

M. Phil Oral Biology (Major Complusary)

PAPER-I

TABLE OF SPECIFICATIONS

The grey areas of the course whose learning cannot be evaluated or are difficult to cover in MCQ's shall be used for framing SEQ's, which may be split into two parts if necessary; attempt shall be made to avoid duplication between MCQ'S and SEQ's. Distribution of MCQ's and SEQ's is with respect to the importance of topics. Table of Specification is also provided with the document.

Note:

MCQ's = 80

Total Marks = 80

Time = 90 Minutes

SEQ's = 07

Total Marks = 70

Time = 90 Minutes

Total Marks of the Paper I = 150

Total Time = 03 Hours

Grand Total = 150

Sr. No.	Topics Covered in Paper I	No of SEQ	No of MCQ's
1.	Oral and Craniofacial Embryology	01	11
2.	Early Tooth Development	01	12
3.	Bone (Development/ Histology/ Structure)	01	11
4.	Enamel (Development/ Histology/Structure)	01	12
5.	Dentine (Development/Histology/Structure) Pulp (Development/Histology/Structure)	01	12
6.	Cementum (Development/ structure/ function) Periodontal ligament (Development/structure/functions)	01	11
7.	Cytoskeleton, cell junction and fibroblasts Salivary glands (Development, structure & function)	01	11
8.	TOTAL	07	80

Table of specification Topics	No. of MCQs	No. of SEQs
Paper 1 Oral Biology		
<p>1. <u>Oral and Craniofacial Embryology</u></p> <p>a) Neural crest cells and molecular regulation of neural crest cell induction, specification, migration and differentiation. Their role in craniofacial development</p> <p>b) Pharyngeal arches, pouches, clefts, membrane and their derivatives</p> <p>c) Development of cranial vault and base</p> <p>d) Development of face</p> <ol style="list-style-type: none"> i. Formation of facial prominences ii. Molecular regulation by Hox genes iii. Face and fronto-ectodermal zone <p>and clinical correlations of face :</p> <ol style="list-style-type: none"> i. Holoprosencephaly ii. First arch syndromes/ sequences (Pierre Robin, Treacher Collin's) iii. Crouzan, Apert's and pfeiffer's syndrome iv. Microstomia <p>e) Development of Palate</p> <ol style="list-style-type: none"> I. Development of primary palate II. Development of secondary palate, palatal shelf elevation and fusion and molecular mechanism of its development III. Clinical consideration <ol style="list-style-type: none"> i. Cleft lip and palate ii. Submucous clefts iii. Common syndromes associated with cleft lip and palate iv. Non neoplastic cysts v. Hypermnasality <p>f) Development of tongue and clinical correlation</p> <ol style="list-style-type: none"> i. Developmental anomalies of tongue <p>a) Development of skull (neurocranium, viscerocranium),</p> <p>b) Development of cranial sutures, newborn skull and clinical consideration</p> <ol style="list-style-type: none"> i. Briefly Craniosynostosis 	11	01

<ul style="list-style-type: none"> g) Development and Growth of jaw bones <ul style="list-style-type: none"> I. Development and Growth of maxilla, II. Development and Growth of mandibular process, mandible, condylar cartilages and molecular mechanisms involved III. Development and role of Meckel's cartilage IV. Clinical correlations <ul style="list-style-type: none"> i. Hemifacial microstomia ii. Treacher Collin's syndrome iii. Pierre Robin sequence iv. Crouzan syndrome v. Local factors & systemic factors h) Development of salivary glands and clinical correlations <ul style="list-style-type: none"> i. Developmental anomalies of salivary glands i) Development of thyroid, parathyroid glands and thymus and clinical correlations <ul style="list-style-type: none"> i. Developmental anomalies related to thyroid, parathyroid and thymus gland j) Development of craniofacial muscles k) Development of ectodermal placodes and cranial ganglia relevant to Head and neck region l) Signaling molecules of craniofacial development 		
<p>2. <u>Early Tooth Development</u></p> <ul style="list-style-type: none"> a) Primary Epithelial Band b) Dental Lamina and its fate c) Vestibular Lamina d) Tooth developmental Stages and their histology <ul style="list-style-type: none"> i. Initiation ii. Bud stage iii. Cap stage iv. Outer and inner enamel epithelium v. Stellate reticulum vi. Dental papilla vii. Dental sac (dental follicle) viii. Bell stage <ul style="list-style-type: none"> ix. Inner enamel epithelium x. Stratum intermedium xi. Stellate reticulum xii. Outer enamel epithelium xiii. Dental papilla xiv. Advanced/late bell stage <ul style="list-style-type: none"> xv. Hertwig's epithelial root sheath xvi. Root formation 	12	01

<ul style="list-style-type: none"> e) Histophysiology <ul style="list-style-type: none"> i. Initiation ii. Proliferation iii. Histodifferentiation iv. Morphodifferentiation v. Apposition f) Molecular mechanisms of tooth shape and tooth type determination (patterning and morphogenesis) g) Tooth initiation potential h) Establishment of oral-aboral axis i) Control of tooth germ position j) Mechanism of control of tooth number k) Functional redundancy and their complexities l) Regulation of ectodermal boundaries n) Enamel knot-Signaling center for toothMorphogenesis o) Breakup of the dental lamina and crown pattern determination p) Nerve and vascular supply during early development, vascular supply and nerve supply q) Formation of permanent dentition r) Tissue engineering and Regeneration of tooth and dental stem cells n) Clinical consideration (anomalies related to tooth number, size, shape) 		
<p>3. <u>Bone---Development/structure/histology</u></p> <ul style="list-style-type: none"> a) Classification of Bones b) Gross morphology of bone c) Composition of Bone <ul style="list-style-type: none"> i. Chemical composition of bone ii. Organic matrix d) Histology of bone <ul style="list-style-type: none"> i. Osteoid ii. Bone organization e) Bone Cells types <ul style="list-style-type: none"> i. Osteoblasts ii. Osteocytes iii. Osteoclasts iv. Bone lining cells v. Osteoprogenitor cells vi. f) Regulation of bone cell formation <ul style="list-style-type: none"> i. Formation of osteoblasts ii. Formation of ostoclast g) Bone Development <ul style="list-style-type: none"> i. Intramembranous formation 	11	01

<ul style="list-style-type: none"> ii. Differences between immature bone and mature bone iii. endochondral bone formation h) Sutural bone growth i) Bone Resorption j) Bone Remodeling k) Alveolar Bone <ul style="list-style-type: none"> i. Development of Alveolar Process ii. Structure of the Alveolar Bone iii. Internal Reconstruction of Alveolar Bone l) Age Changes m) Clinical Considerations and Therapeutic Considerations 		
<p>4. <u>Enamel--- Development/ Histology/Structure</u></p> <ul style="list-style-type: none"> a) Development <ul style="list-style-type: none"> i. Epithelial enamel organ ii. Outer enamel epithelium iii. Stellate reticulum iv. Stratum intermedium v. Inner enamel epithelium vi. Cervical loop b) Histology <ul style="list-style-type: none"> i. Physical and chemical Characteristics of Enamel c) Amelogenesis <ul style="list-style-type: none"> i. Light Microscopy of Amelogenesis ii. Electron Microscopy of Amelogenesis/ life cycle of the ameloblasts iii. Development of Tomes process d) Ameloblast Secretory Products / enamel proteins e) Formation of enamel matrix, Mineralization and maturation of the enamel matrix f) Incremental line formation g) Molecular elements of ameloblast differentiation (gene transcription, membrane receptors, intracellular receptors) h) Regulation of pH During Enamel Formation i) Structural and Organizational Features of Enamel <ul style="list-style-type: none"> i. Rods ii. Structure and direction of striations, rod Interrelationships iii. Striae of Retzius iv. Cross striations v. Enamel cuticle vi. Bands of Hunter and Schreger vii. Gnarled Enamel viii. Enamel Tufts and Lamellae ix. Dentinoenamel Junction and 	12	01

<ul style="list-style-type: none"> x. Odontoblast process and Enamel Spindles xi. Enamel Surface j) Age Changes k) Defects of Amelogenesis l) Clinical Implications i. Fluoridation ii. Acid Etching iii. Enamel pearls 		
<p>5. <u>Dentine---Development/Histology/Structure</u></p> <ul style="list-style-type: none"> a) Basic Structure of Dentin b) Composition, Formation, and Structure of Dentin c) Types of Dentin <ul style="list-style-type: none"> i. Primary Dentin ii. Secondary Dentin iii. Tertiary Dentin d) Pattern of Dentin Formation e) Dentinogenesis <ul style="list-style-type: none"> i. Odontoblast Differentiation ii. Formation of Mantle Dentin iii. Vascular Supply iv. Control of Mineralization v. Pattern of Mineralization vi. Formation of Root Dentin vii. Secondary and Tertiary Dentinogenesis f) Histology of Dentin <ul style="list-style-type: none"> i. Dentinal Tubules ii. Peritubular Dentin iii. Sclerotic Dentin iv. Intertubular Dentin v. Interglobular Dentin vi. Incremental Growth Lines vii. Granular Layer of Tomes g) Pre-dentin h) Odontoblast process i) Innervation of Dentin j) Intratubular nerves k) Dentin Sensitivity and theories of pain transmission through dentin l) Permeability of Dentin m) Age and Functional Changes n) Vitality of dentin o) Reparative dentin p) Dead tracts q) Clinical Considerations 	12	01

Pulp--Development/Histology/Structure

- a) Anatomy
- b) General features
- c) Coronal pulp
- d) Radicular pulp
- e) Apical foramen
- f) Accessory canals
- g) Structural Features
 - i. Intercellular substance
 - ii. Fibroblasts
 - iii. Fibers
 - iv. Non fibrous matrix (Glycoaminoglycans, proetoglycans and glycoproteins
 - v. Undifferentiated mesenchymal cells
 - vi. Odontoblasts of pulp
 - vii. Defense cells
 - viii. Pulpal stem cells
 - ix. Blood vessels
 - x. Lymph vessels
 - xi. Nerves
 - xii. Nerve fiber types
 - xiii. Nerve endings
- h) Molecular events following pulp injury and repair
- i) Functions
 - i. Inductive
 - ii. Formative
 - iii. Nutritive
 - iv. Protective
 - v. Defensive or reparative
- j) Primary pulp
- k) Permanent pulp
- l) Dental pulp stem cells
- m) Regressive Changes (Aging)
 - i. Cell changes
 - ii. Fibrosis
 - iii. Vascular changes
 - iv. Pulp stones (denticles)
 - v. Diffuse calcifications
- n) Development
- o) Clinical Considerations
- p) Vasculature and Lymphatic Supply
- q) Innervation of pulp
- r) Response to Environmental Stimuli

6. Cementum---Development/ structure/ function

- a) Physical Characteristics
- b) Chemical Composition
- c) Cementogenesis
- d) Cementoblasts
- e) Cementoid tissue
- f) Structure
 - i. Acellular extrinsic fiber cementum
 - ii. Cellular cementum
 - iii. Cellular intrinsic fiber cementum (CIFC)
 - iv. Cellular mixed fiber cementum (CMFC)
 - v. Cellular mixed stratified cementum (CMSC)
 - vi. Differences between cementocytes and osteocytes
 - vii. Differences between AEFC and cellular intrinsic fiber cementum (CIFC)
- g) Cemento-dentinal Junction
- h) Cemento-enamel Junction
- i) Functions
 - i. Anchorage
 - ii. Adaptation
 - iii. Repair
- j) Clinical Considerations
 - i. Hypophosphatasia
 - ii. Hyper cementosis

11

01

Periodontal ligament--- Development/structure/functions

- a) Development
- b) Development of the principal fibers
- c) Development of cells
- d) Periodontal ligament collagen fiber attachment to the root surface
- e) Periodontal Ligament Homeostasis
- f) Cell Biology of Normal Periodontium
- g) Cells
 - i. Synthetic cells
 - ii. Osteoblasts
 - iii. Fibroblast
 - iv. Fibroblast-matrix adhesion and traction
 - v. Functions
 - vi. Differences between periodontal ligament fibroblasts and gingival fibroblasts
 - vii. Cementoblasts
 - viii. Resorptive cells

<ul style="list-style-type: none"> ix. Osteoclasts x. Fibroblasts xi. Intracellular degradation xii. Cementoclasts xiii. Progenitor cells xiv. Origin of the periodontal stem cells xv. Relationship between cells xvi. Epithelial rests of Malassez xvii. Defense cells xviii. Mast cells xix. Macrophages xx. Eosinophils 188 k) Extracellular Substance <ul style="list-style-type: none"> i. Fibers ii. Collagen iii. Oxytalan iv. Sharpey's fibers v. Intermediate plexus vi. Elastic fibers vii. Reticular fibers viii. Secondary fibers ix. Indifferent fiber plexus x. Ground substance xi. Interstitial tissue l) Structures Present in Connective Tissue <ul style="list-style-type: none"> i. Blood vessels ii. Lymphatic drainage iii. Nerves iv. Cementicles m) Functions <ul style="list-style-type: none"> i. Supportive ii. Sensory iii. Nutritive iv. Homeostatic v. Eruptive vi. Physical n) Age Changes in Periodontal Ligament o) Unique Features of Periodontal Ligament p) Clinical Considerations 		
<p>7. <u>Cytoskeleton, cell junction and fibroblasts</u></p> <ul style="list-style-type: none"> a) Cytoskeleton b) Intercellular Junctions c) Epithelium-Connective Tissue Interface d) Fibroblasts <ul style="list-style-type: none"> i. Cellular Organization 	11	01

- ii. Contraction and Motility
- iii. Junctions
- iv. Heterogeneity
- v. Aging
- e) Secretory Products of Fibroblasts
 - i. Collagens
 - ii. Collagen Synthesis and Assembly
 - iii. Elastin
 - iv. Proteoglycans
 - v. Glycoproteins
 - vi. Growth Factors and Cytokines
 - vii. Extracellular Matrix Degradation

Salivary glands-development, structure & function

- a) Functions of Saliva
 - i. Protection
 - ii. Buffering
 - iii. Pellicle Formation
 - iv. Maintenance of Tooth
 - v. Integrity
 - vi. Antimicrobial Action
 - vii. Tissue Repair
 - viii. Digestion
 - ix. Taste perception
 - x. Mastication and deglutition
 - xi. Speech
 - i. Excretion
- b) Composition of saliva
- c) Anatomy of salivary glands
 - ii. Parotid gland
- d) Development of salivary glands and its molecular regulation
- e) Structure of salivary glands
 - i. Secretory Cells (serous , mucous)
 - ii. Formation, composition, control and secretion of Saliva
 - iii. Myoepithelial Cells
 - iv. Ducts
 - v. Ductal Modification of Saliva
 - vi. Connective Tissue
 - vii. Basal cells and lymph nodes
 - viii. Nerve Supply
 - ix. Blood Supply
- f) Classification and histology of the Major Salivary Glands
 - i. Parotid Gland
 - ii. Submandibular Gland
 - iii. Sublingual Gland

<ul style="list-style-type: none"> g) Histology of the Minor Salivary Glands <ul style="list-style-type: none"> i. Labial and buccal glands ii. Glossopalatine glands iii. Palatine glands iv. Lingual glands v. Von Ebner's glands h) Clinical Considerations <ul style="list-style-type: none"> i. Age Changes ii. Diseases iii. Dry Mouth (Xerostomia) iv. Sialomicroliths v. Oncocytes vi. Staphne 's cavity (cyst) vii. Mucocele & ranulas viii. Sialoliths ix. Natural sequence of events of chronic sialoliths and sialolithiasis x. Tissue engineering and salivary gland regeneration 		
Total	80	07

M. Phil Oral Biology (Major Complusary)

Major Paper-II

TABLE OF SPECIFICATIONS

The grey areas of the course whose learning cannot be evaluated or are difficult to cover in MCQ's shall be used for framing SEQ's, which may be split into two parts if necessary; attempt shall be made to avoid duplication between MCQ'S and SEQ's. Distribution of MCQ's and SEQ's is with respect to the importance of topics. Table of Specification is also provided with the document

Note:

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Total Marks = 80

Time = 90 Minutes

SEQ's = 07

Total Marks = 70

Time = 90 Minutes

Total Marks of the Paper II = 150

Total Time = 03 Hours

SR. No	Topics Covered	No of SEQ	No of MCQ's
1.	General Aspects of Tooth morphology Forensic Dentistry, Comparative Anatomy and Geometrics Orofacial Complex: Form and Function	01	12
2.	Occlusion Morphology of deciduous dentition Pulp Morphology	01	11
3.	Morphology of permanent dentition	01	12
4.	Oral Physiology	01	11

5.	Oral Mucosa (Structure, Histology, Function & Development)	01	12
6.	Temporomandibular joint Physiological tooth movements, eruption and shedding Repair and Regeneration of oral tissues Facial growth	01	11
7.	Oral Anatomy , General Anatomy & Neuro-anatomy	01	11
8.	TOTAL	07	80

TABLE OF SPECIFICATION		No. of MCQ's	No. of SCQ's
Topics			
Paper II			
Oral Biology			
1. <u>General Aspects of Tooth Morphology, Forensic Dentistry,</u> <u>Comparative Anatomy and Geometrics, Orofacial Complex:</u> <u>Form and Function</u>			
<u>General Aspects of Tooth Morphology:</u> 1. Types of human dentition 2. Arrangement in dental arches i. Classes of teeth ii. Types of teeth 3. Trait categories of teeth 4. Nomenclature of teeth 5. Dental formulae in humans 6. Tooth Numbering Systems 7. Surfaces of the teeth 8. Divisions of crowns and roots into thirds 9. Line angles and point angles 10. Anatomical land marks on tooth surface i. Cusps		12	01

- ii. Tubercle
- iii. Cingulum
- iv. Lobe
- v. Membrane
- vi. Fossae
- vii. Sulcus
- viii. Grooves
- ix. Pits
- x. Fissures
- xi. Ridges
- xii. Embrasures

- 11. Anatomical landmarks on root surface (apex, apical foramen, accessory foramen, root trunk, furcation)
- 12. Malformations/ tooth anomalies
- 13. Chronology of Primary Dentition
- 14. Chronologies of permanent Dentition
- 15. Differences between primary and permanent teeth
- 16. Development and sequence of Eruption/Emergence, sequence, shedding of both dentitions
- 17. Changes in tooth shape after eruption
- 18. Dental Age
 - i. Based on status of tooth emergence /eruption in the oral cavity
 - ii. Based on stages of tooth formation observed on radiographs
- 19. Stages of Tooth Formation
 - i. Nolla stages
 - ii. Moorreee's 14 stages of permanent tooth formation
- 20.

Forensic Dentistry, Comparative Anatomy and Geometrics

- 1. Forensic Dentistry (Odontology)
 - i. Definitions in forensic dentistry
 - ii. Civil litigation and dentistry
 - iii. Identification of human remains
 - iv. Dental DNA
 - v. Bite Marks
 - vi. Role of forensic dentist in mass disaster
 - vii. Importance to practicing dentists
- 2. Evolution of teeth
 - i. General aspects of evolution of teeth
 - ii. Important changes in course of evolution of teeth
 - iii. Increase in tooth complexity favored by evolution
- 3. Comparative Dental Anatomy
 - i. General aspects of Fish, amphibian and reptile dentition
 - ii. Modern mammals (rodents, herbivorous, carnivorous)
- 4. Dental Anthropology

<ul style="list-style-type: none"> i. Categories of teeth by shape ii. Categories of teeth by generation iii. Metric and non-metric variations in teeth iv. Sexual dimorphism of teeth <ol style="list-style-type: none"> 5. Tooth forms and jaw movements 6. General facial and lingual aspects of all teeth 7. Summary of Schematic Outlines 8. Form and Function of the Permanent Dentition, <p>Orofacial Complex: Form and Function</p> <ol style="list-style-type: none"> 1. General aspects of Form and Function 2. Form Follows Function (Tooth forms and jaw movements) 3. Interproximal spaces and protection of interdental gingival 4. Proximal contact areas <ul style="list-style-type: none"> i. Significance of contact areas ii. Position of contact areas iii. Contact area location as viewed facially iv. Location of proximal contacts as viewed occlusally v. Interproximal spaces 5. Embrasures (types, forms, functions) 6. Facial and lingual physiological contours of teeth (anterior teeth , posterior teeth) 7. Curvatures of cervical lines on mesial and distal surfaces 8. Imaginary occlusal planes and curves Contact Areas and Incisal and Occlusal Embrasures from the Labial and Buccal Aspect, 9. Contact Areas and Labial, Buccal, and Lingual Embrasures from the Incisal and Occlusal Aspects, 10. Facial and Lingual Contours at the Cervical Thirds (Cervical Ridges) and Lingual Contours at the Middle Thirds of Crowns, 11. The Height of Epithelial Attachment: Curvatures of the Cervical Lines (Cemento-enamel Junction [CEJ]) mesially and Distally, 		
<p>2. <u>Occlusion, Morphology of Deciduous Dentition and Pulp chambers</u></p> <p>Occlusion</p> <ol style="list-style-type: none"> 1. Arch form, arch length, arch width 2. Characteristics of occlusion in permanent dentition <ul style="list-style-type: none"> i. Overlap of anterior teeth ii. Intra arch tooth contact iii. Angulations iv. Arch curvatures v. Incisor relationships vi. Molar relationship 	11	01

<ol style="list-style-type: none"> 3. Types of occlusions <ol style="list-style-type: none"> i. Ideal occlusion ii. Normal occlusion iii. Physiological occlusion iv. Functional occlusion v. Balanced occlusion vi. Uni and bilateral occlusion vii. Therapeutic occlusion viii. Traumatic occlusion ix. Centric occlusion x. Centric relation xi. Vertical relation of occlusion xii. Deflective occlusion xiii. Canine protected occlusion 4. Development of the occlusion <ol style="list-style-type: none"> i. Gum pad stage ii. Deciduous dentition stage iii. Mixed dentition stage iv. Permanent dentition stage 5. Primary Dentition <ol style="list-style-type: none"> i. Overview of the primary dentition ii. Interdental spacing iii. Primary arch form iv. Occlusion in deciduous dentition (anterior occlusion/ incisor relationship, posterior occlusion, Primary molar relationships- flush terminal plane, mesial and distal step) 6. Mixed (Transitional) Dentition <ol style="list-style-type: none"> i. Spacing ii. Molar relationship iii. Lee way space iv. 1st transitional period (emergence of 1st permanent molars, effect of flush terminal plane, early, late meisl shift and effects of mesial and distal steps, eruption of permanent incisors, incisor liability) v. Inter transitional period vi. Second transitional period (eruption of canine, ugly duckling stage, eruption of canine, premolars and 2nd molars, lee way space of Nance) 7. Permanent Dentition <ol style="list-style-type: none"> i. Intra arch tooth alignment ii. Dental arch form iii. Curvatures of occlusal planes (anterioposterior curve, mediolateral curve) iv. Mesial drift v. Inclination and angulations of the roots of the teeth/ vi. Orientation of long axis of the tooth vii. Forms of occluding surfaces of the teeth viii. Functional forms of teeth at incisal and occlusal thirds 		
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| <ul style="list-style-type: none"> 8. Occlusal relationships of upper and lower teeth <ul style="list-style-type: none"> i. Supporting or centric cusps ii. guiding or non-supporting cusps iii. centric stops (Concept of 138 points of occlusal contact) iv. buccolingual occlusal contacts v. mesiodistal occlusal contacts 9. Occlusal contacts of posterior teeth 10. Occlusal contacts during centric and eccentric positions of mandible <ul style="list-style-type: none"> i. Centric occlusal contacts (anterior & posterior) ii. Centric relation contacts iii. Cusp-fossa occlusion iv. Cusp-embrasure relationship v. Working contacts vi. Non working contacts vii. Protrusive contacts 11. Biomechanics of Chewing Function 12. Determinants of occlusal morphology 13. Tooth guidance (canine guidance, group functions, incisal guidance, condylar guidance) 14. Obtaining centric relation 15. Protrusive, retrusive and lateral movements 16. Angle 's classification <ul style="list-style-type: none"> i. Angle's classification of Malocclusion ii. Incisor classification (based on incisor relationship) iii. Canine classification (based on canine relationship) 17. Neurobehavioral Aspects of Occlusion <ul style="list-style-type: none"> i. Determinants of occlusal morphology ii. Occlusal stability iii. Guidance of occlusion iv. Adaptation v. Occlusal interferences vi. Vertical dimensions 18. Clinical considerations <ul style="list-style-type: none"> i. Malocclusion ii. Parafunctional habits iii. Occlusal trauma | | |
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The Primary (Deciduous) Teeth

- 1. Importance of Primary Teeth
- 2. Life cycle of deciduous dentition
- 3. Morphology of deciduous Maxillary central and lateral incisors
 - i. Labial aspects
 - ii. Palatal aspects
 - iii. Mesial aspects
 - iv. Distal aspects

- v. Incisal aspects
- 4. Morphology of deciduous Maxillary canines
 - i. Labial aspects
 - ii. Palatal aspects
 - iii. Mesial aspects
 - iv. Distal aspects
 - v. Incisal aspects
- 5. Morphology of deciduous Maxillary 1st and 2nd molars
 - i. Buccal aspects
 - ii. Palatal aspect
 - iii. Mesial aspects
 - iv. Distal aspects
 - v. Occusal aspects
- 6. Morphology of deciduous mandibular central and lateral incisors
 - ii. Labial aspects
 - iii. lingual aspects
 - iv. Mesial aspects
 - v. Distal aspects
 - vi. Incisal aspects
- 7. Morphology of deciduous mandibular canines
 - ii. Labial aspects
 - iii. lingual aspects
 - iv. Mesial aspects
 - v. Distal aspects
 - vi. Incisal aspects
- 8. Morphology of deciduous Mandibular 1st and 2nd molars
 - ii. Buccal aspects
 - iii. Lingual aspect
 - iv. Mesial aspects
 - v. Distal aspects
 - vi. Occusal aspects
- 9. Morphology of roots of all deciduous teeth

Pulp Morphology

- 1. Pulp cavity
- 2. Pulp chamber
- 3. Root canals
- 4. Classification of root canals (Weine's Classification)
- 5. Pulp anatomy of permanent maxillary teeth (incisors, canine, premolars, molars)
 - i. Pulp chamber
 - ii. Root canal

<ul style="list-style-type: none"> iii. Cross section iv. Access opening 6. Pulp anatomy of permanent mandibular teeth (incisors, canine, premolars, molars) <ul style="list-style-type: none"> ii. Pulp chamber iii. Root canal iv. Cross section v. Access opening 7. Clinical considerations <ul style="list-style-type: none"> i. Role of radiographs of pulp chambers and canals ii. Crown and root fractures 		
<p>3. Morphology of Permanent Dentition</p> <p>The Permanent Dentition</p> <p><u>The Permanent Maxillary Incisors:</u></p> <ul style="list-style-type: none"> 1. Maxillary Central Incisor <ul style="list-style-type: none"> i. Labial Surface ii. Palatal surface iii. Mesial surface iv. Distal surface v. Incisal surface 2. Maxillary Lateral Incisor <ul style="list-style-type: none"> i. Labial Surface ii. Palatal surface iii. Mesial surface iv. Distal surface v. Incisal surface <p><u>The Permanent Mandibular Incisors:</u></p> <ul style="list-style-type: none"> 3. Mandibular Central Incisor <ul style="list-style-type: none"> ii. Labial Surface iii. Lingual surface iv. Mesial surface v. Distal surface vi. Incisal surface 4. Mandibular Lateral Incisor <ul style="list-style-type: none"> i. Labial Surface ii. Lingual surface iii. Mesial surface iv. Distal surface v. Incisal surface 5. Class , arch and type traits of incisor teeth ; 	<p>12</p>	<p>01</p>

The Permanent Canines: Maxillary and Mandibular:

6. Maxillary Canine

- i. Labial Surface
- ii. Palatal surface
- iii. Mesial surface
- iv. Distal surface
- v. Incisal surface

7. Mandibular Canine

- i. Labial Surface
- ii. Lingual surface
- iii. Mesial surface
- iv. Distal surface
- v. Incisal surface

8. Class , arch and type traits of incisor teeth

The Permanent Maxillary Premolars

9. Maxillary First Premolar

- i. Buccal surface
- ii. Palatal surface
- iii. Mesial surface
- iv. Distal surface
- v. Occlusal surface

10. Maxillary Second Premolar

- i. Buccal surface
- ii. Palatal surface
- iii. Mesial surface
- iv. Distal surface
- v. Occlusal surface

The Permanent Mandibular Premolars:

11. Mandibular First Premolar

- i. Buccal surface
- ii. Lingual surface
- iii. Mesial surface
- iv. Distal surface
- v. Occlusal surface

12. Mandibular Second Premolar,

- i. Buccal Surface
- ii. Lingual surface
- iii. Mesial surface
- iv. Distal surface
- v. Occlusal surface

13. Class , arch and type traits of premolar teeth

The Permanent Maxillary Molars

14. Maxillary First Molar

- i. Buccal surface
- ii. Palatal surface
- iii. Mesial surface
- iv. Distal surface
- v. Occlusal surface

15. Maxillary Second Molar

- i. Buccal surface
- ii. Palatal surface
- iii. Mesial surface
- iv. Distal surface
- v. Occlusal surface

16. Maxillary Third Molar

- i. Buccal surface
- ii. Palatal surface
- iii. Mesial surface
- iv. Distal surface
- v. Occlusal surface

The Permanent Mandibular Molars

17. Mandibular First Molar

- i. Buccal surface
- ii. Lingual surface
- iii. Mesial surface
- iv. Distal surface
- v. Occlusal surface

18. Mandibular Second Molar

- i. Buccal surface

<ul style="list-style-type: none"> ii. Lingual surface iii. Mesial surface iv. Distal surface v. Occlusal surface <p>19. Mandibular Third Molar</p> <ul style="list-style-type: none"> i. Buccal surface ii. Lingual surface iii. Mesial surface iv. Distal surface v. Occlusal surface <p>20. Class , arch and type traits of molar teeth</p> <p>21. Morphology of roots of all permanent teeth</p>		
<p>4. <u>ORAL PHYSIOLOGY</u></p> <ul style="list-style-type: none"> a. Physiology of dental pain transmission through the oral cavity b. Mechano-reception in oral cavity c. Physiology and biochemistry of saliva, mechanism of saliva formation, secretion and flow d. Thermo-reception in oral cavity e. Physiology and mechanism of swallowing f. Physiology and mechanism of speech g. Physiology of vocal cord apparatus h. Physiology of and mechanism of mastication i. Physiology and mechanism of taste transduction j. Physiology of olfaction k. Types of jaw reflexes <ul style="list-style-type: none"> i. Jaw opening reflex ii. Jaw closing reflex iii. Unloading reflex l. Types of salivary reflexes m. Role and effects of hormones, vitamins and micro-nutrients on oral health and tissues <ul style="list-style-type: none"> i. Effects of sex hormones on periodontal health in puberty, menstruation, pregnancy , menopause and post menopause states ii. Effects on vitamins and micronutrients on oral and periodontal health n. Mechanism of calcium homeostasis and calcitropic hormones in the body <ul style="list-style-type: none"> i. Calcium regulation in the body ii. Phosphate regulation in the body iii. Role of Parathyroid hormone in maintaining calcium homeostasis iv. Role of calcitonin and Vitamin D in regulating calcium hemostasis 	<p>11</p>	<p>01</p>

<ul style="list-style-type: none"> o. Stephan's curve and Plaque Biochemistry <ul style="list-style-type: none"> i. Definitions of Pellicle, plaque, calculus ii. Mechanism of Plaque formation and Climax Community iii. Mechanism of calculus formation iv. Stephan's curve p. Physiology of stress and anxiety and its effects on oral cavity <ul style="list-style-type: none"> i. The neural axes of stress response ii. The neuro-endocrine axes of stress response iii. The endocrine axes of stress response q. Physiology of oral wound healing <ul style="list-style-type: none"> i. Phases of wound healing in the oral tissues ii. Cells involved in wound healing iii. Factors affecting wound healing r. Physiology of repair of oral tissues <ul style="list-style-type: none"> i. Repair after tooth extraction ii. Repair of periodontium 		
<p>5. <u>Oral Mucosa—Development/structure/function</u></p> <ul style="list-style-type: none"> a) Classification of Oral Mucosa b) Functions of Oral Mucosa <ul style="list-style-type: none"> i. Defense ii. Lubrication iii. Sensory iv. Protection c) Comparison of oral mucosa with skin and intestinal mucosa d) Basement membrane e) Lamina propria f) Submucosa g) Structure of the Oral Epithelium <ul style="list-style-type: none"> i. Cytokeratins ii. Keratinized epithelium iii. Stratum basale iv. Stratum spinosum v. Stratum granulosum vi. Stratum corneum h) Keratinocytes and nonkeratinocytes <ul style="list-style-type: none"> i. Keratinocytes ii. Nonkeratinocytes iii. Melanocytes iv. Langerhans cell v. Merkel cells vi. Non-keratinized epithelium i) Subdivisions of Oral Mucosa (keratinized and non-keratinized areas) <ul style="list-style-type: none"> i. Masticatory mucosa (gingiva and hard palate) ii. Hard palate 	12	01

<ul style="list-style-type: none"> iii. Gingiva iv. Blood and nerve supply v. Vermilion zone vi. Lining mucosa vii. Lip and cheek viii. Vestibular fornix and alveolar mucosa ix. Inferior surface of tongue and floor of oral cavity x. Soft palate xi. Specialized mucosa xii. Dorsal lingual mucosa xiii. Taste buds j) Gingival sulcus and Dentogingival junction <ul style="list-style-type: none"> i. Development of dentogingival junction ii. Shift of dentogingival junction iii. Sulcus and cuticles iv. Epithelial attachment v. Migration of epithelial attachment k) Development of Oral Mucosa l) Oral Epithelium <ul style="list-style-type: none"> i. Epithelial Proliferation ii. Epithelial Maturation iii. Ultrastructure of the Epithelial Cell iv. Cellular Events in Maturation v. Permeability and Absorption m) Specialized Mucosa <ul style="list-style-type: none"> i. Fungiform Papillae ii. Filiform Papillae iii. Foliate Papillae iv. Circumvallate Papillae n) Junctions in the Oral Mucosa <ul style="list-style-type: none"> i. Mucocutaneous Junction ii. Mucogingival Junction iii. Dentogingival Junction o) Age Changes in Oral Mucosa p) Clinical Considerations 		
<p>6. <u>Temporomandibular Joint, Physiological tooth movements, Eruption and Shedding, repair and regeneration, Facial growth and maxillary sinus</u></p> <p><u>Temporomandibular joint</u></p> <ul style="list-style-type: none"> a) Classification of Joints <ul style="list-style-type: none"> i. Fibrous Joints ii. Cartilaginous Joints 	11	01

iii. Synovial Joints

- b) Type of the Joint
- c) Development of the Joint
- d) Bones of the Joint
- e) Cartilage Associated with the Joint
- f) Histology of the articular surfaces of the joint
- g) Capsule, Ligaments of the Joint
- h) Intra articular disk of the joint
 - i. Collagen fibers
 - ii. Elastin fibers
 - iii. Ground substance
 - iv. Cells of the disk
- i) Synovial Membrane
- j) Condyle of the child
- k) Primary vs secondary cartilages
- l) Muscle Contraction
- m) Motor Unit/ muscles involved in TMJ movements
- n) Muscle Spindle
- o) Golgi Tendon Organ
- p) Muscles of Mastication
- q) Biomechanics of the Joint/ mandibular positions and movements
- r) Innervation of the Joint
- s) Blood Supply to the Joint
- t) Clinical considerations.

Physiological tooth movements, eruption and shedding.

- a) Pre eruptive Tooth Movement
- b) Eruptive Tooth Movements
- c) Histology of tooth movements
 - i. Pre-eruptive phase
 - ii. Eruptive phase
 - iii. Posteruptive phase
- d) Mechanisms of Eruptive Tooth Movement
- e) Theories of tooth eruption
 - i. Bone remodeling theory
 - ii. Root formation theory
 - iii. Vascular pressure theory
 - iv. Periodontal ligament traction theory
- f) Accommodation for Growth
- g) Compensation for Occlusal Wear
- h) Accommodation for Interproximal wear
- i) Posteruptive tooth movement
- j) Cellular and molecular events in eruption
- k) Clinical Considerations
- l) Shedding of Teeth
- m) Pattern of shedding

- n) Histology of Shedding
- o) Mechanism of Resorption and Shedding
- p) Remnants of deciduous teeth
- q) Retained deciduous teeth
- r) Submerged deciduous teeth
- s) Odontoclast
- t) Pressure
- u) Abnormal Tooth Movement
- v) Orthodontic Tooth Movement

Facial growth and development

- a) Facial Types
- b) Facial Profiles
- c) Male and Female Faces
- d) Age Changes
- e) Basic Concepts of Facial Growth
- f) Size Increases and Remodeling
- g) Displacement Process
- h) Curve of Occlusion
- i) Mandibular Condyle and Growth

Repair and Regeneration of oral tissues

- a) Wound Healing in Oral Mucosa
 - i. Initial Response to Wounding:
 - ii. Hemostasis
 - iii. Inflammatory Cell Activation, Migration, and Function
 - iv. Reparative Phase
 - v. Wound Contraction and Scarring
- b) Wound Healing at the Dentogingival Junction
- c) Repair of Enamel
- d) Repair of the Dentin-Pulp Complex
- e) Dental Caries
- f) Cavity Preparation
- g) Repair Following Tooth Extraction
- h) Alterations to the Periodontal Connective Tissues with the Development of Periodontal Inflammation
- i) Repair of the Periodontium
- j) Mechanisms of Repair and Regeneration of Periodontal Connective Tissues
- k) Stem Cells
- l) New Perspectives

7. General & Oral Anatomy and Neuro-anatomy

General Anatomy

- a. Germ cell formation and fertilization
- b. Prenatal development (embryonic stage, fetal stage)
 - a) Bilaminar Germ Disc
 - b) Trilaminar Germ Disc
 - c) The Embryonic Period
- c. Neurulation
- d. Formation and fate of three germ layer

Oral Anatomy

- i. Muscles of face
- ii. Arteries of face
- iii. Veins of face
- iv. Nerves of face
- v. Bone of the face
- vi. Scalp
- vii. Lymphatic drainage
- viii. Thyroid and parathyroid
- ix. Larynx
 - x. Trachea (Only Neck part)
- xi. Pharynx
- xii. Nose and nasal cavity
- xiii. Oral cavity and tongue
- xiv. Lymph nodes
- xv. Tonsils (lingual, palatine, pharyngeal)
- xvi. Skull; its major components
- xvii. Norma basalis, occipitalis, verticalis and lateralis
- xviii. Norma brontalis including bony orbital cavity and mandible
- xix. Cranial cavity, meninges and venous sinuses
- xx. Posterior triangle of the neck, fascia and lymphatics
- xxi. Anterior triangle of the neck
- xxii. Great vessels of the neck
- xxiii. Temporal and infra-temporal fossa
- xxiv. Temporomandibular joint
- xxv. Submandibular and Parotid region
- xxvi. Cervical plexuses

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Maxillary Sinus

- a) Definition
- b) Developmental Aspects
- c) Developmental Anomalies

<ul style="list-style-type: none"> d) Structure and Variations e) Microscopic Features f) Functional Importance g) Clinical Considerations 		
<p><u>General Neuro-anatomy</u></p> <ul style="list-style-type: none"> a) Brief overview of Neurobiology of neurons and neuroglia b) Brief overview of Nerve fibers c) Brief overview of Synapses and Neurotransmission d) Brief overview of Receptor Endings e) Brief overview of Effector endings f) Brief overview of Peripheral nerves g) Brief introduction to parts of Brain h) Brief introduction to Spinal cord and its ascending and descending tracts i) Brief introduction to autonomic nervous system (sympathetic and parasympathetic) j) Cranial Nerves I, II, III (course and clinical aspects) k) Cranial Nerves IV, V (course and clinical aspects) l) Cranial Nerve VI, VII, VIII (course and clinical aspects) m) Cranial Nerves IX, X (course and clinical aspects) Cranial Nerves XI, XII (course and clinical aspects) 		
Total	80	07