Second Edition

Comprehensive Applied Basic Sciences

for MDS Students

Questions–Answers

Salient features

- All the subjects under basic sciences are compiled in one book for MDS students.
- Topics are arranged as per Dental Council of India: New MDS Course Regulations-2017.
- Previous 30 years (1990-2020) Question papers are included from All Indian Universities (Health), including AIIMS, New Delhi.
- All questions are answered as per the type of question (long/short) with applied clinical aspects.
- All questions are provided with most refined and 'to the point' answers to make it more interesting.
- Answers are selected from the standard textbooks/journals with complete references, commonly referred to by the students to avoid confusion during exams.
- Written in a simple, well structured format with a comprehensive examination-oriented description along with a high number of diagrams.
- An indispensable book for the last minute revision during examinations and for quick reference throughout the year.

Suresh K Sachdeva MDS (Oral Medicine and Radiology)

is currently Professor, Department of Oral Medicine and Radiology, Surendera Dental College and Research Institute, Sri Ganganagar, Rajasthan. After his graduation from DAV (C) Dental College and Hospital, Yamunanagar, Haryana, he completed his postgraduation from Tamil Nadu Government Dental College and Hospital, Chennai. He has served as teaching faculty at Vyas Dental College and Hospital, Jodhpur. He has been a member of the Executive Council of Indian Academy of Oral Medicine and Radiology for 2017-18. He actively participated in the IAOMR workshop on drafting guidelines for using CBCT in dental practice in India held in 2019. He is a member of the editorial board of *JIAOMR* (2020-21) and many other journals. He is also an external examiner for both undergraduate and postgraduate examinations for various universities and a keynote speaker at many platforms. He is dedicated to patient's treatment and passionate about teaching. He has many international and national publications to his credit and has presented several papers at many conferences. He is also running an exclusive oral medicine, diagnosis and therapeutic centre at his place.

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Second Edition

Comprehensive **Applied Basic Sciences** for MDS Students

Sachdeva

CBS

Second Edition

Comprehensive Applied Basic Sciences CABS

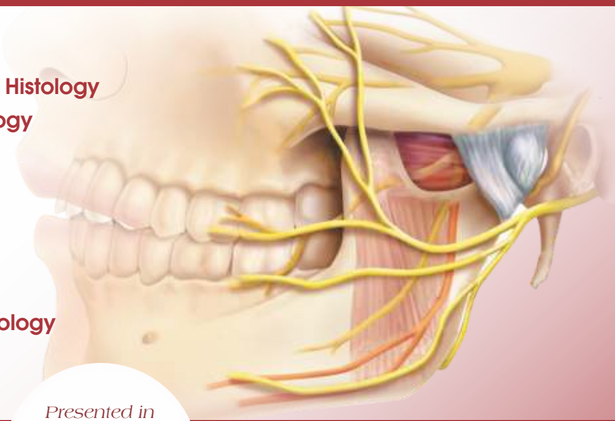
for MDS Students

As per DCI Syllabus: New MDS Course Regulations-2017

Questions–Answers

The Book Covers

- Human Anatomy, Embryology and Histology
- Dental Anatomy and Dental Histology
- Physiology
- Biochemistry
- Microbiology
- Pathology
- Pharmacology
- Biostatistics and Research Methodology
- Dental Materials
- Genetics and Miscellaneous



Presented in Question–Answer Form for Quick and Easy Review of Basic Subjects

Forewords by

Hemant R Umarji

S Gowri Sankar

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Suresh K Sachdeva

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Questions–Answers

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Science and technology are constantly changing fields. New research and experience broaden the scope of information and knowledge. The author has tried his best in giving information available to him while preparing the material for this book. Although, all efforts have been made to ensure optimum accuracy of the material, yet it is quite possible some errors might have been left uncorrected. The publisher, the printer and the author will not be held responsible for any inadvertent errors, or inaccuracies.

Comprehensive Applied Basic Sciences for MDS Students

CABS

Second Edition

Questions–Answers

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to

my parents, wife and daughter

for their love and patience

and

all the students for making this ordinary book as "Extraordinary"

Foreword

I am delighted to write the Foreword to the Second Edition of *Comprehensive Applied Basic Sciences* popularly known as **CABS for MDS students**, authored by Dr Suresh K Sachdeva.

Dr Sachdeva has carefully updated the art and science of basic science in the Second Edition using the same multidisciplinary approach that has been the hallmark of success of its First Edition. The fact that this book has reached its Second Edition is the best sign that you are holding in your hands a very successful book, and probably one of the dental bestsellers published in recent times. Up to now, it has been used by thousands of students and I am sure that it will continue to be read and cherished in the new edition as well.

For the Second Edition, Dr Sachdeva has partially restructured the book, substantially revised it, and updated the text wherever it was necessary, as per **DCI syllabus: New MDS Course Regulations, 2017.**

Furthermore, the author has dramatically increased the number of diagrams/illustrations, which are essential for understanding the subject of applied basic sciences. It will provide a helpful study material to MDS students and help them review the subject for examinations.

In summary, it is my distinct pleasure and honor to most enthusiastically endorse the new edition of an established book. Dr Sachdeva deserves the full appreciation for this compilation and providing the MDS students with such an attractive, comprehensive, up-to-date and useful book of applied basic science.

It is my hope and expectation that this book will provide an effective learning experience and referenced resource for MDS students and other potential readers.

H. R. Umarji

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India

Foreword

It gives me a great pleasure and sense of satisfaction in writing Foreword to the Second Edition of ***Comprehensive Applied Basic Sciences (CABS), for MDS Students*** authored by my junior colleague, Dr Suresh K Sachdeva. I have seen him as a young hardworking student, preparing for postgraduate entrance metamorphosing into a teacher of his capabilities. The newer guidelines set by the Dental Council of India prescribe basic sciences exam at the end of first year. Writing a theory book for the postgraduates is a herculean task that too in an examination point of view. The author has put a great effort to bring all the basic sciences under one umbrella and presented it as a compendium common to all the branches. Our present theory examination system, assess the results of a year-long study of entire basic sciences by a single question paper. The student sometimes finds it challenging to revise all the textbooks in the last phase of preparation. I do not hesitate to recommend that this a precious book in such a situation. The author has taken appropriate care to uniformly and reliably cover the entire basic sciences, but yet comprehensive. The subject is presented in a lucid manner in the form of question and answer type. The questions were drawn from previous year examination papers of various health universities. This gives an insight for the student what needs to be stressed during exam preparation. I have no doubt that dental postgraduates preparing for theory examinations will benefit from a careful study of this book. Careful thought and intelligent use of a sound knowledge of basic facts and principles will usually be more rewarding in the long run than plain memorizing. I wish him the very best in this and all his other professional endeavors.

S. Gowri Sankar

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Preface to the Second Edition

"Your Own Work is More Inspirational Than Anything"

It is my pleasure to release the Second Edition of *Comprehensive Applied Basic Sciences (CABS) for MDS Students* within a few years of its First Edition with reprints in between as the book was well-accepted by students. This overwhelming success and all-round acceptance of the first edition was very encouraging and quite stimulating but at the same time put a huge responsibility and expectation to do better in the new edition. In preparing this edition, I pursued this goal with profound enthusiasm and passionate zeal with a wholly transformed appearance and updated contents in the Second Edition.

New Features: It is designed as per DCI syllabus according to New MDS Course Regulations, 2017 for MDS students (Applied Basic Sciences) with more illustrations, more diagrams and flowcharts. I have extensively done corrections in this edition as per the feedback received from students for previous edition. I have added many new materials with recent classifications, text details, new question papers (1999–2020) from major health universities Pan-India and insufficient topics are upgraded. The basic essence is maintained as all questions are provided with crisp, most refined and "to the point" answers to make it more interesting. "Suggested Reading" section contains more number of references from journals/textbook for students who want to read the subject/topics in depth.

How to Use this Book: Before starting this book, students are advised to go through the latest syllabus for Part I given at the beginning, as all the basic science subjects are not in the syllabus of all the specialties. Moreover, within the subjects, a few questions are speciality specific that can also be skipped by other speciality students. So, students preparing for Part I need to use this book in a smart, specific and precise manner, to get the best out of this edition.

While this book has been compiled for postgraduate students, I am confident that it will serve as a useful reference for students preparing for NEET-MDS Exams, undergraduates and practitioners. I sincerely welcome all suggestions and constructive criticisms towards improving this book in subsequent editions at *cabsformds@rediffmail.com*

September, 2020

Suresh K Sachdeva

Preface to the First Edition

I have written *Comprehensive Applied Basic Sciences (CABS) for MDS Students* not as an author but as a student. When I was doing my postgraduation, every student used to read multiple books, seminars, articles for the applied basic science paper, which consumed a lot of precious time and create unnecessary stress during exam time. If we do preparations as per the previous year's question papers, some difficult and twisted questions make the situation worse. This lead a strong feeling in me to write a comprehensive book for the applied basic sciences which contains all the subjects as solved question–answers, from all over India. I have tried my best to bring out a book which can invoke interest in students in this subject. The basic aim of writing this book is to make the students familiar with the usually asked questions and to give a clear picture of an answer to be written in a particular question.

This book holds the potential of filling the gap that has been felt by dental postgraduate students for years. This book provides the readers a comprehensive and concise overview of the basic science subjects with ten chapters, each having the previous years' questions with answers from almost all the universities of India, arranged as per the syllabus prescribed by Dental Council of India.

The questions are answered as short notes, long questions with "to the point" answers. Also the variants of a question asked in different universities have also been added. Moreover, the answers are selected from the standard textbooks which are usually used by students, to avoid any confusion. And where the answers have been taken from the articles, proper citation of the reference has been given.

This book is written to bring out a concise, easily understandable resource for students to learn and guide them to write well structured answers in their examinations.

I hope that the book will fulfill the need of the students by giving them relevant guidance during their preparation for examination. I am confident that the readers will be greatly benefited by my effort.

I have tried my best to cover all the aspect of applied basic sciences as per the DCI syllabus in my book. As no one is perfect, I humbly accept my limitations regarding shortcomings in the book and I sincerely welcome the constructive suggestions from the readers of this book at cabsformds@rediffmail.com

April, 2016

Suresh K Sachdeva

Acknowledgments

I thank Almighty for the grand success of first edition of CABS for MDS students, which inspired me to work on Second Edition with more enthusiasm and zeal.

My family and friends deserve my heartfelt acknowledgement for their unconditional support.

I appreciate the support and guidance received from the Prof (Dr) Vishal Dang Sir, Past President, Indian Academy of Oral Medicine and Radiology, New Delhi, and Prof (Dr) Sreenivasan V, Principal, BVP Dental College, Navi Mumbai, Maharashtra, India, during the testing time of my professional career.

I would like to extend my special thanks and sincere regards to Prof (Dr) Hemant R Umarji sir and Prof (Dr) S Gowri Sankar sir for kind enough to me in writing the foreword to this book.

I would always be grateful to my teachers at Department of Oral Medicine and Radiology, Tamil Nadu Government Dental College and Hospital, Chennai and DAV (C) Dental College and Hospital, Yamunanagar.

The revision work was indeed a mammoth task to accomplish and would not have been possible without active cooperation from friends and colleagues, who provided valuable feedback of the first edition. I am thankful to Dr Shekhar Kapoor (CDC, Ludhiana), Dr Manas Gupta (Bhopal), Dr Pritesh Ruparelia (Ahmedabad), Dr Sanjay Dutta (GDC, Guwahati), Dr (Major) Ravi Athawale, Dr Purnendu Rout (KIDS, Bhubaneswar), Dr Avinash L Kashid (Ambajogai), Dr Abhishek Sinha (Lucknow), Dr Saurabh Srivastava (Lucknow), Dr Hemant Sawhney (Greater Noida), Dr Bhuvan Jyoti (Ranchi), Dr Ranjeeta Mehta (Rishikesh), Dr Lavina Taneja, Dr K Sashikumar Singh (RIMS, Imphal), Dr Mohsin Muzaffar Tak (GDC, Srinagar), Dr Varun Chopra (Chandigarh), Dr Ravleen Nagi (Panchkula), Dr P Redwin (Kanyakumari), Dr Bhaumik Joshi (Ahmedabad), Dr Ashish Kakkar (Sirsa) for provided me Question Papers from Pan-India on prompt basis.

Last but not the least; I am greatly indebted to Mr Satish Kumar Jain (CMD), Mr YN Arjuna (Senior Vice-President) for continuing faith in me in publishing second edition on time. I also need to say thanks to the entire staff of CBS Publishers & Distributors for patiently answering all my queries and beautifully doing the book work.

September, 2020

Suresh K Sachdeva

Contents

SYLLABUS FOR MDS IN VARIOUS SPECIALTIES

The syllabus for MDS course includes both Applied Basic Sciences and subjects of concerned specialty. The syllabus in Applied Basic Sciences shall vary according to the particular specialty; similarly the candidates shall also acquire adequate knowledge in other subjects related to their respective specialty.

Scheme of Examination: Part I: Basic Science Paper: 100 Marks (10×10). At the end of First year MDS.

1. PROSTHODONTICS AND CROWN AND BRIDGE

APPLIED ANATOMY OF HEAD AND NECK

General Human Anatomy: Gross Anatomy, anatomy of Head and Neck in detail: Cranial and facial bones, TMJ and function, muscles of mastication and facial expression, muscles of neck and back including muscles of deglutition and tongue, arterial supply and venous drainage of the head and neck, anatomy of the para nasal sinuses in relation to the Vth cranial nerve. General considerations of the structure and function of the brain, brief considerations of V, VII, XI, XII, cranial nerves and autonomic nervous system of the head and neck. The salivary glands, pharynx, larynx, trachea, esophagus, functional anatomy of masticatory muscles, deglutition, speech, respiration, and circulation, teeth eruption, morphology, occlusion and function. Anatomy of TMJ, its movements and myofacial pain dysfunction syndrome.

Embryology: Development of the face, tongue, jaws, TMJ, paranasal sinuses, pharynx, larynx, trachea, esophagus, salivary glands, development of oral and para oral tissues including detailed aspects of tooth formation.

Growth and Development: Facial form and facial growth and development overview of dentofacial growth process and physiology from fetal period to maturity and old age, general physical growth, functional and anatomical aspects of the head, changes in craniofacial skeletal development, relationship between development of the dentition and facial growth.

Dental Anatomy: Anatomy of primary and secondary dentition, concept of occlusion, mechanism of articulation, and masticatory function. Detailed structural and functional study of the oral and para oral tissues, normal occlusion, development of occlusion in deciduous mixed and permanent dentitions, root length, root configuration and tooth-numbering systems.

Histology: Histology of enamel, dentin, cementum, periodontal ligament and alveolar bone, pulpal anatomy, histology and biological consideration. Salivary glands and histology of epithelial tissues including glands. Histology of general and specific connective tissue including bone, salivary glands, histology of skin, oral mucosa, respiratory mucosa, connective tissue, bone, cartilage, cellular elements of blood vessels, blood, lymphatics, nerves, muscles, tongue and tooth.

Cell biology: Brief study of the structure and function of the mammalian cell Components of the cell and functions of various types of cells and their consequences with tissue injury.

APPLIED PHYSIOLOGY AND NUTRITION

Introduction, mastication, deglutition, digestion and assimilation, homeostasis, fluid and electrolyte balance, blood composition, volume, function, blood groups and hemorrhage, blood transfusion, circulation, heart, pulse, blood pressure, capillary and lymphatic circulation. Shock, respiration, control, anoxia, hypoxia, asphyxia, artificial respiration. Endocrine glands in particular reference to pituitary, parathyroid and thyroid glands and sex hormones. Role of calcium and Vit D in growth and development of teeth, bone and jaws. Role of Vit A, C and B complex in oral mucosal and periodontal health. Physiology and function of the masticatory system. Speech mechanism, mastication, swallowing and deglutition mechanism, salivary glands and saliva.

Endocrines: General principles of endocrine activity and disorders relating to pituitary, thyroid, pancreas, parathyroid, adrenals, gonads, including pregnancy and lactation. Physiology of saliva, urine formation, normal and abnormal constituents, physiology of pain, sympathetic and parasympathetic nervous system, neuromuscular co-ordination of the stomatognathic system.

Applied Nutrition

General principles, balanced diet, effect of dietary deficiencies and starvation, diet, digestion, absorption, transportation and utilization and diet for elderly patients.

Applied Biochemistry

General principles governing the various biological activities of the body, such as osmotic pressure, electrolytic dissociation, oxidation-reduction carbohydrates, proteins, liquids and their metabolism; Enzymes, vitamins, and minerals; Hormones; Blood; Metabolism of inorganic elements; Detoxification in the body and antimetabolites.

APPLIED PHARMACOLOGY AND THERAPEUTICS

Dosage and mode of administration of drugs. Action and fate of drugs in the body, drug addiction, tolerance and hypersensitive reactions; Drugs acting on the central nervous system, general anesthetics hypnotics, analeptics and tranquilizers. Local anesthetics; Chemotherapeutics and antibiotics; Antitubercular and antisyphilitic drugs; Analgesics and antipyretics; Antiseptics; Styptics; Sialogogue and antisialogogues; Haematinics; Cortisones; ACTH; Insulin and other antidiabetic vitamins: A, D, B-complex group C, K, etc. Chemotherapy and radiotherapy; Drug regime for antibiotic prophylaxis and infectious endocarditis and drug therapy following dental surgical treatments like placement of implants, pre- and periprosthetic surgery.

APPLIED PATHOLOGY

Inflammation, repair and degeneration; Necrosis and gangrene; Circulatory disturbances; Ischemia, hyperemia, chronic venous congestion, edema, thrombosis, embolism and infarction. Infection and infective granulomas; Allergy and hypersensitive reactions; Neoplasms; Classification of tumors; Carcinogenesis; Characteristics of benign and malignant tumors; Spread of tumors. Applied histopathology and clinical pathology.

APPLIED MICROBIOLOGY

Immunity, knowledge of organisms commonly associated with diseases of the oral cavity (morphology cultural characteristics, etc.) of Strepto, Staphylo; Clostridia group of organisms, spirochetes, organisms of tuberculosis, leprosy, diphtheria, actinomycosis and moniliasis, etc. Virology; Cross infection control, sterilization and hospital waste management.

a. **Applied Oral Pathology:** Developmental disturbances of oral and para oral structures, Regressive changes of teeth; Bacterial, viral and mycotic infections of the oral cavity. Dental caries, diseases of pulp and periapical tissues; Physical and chemical injuries of the oral cavity, oral manifestations of metabolic and endocrine disturbances; Diseases of the blood and blood forming organism in relation to the oral cavity; Periodontal diseases; Diseases of the skin, nerves and muscles in relation to the oral cavity.
b. **Laboratory Determinations:** Blood groups, blood matching, RBC and WBC count, bleeding and clotting time, PT, PTT and INR smears and cultures—urine analysis and culture. Interpretation of RBS, glycosylated Hb, GTT.

Biostatistics: Characteristics and limitations of statistics, planning of statistical experiments, sampling, collection, classification and presentation of data (tables, graphs, pictograms, etc.) and Analysis of data, parametric and nonparametric tests.

Introduction to Biostatistics

Scope and need for statistical application to biological data. Definition of selected terms—scale of measurements related to statistics, methods of collecting data, presentation of the statistical diagrams and graphs. Frequency curves, mean, mode of median; Standard deviation and

co-efficient of variation, Correlation-Co-efficient and its significance, Binominal distributions normal distribution and Poisson's distribution, Tests of significance.

RESEARCH METHODOLOGY

Understanding and evaluating dental research, scientific method and the behavior of scientists, understanding to logic-inductive logic-analogy, models, authority, hypothesis and causation. Measurement and Errors of measurement, presentation of results, Reliability, Sensitivity and specificity diagnosis tests and measurements, Research Strategies, Observation, Correlation, Experimentation and Experimental design. Logic of statistical in(ter)ferences, balance judgments, judgment under uncertainty, clinical vs. scientific judgment, problems with clinical judgment, forming scientific judgments, the problem of contradictory evidence, citation analysis as a Means of literature evaluation, influencing judgment: Protocol writing for experimental, observational studies, survey including hypothesis, PICO statement, aim objectives, sample size justification, use of control/placebo, standardization techniques, bias and its elimination, blinding, evaluation, inclusion and exclusion criteria.

APPLIED RADIOLOGY

Introduction, radiation, background of radiation, sources, radiation biology, somatic damage, genetic damage, protection from primary and secondary radiation, Principles of X-ray production, Applied principles of radiotherapy and after care.

ROENTGENOGRAPHIC TECHNIQUES

Intra oral, extra oral roentgenography, Methods of localization digital radiology and ultrasounds. Normal anatomical landmarks of teeth and jaws in radiograms, temporomandibular joint radiograms, neck radiograms. Use of CT and CBCT in prosthodontics.

APPLIED MEDICINE

Systemic diseases and (its) their influence on general health and oral and dental health. Medical emergencies like syncope, hyperventilation, angina, seizure, asthma and allergy/anaphylaxis in the dental offices-Prevention, preparation, medicolegal consideration, unconsciousness, respiratory distress, altered consciousness, seizures, drug related emergencies, chest pain, cardiac arrest, premedication, prophylaxis and management of ambulatory patients, resuscitation, applied psychiatry, child, adult and senior citizens.

APPLIED SURGERY AND ANESTHESIA

General principles of surgery, wound healing, incision wound care, hospital care, control of hemorrhage, electrolyte balance. Common bandages, sutures, splints, shifting of critically ill patients, prophylactic therapy, bone surgeries, grafts, etc, surgical techniques, nursing assistance, anesthetic assistance. Principles in speech therapy, surgical and radiological craniofacial oncology, applied surgical ENT and ophthalmology.

APPLIED PLASTIC SURGERY

Applied understanding and assistance in programs of plastic surgery for prosthodontics therapy.

APPLIED DENTAL MATERIALS

Students should have understanding of all materials used for treatment of craniofacial disorders: Clinical, treatment, and laboratory materials, associated materials, technical considerations, shelf life, storage, manipulations, sterilization, and waste management. Students shall acquire knowledge of testing biological, mechanical and other physical properties of all materials used for the clinical and laboratory procedures in prosthodontics therapy.

2. PERIODONTOLOGY

APPLIED BASIC SCIENCES APPLIED ANATOMY

Development of the Peridontium, Micro and Macro structural anatomy and biology of the periodontal tissues, Age changes in the periodontal tissues, Anatomy of the Peridontium (macroscopic and microscopic anatomy, Blood supply of the Periodontium, Lymphatic system of the Peridontium, Nerves of the Periodontium), Temporomandibular joint, Maxillae and Mandible, Tongue, oropharynx, Muscles of mastication/Face, Blood Supply and Nerve Supply of Head and Neck and Lymphatics, Spaces of Head and Neck.

PHYSIOLOGY

Blood; Respiratory system—knowledge of the respiratory diseases which are a cause of periodontal diseases (periodontal Medicine); Cardiovascular system (Blood pressure, Normal ECG, Shock), Endocrinology-hormonal influences on Peridontium, Gastrointestinal system (Salivary secretion-composition, function and regulation, Reproductive physiology, Hormones—Actions and regulations, role in periodontal disease, Family planning methods), Nervous system (Pain pathways; Taste-Taste buds; primary taste sensation and pathways for sensation), Hemostasis.

BIOCHEMISTRY

Basics of carbohydrates, lipids, proteins, vitamins, enzymes and minerals; Diet and nutrition and Peridontium; Biochemical tests and their significance; Calcium and phosphorus.

PATHOLOGY

Cell structure and metabolism, Inflammation and repair, necrosis and degeneration, Immunity and hypersensitivity, Circulatory disturbances-edema, hemorrhage, shock, thrombosis, embolism, infarction and hypertension, Disturbances of nutrition, Diabetes mellitus, Cellular growth and differentiation, regulation, Lab investigations, Blood

MICROBIOLOGY

General bacteriology (Identification of bacteria, Culture media and methods, Sterilization and disinfection), Immunology and Infection, Systemic bacteriology with special emphasis on oral microbiology-staphylococci, genus actinomyces and other filamentous bacteria and actinobacillus actinomycetumcomitans, Virology (General properties of viruses, Herpes, Hepatitis, virus, HIV virus), Mycology (Candidiasis), Applied microbiology, Diagnostic microbiology and immunology, hospital infections and management.

PHARMACOLOGY

General pharmacology (Definitions-Pharmacokinetics with clinical applications, routes of administration including local drug delivery in Periodontics, Adverse drug reactions and drug interactions), Detailed pharmacology of Analgesics-opiod and nonopiod, Local anesthetics, Haematinics and coagulants, Anticoagulants, Vi.t D and Calcium preparations, Antidiabetics drugs, Steroids, Antibiotics, Antihypertensive, Immunosuppressive drugs and their effects on oral tissues, Antiepileptic drugs Brief pharmacology, dental use and adverse effects of General anesthetics, Antipsychotics, Antidepressants, Anxiolytic drugs, Sedatives, Antiepileptics, Antihypertensives, Antianginal drugs, Diuretics, Hormones, Pre-anesthetic medications, Drugs used in Bronchial asthma, cough, Drug therapy of Emergencies, Seizures, Anaphylaxis, Bleeding, Shock, Diabetic Ketoacidosis, Acute addisonian crisis Dental Pharmacology: Antiseptics, Astringents, Sialogogues, Disclosing agents, Antiplaque agents, Fluoride pharmacology.

BIOSTATISTICS

Introduction, definition and branches of biostatistics, Collection of data, sampling, types, bias and errors, Compiling data-graphs and charts, Measures of central tendency (mean, median and mode), standard deviation and variability, Tests of significance (chi square test, t-test and z-test), Null hypothesis.

3. ORAL AND MAXILLOFACIAL SURGERY

Applied Anatomy

1. Surgical anatomy of the scalp, temple and face
2. Anatomy of the triangles of neck and deep structures of the neck
3. Cranial and facial bones and its surrounding soft tissues with its applied aspects in maxillofacial injuries.

4. Muscles of head and neck; chest, lower and upper extremities (in consideration to grafts/flaps)
5. Arterial supply, venous drainage and lymphatics of head and neck
6. Congenital abnormalities of the head and neck
7. Surgical anatomy of the cranial nerves
8. Anatomy of the tongue and its applied aspects
9. Surgical anatomy of the temporal and infratemporal regions
10. Anatomy and its applied aspects of salivary glands, pharynx, thyroid and parathyroid gland, larynx, trachea, esophagus
11. Tooth eruption, morphology, and occlusion
12. Surgical anatomy of the nose
13. The structure and function of the brain including surgical anatomy of intra cranial venous sinuses
14. Autonomous nervous system of head and neck
15. Functional anatomy of mastication, deglutition, speech, respiration and circulation
16. Development of face, paranasal sinuses and associated structures and their anomalies
17. TMJ: Surgical anatomy and function. Physiology of nerve conduction, pain pathway, sympathetic and parasympathetic nervous system, hypothalamus and mechanism of controlling body temperature.

Physiology

1. **Nervous system:** Physiology of nerve conduction, pain pathway, sympathetic and parasympathetic nervous system, hypothalamus and mechanism of controlling body temperature
2. **Blood:** Composition, Haemostasis, various blood dyscrasias and management of patients with the same, Hemorrhage and its control, Capillary and lymphatic circulation, Blood grouping, transfusing procedures.
3. **Digestive system:** Saliva—composition and functions of saliva, Mastication, deglutition, digestion, assimilation, Urine formation, normal and abnormal constituents.
4. **Respiration:** Control of ventilation, anoxia, asphyxia, artificial respiration, Hypoxia—types and management.
5. **Cardiovascular System:** Cardiac cycle, Shock, Heart sounds, Blood pressure, Hypertension.
6. **Endocrinology:** General endocrinal activity and disorder relating to thyroid gland, Parathyroid gland, adrenal gland, pituitary gland, pancreas and gonads, Metabolism of calcium.
7. **Nutrition:** General principles of a balanced diet, effect of dietary deficiency, protein energy malnutrition, Kwashiorkor, Marasmus. Fluid and Electrolytic balance in maintaining haemostasis and significance in minor and major surgical procedures.

Biochemistry

General principles governing the various biological activities of the body, such as osmotic pressure, electrolytes, dissociation, oxidation, reduction etc. General composition of the body, Intermediary metabolism, Carbohydrates, proteins, lipids, and their metabolism. Nucleoproteins, nucleic acid and nucleotides and their metabolism, Enzymes, vitamins and minerals, Hormones, Body and other fluids. Metabolism of inorganic elements, Detoxification in the body, Antimetabolites.

Pathology

1. **Inflammation:** Repair and regeneration, necrosis and gangrene, Role of component system in acute inflammation, Role of arachidonic acid and its metabolites in acute inflammation, Growth factors in acute inflammation, Role of molecular events in cell growth and intercellular signaling cell surface receptors, Role of NSAIDs in inflammation, Cellular changes in radiation injury and its manifestation.
2. **Haemostasis:** Role of endothelium in thrombogenesis, Arterial and venous thrombi, Disseminated Intravascular coagulation
3. **Shock:** Pathogenesis of hemorrhagic, neurogenic, septic, cardiogenic shock, Circulatory disturbances, ischemia, hyperemia, venous congestion, edema, infarction
4. **Chromosomal abnormalities:** Marfans Syndrome; Ehlers-Danlos Syndrome; Fragile X- Syndrome
5. **Hypersensitivity:** Anaphylaxis, type 2 hypersensitivity, type 3 hypersensitivity and cell mediated reaction and its clinical importance, systemic lupus erythematosus, Infection and infective granulomas.
6. **Neoplasia:** Classification of tumors, Carcinogenesis and carcinogens- chemical, viral and microbial, Grading and staging of cancers, tumor Angiogenesis, Paraneoplastic syndrome, spread of tumors, Characteristics of benign and malignant tumors
7. **Others:** Sex linked agammaglobulinemia, AIDS, Management of immune deficiency patients requiring surgical procedures, Di George Syndrome, Ghons complex, post primary pulmonary tuberculosis—pathology and pathogenesis.

Oral Pathology

Developmental disturbances of oral and paraoral structures; Regressive changes of teeth. Bacterial, viral and mycotic infections of oral cavity. Dental caries, diseases of pulp and periapical tissues; Physical and chemical injuries of the oral cavity. Oral manifestations of metabolic and endocrinal disturbances. Diseases of jawbones and TMJ. Diseases of blood and blood forming organs in relation to oral cavity. Cysts of the oral cavity; Salivary gland diseases. Role of laboratory investigations in oral surgery.

Microbiology

Immunity, Knowledge of organisms commonly associated with diseases of oral cavity. Morphology cultural characteristics of strepto, staphylo, pneumo, gono, meningo, clostridium group of organisms, spirochetes, organisms of TB, leprosy, diphtheria, actinomycosis and moniliasis. Hepatitis B and its prophylaxis. Culture and sensitivity test, Laboratory determinations. Blood groups, blood matching, RBC and WBC count, Bleeding and clotting time etc, smears and cultures. Urine analysis and cultures.

Applied Pharmacology and Therapeutics

1. Definition of terminologies used
2. Dosage and mode of administration of drugs
3. Action and fate of drugs in the body
4. Drug addiction, tolerance and hypersensitivity reactions
5. Drugs acting on the CNS
6. General and local anesthetics, hypnotics, analeptics, and tranquilizers
7. Chemo therapeutics and antibiotics
8. Analgesics and antipyretics, Antitubercular and antisyphilitic drugs, Antiseptics, Sialogogue and antisialogogues
9. Haematinics, Antidiabetic, Vitamins A, B-complex, C, D, E, K

4. CONSERVATIVE DENTISTRY AND ENDODONTICS

Applied Anatomy of Head and Neck

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

Anatomy and Development of Teeth

Enamel-development and composition, physical characteristics, chemical properties, structure, Age changes-clinical structure. Dentin-development, physical and chemical properties, structure type of dentin, innervations, age and functional changes and clinical considerations. Pulp-development, histological structures, innervations, functions,

regressive changes, clinical considerations, Dentin and pulp complex. Cementum-composition, cementogenesis, structure, function, clinical considerations. Knowledge of internal anatomy of permanent teeth, anatomy of root apex and its implications in endodontic treatment. Periodontal ligament-development, structure, function and clinical considerations. Salivary glands-structure, function, clinical considerations.

Applied Physiology

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

Pathology

Inflammation, repair, degeneration, necrosis and gangrene, Circulatory disturbances-ischemia, hyperemia, edema, thrombosis, embolism, infarction, allergy and hypersensitivity reaction, Neoplasms-classifications of tumors, characteristics of benign and malignant tumors, spread of tumors, Blood dyscrasias. Developmental disturbances of oral and Para oral structures, dental caries, regressive changes of teeth, pulp, periapical pathology, pulp reaction to dental caries and dental procedures, Bacterial, viral, mycotic infections of the oral cavity.

Microbiology

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

Pharmacology

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

Biostatistics

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

Research Methodology

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

Applied Dental Materials

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

5. ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS

Applied Anatomy

a. Prenatal growth of head: Stages of embryonic development, origin of head, origin of face, origin of teeth.
b. Postnatal growth of head: Bones of skull, the oral cavity, development of chin, the hyoid bone, general growth of head, growth of the face.
c. Bone growth: Origin of bone, composition of bone, units of bone structure, schedule of Ossification, mechanical properties of bone, roentgen graphic appearance of bone
d. Assessment of growth and development: Growth prediction, growth spurts, the concept of normality and growth increments of growth, differential growth, gradient of growth, methods of gathering growth data. Theories of growth and recent advances, factors affecting physical growth.
e. Muscles of mastication: Development of muscles, muscle change during growth, muscle function and facial development, muscle function and malocclusion
f. Development of dentition and occlusion: Dental development periods, order of tooth eruption, chronology of permanent tooth formation, periods of occlusal development, pattern of occlusion.
g. Assessment of skeletal age.

Physiology

Endocrinology and its disorders: Growth hormone, thyroid hormone, parathyroid hormone, ACTH. Calcium and its metabolism. Nutrition-metabolism and their disorders: Proteins, carbohydrates, fats, vitamins and minerals. Muscle physiology. Craniofacial Biology: Adhesion molecules and mechanism of adhesion. Bleeding disorders in orthodontics: Hemophilia.

Dental Materials

a. Gypsum products: Dental plaster, dental stone and their properties, setting reaction, etc.
b. Impression materials: Impression materials in general and particularly of alginate impression material.
c. Acrylics: Chemistry, composition physical properties
d. Composites: Composition types, properties, setting reaction
e. Banding and bonding cements.
f. Wrought metal alloys: Deformation, strain hardening, annealing, recovery, recrystallization, grain growth, properties of metal alloys
g. Orthodontic arch wires, Elastics: Latex and non-latex elastics.

h. Applied physics, Bioengineering and metallurgy, Specification and tests methods used for materials used in Orthodontics, Survey of all contemporary literature and recent advances in above mentioned materials.

Genetics: Cell structure, DNA, RNA, protein synthesis, cell division. Chromosomal abnormalities. Principles of orofacial genetics. Genetics in malocclusion. Molecular basis of genetics. Studies related to malocclusion. Recent advances in genetics related to malocclusion. Genetic counseling. Bioethics and relationship to Orthodontic management of patients.

Physical Anthropology: Evolutionary development of dentition, Evolutionary development of jaws.

Pathology: Inflammation, Necrosis

Biostatistics: Statistical principles. Data Collection, Method of presentation. Method of Summarizing. Methods of analysis, different tests/errors. Sampling and Sampling technique. Experimental models, design and interpretation. Development of skills for preparing clear concise and cogent scientific abstracts and publication

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

Applied Pharmacology: Definitions and terminologies used-Dosage and mode of administration of drugs. Action and fate of drugs in the body, Drug addiction, tolerance and hypersensitive reactions, Drugs acting on the central nervous system, general anesthetics hypnotics, analeptics and tranquilizers. Local anesthetics, Chemotherapeutics and antibiotics. Vitamins: A, D, B-complex group, C and K, etc.

6. ORAL AND MAXILLOFACIAL PATHOLOGY AND ORAL MICROBIOLOGY

1. **Biostatistics and Research Methodology:** Basic principles of biostatistics and study as applied to dentistry and research. Collection/organization of data/measurement scales/presentation of data and analysis. Measures of central tendency, Measures of variability. Sampling and planning of health survey. Probability, normal distribution and indicative statistics. Estimating population values. Tests of significance (parametric/non-parametric qualitative methods). Analysis of variance, Association, correlation and regression
2. **Applied Gross Anatomy of head and neck, histology and genetics:** Temporomandibular joint. Trigeminal nerve and facial nerve. Muscles of mastication, Tongue, Salivary glands, Nerve supply, blood supply, lymphatic drainage and venous drainage of oro-dental tissues. Development of face, palate, mandible, maxilla, tongue and applied aspects of the same. Development of teeth and dental tissues and developmental defects of oral and maxilla-facial region and abnormalities of teeth. Maxillary sinus. Jaw muscles and facial muscles. Introduction to genetics. Modes of inheritance. Chromosomal anomalies of oral tissues and single gene disorders
3. **Physiology (General and Oral):** Saliva, Pain, Mastication, Taste, Deglutition, Wound healing, Vitamins (influence on growth, development and structure of oral soft and hard tissues and paraoral tissues), Calcium metabolism, Theories of mineralization, Tooth eruption and shedding, Blood and its constituents, Hormones (influence on growth, development and structure of oral soft and hard tissues and paraoral tissues)
4. **Cell Biology:** Cell structure and function (ultra structural and molecular aspects).Intercellular junctions. Cell cycle and division. Cell cycle regulators. Cell–cell and cell-extracellular matrix interactions. Detailed molecular aspects of DNA,RNA and intracellular organelles, transcription and translation and molecular biology techniques
5. **General Histology:** Light and electron microscopy considerations of epithelial tissues and glands, bone. Light and electron microscopy considerations of hemopoetic system, lymphatic system, muscle, neural tissue, endocrinal system (thyroid, pituitary, parathyroid)
6. **Biochemistry:** Chemistry of carbohydrates, lipids and proteins. Methods of identification and purification. Metabolism of carbohydrates, lipids and proteins. Biological oxidation. Various techniques-cell fractionation and ultra filtration, centrifugation, electrophoresis, spectrophotometry and radioactive techniques.
7. **General Pathology:** Inflammation and chemical mediator, Thrombosis, Embolism, Necrosis, Repair, Degeneration, Shock, Hemorrhage, Pathogenic mechanisms at molecular level, Blood dyscrasias. Carcinogenesis and Neoplasia
8. **General Microbiology:** Definitions of various types of infections. Routes of infection and spread. Sterilization, disinfection and antiseptics. Bacterial genetics. Physiology, growth of micro-organisms
9. **Basic Immunology:** Basic principles of immunity, antigen and antibody reaction. Cell mediated and humoral immunity. Immunology of hypersensitivity. Immunological basis of auto immune phenomena. Immunodeficiency with relevance to opportunistic infections. Basic principles of transplantation and tumor immunity.
10. **Systemic Microbiology/Applied Microbiology:** Morphology, classification, pathogenicity, mode of transmission, methods of prevention, collection and transport of specimen for laboratory diagnosis, staining methods, common culture media, interpretation of laboratory reports and antibiotic sensitivity tests. Staphylococci, Streptococci, *Corynebacterium diphtheriae*, Mycobacterium, Clostridia, bacteroids and fusobacteria, Actinomycetales, Spirochetes, General structure, broad classification of viruses, pathogenesis, pathology of viral infections, Herpesvirus, Hepatitis virus, HIV, General properties of fungi, Superficial, subcutaneous, deep opportunistic infections, General principles of fungal infections, method of collection of samples, diagnosis and examination of fungi.
11. **Oral biology (Oral and Dental Histology):** Study of morphology of permanent and deciduous teeth. Structure and function of oral, dental and paraoral tissues including their ultra structure, molecular and biochemical aspects
12. **Basic Histo-Techniques and Microscopy:** Routine hematological tests and clinical significance of the same. Biopsy procedures for oral lesions. Tissue processing. Microtome and principles of microtomy. Various stains used in histopathology and their applications. Microscope, principles and theories of microscopy. Light microscopy and various other types including electron microscopy. Fixation and fixatives. Ground sections and decalcified sections. Cytological smears

7. PUBLIC HEALTH DENTISTRY

Applied Anatomy and Histology

a. **Applied Anatomy in relation to:** Development of face, Bronchial arches, Muscles of facial expression, Muscles of mastication, TMJ, Salivary gland, Tongue, Hard and soft palate, Infratemporal fossa, Paranasal air sinuses, Pharynx and larynx, Cranial and spinal nerves-with emphasis on trigeminal, facial, glossopharyngeal and hypoglossal nerve, Osteology of maxilla and mandible, Blood supply, venous and lymphatic drainage of head and neck, Lymph nodes of head and neck, Structure and relations of alveolar process and edentulous mouth, Genetics—fundamentals.

b. **Oral Histology:** Development of dentition, Innervations of dentin and pulp, Peridontium—development, histology, blood supply, nerve supply and lymphatic drainage, Oral mucous membrane, Pulp-periodontal complex.

Applied Physiology and Biochemistry

Cell, Mastication and deglutition, Food and nutrition, Metabolism of carbohydrates, proteins and fats, Vitamins and minerals, Saliva and Oral health, Fluid and electrolyte balance, Pain pathway and mechanism—types, properties, Blood composition and functions, clotting mechanism and erythropoiesis, Blood groups and transfusions, Pulse and blood pressure, Dynamics of blood flow, Cardiovascular

homeostasis—heart sounds, Respiratory system: Normal physiology and variations in health and diseases, Asphyxia and artificial respiration, Endocrinology: thyroid, parathyroid, adrenals, pituitary, sex hormones and pregnancy, Endocrine regulation of blood sugar.

Applied Pathology

Pathogenic mechanism of molecular level, Cellular changes following injury, Inflammation and chemical mediators, Edema, thrombosis and embolism, Hemorrhage and shock, Neoplasia and metastasis, Blood disorders, Histopathology and pathogenesis of dental caries, periodontal disease, oral mucosal lesions, and malignancies, HIV, Propagation of dental infection.

Microbiology

Microbial flora of oral cavity, Bacteriology of dental caries and periodontal disease, Methods of sterilization, Infection control, dental office/camps, Virology of HIV, herpes, hepatitis, Parasitological, Basic immunology-basic concepts of immune system in human body: Cellular and humoral immunity, Antigen and antibody system, Hypersensitivity, Autoimmune diseases.

Oral Pathology

Detailed description of diseases affecting the oral mucosa, teeth, supporting tissues and jaws.

Physical and Social Anthropology

Introduction and definition, Appreciation of the biological basis of health and disease, Evolution of human race, various studies of different races by anthropological methods

Applied Pharmacology

Definition, scope and relations to other branches of medicine, mode of action, bioassay, standardization, pharmacodynamic, pharmacokinetics. Chemotherapy of bacterial infections and viral infections-sulphonamides and antibiotics. Local anesthesia Analgesics and anti-inflammatory drugs. Hypnotics, tranquilizers and antipyretics. Important hormones-ACTH, cortisone, insulin and oral antidiabetic. Drug addiction and tolerance. Important pharmacological agents in connection with autonomic nervous system-adrenaline, Noradrenaline, atropine. Brief mention of antihypertensive drugs. Emergency drugs in dental practice. Vitamins and Hemopoietic drugs. Effect of drugs on oral health.

Research Methodology and Biostatistics

Health Informatics—basic understanding of computers and its components, operating software (Windows), Microsoft office, preparation of teaching materials like slides, project, multimedia knowledge. Operative skills in analyzing the data.

Research Methodology—definitions, types of research, designing written protocol for research, objectivity in methodology, quantification, records and analysis.

Biostatistics—introduction, applications, uses and limitations of biostatistics in Public Health dentistry, collection of data, presentation of data, measures of central tendency, measures of dispersion, methods of summarizing, parametric and non parametric tests of significance, correlation and regression, multivariate analysis, sampling and sampling techniques–types, errors, bias, trial and calibration

8. PEDIATRIC AND PREVENTIVE DENTISTRY

Applied Anatomy of Head and Neck

Anatomy of the scalp, temple and face, triangles of neck and deep structures of the neck, Cranial and facial bones and its surrounding soft tissues with its applied aspects, Muscles of head and neck, Arterial supply, venous drainage and lymphatics of head and neck, Congenital abnormalities of the head and neck, Anatomy of the cranial nerves, tongue and its applied aspects, salivary glands, pharynx, thyroid and parathyroid gland, larynx, trachea, esophagus, Autonomous nervous system of head and neck, Functional anatomy of mastication, deglutition, speech, respiration and circulation, TMJ: anatomy and function.

Applied Physiology

Introduction, Mastication, deglutition, digestion and assimilation, Homeostasis, fluid and electrolyte balance. Blood composition, volume, function, blood groups and hemorrhage, Blood transfusion, circulation, Heart, Pulse, Blood pressure, Normal ECG, capillary and lymphatic circulation, shock, respiration, control, anoxia, hypoxia, asphyxia, artificial respiration. Endocrine glands in particular reference to pituitary, parathyroid and thyroid glands and sex hormones. Role of calcium and Vit. D in growth and development of teeth, bone and jaws. Role of Vit. A, C and B complex in oral mucosal and periodontal health. Physiology and function of the masticatory system. Speech mechanism, swallowing and deglutition mechanism, salivary glands and Saliva.

Applied Pathology

Inflammation and chemical mediators, Thrombosis, Embolism, Necrosis, Repair, Degeneration, Shock, Hemorrhage, Blood dyscrasias, Pathogenesis of Dental Caries, Periodontal diseases, tumors, oral mucosal lesions, etc. in children.

Applied Microbiology

Microbiology and Immunology as related to Oral Diseases in Children: Basic concepts, immune system in human body, Auto Immune diseases and Immunology of Dental caries.

Applied Nutrition and Dietics: General principles, balanced diet, effect of dietary deficiencies and starvation, protein energy, malnutrition, Kwashiorkor, Marasmus. Fluid and Electrolytic balance in maintaining haemostasis. Diet, digestion, absorption, transportation and utilization

Genetics: Introduction to genetics, Cell structure, DNA, RNA, protein synthesis, cell division. Modes of inheritance. Chromosomal anomalies of oral tissues and single gene disorders

Growth and Development: Prenatal and Postnatal development of cranium, face, jaws, teeth and supporting structures. Chronology of dental development and development of occlusion. Dimensional changes in dental arches. Cephalometric evaluation of growth.

9. ORAL MEDICINE AND RADIOLOGY

Applied Anatomy

1. **Gross anatomy of the face:** Muscles of Facial Expression and Muscles of Mastication. Facial nerve, Facial artery, Facial vein, Parotid gland and its relations, Submandibular salivary gland and its relations
2. **Neck region:** Triangles of the neck with special reference to Carotid, Digastric triangles and midline structures, Facial spaces, Carotid system of arteries, Vertebral Artery, and Subclavian arteries, Jugular system: Internal jugular, External jugular, Lymphatic drainage, Cervical plane, Muscles derived from Pharyngeal arches, Infratemporal fossa in detail and temporomandibular joint, Endocrine glands: Pituitary, Thyroid, Parathyroid. Exocrine glands: Parathyroid, Parotid, Thyroid. Sympathetic chain, Cranial nerves-V, VII, IX, XI, and XII.
3. **Oral Cavity:** Vestibule and oral cavity proper, tongue and teeth, Palate-soft and hard.
4. **Nasal Cavity:** Nasal septum, Lateral wall of nasal cavity, Paranasal air sinuses
5. **Pharynx.**
6. **Gross salient features** of brain and spinal cord with references to attachment of cranial nerves to the brainstem Detailed study of the cranial nerve nuclei of V, VII, IX, X, XI, XII
7. **Osteology:** Comparative study of fetal and adult skull, Mandible: Development, ossification, age changes and evaluation of mandible in detail.

Embryology

Development of face, palate, nasal septum and nasal cavity, paranasal air sinuses. Pharyngeal apparatus in detail including the floor of the

primitive pharynx. Development of tooth in detail and the age changes. Development of salivary glands. Congenital anomalies of face must be dealt in detail.

Histology

Study of epithelium of oral cavity and the respiratory tract. Connective tissue, Muscular tissue, Nervous tissue, Blood vessels, Cartilage, Bone and tooth, Tongue, Salivary glands, Tonsil, thymus, lymph nodes.

Physiology

1. General Physiology: Cell, Body Fluid Compartments, Classification, Composition, Cellular transport, RMP and action potential
2. Muscle Nerve Physiology: Structure of a neuron and properties of nerve fibers, Structure of muscle fibers and properties of muscle fibers, Neuromuscular transmission, Mechanism of muscle contraction
3. Blood: RBC and Hb, WBC-Structure and functions, Platelets-functions and applied aspects, Plasma proteins, Blood Coagulation with applied aspects, Blood groups, Lymph and applied aspects
4. Respiratory System: Air passages, composition of air, dead space, mechanics of respiration with pressure and volume changes. Lung volumes and capacities and applied aspects. Oxygen and carbon dioxide transport. Neural regulation of respiration. Chemical regulation of respiration. Hypoxia, effects of increased barometric pressure and decreased barometric pressure.
5. Cardio-Vascular System: Cardiac Cycle, Regulation of heart rate/Stroke volume/cardiac output/blood flow, Regulation of blood pressure, Shock, hypertension, cardiac failure.
6. Excretory System: Renal function tests
7. Gastrointestinal tract: Composition, functions and regulation of: Saliva, Gastric juice, Pancreatic juice, Bile and intestinal juice, Mastication and deglutition
8. Endocrine System: Hormones—classification and mechanism of action, Hypothalamic and pituitary hormones, Thyroid hormones, Parathyroid hormones and calcium homeostasis, Pancreatic hormones, Adrenal hormones.
9. Central Nervous System: Ascending tract with special references to pain pathway
10. Special Senses: Gustation and Olfaction

Biochemistry

1. Carbohydrates: Disaccharides specifically maltose, lactose, sucrose, Digestion of starch/absorption of glucose, Metabolism of glucose, specifically glycolysis, TCA cycle, gluconeogenesis, Blood sugar regulation, Glycogen storage regulation, Glycogen storage diseases, Galactosemia and fructosemia
2. Lipids: Fatty acids-Essential/nonessential, Metabolism of fatty acids-oxidation, ketone body formation, utilization ketosis, Outline of cholesterol metabolism- synthesis and products formed from cholesterol
3. Protein: Amino acids-essential/nonessential, complete/incomplete proteins, Transamination/Deamination (Definition with examples), Urea cycle, Tyrosine-Hormones synthesized from tyrosine, Inborn errors of amino acid metabolism, methionine and transmethylation
4. Nucleic Acids: Purines/Pyrimidines, Purine analogs in medicine, DNA/RNA– Outline of structure, Transcription/translation, Steps of protein synthesis, Inhibitors of protein synthesis, Regulation of gene function
5. Minerals: Calcium/Phosphorus metabolism specifically regulation of serum calcium levels, Iron metabolism, Iodine metabolism, Trace elements in nutrition
6. Energy Metabolism: Basal metabolic rate, Specific dynamic action (SDA) of foods.
7. Vitamins: Mainly these vitamins and their metabolic role-vitamin A, Vitamin C, Vitamin D, Thiamin, Riboflavin, Niacin, Pyridoxine

Pathology

1. Inflammation: Repair and regeneration, necrosis and gangrene, Role of complement system in acute inflammation, Role of arachidonic acid and its metabolites in acute inflammation, Growth factors in acute inflammation, Role of molecular events in cell growth and intercellular signaling cell surface receptors, Role of NSAIDs in inflammation, Cellular changes in radiation injury and its manifestations
2. Homeostasis: Role of Endothelium in thrombo genesis, Arterial and venous thrombi, Disseminated Intravascular Coagulation, Shock: Pathogenesis of hemorrhagic, neurogenic, septic, cardiogenic shock, circulatory disturbances, ischemic hyperemia, venous congestion, edema, infarction
3. Chromosomal Abnormalities: Marfan's syndrome, Ehlers-Danlos Syndrome, Fragile X Syndrome
4. Hypersensitivity: Anaphylaxis, Type II Hypersensitivity, Type III Hypersensitivity, Cell mediated Reaction and its clinical importance, Systemic Lupus Erythematosus, Infection and infective granulomas
5. Neoplasia: Classification of Tumors, Carcinogenesis and Carcinogens – Chemical, Viral and Microbial, Grading and Staging of Cancer, tumor Angiogenesis, Paraneoplastic Syndrome, Spread of tumors, Characteristics of benign and malignant tumors
6. Others: Sex linked agammaglobulinemia, AIDS, Management of Immune deficiency patients requiring surgical procedures, DiGeorge's Syndrome, Ghon's complex, post primary pulmonary tuberculosis-pathology and pathogenesis

Pharmacology

1. Definition of terminologies used
2. Dosage and mode of administration of drugs
3. Action and fate of drugs in the body
4. Drugs acting on CNS
5. Drug addiction, tolerance and hypersensitive reactions
6. General and local anesthetics, hypnotics, antiepileptic and tranquilizers
7. Chemotherapeutics and antibiotics
8. Analgesics and anti-pyretic
9. Anti-tubercular and anti-syphilitic drugs
10. Antiseptics, Sialogogue, and anti-Sialogogue
11. Haematinics
12. Antidiabetics
13. Vitamins: A, B complex, C, D, E and K
14. Steroids

LIST OF INDIAN UNIVERSITIES INCLUDED (1990–2020)

1. All India Institute of Medical Sciences-Centre for Dental Education and Research.(AIIMS-CDER), New Delhi
2. Baba Farid University of Health Science (BFUHS), Faridkot
3. Bangalore University
4. Bombay University
5. Dr. N.T.R University of Health Sciences (NTR Uni.), Vijayawada
6. Dr. Ram Manohar Lohia Avadh University, Ayodhya (DRMLA Uni.)
7. Gujarat University, Ahmedabad
8. Guwahati University/Srimanta Sankaradeva University of Health Sciences.
9. Hemvati Nandan Bahuguna Garhwal University, Uttarakhand. (HNBG, Uni.), Srinagar
10. Himachal Pardesh University (HP Uni.), Shimla
11. Kerala University of Health Science (KUHS), Thrissur
12. Madhya Pradesh Medical Science University (MDMS Uni.), Jabalpur
13. Maharashtra University of Health Science (MUHS), Nashik
14. Nagpur University.
15. Pandit Deendayal Upadhyay Memorial Health Science and Ayush University of Chattisgarh (AHSUC Uni.), Raipur
16. Rajasthan University of Health Sciences (RUHS), Jaipur
17. Rajiv Gandhi University of Health Sciences (RGUHS), Bengaluru
18. Tamil Nadu Dr. M.G.R. Medical University (TNMGR), Chennai
19. University of Delhi (UOD)
20. University of Health Sciences, Rohtak (UHSR)
21. University of Kashmir (UOK)
22. Babu Banarasi Das University, Lucknow (BBD Uni.)
23. Bharati Vidyapeeth Deemed University, Pune (BVP Uni.)
24. DYP Uni., Navi Mumbai
25. KLE Deemed University, Belgaum
26. Manipal Academy of Higher Education (MAHE).
27. NITTE Uni. Mangaluru.
28. Pacific University (PAHER), Udaipur.
29. Sharda University, Greater Noida, Uttar Pradesh
30. Sumandeep Vidyapeeth University, Vadodara, Gujarat
31. Yenepoya University, Mangalore
32. Kaloji Narayana Rao University of Health Sciences, Warangal, Telangana (KNRUHS)
33. People's University, Bhopal