ORTHODONTICS

GOALS

1. The program outlined, addresses both the knowledge needed in Orthodontics and allied medical specialities in its scope. A minimum of three years of formal training through a graded system of education as specifies, will equip the trainee with skill and knowledge at its completion to be able to practice basic orthodontics and have the ability to intelligently pursue further apprenticeship towards advanced orthodontics.
2. Develop an attitude to adopt ethical principles in all aspects of orthodontic practice.
3. Professional honesty and integrity are to be fostered.
4. Treatment care is to be delivered irrespective of the social Status, cast, creed or colleagues.
5. Willingness to share the knowledge and clinical experience with professional colleagues.
6. Willingness to adopt, after a critical assessment, new methods and techniques of orthodontic management developed from time to time based on scientific research, which are in the best interest of the patient.
7. Respect patients rights and privileges, including patients right to information and right to seek a second opinion.
8. Develop attitude to seek opinion from allied medical and dental specialists as and when required.

Objectives

The training programme in Orthodontics is to structure and achieve the following objectives

Knowledge

1. The dynamic interaction of biologic processes and mechanical forces acting on the stomatognathic system during orthodontic treatment
2. The etiology, pathophysiology, diagnosis and treatment planning of various common Orthodontic problems
3. Various treatment modalities in Orthodontics; preventive interceptive and corrective.
4. Basic sciences relevant to the practice of Orthodontics
5. Interaction of social, cultural, economic, genetic and environmental factors and their relevance to management of oro - facial deformities
6. Factors affecting the long-range stability of orthodontic correction and their management
7. Personal hygiene and infection control, prevention of cross infection and safe disposal of hospital waste, keeping in view the high prevalence of Hepatitis and HIV and other highly contagious diseases.

Skills

1. To obtain proper clinical history, methodical examination of the patient, perform essential diagnostic procedures, and interpret them and arrive at a reasonable diagnosis about the Dentofacial deformities.
2. To be competent to fabricate and manage the most appropriate - intra or extra oral, removable or fixed, mechanical or functional, and active or passive appliances - for the treatment of any orthodontic problem to be

treated singly or as a part of multidisciplinary treatment of orofacial deformities.

3. 3.Develop adequate communication skills particularly with the patients giving them the various options available to manage a particular Dentofacial problem and to obtain a true informed consent from them for the most appropriate treatment available at that point of time.
4. 4.Develop the ability to communicate with professional colleagues, in Orthodontics or other specialities through various media like correspondence, Internet, e-video, conference, etc. To render the best possible treatment.

COURSE CONTENT

Spread of the Curriculum

Six months teaching of basic subjects including completion of pre - clinical exercises. Rest 2 ^{1}/2 years will cover all the relevant topics in orthodontics, clinical training involving treatment of patients and submission of dissertation.

I. Applied Anatomy:

1. Prenatal growth of head
   Stages of embryonic development of head, face & teeth.
   Postnatal growth of head: Bones of skull, the oral cavity, development of chin, the hyoid bone, general growth of head & face .

2. Bone growth
   Development of bone, composition of bone, units of bone structure, schedule of Ossification, mechanical properties of bone, roentgenographic appearance of bone.

3. Assessment of growth and development
   Growth prediction, growth spurts, the concept of normality and growth increments of growth, differential growth, gradient of growth, methods of gathering growth data. Theories of growth and recent advances. Factors affecting physical growth.

4. Muscles of mastication
   Development of muscles, muscle change during growth, muscle function and facial development, muscle function and malocclusion.

5. Development of dentition and occlusion
   Dental development periods, sequence of tooth eruption, chronology of teeth formation, periods of occlusal development & pattern of occlusion.

6. Assessment of skeletal age
   The carpal bones, carpal x - rays, cervical vertebrae.

II Applied Physiology

1. Endocrinology and its disorders
   Growth hormone, thyroid hormone, parathyroid hormone, ACTH, pituitary gland hormones,
2. Calcium and its metabolism
3. Nutrition-metabolism and disorders:
   Proteins, Carbohydrates, Fats, Vitamins And Minerals.
4. Muscle physiology.
5. Bleeding disorders.

III. Dental materials

1. Gypsum products: dental plaster, dental stone and their properties, setting reaction etc.
2. Impression materials: impression materials in general and alginate impression material in particular.
3. Acrylics: chemistry, composition physical properties
4. Composites: composition types, properties setting reaction
5. Banding and bonding cements: Zn (P04)2, zinc silicophosphate, Zinc polycarboxylate, resin cements and glass lonomer cements
6. Wrought metal alloys: deformation, strain hardening, annealing, recovery, recrystallization, grain growth, properties of metal alloys
7. Orthodontic arch wires: stainless steel, gold, wrought cobalt chromium nickel alloys, alpha & beta titanium alloys
8. Elastics: Latex and non-latex elastics.
9. Applied physics, Bioengineering and metallurgy. Specification and testing methods used for materials used in Orthodontics. Survey of all contemporary literature and Recent advances in above - mentioned materials.

IV. Genetics

1. Cell structure, DNA, RNA, protein synthesis, cell division
2. Chromosomal abnormalities
3. Principles of orofacial genetics, Genetics in malocclusion
4. Molecular basis of genetics
5. Genetic studies related to malocclusion
6. Recent advances in genetics related to malocclusion, Genetic counseling
7. Bioethics and relationship to Orthodontic management of patients.

V. Physical Anthropology

1. Evolutionary development of dentition
2. Evolutionary development of jaws.

VI. Pathology

1. Inflammation
2. Necrosis

VII. 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.

VIII. Applied research methodology in orthodontics

Experimental design Animal experimental protocol, Principles in the development, execution and interpretation of methodologies in Orthodontics, Critical Scientific appraisal of literature.

IX. Applied pharmacology

Anti plaque agents, topical fluorides, analgesics prostaglandin inhibiting factors.

X. Orthodontic history

Historical perspective, Evolution of orthodontic appliances, history of Orthodontic peers, history of Orthodontics in India

XI. Concepts of occlusion and esthetics:

Structure and function of all anatomic components of occlusion,Mechanics of articulation, Recording of masticatory function, Diagnosis of Occlusal dysfunction, Relationship of TMJ anatomy and pathology and related neuromuscular physiology.

XII. Etiology and Classification of malocclusion:

A comprehensive review of the local and systemic factors in the causation of malocclusion

Various classifications of malocclusion

XIII. Dentofacial Anomalies:

Anatomical, physiological and pathological characteristics of major groups of developmental defects of the orofacial structures.

XIV. Child and Adult Psychology:

Stages of child development. Theories of psychological development. Management of child in orthodontic treatment. Management of physically challenged child.

Motivation and Psychological problems related to malocclusion / orthodontics, Adolescent psychology, Behavioral psychology and communication

XV. Diagnostic procedures and treatment planning in orthodontics

Emphasis on the process of data gathering, synthesis and translating it into a treatment plan.

Problem cases - analysis of cases and its management. Adult cases, physically and mentally challenged cases and their special problems. Critique of treated cases.

Cephalometrics instrumentation, image processing tracing and analysis. Advanced cephalometric techniques: Comprehensive review of literature, Video imaging principles and application.

XVII. Practice management in Orthodontics

Economics and dynamics of solo and group practices.
Personal management.
Materials management.
Public relations.
Professional relationship.
Dental ethics and jurisprudence.
Office sterilization procedures.
Community based Orthodontics.

XVIII. Clinical Orthodontics Myofunctional Orthodontics:

Basic principles, Contemporary appliances -their design and manipulation. Case selection and evaluation of the treatment results. Review of the current literature.

Dentofacial Orthopedics Principles & Biomechanics. Appliance design and manipulation. Review of contemporary literature.

Cleft lip and palate rehabilitation:
Diagnosis and treatment planning Mechanotherapy, Special growth problems of cleft cases. Speech physiology, pathology and elements of therapy as applied to orthodontics. Team rehabilitative procedures.

Biology of tooth movement:
Principles of tooth movement - Review of contemporary literature. Applied histophysiology of bone, periodontal ligament Molecular and ultra cellular consideration in tooth movement.

Orthodontic / Orthognathic surgery:

Orthodontist' role in conjoint diagnosis and treatment planning, Pre and post-surgical Orthodontics, Participation in actual clinical cases, progress evaluation and post retention study. Review of current literature Ortho / interdisciplinary inter relationship.
Principles of interdisciplinary patient treatment Common problems and their management
Basic principles of Mechanotherapy Includes Removable appliances and fixed appliances Design Construction Fabrication Management.
Review of current literature on treatment methods and results

Applied preventive aspects in Orthodontics: Caries and periodontal disease prevention, Oral hygiene measures.

Clinical procedures Interceptive Orthodontics Principles

Growth guidance
Diagnosis and treatment planning Therapy emphasis on:
a. Dento-facial problems.
b. Tooth material discrepancies.
c. Minor surgery for Orthodontics.
d. Retention and relapse
Mechanotherapy -special reference to stability of results with various procedures. Post retention analysis Review of contemporary literature.

XIX. Recent advances

Use of implants.
Lasers.
Application of F.E.M.
Distraction Osteogenesis.

II. Pre - Clinical Exercises

1. General Wire bending exercises to develop the manual dexterity.
2. Clasps, Bows and springs used in the removable appliances.
3. Soldering and welding exercises.
4. Fabrication of removable habit breaking, mechanical and functional appliances, also all types of space maintainers and space regainers.
5. Bonwill Hawley Ideal arch preparation.
6. Construction of orthodontic models trimmed and polished preferably as per specifications of Tweed or American Board of Orthodontics.
7. Cephalometric tracing, various analysis & superimposition methods
   a. Training shall be imparted in one basic technique i.e. Standard Edgewise / Begg technique or its derivative/ Straight wire etc., with adequate exposure to latest techniques.
   b. Typodont exercise
      - ❖ Band making
      - ❖ Bracket positioning and placement
      - ❖ Different stages in treatment appropriate to technique taught
8. Fixed appliance typodont exercises.
9. Clinical photography
10. Computerized imaging
11. Preparation of surgical splints, and splints for TMJ problems.
12. Handling of equipments like vacuum forming appliances and hydro solder etc.

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

FIRST YEAR
Training Schedule

I. Basic Pre-Clinical Exercise: First 6 Months

1. Non-appliance exercises

All the following exercises should be done with 0.7 or 0.8mm wire

Sl. No.	Exercise	No.
1.	Straightening of 6" & 8" long wire	1 each
2.	Square	1
3.	Rectangle	1
4.	Triangle of 2" side	1
5.	Circle of 2" radius	1
6.	Bending of 5U's	1
7.	Bending of 5V's	1

2. Clasps

Sl. No.	Exercise	No.
1.	¾ clasps	2
2.	Full clasps	2
3.	Triangular clasps	2
4.	Adam's clasp - upper molar	2
5.	Adam's clasp – lower molar	2
6.	Adam's clasp – pre-molar	2
7.	Adam's clasp – incisor	2
8.	Modification of Adam's - With Helix	2
9.	Modification of Adam's - With distal extension	2
10.	Modification of Adam's - With soldered tube	2
11.	Duyzing Clasps on Molars	2
12.	Southend Clasp	1

3. LABIAL BOWS

Sl. No.	Exercise	No.
1.	Short labial bow (upper & lower)	1
2.	Long labial bow (upper & lower)	1
3.	Robert's retractor	1
4.	High labial bow-with apron spring's	1
5.	Miller's labial bow	1
6.	Reverse loop labial bow	1
7.	Retention labial bow soldered to Adam's clasp	1
8.	Retention labial bow extending distal to second molar	1
9.	Fitted labial bow	1
10.	Split high labial bow	1

4. SPRINGS

Sl. No.	Exercise	No.
1.	Finger spring-mesial movement	2
2.	Finger spring-distal movement	2
3.	Double cantilever spring	2
4.	Flapper spring	2
5.	Coffin spring	2
6.	T spring	2

5. CANINE RETRACTORS

Sl. No.	Exercise	No.
1.	U Loop Canine Retractor	2 pairs
2.	Helical Canine Retractor	2 pairs
3.	Palatal Canine Retractor	2 pairs
4.	Self -Supporting Canine Retractor	2 pairs
5.	Self -Supporting Canine Retractor	2 pairs

6. APPLIANCES : 1 each

1. Hawley's retention appliance with anterior bite plane
2. Upper Hawley's appliance with posterior bite plane
3. Upper expansion appliance with coffin spring
4. Upper expansion appliance with expansion screw
5. Habit breaking appliance with tongue crib
6. Oral screen and double oral screen
7. Lip bumper
8. Splint for Bruxism
9. Catalan's appliance
10. Activator
11. Bionator
12. Frankel-FR II, III appliance
13. Twin block
14. Lingual arch
15. Trans Palatal Arch
16. Quad helix
17. Bihelix
18. Utility arches
19. Pendulum appliance

7. Soldering exercises : 1 each

1. Star
2. Comb
3. Christmas tree
4. Soldering buccal tube on molar bands

8. Welding exercises

1. Pinching and welding of molar, premolar, canine and Incisor bands
2. Welding of buccal tubes and brackets on molar and incisor bands

9.Impression of upper and lower arches in alginate

10. Study model preparation

11. Model analysis : All the mixed dentition & permanent dentition analyses to be done.

12. Cephalometrics

1. Lateral cephalogram to be traced in five different colors and super-imposed to see the accuracy of tracing.
2. Steiner's analysis
3. Down's analysis
4. Tweed analysis
5. Rickett's analysis
6. Burstone analysis
7. Rakosi's analysis
8. Mc Namara analysis
9. Bjork analysis
10. COGS's analysis
11. Quadrilateral analysis
12. Soft tissue analysis - Holdaway and Burstone

13. Basics of Clinical Photography including Digital Photography

14. Light wire bending exercises for the Begg's technique

1. Wire bending technique on 0.016' wire circle "Z" Omega
2. Bonwill-Hawley diagram
3. Making a standard arch wire
4. Inter maxillary hooks- Boot leg and Inter Maxillary type
5. Upper and Lower arch wire
6. Bending a double back arch wire
7. Bayonet bends (vertical and horizontal offsets)
8. Stage-III arch wire
9. Torquing auxiliary (upper)
10. Reverse Torquing (lower)
11. Uprighting spring

15. Typodont exercises: Begg's or Pre Adjusted Edgewise Appliance method

1. Teeth setting in Class-II division I malocclusion with maxillary anterior Proclination and mandibular anterior crowding
2. Band pinching, welding brackets and buccal tubes to the bands
3. Stage - I
4. Stage - II
5. Pre Stage - III
6. Stage - III

CLINICAL WORK:

Once the basic pre-clinical work is completed the students takes up clinical cases and the clinical training is for the two and half years.

Each postgraduate student should treat a minimum of 50 new cases and 20 transferred cases.

The type of cases can be as follows:

1. Removable active appliances.
2. Class-I malocclusion with crowding.
3. Class-I malocclusion with bi-maxillary protrusion.
4. Class-II division-1.
5. Class-II division-2.
6. Class-III (Orthopedic, Surgical, Orthodontic cases).
7. Inter - disciplinary cases.
8. Removable functional appliance cases like activator, Bionator, functional regulator, twin block and new developments.
9. Fixed functional appliances - Herbst appliance & jasper jumper etc.
10. Dento-facial orthopedic appliances like head gears, rapid maxillary expansion NiTi expander etc.,
11. Appliance for arch development such as molar distalization.
12. Fixed mechano therapy cases (Begg's, PEA, Tip edge, Edgewise).
13. Retention procedures of above treated cases.

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

OTHER ASSIGNMENTS

FIRST YEAR

1. A minimum of five seminars & journal clubs should be presented by each student each year.
2. Protocol for dissertation to be submitted on or before the end of 6 months from the date of admission.
3. Under graduate classes: 1-2 classes should be conducted by each post-graduate student.
4. should participate in Inter-departmental case conferences.
5. Case discussions 2 per week.
6. Field visits: To attend dental camps and to educate the community.
7. Basic subjects classes to be attended.
8. Internal assessment or Term paper.

First 6 months basic preclinical exercises.
Finalization of library dissertation topic.
Finalization and submission of main dissertation synopsis.

SECOND YEAR

The clinical cases taken up should be followed under the guidance. More case discussions and cases to be taken up. Other routine work as follows.

1. A minimum of five seminars & journal clubs should be presented by each student each year
2. Under graduate classes: 1 theory class should be conducted by each post-graduate student.
3. should participate in Inter-departmental case conferences
4. Case discussions 2 per week.
5. Field visits: To attend dental camps and to educate the community.
6. Submission of library dissertation by 18 months after commencement of post graduate programme.
7. On getting the approval from the university dissertation work to be started.

THIRD YEAR

The clinical cases taken up should be followed under the guidance. More cases discussions and cases to be taken up. Other routine work as follows:

1. A minimum of five seminars & journal clubs should be presented by each student each year.
2. Under graduate classes: 1 theory class should be conducted by each post-graduate student.
3. Should participate in Inter-departmental case conferences
4. Case discussions 2 per week.
5. Field visits: To attend dental camps and to educate the community.
6. The completed dissertation should be submitted six months before the final examination.
7. Finishing and presenting the cases taken up.
8. Preparation of finished cases and presenting the cases (to be presented for the examination).
9. Preliminary examination.

Dissertations

a) Synopsis

1. Identifying and selection of topic.
2. Synopsis writing.
3. Presentation of synopsis to the department, institute review board and ethical committee.
4. Submission to university (End of first 6 months after commencement of post graduate programme).

b) Library Dissertation: Submission by 18 months after commencement of post graduate programme.

c) Main Dissertation submission 6 months before university examination.

Assessment and monitoring

1. Maintaining 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 exam in the last six months (Theory and practical / clinical and viva voce).

SCHEME OF UNIVERSITY EXAMINATION

A. THEORY : 300 MARKS

Written examination shall consist of four question papers each of 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, Dental Materials, Genetics, Pathology, Physical Anthropology, Applied Research methodology, Bio-Statistics and Applied Pharmacology.

Paper II : Orthodontic history, Concepts of occlusion and esthetics, Child and Adult Psychology, Etiology and classification of malocclusion, Dentofacial Anomalies, Diagnostic procedures and treatment planning in Orthodontics, Practice management in Orthodontics

Paper III : Clinical Orthodontics

Paper IV: Essay

The topics assigned to the different papers are generally evaluated under those sections. However a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.

B. PRACTICAL / CLINICAL EXAMINATION : 200 MARKS

1. Exercise No: 1 Functional Case — 50 Marks — 2 Hrs.
   Selection of case for functional appliance and recording of construction bite. Fabrication and delivery of the appliance the next day.

2. Exercise No:2 Multiband exercise — 50 Marks — 1.5 Hrs.
   - III stage with auxiliary springs

     OR
   - Bonding of SWA brackets and construction of suitable arch wire.

3. Exercise No. 3 Display of records of the treated cases (minimum of 5 cases)
   - 5 cases * 15 marks — 75 Marks — 2 Hrs.
   - Exercise No: 4 long case discussions: — 25 Marks — 1 Hrs.

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 / thesis 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.

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