BDS SYLLABUS AS PER DENTAL COUNCIL OF INDIA NORMS

HUMAN ANATOMY, EMBRYOLOGY, HISTOLOGY & MEDICAL GENETICS

INTRODUCTION : 1. Anatomical terms. 2. Skin, superficial fascia & deep fascia 3. Cardiovascular system, portal system collateral circulation and arteries. 4. Lymphatic system, regional lymph nodes 5. Osteology - Including ossification & growth of bones 6. Myology – Including types of muscle tissue & innervation. 7. Syndesmology – Including classification of Joints. 8. Nervous system

HEAD & NECK: 01. Scalp, face & temple, lacrimal apparatus 02. Neck - Deep fascia of neck, posterior triangle, suboccipital triangle, anterior triangle, anterior median region of the neck, deep structures in the neck. 03.Cranial cavity - Meninges, parts of brain, ventricles of brain, dural venous sinuses, cranial nerves attached to the brain, pituitary gland. 04. Cranial nerves - III, IV, V, VI, VII, IX,XII in detail. 05. Orbital cavity – Muscles of the eye ball, supports of the eye ball, nerves and vessels in the orbit. 06. Parotid gland. 07. Temporo mandibular joint, muscles of mastication, infratemporal fossa, pterygo - palatine fossa. 08. Submandibular region 09. Walls of the nasal cavity, paranasal air sinuses 10. Palate 11. Oral cavity, Tongue 12. Pharynx (palatine tonsil and the auditory tube) Larynx. OSTEOLOGY – Foetal skull, adult skull, individual bones of the skull, hyoid bone and cervical vertebrae

EMBRYOLOGY : Oogenesis, Spermatogenesis, Fertilisation, Placenta, Primitive streak, Neural crest, Bilaminar and trilaminar embryonic disc, Intra embryonic mesoderm - formation and fate, notochord formation & fate, Pharyngeal arches, pouches & clefts, Development of face, tongue, palate, thyroid gland, pituitary gland, salivary glands, and anomalies in their development, Tooth development in brief.

HISTOLOGY : The Cell : Basic tissues - Epithelium, Connective tissue including cartilage and bone, Muscle Tissue, Nervous tissue : Peripheral nerve, optic nerve, sensory ganglion, motor ganglion, Skin Classification of Glands Salivary glands (serous, mucous and mixed gland), Blood vessels, Lymphoid tissue Tooth, lip, tongue, hard palate, oesphagus, stomach, ,duodenum ,ileum, colon, vermiform appendix Liver, Pancreas, Lung, Trachea ,Epiglottis, Thyroid gland , para thyroid gland , supra renal gland and pituitary gland, Kidney, Ureter, Urninary bladder, Ovary and testis.

MEDICAL GENETICS : Mitosis, meiosis, Chromosomes, gene structure, Mendelism, modes of inheritance

HUMAN PHYSIOLOGY

1. GENERAL PHYSIOLOGY: 1. Homeostasis: Basic concept, Feed back mechanisms 2. Structure of cell membrane, transport across cell membrane 3. Membrane potentials

2. BLOOD: Composition & functions of blood. Specific gravity, Packed cell volume, factors affecting & methods of determination. Plasma proteins - Types, concentration, functions & variations. Erythrocyte - Morphology, functions & variations. Erythropoiesis & factors affecting erythropoiesis. ESR- Methods of estimation, factors affecting, variations & significance. Haemoglobin - Normal concentration, method of determination & variation in concentration. Blood Indices - MCV, MCH, MCHC - definition, normal values, variation. 39 Anaemia - Definition, classification, life span of RBC's destruction of RBC's , formation & fate of bile pigments, Jaundice - types. Leucocytes : Classification, number, percentage, distribution morphology, properties, functions & variation. Role of lymphocytes in immunity , leucopoiesis life span & fate of leucocytes. Thromobocytes - Morphology, , number, variations, function & thrombopoiesis. Haemostatsis - Role of vasoconstriction, platelet plug formation in haemostasis, coagulation factors, intrinsic & extrinsic pathways of coagulation, clot retraction. Tests of haemostatic function, platelet count, clotting time, bleeding time, prothrombin time - normal values, method & variations. Anticoagulants - mechanism of action. Bleeding disorders. Blood groups: ABO & Rh system, method of determination, importance,indications & dangers of blood transfusion, blood substitutes. Blood volume: Normal values, variations. Body fluids : distribution of total body water, intracellular & extracellular compartments, major anions & cations in intra and extra cellular fluid. Tissue fluids & lymph : Formation of tissue fluid, composition, circulation & functions of lymph. Oedema - causes. Functions of reticulo endotrelial system.

3. MUSCLE AND NERVE: Classification of nerves, structure of skeletal muscle - Molecular mechanism of muscle contraction, neuromuscular transmission. Properties of skeletal muscle. Structure and properties of cardiac muscle & smooth muscle.

4. DIGESTIVE SYSTEM : Introduction to digestion : General structure of G.I. tract, Innervation. Salivary glands: Structure of salivary glands, composition , regulation of secretion & functions of saliva. Stomach: Composition and functions of gastric juice, mechanism and regulation of gastric secretion. Exocrine Pancreas - Structure, composition of pancreatic juice, functions of each component, regulation of pancreatic secretion. Liver : structure , composition of bile, functions of bile, regulation of secretion – Gall bladder : structure, functions. Small intestine - Composition, functions & regulation of secretion of intestinal juice. Large intestine - Functions. Motor functions of GIT: Mastication, deglutition, gastric filling & emptying, movements of small and large intestine, defecation.

5. EXCRETORY SYSTEM : Structure & functions of kidney, functional unit of kidney & functions of different parts. Juxta glomerular apparatus, renal blood flow. Formation of Urine : Glomerular filteration rate - definition, determination , normal values, factors influencing G.F.R. Tubular reabsorption - Reabsorption of sodium, glucose, water & other substances. Tubular secretion - secretion of urea, hydrogen and other substances. Mechanism

of concentration & dilution of urine. Role of kidney in the regulation of pH of the blood. Micturition : anatomy & innervation of Urinary bladder, mechanism of miturition & abonrmalities.

6. BODY TEMPERATURE & FUNCTIONS OF SKIN

7. ENDOCRINOLOGY: General endocrinology - Enumeration of endocrine glands & hormones - General functions of endocrine system, chemistry, mechanism of secretion, transport, metabolism, regulation of secretion of hormones. Hormones of anterior pituitary & their actions, hypothamic regulation of anterior pituitary function. Disorders of secretion of anterior pituitary hormones. Posterior pituitary : Functions, regulation & disorders of secretion. Thyroid: Histology, synthesis, secretion & transport of hormones, actions of hormones, regulation of secretion & disorders, Thyroid function tests. Adrenal cortex & Medulla -synthesis, secretion, action, metabolism, regulation of secretion of hormones & disorders. Other hormones - Angiotensin, A.N.F.

8. REPRODUCTION: Sex differentiation, Physiological anatomy of male and female sex organs, Female reproductive system : Menstrual cycle, functions of ovary, actions of oestrogen & Progesterone, control of secretion of ovarian hormones, tests for ovulation, fertilisation, implantation, maternal changes during pregnancy, pregnancy tests & parturition. Lactation, composition of milk, factors controlling lactation, milk ejection, reflex, Male reproductive system :spermatogenesis, semen and contraception.

9. CARDIO VASCULAR SYSTEM: Functional anatomy and innervation of heart Properties of cardiac muscle Origin & propagation of cardiac impulse and heart block. Electrocardiogram - Normal electrocardiogram. Two changes in ECG in myocardial infarction. 40 Cardiac cycle - Phases, Pressure changes in atria, ventricles & aorta. Volume changes in ventricles. Jugular venous pulse, arterial pulse. Heart sounds: Mention of murmurs. Heart rate: Normal value, variation & regulation. Cardiac output: Definition, normal values, one method of determination, variation, factors affecting heart rate and stroke volume. Arterial blood pressure: Definition, normal values & variations,determinants, regulation & measurement of blood pressure. Coronary circulation. Cardio vascular homeostasis - Exercise & posture.

10. RESPIRATORY SYSTEM: Physiology of Respiration : External & internal respiration. Functional anatomy of respiratory passage & lungs. Respiratory movements: Muscles of respiration, Mechanism of inflation & deflation of lungs. Intra pleural & intra pulmonary pressures & their changes during the phases of respiration. Mechanics of breathing - surfactant, compliance & work of breathing. Spirometry: Lung volumes & capacities definition, normal values, significance, factors affecting vital capacity, variations in vital capacity, FEV & its variations. Pulmonary ventilation - alveolar ventilation & dead space –

ventilation. Composition of inspired air, alveolar air and expired air. Exchange of gases: Diffusing capacity, factors affecting it. Transport of Oxygen & carbon dioxide in the blood. Regulation of respiration – neural & chemical. Hypoxia, cyanosis, dyspnoea, periodic breathing. Artificial respiration, pulmonary function tests.

11. CENTRAL NERVOUS SYSTEM: 1. Organisation of central nervous system 2. Neuronal organisation at spinal cord level 3. Synapse receptors, reflexes, sensations and tracts 4. Physiology of pain 5. Functions of cerebellum, thalamus, hypothalamus and cerebral cortex. 6. Formation and functions of CSF 7. Autonomic nervous system

12. SPECIAL SENSES : Fundamental knowledge of vision, hearing, taste and smell.

BIOCHEMISTRY AND NUTRITION

1. CHEMISTRY OF BIO-ORGANIC MOLECULES: Carbohydrates: Definition, biological importance and classification. Monosaccharides - Isomerism, anomerism. Sugar derivatives, Disaccharides. Polysaccharides. Structures of starch and glycogen. Lipids : Definition, biological importance and classification. Fats and fatty acids. Introduction to compound lipids. Hydrophobic and hydrophilic groups. Cholesterol. Bile salts. Micelle. Bimolecular leaflet. 42 Proteins: Biological importance. Aminoacids: Classification. Introduction to peptides. Proteins : Simple and conjugated; globular and fibrous. Charge properties. Buffer action . Introduction to protein conformation . Denaturation. Nucleic acids: Building units . Nucleotides. Outline structure of DNA and RNA. High energy compounds: ATP , Phosphorylamidines, Thiolesters, Enol phosphates.

2. MACRONUTERIENTS AND DIGESTION: Energy needs: Basal metabolic rate. Dietary carbohydrates, fibres. Dietary lipids, essential fatty acids. Nitrogen balance. Essential amino acids. Protein quality and requirement (methods for evaluation of protein quality to be excluded). Protein calorie malnutrition. Balanced diet. Enzymatic hydrolysis of dietary carbohydrates. Mechanism of uptake of monosaccharides. Digestion and absorption of triacylglycerols. Enzymatic hydrolysis of dietary proteins and uptake of amino acids.

3. MICRONUTRIENTS: Vitamins: Definition, classification, daily requirement, sources and deficiency symptoms. Brief account of water-soluble vitamins with biochemical functions. Vitamins A functions including visual process. Vitamin D and its role in calcium metabolism. Vitamin E. Vitamin K and gamma carboxylation. Introduction to antivitamins and hypervitaminosis. Minerals :Classification, daily requirement. Calcium and phosphate: sources, uptake, excretion, function. Serum calcium regulation. Iron: sources, uptake and transport. Heme and nonheme iron functions; deficiency. Iodine: Brief introduction to thyroxine synthesis. General functions of thyroxine. Fluoride: function, deficiency and excess. Indications of role of other minerals.

4. ENERGY METABOLISM Overview: Outlines of glycolysis, pyruvate oxidation and citric acid cycle. Beta oxidation of fatty acids. Electron transport chain and oxidative phosphyorylation. Ketone body formation and utilisation. Introduction to glycogenesis, glycogenolysis, fatty acid synthesis, lipogenesis and lipolysis. Gluconeogenesis. Lactate metabolism . Protein utilisation for energy. Glucogenic and ketogenic amino acids. Integration of metabolism.

5. SPECIAL ASPECTS OF METABOLISM: Importance of pentose phosphate pathway. Formation of glucuronic acid. Outlines of cholesterol synthesis and breakdown. Ammonia metabolism. Urea formation. Phosphocreatine formation. Transmethylation. Amines. Introduction to other functions of amino acids including one carbon transfer. Detoxication : Typical reactions. Examples of toxic compounds. Oxygen toxicity

6. BIOCHEMICAL GENETICS AND PROTEIN SYNTHESIS: Introduction to nucleotides; formation and degradation. DNA as genetic material. Introduction to replication and transcription. Forms and functions of RNA. Genetic code and mutation. Outline of translation process. Antimetabolites and antibiotics interfering in replication, transcription and translation. Introduction to cancer, viruses and oncogenes.

7. ENZYME AND METABOLIC REGULATION Enzymes: Definition, classification, specificity and active site. Cofactors. Effect of pH, temperature and substrate concentration. Introduction to enzyme inhibitors, proenzymes and isoenzymes. Introduction to allosteric regulation, covalent modification and regulation by induction/repression. Overview of hormones. Introduction to second messengers, cyclic AMP, calcium ion, inositol triphosphate. Mechanism of action of steroid hormones, epinephrine, glucagon and insulin in brief. Acid base regulation. Electrolyte balance.

8. STRUCTURAL COMPONENTS AND BLOOD PROTEINS: Connective tissue: Collagen and elastin. Glycosaminoglycans. Bone structure. Structure of membranes. Membrane associated processes in brief. Exocytosis and endocytosis. Introduction to cytoskeleton. Myofibril and muscle contraction in brief. Haemoglobin: functions. Introduction to heme synthesis and degradation. Plasma proteins: classification and separation. Functions of albumin. A brief account of immunoglobulins. Plasma lipoproteins: Formation, function and turnover.

9. MEDICAL BIOCHEMISTRY: Regulation of blood glucose. Diabetes mellitus and related disorders. Evaluation of glycemic status. Hyperthyroidism and hypothyroidism: Biochemical evaluation. Hyperlipoproteinemias and atherosclerosis, Approaches to treatment. Jaundice: Classification and evaluation. Liver function tests: Plasma protein pattern, serum enzymes levels. Brief introduction to kidney function tests and gastric function tests. Acid base imbalance. Electrolyte imbalance: evaluation. Gout. Examples of genetic disorders including

lysosomal storage disorders, glycogen storage disorders, glucose 6- phosphate dehydrogenase deficiency, hemoglobinopathies, inborn errors of amino acid metabolism and muscular dystrophy (one or two examples with biochemical basis will be adequate). Serum enzymes in diagnosis.

DENTAL ANATOMY, EMBRYOLOGY AND ORAL HISTOLOGY

I. TOOTH MORPHOLOGY

1. Introduction to tooth morphology: Human dentition, types of teeth,♦ & functions, Palmer's & Binomial notation systems, tooth surfaces, their junctions - line angles & point angles, definition of terms used in dental morphology, geometric concepts in tooth morphology, contact areas & embrasures - Clinical significance. 2. Morphology of permanent teeth : Description of individual teeth, along with their endodontic anatomy• & including a note on their chronology of development, differences between similar class of teeth & identification of individual teeth. Variations• & Anomalies commonly seen in individual teeth. 3. Morphology of Deciduous teeth : Generalized differences between Deciduous♦ & Permanent teeth. Description of individual deciduous teeth, including their chronology of development, endodontic♦ anatomy, differences between similar class of teeth & identification of individual teeth. 4. Occlusion : Definition, factors influencing occlusion - basal bone, arch, individual teeth, external♦ & internal forces & sequence of eruption. Inclination of individual teeth - compensatory curves.♦ Centric relation♦ & Centric occlusion - protrusive, retrusive & lateral occlusion. Clinical significance of normal occlusion.♦ Introduction to♦ & Classification of Malocclusion.

II. ORAL EMBRYOLOGY 1. Brief review of development of face, jaws, lip, palate & tongue, with applied aspects. 2. Development of teeth : Epithelial mesenchymal interaction, detailed study of different stages of development of crown, root♦ & supporting tissues of tooth & detailed study of formation of calcified tissues. Applied aspects of disorders in development of teeth.♦ 3. Eruption of deciduous & Permanent teeth : Mechanisms in tooth eruption, different theories♦ & histology of eruption, formation of dentogingival junction, role of gubernacular cord in eruption of permanent teeth. Clinical or Applied aspects of disorders of eruption.♦ 4. Shedding of teeth : Factors♦ & mechanisms of shedding of deciduous teeth. Complications of shedding.♦

III. ORAL HISTOLOGY 1. Detailed microscopic study of Enamel, Dentine, Cementum & Pulp tissue. Age changes & Applied aspects (Clinical and forensic significance) of histological considerations - Fluoride applications, transparent dentine, dentine hypersensitivity, reaction of pulp tissue to varying insults to exposed dentine ; Pulp calcifications & Hypercementosis. 2. Detailed microscopic study of Periodontal ligament & alveolar bone, age

changes, histological changes in periodontal ligament & bone in normal & orthodontic tooth movement, applied aspects of alveolar bone resorption. 3. Detailed microscopic study of Oral Mucosa, variation in structure in relation to functional requirements, mechanisms of keratinization, clinical parts of gingiva, Dentogingival & Mucocutaneous junctions & lingual papillae. Age changes & clinical considerations. 4. Salivary Glands : Detailed microscopic study of acini♦ & ductal system. Age changes♦& clinical considerations. 5. TM Joint : Review of basic anatomical aspects♦ & microscopiuc study & clinical considerations. 6. Maxillary Sinus : Microscopic study, anatomical variations, functions♦ & clinical relevance of maxillary sinus in dental practice. 7. Processing of Hard & soft tissues for microscopic study : Ground sections, decalcified sections♦ & routine staining procedures. 8. Basic histochemical staining patterns of oral tissues.

IV. ORAL PHYSIOLOGY 1. Saliva : Composition of saliva - variations, formation of saliva♦ & mechanisms of secretion, salivary reflexes, brief review of secretomotor pathway, functions, role of saliva in dental caries & applied aspects of hyper & hypo salivation. 2. Mastication : Masticatory force♦ & its measurement - need for mastication, peculiarities of masticatory muscles, masticatory cycle, masticatory reflexes & neural control of mastication. 3. Deglutition : Review of the steps in deglutition, swallowing in infants, neural control of deglutition♦ & dysphagia. 4. Calcium, Phosphorous & fluoride metabolism : Source, requirements, absorption, distribution, functions♦ & excretion, clinical considerations, hypo & hypercalcemia & hyper & hypo phosphatemia & fluorosis. 5. Theories of Mineralization : Definition, mechanisms, theories♦ & their drawbacks. Applied aspects of physiology of mineralization, pathological considerations - calculus formation.♦ 6. Physiology of Taste : Innervation of taste buds♦ & taste pathway, physiologic basis of taste sensation, age changes & applied aspects - taste disorders. 7. Physiology of Speech : Review of basic anatomy of larynx♦ & vocal cords. Voice production, resonators, production of vowels♦ & different consonants - Role of palate, teeth & tongue. Effects of dental prosthesis♦ & appliances on speech & basic speech disorders.

GENERAL PATHOLOGY

A. General Pathology –
1. Introduction to Pathology Terminologies The cell in health The normal cell structure The cellular functions
2. Etiology and Pathogenesis of Disease Cell Injury Types – congenital Acquired Mainly Acquired causes of disease (Hypoxic injury, chemical injury, physical injury, immunological injury)
3. Degenerations Amyloidosis Fatty change Cloudy swelling Hyaline change, mucoid degeneration

4. Cell death & Necrosis Apoptasis Def, causes, features and types of necrosis Gangrene - Dry, wet, gas Pathological Calcifications (Dystrophic and metastatic)
5. Inflammation - Definition, causes types, and features - Acute inflammation a. The vascular response b. The cellular response c. Chemical mediators d. The inflammatory cells e. Fate - Chronic inflammation Granulomations inflammation
6. Healing - Regeneration - Repair a. Mechanisms b. Healing by primary intention c. Healing by secondary intention d. Fracture healing e. Factors influencing healing process f. Complications
7. Tuberculosis - Epidemiology - Pathogenesis (Formation of tubercle) - Pathological features of Primary and secondary TB - Complications and Fate
8. Syphilis - Epidemiology - Types and stages of syphilis - Pathological features - Diagnostic criterias - Oral lesions
9. Typhoid - Epidemiology - Pathogenesis - Pathological features - Diagnostic criterias
10. Thrombosis - Definition, Pathophysiology - Formation, complications & Fate of a thrombus
11. Embolism - Definition - Types - Effects
12. Ischaemia and Infraction - Definition, etiology, types - Infraction of various organs
13. Derangements of body fluids - Oedema – pathogenesis Different types
14. Disorders of circulation - Hyperaemia - Shock
15. Nutritional Disorders - Common Vitamin Deficiencies
16. Immunological mechanisms in disease - Humoral & cellular immunity - Hypersensitivity & autommunity
17. AIDS and Hepatitis.
18. Hypertension - Definition, classification - Pathophysiology - Effects in various organs
19. Diabetes Mellitus - Def, Classification, Pathogenesis, Pathology in different organs
20. Adaptive disorders of growth - Atrophy & Hypertrophy, Hyperplasia, Metaplasia and Dysplasia
21. General Aspects of neoplesia a. Definition, terminology, classification b. Differences between benign and malignant neoplasms c. The neoplastic cell d. Metastasis e. Etiology and pathogenesis of neoplasia, Carcinogenesis f. Tumour biology g. Oncogenes and anti-oncogenes h. Diagnosis i. Precancerous lesions j. Common specific tumours, Sq papilloma & Ca, Basal cell Ca, Adenoma & Adenoca, Fibroma & Fibrosarcoma, Lipoma and liposarcoma
B. Systemic Pathology –
22 Anaemias - Iron Deficiency anaemia, Megaloblastic anaemia
23.Leukaemias - Acute and chronic leukaemias, Diagnosis and clinical features
24. Diseases of Lymph nodes - Hodgkin's disease, Non Hodgkins lymphoma, Metastatic carcinoma
25. Diseases of oral cavity - Lichen planus, Stomatitis, Leukoplakia, Sq cell Ca, Dental caries, Dentigerious cyst, Ameloblastoma

26. Diseases of salivary glands - Normal structure, Sialadenitis, Tumours
27. Common diseases of Bones - Osteomyelitis, Metabolic bone diseases, Bone Tumours, Osteosarcoma, Osteocalstoma, Giant cell Tumour, Ewing's sarcoma, Fibrous dysplasia, Aneurysmal bone cyst 28.Diseases of Cardiovascular system - Cardiac failuare - Congenital heart disease – ASD, VSD,PDA Fallot's Tetrology 47 - Infective Endocarditis - Atherosclerosis - Ischaemic heart Disease
29. Haemorrhagic Disorders Coagulation cascade Coagulation disorders - Platelet funtion - Platelet disorders

MICROBIOLOGY

A. GENERAL MICROBIOLOGY:
1. History, Introduction, Scope, Aims and Objectives.
2. Morphology and Physiology of bacteria.
3. Detail account of Sterlisation and Disinfection.
4. Brief account of Culture media and Culture techniques.
5. Basic knowledge of selection, collection, transport, processing of clinical Specimens and identification of bacteria.
6. Bacterial Genetics and Drug Resistance in bacteria.

B. IMMUNOLOGY:
1. Infection - Definition, Classification, Source, Mode of transmission and types of Infectious disease.
2. Immunity
3. Structure and functions of Immune system
4. The Complement System
5. Antigen
6. Immunoglobulins - Antibodies - General structure and the role played in defense mechanism of the body.
7. Immune response
8. Antigen - Antibody reactions - with reference to clinical utility.
9. Immuno deficiency disorders - a brief knowledge of various types of immuno deficiency disorders - A sound knowledge of immuno deficiency disorders relevant to dentistry.
10. Hypersensitivity reactions
11. Autoimmune disorders - Basic knowledge of various types - sound knowledge of autoimmune disorders of oral cavity and related structures.
12. Immunology of Transplantation and Malignancy
13. Immunehaematology

C. SYSTEMATIC BACTERIOLOGY:
1. Pyogenic cocci - Staphylococcus, Streptococcus, Pneumococcus, Gonococcus, Meningococcus – brief account of each coccus - detailed account of mode of spread, laboratory
diagnosis, Chemo therapy and prevention - Detailed account of Cariogenic Streptococci.
2. Corynebacterium diphtheriae - mode of spread, important clinical feature, Laboratory diagnosis,

Chemotherapy and Active immunisation.
3. Mycobacteria - Tuberculosis and Leprosy
4. Clostridium - Gas gangrene, food poisoning and tetanus.
5. Non-sporing Anaerobes - in brief about classification and morphology, in detail about dental
pathogens - mechanism of disease production and prevention.
6. Spirochaetes - Treponema pallidum - detailed account of Oral Lesions of syphilis, Borrelia vincentii.
7. Actinomycetes.
D. VIROLOGY:
1. Introduction
2. General properties, cultivation, host - virus interaction with special reference to Interferon.
3. Brief account of Laboratory diagnosis, Chemotherapy and immuno prophylaxis in general.
4. A few viruses of relevance to dentistry.
☐ Herpes Virus
☐ Hepatitis B Virus - brief about other types
☐ Human Immunodeficiency Virus (HIV)
☐ Mumps Virus
☐ Brief - Measles and Rubella Virus
5. Bacteriophage - structure and Significance
E. MYCOLOGY
1. Brief Introduction
2. Candidosis - in detail
3. Briefly on oral lesions of systemic mycoses.
F. PARASITOLOGY:
1. Brief introduction - protozoans and helminths
2. Brief knowledge about the mode of transmission and prevention of commonly seen parasitic infection in the region.

GENERAL AND DENTAL PHARMACOLOGY AND THERAPEUTICS

GENERAL PHARMACOLOGY:
1. General principles of pharmacology; sources and nature of drugs dosage forms; prescription writing; pharmacokinetics (absorption, distribution, metabolism and excretion of drugs), mode of action of drugs, combined effects of drugs, receptor mechanism of drug action, factors modifying drug response, adverse drug reactions; drug interactions, Implications of General Principles in clinical dentistry.
2. CNS drugs; General anaesthetics, hypnotics, analgescis psychotropic drugs, anti – epileptics, muscle relaxants, local anaesthetics, Implications of these drugs in clinical dentistry.
3. Autonomic drugs; sympathomimetics, antiadrenergic drugs parasympothomimetics and parasympatholytics, Implications of Autonomic drugs in clinical dentistry.

4. Cardiovascular drugs; Cardiac stimulants ; antihypertensive drugs, vasopressor agents, treatment of shock, Antianginal agents and diuretics, Implications of these drugs in clinical dentistry.
5. Autocoids: Histamine, antihistamines, prostaglandins, leukotriens and bronchodilators, Implications of Autocoids in clinical dentistry.
6. Drugs acting on blood : coagulants and anticoagulants, hematinics, Implications of these drugs inclinical dentistry.
7. G.I.T. Drugs, Purgatives, anti-diarrhoeal, antacids, anti-emetics, Implications of these drugs in clinical dentistry.
8. Endocrines; Emphasis on treatment of diabetes and glucocorticoids, thyroid and antithyroid agents, drugs affecting calcium balance and anabolic steroids, Implications of these drugs in clinical dentistry.
9. Chemotherapy: Antimicrobial agents (against bacteria, anaerobic infections, fungi, virus and broad spectrum). Infection management in dentistry. Phamacotherapy of Tuberculosis, leprosy and chemotherapy of malignancy in general. Implications of Chemotherpy in clinical dentistry.
10. Vitamins : Water soluble vitamins, Vit. D, Vit.K. and Vit. E, Implications of Vitamins in clinical dentistry.
11. Pharmacotherapy of emergencies in dental office and emergency drugs tray Implications of Pharmacotherapy in clinical dentistry.
12. Chealating agents – BAL,EDTA and desferrioxamine,

II. DENTAL PHARMACOLOGY

1. Anti - septics, astrigents, obtundents, mummifying agents, bleaching agents, styptics, disclosing agents, dentifrices, mouth washes, caries and fluorides.

DENTAL MATERIALS

STRUCTURE OF MATTER AND PRINCIPLES OF ADHESION:

Change of state, inter atomic primary bonds, inter atomic secondary bonds, inter atomic bond distance and bonding energy, thermal energy, crystalline structure, non crystalline structures, diffusion, adhesion and bonding and adhesion to tooth structures.

IMPORTANT PHYSICAL PROPERTIES APPLICABLE TO DENTAL MATERIALS

Physical properties are based on laws of mechanics, acoustics, optics, thermodynamics, electricity, magnetism, radiation, atomic structure or nuclear phenomena. Hue, value, chroma and translucency physical properties based on laws of optics, dealing with phenomena of light, vision and sight. Thermal conductivity & coefficient of thermal expansion are physical properties based on laws of thermodynamics. Stress, strain, proportional limit, elastic limit yield strength, modulus of elasticity, flexibility, resilience, impact, impact strength, permanent deformation, strength, flexure strength fatigue, static fatigue, toughness, brittleness, ductility & malleability, hardness, abrasion resistance, relaxation, rheology, Thixotropic, creep, static creep, dynamic creep, flow, colour, three dimensional colour – hue, values, chroma, Munsell system, metamersim, fluorescence, physical properties of tooth, stress during mastication

BIOLOGICAL CONSIDERATIONS IN USE OF DENTAL MATERIALS.

Materials used are with the knowledge of appreciation of certain biological considerations for use in oral cavity. Requirement of materials with biological compatibility. Classification of

materials from perspective of biological compatibility. eg. contact with soft tissues, affecting vitality of pulp, used for root canal fillings, affecting hard tissues of teeth, laboratory materials that could be accidentally be inhaled or ingested during handling. Hazards associated with materials: pH-effecting pulp, polymers causing chemical irritation, mercury toxicity, etc. Microleakage, Thermal changes, Galvanism, toxic effect of materials. Biological evaluation for systemic toxicity, skin irritation, mutagenecity and carcinogenicity.
Disinfection of dental materials for infection control.

GYPSUM & GYPSUM PRODUCTS.

Gypsum – its origin, chemical formula, Products manufactured from gypsum.
Dental plaster, Dental stone, Die stone, high strength, high expansion stone.
Application and manufacturing procedure of each, macroscopic and microscopic structure of each .Chemistry of setting, setting reaction, theories of setting, gauging water, Microscopic structure of set material.
Setting time: working time and setting time, Measurement of setting time and factors controlling setting time .
Setting expansion, Hygroscopic setting expansion – factors affecting each
Strength :wet strength, dry strength, factors affecting strength, tensile strength
Slurry – need and use.
Care of cast.
ADA classification of gypsum products
Description of impression plaster and dental investment
Manipulation including recent methods or advanced methods.
Disinfection : infection control, liquids, sprays, radiation
Method of use of disinfectants
Storage of material – shelf life

IMPRESSION MATERIALS USED IN DENTISTRY

Impression plaster, Impression compound, Zinc oxide eugenol impression paste & bite registration paste incl., non eugenol paste, Hydrocolloids, reversible and irreversible, Elastomeric impression materials. Polysulphide, Condensation silicones, Addition silicones, Polyether, Visible light cure polyether urethane dimethacrylate, Historical background & development of each impression material,
Definition of impression , Purpose of making impression, Ideal properties required and application of material, Classification as per ADA specification, general & individual impression material.
Application and their uses in different disciplines, Marketed as and their commercial names, Mode of
supply & mode of application bulk/wash impression. Composition, chemistry of setting ,Control of
setting time , Type of impression trays required, Adhesion to tray, manipulation, instruments &
equipments required. Techniques of impression, storage of impression, (Compatibility with cast and die
material). Any recent advancements in material and mixing devices. Study of properties: Working time,

setting time, flow, accuracy, strength, flexibility, tear strength, dimensional stability, compatibility with
cast & die materials incl., electroplating Biological properties: tissue reaction , Shelf life & storage of
material, Infection control – disinfection, Advantages & disadvantages of each material.
7). SYNTHETIC RESINS USED IN DENTISTRY.
Historical background and development of material, Denture base materials and their classification and
requirement
Classification of resins
Dental resins – requirements of dental resins, applications, polymerisation, polymerisation mechanism
stages in addition polymerisation, inhibition of polymerisation, co polymerization, molecular weight,
crosslinking, plastixizers, Physical properties of polymers, polymer structures types of resins.
ACRYLIC RESINS:
Mode of polymerisation: Heat activated, Chemically activated, Light activated, Mode of supply,
application, composition, polymerisation reaction of each. Technical considerations: Methods of
manipulation for each type of resin. Physical properties of denture base resin. Miscellaneous resins &
techniques: Repair resins, Relining and rebasing. Short term and long-term soft-liners, temporary crown
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and bridge resins, Resin impression trays, Tray materials, Resin teeth, materials in maxillofacial
prosthesis, Denture cleansers, Infection control in detail, Biological properties and allergic reactions.
RESTORATIVE RESINS:
Historical background, Resin based restorative materials, Unfilled & filled, Composite restorative
materials, Mode of supply, Composition, Polymerisation mechanisms: Chemically activated, Light
activated, Dual cure: Degree of conversion, Polymerisation shrinkage Classification of Composites:
Application, composition and properties of each Composites of posterior teeth, Prosthodontics resins for
veneering. Biocompatibility – microleakage, pulpal reaction, pulpal protection Manipulation of
composites: Techniques of insertion of Chemically activated, light activated, dual cure Polymerisation,
Finishing and polishing of restoration, Repair of composites Direct bonding Bonding: Need for bonding,

Acid - etch technique, Enamel bonding, Dentin bonding agents. Mode of bonding, Bond strength,
Sandwich technique its indication and procedure. Extended application for composites: Resins for
restoring eroded teeth, Pit and fissure sealing, Resin inlays system – Indirect & direct, Core build up,
Orthodontic applications.

8). METAL AND ALLOYS:

Structure and behaviour of metals, Solidification of metals, mechanism of crystallisation amorphous &
crystalline. Classification of alloys, Solid solutions, Constitutes or equilibrium phase diagrams:Electric
alloys, Physical properties, Peritectic alloys, Solid state reaction other binary systems: Metallography &
Heat treatment. Tarnish and corrosion. Definition: causes of corrosion, protection against corrosion.,
Corrosion of dental restorations, clinical significance of galvanic current. Dental Amalgam. History:
Definition of dental amalgam, application, Alloy classification, manufacture of alloy powder composition - available as.
Amalgamation : setting reaction & resulting structure , properties , Microleakage
Dimensional stability, Strength, Creep, Clinical performance
Manipulation: Selection of alloy, proportioning, mechanism of trituration, condensation, carving &
finishing. Effect of dimensional changes, Marginal deterioration., Repair of amalgam, mercury toxicity,
mercury hygiene.

DIRECT FILLING GOLD:

Properties of pure gold, mode of adhesion of gold for restoration forms of direct filling gold for using as
restorative material
Classification : Gold Foil, Electrolytic precipitate, powdered gold.
Manipulation: Removal of surface impurities and compaction of direct filling gold.
Physical properties of compacted gold, Clinical performance.

DENTAL CASTING ALLOYS:

Historical background, desirable properties of casting alloys.
Alternatives to cast metal technology: direct filling gold, amalgam, mercury free condensable intermetallic compound - an alternative to metal casting process. CAD-CAM process for metal &
ceramic inlays - without need of impression of teeth or casting procedure, pure titanium, most bio
compatible metal which are difficult to cast can be made into crowns with the aid of CAD-CAM
technology . Another method of making copings - by copy milling (without casting procedures).

Classification of casting alloys: By function & description.
Recent classification , High noble (HN), Noble (N) and predominantly base metal (PB) Alloys for crown & bridge, metal ceramic & removable partial denture. Composition, function,
constituents and application, each alloy both noble and base metal. Properties of alloys: Melting range, mechanical properties, hardness, elongation, modulus of elasticity, tarnish and corrosion.
Casting shrinkage and compensation of casting shrinkage. Biocompatability - Handling hazards & precautions of base metal alloys, casting investments used. Heat treatment : Softening & hardening heat treatment. Recycling of metals. Titanium alloys & their application , properties & advantages.
Technical considerations In casting . Heat source, furnaces.

DENTAL WAXES INCLUDING INLAY CASTING WAX

Introduction and importance of waxes. Sources of natural waxes and their chemical nature.
Classification of Waxes:
Properties: melting range, thermal expansion, mechanical properties, flow & residual stresses, ductility. Dental Wax: Inlay wax: Mode of supply : Classification & composition, Ideal requirements:
Properties of inlay wax: Flow, thermal properties Wax distortion & its causes.
Manipulation of inlay wax: Instruments & equipment required, including electrically heated instruments metal tips and thermostatically controlled wax baths.
Other waxes: Applications, mode of supply & properties.
corrective impressions, Bite registration wax.

DENTAL CASTING INVESTMENTS.

Definition, requirements, classification
Gypsum bonded - classification. Phosphate bonded, Silica bonded
Mode of Supply: Composition, application , setting mechanism, setting time & factors controlling.
Expansions :Setting expansion, Hygroscopic Setting expansion, & thermal expansion : factors affecting. Properties : Strength, porosity, and fineness & storage. Technical considerations: For Casting procedure, Preparation of die, Wax pattern, spruing, investing, control of shrinkage compensation, wax burnout, and heating the invested ring, casting.
Casting machines, source of heat for melting the alloy. Defects in casting.

SOLDERING, BRAZING AND WELDING

Need of joining dental appliances, Terms & Definition
Solders: Definition, ideal requirement, types of solders – Soft & hard and their fusion temperature, application. Mode of supply of solders, Composition and selection, Properties. Tarnish & corrosion resistance mechanical properties, microstructure of soldered joint.
Fluxes & Anti fluxes: Definition,
Function, Types, commonly used fluxes & their selection Technique of Soldering & Brazing : free hand soldering and investment, steps and procedure. Welding,: Definition, application, requirements, procedure, weld decay - causes and how to avoid it. Laser welding.

WROUGHT BASE METAL ALLOYS

Applications and different alloys used mainly for orthodontics purpose
1. Stainless steel

2. Cobalt chromium nickel
3. Nickel titanium
4. Beta titanium
Properties required for orthodontic wires, working range, springiness, stiffness, resilience, Formability,
ductility, ease of joining, corrosion resistance, stability in oral environment, bio compatibility
Stainless steels: Description, type, composition & properties of each type. Sensitisation & stabilisation , Mechanical properties – strength, tensile, yield strength, KHN. Braided & twisted wires their need
Solders for stainless steel, Fluxes, Welding
1. Wrought cobalt chromium nickel alloys, composition, allocation, properties, heat treatment, physical properties
2. Nickel – Titanium alloys, shape, memory & super elastic
3. Titanium alloys, application, composition, properties, welding, Corrosion resistance
DENTAL CEMENTS
Definition & Ideal requirements:
Cements: Silicate, Glass ionomer, metal modified glass ionomer, resin modified glass ionomer, zinc oxide eugenol, modified zinc oxide eugenol, zinc phosphate, zinc silico phosphate, zinc poly carboxylate,
Cavity liners and cement bases, Varnishes Calcium hydroxide, Gutta percha
Application, classification (general and individual), setting mechanism, mode of supply, Properties, factors affecting setting, special emphasis on critical procedures of manipulation and protection of cement, mode of adhesion, biomechansim of caries inhibition.
Agents for pulpal protection., Modifications and recent advances, Principles of cementation. Special emphasis on cavity liners and cement bases and luting agents.
DENTAL CERAMICS
Historical background & General applications.
Dental ceramics : definition, classification, application, mode of supply, manufacturing procedure, methods of strengthening. Properties of fused ceramic: Strength and factors affecting, modulus of elasticity, surface hardness, wear resistance, thermal properties, specific gravity, chemical stability, esthetic properties, biocompatability, technical considerations.
Metal Ceramics (PFM): Alloys - Types and composition of alloys. Ceramic - Type and Composition.
Metal Ceramic Bond - Nature of bond. Bonding using electro deposition, foil copings, bonded platinum foil, swaged gold alloy foil coping. Technical considerations for porcelain and porcelain fused metal restorations. Recent advances - all porcelain restorations, Manganese core, injection moulded, castable ceramics, glass infiltrated alumina core ceramic (In ceram), ceramic veners, inlays and onlays, and CAD
- CAM ceramic. Chemical attack of ceramic by fluoride. Porcelain furnaces.
ABRASION & POLISHING AGENTS
Definition of abrasion and polishing. Need of abrasion and polishing. Types of abrasives: Finishing, polishing & cleaning. Types of abrasives: Diamond, Emery, aluminium oxides garnet, pumice, Kieselgurh, tripoli, rouge, tin oxide, chalk, chromic oxide, sand, carbides, diamond, zirconium silicate, Zinc oxide

ABRASIVE ACTION :
Desirable characteristics of an abrasive, Rate of abrasion, Size of particle, pressure and speed. Grading of abrasive & polishing agents. Binder, Polishing materials & procedures used. Technical
consideration - Material and procedure used for abrasion and polishin Electrolytic polishing and
burnishing.
DIE AND COUNTER DIE MATERIALS INCLUDING ELECTROFORMING AND ELECTROPOLISHING.
Types – Gypsum products, Electroforming, Epoxy resin, Amalgam.
DENTAL IMPLANTS : Evolution of dental implants, types and materials.
MECHANICS OF CUTTING : Burs and points.
At the end of the course the student should have the knowledge about the composition, properties,manipulative techniques and their various commercial names.

DENTAL MATERIALS PERTAINING TO CONSERVATIVE DENTISTRY :

INTRODUCTION TO MATERIAL SCIENCE :Dental Amalgam-Definition, History, Classification, Manufacturing, Composition, Roll of each ingredients Low Copper & High Copper – Setting Reaction Properties, Manipulation, Mercury toxicity and hygiene

DENTAL CEMENTS: Introduction and Classification Cavity Liners, bases and Varnishes Calcium Hydroxide, Zinc Phosphate, Zinc Polycarboxylate, Zinc Oxide Eugenol and its modifications, Glass Ionomer cements and its modifications, Resin Cements Application, Classification, types, setting reaction, mode of supply, properties, factors affecting setting, manipulation, biocompatibility, advantages, Disadvantages, uses and all other relevant information about above individual cements

RESTORATIVE RESINS : Composite Resins History, Classification, Composition Polymerization, Filled and unfilled, Other types Properties, Biocompatibility, Acid Etching in detail, Dentin Bonding Agents-Generations, Concepts Sandwich technique, Pit & Fissure Sealants Clinical Implications,

ROOT FILLING MATERIALS Gutta Percha, Sealers, Direct Filling Gold Types, Degassing Properties Compaction

NEWER MODIFIED AMALGAMS Bonded amalgams

DENTAL CEMENTS: Silicate cements, Zinc silico Phosphates,

RESTORATIVE RESINS – Composite Resins Recent Advances, Indirect Composite materials, Root Filling materials, Mineral Trioxide Aggregate (MTA), Advances in Obturating materials:Miscellaneous Materials Smart Materials

GENERAL MEDICINE

1. INFECTIONS:Enteric fever, AIDS, Herpes Simplex, Herpes Zoster, Syphills Diphtheria

2. G.I.T: Stomatitis, gingival hyperplasia, dysphagia, acid septic disease, jaundice, acute and chronic hepatitis, cirrhosis of liver, ascites.

3. CVS: Acute rheumatic fever, rheumatic valvular heart disease, hypertension, ischemic heart disease, infective endocarditis, common arrthythmias, congenital heart disease, congestive cardiac failure.

4. RS: Pneumonia, COPD,Bronchiectasis, Pulmonary TB, Bronchial asthma, Lung Abcess.

5. HEMATOLOGY: Anaemias, bleeding & clotting disorders, leukemias, lymphomas, agranulocytosis, splenomegaly, oral manifestations, hematologic disorders, generalized Lymphadenopathy.

6. RENAL SYSTEM : Acute nephritis, Nephrotic syndrome, Nutrition, Avitaminosis, PEM

7. CNS: Facial palsy, facial pain including trigeminal neuralgia, Epilepsy, Meningitis and headaches including migraine.

8. ENDOCRINES: Diabetes Mellitus Acromegaly, Hypothyroidism, Thyrotoxicosis, Calcium metabolism and parathyroids.

9. CRITICAL CARE: Syncope, cardiac arrest, CPR, shock

10. INFECTIONS AND SYSTEMIC CONDITIONS: Infectious mononucleosis mumps Measles, rubella, Malaria Diarrhoea, Dysentery including Amoebiasis Malabsorption, Pleural effusion, Pneumothorax Lung cancers, Renal failure. Balanced diet, Examination of comatose patient Examination of cranial nerves., Addison's disease, Cushing's syndrome. Acute LVF, ARDS

11. GENERAL EXAMINATION: History taking, General physical examination including build, nourishment, pulse, BP, respiration, clubbing, cyanosis, jaundice, oedema, nails, lymph nodes & Oral Cavity., Examination of CVS, RS, abdomen and facial nerve.

GENERAL SURGERY

1.INTRODUCTION: History & Principles

2. WOUNDS, INFLAMMATION: Aetiology, Pathology & Management, Carbuncle, Cellulitis, Abscess, Ludwig's angina, Erysepelas, Tetanus, Gas Gangrene,

3. CHRONIC INFECTION : Tuberculosis, Syphilis, Leprosy, Actinomycosis, VIRAL INFECTIONS: HIV & Hepatitis B ,

4. SHOCK-Definition, Classification, Pathophysiology & Management

5. HAEMORRHAGE : Types, Aetiology, Clinical features & Management & Syncope, Blood groups & Blood transfusion

6. TUMOURS : classification, Aetiology, Methods of spread, Investigations & modalities of treatment, Ulcer, Cyst, Sinuses & fistulae – Definition, Classification, Aetiology and treatment, Lymphoma, Resuscitation, Tracheostomy – Indication, Procedure & management, Facial Nerve affections and Trigeminal Neuralgia, Salivary gland – Tumours, Classification, Pathology, Investigation and treatment

7. FRACTURES : Principles, Classification, Healing & management

8. STERILIZATION: Dressings – Types & uses, Sutures – Types of uses, Diathermy & other methods of Haemostasis,

9. SWELLINGS OF JAW: Dentigerous cyst, Admantinoma, Cleft Lip & Cleft Palate – Principles of management

10. NECK: Anatomy, Triangles, midline & lateral Swellings, Disease of Tonsils

Thyroid – Anatomy Physiology Benign & management diseases, clinical features and management, Biopsy – Types, Indication & Procedure, Benign diseases of mouth, Lip, Tongue & Palate, Oral Carcinoma – Aetiology, Pathology, investigation and management

11. BURNS: Aetiology, Classification Pathophysiology and management, Principles of Radiotherapy, Principles of Chemotherapy, Lymphoedema, Laryngocele, Tumours of Nasopharynx, Peripheral nerve Injuries, Parathyroid – Anatomy, Physiology Benign & Malignant diseases, Clinical features & Management, Operation Theatre techniques

12. HEAD INJURY, Blood Coagulation – Factors, mechanism Intrinsic and Extrinsic pathways., Deep Vein Thrombosis., Local Anaesthesia – Indications, Nature of Drugs used, Dosage, Toxicity, Principles of General Anaesthesia – Preoperative evaluation, stages of Anaesthesia, Nature of Drugs used & their toxicity, Peripheral Nerve Injuries, Varicose Veins

ORAL PATHOLOGY AND MICROBIOLOGY

1.DEVELOPMENTAL DISTURBANCES: Oral and paraoral structures, hard tissues, dental arch relations, disturbances related to -size,shape,number and structure of teeth, eruption and shedding, soft tissues: Lip,palate,oral mucosa,gingival,tongue and salivary glands CRANIOFACIAL ANOMALIES

2. BENIGN AND MALIGNANT TUMORS of oral cavity, Potentially Malignant Disorders of epithelial tissue origin.-Definitions and nomenclature-Epithelial dysplasia, Squamous papilloma, Oral nevi. Malignant tumors of epithelial tissue origin. -Oral squamous cell

carcinoma: Definition and nomenclature,etiopathogenesis, TNM staging, Broder's and Bryne's grading systems. Verrucous carcinoma, -Basal cell carcinoma: Definition etiopathogenesis and histopathology, -Malignant melanoma: Definition etiopathogenesis and histopathology LESIONS AND CONDITIONS: leukoplakia, erythroplakia,oral lichen planus and oral submucous fibrosis.

3. BENIGN AND MALIGNANT TUMORS OF CONNECTIVE TISSUE:- Fibroblast origin: Oral fibromas and fibromatosis, peripheral ossifying fibroma peripheral giant cell granuloma, pyogenic granuloma and Fibrosarcoma -Adipose tissue origin:Lipoma -Endothelial origin(blood and lymphatics: Hemangiomas and lymphangiomas, Hereditary hemorrhagic telangiactasia, Kaposi's sarcoma Bone and cartilage: Chondroma,osteoma,osteoid osteoma, benign osteoblastoma, osteosarcoma, torus palatinus and mandibularis, Muscle tissue origin: Leiomyoma.Rhabdomyoma,rhabdomyosarcoma. -Nerve tissue origin:Traumatic neuroma, neurilemmoma, neurofibroma -Lymphomas: Definition, classification, differences between Hodgkins and Non-Hodgkins lymphoma and Burkitts lymphoma, - Squamous acanthoma, Keratoacanthoma,-Angiomyoma, leiomyosarcoma-MEN syndrome, malignant nerve tumors, granular cell tumor,-Different histological grading systems,-Histological variants and molecular biology of squamous cell carcinoma-Histological variants-Clarks and Breslow system-Giant cell fibroma, myofibroma,fibromatosis,benign and malignant fibrous histiocytoma. LipoblastomaLiposarcoma-Vascular malformations,sturge weber syndrome, angiofibroma. hemangioendothelioma,hemangiopericytoma.Chondroblastoma and Ewing's sarcoma and other varients of lymphomas

4. TUMORS OF SALIVARY GLANDS: -Histogenesis, -Classification. -BENIGN TUMORS: pleomophic adenoma,Warthin tumor,myoepithelioma, -MALIGNANT TUMORS: mucoepidermoid carcinoma, adenoid cystic carcinoma, polymorphous low grade adenocarcinoma,

5. NON-NEOPLASTIC DISEASES OF SALIVARY GLANDS: -Xerostomia, Sjogren syndrome, Mickuliz syndrome, Sialadenosis, necrotizing sialometaplasia, mucocele and sialolithiasis

6. ODONTOGENIC AND NON-ODONTOGENIC CYSTS: -Definition, -Classification-Lesions: Keraocystic odontogenic tumor,dentigerous cyst, calcifying odontogenic cyst, radicular cyst and dental lamina cyst of new born and eruption cysts. Non-Odontogenic cysts: Solitary bone cyst and aneurismal bone cyst

7. ODONTOGENIC TUMORS -Definition -Classification, -Lesions: Ameloblastoma, Squamous odontogenic tumour, Calcifying epithelial odontogenic tumour, - Ameloblastic fibroma, fibrodentinoma, Ameloblastic fibrodentinoma, Ameloblastic fibro-odontoma, Complex odontoma,Compound odontoma, Ameloblastic carcinoma and malignant ameloblastoma.-Odontogenic fibroma (simple and WHOtype), Odontogenic myxoma or myxofibroma, Benign cementoblastoma,

8. BACTERIAL INFECTIONS of oral cavity-Tuberculosis, Syphilis, Diptheria, Noma, Leprosy, Actinomycosis, Tetanus.VIRAL INFECTIONS of oral cavity: -Herpes simplex,

Herpes zoster, Measles, Rubella, Herpangina, Mumps, Chicken pox, Molluscum contagiosum and Oral manifestations of HIV infection.MYCOTIC INFECTIONS of oral cavity - Candidiasis, South American Blastomycosis, North American Blastomycosis, Mucormycosis, Botromycosis, Tularemia, Melioidisis, Gonorrhea, Rhinoscleroma, Cat-Scratch disease-Rhinosporidiasis, Cryptococcosis, Coccidioidomycosis, Sporotrichosis

9. DISEASES OF THE PERIODONTIUM: Classification, -Etiopathogenesis, -Lesions: Gingivitis, ANUG, Gingival enlargement, desquamative gingivitis, Chronic and aggressive periodontitis. - Trauma from occlusion,

10. DENTAL CARIES: -Definition, -Classification, -Etiopathogenesis,Theories, microbiology of dental caries, histopathology of enamel, dentinal and cemental caries.

11. DISEASES OF PULP AND PERIAPICAL TISSUE -Definition, -Classification, -Lesions: acute pulpitis,chronic pulpitis,chronic hyperplastic pulpitis, pulp abscess,pulp necrosis,pulp fibrosis,periapical granuloma, periapical abscess, periapical cyst, -Sequale of pulpitis.

12. OSTEOMYELITIS: Definition, classification, etiopathogenesis, -Types: Acute and chronic suppurative Osteomyelitis, Garre's Osteomyelitis, Spread of oral infection, Focus of infection-Focal infection, Routes of spread of infection, -Space infections: cellulitis, space infections, ludwing's angina, Maxillary sinusitis,

13. PHYSICAL AND CHEMICAL INJURIES TO THE ORAL TISSUES -Traumatic cyst,bruxism,tooth ankylosis,linea alba,traumatic ulcerations of oral mucosa(eosinophilic granuloma),denture sore mouth, epulis fissuratum,mucocele, ranula, sialolithiasis,radiation effects of oral and paraoral tissues-osteoradionecrosis -Plumbism,mercury poisoning,argyria,effects of tetracycline

14. REGRESSIVE ALTERATIONS OF THE TEETH: -Attrition, abrasion and erosion sclerotic dentin, dead tracts, secondary dentin, pulp calcification, resorption of teeth,hypercementosis,cementicles Abfraction, Reticular Atrophy Of The Pulp

15. Replantation and transplantation of teeth , Implants and osseointegrated implants Disturbances Of Mineral Metabolism(Trace Elements)-Porphyria-Lysosomal storage diseases Disturbances of carbohydrate metabolism: mucopolysaccharidosis-Vitamin E-Progeria

16. HEALING OF ORAL WOUNDS -Factors affecting wound healing -Complications, -Healing of wounds: gingivectomy, biopsy, extraction and fracture), -Biopsy techniques, exfoliative cytology,

17. ORAL ASPECTS OF METABOLIC DISEASES -Classification, -Disturbances of mineral metabolism: calcium and phosphorus- osteoporosis, rickets. Fluoride and fluorosis. Disturbances of protein metabolism: marasmus and Kwashiorkor-Amyloidosis, -Avitaminosis: vitamin A,D,K.C and B-complex Disturbances of hormonal metabolism: Hypo and hyper pituitarism, Addison's disease, hypo and hyper parathyroidism, diabetes mellitus

18. ALLERGIC AND IMMUNOLOGIC DISEASES OF THE ORAL CAVITY -Definition and nomenclature, -Lesions: recurrent aphthous stomatitis,reiter's syndrome,behcet's syndrome,contact dermatitis and stomatitis, sarcoidosis

19. DISEASES OF BONE AND JOINTS: -Osteogenesis imperfecta, fibrous dysplasia, cherubism, cleidicranial dysplasia,Down's syndrome, Pagets disease, Cementoblastoma-Hyper and hypo parathyroidism, rickets -Developmental disturbances of TMJ,: ankylosis, rheumatoid arthritis, osteoarthritis

20. DISEASES OF BLOOD AND BLOOD FORMING ORGANS-RBC diseases: -Anemias: iron deficiency anemia and plummervinson syndrome, pernicious anemia and megaloblastic anemia, thalassemia, sickle cell anemia, aplastic anemia,erythroblastosis foetalis and polycythemia vera. -WBC diseases: agranulocytosis,cyclic neutropenia, leukocytosis and leucopenia, infectious mononucleosis,leukemias, -Platelet and coagulation diseases: Purpura, thrombocytopenia, hemophilia, von Willebrand's disease,

21. DISEASES OF THE SKIN -Ectodermal dysplasia, oral lichen planus, psoriasis, erhthema multiformae, pemphigus pemphigoid (bullous, cicatricial), epidermolysis bullosa, Lupus erythematosis, systemic sclerosis, Dyskeratosis congenita,

22. DISEASES OF NERVES AND MUSCLES -Trigeminal neuralgia, auriculotemporal syndrome, Bell's palsy, burning mouth syndrome, glossodynia and glossopyrosis, migraine-Classification of diseases of muscles, myasthenia gravis, myositis ossificansChronic Granulomatius Disease. Midline Lethal Granuloma, Uveoparotid Fever, Wegeners Granulomatosis, Angioedema, Craniofacial Dysostosis, Mandibulofacial Dysostosis, Pierre-Robin's Syndrome, Apert Syndrome, -Luxation and subluxation,TMJ syndrome, langerhans cell histiocytosis, eosinophilic granuloma and Hand-Schuller-Christian disease, Chediak – Higasi Syndrome, Thrombasthenia, Parahemophilia Keratosis Follicularis,White Sponge Nevus,Acanthosis Nigricans, Paraneoplastic Pemphigus,Hailey- Hailey Disease,Ehlers – Danlos Syndrome, Goltz's Syndrome Spenopalatine Neuralgia, Miscellaneous Disturbances of Nerves And Muscles

FORENSIC ODONTOLOGY

-Definitions and nomenclature

-Personal identification

-Dental identification-Palatal rugae patterns-Age estimation,-

BITE MARKS: classification, appearance, investigations, analysis, comparison and conclusion-Lip prints Identification In Disasters, Identification From Dental DNA, Dental Profiling, Sex Identification From Craniofacial Morphology And Dimensions And By DNA Analysis

PUBLIC HEALTH DENTISTRY

1.INTRODUCTION: History of Dentistry (India and abroad), Definitions - Public Health

Introduction, Definition, History, Changing concepts, History of Public Health In India Characteristic method and Technique,

2.DENTAL PUBLIC HEALTH Aims, and Objectives, Tools, Procedural Steps in Dental Public Health, Similarities and dissimilarities between Clinical Dentistry and Public Health Dentistry, Functions of the public health dentist,

3. SURVEY: Need, Aims of a Survey, types of survey ,Oral health Surveys Basic Methods (WHO-1997), Program Planning and Evaluation. Planning cycle, types of evaluation

4. BIOSTATISTICS:Introduction, Application in Dentistry ,data collection, Sampling techniques -Measures of Central Tendency,Measures of Dispersion, Normal Curve, Presentation of data- Tables, charts and Diagram. Tests of Significance,Confidence limits.

5. GENERAL EPIDEMIOLOGY Introduction, Definition, Aims and Objectives, Principles, Difference between clinical medicine and Epidemiology, Basic measurement in Epidemiology, Incidence and Prevalence. Descriptive Epidemiology, Analytical Epidemiology (Case control and Cohort study), Experimental Epidemiology. Uses of Epidemiology.

6. HEALTH Definition, Changing concepts, Dimension, Determinants, Ecology, and Spectrum of health.

7. DISEASE Concepts, Natural history, Epidemiological Triad, Iceberg Phenomenon, Spectrum of disease and Dynamics of disease transmission. Concepts of prevention(Levels and modes of intervention)

8. ENVIRONMENT AND HEALTH Water: Norms of Potability, uses of water and sources, purification of water (Large and small scale), hardness of water, -Air: Composition, air pollution, effects, prevention and control of air pollution.

9. SOCIAL ENVIRONMENT Definitions, Types of Family, Influence of culture on oral health, Influence of social class on oral health, Types of social classes. Utilization of dental care according to social class,

10. WASTE DISPOSAL, Sources of refuse, health hazard and methods of Disposal

11. COMMUNICATION FOR HEALTH EDUCATION. Definition, communication process, types, barriers, approaches in health education, health education and Propaganda, Contents of Health Education, Principles, methods, and aids,

12. SCHOOL HEALTH PROGRAMMES Aims, elements, advantages, disadvantages, School Health programs in developing and developed countries

13. EPIDEMIOLOGY OF DENTAL CARIES Host, agent and Environmental factors.

Levels of prevention for dental caries, Prevention and control of Dental caries.

14. FLUORIDES: Introduction, History, Physiology of Fluoride, sources, Systemic fluoridation, topical fluoride, Defluoridation, toxicity, safety dose, Caries vaccine. Caries Activity tests

Pit and fissure sealant.

15. EPIDEMIOLOGY OF PERIODONTAL DISEASE. Host, agent and Environmental factors. Prevalence of periodontal disease. Prevention and control of Periodontal Disease.

Levels of prevention for periodontal disease. Plaque control

16. EPIDEMIOLOGY AND PREVENTION AND CONTROL of malocclusion, oral cancer.

Host, agent and Environmental factors. Prevalence, Levels of prevention for oral cancer.

17. INDICES. Introduction, classification, ideal requisites, uses. Dental caries indices – DMFT, DMFS, dmft, deft, dft, dfs, defs, Gingival Indices - Loe and Sillness indexnPlaque Indices- Sillness and Loe index. Oral hygiene indices- OHI and OHI-S Periodontal Indices- Russell's periodontal index, CPITN, CPI. Dental fluorosis Index- Dean's fluorosis index WHO proforma 1997

18. PROVISION OF DENTAL CARE Private and group practice, Part time practice, HMO, PPO, Neighborhood health clinic, Portable equipments.

19. DENTAL PAYMENTS.Types of dental payments in detail Dental insurance

20. DENTAL AUXILIARIES.Definition, classification, description of each in Detail , New type of dental auxiliaries, Degree of supervision of auxiliaries Health care of the community

21. PHC, Elements of primary health care, Principles of primary health care. Health care system in India.- Public sector, private sector, indigenous systems voluntary health agency, National health program and National oral health care program, Health agencies around the world.

WHO

Dental council of India

Dentist's Act 1948

Indian Dental Association. Structure, functions.

Ethics, Ethical Principles, Ethical rules for Dentists

Dental Jurisprudence and Consumer Protection Act

22. DENTAL PRACTICE MANAGEMENT

Areas for consideration - planning, finance, setting up of fees, quality care, records, Legal implications, Consumer related aspects.

Child psychology Classification and behavior management.

Computers in dentistry Atraumatic restorative treatment Recent dental caries index i.e. ICDAS Indices for incipient caries Community fluorosis index.

23. PROVISION OF DENTAL CARE IN INDIA National Rural Health Mission

Contribution of centre and state in oral health in India, oral health care for special groups

Indian Association of Public Health Dentistry, International Labor organization.

International food Organization. WHO goals for oral health.

Organisation of IDA in India Nuremberg code, Declaration of Geneva, World medical association, International code of Medical ethics, Declaration of Helsinki Ethics in Dental Research Classification of malpractice

New materials for ART , Evaluating a public health problem (Problem Based learning) Regression techniques

Association and Causation Investigation of an epidemic

24. RECENT ADVANCES IN EPIDEMIOLOGY Epidemic, endemic and pandemic diseases across the world.

Light, Requirement of good lighting, Natural and artificial light, methods of artificial lighting.

Noise: Sources, properties, effects, control.

Radiation: Sources, Types, Biological Effects, Radiation protection. Social and Cultural Anthropology. Dental waste disposal. Health promotion, Approaches to Health Promotion.

WHO contribution, Implementation of school health program. Trends in dental caries in developed and developing countries Caries risk assessment i.e. Cariogram

Chairside caries activity test newer advances in pit and fissure sealants Periodontal risk assessment

Tobacco control and Habit cessation. New modalities in diagnosis of oral cancer

Genetics and oral cancer Malocclusion indices-.

PERIODONTOLOGY

1.INTRODUCTION: Definition of Periodontology, Periodontics, Periodontia

2. DEVELOPMENT OF PERIODONTAL TISSUES: 02 HRS Micro –structural Anatomy & biology of periodontal tissues in detail, gingiva, junctional epithelium in detail, epithelial - mesenchymal interaction, periodontal ligament cementum alveolar bone.

3. DEFENSIVE MECHANISMS IN THE ORAL CAVITY: Role of epithelium, gingival fluid, saliva and other defensive mechanisms in the oral environment.

Age change in periodontal structures

4.CLASSIFICATION OF PERIODONTAL DISEASES: need for classification, classification of gingival and periodontal diseases as described in world workshop 1989, AAP 1999.

GINGIVITIS:-Plaque associated, ANUG, steroid hormone influenced, medication influenced, desquamative gingivitis, other forms of gingivitis as in nutritional deficiency, bacterial and viral infections etc.

PERIODONTITIS :-Chronic periodontitis, aggressive periodontitis, and refractory periodontitis.

GINGIVAL DISEASES: Localized and generalized gingivitis. Papillary, marginal and diffuse gingivitis. Etiology, pathogenesis, clinical signs, Symptoms and management of Plaque associated gingivitis. Systemically aggravated gingivitis, hormones, drugs and systemic diseases, ANUG, Periocoronitis,

GINGIVAL ENLARGEMENT (Classification & differential diagnosis)

Extension of Inflammation from Gingiva:- Mechanism of spread of inflammation from gingival area to deeper periodontal structures. Factors that modify the spread

POCKET Definition, signs and symptoms, classification, pathogenesis, histopathology, root surface changes and contents of the pocket Etiology

5. DENTAL PLAQUE (Bio film)- Definition, new concept of bio film, Types composition, bacterial colonization, growth, maturation and disclosing agents. Role of dental plaque in periodontal diseases. Plaque microorganisms in details and bacteria associated with periodontal diseases. Plaque retentive factors Material alba:- Food debris

6. CALCULUS Definition, Types, composition, attachment, theories of formation Role of calculus in disease

7. FOOD IMPACTION:- Definition, Types, etiology, Hirschfeld's classification Signs, symptoms & sequelae of treatment

8. TRAUMA FROM OCCLUSION Definition, types, Histopathological changes, Role in periodontal disease, Measures of management in brief

9. SYSTEMIC DISEASE Diabetes, sex hormones, nutrition (vit. C.& proteins)

Aids & periodontium, Hemorrhagic diseases, Leukemia, clotting factor disorders, PMN disorders, Risk factors, Definition, risk factors for periodontal diseases. Host Response

Mechanism of initiation and progression of periodontal diseases

Basic concepts about cells, mast cells neutrophils, macrophages, lymphocytes, immunoglobulins, complement system, immune mechanisms and cytokines in brief.

Stages in gingivitis –initial, early, established and advanced

10. PERIODONTITITS etiology, histopathology, clinical signs and symptoms, diagnosis and treatment of chronic periodontitis, periodontal abscess, definition, classification, pathogenesis, differential diagnosis and treatment. Furcation involvement Glickman's, classification, prognosis and management. Aggressive periodontitis. Periodontitis associated with systemic diseases, Refractory periodontitis- Diagnosis, Routine procedures, method of probing, type of probes (according to case history),

11. HALITOSIS etiology and treatment, mention advanced diagnostic aids and theirs role in brief. Prognosis, Definition, types, purpose and factors to be taken into consideration Treatment Plan Factors to be considered Periodontal therapy

General principles of periodontal therapy. Phase I,II,II, IV therapy

Definition of periodontal regeneration, repair, new attachment.

12. PLAQUE CONTROL Mechanical tooth brushes, interdental cleaning aids, dentifrices.

Chemical: Classification and mechanism of action of each & pocket irrigation. Pocket eradication procedures-

13. SCALING AND ROOT PLANNING – Indication, Aims and objectives, Healing following root planning, Hand instruments, sonic, ultrasonic & piezo electric scalers.

14. CURETTAGE and present concepts Definition, Indications, Aims and objectives, Procedures and healing response,

15. FLAP SURGERY Definition, Types of flaps designs of flap papilla preservation, Indication and contraindications, Armamentarium , Surgical procedure and healing response

16. OSSEOUS SURGERY Osseous defects in periodontal diseases Definition, Classification Surgery : Resective, additive osseous surgery (osseous grafts with classification of grafts)

Healing responses, Other regenerative procedures : root conditioning Guided tissue regeneration,

17. MUCOGINGIVAL SURGERY & PERIODONTAL PLASTIC SURGERIES

Definition, Mucogingival problem : etiology, classification of gingival recession (P.D. Miller Jr. & Sullivan and Atkins), Indication and objectives, Gingival extension procedures : lateral

pedicle graft frenectomy, frenotomy, frenoplasty, Crown lengthening procedures Periodontal microsurgery in brief

18. SPLINTS Periodontal splints, Purpose and classification principles of splinting

19. HYPERSENSITIVITY Causes, theories & management

20. IMPLANTS Definition, types scope and biomaterials uses.

21. MAINTENANCE PHASE Aims, objective, & principles, Importance, Pharmaco – Therapy periodontal dressings, Antibiotics and anti inflammatory drugs local drugs delivery system. Periodontal management of medically compromised patients

Topics concerning periodontal management of medically compromised patients

22. INTER - DISCIPLINARY CARE Pulpo- periodontal involvement, Perio ortho,

Systemic Effects of periodontal diseases in brief Cardiovascular diseases, low birth weight babies diabetes etc

23. INFECTION CONTROL PROTOCOL

Sterilization and various aseptic procedures

Desquamative Gingivitis:- Gingivitis associated with lichen planus, pemphigoid, pemphigus, and other vesiculobullous lesions, Allergic gingivitis, Infective gingivitis – herpetic, bacterial and candidial. Epidemiology of Periodontology Disease

24. INDICES:Definition of index, incidence, prevalence, epidemiology endemic epidemic and pandemic, Classification of indices (Irreversible and reversible) Deficiencies of earlier indices used in Periodontics Detailed understanding of silness & Loe Plaque index, loe & silness Gingival index, CPITN & CPI -Prevalence of periodontal disease in India and other countries. Public health significance

25. HABITS - Their periodontal significance Bruxism and parafunctional habits, tongue thrusting, lip biting, occupational habits.

26. PROSTHODONTICS INTERRELATIONSHIP,Bridges and other prosthesis, pontics (types), surface contour, relationships of margins to the periodontium, gingival protection theory, muscle action theory and theory of access to oral hygiene

27. ORTHODONTICS INTERRELATIONSHIP: removable appliances and fixed appliances Retention of plaque, bacterial changes Periodontal disease activity, continuous paradigm, random burst and asynchronous multiple burst hypothesis. Periodontal considerations ; such as implant bone interface, implant – gingival interface, implant failure, peri- implantitis and management Procedures

Maintenance of implants

ORTHODONTICS & DENTOFACIAL ORTHOPAEDICS

1.INTRODUCTION Definition, Historical Background, aims and Objectives of Orthodontics and Need for Orthodontics care

2. GROWTH AND DEVELOPMENT In General a. Definition, Growth spurts and Differential growth, Factors influencing growth and Development, Methods of measuring growth

Growth theories (Genetic, Sicher's, Scott's,Moss's, Petrovic's, Multifactorial) Genetic and epigenetic factors in growth Cephalocaudal gradient in growth

Morphologic Development of Craniofacial structures Methods of bone growth Prenatal growth of craniofacial structures, Postnatal growth and development of cranial base, maxilla, mandible, dental arches and occlusion.

3.FUNCTIONAL DEVELOPMENT OF DENTAL ARCHES AND OCCLUSION

Factors influencing functional development of dental arches and occlusion

forces of occlusion - Wolff's law of transformation of bone, Trajectories of forces

Clinical Application of Growth and development.

4. MALOCCLUSION - In General, Concept of normal occlusion, Definition of malocclusion

Description of different types of dental, skeletal and functional malocclusion. Classification of Malocclusion, Principle, description, advantages and disadvantages of classification of malocclusion by Angle's, Simon's, Lischer's and Ackerman and Proffitt's

Normal and Abnormal Function of Stomatognathic system,

5. ETIOLOGY OF MALOCCLUSION Definition, importance, classification, local and general etiological factors., Etiology of following different types of malocclusion: Midline diastema,

Spacing, Crowding, Cross - Bite: Anterior / Posterior, Class III Malocclusion, Class II Malocclusion, Deep Bite, Open Bite, habits

6. DIAGNOSIS AND DIAGNOSTIC AIDS Definition, Importance and classification of diagnostic aids, Importance of case history and clinical examination in orthodontics

Study Models: - Importance and uses - Preparation and preservation of study models

Importance of intraoral X-rays in orthodontics, Panoramic radiographs:- Principles, Advantages, disadvantages and uses,

Cephalometrics: Its advantages, disadvantages Definition, Description and use of cephalostat

Description and uses of anatomical landmarks lines and angels used in cephalometric analysis

Analysis - Steiner's, Down's, Tweed's, Rickett's- E- line,

Electromyography and its uses in orthodontics, Hand and Wrist X-rays and its importance in orthodontics

7. GENERAL PRINCIPLES IN ORTHODONTIC TREATMENT PLANNING Of Dental And Skeletal Malocclusions

Anchorage In Orthodontics- Definition, Classification, Types and Stability Of Anchorage

Biomechanical Principles In Orthodontics Tooth movement- Different types of tooth movements, Tissue response to orthodontic force application, Age factor in orthodontic tooth movement, Theories of Tooth Movement

8. PREVENTIVE ORTHODONTICS Definition, Different procedures undertaken in preventive orthodontics and their limitations.

9. INTERCEPTIVE ORTHODONTICS Definition, Different procedures undertaken in interceptive orthodontics, Serial extractions: Definition, indications, contraindication, technique, advantages and disadvantages. Role of muscle exercises as an interceptive procedure,

10. CORRECTIVE ORTHODONTICS Definition, factors to be considered during treatment planning.,

11. MODEL ANALYSIS: Pont's, Ashley Howe's, Bolton's, Carey's, Moyer's Mixed Dentition Analysis

12. METHODS OF GAINING SPACE IN THE ARCH:- Indications, relative merits and demerits of proximal stripping, arch expansion and extractions

Extractions in Orthodontics - indications and selection of teeth for extraction

13. ORTHODONTIC APPLIANCES: General Requisites for orthodontics appliances

Classification, indications of Removable and Functional Appliances Methods of force application, Materials used in construction of various orthodontic appliances - uses of stainless steel, technical considerations in curing of acrylic,

14. PRINCIPLES OF WELDING AND SOLDERING, fluxes and antifluxes.

Preliminary knowledge of acid etching and direct bonding, Ethics

15. REMOVABLE ORTHODONTIC APPLIANCES

Components of removable appliances, Different types of clasps and their uses, Different types of labial bows and their uses, Different types of springs and their uses,

16. EXPANSION APPLIANCES IN ORTHODONTICS: Principles, Indications for arch expansion, Description of expansion appliances and different types of expansion devices and their uses. Rapid maxillary expansion

17. MYOFUNCTIONAL APPLIANCES

18. FIXED ORTHODONTIC APPLIANCES Definition, Indications & Contraindications, Component parts and their uses, Basic principles of different techniques: Edgewise, Begg's, straight wire.

19. EXTRAORAL APPLIANCES Headgears, Chincup, Reverse pull headgears

20. MYOFUNCTIONAL APPLIANCES Definition and principles, Muscle exercise and their uses in orthodontics, Functional appliances: Activator, Oral screens, Frankel's functional regulator, Bionatar,Twin Block, lip bumper, Inclined planes - upper and lower

Orthodontic Management of Cleft Lip And Palate

21. PRINCIPLES OF SURGICAL ORTHODONTICS Brief Knowledge of correction of : Mandibular Prognathism and Retrognathism, Maxillary Prognathism and Retrognathism, Anterior open bite and deep bite, Cross bite

Principle, Differential diagnosis and methods of Treatment of – 1. Midline diastema 2. Cross bite, 3. Open bite, 4. Deep bite, 5.Spacing, 6.Crowding, 7.Class II -Division 1, Division 2, 8.Class III Malocclusion - True and Psuedo Class III

22. RETENTION AND RELAPSE Definition, Need for retention Causes of relapse Methods of retention, Different types of retention devices, Duration of retention, Theorems of retention

Role of Genetic Control In Growth And Development Late Adult Growth

Mandibular Rotation Electromyography Hand Wrist X-Rays

Anchorage Preparation and in Various Treatment Modality Age Factors In Tooth Movement

Detailed Biomechanics of the moment to force ratio for various tooth movements

Distalisation of molars, Distal Driving of Entire Arches, Elastomeric Impression Ethics

Types and Principles Of Pre Adjusted Edgewise Appliance. Fixed Functional Appliances

Surgical Management Of Cleft Lip and Palate Surgical Procedure for Orthognathic Surgery True Class III, Fabrication of Retainers, Repair of Lingual Bonded Retainer

ORAL MEDICINE, DIAGNOSIS & RADIOLOGY

1.Oral medicine and diagnostic AIDS:

SECTION A-DIAGNOSTIC METHODS Definition and importance of Diagnosis and various types of diagnosis, Method of clinical examinations., General Physical examination by inspection., Oro-facial region by inspection, palpation and other means, Importance, role, use of saliva and techniques of diagnosis of saliva as part of oral disease, Examination of lesions like swellings, ulcers, erosions, sinus, fistula, growths, pigmented lesions, white and red patches, Examination of lymph nodes, Investigations, Biopsy and exfoliative cytology

Hematological, Microbiological and other tests and investigations necessary for diagnosis and prognosis,

SECTION B- DIAGNOSIS, DIFFERENTIAL DIAGNOSIS: Teeth: Developmental abnormalities, causes of destruction of teeth and their sequelae and discoloration of teeth

Inflamation – Injury, infection and sperad of infection,fascial space infections, osteoradionecrosis. Temparomandibular joint: Developmental abnormalities of the condyle. Rheumatoid arthritis, Osteoarthritis, Subluxation and luxation. Periodontal diseases: Gingival hyperplasia, gingivitis, periodontitis, pyogenic granuloma, Common cysts and Tumors:

CYSTS: Cysts of soft tissue: Mucocele and Ranula Cysts of bone: Odontogenic and nonodontogenic.

TUMORS: Soft Tissue: Epithelial: Papilloma, Carcinoma, Melanoma Connective tissue: Fibroma, Lipoma, Fibrosarcoma Vascular: Haemangioma, Lymphangioma, Nerve Tissue: Neurofibroma, Traumatic Neuroma, Neurofibromatosis Salivary Glands: Pleomorphic adenoma, Adenocarcinoma, Warthin's Tumor, Adenoid cystic carcinoma.

Teeth: Developmental abnormalities, causes of destruction of teeth and their sequelae and discoloration of teeth, Inflamation – Injury, infection and sperad of infection,fascial space infections, osteoradionecrosis. Temparomandibular joint: Developmental abnormalities of the condyle. Rheumatoid arthritis, Osteoarthritis, Subluxation and luxation.

Periodontal diseases: Gingival hyperplasia, gingivitis, periodontitis, pyogenic granuloma

Nerve Tissue: Neurofibroma, Traumatic Neuroma, Neurofibromatosis

Salivary Glands: Pleomorphic adenoma, Adenocarcinoma, Warthin's Tumor, Adenoid cystic carcinoma.

Hard Tissue: Non Odontogenic: Osteoma, Osteosarcoma, Osteoclastoma, Chondroma, Chandrosarcoma, Central giant cell rumor, and Central haemangioma

Odontogenic: Enameloma, Ameloblastoma, Calcifying Epithelial Odontogenic tumor, Adenomatoid Odontogenic tumor, Periapical cemental dysphasia and Odontomas

SECTION C-ORAL MEDICINES AND THERAPEUTICS

Infections of oral and paraoral structures: Bacterial: Streptococcal, tuberculosis, syphillis, vincents, leprosy, actinomycosis, diphtheria and tetanus Fungal: Candida albicans

Virus: Herpes simplex, herpes zoster, ramsay hunt syndrome, measles, herpangina, mumps, infectious mononucleosis, AIDS and hepatitis-B

Important common mucosal lesions: WHITE LESIONS: Chemical burns, leukodema, leukoplakia, fordyce spots, stomatitis nicotina palatinus, white sponge nevus, candidiasis, lichen planus, discoid lupus erythematosus VEICULO-BULLOUS LESIONS: Herpes simplex, herpes zoster, herpangina, bullous lichen planus, pemphigus, cicatricial pemphigoid erythema multiforme. Ulcers: Acute and chronic ulcers PIGMENTED LESIONS: Exogenous and endogenous Red lesions: Erythroplakia, stomatitis venenata and medicamentosa, erosive lesions and denture sore mouth. Cervico-facial lymphadenopathy

Facial pain: Organic pain: Pain arising from the diseases of orofacial tissues like teeth, pulp, gingival, periodontal tissue, mucosa, tongue, muscles, blood vessels, lymph tissue, bone, paranasal sinus, salivary glands etc.,

Tongue in local and systemic disorders: (Aglossia, ankyloglossia, bifid tongue, fissured tongue, scrotal tongue, macroglossia, microglossia, geographic tongue, median rhomboid glossitis, depapillation of tongue, hairy tongue, atrophic tongue, reactive lymphoid hyperplasia, glossodynia, glossopyrosis, ulcers, white and red patches etc.

ORAL MANIFESTATIONS OF:

Metabolic disordeers: Porphyria, Haemochromatosis, Histocytosis X diseases

Endocrine disorders: Pituitary: Gigantism, acromegaly, hypopituitarism, Adrenal cortex:, Addison's disease (Hypofuntion) Cushing's syndrome (Hyperfunction) Parathyroid glands: Hyperparathyroidism. Thyroid gland: (Hypothyroidism) Cretinism, myxedema, Pancreas: , Diabetes, Nutritional deficiency: Vitamins: riboflavin, nicotinic acid, folic acid Vitamin B12, Vitamin C (Scurvy

Blood disorders: Red blood cell diseases- Deficiency anemias: (Iron deficiency, plummer – vinson syndrome, pernicious anemia), Haemolytic anemias: (Thalassemia, sickle cell anemia, erythroblastosis fetalis) Aplastic anemia, Polycythemia, White Blood cell diseases: Neutropenia, cyclic neutropenia, agranulocytosis, infectious mononeucleosis and leukemias

Haemorrhagic disorders: Thrombocytopenia, purpura, hemophillia, chrismas disease and von willebrand's disease

DISEASE OF SALIVARY GLANDS:

Development distrubances: Aplasia, atresia and aberration

Functional disturbances:Xerostomia, ptyalism

Inflammatory conditions: Nonspecific sialadenitis, mumps, sarcoidosis, heerdfort's syndrome (Uveoparotid fever), Necrotising sialometaplasia

Cysts and tumors: Mucocele, ranula, pleomorphic adenoma,

mucoepidermoid carcinoma

Miscellaneous: Sialolithiasis, Sjogren's syndrome, mikuliez's disease and sialosis

DERMATOLOGICAL DISEASES WITH ORAL MANIFESTATIONS:

Ectodermal dysplasia (b) Hyperkerotosis palmarplantaris with periodontopathy (c)Scleroderma (d) Lichen planus including ginspan's syndrome (e) Lupus erythematosus (f) Pemphigus (g)Erythema multiforme (h) Psoriasis

IMMUNOLOGICAL DISEASES WITH ORAL MANIFESTATIONS

Leukemia (b) Lymphomas (c) Multiple mycloma (d) AIDS clinical manifestations, opportunistic infections, neoplasms (e) Thrombcytopenia (f) Lupus erythematosus (g)

Scleroderma (h) dermatomyositis (I) Submucous fibrosis (j) Rhemtoid arthritis (k) Recurrent oral ulcerations including behcet's syndrome and reiter's syndrome

ALLERGY: Local allergic reactions, anaphylaxis, serum sickness (local and systemic allergic manifestations to food drugs and chemicals) Foci of oral infection and their ill effects on general health

MANAGEMENT OF DENTAL PROBLEMS IN MEDICALLY COMPROMISED PERSONS:

Physiological changes: Puberty, pregnancy and menopause

The patients suffering with cardiac, respiratory, liver, kidney and bleeding disorders, hypertension, diabetes and AIDS. Post-irradiated patients.

Precancerous lesions and conditions

Neuralgic pain due to unknown causes: Trigeminal neuralgia

MPDS, Bell's palsy

Pain arising due to C.N.S. diseases: (a) Pain due to intracranial and extracranial involvement of cranial nerves. (Multiple sclerosis, cerebrovascular diseases, trotter's syndrome etc.)

(b) Neuralgic pain due to unknown causes:, glossopharyngeal neuralgia, sphenopalatine ganglion neuralgia, periodic migrainous neuralgia and atypical facial pain

Referred pain: Pain arising from distant tissues like heart, spine etc.,

Altered sensations: paresthesia, halitosis

Nerve and muscle diseases: Nerves: (a) Neuropraxia (b) Neurotemesis (c) Neuritis (d) Facial nerve paralysis including Heerfordt's syndrome, Melkerson Rosenthel syndrome and ramsay hunt syndrome (e) Neuroma (f) Neurofibromatosis (g) Frey'syndrome Muscles: (a) Myositis ossificans (b) Myofascial pain dysfunction syndrome (c) Trismus

FORENSIC ODONTOLOGY:

Medicolegal aspects of orofacial injuries, Identification of bite marks, Determination of age and sex, Identification of cadavers by dental appliances, Restorations and tissue remanants

Therapeutics: General therapeutic measures – drugs commonly used in oral medicine viz., antibiotics, chemotherapeutic agents, anti-inflammatory and analgesic drugs, astringents, mouth washes, styptics, demelucents, local surface anaesthetic, sialogogues, antisialogogues and drugs used in the treatment of malignancy

ORAL RADIOLOGY

1.INTRODUCTION: (1) Scope of the subject and history of origin(2) Physics of radiation: (a) Nature and types of radiations (b) Source of radiations (c) Production of X- rays (d) Properties of X-rays (e) Compton effect (f) Photoelectric effect (g) Radiation measuring units

2.BIOLOGICAL EFFECTS OF RADIATION- Radiation safety and protection measures- Principles of image production- Radiographic techniques: Intra-Oral: (a) Periapical radiographs (Bisecting and parallel technics) (b) Bite wing radiographs (c) Occlusal radiographs, Extra-oral: (a) Lateral projections of skull and jaw bones and paranasal sinuses (c) Cephalograms (d)Orthopantomograph (e) Projections of temporomandibular joint and condyle of mandible (f) Projections for Zygomatic arches, Specialised techniques: (a) Sialography (b) Xeroradiography (c)Tomography

3.FACTORS IN PRODUCTION OF GOOD RADIOGRAPHS: (a) K.V.P. and mAs of X-ray machine (b) Filters (c) Collimations (d) Intensifying screens (e) Grids (f) X-ray films (g) Exposure time (h) Techniques (i) Dark room (j) Developer and fixer solutions (k) Film processing

Radiographic normal anatomical landmarks

Faulty radiographs and artefacts in radiographs

Interpretation of radiographs in various abnormalities of teeth, bones and other orofacial tissue.

Principles of radiotherapy of orofacial malignancies and complications of radiotherapy

Contrast radiography and basic knowledge of radio-active isotopes

4.RADIOGRAPHY IN FORENSIC ODONTOLOGY - Radiographic age estimation and post-mortem radiographic methods

ORAL & MAXILLOFACIAL SURGERY

1.INTRODUCTION TO ORAL SURGERY : Introduction, Definition, Scope, Aims and objectives.

2.DIAGNOSIS IN ORAL SURGERY: History taking, Clinical examination, Investigations.

3.PRINCIPLES OF INFECTION CONTROL: Asepsis and sterilization,

4.GENERAL PRINCIPLES OF ORAL SURGERY Access: Intra-oral: Mucoperiosteal flaps -principles. Commonly used intra oral incisions. Bone Removal: Methods of bone removal. Extra-oral- Skin incisions –principles., Control of haemorrhage during surgery: Normal Haemostasis, Local measures available to control bleeding, Drainage & Debridement: Purpose of drainage in surgical wounds, Debridement: Purpose, Closure of wounds: Suturing: Principles, Suture material, Classification., Post-operative care: Post-operative instructions. Physiology of cold and heat.
Control of pain –analgesics. Control of infection –antibiotics. Control of swelling – anti-inflammatory drugs.

5.EXODONTIA - General considerations. Ideal Extraction. Indications and contraindications for extraction of teeth, Extractions in medically compromised patients. Methods of extraction –Forceps or intra-alveolar or closed method. Principles, types of movement, force etc. Trans-alveolar / surgical method. Indications, surgical procedure. Dental elevators: uses, classification, principles in the use of elevators, Commonly Used elevators

6. IMPACTED TEETH: -Incidence definition, aetiology. (a) Impacted mandibular third molar. -Classification, reasons for removal. -Assessment - both clinical & radiological - Surgical procedures for removal. -Maxillary third molar- Indications for removal, classification, Surgical procedure for removal. -Impacted maxillary canine- Reasons for canine impaction, Localization, indications for removal, -Methods of management, labial and Palatal approach, Surgical exposure, transplantation, Removal

7. PRE-PROSTHETIC SURGERY: Definition, classification of procedures. Corrective procedures: Alveoloplasty, Frenoctemies. Ridge extension or Sulcus extension procedures Indications Ridge augmentation and reconstruction. Indications

8. IMPLANTS – Concept of osseointegration Knowledge of various types of implants

9. DISEASES OF THE MAXILLARY SINUS: Surgical anatomy of the sinus. Sinusitis: Etiology, Clinical features, Non – surgical management, Names of surgical procedures and its principles, Removal of root from the sinus, Oro-antral fistula: Etiology, Clinical features, Names of surgical procedures and its principles

10. DISORDERS OF T.M. JOINT: Applied surgical anatomy of the joint, Dislocation, Definition of related terminologies, Types, Aetiology, Clinical features, Management – Non surgical, Comparison of dislocation and subluxation, Ankylosis: Definition and classification. Aetiology, Clinical features, Management- Non surgical,

11. INFECTIONS OF THE ORAL CAVITY: Introduction, Factors responsible for infection; Course of Infections, Spread of odontogenic infections through various fascial spaces, Dento-alveolar abscess - aetiology, clinical features and management, Osteomyelitis of the jaws – definition, aetiology, pre-disposing factors, Classification, Clinical features, Management- Non surgical. Ludwig's angina –Definition, Aetiology, Clinical features, Management- Non surgical.

12. BENIGN CYSTIC LESIONS OF THE JAWS - Definition, Classification, Pathogenesis. Diagnosis –Clinical features, Radiological, Aspiration biopsy, Use of contrast media, Histopathology, Management – Types of surgical procedures, Rationale of the techniques, Indication,

13. TUMOURS OF THE ORAL CAVITY: General considerations, Non odontogenetic benign tumours, Fibroma, Papilloma, Lipoma, Ossifying fibroma, Myxoma, Ameloblastoma, Clinical features, Radiological appearance. Carcinoma of the oral cavity -Biopsy, TNM classification, Outline of management of squamous cell carcinoma, Role of dental surgeons in the prevention and early detection of oral cancer,

14. FRACTURES OF THE JAWS: General considerations, Types of fractures, Aetiology Clinical features, General principles of management. Mandibular fractures –Applied anatomy Classification, Diagnosis - Clinical Radiological, Fractures of the condyle Aetiology Classification, Clinical features, Fractures of the middle third of the face. Definition of the mid face, Applied surgical anatomy Classification, Clinical features, Alveolar fractures - methods of management, Fractures of the Zygomatic complex Classification, Clinical features Indications for treatment.

15. SALIVARY GLAND DISEASES Diagnosis of salivary gland disease Sialography, contrast media, procedure, Infections of the salivary glands, Sialolithiasis - Sub mandibular duct and gland and parotid duct. Clinical features, management, Jaw deformities, Basic forms – Prognathism Retrognathism, Open bite- Reasons for correction.

16. NEUROLOGICAL DISORDERS- Trigeminal neuralgia –Definition, etiology, clinical features and medical management. Facial paralysis –Definition, etiology and clinical features. Nerve injuries – Classification ; Cleft Lip and Palate- Aetiology of the clefts. Incidence of the clefts. Classification of the clefts.

17.MEDICAL EMERGENCIES IN DENTAL PRACTICE Primary care of medical emergencies in dental practice particularly –Cardio vascular, Respiratory, Endocrine, Anaphylactic reaction, Epilepsy,

18. EMERGENCY DRUGS AND PROCEDURES Emergency drugs, Oral Implantology, Concept of osseo integration, Knowledge of various types of implants,

19. ANAESTHESIA

20. LOCAL ANAESTHESIA: Introduction, Concept of L.A, Classification of local anaesthetic agents, Ideal requirements, Mode of action, Types of local anaesthesia, Vasoconstrictors in local anaesthetic solution - Advantages, contra-indications, various vaso constrictors used. Anaesthesia of the mandible, Pterygomandibular space - boundaries, contents etc. Inferior Dental Nerve Block – various techniques, Complications, Mental foramen nerve block, Anaesthesia of Maxilla - Intra - orbital nerve block. Posterior superior alveolar nerve block, Maxillary nerve block - techniques. Complications of local anesthesia

21. GENERAL ANAESTHESIA: Concept of general anaesthesia. Indications of general anaesthesia in dentistry. Pre-anaesthetic evaluation of the patient. Pre-anaesthetic medication - advantages, drugs used. Commonly used anaesthetic agents. Complication during and after G.A. I.V. sedation with Diazepam and Medozolam. Indications, mode of action, technique etc. Cardiopulmonary resuscitation, Use of oxygen and emergency drugs Tracheostomy, Recent advances: Peizosurgery 2.Nanosurgery 3.Navigation surgery 4.Endoscopic surgery, Computer assisted local anaesthesia delivery system.

22. SURGERY SET UP: Access: Intra-oral- Use of Burs: Advantages, Precautions. Bone cutting instruments: Principles of using chisel & osteotome. Extra-oral- Various extra-oral incisions to expose facial skeleton. Submandibular. Pre auricular. Incisions to expose maxilla & orbit. Bicoronal incision. Control of haemorrhage during surgery: Hypotensive anaesthesia. Drainage & Debridement: Types of drains used. Debridement: Soft tissue & Bone debridement. Closure of wounds: Body response to various materials. Long term post operative follow up – significance; Exodontia- 1) Complications of Exodontia: Operative complications common to both maxilla and mandible. Post-operative complications. Prevention and management of complications, Impacted teeth: Complications during and after removal, Prevention and management, Pre-prosthetic Surgery: Corrective procedures: Reduction of maxillary tuberosities, Removal of tori. Ridge extension or Sulcus extension procedures, Surgical procedures: Ridge augmentation and reconstruction. Use of bone grafts, Hydroxyapatite, Implants - Surgical procedure to place implants.

23. FRACTURES OF THE JAWS Mandibular fractures: Management – Reduction Closed/Open Fixation and immobilization methods, Outline of rigid and semi-rigid internal fixation. Fractures of the condyle, Principles of management. Fractures of the middle third of the face. Outline of management. Fractures of the Zygomatic complex, Various methods of reduction and fixation. Complications of fractures -Delayed union Non-union Malunion

PROSTHODONTICS AND CROWN & BRIDGE

1.INTRODUCTION Patient evaluation, Radiographic Examination

2.COMPLETE DENTURES: Components / Parts of a Complete Denture, Steps in fabrication of Complete Dentures,

3.DIAGNOSIS & TREATMENT PLANNING Clinical History taking, Mouth Preparation in Complete Dentures; Mouth Preparation in CD Mouth preparation in CD Impression Making, Impression Techniques in Special Cases Reading of Impression, Indexing Master cast Articulators & Articulation Remounting, Pre-prosthetic surgery

4. IMPRESSION MAKING, Objectives of impression making Theories of impression making Anatomical landmarks Recording PI& FI, Beading & Boxing,

5. MAXILLO MANDIBULAR RELATION: Mandibular Movements Orientation JR, Vertical JR, Centric JR, Anatomy of TMJ, Facebow Parts, Articulators & Articulation, Articulators Selection & Arrangement of teeth Balanced occlusion, Lab Steps in CD, Complete Denture Insertion, Post insertion instructions Post insertion problems, Relining & Rebasing Relining Rebasing,

6. SPECIAL COMPLETE DENTURE Over denture Basic aspect, Immediate Denture Basic Concept Single CD Basic Aspect,

7. INFECTION CONTROL Cross-infection control with particular reference to HIV/AIDS and Hepatitis

8. REMOVABLE PROSTHODONTICS Introduction, classification term and terminology in RPD: Indications, Contra-indications of FPD, Rationale of RPD, Treatment Kennedys Classification System, Apple gate rules for Classification
DIAGNOSIS & TREATMENT PLANNING IN RPD: Introduction, Diagnostics, Examination, patient interview Effect of physical problems on dental treatment Effects of drug Patients expectation Dental history, Infection control & disinfection Evaluation of oral hygiene Radio Graph, Diagnostic impression, Evaluation of diagnostic cast Treatment plan
MAJOR CONNECTORS: Definition, Structural Requirements, Types maxillary major connectors Indication of maxillary major connectors Types mandibular major connectors Indication of mandibular major Connectors
MINOR CONNECTORS: Definition, Structural Requirements Types minor connectors
Direct retainers: Definition, Classification Parts of the clasp, Requirements of clasp design Types of supra bulge clasps Types of infra bulge clasps
Indirect Retainers: Definitions, Principles of indirect retention Factors determining the effectiveness Forms of indirect retention
Rest & Rest Seats: Definition, Structural Requirements of rest seats Types of rest seats

I- Bar Removable Partial Dentures: How does differ from conventional barclasp Components of I bar, Design concepts RPI system
Stress breakers: Definition, Principles of stress breakers Types of stress breakers
Principles of RPD design: Mechanics of movement Support vs force, Type of lever force & inclined plane Types of fulcrum, Forces acting on partial denture, Factors influencing the magnitude of stresses Controlling stress by design considerations
Surveying & Designing: Definition, Parts of surveyor, Surveying the diagnostic cast, Tripoding of cast, Importance consideration in use of dental surveyor Path of insertion Factors influencing path of insertion Principles & Philosophy of design
Functional impression in RPD: Influencing support of distal extension base Indications Impression methods,

9. DIAGNOSIS & TREATMENT PLANNING IN FPD: Abutment definition
Ante's Law, Criteria for selection of the abutment
PRINCIPAL OF OCCLUSION: Ideal Occlusion Balanced occlusion Group function occlusion, Mutually protected occlusion
PRINCIPLES OF TOOTH PREPARATION: Ideal requirements, Biological considerations Mechanical considerations Esthetic considerations, Restoration of endodontically treated teeth: Treatment planning, Consideration for anterior teeth Principles of tooth preparation
Complete Cast crown preparation: Advantages, Disadvantages ,Indications, Contraindications, Recommended armamentarium Preparation steps, Criteria for preparation
Metal ceramic crown preparation: Advantages, Disadvantages, Indications Contraindications Recommended armamentarium Preparation steps, Criteria for preparation
All ceramic crown preparation: Advantages, Disadvantages Indications Contraindications, Recommended armamentarium Preparation steps, Criteria for preparation
Metal ceramic Restoration: Indications, Contra-indications Advantages Disadvantages Trouble shooting
All ceramic restoration: Ideal requirements, Indications, Contra-indications Advantages Disadvantages
Methods to strengthen ceramics Trouble shooting
Impression materials & techniques in FPD, Fluid control, Retraction of the gingival Elastic impression materials Impression trays Impression making methods
Provisional restoration: Ideal requirements Biological consideration Mechanical consideration Esthetic consideration Techniques of temporization

CONSERVATIVE DENTISTRY AND ENDODONTICS

1.NOMENCLATURE OF DENTITION: Tooth numbering systems - A.D.A. Zsigmondy Palmer and F.D.I. systems

2.PRINCIPLES OF CAVITY PREPARATION : Steps and nomenclature of cavity preparation Classification of cavities, Nomenclature of floors & angles of cavities.

3.DENTAL CARIES : Aetiology Types of direct filling gold Classification and clinical features Morphological features, Microscopic features Treatment Plans, Diagnosis and sequel of dental caries,

4.TREATMENT PLANNING FOR OPERATIVE DENTISTRY: Detailed clinical examination, Radiographic examination Tooth vitality tests Diagnosis
Treatment planning Preparation of the case sheet

5.ARMAMENTARIUM FOR CAVITY PREPARATION: General classification of operative instruments, Hand cutting instruments design formula Rotary cutting instruments and dental bur Mechanism of cutting, Evaluation of hand piece and speed
Current concepts of rotary cutting procedures Sterilization, Maintenance of instruments.
Basic instrument tray set up,

6. CONTROL OF OPERATING FIELD: Light source, Sterilization of field of operation and control of moisture Rubber dam in detail
Cotton rolls and anti sialogogues

7.AMALGAM RESTORATION Indication and contraindication Physical and mechanical properties Clinical features, Cavity preparation for Class I , II, V and III.
Step wise procedure for cavity preparation and restoration. Failure of amalgam restoration

8. PULP PROTECTION : Liners – Calcium Hydroxide Varnishes and bases, Zinc phosphate Zinc polycarboxylate Zinc oxide eugenol Glass ionomer cements,

9. ANTERIOR RESTORATION: Selection of cases Selection of material, Step wise procedures for using restorations, Glass ionomer, composites including sandwich restorations and bevels of the same with a note on status of the dentine bonding agents.

10. PREVENTIVE MEASURES IN RESTORATIVE PRACTICE: Plaque Control
Pit and fissure sealants Dietary measures Periodontal health, Contact and contour of teeth Tooth separation. Matrices and wedges Temporization or Interim Restoration
Pin retained Amalgam Restoration, Indication and Contra Indication, Advantages disadvantages Types of pin, Methods of placements Use of automatrix
Failure of pin amalgam restoration,

11.MANAGEMENT OF DEEP CARIOUS LESIONS Direct Pulp Capping. Indirect Pulp Capping Restorative measures, Non Carious Destruction's Tooth Structures: Diagnosis and Clinical Management, Hyper Sensitive Dentine And Its Management

12. CAST RESTORATION Indications Contra indications, Advantages and disadvantages and materials used for same Cavity preparation, Gingival Tissue Management For Cast Restoration And Impression Procedures
Recent Cavity Modification for Amalgam Restoration
Differences between Amalgam And Inlay Cavity preparation
Note on all the types of Bevels used for Cast Restoration
Control Of Pain During Operative Procedure

13.TREATMENT PLANNING For Operative Dentistry Detailed Clinical Examination Radiographic Examination Vitality Tests
Diagnosis And Treatment Planning. Preparation Of Case Sheet

14. APPLIED DENTAL MATERIALS. Biological Considerations Evaluation clinical application and adverse effects of the following Materials

15. DENTAL CEMENTS.Zinc oxide eugenol cements Zinc phosphate cements Polycarboxylates, Glass ionomer cements Calcium hydroxidesVarnishes
Dental amalgam- Technical considerations mercury toxicity mercury hygiene
Composite, Dentine bonding agents, chemical and light curing composites Rubber base Impression Materials -, nobel metal alloys & non noble metal alloys Investment and die materials, Inlay casting waxes Dental porcelain

16. AESTHETIC DENTISTRY Anatomy & physiology of smile Bleaching of teeth,

17. ENDODONTICS Introduction, definition, scope and future of endodontics
Clinical diagnostic methods
Emergency endodontic procedures

18. PULPAL DISEASES Causes, Types Treatment: Periapical diseases Acute periapical abscess- Acute periodontal abscess, phoenix abscess, Chronic alveolar abscess granuloma cysts condensing osteitis External and internal resorption
Vital pulp therapy- Indirect and direct pulp capping, pulpotomy Different types of medicaments used, Apexogenesis and apexification or problems of open apex. Rationale of endodontic treatment

19. ROOT CANAL TREATMENT Objectives,Indication & Contraindications for root canal treatments Anatomy of the pulp cavity Root canals apical foramen
Anomalies of pulp cavities access cavity preparation of anterior and premolar teeth

20. PRINCIPLES OF ROOT CANAL TREATMENT Access cavity preparation.
Root canal instruments Hand instruments, Power driven instruments Standardization Color coding principle of using endodontic instruments Sterilization of root canal instruments and materials. Rubber dam application Determination of working length- Traditional methods, Apex locator, Cleaning and shaping of root canals, Irrigating solution, Chemical aids to instrumentation Chelators Disinfection of root canal space

Intracanal medicaments, Poly antibiotic paste Grossman's paste.
Methods of cleaning and shaping –principle & objectives
Methods – step back technique, Crown down technique
Obturation of the root canal system, Requirements of an ideal root canal filling material
Obturation methods using gutta percha Obturation material, Cold lateral condensation
Warm vertical condensation, Thermoplasticized obturation technique Failures in endodontics.

21. ROOT CANAL SEALERS: Ideal properties Classification, Manipulation of root and canal sealers, Problems during cleaning and shaping of root canal spaces (Endodontic mishaps) -Perforation and its management. Broken instruments and its management
Management of single and double curved root canals.
Post endodontic restoration Material used Post and core, Smear layer and Its importance in endodontics and conservative dentistry

22. DISCOLOURED TEETH AND ITS MANAGEMENT, Bleaching agents
Vital and non vital bleaching method
Traumatic Injuries : Classification, Management of fractured tooth and root Luxated teeth and its management,

23. ENDODONTIC SURGERIES: Indication contraindications Pre operative preparation
Pre medication, Surgical instruments Techniques apicectomy Retrograde filling
Post operative sequale Terphination Hemisection
Radisectomy techniques of tooth reimplantation (both intentional and accidental)
Endodontic implant, Root resorption, Emergency endodontic procedures
Lasers in conservative endodontics (introduction only) Practice management

PEDODONTICS

1.INTRODUCTION to Pedodontics

2.GROWTH & DEVELOPMENT : Prenatal & Postnatal Development arches of Cranium, face, jaws, teeth and supporting structures. Chronology of dental development and development of occlusion.

3.CHILD PSYCHOLOGY : Development & Classification of behavior, personality, intelligence in children, theories of child psychology management.

4. BEHAVIOUR MANAGEMENT : Non- Pharmacological. Child Abuse & Dental Neglect. Conscious sedation, Deep Sedation & General anesthesia in pediatric Dentistry(Including Other Drugs, Synergic & Antagonistic Actions Of Various Drugs Used In children)

5. DENTAL CARIES Historical background , Definition, Aeitology & Pathogenesis. Caries pattern in primary, Young permanent and permanent teeth in children.

Rampant caries, early childhood caries and extensive caries.
Definition, aeitology, pathogensis, Clinical features Complications Management.
Subjective & Objective methods of caries detections with emphasis on caries
Activity : Tests, Caries Prediction, caries susceptibility & their clinical Applications.

6. CASE HISTORY : Recording, Outline of Principles of examinations, diagnosis & treatment planning.

7. PEDIATRIC ORAL MEDICINE & CLINICAL PATHOLOGY : Recognition & Management of development dental anomalies, teething disorders, stomatological conditions, mucosal lesions, viral infections etc.

8. PREVENTIVE PEDODONTICS : Concept , chair side preventive measures for dental diseases, high-risk caries including rampant & extensive caries- Recognition, Features & preventive Management, Pit Fissures Sealants, Oral Hygiene measures, correlation of brushing with dental caries and periodontal diseases.

9. MICROBIOLOGY & IMMUNOLOGY AS RELATED TO ORAL

10. DISEASES IN CHILDREN : Basic concepts, Immune system in human body, Auto Immune dieseases
Dental Material used in pediatric Dentistry.
Pediatric Operative Dentistry.

11. GINGIVAL & PERIODONTAL DISEASES IN CHILDREN : Gingival & Periodontium in children . Gingival & Periodontal diseases – Etiology. Pathogenesis & Management In Short

12. PEDIATRIC ENDODONTICS : Primary Dentition :- Diagnosis of Pulpal dieses and their management – Pulp capping, pulpotomy, pulpectomy, (Materials & Methods), Controversies & recent concepts. Young Permanent teeth and permanent teeth, pulp capping, Pulpotomy, Apexogensis, Apexification, concepts, Techniques and materials used for different procedures.
Prosthesis consideration in pediatric Dentistry.
Traumatic Injuries in Children : Classification & Importance, Sequalae & reaction of teeth to trauma Management of trauma, Management of Traumatized teeth with latest concepts

13. SPACE MAINTENANCE: oral habits in children : Definition, Etilogy classification.,Factors to be considered before giving a space maintainer. Different space maintainers according to clinical situations. Clinical features of digit sucking, tongue thrusting, mouth breathing & various othersecondary habits. Management of oral habits in children.

14. FLUORIDES : Historical background. Systemic & topical fluorides. Mechanism of action. Toxicity & Management. Defluoridation techniques

15. MANAGEMENT OF HANDICAPPED CHILD AND MANAGEMENT OF PATIENTS WITH SYSTEMIC CONDITION. Definition, Etiology & Classification , Behavioral ,clinical features, & Management of Physically handicapping Conditions Mentally compromising Conditions Dimensional Changes in dental arches & Cepholometric evaluation of growth.

16. STAGE OF PSYCHOLOGICAL CHILD DEVELOPMENT, fear, anxiety, apprehension andPharmacological Methods of management. Dietary Modifications & Diet Counseling

17. CONGENITAL ABNORMALITIES IN CHILDREN: Definition, Classification, Clinical Features & management . Dental Emergencies in children and their Management
Diet & Nutrition as related to dental caries & Diet Counseling Histopathology, Pathogenesis, Immunology of dental caries, Periodontal diseases, Tumors, Oral Mucosal Lesions etc.
Nanotechnology & Recent advances in dental materials.
Genetics related to gingival & periodontal diseases.
Recent Advances in Paediatric Endodontics
Management of Jaw fracture in children
Space Analysis & Cephalometrics.
Genetic disorders

LIST OF BOOKS

Subject: **GENERAL HUMAN ANATOMY INCLUDING EMBRYOLOGY AND HISTOLOGY**
Clinical Anatomy for Medical Students, Snell (Richard S.), Little Brown & company, Boston.
Anatomy, R J Last's - McMinn,
Cunningham Manual of Practical Anatomy: Head & Neck & Brain.Vol.III, Romanes (G.J) Oxford Medical publication.
Functional Histology, Wheater, Burkitt & Daniels, Churchill Livingstone.
Medical Embryology, Sadler, Langman's,
Grant's Atlas of Anatomy, James E Anderson, Williams & Wilkins.
Gray's Anatomy, Williams, Churchill Livingstone.
Medical Genetics, Emery.
Essentials of Anatomy for Dentistry Students, D R Singh, Wolters Kluwer

Subject: **PHYSIOLOGY**
Text book of Physiology, Guyton
Review of Medical Physiology, Ganong
Human physiology, Vander
Concise Medical Physiology, Choudhari
Human Physiology, Chaterjee
Human Physiology for BDS students, A.K. Jain Reference books;
Physiology, Berne & Levey
Physiological basis of Medical Practice, West-Best & Taylor's
Experimental Physiology:
Practical Physiology, Rannade
A text book of practical physiology, Ghai
Clinical Methods, Hutchison's

Subject: **BIOCHEMISTRY**
Textbook of Biochemistry for Dental Students, DM Vasudevan, Sreekumari S
Text book of Biochemistry-U Satyanarayana Reference books;
Harper's Biochemistry, R.K. Murray et.al.
Text book of Biochemistry with clinical correlations T.N. Devlin
Basic and applied Dental Biochemistry, R.A.D. Williams & J.C. Elliot
Nutritional Biochemistry S. Ramakrishnan and S.V. Rao

Subject: **DENTAL ANATOMY, EMBRYOLOGY AND ORAL HISTOLOGY**
Orban's Oral Histology & Embryology - S.N. Bhaskar
Oral Development & Histology - James & Avery
Wheeler's Dental Anatomy, Physiology & Occlusion – Major M. Ash
Dental Anatomy - its relevance to dentistry - Woelfel & Scheid
Applied Physiology of the mouth – Lavelle
Physiology & Biochemistry of the mouth – Jenkins
Oral Histology- 'Development, Structure and Function- A.

R. Tencate

Subject: **GENERAL PATHOLOGY**
Robbins - Pathologic Basis of Disease Cotran, Kumar, Robbins
Anderson's Pathology Vol 1 & 2 Editors - Ivan Damjanov & James Linder
Wintrobe's clinical Haematology Lee, Bithell, Foerster, Athens, Lukens

Subject: **MICROBIOLOGY**
Text book of Microbiology - R. Ananthanarayan & C.K. Jayaram Paniker.
Medical Microbiology - David Greenwood et al. Reference books;
Microbiology - Prescott, et al.
Microbiology - Bernard D. Davis, et al.
Clinical & Pathogenic Microbiology - Barbara J Howard, et al.
Mechanisms of Microbial diseases - Moselio Schaechter, et al.
Immunology an Introduction – Tizard
Immunology - Evan Roitt, et al.

Subject: **DENTAL MATERIALS**
Phillips Science of Dental Materials - Kenneth J. Anusavice
Restorative Dental Materials -Robert G. Craig
Notes on Dental Materials - E.C. Combe Reference books:-
Introduction to Dental Materials, Van Noort,
Applied Dental Materials, McCabe,

Subject: **GENERAL AND DENTAL PHARMACOLOGY AND THERAPEUTICS**
Basic and Clinical pharmacology, Bertam G. Katzung, Appleton & Lange
Clinical Pharmacology, Lauerence DR, Churchill Livingstone
Pharmacology and Pharmacotherapeutics Part I & Part II, Satoskar R.S. & Bhandarkar S. D, Popular Prakashan Mumbai.
Essentials of Medical Pharmacology, Tripathi K.D, Jaypee Brothers
Medical Pharmacology, Udaykumar, CBS publishing

Subject: **GENERAL MEDICINE**
Textbook of Medicine Davidson
Textbook of Medicine Hutchinson

Subject: **GENERAL SURGERY**
1) Short practice of Surgery Baily & Love

Subject: **ORAL PATHOLOGY & ORAL MICROBIOLOGY**
A Text Book of Oral Pathology Shafer, Hine & Levy
Oral Pathology - Clinical Pathologic correlations Regezi & Sciubba.
Oral Pathology Soames & Southam.
Oral Pathology in the Tropics Prabhu, Wilson, Johnson & Daftary
Synopsis of Oral Pathology, Bhaskar, CBS publishing

Subject: **PUBLIC HEALTH DENTISTRY**

Dentistry Dental Practice and Community by David F. Striffler and Brain A. Burt, W. B. Saunders Company
Principles of Dental Public Health by James Morse Dunning, Harward University Press.
Dental Public Health and Community Dentistry Ed by Anthony Jong Publication by The C. V. Mosby Company
Community Oral Health-A system approach by Patricia P. Cormier and Joyce I. Levy published by Apple ton- Century-Crofts/ New York,
Community Dentistry-A problem oriented approach by P. C.
Dental Hand book series Vol.8 by Stephen L. Silverman and Ames F. Tryon, Series editor-Alvin F. Gardner, PSG Publishing company Inc. Littleton Massachusetts,
Dental Public Health- An Introduction to Community Dentistry. Edition by Geoffrey L. Slack and Brain Burt, Published by John Wright and sons Bristol.
Oral Health Surveys- Basic Methods, 1997, published by
W. H. O Geneva available at the regional office New Delhi.
Preventive Medicine and Hygiene-By Maxcy and Rosenau, published by Appleton Century Crofts,
Preventive Dentistry-by J. O. Forrest published by John Wright and sons Bristoli,
Preventive Dentistry by Murray,.
Text Book of Preventive and Social Medicine by Park and park,
Community Dentistry by Dr. Soben Peter.
Public Health dentistry, Sikri. CBS Publishing

Subject: **RESEARCH METHODOLOGY AND BIO-STATISTICS**

Introduction to Bio-statistics by B. K. Mahajan
Introduction to Statistical Methods by Grewal

Subject: **PAEDIATRIC AND PREVENTIVE DENTISTRY**

Dentistry for the Child and Adolescence - Mc. Donald.
Pediatric Dentistry (Infancy through Adolescence) - Pinkham.
Pediatric Dentistry : Total Patient Care – Stephen H.Y. Wei
Clinical Pedodontics – Sidney B. Finn
Fundamentals of Pediatric Dentistry – R.J. Mathewson
Handbook of Clinical Pedodontics - Kenneth. D.
Text Book of Pedodontics- Shobha Tandon
Pediatric Dentistry - Damle S. G.
Kennedy's Pediatric Operative Dentistry - Kennedy & Curzon.
Handbook of Pediatric Dentistry – Cameron and Widmer
Pediatric Dentistry - Richard R. Welbury
Pedodontics: A Clinical Approach - Goran Koch
Orthodontics and Pediatric Dentistry (Colour Guide) - D Millet & R Welbury
Color Atlas of Oral Diseases in Children and Adolescents
- George Laskaris
Dental Management of the Medically Compromised Patient –J.W. Little

Pediatric Dentistry – Scientific Foundations and Clinical Practice – Stewart and Barber.
Clinical Use of Fluorides - Stephen H. Wei.
Understanding of Dental Caries - Niki Foruk.
Essentials of Community & Preventive Dentistry - Soben Peters.
Behaviour Management – Wright
Traumatic Injuries - Andreason.
Occlusal Guidance in Pediatric Dentistry - Stephen H. Wei / Nakata
Pediatric Oral & Maxillofacial Surgery - Kaban.
Pediatric Medical Emergencies - P. S. Whatt.
An Atlas of Glass Ionomer Cements - G. J. Mount..
Textbook of Pediatric Dentistry - Braham Morris.
Primary Preventive Dentistry - Norman O. Harris.
Preventive Dentistry - Forrester.
Contemporary Orthodontics - Profitt..
Preventive Dentistry - Depaola.
Endodontics - Ingle.
Pathways of Pulp - Cohen.
Management of Traumatized anterior Teeth - Hargreaves.

Subject: **ORAL MEDICINE AND RADIOLOGY**
Oral Diagnosis, Oral Medicine & Oral Pathology
Oral Medicine, Burkit, J.B. Lippincott Company
Principles of Oral Diagnosis, Coleman, Mosby Year Book
Oral Manifestations of Systemic Diseases, Jones, W.B. Saunders company
Oral Diagnosis & Oral Medicine, Mitchell
Oral Diagnosis, Kerr
Oral Diagnosis & Treatment ,Miller
Clinical Methods, Hutchinson
Shafers, Oral Pathology
Principles and practice of Oral Medicine, Sonis.S.T., Fazio.R.C. and Fang.L

Subject : **ORAL RADIOLOGY**
Oral Radiology White & Goaz, Mosby year Book
Dental Radiology, Weahrman,C.V. Mosby Company
Oral Roentgenographs Diagnosis, Stafne ,W.B. Saunders Co
Fundementals of Dental radiology, Sikri, CBS Publishing.

Subject : **FORENSIC ODONTOLOGY**
Practical Forensic Odontology, Derek H. Clark, Butterworth-Heinemann
Manual of Forensic Odontology, C Michael Bowers, Gary Bell

Subject: **ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS**
Contemporary Orthodontics- William R. Proffit
Orthodontics For Dental Students- White And Gardiner
Handbook Of Orthodontics- Moyers

Orthodontics - Principles And Practice- Graber
Design, Construction And Use Of Removable Orthodontic Appliances- C. Philip Adams
Clinical Orthodontics: Vol 1 & 2- Salzmann

Subject: **ORAL AND MAXILLOFACIAL SURGERY**
Impacted teeth, Alling John et al
Principles of Oral & maxillofacial Surgery vol1,2&3 Peterson LJ et al
Text book of Oral & maxillofacial Surgery, Srinivasan B
Hand book of Medical emergencies in the dental office, Melamed SF
Killey's Fracture of the Mandible, Banks
Killey's Fractures of the Middle 3 of the Facial Skeleton; Banks P
The Maxillary Sinus and its Dental Implications; Mc Govanda
Killey and Kays Outline of Oral Surgery - Fart l& 2; Seward GR & et al
Essentials of Safe Dentistry for the Medically Compromised Patients; Mc Carthy FM
Oral & Maxillofacial Surgery, Vol l& 2; Laskin DM
Extraction of Teeth; Howe GL
Minor Oral Surgery; Howe GL
Contemporary Oral & Maxillofacial Surgeiy; Peterson LJ
Text book of Oral &Maxillofacial Surgery , Neelima Anil Malik
Text book of Oral &Maxillofacial Surgery, SM Balaji
Principles of Oral Surgery; Moore J'R
Handbook of Local Anaesthesia, Malamed
Sedation; Malamed
Text book of Oral & Maxillofacial Surgery; Gustav O Kruger
A Practical guide to Hospital Dentistry, Dr. George Varghese, Jaypee brothers publishing, New Delhi.
A Practical guide to the Management of Impacted Tooth, Dr. George Varghese, Jaypee brothers publishing, New Delhi.
Textbook of Local Anaesthesia; Monheim

Subject: **PROSTHODONTICS, AND CROWN & BRIDGE**
Syllabus of Complete denture -Charles M. Heartwell Jr. and Arthur O. Rahn
Prosthodontic treatment for edentulous patients- Carl O. Boucher
Essentials of complete denture prosthodontics by - Sheldon Winkler.
Maxillofacial prosthetics by - Willam R. Laney.
McCraken's Removable partial Prosthodontics
Removable partial Prosthodontics by - Ernest L. Miller and Joseph E. Grasso.
Stewart's Clinical Removable Partial Prosthodontics, Quintessence Publishing Co.
Fundementals of Fixed Prosthodontics, Shillingburg, Quintessence Publishing Co.
Management of Temporomandibular Disorders and Occlusion, Jeffery P. Okeson, Mosby Year book, Inc.

Subject: **PERIODONTOLOGY**
1) Glickman's Clinical Periodontology-Carranza Reference books
Essentials of Periodontology and periodontics- Torquil MacPhee

Contemporary periodontics- Cohen
Periodontal therapy- Goldman
Orbans' periodontics- Orban
Oral Health Survey- W.H.O.
Preventive Periodontics- Young and Stiffler
Advanced Periodontal Disease- John Prichard
Clinical Periodontology- Jan Lindhe
Periodontics- Baer & Morris.

Subject: **CONSERVATIVE DENTISTRY AND ENDODONTICS**
The Art & Science of Operative Dentistry, Sturdivant, Mosby U.S.A
Principle & Practice of Operative Dentistry, Charbeneu,Varghese Publishing, Mumbai.
Grossman's Endodontic Practice, B. Suresh Chandra &
V. GopiKrishna, Wolters Kluwer

Subject: **ESTHETIC DENTISTRY**
Esthetic guidelines for restorative dentistry; Scharer & others
Esthetics of anterior fixed prosthodontics; Chiche (GJ) & Pinault (Alain)
Esthetic & the treatment of facial form, Vol 28; Mc Namara (JA)

Subject: **FORENSIC ODONTOLOGY**
1) Practical Forensic Odontology- Derek Clark

Subject: **BEHAVIOURIAL SCIENCE**
General Psychology- Hans Raj, Bhatia
Behavioural Sciences in Medical Practice- Manju Mehta
General psychology — Hans Raj, Bhatia
General psychology —Munn
Sciences basic to psychiatry -- Basanth Puri & Peter J Tyrer

Subject: **ETHICS**
1) Medical Ethics, Francis C M, Jaypee Brothers, New Delhi

Subject: **IMPLANTOLOGY**
Contemporary Implant Dentistry, Carl. E. Misch, Mosby
Osseointegration and Occlusal Rehabilitation, Hobo S., Ichida. E. and
Garcia L.T. Quintessence Publishing Company,

*Note: 1. Book titles will keep on adding in view of latest advances in Dental Sciences.
2. Standard books from Indian authors are also recommended

LIST OF JOURNALS

Journal of Dentistry
British Dental Journal

International Dental Journal
Dental Abstracts
Journal of American Dental Association
British Journal of Oral and Maxillofacial Surgery
Oral Surgery, Oral Pathology and Oral Medicine
Journal of Periodontology
Journal of Endodontics
American journal of Orthodontics and Dentofacial Orthopedics
Journal of Prosthetic Dentistry
International Journal of Prosthodontics
Journal of Public Health Dentistry
Endodontics and Dental Traumatology
Journal of Dental Education
Dental Update
Journal of Dental Material
International Journal of Pediatric Dentistry
International Journal of Clinical Pediatric dentistry

*Note: This is the minimum requirement. More journals both Indian and Foreign are recommended for imparting research oriented education.