

SYLLABUS FOR Ph.D ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS	
A.	APPLIED BASIC SCIENCES
I	Anatomy
Sl. No	Topics
1	prenatal growth of head including the stages of embryonic development, origin of head, origin of face, and origin of teeth
2	postnatal growth of head, bones of skull, the oral cavity, development of chin, the hyoid bone, general growth of head, face growth
3.	bone growth, origin of bone, composition of bone, units of bone structure, schedule of ossification, mechanical properties of bone, roentgenographic appearance of bone
4.	Assessment of growth and development using various growth prediction methods ,growth spurts, the concept of normality and increments of growth, differential growth, gradient of growth and methods of gathering growth data, theories of growth and recent advances, factors affecting physical growth in the diagnosis of a clinical case
5.	Development of muscles, muscle change during growth, muscle function and facial development, muscle function and malocclusion.
6.	Dental developmental periods, order of tooth eruption, chronology of permanent tooth formation, periods of occlusal development, pattern of occlusion in a clinical scenario
7.	Apply the knowledge of carpal bones and skeletal age assessment using carpal x-rays, cervical vertebrae.
II	Physiology
1.	Effect of hormones - pituitary gland hormones, (Growth hormone, thyroid hormone, parathyroid hormone, ACTH) thyroid gland hormones, parathyroid gland hormones on the development of craniofacial skeletal structures and dentition
2.	Calcium, proteins, carbohydrate, fats, vitamins and minerals and their metabolism and the role of muscle physiology in normal function and the their associated disorders
3.	Cell Adhesion molecules & mechanism of adhesion in craniofacial biology
4.	Bleeding disorders in general and haemophilia in particular in orthodontics
III	Dental materials
1.	dental materials and its application in orthodontics <ul style="list-style-type: none"> • Gypsum Products: Dental plaster, dental stone & their properties, setting reaction, etc. • Impression Materials: Impression material in general & particularly of alginate impression material. • Acrylics: Chemistry, composition & physical properties. • Composites: Composition, types, properties & setting reaction

	<ul style="list-style-type: none"> • Banding & bonding cements: Zn (PO₄)₂, Zinc silicophosphate, Zinc Polycarboxylate, resin cements & glass ionomer cements. • Wrought metal alloys, Deformation, Strain hardening, annealing, recovery, recrystallization, grain growth, properties of metal alloys. • Orthodontic arch wires: Stainless steel gold, wrought cobalt chromium nickel alloys, alpha & beta titanium alloys. • Elastics: Latex & non-latex elastics. • Applied physics, Bioengineering & metallurgy. • Specification & test methods used for materials used in orthodontics • Survey of an contemporary literature • Recent advances in above mentioned materials
IV	Biochemistry
1.	Cell structure, DNA, RNA, protein synthesis, cell division is its role in the growth and development
2.	Chromosomal abnormalities, principles of orofacial genetics, genetics in malocclusion, molecular basis of genetics, studies related to malocclusion and recent advances in genetics related to malocclusion and genetic counselling, bioethics & relationship to orthodontic management of patients
3.	Genetic mapping
V	Physical anthropology
1.	Evolutionary development of dentition and jaws.
VI	Pathology
1	Inflammation and necrosis
VII	Biostatistics
1.	Principles of biostatistics : <ul style="list-style-type: none"> • Statistical principles • Data collection. • Method of presentation. • Method of summarizing • Methods of analysis-different tests/errors. • Sampling and sampling technique • Experimental models, design and interpretation • Be able to develop clear and cogent scientific abstracts and publications.
VIII	Applied research methodology in orthodontics
1	Research methodology in orthodontics - <ul style="list-style-type: none"> • Experimental design • Animal experimental protocol • Principles in the development, execution and interpretation of methodologies in Orthodontics

	<ul style="list-style-type: none"> • Critical scientific appraisal of literature.
IX	Applied pharmacology
	<p>Different pharmacological agents used in orthodontics -</p> <ul style="list-style-type: none"> • Analgesics • Local anaesthetics • Antibiotics • Antihypertensives • Antiseptics • Astringents • Antiplaque agents • Vitamins and minerals (A,B,C,D,E, K, iron) • Disinfectants, antiviral agents
B.	BASIC ORTHODONTICS
Sl. No	Topics
1	history of orthodontics, historical perspective, evolution of orthodontic appliances, pencil sketch history of orthodontic peers and history of orthodontics in India
2	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 related neuromuscular physiology (use of TMJ splints)
3.	Etiology and classification of malocclusion, comprehensive review of local and systemic factors in the causation of malocclusion and various classification of malocclusion Management of the malocclusion
4.	Anatomical, physiological and pathological characteristics of major groups of developmental defects of the orofacial structures
5.	Stages of child development, theories of psychological development, management of child in orthodontics treatment, management of handicapped child, adolescent psychology
6.	Diagnostic procedures and treatment planning in orthodontics with emphasis on process of data gathering for comprehensive orthodontic treatment Kesling set-up, Photographic and radio-graphic morphing
7	Cephalometrics- Instrumentation, image processing, tracing and analysis of errors and applications, radiation hygiene for the diagnosis of a case, comprehensive review of literature in planning and executing orthodontic treatment and evaluating the progress of the treatment and know about recent advances of dental imaging including video imaging principles and its application in orthodontic treatment
8.	Practice management under the following headings: <ul style="list-style-type: none"> • Economics and dynamics of solo and group practice • Personal management • Material management • Public relationship • Professional relationship

	<ul style="list-style-type: none"> • Dental ethics and jurisprudence • Office sterilization procedures • Community based orthodontics
C.	CLINICAL ORTHODONTICS
Sl. No	Topics
1.	Myofunctional orthodontics, its basic principles, contemporary appliances , their design and manipulation on a patient ,case selection, evaluation
2.	Principles, biomechanics, design of appliance of dentofacial orthopedics in management of clinical situation
3.	Basic concepts of diagnosis and treatment planning, mechanotherapy and special growth problems of cleft cases, speech physiology, pathology and elements of therapy and team rehabilitative procedures in management of a cleft case.
4.	Basic concepts of biology of tooth movement, review of contemporary literature, applied histophysiology of bone, periodontal ligament and molecular and ultra-cellular considerations in tooth movement
5.	Orthodontist's role in conjoint diagnosis and treatment planning in Orthodontic /Orthognathic surgery, pre and post surgical orthodontics, Participation in actual clinical cases, progress evaluation and post retention study and recent advances in treating a case
6.	<p>Mechanotherapy of removable appliances and fixed appliances, design, construction and fabrication</p> <ul style="list-style-type: none"> • Use of various appliance system- PEA -Roth, MBT, Butterfly, • Evaluation of orthodontic treatment phase • Use of various loops, • Use of first, second and third order bends, • Piggyback archwires, • Finishing wires • Adult orthodontics • Ortho-Perio relationship • Adjunctive orthodontic treatment
6a. .	Lingual techniques & Indirect bonding
6b.	CADCAM based treatment planning (clear aligner)

7	Preventive aspects in orthodontics including caries and periodontal disease prevention oral hygiene measures.
8.	Interceptive orthodontics with emphasis on principles, growth guidance, diagnosis and treatment planning
9	Retention and relapse,
10.	Recent advances in treatment <ul style="list-style-type: none"> • Ortho implants • Lasers • Distraction Osteogenesis • Application of F.E.M (Research)

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