4. CONSERVATIVE DENTISTRY & ENDODONTICS

OBJECTIVES:

The following objectives are laid out to achieve the goals of the course. These are to be achieved by the time the candidate completes the course. These objectives may be considered under the following subtitles.

KNOWLEDGE:

At the end of 36 months of training, the candidates should be able to:

- Describe aeitology, 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.
- Demonstrate understanding of basic sciences as relevant to conservative / Restorative dentistry and Endodontics.
- Identify social, economic, environmental and emotional determinants in a given case or community and take them into account for planning and execution at individual and community level.
- Ability to master differential diagnosis and recognize conditions that may require multidisciplinary approach or a clinical situation outside the realm of the specialty, which he or she would be able to recognize and refer to appropriate specialist.
- Update himself by self-study and by attending basic and advanced courses, conferences, seminars, and workshops in the specialty of Conservative Dentistry- Endodontics-Dental Materials and Restorative Dentistry.
- Ability to teach/guide, colleagues and other students.
  Use information technology tools and carry out research both basic and clinical with the aim of his publishing his work and presenting the same at scientific platform

SKILLS:

- Take proper chair side history, exam the patient and perform medical and dental diagnostic procedures and order as well as perform relevant tests and interpret to them to come to a reasonable diagnosis about the dental condition in general and Conservative Dentistry – Endodontics in particular. And undertake complete patient monitoring including preoperative as well as post operative care of the patient.
- Perform all levels of restorative work and surgical and non-surgical Endodontics including endodontic endoosseous implants, as well as endodontic-periodontal surgical procedures as part of multidisciplinary approach to clinical condition.
- Provide basic life saving support in emergency situations.
- Manage acute pulpal and pulpo periodontal situations.
- Have a thorough knowledge of infection control measures in the dental clinical environment and laboratories.

Human Values, Ethical Practice and Communication Abilities

- Adopt ethical principles in all aspects of restorative and contemporaries Endodontics including non-surgical and surgical Endodontics.
- Professional honesty and integrity should be the top priority.
- Dental care has to be provided regardless of social status, caste, creed or religion of the patient.
- Develop communication skills in particular to explain various options available management and to obtain a true informed consent from the patient.
- Apply high moral and ethical standards while carrying on human or animal research.

- He / She shall not carry out any heroic procedures and must know his limitations in performing all aspects of restorative dentistry including Endodontics. Ask for help from colleagues or seniors when required without hesitation
- Respect patient's rights and privileges including patients right to information.

COURSE CONTENTS:

PAPER – I : APPLIED ANATOMY OF HEAD AND NECK

- Development of face, paranasal sinuses and the associated structures and their anomalies, cranial and facial bones, TMJ anatomy and function, arterial and venous drainage of head and neck, muscles of face and neck including muscles of mastication and deglutition, brief consideration of structures and function of brain. Brief consideration of all cranial nerves and autonomic nervous system of head and neck. Salivary glands, Functional anatomy of mastication, deglutition and speech. Detailed anatomy of deciduous and permanent teeth, general consideration in physiology of permanent dentition, form, function, alignment, contact, occlusion.
- Internal anatomy of permanent teeth and its significance
- Applied histology – histology of skin, oral mucosa, connective tissue, bone cartilage, blood vessels, lymphatics, nerves, muscles, tongue.

DEVELOPMENT OF TEETH:

- Enamel – development and composition, physical characteristics, chemical properties, structure
- Age changes – clinical structure
- Dentin – development, physical and chemical properties, structure type of dentin, innervations, age and functional changes.
- Pulp – development, histological structures, innervations, functions, regressive changes, clinical considerations.
- Cementum – composition, cementogenesis, structure, function, clinical consideration.
- Periodontal ligament – development, structure, function and clinical considerations.
- Salivary glands – structure, function, clinical considerations.
- Eruption of teeth.

APPLIED PHYSIOLOGY:

- Mastication, deglutition, digestion and assimilation, fluid and electrolyte balance.
- Blood composition, volume, function, blood groups, haemostasis, coagulation, blood transfusion, circulation, heart, pulse, blood pressure, shock, respiration, control, anoxia, hypoxia, asphyxia, artificial respiration, and endocrinology – general principles of endocrine activity and disorders relating to pituitary, thyroid, parathyroid, adrenals including pregnancy and lactation.
- Physiology of Saliva – composition, function, clinical significance.
- Clinical significance of vitamins, diet and nutrition – balanced diet.
- Physiology of pain, sympathetic and Para sympathetic nervous system, pain pathways, physiology of pulpal pain, Odontogenic and non Odontogenic pain, pain disorders – typical and atypical, biochemistry such as osmotic pressure, electrolytic dissociation, oxidation, reduction etc. carbohydrates, proteins, lipids and their metabolism, nucleoproteins, nucleic acid and their metabolism. Enzymes, vitamins and minerals, metabolism of inorganic elements, detoxification in the body, anti metabolites, chemistry of blood lymph and urine.

PATHOLOGY:

- Inflammation, repair, degeneration, necrosis and gangrene.
- Circulatory disturbance – ischemia, hyperemia, edema, thrombosis, embolism, infarction, allergy and hypersensitivity reaction.
- Neoplasms – classifications of tumors, characteristics of benign and malignant tumors, spread tumors.
- Blood dyscrasias
- 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.
- Bacterial, viral, mycotic infections of the oral cavity.

MICROBIOLOGY:

- Pathways of pulpal infection, oral flora and micro organisms associated with endodontic diseases, pathogenesis, host defense, bacterial virulence factors, healing, theory of focal infections, microbes or relevance to dentistry – strepto, staphylococci, lactobacilli, cornyebacterium, actionmycetes, clostridium, neisseria, vibrio, bacteriods, fusobacteria, spirochetes, mycobacterium, virus and fungi.
- Cross infection, infection control, infection control procedure, sterilization and disinfection.
- Immunology – antigen antibody reaction, allergy, hypersensitivity and anaphylaxis, auto immunity, grafts, viral hepatitis, HIV infections and aids. Identification and isolation of microorganisms from infected root canals. Culture medium and culturing technique (Aerobic and anaerobic interpretation and antibiotic sensitivity test).

PHARMACOLOGY:

- Dosage and route of administration of drugs, actions and fate of drug in body, drug addiction, tolerance of hypersensitivity reactions.
- Local anesthesia – agents and chemistry, pharmacological actions, fate and metabolism of anesthetic, ideal properties, techniques and complications.
- General anesthesia – pre medications, neuro muscular blocking agents, induction agents, inhalation anesthesia, and agents used , assessment of anesthetic problems in medically compromised patients.
- Anaesthetic emergencies
- Antihistamines, corticosteroids, chemotherapeutic and antibiotics, drug resistance, haemostasis, and haemostatic agents, anticoagulants, sympathomimitic drugs, vitamins and minerals (A, B, C, D, E, K, IRON), anti sialogogue, immunosuppressant, drug interactions, antiseptics, disinfectants, anti viral agents, drugs acting on CNS.

BIOSTATISTICS:

- Introduction, Basic concepts, Sampling, Health information systems – collection, compilation, presentation of data. Elementary statistical methods – presentation of statistical data, Statistical averages – measures of central tendency, measures of dispersion, Normal distribution. Tests of significance – parametric and non – parametric tests (Fisher extract test, Sign test, Median test, Mann Whitney test, Krusical Wallis one way analysis, Friedmann two way analysis, Regression analysis),Correlation and regression, Use of computers.

RESEARCH METHODOLOGY:

- Essential features of a protocol for research in humans
- Experimental and non-experimental study designs
- Ethical considerations of research

APPLIED DENTAL MATERIALS:

- Physical and mechanical properties of dental materials, biocompatibility
- Impression materials, detailed study of various restorative materials, restorative resin and recent advances in composite resins, bonding – recent developments – tarnish and corrosion, dental amalgam, direct filling gold, casting alloys, inlay wax, die materials, investments, casting procedures, defects, dental cements for restoration and pulp protection (luting, liners, bases) cavity varnishes.
- Dental ceramics- recent advances, finishing and polishing materials.
- Dental burs – design and mechanics of cutting – other modalities of tooth preparation.
- Methods of testing biocompatibility of materials used.

PAPER –II : CONSERVATIVE DENTISTRY

1. Examination, diagnosis and treatment plan
2. Occlusion as related to conservative dentistry, contact, contour, its significance. Separation of teeth, matrices, used in conservative dentistry.
3. Dental caries – epidemiology, recent concept of etiological factors, pathophysiology, Histopathology, diagnosis, caries activity tests, prevention of dental caries and management - recent methods.
4. Hand and rotary cutting instruments, development of rotary equipment, speed ranges, hazards.
5. Dental burs and other modalities of tooth reparation – recent developments (air abrasions, lasers etc.)
6. Infection control procedures in conservative dentistry, isolation equipments etc.
7. Direct concepts in tooth preparation for amalgam, composite, GIC and restorative techniques, failures and management.
8. Direct and indirect composite restorations.
9. Indirect tooth colored restorations – ceramic, inlays and onlays, veneers, crowns, recent advances in fabrication and materials.
    a. Tissue management
10. Impression procedures used for indirect restorations.
11. Cast metal restorations, indications, contraindications, tooth preparation for class 2 inlay,
    Onlay full crown restorations.
    Restorative techniques, direct and indirect methods of fabrication including materials used for fabrication like inlay wax, investment materials and
12. Direct gold restorations.
13. Recent advances in restorative materials and procedures.
14. Management of non-carious lesion.
15. Advance knowledge of minimal intervention dentistry.
16. Recent advances in restoration of endodontically treated teeth and grossly mutilated teeth
17. Hypersensitivity, theories, causes and management.
18. Lasers in Conservative Dentistry
19. CAD-CAM & CAD-CIM in restorative dentistry
20. Dental imaging and its applications in restorative dentistry (clinical photography)
21. Principles of esthetics
    - Color
    - Facial analysis
    - Smile design
    - Principles of esthetic integration
    - Treatment planning in esthetic dentistry

PAPER – III : 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. Pathobiology of periapex.
6. Diagnostic procedure – recent advances and various aids used for diagnosis-
    a. Orofacial dental pain emergencies : endodontic diagnosis and management
7. Case selection and treatment planning
8. Infection control procedures used in Endodontics (aseptic techniques such as rubber dam, sterilization of instruments etc.)
9. Access cavity preparation – objectives and principles
10. Endodontic instruments and instrumentation – recent developments, detailed description of hand, rotary, sonic, ultra sonic etc..
11. Working length determination / cleaning and shaping of root canal system and recent development in techniques of canal preparation.
12. Root canal irrigants and intra canal medicaments used including non – surgical Endodontics by calcium hydroloride.
13. Endodontic microbiology.
14. Obturating materials, various obturation techniques and recent advances in obturation of root canal.
15. Traumatic injuries and management – endodontic treatment for young permanent teeth. Pediatric Endodontics – treatment of immature apex.
16. Endodontic surgeries, recent developments in technique and devices, endoosseous endodontic implants – biology of bone and wound healing.
17. Endoperio interrelationship, endo + Perio lesion and management
18. Drugs and chemicals used in Endodontics
19. Endo emergencies and management.
20. Restoration of endodontically treated teeth, recent advances.
21. Geriatric Endodontics
22. Endo emergencies and management.
23. Biologic response of pulp of various restorative materials and operative procedures.
24. Lasers in Endodontics.
25. Multidisciplinary approach to endodontics situations.
26. Endodontics radiology – digital technology in endodontics practice.
27. Local anesthesia in endodontics.
28. Procedural errors in endodontics and their management.
29. Endodontics failures and retreatment.
30. Resorptions and its management.
31. Microscopes in endodontics.
32. Single visit endodontics, current concepts and controversies.

TEACHING / LEARNING ACTIVITIES:

The following is the minimum required to be completed before the candidate can be considered eligible to appear for final MDS exam.

First Year

Pre Clinical Work – Operative and Endodontics

Preclinical work on typhodont teeth

1. Class 2 amalgam cavities
    a. Conservative preparation -03
    b. Conventional preparation -03

2. Inlay cavity preparation on premolars
And molars – MO, DO, MOD -10
a. Wax pattern -06
b. Casing -04

3. Onlay preparation on molars -02
a. Casting -01

4. Full Crown
a. Anterior -05
b. Posterior -05
(2 each to be processed)

5. 7/8 crown -02
(1 to be processed)

6. 3 / 4 crown premolars -02
(1 to be processed)

Pre Clinical work on natural teeth

1. Inlay on molars and premolars MO, DO, and MOD -08
a. Casting -02
b. Wax pattern -02
2. Amalgam cavity preparation
a. Conventional -02
b. Conservative -02

3. Pin retained amalgam on molar teeth -02

4. Post and core build up
a. Anterior teeth -10
b. Posterior teeth -05

5. Casting
a. Anterior -04
b. Posterior -02

6. Onlay on molars -03
(1 to be processed)

7. Full crown premolars and molars -04

8. Full crown anterior -06
(2 and 3 to be processed)

9. Veneers anterior teeth (indirect method) -02

10. Composite inlay (class 2) -03
(1 to be processed)

11. Full tooth wax carving – all permanent teeth

ENDODONTICS:

1. Sectioning of all maxillary and mandibular teeth.
2. Sectioning of teeth – in relation to deciduous molar, 2nd primary upper and lower molar 1 each
3. Access cavity opening and root canal therapy in relation to maxillary and mandibular permanent teeth
4. Access cavity preparation and BMP
   Anterior
   a. Conventional prep
   b. Step back
   c. Crown down
   Obturation 03
5. BMP Premolar 06 (2 upper and 2 lower) obturation 1 each
6. BMP Molar 06 (3 upper – 2 first molars and 1 second molar, 3 lower -2 first molars and 1 second molar) obturation 1 each
7. Post and core preparation and fabrication in relation to anterior and posterior teeth
   a. Anterior 10 (casting 4)
   b. Posterior 05 (casting 2)
8. Removable dies 04

Note : Techniques work to be completed in the first four months

CLINICAL WORK :

A	Composite restorations	30
B	GIC Restorations	30
C	Complex amalgam restorations	05
D	Composite inlay + veneers (direct and indirect)	05
E	Ceramic jacket crowns	05
F	Post and core for anterior teeth	05
G	Bleaching vital	05
	Non vital	05
H	RCT Anterior	20
I	Endo surgery – observation and assisting	05

Presentation of :

- Seminars- 5 seminars by each student – should include topics in dental materials, conservative dentistry and endodontics
- Journal clubs – by each student
- Submission of synopsis at the end of 6 months
- Library assignment work
- Internal assessment – theory and clinicals.

Second Year

Case discussion – 5

1	Ceramic jacket crowns	10
2	Post and core for anterior teeth	10
3	Post and core for posterior teeth	05
4	Composite restoration	05
5	Full crown for posterior teeth	15

6	Cast gold inlay	05
7	Other special types of work such as splinting -Reattachment of fractured teeth etc.	05
8	Anterior RCT	20
9	Posterior RCT	30
10	Endo surgery performed independently	05
11	Management of endo – Perio problems	05

- Under graduate teaching program as allotted by the HOD
- Seminars – 5 by each student
- Journal club – 5 by each student
- Dissertation work
- Prepare scientific paper and present in conference and clinical meeting
- Library assignment to be submitted 18 months after starting of the course
- Internal assessment – theory and clinical

Third Year

Dissertation work to be submitted 6 months before final examination.

Clinical work

- Cast gold inlay – Onlay, cuspal restoration 10
- Post and core 20
- Molar endodontics 50
- Endo surgery 05
- All other types of surgeries including crown lengthening, perioesthetics, hemi sectioning, splinting, replantation, endodontic implants.

Presentation of :

- Seminars
- Journal club
- Teaching - lecture (under graduates)
- Internal assessment – theory and clinical

MONITORING LEARNING PROGRESS :

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only helps teachers to evaluate students, but also students to evaluate themselves. The monitoring be done by the staff of the department based on participation of students in various teaching / learning activities. It may be structured and assessment be done using checklists that assess various aspects. Checklists are given in Section IV.

SCHEME OF EXAMINATION :

A. Theory : 300 Marks

Written examination shall consist of four question papers each three hours duration. Total marks for each paper will be 100. Paper I, II and III shall consist of two long questions carrying 20 marks each and 6 short essay questions each carrying 10 marks. Paper IV will be on Essay. Questions on recent advances may be asked in any or all the papers. Distribution of topics for each paper will be as follows:*

PAPER – I : Applied Basic Sciences : Applied Anatomy, Physiology, Pathology Including Oral Microbiology, Pharmacology, Biostatistics and Research Methodology and Applied Dental Materials.

PAPER – II : Conservative Dentistry

PAPER – III : Endodontics
PAPER – IV : Essay

B. Clinicals : 200 Marks

The duration of Clinical and Viva Voce examination will be 2 days for a batch of four students. If the number of candidates exceeds 4, the programme can be extended to 3rd day.

Day 1

Clinical Exercise I - 50 Marks

Cast core preparation

(i) Tooth preparation	-10 marks
(ii) Direct Wax Pattern	-10 marks
(iii) Casting	-10 marks
(iv) Cementation	-10 marks
(v) Retraction & Elastomeric Impression	-10 marks

Clinical Exercise II – 50 Marks

(Inlay Exercise)

(i) Tooth preparation for Class II Gold Inlay	-25 marks
(ii) Fabrication of Direct Wax Pattern	-25 marks

Day 2

Clinical Exercise III – 100 Marks

(Molar Endodontics)

(i) Local Anaesthesia and Ruber Dam application	-20 marks
(ii) Access Cavity	-20 marks
(iii) Working length determination	-20 marks
(iv) Canal Preparation	-20 marks
(v) Master bone selection	-20 marks

C. Viva Voce : 100 Marks

i. Viva –Voce examination : 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. It includes presentation and discussion on dissertation also.

ii. Pedagogy Exercise : 20 marks

A topic be given to each candidate in the beginning of clinical examination. He/She is asked to make a presentation on the topic for 8-10 minutes.

Day 3

Viva –Voce (Continued if more than 4 students are taking examination or shortage of time on 2nd day).