatment of Posterior teeth 30 nos.
12. Endo surgery – assisting and observation 05 nos.
13. Management of endo - Perio problems 05 nos.

**Approach of**

1. Under graduate teaching program 02 lectures
2. Seminars & Journal club - 5 each
3. Dissertation work
4. Scientific paper and poster presentation in conference and clinical meeting
5. Library dissertation submission
6. II Internal assessment - theory and clinical

**This is basic minimum requirement, however a student needs to know all the related aspects of the above mentioned topics.**

## THIRD YEAR

### I. Conservative dentistry

1. CAD-CAM & CAD-CIM in restorative dentistry
2. Dental imaging and its applications in restorative dentistry (clinical photography)
3. Principles of esthetics
   a. Color
   b. Facial analysis
   c. Smile design
   d. Principles of esthetic integration
   e. Treatment planning in esthetic dentistry

### II. Endodontics

1. Multidisciplinary approach to endodontic situations.
2. Resorption and its management.
3. Endodontic surgeries, recent developments in techniques and devices, endoosseous endodontic implants .
4. Restoration of endodontically treated teeth & recent advances.
5. Geriatric endodontics
6. Microscopes in endodontics.
7. Lasers in Endodontics.

### Clinical work

| | | |
|---|---|---|
| 1. | Cast gold inlay- Onlay, cuspal restoration | 10 nos. |
| 2. | Post and core | 20 nos. |
| 3. | Molar endodontics | 50 nos. |
| 4. | Endodontic retreatment | 10 nos. |
| 5. | Endodontic surgeries | 05 nos. |
| 6. | All other types of surgeries including crown lengthening, perioesthetics, hemisectioning, splinting & replantation. | 05 nos. |

### Approach of

1. Dissertation work to be submitted 6 months before final examination.
2. Seminars & Journal Clubs 5 each.
3. Conducting undergraduates lectures 02 nos.
4. Preliminary exams- Theory , clinical and viva.

**This is basic minimum requirement, however a student needs to know all the related aspects of the above mentioned topics.**

**Dissertations**

1. Synopsis
    a. Identifying and selection of topic
    b. Synopsis writing
    c. Presentation of synopsis to the department, institute review board and ethical committee.
    d. Submission to University (End of first 6 months).
2. Library Dissertation : Completion and submission by 18 months of commencement of post graduate programme.
3. Main Dissertation : Submission 6 months before the university examination.

**Scheme of Exams (Institutional Level)**

a. First internal assessment at the end of first year
b. Second internal assessment at the end of second year
c. Prelim exam in the last six months

**Assessment and monitoring**

1. Log Books
2. Scheme of exams (Institutional Level)
    a. First internal assessment on basic sciences at the end of first year (Theory)
    b. Second internal assessment at the end of second year (Theory and practical / Clinical)
    c. Preliminary examination in the last six months (Theory and practical / clinical & viva voce)

## SCHEME OF UNIVERSITY EXAMINATION

### A. THEORY : 300 MARKS

1. Paper 1 : 75 Marks
   Applied basic sciences : Applied anatomy, Physiology, Pathology including Oral Microbiology, Pharmacology, Biostatistics and Research Methodology and Applied Dental Materials.

2. Paper 2 : 75 Marks
   Conservative Dentistry

3. Paper 3 : 75 Marks
   Endodontics

4. Paper 4 : 75 Marks
   Essay.

### B. PRACTICAL / CLINICALS : 200 MARKS

The duration of Clinical and Viva Voce examination will be 2 days for a batch of six students. If the *number* of candidates exceeds 6, the programme can be extended to 3rd day.

1. Clinical Exercise I - Inlay Exercise : 80 Marks
   a. Tooth Preparation - 30 marks
   b. Direct Wax Pattern - 20 marks
   c. Retraction and Elastomeric Impression - 10 marks
   d. Casting - 10 marks
   e. Cementation - 10 marks

2. Clinical Exercise II - Class IV Composite Restoration : 60 Marks
   a. Tooth preparation - 20 Marks
   b. Matricing - 10 Marks
   c. Restoration (Shade selection, contact-contour and finishing and polishing) - 30 Marks

3. Clinical Exercise III - Molar Endodontics : 60 Marks
   a Local Anaesthesia and Rubber Dam application - 10 Marks
   b Access Cavity - 15 Marks
   c Working length determination - 20 Marks
   d Master cone selection - 15 Marks

## C. VIVA VOCE EXAMINATION : 100 MARKS

*1. Viva-Voce : 80 Marks*

All examiners will conduct viva-voce conjointly on candidate's comprehension, analytical approach, expression, interpretation of data and communication skills. It includes all components of course contents.

*2. Dissertation / Pedagogy Exercise: 20 Marks*

Either a topic will be given to each candidate at the beginning of the clinical examination, which he/she will present for 8-10 minutes or present and discuss the dissertation.

**TOTAL MARKS (A+B+C = 600)**