Faculty of Biomedical Science

JSS ACADEMY OF HIGHER EDUCATION & RESEARCH
(DEEMED TO BE UNIVERSITY) MYSURU

JSS Academy of Higher Education & Research
(Deemed to be University)
Accredited "A" Grade by NAAC
Sri Shivarathreeshwara Nagar, Mysuru – 570 015

Regulation & Syllabus

MSc FORENSIC ODONTOLOGY
2018

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M.SC FORENSIC ODONTOLOGY

1. GOALS

- Practice the specialty efficiently and effectively, backed by scientific knowledge and skill.
- Exercise empathy and a caring attitude and maintain high ethical standards.
- Continue to demonstrate keen interest in continuing professional education in the specialty and allied specialties irrespective of whether in teaching or practice.
- Willing to share the knowledge and skills with any learner, junior or a colleague.
- Develop the faculty for critical analysis and evaluation of various concepts and views, to adopt the most rational approach.

2. OBJECTIVES:

The objective is to train a candidate so as to ensure higher competence in both general and special area of interest and prepare him/her, for a career in the specialty. A candidate must achieve a high degree of proficiency in the

- Necessary laboratory procedures such as tissue handling
- Tissue and teeth processing for microscopy and histology as well for appropriate biochemical analysis
- Making different intra and extra oral radiographic procedures
- Making impression of the jaws and teeth using different impression materials
- Age estimation, gender identification procedures from bone and teeth
- Perform oral autopsy
- Human Values, ethical practice and communication abilities.

3. OUTCOMES

After completing two years of MSc Forensic odontology, the post graduate should be able to:

- Work as a competent odontologist,
- Acquire knowledge and skills in educational technology and conduct research in biomedical sciences.

4. COMPONENTS OF THE COURSE CURRICULUM

The major components of the Postgraduate curriculum shall be:

- Theoretical knowledge
- Practical skills
- Research skills.
- Attitudes including communication skills.
- Training in research methodology.

5. ELIGIBILITY FOR ADMISSION

A candidate seeking admission to the Post graduate Degree Courses must have passed B. Sc with at least one subject of biological Sciences or B. Sc Biotechnology or MBBS or BDS from a recognized Deemed to be University.

6. DURATION OF THE COURSE

The course of study shall be for a period of 3 academic years for non-medical graduates (BSc biological sciences) Medical/Dental/medical MSc graduates shall have lateral entry to IInd year.

7. Medium of instruction

The Medium of instruction and examination shall be in English.

8. METHOD OF TRAINING

Training should include involvement in theory, laboratory & experimental work and research studies.

9. ATTENDANCE

Candidates shall have attended at least 80% of the total number of classes conducted from the date of commencement of the term to the last working day, as notified by the JSS Academy of Higher Education and Research (JSSAHER), in theory and clinical training jointly, to be eligible to appear for the Final examinations.

Candidate lacking in prescribed percentage of attendance in theory and clinical training jointly will not be eligible to appear for final examination in that subject. However candidate shall put in required attendance in subsequent term and appear for final examination

10. Subjects and teaching hours

I Year

Papers	Title	Teaching hours Theory
Paper – I	Anatomy	60
Paper – II	Physiology	60
Paper – III	Bio-chemistry	60
	Total	

II & III Year

Theory	Title	Teaching hours Theory	Teaching hours Practicals
Paper – I	Basics and Applied Dental Sciences	60	200
Paper – II	Forensic Odontology	60	
Paper – III	Applied Forensic Sciences	60	

11. Monitoring of Progress in Studies

i. Internal assessment

I Year-non-medical graduates

There shall be minimum three periodical tests spread over evenly in in first year for Anatomy, Physiology and Biochemistry.The Average of the best two tests will be calculated and submitted to JSSAHER. A candidate must secure a minimum of 35 % in the internals to qualify for the Deemed to be University exam.

II & III Year- The tests in second and final year may include written papers, practicals and viva voce. Records and marks obtained in such tests will be maintained by the Head of the Department and sent to the JSS AHER when called for. A mock exam will be held one month before the final exam to see if students are eligible to attend the final exams. The candidates who have failed in final examination shall be given an internal assessment improvement test and the best marks shall be submitted to JSS AHER when called for.

ii. Dissertation

Every candidate pursuing M. Sc in Forensic odontology course is required to carry out work on a selected research Dissertation under the guidance of a recognized post graduate teacher in their respective subjects. The results of such work shall be submitted in the form of a Dissertation The student can choose topic related to Forensic Odontology from the following subjects:

1. Oral Radiology/Oral Medicine
2. Oral Pathology
3. Forensic Medicine
4. Pedodontics
5. Prosthodontics

The project is aimed to train a post graduate student in research methods and techniques. In includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, and comparison of results and drawing conclusions.

Every candidate shall submit a synopsis in the prescribed format containing particulars of proposed Dissertation work within Nine months from the date of commencement of the course and on or before the dates notified by the JSSAHER The synopsis shall be sent through the proper channel. Such synopsis will be reviewed and the project topic will be registered by the JSSAHER. No change in the project topic or guide shall be made without prior approval of the JSSAHER.
The candidates shall report the progress of the project work to the concerned guide periodically and obtain clearance for the continuation of the Dissertation work
The Dissertation report shall be written under the following headings

1. Introduction
2. Aims and Objectives of study
3. Review of Literature
4. Material and Methods
5. Results
6. Discussion
7. Conclusion
8. Summary
9. References
10. Tables
11. Annexure

Four copies of Dissertation report thus prepared shall be submitted one month before final examination on or before the dates notified by the JSSAHER
A co-guide may be included provided the work requires substantial contribution from a sister department or from another medical institution recognized for teaching/training by JSS Academy of Higher Education and Research.

12. Scheme & Schedule of Final Examination

The JSSAHER Examination for M.Sc Forensic Odontology shall be held at the end of I Year (Non Medical graduates) and at the end of III Year

I year M.Sc (preliminary) Exam:

Theory	Title	Max. Marks
Paper – I	Anatomy	100
Paper – II	Physiology	100
Paper – III	Bio-chemistry	100
	Total	300

NO PRACTICAL EXAMINATION / VIVA-VOCE FOR Ist YEAR M.Sc (preliminary)

FINAL EXAM:

The exam shall consist of written paper (Theory), Practical, Viva-voce and Project.

Written Examination (Theory): A written examination shall consist of three papers, each of three hours duration. Each paper shall carry 100 marks.

Distribution of Marks at the Deemed to be University Examination

Theory	Title	Max. Marks	Practicals	Viva voce on project and subjects
Paper – I	Basics and Applied Dental Sciences	100	200	20 + 80
Paper – II	Forensic Odontology	100		
Paper – III	Applied Forensic Sciences	100		

13. Theory Question paper pattern

Theory Question Paper of 100 marks

Marks	No of Questions	Total marks
10	02	20
5	10	50
3	10	30
Total Marks		100

14. Practical Examination:

In case of practical examination, it shall be aimed at assessing competence and skills of techniques and procedures as well as testing students' ability to make relevant and valid observations, interpretations and inference of laboratory or experimental work relating to his/ her subject.

Practical Exams: Tooth/ tissue processing for Microscopy/ Histology, Oral Radiology / Medico-legal report writing, Mock Mass disaster Exercise, Court witness exercise, Photography, Bitemark/rugoscopy/cheiloscopy exercise, Age and gender determination exercise – Total Marks - 200

15. Appointment of EXAMINERS:

For preliminary Examination: There shall be two examiners in practical examination. Out of them one shall be external examiner and one shall be internal examiner. Postgraduate teacher with MD/MS /PhD degree with 5 years of experience shall be appointed as examiners.

For III Year- There shall be four examiners in practical examination. Out of

them two shall be external examiner and two shall be internal examiner. External examiner from outside institution. Postgraduate teacher with MD/MS/PhD degree with 5 years of experience shall be appointed as examiners.
The Internal/external examiner shall be from the either Medical faculty (Forensic Medicine department) and Dental faculty (Oral Medicine/Oral Pathology/forensic odontology/Prosthodontics/Pedodontics). The Internal and External examiners will be alternating between these subjects mentioed every year.

16. Criteria for declaring as pass in Examination:
I Year (Priliminary) Examination: A candidate shall secure not less than 50% marks in each subjects separately. A candidate securing less than 50% of marks as described above shall be declared to have failed in the examination. Failed candidate may appear in any subsequent examination upon payment of fresh fee. Those candidates who fail in one or more subjects shall have to appear only in the subject so failed, in the subsequent examinations.
Final Examination: A candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory, (2) Practical and viva voce examination. A candidate securing less than 50% of marks as described above shall be declared to have failed in the examination. Failed candidate may appear in any subsequent examination upon payment of fresh fee.

17. Declaration of Class:
Distinction: A successful candidate passing the Deemed to be University examination in first attempt will be declared to have passed the examination with distinction, if the grand total aggregate mark is **75% and above.**
First class: Aggregate mark is **65% and 74%.**
Pass class: Aggregate mark is **50% and 64%**

18. Carry over:
A candidate who fails in any subject of I year shall be permitted to carry those subjects up to final year. However the candidate must pass the carry over subjects six months before appearing the Final examinations.

19. Award of Degree:
A candidate who has passed all the subjects of I year (Non Medical Graduates) and final year shall be eligible for award of Degree

20. Duration for completion of the course of study
The duration for the completion of the course shall be fixed as double the actual duration of the course and the students have to pass within the said period, otherwise they have to get fresh Registration.

21. Revaluation/Retotaling of answer papers
There is no provision for revaluation of the answer papers of failed candidates in any examination. However, the failed candidates can apply for retotaling.
22. Re-admission after break of study
Candidate who seeks re-admission to the course after break of study has to get the approval from the JSSAHER by paying a condonation fee.
No condonation is allowed for the candidate who has more than 2 years of break up period and he/she has to rejoin the course by paying the required fees.

I ST year Syllabus;

PAPER I

ANATOMY INCLUDING HISTOLOGY, EMBRYOLOGY AND OSTEOLOGY

I. INTRODUCTION TO: 3 Hrs

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 & innervations
7. Syndesmology – Including classification of Joints

II. HEAD & NECK: 18 Hrs

1. Scalp, face & temple, lacrimal apparatus
2. Cranial cavity - Meninges, parts of brain, dural venous sinuses, cranial nerves attached to the brain,
3. Cranial nerves - III, IV, V, VI, VII, IX,XII in detail
4. Parotid gland
5. Triangles of the neck
6. Temporo mandibular joint, muscles of mastication, infratemporal fossa, pterygo - palatine fossa
7. Submandibular region
8. Walls of the nasal cavity, paranasal air sinuses
9. Palate
10. Oral cavity, Tongue

III. OSTEOLOGY: 2 Hrs

1. Foetal skull
2. Adult skull
3. Individual bones of the skull
4. Hyoid bone and cervical vertebrae

IV. EMBRYOLOGY: 5 Hrs

1. Pharyngeal arches pouches & clefts
2. Development of face, tongue, palate, thyroid gland, pituitary gland, salivary glands, and anomalies in their development
3. Tooth development in brief

V. HISTOLOGY: 10 Hrs

1. The Cell
2. Basic tissues - Epithelium, Connective tissue including cartilage and bone, Muscle Tissue, Nervous tissue : Peripheral nerve, optic nerve, sensory ganglion, motor ganglion
3. Skin
4. Classification of Glands, Salivary glands (serous, mucous and mixed gland)
5. Blood vessels, Lymphoid tissue
6. Tooth, lip, tongue, hard palate

Dissection Topics: (Demonstration) 5 Hrs

1. Scalp
2. Face

3. Infra temporal fossa
- Muscles of mastication
- Mandibular nerve and its branches
- Maxillary artery
- Temporo mandibular joint

4. Sub mandibular region – gland, hyoglossus and its relations
5. Mouth, palate and pharynx.
6. Nasal cavity and paranasal air sinuses
7. Tongue

Surface land marks & regional anatomy of medico legal significance 3 Hrs

Histology slides: 5 Hrs

1. Basic tissues - Epithelium, Connective tissue including cartilage and bone, Muscle Tissue, Nervous tissue : Peripheral nerve, optic nerve, sensory ganglion, motor ganglion
2. Skin
3. Classification of Glands, Salivary glands (serous, mucous and mixed gland)
4. Blood vessels, Lymphoid tissue
5. Tooth, lip, tongue, hard palate

RECOMMENDED BOOKS:

1. Romanes(G.J.). Cunningham Manual of Practical Anatomy: Head & Neck & Brain, 15th Edition
2. McMinn. RJ Last's Anatomy, 11th Edition
3. A.K. Dutta. Essentials of Human Anatomy, 4th Edition
4. Sadler. Langman's Medical Embryology, 10th Edition
5. Inderbir singh. Text Book of Human Histology, 5th Edition
6. John V. Basmajian. Grant's Method of Anatomy, 11th Edition
7. Snell (Richard s). Clinical Anatomy for Medical Students, 8th Edition.
8. Wheater, Burkitt & Daniels. Functional Histology, 5th Edition.
9. James E Anderson. Grant's Atlas of Anatomy, 12th Edition
10. William Drake. Gray's Anatomy, 39th Edition
11. Emery. Medical Genetics, 13th Edition
12. Inderbir singh. Human Embryology, 8th Edition
13. G.A.G. Decker. Lee. Mc Gregor's Synopsis of Surgical Anatomy, 12th Edition

PAPER II

GENERAL HUMAN PHYSIOLOGY

i. GENERAL PHYSIOLOGY

1. Introduction to Physiology
2. Cell- Morphology - Functions of organelles: mitochondria, ribosome, Lysosomes:nucleus
3. Cell membrane & Transport across cell membrane
4. Body fluid compartments
5. Membrane potentials
6. Homeostasis – Basic concepts , Feedback mechanisms

ii. BLOOD:

1. Composition & functions of blood. Blood volume: Normal values, variations. Specific gravity, packed cell volume, factors affecting & methods of determination. Plasma proteins - Types, concentration, functions & variations.
2. Erythrocytes Morphology, functions & variations. Erythropoiesis & factors affecting erythropoiesis. ESR- Determination, factors affecting, variations & significance. Hemoglobin - Normal concentration,Types method of determination,variation in concentration& functions. Blood Indices - MCV, MCH, MCHC - definition, normal values, variation. Anemia - Definition, classification, life span of RBC's
3. Leucocytes Classification, leucopoiesis, number, percentage, distribution, morphology, properties, Functions & variation. Role of lymphocytes in immunity, leucopoiesis life span & fate of leucocytes.
4. Thromobocytes Morphology, number, variations, function & thrombopoiesis.
5. Blood **groups** ABO & Rh system, method of determination, importance

iii. MUSCLE AND NERVE

1. Nerve Neurons - Morphology, classification, Nerve fibers classification, resting membrane potential, action potential, properties, conduction of impulses in myelinated & nonmyelinated fibers. Degeneration & Regeneration.
2. Neuromuscular transmission
3. Muscle Structure of skeletal muscle, EC Coupling, Molecular mechanism of muscle contraction, Types & Properties of skeletal muscle. 4. Structure and properties of smooth muscle.

iv. DIGESTIVE SYSTEM:

1. Introduction to digestive system General structure of G.I. tract, Innervations.
2. Salivary glands Structure of salivary glands, composition, regulation of secretion & functions of saliva.

v. SPECIAL SENSES

1. Vision Physiological anatomy of eye ball, functions of iris, aqueous humor, Lens, rods & cones. Accommodation to near vision, Refractive errors: Myopia, hypermetropia, presbyopia & astigmatism. Visual acuity, Visual pathways, colour vision

2. Hearing Anatomic consideration, functions of outer, middle & inner ear, cochlea, organ of corti, mechanism of hearing. Auditory pathways, deafness - types & tests
3. Gustation Taste buds, primary taste sensation, pathway for taste sensation Olfaction Receptors, olfactory pathways.

PROCEDURES

1. Study of Microscope & its uses.
2. Collection of blood
3. Enumeration of Red Blood Cells
4. Enumeration of White Blood Cells
5. Differential leukocyte counts
6. Determination of Hemoglobin and calculation of blood indices
7. Determination of blood group
8. Determination of bleeding time and clotting time
9. Examination of pulse
10. Recording of blood pressure

RECOMMENDED BOOKS:

1. Vander. Human physiology:The mechanism of body function, 10th Edition 2001
2. A.K. Jain. Human Physiology for BDS students, 3rd Edition 2005
3. Yogesh Tripathi . Concise Textbook of Physiology for dental students, 1st edition 2007 iv) Choudhari. Concise Medical Physiology, 6th Edition 2008
4. Guyton. Text book of Physiology, 11th Edition 2006
5. Ganong. Review of Medical Physiology, 22nd Edition 2005
6. Berne & Levy. Physiology, 5th Edition 2004
7. Best & Taylor's Physiological basis of Medical Practice, 12th Edition 1996

PRACTICAL BOOKS:

1. A.K. Jain. Manual of Practical Physiology for BDS, 2nd Edition 2007

PAPER III

BIOCHEMISTRY

i. CHEMISTRY OF BIOORGANIC MOLECULES

1. Chemistry of Carbohydrates Definition, biological importance and classification. Monosaccharides - Isomerism, anomerism. Sugar derivatives, Disaccharides, Polysaccharides. Structures of starch, glycogen and glycosoaminoglycans.
2. Chemistry of Proteins Biological importance. Aminoacids: Classification. Introduction to peptides. Proteins: Simple and conjugated; globular and fibrous. Charge properties. Buffer action Introduction to protein conformation. Denaturation.
3. Chemistry of Lipids Definition, biological importance and classification. Fats and fatty acids. Introduction to compound lipids. Hydrophobic and hydrophilic groups. Cholesterol. Bile salts. Micelle. Bimolecular leaflet, Lipoproteins – formation, function and turnover.
4. Chemistry of Nucleic acids Building units Nucleotides. Outline structure of DNA and RNA. High energy compounds: ATP , Phosphorylamidines, Thiolesters, Enol phosphates.
5. Enzymology
    a. Definition, classification, properties
    b. Coenzymes and cofactors (apoenzyme, holoenzyme, cofactors and activators)
    c. Mechanism of enzyme action
    d. Factors affecting enzyme activity and Km, its significance (derivation not required)
    e. Enzyme inhibition – types with Lineweaver-Burk plots and clinical importance
    f. Enzyme regulation – modes, mechanism and importance
    g. Isoenzymes – definition, chemistry, separation and clinical importance
    h. Diagnostic and therapeutic importance of enzymes

i. Proenzymes, multienzyme complex and metalloenzymes

j. RIA and ELISA

ii. Vitamins

Definition and classification, Chemistry, sources, absorption and transport, biochemical role, RDA, and deficiency, antivitamins and hypervitaminosis of fat and water soluble vitamins

iii. Genetics and Molecular biology 10 hours

a. DNA replication

b. Transcription, post transcriptional modifications, reverse transcriptase

c. Genetic code, translation, post translational modifications

d. Regulation of gene expression, mutation, Polymerase Chain Reaction, recombinant DNA technology, gene therapy, blotting techniques, Restriction Fragment Length Polymorphism, DNA fingerprinting

Practicals:

Qualitative analysis

1. Qualitative analysis of carbohydrates
2. Color reactions of proteins and amino acids
3. Identification of nonprotein nitrogen substance

RECOMMEDED BOOKS:

1. Vasudevan. Text Book of Biochemistry for Dental Students,
2. T.N. Pattabiraman. Concise text book of Biochemistry, 3rd Edition
3. S. Ramakrishnan and S.V. Rao. Nutritional Biochemistry,
4. T.N. Devlin. Text book of Biochemistry with clinical correlations, 6th Edition
5. R.K. Murray etal. Harper's Biochemistry, 27th Edition.
6. R.A.D.Williams & J.C.Elliot. Basic and applied Dental Biochemistry, 2nd Edition

II nd and III rd Year Syllabus.

PAPER I

BASICS & APPLIED DENTAL SCIENCES

A :DENTAL ANATOMY, EMBRYOLOGY AND ORAL HISTOLOGY

i. DENTAL ANATOMY & APPLIED ASPECTS 16 hrs

1. Introduction to tooth morphology:

a. Human dentition
b. Types of teeth, & functions
c. Palmer's & Binomial notation systems
d. Tooth surfaces, their junctions
e. Line angles & point angles
f. Definition of terms used in dental morphology
g. Geometric concepts in tooth morphology
h. Contact areas & embrasures
i. Clinical significance

2. Morphology of permanent teeth :

a. 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
b. Variations & Anomalies commonly seen in individual teeth

3. Morphology of Deciduous teeth :

a. Generalized differences between Deciduous & Permanent teeth
b. Description of individual deciduous teeth, including their chronology of development
c. Endodontic anatomy
d. Differences between similar class of teeth &identification of individual teeth

4. Occlusion:

a. Definition
b. Factors influencing occlusion
c. Basal bone
d. Arches
e. Individual teeth
f. External & internal forces & sequence of eruption
g. Inclination of individual teeth - compensatory curves

h. Centric relation & Centric occlusion - protrusive, retrusive & lateral occlusion

i. Clinical significance of normal occlusion

j. Introduction to & Classification of Malocclusion

ii. ORAL EMBRYOLOGY & APPLIED ASPECTS 7 hrs

1. Brief review of development of face, jaws, lip, palate & tongue, with applied aspects.
2. Development of teeth :
    a. Epithelial mesenchymal interaction
    b. Detailed study of different stages of development of crown, root & supporting tissues of tooth & detailed study of formation of calcified tissues
    c. Applied aspects of disorders in development of teeth
3. Eruption of deciduous & permanent teeth:
    a. Mechanisms in tooth eruption
    b. Different theories & histology of eruption
    c. Formation of dentogingival junction
    d. Role of gubernacular cord in eruption of permanent teeth
    e. Clinical or Applied aspects of disorders of eruption
4. Shedding of teeth
    a. Factors & mechanisms of shedding of deciduous teeth
    b. Complications of shedding

iii. ORAL HISTOLOGY & APPLIED ASPECTS 25 hrs

1. Detailed microscopic study of

a. Enamel

b. Dentine

c. Cementum

d. Pulp tissue

e. Age changes & Applied aspects (Clinical and forensic significance) of the above

f. 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

a. Periodontal ligament

b. Alveolar bone

c. 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 & microscopic 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 & APPLIED ASPECTS 2 hrs

1. **Saliva**
   a. Composition of saliva –formation of saliva

2. **Mastication**
   a. Masticatory force & its measurement
   b. Peculiarities of masticatory muscles
   c. Masticatory cycle
   d. Masticatory reflexes

3. **Practicals:**

DENTAL ANATOMY 15 hrs

1. Carving on wax blocks- demonstration - Only permanent teeth of both arches.
2. Identification of individual teeth using extracted teeth specimen
3. Identification of dentition using study models

HISTOLOGY 30 hrs

1. Processing of hard and soft tissues for microscopic study
2. Ground sections, decalcified sections and routine staining procedures 3) Basic histochemical staining patterns of oral tissues.
3. General histology of cells and tissues
4. Special stained sections

List of Histology slides: 30 hrs

DEVELOPMENT OF TOOTH:

1. Bud stage of tooth development.
2. Cap stage of tooth development 3. Early bell stage of tooth development.

3. Late Bell stage of tooth development.
4. Root formation.

ENAMEL:

1. Enamel rod.
2. Hunter-Schreger Bands.
3. Tufts, Lamellae, Spindles.
4. Incremental lines of Retzius.
5. Neonatal line.
6. Gnarled Enamel.

DENTIN:

1. Dentino – Enamel junction
2. Dentinal Tubules.
3. Incremental lines of Von Ebner
4. Contour lines of Owen.
5. Neonatal line.
6. Tomes granular layer.
7. Interglobular Dentin.

8. Secondary Dentin.
9. 9. Intratubular Dentin
10. 10. Intertubular Dentin.

CEMENTUM:

1. Cellular cementum
2. Acelular cementum
3. Cemento enamel junction
4. Sharpey's fibers.
5. Hypercementosis.

PULP:

1. Zones of Pulp
2. Pulp stones.

PERIODONTAL LIGAMENT:

1. Principal fibers of periodontal ligament
    - Apical, Horizontal, Oblique, Alveolar crest, Interradicular, Transeptal

ALVEOLAR BONE:

1. Haversian system
2. Trabeculated bone.
3. Mature and immature bone.

SALIVARY GLANDS:

1. Mucous gland.
2. Serous gland 3. Mixed gland.

MAXILLARY SINUS: - Sinus lining (Pseudostratified ciliated columnar)

ORAL MUCOUS MEMBRANE: -

1. Parakeratinised epithelium.
2. Orthokeratinised epithelium.
3. Palate – Anterolateral zone.
4. Palate – Posterolateral zone.
5. Alveolar mucosa.
6. Vermilion border of lip.
7. Tongue – Circumvallater Papillae.
    - Fungiform Papillae
    - Filiform Papillae
8. Dentogingival junction.
9. Skin

RECOMMENDED BOOKS:

1. S.N.Bhaskar. Orban's Oral Histology & Embryology, 12th Edition.
2. James & Avery. Oral Development & Histology, 31st Edition.
3. Major.M.Ash. Wheeler's Dental Anatomy, Physiology & Occlusion, 8th Edition.
4. Woelfel & Scheid. Dental Anatomy - its relevance to dentistry, 7th Edition.
5. Lavelle. Applied Physiology of the mouth, 2nd Edition.
6. Jenkins. Physiology & Biochemistry of the mouth,

DENTAL MATERIALS & APPLIED ASPECTS

1. IMPORTANT PHYSICAL PROPERTIES APPLICABLE TO DENTAL MATERIALS-3 hrs

Physical properties based on laws of mechanics, acoustics, optics, thermodynamics, electricity, magnetism, radiation, atomic structure or nuclear phenomena. 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, color, three dimensional color – hue, values, chroma, Munsell system, metamersim, fluorescence, physical properties of tooth, stress during mastication

2. BIOLOGICAL CONSIDERATIONS IN USE OF DENTAL MATERIALS-2 hrs

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-affecting 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.

3. GYPSUM & GYPSUM PRODUCTS-3 hrs

a. Gypsum–its origin, chemical formula, Products manufactured from gypsum.

b. Dental plaster, Dental stone, Die stone, high strength, high expansion stone. Application of each, macroscopic and microscopic structure of each, Chemistry of setting, setting reaction, theories of setting, gauging water, Microscopic structure of set material.

c. Setting time: working time and setting time, Measurement of setting time and factors controlling setting time. Setting expansion, Hygroscopic setting expansion – factors affecting each

d. Care of cast.

e. ADA classification of gypsum products

f. Disinfection : infection control, liquids, sprays, radiation

g. Storage of material – shelf life

4. IMPRESSION MATERIALS USED IN DENTISTRY-4 hrs

a. Impression plaster, Impression compound, Zinc oxide eugenol impression paste & bite registration paste incl., non eugenol paste, Hydrocolloids, reversible and irreversible, Elastomeric impression materials.

b. Definition of impression , Purpose of making impression, Ideal properties required and application of material, Classification as per ADA specification, general & individual impression material.

c. Type of impression trays required, Adhesion to tray, manipulation, instruments & equipments required.

5. SYNTHETIC RESINS USED IN DENTISTRY-2 hrs

a. Classification of resins

b. Dental resins – requirements of dental resins, applications, polymerisation, and polymerisation mechanism stages in addition polymerisation, inhibition of polymerisation, co polymerization, molecular weight, cross linking, plasticizers, Physical properties of polymers, polymer structures types of resins.

c. Acrylic Resins:

d. Restorative Resins:

6. METAL AND ALLOYS-2 hrs

a. Structure and behaviour of metals, Solidification of metals, mechanism of crystallisation amorphous & crystalline. Classification of alloys, Solid solutions, and 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.

b. Dental Amalgam

c. Direct filling gold:

d. Dental casting alloys: Classification of casting alloys: By function & description, 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, and elongation, modulus of elasticity, tarnish and corrosion. Biocompatability - Handling hazards & precautions of base metal alloys, casting investments used. Heat treatment, Softening & hardening heat treatment. Titanium alloys & their application, properties & advantages.

7. DENTAL WAXES-2 hrs

a. 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.

b. Other waxes: Applications, mode of supply & properties.

c. Impression wax, Bite registration wax.

8. DENTAL CEMENTS -3 hrs

Definition & Ideal requirements:

Cements: Silicate, Glass ionomer and modified glass ionomer, Modifications and recent advances, Principles of cementation. Other dental cements

9. DENTAL CERAMICS-1 hrs

Dental ceramics: definition, classification, application, mode of supply, manufacturing procedure, methods of strengthening. Properties of fused ceramic: Metal Ceramics (PFM): Alloys - Types and composition of alloys, Ceramic - Type and Composition.

10. DENTAL IMPLANTS-1 hr

Evolution of dental implants, types and materials

PRACTICALS-10hrs

Manipulation of

1. Plaster of Paris
2. Dental Stone
3. Dental Amalgam
4. Dental Cements
5. Impression compound
6. Alginate
7. Elastomeric Impression Materials

RECOMMENDED BOOKS:

1. Kenneth J. Anusavice .Phillips Science of Dental Materials, 11th edition
2. Robert G.Craig -Restorative Dental Material, 11th Edition
3. V.Shama Bhat & B.T. Nandeesh -Science of Dental materials clinical applications, edition
4. Criag,Powers, Wataha -Dental Materials-Properties and Manipulation, 8th edition
5. E.C. Combe. Notes on Dental Materials, 6th edition
6. O' Brien, W.J. Dental materials – Properties and their selection, 2nd edition
7. Mc Cabe. Applied dental materials –– 8th edition

GENERAL PATHOLOGY

1. General pathology: Pathology of cell / tissues – degenerative changes & secondary changes (atrophy, hypertrophy, aplasia, hyperplasia, ischemia, necrosis, infarction, cloudy swelling, and amyloidosis), embolism, asphyxia deaths, electrocution, gun- shot wounds, poisoning, thrombo-embolism, fat embolism, aspiration pneumonia, wound healing, histological determination of time of death.
2. Body's local and systemic response to trauma.
3. Healing and fibrosis (Pathology of scar).
4. Common general and systemic diseases and caused by physical/chemical agents.
5. Disorders of infancy and old age changes relevant to forensic medicine

GENERAL MICROBIOLOGY

1. Microbiology and serology of venereal diseases infections.
2. Microbiology of Cadavers.

ORAL RADIOLOGY & APPLIED ASPECTS

a. Scope of the subject and history of origin 2 hrs

b. Physics of radiation: 3 hrs

- Nature and types of radiations
- Source of radiations
- Production of X- rays
- Properties of X-rays

c. Biological effects of radiation 2 hrs

d. Radiation safety and protection measures 2 hrs

e. Principles of image production 2 hrs

f. Radiographic techniques: 6 hrs

Intra-Oral

a. Periapical radiographs (Bisecting and parallelling techniques)

b. Bite wing radiographs

c. Occlusal radiographs Extra-oral

d. Lateral projections of skull and jaw bones and paranasal sinuses

e. Cephalograms

f. Orthopantomograph

g. Projections of temporomandibular joint and condyle of mandible

h. Projections for Zygomatic arches

i. Radiographic normal anatomical landmarks 6 hrs Faulty

j. radiographs and artifacts in radiographs 2 hrs Advanced

k. imaging techniques 2 hrs

l. Radiographic differential diagnosis of maxillofacial pathologies 2 hrs

Practicals: 65 hrs

Intra-oral radiographs - Periapical, bitewing, Occlusal

Demonstration: Panoramic radiography, Skull radiography

ORAL PATHOLOGY & APPLIED ASPECTS 15 hrs

a. Developmental disturbances of oral and paraoral structures: Developmental disturbances of teeth, jaws and soft tissues of oral & paraoral region: Introduction to developmental disturbances - Hereditary, Familial mutation, Hormonal etc. causes to be highlighted. Developmental disturbances of teeth - Etiopathogenesis, clinical features, radiological features & histopathological features as appropriate :- The size, shape, number, structure & eruption of teeth & clinical significance of the anomalies to be emphasized. Developmental disturbances of jaws - size & shape of the jaws. Developmental disturbances of oral & paraoral soft tissues - lip & palate - clefts, tongue, gingiva, mouth, salivary glands & face.

b. Physical, Chemical and Biological injuries of the oral cavity

c. Regressive alterations of teeth

d. Radiation effects on oral cavity,

e. Healing of Oral wounds & complications

f. Systemic Diseases involving Oral cavity : Brief review & oral manifestations, diagnosis & significance of common Blood, Nutritional, Hormonal & Metabolic diseases of Oral cavity.

Practical: 5 hrs

1. Identification of Hard and Soft Tissue specimens
2. Demonstration of cytosmear and bacteriology smear
3. Identification of Microscopic slides of various Oral Lesions:

   a. Pit & Fissure caries

   b. Smooth surface caries

   c. Dental caries – Liquefaction Foci

   d. Pulp Hyperemia

   e. Pulp polyp

   f. Periapical Granuloma

   g. Radicular Cyst

   h. Cholesterol Crystals

PAPER II

FORENSIC ODONTOLOGY:

1. **Introduction to forensic odontology:** **26 hrs**
   a. **Recent developments and future trends**

2. **History of Forensic Dentistry**

3. **Scope of Forensic Odontology**

4. **Maintaining dental records**
   a. Basic aspects of good record keeping
   b. Different types of dental records
      i. Dental charts
      ii. Dental radiographs
      iii. Study casts
      iv. Denture marking
      v. Photographs

5. **Age estimation in adults**
      i. Radiographic and clinical method

6. **Sex determination in adults from radiographs**

7. **Dental and Maxillofacial trauma**

8. **Dental identification:**
   a. Definition
   b. Basis for dental identification
   c. Postmortem procedures
   d. Dental record compilation and interpretation
   e. Comparison of data and principles of report writing
   f. Postmortem changes of oral structures

9. **Maintaining dental records**
   a. Basic aspects of good record keeping
   b. Different types of dental records

10. **Forensic Photography**

11. **Computers in Forensics**

12. **Ethnic variations ('racial' differences) in tooth morphology**
    a. Description of human population groups

b. Genetic and environmental influences on tooth morphology

c. Description of metric and non-metric dental features used in ethnic differentiation

13. Age estimation in adults

i. Morphologic and Histologic method
ii. Morphologic methods

14. Sex determination in adults from dental and skeletal morphology

15. Dentist's role in mass disasters

16. Bite mark procedures

a. Definition and classification

b. Basis for bite mark investigation

c. Bite mark appearance

d. Macroscopic and microscopic ageing of bite marks

e. Evidence collection from the victim and suspect of bite mark

f. Analysis and comparison

g. Principles of report writing

h. Animal bite investigation

17. International Organisation for Forensic Odontolostomatology (IOFOS) and American Board of Forensic Odontology (ABFO) quality assurance guidelines in evidence collection, preservation, analysis and report writing.

Practicals: Specimen collection–saliva, blood, oral tissues, dental pulp etc-2**hrs.**

18. Dental DNA methods at Gujarat Forensic Sciences Deemed to be University:

a. Importance of dental DNA evidence in forensic investigations

b. Types of DNA and dental DNA isolation procedures

c. DNA analysis in personal identification

d. Gene-linked sex dimorphism

e. Population genetics

PEDODONTICS & APPLIED ASPECTS

a. Age estimation in children and adolescents

b. Sex determination in Children and adolescents

c. Child abuse and forensic dentist's role

d. Computers in forensics

e. Post natal growth and development

f. Principles assessment and factors influencing growth

PAPER III

Applied forensic sciences:

FORENSIC MEDICINE: 6 hrs

a. Identification of the living and dead, determination of race and religion, sex, age, external peculiarities such as moles, birth marks, occupational marks, anthropometry, finger prints, foot prints, handwriting etc. and their medico legal aspects. Evaluation of evidence from the skeleton. Problems of reconstruction, superimposition technique. Evidence from trace elements like hair and biological stains of blood, semen, sweat, saliva, milk, sputum etc.

b. Forensic radiology in identification, pathology, child abuse, trauma, medico legal implications of radiological procedures

c. Forensic Anthropology

FORENSIC PSYCHIATRY: 2 hrs

a. Various Acts in relation to forensic psychiatry, classification of mental disorders and abnormal human behaviours. Medico legal aspects of insanity and abnormal human behaviour as regards to civil & criminal responsibilities and rules regarding admission, treatment and discharge of mentally ill person in the mental hospitals, feigned insanity, juvenile delinquency in the juvenile court.

b. Biology of behaviour, emotion, stress, attitudes, normal & abnormal personalities.

c. Psychological assessment & testing personality and its disorders, abnormal psychology, health psychology, assessment strategies in medical education.

FORENSIC TRAUMATOLOGY: 6 hrs

a. Mechanical injuries & their medico legal aspects in relation to nature of injuries, accidental, suicidal, homicidal, distinction between injuries caused during life and after death.

b. Medico legal examination of injured person. Regional and transportation injuries. Injuries and thermal death from cold coma, heat coma, electricity coma, lightning and radiation

c. Torture medicine: medico legal aspects & duties of physician in cases of torture.

d. Type of personalities.

e. Mass disasters.

f. Bombs and other explosives. Biological and chemical warfare and barotraumas

MEDICAL JURISPRUDENCE 8 hrs

a. General & forensic toxicology including classification, mechanism of action, clinical features, diagnosis, management, autopsy appearances & medico-legal importance of poisons.

b. Introduction & working of various wings of forensic science laboratory.

Immunology, examination of biological trace material evidence

c. Definition of medical jurisprudence. Introductory remarks, criminal courts & their powers, inquests and legal procedures, procedure in court, medical evidence, various medical certificates, medico legal reports, dying declaration & dying deposition, witness, conduct and duties of the doctor in the witness box, professional secrecy.

d. Relevant parts of Indian Penal Code of criminal procedure, Indian Evidence Act

e. Supreme Court and High Court landmark judgments related to forensic medicine and medical jurisprudence

f. Day-to-day MLC problems in hospitals.

g. Value of medical opinion in the court of law.

PRACTICAL **50 hrs**

a. Medico-legal autopsy. (Demonstration)

b. Fetal Autopsy (Demonstration)

c. Oral Autopsy

d. Age estimation

e. Medico-legal injury report preparation.

f. Medico-legal examination of bones, weapons, clothing, wet specimens, poisons.

g. Medico-legal examination of photographs.

h. Medico-legal examination of X-rays.

i. Court evidence / attendance.

j. Expert opinion on clinical cases of medico legal importance.

k. Awareness of medico legal & crime laboratory instruments & equipments.

BIOSTATISTICS: **6 hrs**

1. Descriptive statistics
2. Statistical tests relevant in Forenesic analysis

Practicals

A: Clinical training

Clinical training including postings in Forensic Medicine, Oral Pathology, Prosthodontics and Oral Medicine and Radiology and Pedodontics

B: Presentation of special Forensic cases observed and diagnosed with details like : Oral autopsies conducted Radiographs,Specimen Collection- saliva, blood, oral tissues, dental pulp etc

Tissue and Specimen processing – for Histopathologic & Microscopic examination

Impression making procedures on human volunteers and subjects

C: Hands on training : Forensic archival or simulated forensic dental cases such as post-mortem comparative dental identification, post-mortem reconstructive identification, age estimation, bite mark investigation, and dental and maxillofacial injury.

D: Simulation of Mass disaster workup

E: Presentation of at least 12 seminars and 12 Journal clubs on given topics in two years

RECOMMENDED BOOKS:

1. Forensic Dental evidence, Mike Bowers, Elsevier Publ
2. Forensic Radiology, B.G.Brogdon, 2nd Ed, CRP Press, 2010
3. Forensic Radiology, B.G. Brogdon, 1st Ed, CRP Press, 1998
4. Bite Mark Evidence, Robert BJ Dorian, 1st Ed, CRP Press, 2004
5. Dental Autopsy, William E Silver, Richard R Souviron, 1st Ed, CRP Press, 2009
6. Forensic Dentistry, Senn DR and PG Simson, 2nd Ed, CRP Press, 2010
7. Forensic Photography, Sanford L Weiss, 1st Ed, Prentice Hall, 2008
8. Manual of Forensic odontology, Herschaft EE, Alder ME, Ord DK, Rawson RD & Smith ES, 4th Ed, ASFO, 2007
9. A color atlas of forensic dentistry, Whittaker DK and Mc Donald DG, 1st Ed, Mosby Yr Book, 1989
10. Digital analysis of bite mark evidence, RJ Johanson & Bowers CM
11. Forensic dentistry, PG Simson &Mertz CA, 1st Ed, CRP Press, 1997
12. Computer graphic facial reconstruction, JG Clemat, MK Marks, Elsevier,2010
13. Forensic facial reconstruction, C.Wilkinson, 1st press, Cambridge univ press, 2008
14. Forensic odontology, G Willams, Leuven Univ Press, 2000
15. Practical forensic odontology, DH Clark, Butterworth-Heinemman Publis
16. Forensic odontolgy, G Gustafson, 1st Ed, Elsevier, 1966
17. Text Book of Forensic odontology, Yadav, Globalmedik, 2010
18. Text book of Oral Pathology, Shafer, Hine and Levy, 4th,5th,6th Ed
19. Text book of Oral Pathology, Neville, Allan, Bouquot, 3rd, 4th Ed, Elsevier
20. Text book of Oral Pathology, Regezzi, Schuibba, 5th and 6th Ed, Elsevier
21. Text book of Forensic Medicine

RECOMMENDED JOURNALS:

1. International Journal of Legal Medicine
2. Journal of Forensic Sciences
3. Forensic Science international
4. Journal of Forensic and Legal Medicine
5. American Journal of Forensic Medicine and Pathology
6. Medico-Legal Update
7. Indian Journal of Forensic sciences

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